

HYDAC INTERNATIONAL



With roughly 9,000 employees worldwide, HYDAC is one of the leading suppliers in fluid technology, hydraulics, electronics, process technology, system technology and fluid engineering. With 50 overseas companies, and over 500 sales and service partners, HYDAC is your reliable expert partner worldwide.

The product range of HYDAC **ELECTRONIC** covers sensors, measurement equipment and control technology. The sensor range includes products for the measurement of pressure, temperature, distance, angle, inclination, position, level, flow rate and speed, as well as contamination and oil condition. Beyond the standard programme, products with special characteristics are supplied, such as those for applications in potentially explosive atmospheres or applications with increased functional safety requirements. Our connectivity options cover a variety of analogue and digital interfaces, such as IO-Link, CAN and HART. With its profound application expertise, HYDAC also makes for the perfect development partner for machinery.

Utilising our own sensors, controllers and displays, optimally harmonised systems can be developed and application software can be created for these systems as required.

Almost all these products are developed, manufactured and marketed by HYDAC **ELECTRONIC.** Suitability for the application is tested on HYDAC test rigs. With its high quality standards, HYDAC **ELECTRONIC** fulfils the demanding requirements for product quality.

The international HYDAC sales network provides customers with worldwide product availability, expert advice and support. An extensive service package completes our offer.



Development and manufacturing plant in Saarbrücken-Gersweiler



Slovakia



Siegert



Production



Automatic function test



HYDAC Servicenter, a complete package of services



Technical advice and training



Computer simulation of a HYDAC pressure sensor



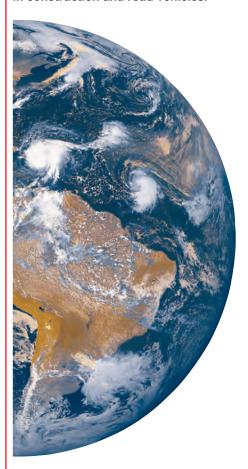
IO-Link, Industrie 4.0, functional safety

Industries and applications

There is almost no hydraulic or pneumatic medium or system that could not be monitored and controlled, quickly precisely and safely, using HYDAC measurement and control technologies.

It is not surprising, therefore, that the individually designed **HYDAC** measurement equipment is employed by well-known manufacturers and operators in all industries.

These applications range from analysis and diagnostics of operating fluids in the laboratory and on site to controlling complex industrial systems and miniaturised systems in construction and road vehicles.



Excavators

Electronic controls and sensors to complete the system electronics.

- Load limit control
- Electro-hydraulic load sensing
- Integrated operating data logging
- Controls of special equipment
- Cut-off devices
- Safety cut-off devices

Wheel Loaders

Electronic controls and sensors to complete the system electronics.

- Load limit control
- Electro-hydraulic load sensing
- Integrated operating data logging
- Controls of special equipment
- Cut-off devices
- Safety cut-off devices



Road Construction Machinery

Sensor technology and system electronics to generate modern control concepts or ready-to-install total concepts.

- Load spectra
- Condition monitoring
- Safety systems
- Load limiting
- Function controls
- Energy management



Telescopic Cranes

Sensor technology and system electronics to generate modern control concepts or ready-to-install total concepts.

- Load torque limiting
- Load spectra
- Load sensing
- Load limit control
- Energy management
- Condition monitoring



Municipal Machines

Sensors, system electronics and condition monitoring.

- Working hydraulics
- Axle suspension systems
- Cab suspension systems
- Levelling systems



Tractors

Sensors, system electronics and condition monitoring.

- Cab suspension
- Central hydraulics
- Front axle suspension
- Transmission shift control
- Level control
- Anti-roll stabilisation



Agricultural Technology

Electronic controls and sensors to complete the system electronics.

- Load limit control
- Electro-hydraulic load sensing
- Integrated operating data logging
- Controls of special equipment
- Cut-off devices
- Safety cut-off devices



Mining

Electronic measurement technology for underground applications.

- Pump station / media supply
- Mining of raw materials
- Heading
- Material-handling and passenger transportation
- Analysis and diagnostics
- Condition monitoring



Iron - Steel - Metal

Measuring technology and electronics.

- Pump stations
- Valve stations
- Accumulator stations
- Heat exchangers
- Condition monitoring



Sensors, system electronics and condition monitoring.

Aviation and Aerospace Industry

- Rocket test rigs
- Test rigs for aircraft hydraulics
- Satellite test rigs
- Flight simulators



Wind Turbines

Sensors, system electronics and condition monitoring.

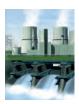
- Condition monitoring of hydraulic and lubrication oils
- Measurement technology
- Safety and yaw brakes
- Pitch control
- Performance testing stations for transmission systems



Machine Tools

Sensors, system electronics and condition monitoring.

- Hydraulic weight counter-balance
- Hydrostatic slide bearing
- Pressure boost station
- Central processing of cooling lubricants
- Tool clamping device



Power Plant Technology

Sensors, system electronics and condition monitoring.

- Condition monitoring of hydraulic and lubrication oils
- Hydraulic drive and control systems including electronic controls



Pulp and Paper Industry

Sensors, system electronics and condition monitoring.



Transformers

Measuring technology, electronics and condition moni-

- Insulating oil conditioning
- Insulating oil monitoring
- Cooling



Automotive Production

Measurement technology and condition monitoring for machine tools and presses, Cooling lubricant supply and test rigs.



Oil and Gas Industry

Sensors, system electronics and condition monitoring for offshore, subsea or onshore applications.



Shipping

Measuring technology, electronics and condition monitoring for:

- Engines
- Control of motion sequences
- Rudder gear/propeller
- Ballast water treatment
- Deck superstructures



Condition Monitoring

Data logging and interpretation providing information on the condition of machines, systems and their components.

OVERVIEW OF SECTIONS 1 PRESSURE TRANSMITTERS **2 PRESSURE SWITCHES TEMPERATURE TRANSMITTERS TEMPERATURE SWITCHES** SENSORS FOR DISTANCE AND POSITION LEVEL SENSORS FLOW RATE TRANSMITTERS / FLOW SWITCHES SPEED SENSORS **ANGLE SENSORS INCLINOMETERS** 10 10 **CONDITION MONITORING PRODUCTS** 11 **MEASURING INSTRUMENTS AND DISPLAY UNITS** 12 13 ACCESSORIES 13 A detailed table of contents is given on the following pages.

NOTE

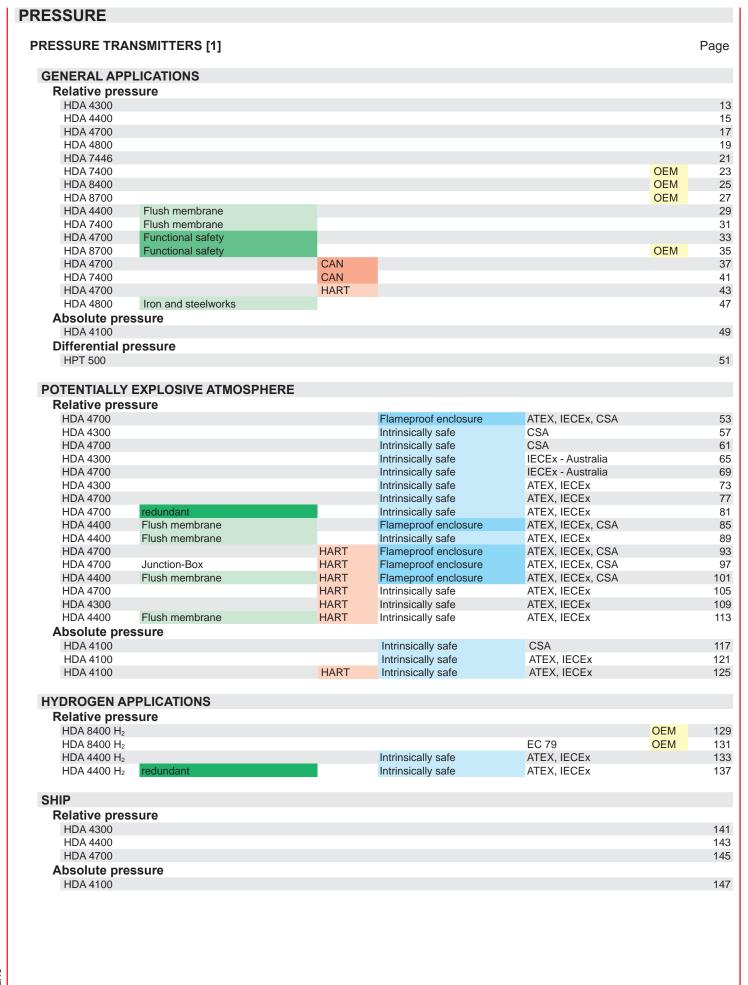
The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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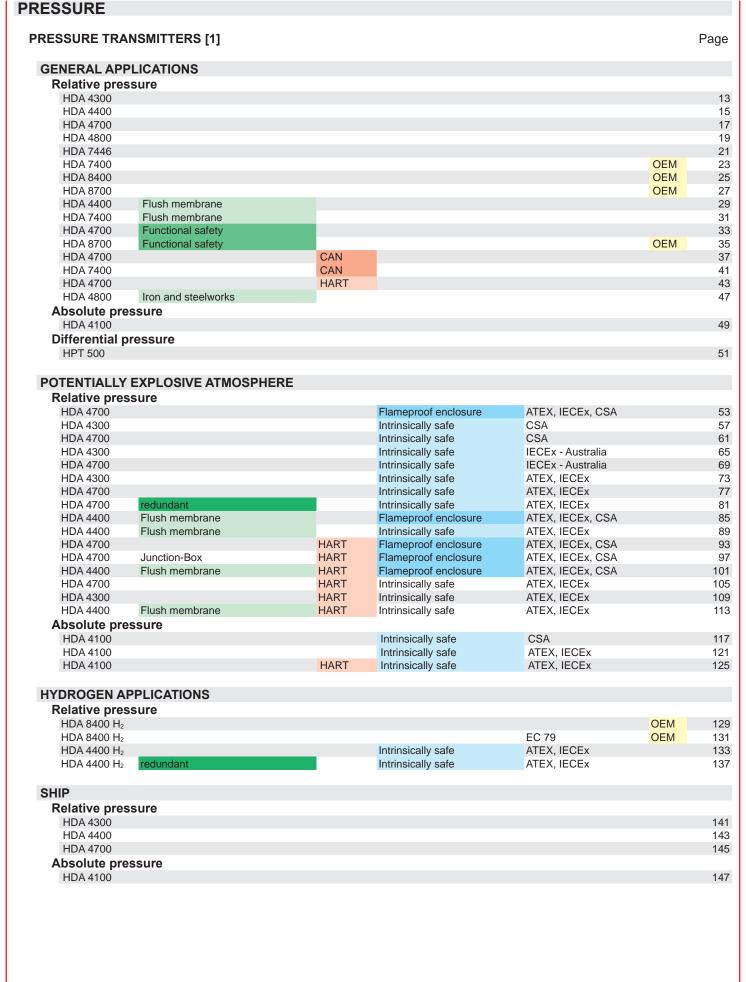
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HLT 1100-R2		Analogue	Rod	for full integration		2
HLT 1100-R2		CAN	Rod	for full integration		2
HLT 2100-R1		Analogue	Rod	for partial integration		2
HLT 2100-R1		CAN	Rod	for partial integration		2
HLT 2100-R1		Profibus	Rod	for partial integration		2
HLT 2100-R1		SSI	Rod	for partial integration		2
HLT 2100-R1		EtherCAT	Rod	for partial integration		2
HLT 2150-R1		Analogue	Rod	for partial integration		2
HLT 2150-R1		CAN	Rod	for partial integration		- 2
HLT 2150-R1		SSI	Rod	for partial integration		- 1
HLT 2102/3	Double / triple redundancy	Analogue	Rod	for partial integration		;
HLT 1100-R2	Functional safety	Analogue	Rod	for full integration		;
HLT 1100-R2	Functional safety	CAN	Rod	for full integration		;
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HLT 2500-L2		CAN Profibus	Profile Profile			
HLT 2500-L2		SSI	Profile			
HLT 2500-L2		EtherCAT	Profile			;
HLT 2550-L2		Analogue	Profile			
HLT 2550-L2		CAN	Profile			
HLT 2550-L2		SSI	Profile			
HLT 2500-F1		Analogue	Flat housing			
HLT 2500-F1		CAN	Flat housing			
HLT 2500-F1		Profibus	Flat housing			
HLT 2500-F1		SSI	Flat housing			
HLT 2500-F1		EtherCAT	Flat housing			,
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POSITION						
Ultrasound						
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HLS 100	Functional safety					
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YDAC INTERNATIONAL



Pressure Transmitter HDA 4300

Relative pressure

Accuracy 0.5 %



Description:

The pressure transmitter series HDA 4300 is equipped with a ceramic pressure measurement cell with thick-layer strain gauge, which was specially developed for relative pressure measurement in the lowpressure range.

The output signals 4 .. 20 mA or 0 .. 10 V allow connection of all HYDAC **ELECTRONIC GMBH measurement and** control devices as well as industry standard open- and closed-loop control instruments.

The main fields of application are lowpressure applications in hydraulics and pneumatics, particularly in refrigeration and air-conditioning technology and pharmaceutical industries.

Technical data:

Input data

iliput uata	,											-1 9			
Measuring ranges	bar	1	2.5	4											
Overload pressures	bar	3	8	12	20	32	50	80	120	3	20	32			
Burst pressure	bar	5	12	18	3 3 13 12 13 13 1										
Mechanical connection	1				G1/4 A ISO 1179-2 G1/2 B DIN-EN 837										
Tightening torque, reco	ommer	nded			20 Nm (G1/4); 45 Nm (G1/2)										
Parts in contact with flu					Mech.					steel					
		Sensor cell: Ceramic Seal: Copper (G1/2) / FKM / EPDM (as per model code)													
Output data					(as pe	i iiioue	er cou	e)							
Output signal, permitte	d load	rocio	tance		4 20	mΔ 2	-conc	luctor							
Output signal, permitte	u loau	16313	itarice		R _{Lmax} = 0 10 R _{Lmin} =	= (U _B - V, 3-c	8 V)	/ 20 n	nA [kΩ	Σ]					
Accuracy acc. to DIN 1	6086,				≤ ± 0.5	% FS	typ.								
terminal based					≤ ± 1 %						-				
Accuracy, B.F.S.L.					$\leq \pm 0.2$										
	-4:				$\leq \pm 0.5$										
Temperature compens Zero point					$\leq \pm 0.0$ $\leq \pm 0.0$)3 % F	S/°C	max							
Temperature compens Span	ation				≤ ± 0.0 ≤ ± 0.0)2 % F)3 % F	S / °C S / °C	typ. max							
Non-linearity acc. to Diterminal based	IN 160	86,			≤ ± 0.5 % FS max.										
Hysteresis					≤ ± 0.4 % FS max.										
Repeatability					≤±0.1 % FS										
Rise time					≤ 1 ms										
Long-term drift					≤ ± 0.3	3 % FS	typ.	/ year							
Environmental condi															
Compensated tempera	ature ra	ange			-25	+85 °C									
Operating temperature	range	;			-25										
Storage temperature ra	ange				-40	+100 °	С								
Medium temperature ra	ange ¹⁾				-40	+100 °	C / -2	5 +′	100 °C	;					
(€ mark					EN 61000-6-1 / 2 / 3 / 4										
。¶¹us mark²)					Certificate no.: E318391										
Vibration resistance ac DIN EN 60068-2-6 at 1		00 Hz			≤ 20 g										
Shock resistance acc. t				2-29	≤ 100 g / 6 ms										
Protection class acc. to	DIN I	EN 60)529 ³⁾		IP 65 (IP 67 -	M12x	1 ma	e con		r 5301-80	3				
Other data															
Supply voltage					8 30 12 3										
when applied acc. to U	IL spec	cificat	ions		- limite UL 13	d ene	gy - a	acc. to	9.3 L		0; Class	2;			
Residual ripple of supp	ly volt	age			≤ 5 %										
Current consumption					≤ 25 m										
Life expectancy					> 10 m		cycles	, 0	100 %	FS					
Weight					~ 150 g										
Note: Reverse polari protection are FS (Full Scale	provid	ed.						voltaç	ge, ov	erride a	nd short	circuit			

FS (Full Scale) = relative to complete measuring range

- B.F.S.L. = Best Fit Straight Line

 1) -25 °C with FKM or EPDM seal, -40 °C on request
 2) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1 3) With mounted mating connector in corresponding protection class

HDA 4 3 X X - X - XXXX - 000 - X1

Mechanical connection

- = G1/2 B DIN-EN 837 = G1/4 A ISO 1179-2

Electrical connection

- = male, 4 pole Binder series 714 M18 (mating connector not supplied)
- = male, 3 pole + PE, DIN EN175301-803 (mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor = 0 .. 10 V, 3-conductor

Measuring ranges in bar

01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040 0001 (-1 .. 1); 0005 (-1 .. 5); 0009 (-1 .. 9)

Modification number

000 = standard

Sealing material (in contact with fluid)

= FKM seal (e.g. for hydraulic oils) = EPDM seal (e.g. for refrigerants)

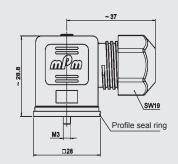
Connection material (in contact with fluid)

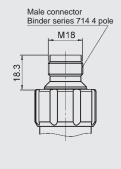
= stainless steel

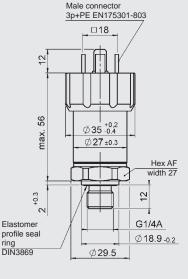
Accessories:

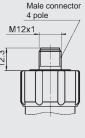
Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

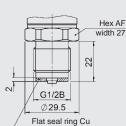
Dimensions:











Pin connections:

Binder series 714 M18



HDA 43X4-A	HDA 43X4-B	
n.c.	+U _B	
Signal +	Signal	
Signal -	0 V	
n.c.	n.c.	
	n.c. Signal + Signal -	n.c. +U _B Signal + Signal Signal - 0 V

EN175301-803



Pin	HDA 43X5-A	HDA 43X5-B	
1	Signal +	+U _B	
2	Signal -	0 V	
3	n.c.	Signal	
工	Housing	Housing	

M12x1



Pin	HDA 43X6-A	HDA 43X6-B	
1	Signal +	+U _B	
2	n.c.	n.c.	
3	Signal -	0 V	
4	n.c.	Signal	

Note:

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YDAC INTERNATIONAL



Pressure Transmitter HDA 4400

Relative pressure

Accuracy 0.5 %



Description:

The pressure transmitter series HDA 4400 has a pressure measurement cell with thin-film strain gauge on a stainless steel membrane.

The output signals 4 .. 20 mA or 0 .. 10 V enable connection to all measurement and control devices of HYDAC ELECTRONIC GMBH as well as standard evaluation systems (e.g. PLC controls).

The main fields of application are in mobile or industrial hydraulics and pneumatics.

Technical data:

Input data

input uata														
Measuring ranges	bar	16	40	60										
Overload pressures	bar	32	80	120										
Burst pressure	bar	200	200	300										
Mechanical connection					G1/4 A ISO 1179-2 G1/2 B DIN EN 837									
Tightening torque, recomm	iende	d		2	20 Nm	(G1/4)	; 45 Nn	n (G1/2	2)					
Parts in contact with fluid	Parts in contact with fluid							tainless	steel					
Output data														
Output signal, permitted lo	ad res	sistance	e	F ($R_{Lmax} =$	(U _B - 8 V, 3-co	conduc 3 V) / 20 nducto	0 mA [k	Ω]					
Accuracy acc. to DIN 1608 terminal based	6,			<u> </u>	≤ ± 0.5 ≤ ± 1 %	FS m	áx.							
Accuracy, B.F.S.L.				<u> </u>	≤ ± 0.29 ≤ ± 0.5	% FS	max.							
Temperature compensation Zero point	า				$\leq \pm 0.02$	25 % F	S/°C	max.						
Temperature compensation Span				5	≤ ± 0.02	25 % F	S/°C	typ. max.						
Non-linearity acc. to DIN 1 terminal based	6086,	·		<u> </u>	≤ ± 0.3	% FS	max.							
Hysteresis				<u> </u>	≤ ± 0.4 % FS max.									
Repeatability					≤ ± 0.1 % FS									
Rise time					≤ 1 ms									
Long-term drift					≤ ± 0.3	% FS	typ./ye	ear						
Environmental condition														
Compensated temperature		e			25 +									
Operating temperature ran					25 +									
Storage temperature range					-40 +100 °C									
Medium temperature range))				-40 +100 °C / -25 +100 °C									
(mark					EN 61000-6-1 / 2 / 3 / 4									
c Mus mark ²⁾					Certificate no.: E318391									
Vibration resistance acc. to DIN EN 60068-2-6 at 10	500 F				≤ 20 g									
Shock resistance acc. to D					≤ 100 g									
Protection class acc. to DII	N EN	60529	3)		IP 65 (Binder 714 M18) IP 67 - M12x1 male connector - Male connector EN175301-803									
Other data														
Supply voltage					8 30 V DC 2-conductor 12 30 V DC 3-conductor									
when applied acc. to UL sp	ecific	ations			- limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950									
Residual ripple of supply v	oltage	€		5	≤ 5 %									
Current consumption					≤ 25 mA									
Life expectancy ⁴⁾				(> 10 million cycles 0 100 % FS									
Weight					~ 150 g									
Note: Reverse polarity p	rotec	tion of t	he sup				oltage,	, overri	de and	short o	circuit			

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS_(Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

- 1) -25 °C with FKM seal, -40 °C on request 2) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1

3) With mounted mating connector in corresponding protection class
4) Measuring ranges ≥ 1000 bar: > 1 million cycles (0 .. 100 % FS)



Mechanical connection

- = G1/2 B DIN EN 837 (only for pressure ranges "1600 and 2000 bar")
- = G1/4 A ISO 1179-2 (male)

Electrical connection

- = male, 4 pole Binder series 714 M18 (mating connector not supplied) = male, 3 pole + PE, EN175301-803
- 5 (mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

- = 4 .. 20 mA, 2-conductor
- = 0 .. 10 V, 3-conductor

Measuring ranges in bar

016; 040; 060; 100; 250; 400; 600; 1000 1600; 2000 bar (only with mech. connection code "1")

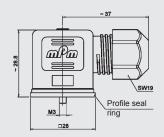
Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

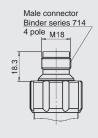
Dimensions:

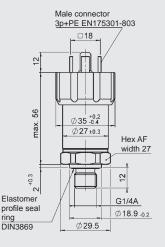


Male connector

4 pole

M12x1







Pin connections:

Binder series 714 M18

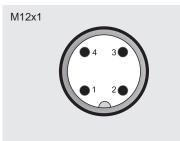


Pin	HDA 44X4-A	HDA 44X4-B	
1	n.c.	+U _B	
2	Signal +	Signal	
3	Signal -	0 V	
4	n.c.	n.c.	

EN175301-803



Pin	HDA 44X5-A	HDA 44X5-B	
1	Signal +	+U _B	
2	Signal -	0 V	
3	n.c.	Signal	
<u> </u>	Housing	Housing	



HDA 44X6-A	HDA 44X6-B	
Signal +	+U _B	
n.c.	n.c.	
Signal -	0 V	
n.c.	Signal	
	Signal + n.c. Signal -	Signal + +U _B n.c. n.c. Signal - 0 V

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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YDAC INTERNATIONAL



Pressure Transmitter HDA 4700

Relative pressure

Accuracy 0.25 %



Description:

The pressure transmitter series HDA 4700 has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

The output signals 4 \dots 20 mA or 0 \dots 10 V enable connection to all measurement and control devices of HYDAC ELECTRONIC GMBH as well as standard evaluation systems (e.g. PLC controls).

The main fields of application are in mobile and industrial hydraulics and pneumatics.

Technical data:

Input data

input uata														
Measuring ranges	bar	6	16	40	60	100	250	400			1600	_		
Overload pressures	bar	15	32	80	120	200	500				2400	-		
Burst pressure	bar	100	200	200	300		1000	2000	2000	3000	3000	4000		
Mechanical connection					G1/4 A ISO 1179-2 G1/2 B DIN EN 837									
Tightening torque, reco	mmen	ded			20 Nm	(G1/4); 45 N	m (G1	/2)					
Parts in contact with flu		Mech. Seal: F		ection:	Stainle	ess ste	el							
Output data														
Output signal, permitted load resistance						(U _R - 8	-conduct	0 mA	[kΩ]					
Accuracy acc. to DIN 1 terminal based	6086,				≤ ± 0.2 ≤ ± 0.5	% FS	máx.							
Accuracy, B.F.S.L.					≤ ± 0.1 ≤ ± 0.2									
Temperature compensa Zero point	ation				≤ ± 0.0 ≤ ± 0.0	08 % I 15 % I	FS/°C FS/°C	typ. max.						
Temperature compensa Span	ation				≤ ± 0.0 ≤ ± 0.0	15 % I	FS / °C							
Non-linearity acc. to DII terminal based	N 1608	36,			≤ ± 0.3	% FS	max.							
Hysteresis					≤ ± 0.1									
Repeatability					≤±0.05 % FS									
Rise time					≤ 1 ms									
Long-term drift					≤ ± 0.1	% FS	typ./	/ear						
Environmental condit														
Compensated tempera					-25 +									
Operating temperature		1)			-40 +			+85 °	<u> </u>					
Storage temperature ra					-40 +									
Medium temperature ra	inge ¹⁾				-40 +				0 °C					
(€ mark					EN 61000-6-1 / 2 / 3 / 4									
mark ²⁾					Certificate no.: E318391									
Vibration resistance acc	0 50	0 Hz			≤ 20 g									
Shock resistance acc. t DIN EN 60068-2-29					≤ 100 (
Protection class acc. to	DIN E	N 6052	29 ³⁾		IP 65 (IP 67 - -	M12x		conne		1-803				
Other data														
Supply voltage							2-con							
when applied acc. to U	L spec	ification	าร		12 30 - limite UL 131	0 V DC d ener 0/158	3-con gy - ac 5; LPS	ductor c. to 9 UL 60	.3 UL 6 1950	31010;	Class	2;		
Residual ripple of supp	ly volta	age			≤5%									
Current consumption					≤ 25 m	A								
Life expectancy ⁴⁾					> 10 million cycles, 0 100 % FS									
Weight					~ 150	g								
Note: Reverse polarity	/ prote	ction o	f the si	upply	voltage	e, exce	ss volt	age, o	verride	and s	hort ci	rcuit		

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

- 1) -25 °C with FKM seal, -40 °C on request 2) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1
- 3) With mounted mating connector in corresponding protection class 4) Measuring ranges ≥ 1000 bar: > 1 million cycles (0 .. 100 % FS)

HDA 4 7 \times \times - \times - \times - \times - \times

Mechanical connection

- = G1/2 B DIN EN 837
 - (only for pressure ranges "1600; 2000 bar")
- = G1/4 A ISO 1179-2

Electrical connection

- = male, 4 pole Binder series 714 M18 (mating connector not supplied)
- = male, 3 pole + PE, EN175301-803
- (mating connector supplied)
- 6 = male M12x1, 4 pole
 - (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor

= 0 .. 10 V, 3-conductor

Measuring ranges in bar 006; 016; 040; 060; 100; 250; 400; 600; 1000

1600; 2000 bar (only with mech. connection code "1")

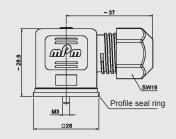
Modification number

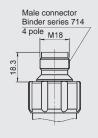
000 = standard

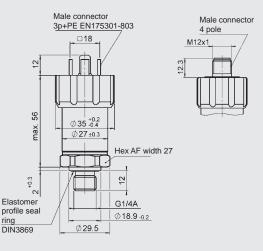
Accessories:

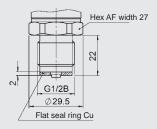
Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Dimensions:









Pin connections:

Binder series 714 M18

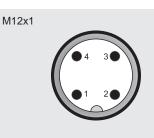


Pin	HDA 47X4-A	HDA 47X4-B	
1	n.c.	+U _B	
2	Signal +	Signal	
3	Signal -	0 V	
4	n.c.	n.c.	





Pin	HDA 47X5-A	HDA 47X5-B	
1	Signal +	+U _B	
2	Signal -	0 V	
3	n.c.	Signal	
<u></u>	Housing	Housing	



Pin	HDA 47X6-A	HDA 47X6-B
1	Signal +	+U _B
2	n.c.	n.c.
3	Signal -	0 V
4	n.c.	Signal

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAC INTERNATIONAL



Pressure Transmitter HDA 4800

Relative pressure

Accuracy 0.125 %



Description:

The pressure transmitter series HDA 4800 has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Outstanding technical data and robust construction make the HDA 4800 particularly suited to the field of test rig and diagnostic technology. It is also suitable for a broad range of applications in industry.

Since the accuracy of a pressure transmitter varies greatly with the temperature of the fluid, the instrument has excellent characteristics in this respect. By default, the output signals 4 .. 20 mA, 0 .. 10 V and 0 .. 20 mA (source) are available.

Technical data:

Input data

Measuring ranges	bar	6	16	40	60	100	250	400	600	1000	1600	2000
Overload pressures	bar	15	32	80	120	200	500				 	3000
Burst pressure	bar	100	200	200	300	500	1000	2000	2000	3000	3000	4000
Mechanical connection			·	(G1/4 A G1/2 E	ISO 1	179-2 EN 837	7				
Tightening torque, recor	nmend	led); 45 N		[/2]			
Parts in contact with flui						conne	, .		ess ste	el		
Output data												
Output signal, permitted load resistance					420 mA, 2-conductor $R_{L_{max}} = (U_B - 10 \text{ V}) / 20$ mA $[kΩ]$ 010 V , 3-conductor $R_{L_{min}} = 2 \text{ k}Ω$ 020 mA, 3-conductor source							
Accuracy acc. to DIN 16	3086						FS tvp		[kΩ]			
terminal based				:	$\leq \pm 0.2$	5 % F	S máx	· -				
Accuracy, B.F.S.L.						25 %	FS ma					
Temperature compensa Zero point	tion 			:	$\leq \pm 0.0$	11 % F	FS / °C S / °C	max.				
Temperature compensa Span	tion			:	≤ ± 0.0 ≤ ± 0.0	05 % 1 % F	FS / °C S / °C	C typ. max.				
Non-linearity acc. to DIN terminal based	N 1608	6,		:	≤ ± 0.1	5 % F	S max					
Hysteresis					≤ ± 0.1 % FS max.							
Repeatability					≤ ± 0.05 % FS							
Rise time				:	≤ 1 ms							
Long-term drift				:	≤ ± 0.1 % FS typ. / year							
Environmental conditi												
Compensated temperat					-25 +							
Operating temperature							/ -25 .	. +85°	C			
Storage temperature rai					-40 +							
Medium temperature ra	nge¹)				-40 +100 °C / -25 +100 °C							
(€ mark					EN 61000-6-1 / 2 / 3 / 4							
c 👊 📆 mark²)				(Certificate no.: E318391							
Vibration resistance acc DIN EN 60068-2-6 at 10		Hz		:	≤ 20 g							
Shock resistance acc. to DIN EN 60068-2-29)			:	≤ 100 (g / 6 m	IS					
Protection class acc. to	DIN EI	N 6052	.9 ³⁾		IP 67 -	M12x	· 714 N 1 male conne	conne	ector N1753	01-803	3	
Other data												
Supply voltage when applied acc. to UL	specif	ication	s		10 30 12 30 - limite	0 V DO	2-cor 3-cor	nducto nducto	r r 9.3 UI	61010) Class	s 2·
					- limited energy - acc. to 9.3 UL 61010 Class 2; UL 1310/1585; LPS UL 60950							
Residual ripple of supply	y volta	<u>je</u>			≤ 5 % ≤ 25 m	. ^						
Current consumption							v (alaa	0 10	00 0/ E	<u> </u>		
Life expectancy ⁴⁾							ycies,	0 10	00 % F	<u>s</u>		
Weight Note: Reverse polarit	ı nrot-	otion -	f tha =		~ 150 g		00 1/5 1/	000 -		o o o o o o	abort:	oirouit
Note: Reverse polarity protection are professional profes	rovide = relati	d. ive to d						age, 0	vema	e and s	511011	JICUIL

B.F.S.L. = Best Fit Straight Line

- b.r.s.t. = Best Fit Straight Line
 1) -25 °C with FKM seal, -40 °C on request
 2 Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1
 3 With mounted mating connector in corresponding protection class
 4 Measuring ranges ≥ 1000 bar: > 1 million cycles (0 .. 100 % FS)

HDA 4 8 X X - X - XXX - 000

Mechanical connection

- = G1/2 B DIN EN 837
 - (only for pressure ranges "1600; 2000 bar")
- = G1/4 A ISO 1179-2

Electrical connection

- = male, 4 pole Binder series 714 M18 (mating connector not supplied)
- = male, 3 pole + PE, EN175301-803 (mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

- = 4 .. 20 mA, 2-conductor
- = 0 .. 10 V, 3-conductor
- = 0 .. 20 mA, 3-conductor (source)

Measuring ranges in bar

006, 016; 040; 060; 100; 250; 400; 600; 1000

1600; 2000 bar (only with mech. connection code "1")

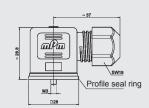
Modification number

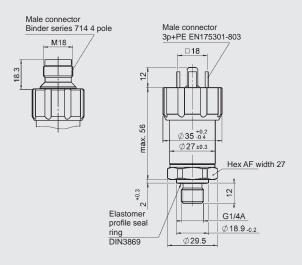
000 = standard

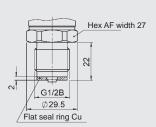
Accessories:

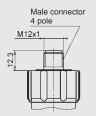
Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Dimensions:









Pin connections:

Binder series 714 M18

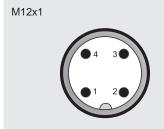


Pin	HDA 48X4-A	HDA 48X4-B	HDA 48X4-E
1	n.c.	+U _B	+U _B
2	Signal +	Signal	Signal
3	Signal -	0 V	0 V
4	n.c.	n.c.	n.c.

EN175301-803



Pin	HDA 48X5-A	HDA 48X5-B	HDA 48X5-E
1	Signal +	+U _B	+U _B
2	Signal -	0 V	0 V
3	n.c.	Signal	Signal
工	Housing	Housing	Housing



Pin	HDA 48X6-A	HDA 48X6-B	HDA 48X6-E
1	Signal +	+U _B	+U _B
2	n.c	n.c	n.c
3	Signal -	0 V	0 V
4	n.c	Signal	Signal

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAC INTERNATIONAL



Pressure Transmitter HDA 7446

Relative pressure

Accuracy 0.5 %



Description:

The pressure transmitter series HDA 7400 combines excellent technical data with highly compact design.

The HDA 7446 was specifically developed for OEM applications, especially for use in confined cavities. A sensor cell with a thin-film strain gauge on a stainless steel membrane is the basis for a robust, long-life pressure transmitter.

Various pressure ranges between 0 .. 40 bar and 0 .. 1000 bar provide versatility when adapting to particular applications.

For integration into controls (e.g. with PLC), the analogue output signals 4 .. 20 mA or 0 .. 10 V are available on the standard

Other measuring ranges and output signals can be provided on request.

Technical data:

Input data

mput uutu				_								
Measuring ranges	bar	40	60	100	250	400	600	1000				
Overload pressures	bar	80	120	200	500	800	1000	1600				
Burst pressure	bar	200	300	500	1000							
Mechanical connection				G1/4 A ISO 1179-2								
Tightening torque, reco		ed		20 Nm								
Parts in contact with fi	luid			Mech. coi Seal: FKN	nnection: S	Stainless	steel 					
Output data												
Output signal, permitte	$R_{Lmax} = (U$	A, 2-condu _B - 8 V) / 2 3-conduct Ω	20 mA [ks)]								
Accuracy acc. to DIN 1	16086,			≤ ± 0.5 %	FS typ.							
terminal based				≤±1%F								
Accuracy, B.F.S.L.				$\leq \pm 0.25 \%$ $\leq \pm 0.5 \%$								
Temperature compens	ation			≤ ± 0.015	% FS / °C	typ.		-				
Zero point	- 0				% FS / °C							
Temperature compens Span	ation			$\leq \pm 0.015$ $\leq \pm 0.025$	% FS / °C % FS / °C	typ. max.						
Non-linearity acc. to D	IN 16086	,		≤ ± 0.3 %	FS max.							
terminal based				≤±0.4 % FS max.								
Hysteresis Repeatability				≤±0.1 % FS								
Rise time				≤ 2 ms								
Long-term drift					EC tup /	/oor						
Environmental condi	tions			≤±0.3 % FS typ. / year								
Compensated tempera		70		-25 +85 °C								
Operating temperature		JC		-25 +65 °C -40 +85 °C / -25 +85 °C								
Storage temperature ra				-40 +65 C7-25 +65 C								
Medium temperature r				-40 +100 °C -40 +100 °C / -25 +100 °C								
(€ mark	ange			EN 61000-6-1 / 2 / 3 / 4								
mark ²⁾				Certificate no.: E318391								
Vibration resistance ad	cc. to			≤ 20 g	, 110 LOTO	JJJ 1						
DIN EN 60068-2-6 at 1 Shock resistance acc. to			7	< 100 a //	- ma							
			/	≤ 100 g / 6	5 1118							
Protection class acc. to Other data	DIN EN	605299		IP 67								
				0 20 1/	DC 2-con	duotor						
Supply voltage				12 30 V	DC 3-con	ductor						
when applied acc. to U		- limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950										
Residual ripple of supp	oly voltag	е		≤ 5 %								
Current consumption				≤ 25 mA								
Life expectancy4)				> 10 million cycles 0 100 % FS								
Weight				~ 60 g								
Note: Reverse pola	rity prote	ction of the	e supply	voltage, ex	cess volta	age, over	ride and s	hort				

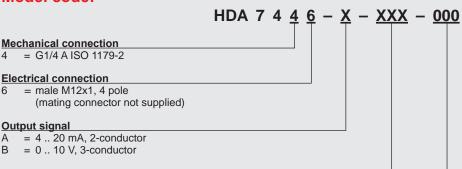
circuit protection are provided.

FS (Full Scale) = relative to complete measuring range B.F.S.L. = Best Fit Straight Line

1) -25 °C with FKM seal, -40 °C on request

²⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1

3) With mounted mating connector in corresponding protection class 4) Measuring range 1000 bar: > 1 million cycles (0 .. 100 % FS)



Measuring ranges in bar 040; 060; 100; 250; 400; 600; 1000

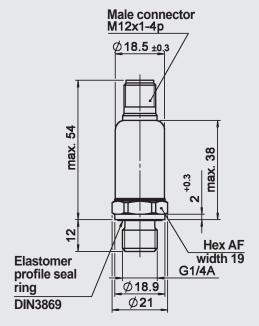
Modification number

000 = standard

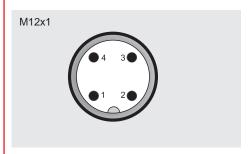
Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Dimensions:



Pin connections:



Pin	HDA 7446-A	HDA 7446-B	
1	Signal +	+U _B	
2	n.c.	n.c.	
3	Signal -	0 V	
4	n.c.	Signal	

Note:

The information in this brochure relates to the operating conditions and applications

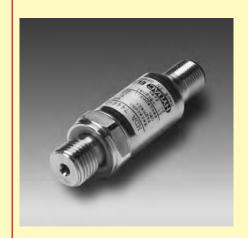
For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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YDAC INTERNATIONAL



Pressure Transmitter HDA 7400 for series applications

Relative pressure

Accuracy 0.5 %

Customised designs thanks to diverse electrical and mechanical connections and a large number of output signals



Description:

The pressure transmitter series HDA 7400 combines excellent technical data with highly compact design.

The HDA 7400 was specifically developed for OEM applications e.g. in mobile applications. A sensor cell with a thin-film strain gauge on a stainless steel membrane is the basis for a robust, long-life pressure transmitter.

Various pressure ranges between 0 .. 40 bar and 0 .. 1000 bar provide versatility when adapting to particular applications.

For integration into modern controls (e.g. with PLC), standard analogue output signals are available.

Technical data:

Input data

Measuring ranges	bar	40	60	100	160	250	400	600	1000			
Overload pressures	bar	80	120	200	320	500	800	1000	1600			
Burst pressure	bar	200	300	500	800	1250	2000	2000	3000			
Mechanical connection				G1/4 A ISO 1179-2								
Tightening torque, recon	nmended			20 Nm								
Parts in contact with fluid		Mech. co Seal: FK		n: Stainl	ess steel	l						
Output data												
Output signal ¹⁾				e.g.: 4 0.5 4.5 0 10 V	5 V, 1 6							
Accuracy acc. to DIN 16 terminal based	086,			≤ ± 0.5 % ≤ ± 1 %								
Accuracy, B.F.S.L.				≤ ± 0.25 ≤ ± 0.5 %	% FS má	X.						
Temperature compensations Zero point / span	tion			≤ ± 0.01 ≤ ± 0.02			-					
Non-linearity acc. to DIN terminal based	I 16086,			≤ ± 0.3 %	% FS ma	х.						
Hysteresis				≤±0.4%	% FS ma	X.						
Repeatability				≤±0.1 % FS								
Rise time				≤ 2 ms								
Long-term drift				≤ ± 0.3 % FS typ. / year								
Environmental condition	ons											
Compensated temperation)		-25 +8								
Operating temperature r				-40 +8		5 +85	°C					
Storage temperature ran				-40 +1								
Medium temperature rar	nge ²⁾			-40 +100 °C / -25 +100 °C								
				EN 6100								
mark ³⁾				Certifica	te no.: E	318391						
Vibration resistance acc DIN EN 60068-2-6 at 10				≤ 20 g								
Shock resistance acc. to [DIN EN 60	068-2-27		≤ 100 g								
Protection class acc. to	DIN EN 60)529 		IP 65 / IF (depend		ectrical	connecti	on)				
Other data												
Electrical connection ¹⁾				e.g. M12	2x1 (4 pc	le); jack	eted cab	le				
Supply voltage		12 30		conducto	or							
when applied acc. to UL		- limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950										
Residual ripple of supply voltage ≤ 5 %												
Current consumption				≤ 25 mA								
Life expectancy ⁴⁾					ion cycle	es, 0 1	00 % FS					
Weight				~ 60 g								
Note: Reverse polarity	/ protectio	n of the	supply v	oltage, e	xcess vo	oltage, o	verride a	ind short	circuit			

protection are provided.

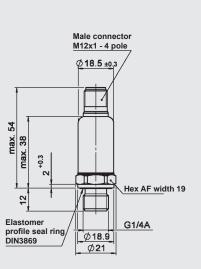
FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

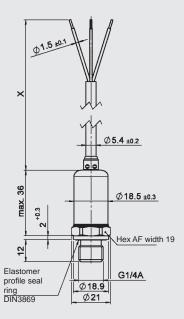
- $^{1)}$ Other versions available on request $^{2)}$ -25 $^{\circ}\text{C}$ with FKM seal, -40 $^{\circ}\text{C}$ on request
- ³⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1 ⁴⁾ Measuring range 1000 bar: ≥ 1 million cycles (0 .. 100 % FS)

EN 18.349.3/02.18

Dimensions (examples):

Cable screen and core ends are twisted & tinned





Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

Ordering Details:

The electronic pressure transmitter HDA 7400 has been specially developed for OEM customers and is available for minimum order quantities of 100 units per type.

For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

HYDAC ELECTRONIC GMBH

Hauptstraße 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01

Fax +49 (0)6897 509-1726 E-mail: electronic@hydac.com Internet: www.hydac.com

DAC INTERNATIONAL



Pressure Transmitter HDA 8400 for series applications

Relative pressure

Accuracy 0.5 %

Customised designs thanks to diverse electrical and mechanical connections and a large number of output signals



Description:

The pressure transmitter series HDA 8400 has been specifically developed for the OEM market, e.g. in mobile applications. Like most of our pressure transmitter series, the HDA 8400 is based on a robust and long-life thin-film sensor.

All of the parts in contact with the fluid (sensor and pressure port) are made of stainless steel and are welded together with one another. This means that there are no sealing points in the interior of the sensor. The possibility of leakage is excluded.

The pressure transmitters are available in various pressure ranges from 0 .. 40 bar up to 0 .. 600 bar.

For integration into modern controls standard analogue output signals are available, e.g. 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V or 0 .. 10 V. Ratiometric output signals are also available.

A variety of connection plugs integrated in the device and diverse cable solutions are available for the electrical connection.

A basic accuracy of ≤ ± 0.5% FS typical, combined with a small temperature drift, ensures a broad range of applications for the HDA 8400.

Technical data:

Input data

Measuring ranges	bar	40	60	100	160	250	400	600			
Overload pressures	bar	80	120	200	320	500	800	1000			
Burst pressure	bar	200	300	500 800 1250 2000 2000							
Mechanical connection Parts in contact with flui		Various the G1/4 A ISO M14x1.5 SAE 6, 9/1 Mech. con	0 1179-2 6-18 UNF nection: Si	2A	eel						
0.4.1.4	Seal: FKM										
Output data				\/amiaa.air							
Output signal				Various sig 4 20 mA ratiometric (10 90 %	, 0 5 V, 1 : 0.5 4.5	V for $\dot{U}_B =$					
Accuracy acc. to DIN 16 terminal based	6086,			≤ ± 0.5 % ≤ ± 1 % FS	FS typ.						
Accuracy, B.F.S.L.				≤ ± 0.25 % ≤ ± 0.5 %	FS max.						
Temperature compensa Zero point / span				≤ ± 0.015 ° ≤ ± 0.025 °	% FS / °C	typ. max.					
Non-linearity acc. to DIN terminal based	N 16086,			≤ ± 0.3 %							
Hysteresis				≤ ± 0.4 %							
Repeatability				≤ ± 0.1 %	FS						
Rise time				≤ 1.5 ms							
Long-term drift				≤ ± 0.3 % FS typ. / year							
Environmental conditi				25 ±05	°C						
Compensated temperature in Operating temperature in Compensated in Compensa				-25 +85 °C -40 +100 °C / -25 +100 °C							
Storage temperature rai				-40 +100 °C 7 -25 +100 °C							
Medium temperature rai				-40 +100 °C -40 +125 °C / -25 +125 °C							
(f mark	ige -										
CM us mark ³⁾				EN 61000-6-1 / 2 / 3 / 4 Certificate no.: E318391							
(E ₃) mark				E13*10R00*10R03*3969*01							
Vibration resistance acc DIN EN 60068-2-6 at 5		,		≤ 25 g							
Shock resistance acc. to DIN EN 60068-2-27				100 g / 6 ms / half-sine 500 g / 1 ms / half-sine							
Protection class acc. to	DIN EN 6 ISO 2065			IP 67 or IP 69 (depending on electr. connection) IP 6K9K							
Other data											
Electrical connection				Various male connectors e.g.: M12x1, Packard Metri Pack, Deutsch DT 04, AMP Superseal, AMP Junior Power Timer, jacketed cable							
Supply voltage when applied acc. to UL specifications				8 30 V DC 12 30 V DC for output signal 0 10 V 5 V ± 5 % for ratiometric output signal - limited energy - acc. to 9.3 UL 61010; Class 2 UL 1310/1585; LPS UL 60950							
Residual ripple of supply	y voltage			≤ 5 %							
Current consumption				max. 22 mA total							
Life expectancy				> 10 million cycles, 0 100 % FS							
Weight				~ 55 g							
Note: Reverse polarit	y protection	on of the s	upply volta	age, excess	voltage, c	verride an	d short circ	cuit			

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

- 1) Other seal materials on request 2) -25 °C with FKM seal, -40 °C on request 3) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1

EN 18.348.3/02.18

Dimensions:

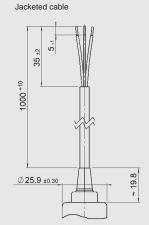




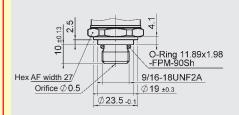
Male connector Junior Power Timer 3 pole

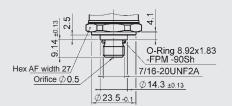






Seal ring DIN3869-14-FKM | Hex AF | ## Width 27 | ## 9-0.2 | | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1, 4 pole | \$\psi 25.9 \pm 0.30 | ## Male connector M12x1





Order details:

The electronic pressure transmitter HDA 8400 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type.

For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

Note:

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Subject to technical modifications.

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DACINTERNATIONAL



Pressure Transmitter HDA 8700 for series applications

Relative pressure

Accuracy 0.25 %

Customised designs thanks to diverse electrical and mechanical connections and a large number of output signals



Description:

The pressure transmitter series HDA 8700 has been specifically developed for the OEM market, e.g. in mobile applications. Like most of our pressure transmitter series, the HDA 8700 is based on a robust and long-life thin-film sensor.

All of the parts in contact with the fluid (sensor and pressure port) are made of stainless steel and are welded together with one another. This means that there are no sealing points in the interior of the sensor. The possibility of leakage is excluded.

The pressure transmitters are available in various pressure ranges from 0 .. 40 bar up to 0 .. 600 bar. For integration into modern controls, standard analogue output signals are available, e.g. 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V or 0 .. 10 V. Ratiometric output signals are also available.

A variety of connection plugs integrated in the device and diverse cable solutions are available for the electrical connection.

A basic accuracy of ≤ ± 0.25 % FS typical, combined with a small temperature drift, ensures a broad range of applications for the HDA 8700.

Technical data:

Input data

Measuring ranges

Measuring ranges	bar	40	60	100	160	250	400	600		
Overload pressures	bar	80	120	200	320	500	800	1000		
Burst pressure	bar	200	300	500	800	1250	2000	2000		
Mechanical connection		Various threads e.g.: G1/4 A ISO 1179-2 M14x1 5 SAE 6, 9/16-18 UNF 2A								
Parts in contact with fluid ¹⁾				Mech. con Seal: FKM	nection: S		eel			
Output data										
Output signal	Various signals e.g.: $4 20 \text{ mA}, 0 5 \text{ V}, 1 6 \text{ V}, 0 10 \text{ V}, $									
Accuracy acc. to DIN 16086 terminal based	,			≤ ± 0.25 % ≤ ± 0.5 %	FS máx.					
Accuracy, B.F.S.L.				≤ ± 0.15 % ≤ ± 0.25 %	FS typ. FS max.					
Temperature compensation Zero point / span				≤ ± 0.01 % ≤ ± 0.02 %						
Non-linearity acc. to DIN 160 terminal based	086,			≤ ± 0.3 %	FS max.					
Hysteresis				≤ ± 0.1 %	FS max.					
Repeatability				≤ ± 0.1 %	FS					
Rise time				≤ 1.5 ms						
Long-term drift				≤ ± 0.3 % FS typ. / year						
Environmental conditions										
Compensated temperature r				-25 +85 °C						
Operating temperature range	e ²⁾			-40 +100 °C / -25 +100 °C						
Storage temperature range				-40 +100 °C						
Medium temperature range ²				-40 +125 °C / -25 +125 °C						
(€ mark				EN 61000	-6-1 / 2 / 3	/ 4				
c su 'us mark³)				Certificate	no.: E318	391				
E13 mark				E13*10R00*10R03*3969*01						
Vibration resistance acc. to DIN EN 60068-2-6 at 5 20	00 Hz			≤ 25 g						
Shock resistance acc. to DIN EN 60068-2-27				100 g / 6 ms / half-sine 500 g / 1 ms / half-sine						
Protection class acc. to DIN ISO	EN 605 20653	529		IP 65, 67 or 69 (depending on electr. connection) IP 6K9K						
Other data										
Electrical connection				Various male connectors e.g.: M12x1, Packard Metri Pack, Deutsch DT 04, AMP Superseal, AMP Junior Power Timer, jacketed cable						
Supply voltage when applied acc. to UL spe		8 30 V DC 12 30 V DC for output signal 0 10 V 5 V ± 5 % for ratiometric output signal - limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950								
Residual ripple of supply vol	tage			≤ 5 %						
Current consumption				max. 22 m						
Life expectancy				> 10 millio	n cycles, C	100 %	FS			
Weight				~ 55 g						
Note: Reverse polarity pr	otection	n of the su	pply voltage	ge, excess	voltage, o	verride and	d short circ	cuit		

protection are provided.

FS (Full Scale) = relative to complete measuring range,

B.F.S.L. = Best Fit Straight Line

Other seal materials on request
 -25 °C with FKM seal, -40 °C on request
 Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1

EN 18.347.3/02.18

Dimensions:

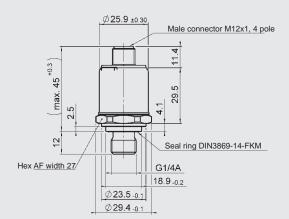




Male connector Junior Power Timer 3 pole





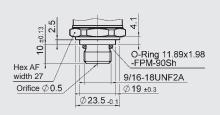


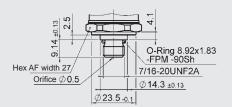
Jacketed cable

35 ±2

Ø 25.9 ±0.30

1000 +10





Order details:

The electronic pressure transmitter HDA 8700 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type.

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Note:

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Subject to technical modifications.

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YDAC INTERNATIONAL



Pressure Transmitter HDA 4400

Relative pressure

Accuracy 0.5 %

Flush membrane



Description:

Pressure Transmitter HDA 4400 with a flush membrane was designed specifically for applications in which a standard pressure port could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media.

Like the standard model, the HDA 4400 with flush membrane has a pressure measurement cell with a thin-film strain gauge on a stainless steel membrane for relative pressure measurement in the high pressure range.

The pressure port is achieved with a fullysealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

The 4 .. 20 mA or 0 .. 10 V output signals permit connection to all HYDAC measuring and control devices, as well as connection to standard evaluation systems (e.g. PLC

Technical data:

Input data															
Measuring ranges	bar	2.5	4	6	10	16	25	40	100	250	400	600	-1 3		
Overload pressures	bar	8	8	12	20	32	50	80	200	500	800	1000	8		
Burst pressure 1)	bar	20	20	30	50	80	125	200	500	1000	2000	2000	20		
Mechanical connection		G1/2 A ISO 1179-2 G1/4 A ISO 1179-2 G1/4 with additional front O-ring seal G1/2 with additional front O-ring seal G1/2 with additional front O-ring seal													
Pressure transfer fluid					Silicone-free oil										
Tightening torque, recomm	ended				45 Nm for G1/2, G1/2 A 20 Nm for G1/4										
Parts in contact with fluid 2)	1				Mech. Seal: F O-ring:	KM	ection:	Stain	ess st	eel					
Output data															
Output signal, permitted loa	ad resi	stance			4 20 0 10						8 V) / 2	20 mA	kΩ]		
Accuracy acc. to DIN 1608 terminal based	6,				≤ ± 0.5 ≤ ± 1 %										
Accuracy, B.F.S.L.					≤ ± 0.2 ≤ ± 0.5										
Temperature compensation Zero point	1				≤ ± 0.0 ≤ ± 0.0	25 %	FS/°	C max							
Temperature compensation Span	1				≤ ± 0.0 ≤ ± 0.0										
Non-linearity acc. to DIN 16086, terminal based					≤±0.3 % FS max.										
Hysteresis					≤ ± 0.4 % FS max.										
Repeatability					≤ ± 0.1 % FS max.										
Rise time					≤ 1 ms										
Long-term drift					≤ ± 0.3 % FS / year typ.										
Environmental condition	s														
Compensated temperature	range				-25 +	-85 °C	:								
Operating temperature ran	ge				-25 +	-85 °C	:								
Storage temperature range)				-40 +	-100 °	С								
Fluid temperature range 3)					-30 +100 °C / -25 +100 °C -30 +150 °C / -25 +150 °C for G1/2 with cooling section										
(€ mark					EN 61										
c R °us mark 4)					Certificate no.: E318391										
Vibration resistance acc. to DIN EN 60068-2-6 at 10	500 Hz				≤ 20 g										
Protection class acc. to DIN EN 60529 5)						IP 65 (male connector EN175301-803) IP 67 (M12x1 male connector)									
Other data															
Supply voltage								onduct							
when applied acc. to UL specifications						12 30 V DC 3-conductor - limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950									
Residual ripple of supply v	oltage				≤ 5 %										
Current consumption					≤ 25 mA										
Life expectancy					> 10 million cycles (0 100 % FS)										
Weight					~ 150			•							
Note: Reverse polarity provided	orotecti	on of th	ne sup	oly volt	tage, e	xcess	voltag	je, ove	erride a	and she	ort circ	uit prot	ection are		

provided.
FS (Full Scale) = relative to complete measuring range, B.F.S.L. = Best Fit Straight Line

- 1) For G1/2 with additional front O-ring seal max. 1500 bar
- ²⁾ Other seal materials on request ³⁾ -25 °C with FKM seal, -30 °C on request
- 4) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1
- 5) With mounted mating connector in corresponding protection class

HDA 4 4 $\frac{Z}{Z} \frac{X}{X} - \frac{X}{X} - \frac{XXXX}{X} - \frac{XXX}{X} - \frac{000}{X}$

Mechanical process connection Z = flush membrane

Electrical connection

= male, EN175301-803, 3 pole + PE (mating connector supplied)

= male M12x1, 4 pole

(mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor = 0 .. 10 V, 3 conductor

Measuring ranges in bar

02.5; 0004; 0006; 0010; 0016; 0025; 0040; 0100; 0250; 0400; 0600; -1 .. 3

Mechanical connection

G01 = G1/2 A, ISO 1179-2

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal (only for measuring ranges ≥ 40 bar)

G05 = G1/4 A ISO 1179-2 (only for measuring ranges ≥ 40 bar)

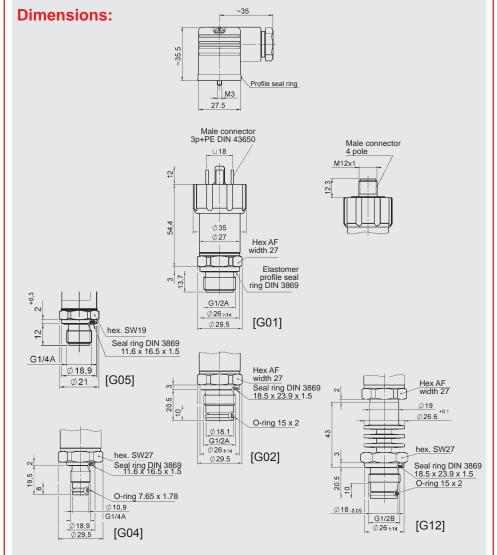
G12 = G1/2 with additional front O-ring seal and cooling section

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

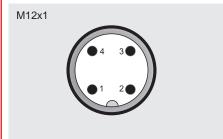


Pin connections:

EN175301-803



Pin	HDA 44Z5-A	HDA 44Z5-B
1	Signal +	+U _B
2	Signal -	0 V
3	n.c.	Signal
^	Housing	Housing



Pin	HDA 44Z6-A	HDA 44Z6-B	
1	Signal +	+UB	
2	n.c.	n.c.	
3	Signal -	0 V	_
4	n.c.	Signal	

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany

Phone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com

DADINTERNATIONAL



Pressure Transmitter HDA 7400

Relative pressure

Accuracy 0.5 %

Flush membrane



Description:

Pressure Transmitter HDA 7400 with a flush membrane was designed specifically for applications in which a standard pressure port could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media.

Like the standard model, the HDA 7400 with flush membrane has a pressure measurement cell with a thin-film strain gauge on a stainless steel membrane for relative pressure measurement in the high pressure range.

The pressure port is achieved with a fullysealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

The output signals 4 .. 20 mA or 0 .. 10 V permit connection to all HYDAC measuring and control devices, as well as connection to standard evaluation systems (e.g. PLC controls).

Technical data:

Input data										
Measuring ranges	bar	40	100	250	400	600				
Overload pressure	bar	80	200	500	800	1000				
Burst pressure	bar	200	500	1000	2000	2000				
Mechanical connection		G1/4 A ISO G1/4 with a	1179-2 Idditional fro	nt O-ring sea	al					
Pressure transfer fluid			Silicone-fre		<u> </u>					
Tightening torque, recommende	d		20 Nm							
Parts in contact with fluid 1)			Mech. conn Seal: FKM O-ring: FKM	ection: Stain	less steel					
Output data										
Output signals, permitted load re	esistar	nce	R _{Lmax} 0 10 V, 3-	2-conductor = $(U_B - 8 V)$ conductor = $2 k\Omega$		[2]				
Accuracy acc. to DIN 16086, terminal based			≤ ± 0.5 % F ≤ ± 1.0 % F							
Accuracy, B.F.S.L.			≤ ± 0.25 % ≤ ± 0.5 % F	S max.						
Temperature compensation Zero point			≤± 0.015 % FS / °C typ. ≤± 0.025 % FS / °C max.							
Temperature compensation Span		≤ ± 0.015 % FS / °C typ. ≤ ± 0.025 % FS / °C max.								
Non-linearity acc. to DIN 16086, terminal based		≤ ± 0.3 % FS max.								
Hysteresis			≤ ± 0.4 % F	S max.						
Repeatability			≤ ± 0.1 % F	S max.						
Rise time			≤ 2 ms							
Long-term drift			≤ ± 0.3 % F	S / year typ.						
Environmental conditions										
Compensated temperature range	je		-25 +85 °	С						
Operating temperature range			-25 +85 °	С						
Storage temperature range			-40 +100	°C						
Fluid temperature range 2)			-30 +100	°C / -25 +	100 °C					
(€ mark			EN 61000-6	6-1/2/3/4						
cal us mark 3)			Certificate-l	No.: E31839	1					
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 h	Нz		≤ 20 g							
Protection class acc. to DIN EN	60529) ⁴⁾	IP 67							
Other data										
Supply voltage			8 30 V D	-	onductor					
when applied acc. to UL specific	ations	3	 limited en 		onductor to 9.3 UL 61 60950	010; Class 2;				
Residual ripple of supply voltage	Э		≤ 5 %							
Current consumption			≤ 25 mA							
Life expectancy			> 10 million	cycles (0	100 % FS)					
Weight			~ 80 g							
Compensated temperature range Operating temperature range Storage temperature range Fluid temperature range Pluid temperature range Fluid temperature range Fluid temperature range The mark The	Hz 60529 cations	5	-25 +85 ° -40 +100 -30 +100 EN 61000-6 Certificate-1 ≤ 20 g IP 67 8 30 V E 12 30 V E - limited en UL 1310/15 ≤ 5 % ≤ 25 mA > 10 million ~ 80 g	C °C °C -25 + 6-1 / 2 / 3 / 4 No.: E31839 OC 2-c OC 3-c lergy – acc. 85; LPS UL	onductor onductor to 9.3 UL 61 60950					

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit rotection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

- 1) Other seal materials on request
- ²⁾ -25 °C with FKM seal, -30 °C on request
- ³⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1 ⁴⁾ With mounted mating connector in corresponding protection class

HDA 7 4 Z = 6 - X - XXXX - XXX - 000

Mechanical process connection Z = flush membrane

Electrical connection

= male M12x1, 4 pole (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor = 0 .. 10 V, 3-conductor

Measuring ranges in bar

0040; 0100; 0250; 0400; 0600

Mechanical connection
G04 = G1/4 with additional front O-ring seal

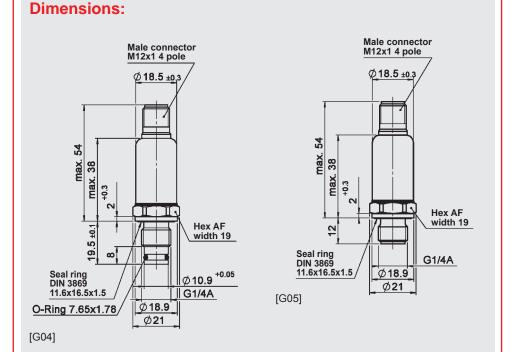
G05 = G1/4 A DIN 3852

Modification number

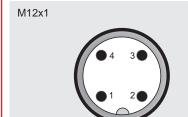
000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.



Pin connections:



Pin	HDA 74Z6-A	HDA 74Z6-B	
1	Signal +	+U _B	
2	n.c.	n.c.	
3	Signal -	0 V	
4	n.c.	Signal	
	11.0.	Olgital	_

Note:

The information in this brochure relates to the operating conditions and applications described.

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Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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DAC INTERNATIONAL



Pressure Transmitter HDA 4700

Relative pressure

Accuracy 0.25 %



Increased Functional Safety

Description:

This version of the pressure transmitter series HDA 4700 has been specially developed for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to PL d - Cat 3 (in accordance with ISO 13849).

The pressure transmitters are designed with two channels. Each channel consists of a sensor element and evaluation electronics. As a result, the pressure transmitter develops two separate and independent output signals in proportion to the pressure.

The safety function is tested by evaluating and comparing the two analogue output signals in a higher-level system.

The main fields of application are as sensor elements in mobile, safety-oriented systems such as load torque displays, load torque limitation in truck-mounted cranes or working platforms and much more.

Technical data:

Input data

input uata											
Measuring ranges signal 1	bar	25	40	60	100	160	250	400	600		
Measuring ranges signal 2	bar	25/40	40/60	60/100	100/160	160/250	250/400	400/600	600/1000		
Overload pressures	bar	80	80	120	200	320	500	800	1200		
Burst pressure	bar	200	200	300	500	800	1250	2000	2000		
Mechanical connecti	on				G¼ A ISC) 1179-2 v	with 0.5 m	m orifice			
Tightening torque, re	comr	nended			20 Nm						
Parts in contact with	fluid	1)			Mech. co			steel film strain	gauge)		
Outract data					Seal: FKI	M					
Output data					4 00	^ ^ ~ ~ ~ ~ ~ ~ ~					
Output signal 1 2) Output signal 2 2)				4 20 m/ 4 20 m/	4, 3-cond	uctor uctor					
Accuracy acc. to DIN terminal based	160	86, 		.,	$\leq \pm 0.25$ $\leq \pm 0.5$ %	FS máx.					
Accuracy, B.F.S.L.					≤ ± 0.15 ° ≤ ± 0.25 °	% FS max					
Temperature comperator point	nsatio	on 			≤ ± 0.008 ≤ ± 0.015	% FS / °	C max.				
Temperature comper Span	nsatio	n			≤ ± 0.008 ≤ ± 0.015	% FS / °	C typ. C max.				
Non-linearity acc. to terminal based	DIN 1	16086,			≤ ± 0.3 %	FS max.					
Hysteresis		≤ ± 0.1 % FS max.									
Repeatability					≤ ± 0.05 % FS						
Rise time					≤ 2 ms						
Long-term stability					≤ ± 0.1 %	FS typ. /	year				
Environmental con	ditior	าร									
Compensated tempe	eratur	e range			-25 +85						
Operating temperatu	re rai	nge (fail	safe) 3)		-40 +85		+85 °C				
Storage temperature	rang	е			-40 +85						
Medium temperature	rang	је ³⁾			-40 +85	°C / -25	+85 °C				
C ← mark					EN 61000	0-6-1/2/	3 / 4				
Vibration resistance DIN EN 60068-2-6 a	acc. t	o 2000 Hz			≤ 20 g						
Shock resistance acc				-27	≤ 100 g / 6 ms						
Protection class 4) ac	c. to		60529		IP 67 / IP 69 (with attached mating connector) IP 6K9K						
Safety-related data											
Performance level											
Based on					DIN EN ISO 13849-1:2008						
PL		d									
Architecture					Category 3						
Other data											
Supply voltage	7 35 V DC (max. load resistance 250 Ω) 12 35 V DC (max. load resistance 500 Ω)										
Residual ripple of su	pply v	voltage			≤ 5 %						
Current consumption	1				≤ 50 mA						
Life expectancy					> 10 million cycles, 0 100 % FS						
Weight					~ 180 g						
Note: Reverse pol	arity p	orotectio	n of the	supply vo	ltage, exc	ess voltaç	ge, overri	de and sh	ort circuit		

rotection are provided.

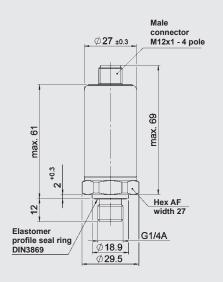
FS (Full Scale) = relative to complete measuring range

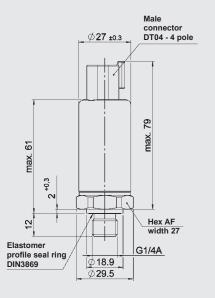
B.F.S.L. = Best Fit Straight Line

- 1) Other seal materials on request
 2) Other output signals on request
 3) -25 °C with FKM seal, -40 °C on request
 4) With mounted mating connector in corresponding protection class

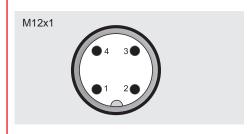
EN 18.381.2/02.18

Dimensions:

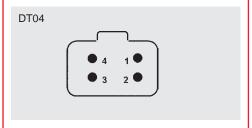




Pin connections:

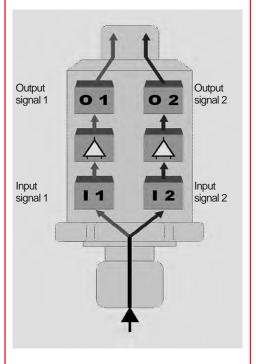


1 +U _B 2 Signal 2 3 0 V 4 Signal 1	Pin	HDA 4746-CC
3 0 V	1	+U _B
<u> </u>	2	Signal 2
4 Signal 1	3	0 V
	4	Signal 1



Pin	HDA 474V-CC
1	+U _B
2	0 V
3	Signal 2
4	Signal 1

Block circuit diagram:



Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Model code:

HDA 4 7 <u>4 X - C C - XXXX - XXXX - Pd- 000</u> Mechanical connection = G1/4 A ISO 1179-2

Electrical connection

= male M12x1, 4 pole (mating connector not supplied)

= male Deutsch DT04, 4 pole (mating connector not supplied)

Output signal 1

= 4 .. 20 mA, 3-conductor

Output signal 2

= 4 .. 20 mA, 3-conductor

<u>Measuring ranges signal 1 in bar (max. operating pressure)</u> 0025; 0040; 0060; 0100; 0160; 0250; 0400; 0600

Measuring ranges signal 2 in bar

0025; 0040; 0060; 0100; 0160; 0250; 0400; 0600; 1000

Measuring range signal 2 = Measuring range signal 1

or max. 1 pressure range higher

Functional safety

Pd = PL d - Cat 3 acc. to DIN EN 13849-1

Modification number

000 = standard

Accessories:

Appropriate accessories such as mating connectors can be found in the Accessories brochure.

DAC INTERNATIONAL



Pressure Transmitter HDA 8700 for series applications

Relative pressure

Accuracy 0.25 %





Description:

This version of the pressure transmitter series HDA 8700 has been specially developed for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to SIL 2 (IEC 61508) or PL d (ISO 13849).

During normal operation the pressure transmitter HDA 8700 generates an output signal proportional to the pressure. In the background, the pressure transmitter performs cyclical diagnostic tests to detect internal errors.

If an instrument error is detected, the pressure transmitter HDA 8700 supplies an output signal < 3 mA which is recognised by the user as an unacceptable discrepancy.

This means that the pressure transmitter HDA 8700 achieves Performance Level d in the Safety category (based on a Category 2 of the architecture) and SIL 2. As a result, the pressure transmitter can be recommended for use in applications where safety is critical.

The main fields of application are in mobile and stationary safety-oriented systems such as load torque displays or load torque limitation in loading cranes or working platforms.

Technical data:

Increased Functional Safety

Input data												
Measuring ranges	bar	40	60	100	160	250	400	600				
Overload pressures	bar	80	120	200	320	500	800	1000				
Burst pressure	bar	200	300	500	800	1250	2000	2000				
Mechanical connection (Tightening torque, recomme	ended)			G1/4 A IS 7/16-20 L	O 1179-2	SAE 4)	(20 Nm (15 Nm	າ)				
Parts in contact with fluid 1)				7/16-20 UNF 2A (SAE 4) (15 Nm) 9/16-18 UNF 2A (SAE 6) (20 Nm) Mech. connection: Stainless steel Seal: FKM								
Output data				Ocai. Tit	141							
Output signal, permitted load	resist	tance		4 20 mA								
Output signal with error reco				$R_{Lmax} = (L < 3 \text{ mA})$	J _B – 12 V)	/ 20 mA	[kΩ]					
Accuracy acc. to DIN 16086 terminal based	,			$\leq \pm 0.25\%$ $\leq \pm 0.5\%$	% FS typ. FS max.							
Accuracy, B.F.S.L.				≤ ± 0.15 ° ≤ ± 0.25 °	% FS typ. % FS max	·						
Temperature compensation Zero point / span				≤ ± 0.01 ° ≤ ± 0.02 °	% FS / °C % FS / °C	typ. max.						
Non-linearity acc. to DIN 160 terminal based	086,			≤ ± 0.3 %								
Hysteresis				≤ ± 0.1 %	FS max.							
Repeatability ≤±0.1 % FS												
Rise time				≤ 10 ms								
Long-term drift				≤ ± 0.3 % FS typ. / year								
Environmental conditions												
Compensated temperature r	ange			-25 +85 °C								
Operating temperature range	e ²⁾			-40 +100 °C / -25 +100 °C								
Storage temperature range				-40 +100 °C								
Fluid temperature range 2)				-40 +125 °C / -25 +125 °C								
(€ mark				EN 61000-6-1 / 2 / 3 / 4								
Vibration resistance acc. to DIN EN 60068-2-6 at 0 50	0 Hz			≤ 25 g								
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)				100 g / 6 500 g / 1	ms / half- ms / half-	sine sine						
Protection class acc. to DIN	EN 60	529 ³⁾		IP 67								
Safety-related data												
Performance level												
Based on				DIN EN ISO 13849-1:2008								
PL				d								
Architecture				Category	2							
Safety Integrity Level												
Based on				DIN EN 61508: 2010								
SIL				2								
Other data												
Electrical connection				M12x1, 4 AMP Jun		Timer, 2	pole					
Supply voltage				12 32 V DC								
Residual ripple of supply vol	tage			≤ 5 %								
Current consumption ≤ 25 mA												
Life expectancy > 10 million cycles (0 100 %)												
Weight				~ 75 g								
Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit												

protection are provided.

FS (Full Scale) = relative to complete measuring range

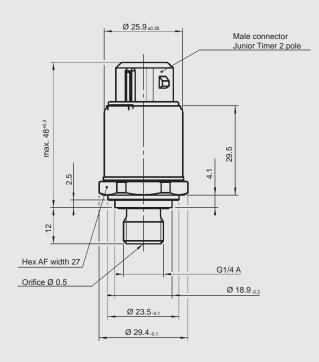
B.F.S.L. = Best Fit Straight Line

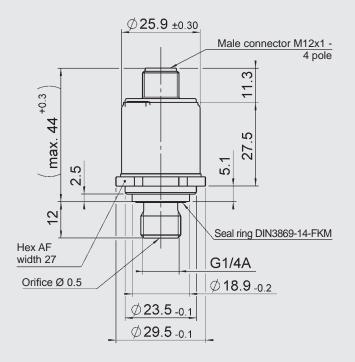
Other seal materials on request
 -25 °C with FKM seal, -40 °C on request
 With mounted mating connector in corresponding protection class

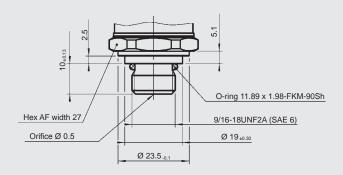
EN 18.347.1.1/02.18

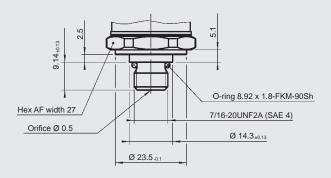
EN 18.347.1.1/02.18

Dimensions:









Order details:

This version of the electronic pressure transmitter HDA 8700 has been specially developed for OEM customers and is available for minimum order quantities of 500 pieces per type. For exact specification, please contact the Sales Department of HYDAC ELECTRONIC.

Note:

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For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAD INTERNATIONAL



Pressure Transmitter HDA 4700

Relative pressure

Accuracy 0.25 %

CAN interface Optional temperature measurement



Description:

HDA 4700 with CAN interface is a digital pressure transmitter which is used to measure relative pressures in hydraulics and pneumatics. The measured pressure value is digitised and made available to the CAN field bus system via the CANopen protocol or J1939 protocol. The instrument parameters can be viewed and configured by the user using standard CAN software.

This pressure transmitter, which is based on the HDA 4700 series, has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Due to their outstanding temperature and EMC characteristics, together with their compact dimensions, these instruments can be used in a wide range of applications in the mobile and industrial sectors.

The device provides the option of an externally attached temperature probe that measures in the system fluid directly and can be thus be used for closed-loop control tasks. Adding the option of temperature measurement to the pressure transmitter functions saves one additional measuring point and eases the installation for the customer.

Technical data:

Input data

Input data									
Measuring ranges ¹⁾	bar	40	100	250	400	600	1000		
Overload pressures	bar	80	200	500	800	1000	1600		
Burst pressure	bar	200	500	1000	2000	2000	3000		
Mechanical connection				G1/4 A ISO 1179-2 G1/2 A ISO 1179-2					
Tightening torque, reco	mmen	ded		20 Nm (G1	/4); 45 Nm (0	G1/2)			
Parts in contact with flu		Mech. con Seal: FKM	nection: Stair	nless steel					
Output data									
Output signal					or J1939 prot on version	tocol			
Accuracy acc. to DIN 1 terminal based	6086,			$\leq \pm 0.25 \%$ $\leq \pm 0.5 \% $					
Accuracy, B.F.S.L.		≤ ± 0.15 % ≤ ± 0.25 %	FS max.						
Temperature compensation Zero point					% FS / °C typ % FS / °C ma				
Temperature compensation Span					% FS / °C typ % FS / °C ma				
Non-linearity acc. to DII terminal based		≤ ± 0.3 % FS max.							
Hysteresis				≤ ± 0.1 % F	S max.				
Repeatability				≤ ± 0.08 % FS					
Rise time				≤ 1 ms					
Long-term drift				≤ ± 0.1 % FS typ. / year					
Environmental condit	ions								
Compensated tempera	ture rai	nge		-25 +85 °					
Operating temperature	range ²)			°C / -25 +8	5 °C			
Storage temperature ra	inge			-40 +100					
Medium temperature ra	nge ²⁾			-40 +100	°C / -25 +	100 °C			
(mark				EN 61000-6-1 / 2 / 3 / 4					
₽№ mark³)				Certificate no.: E318391					
Vibration resistance acc DIN EN 60068-2-6 at 1) Hz		≤ 20 g					
Protection class acc. to	DIN E	N 60529 ⁴⁾		IP 67					
Other data									
Supply voltage when applied acc. to Ul	L speci	fications		9 35 V D - limited er UL 1310/1	C ergy - acc. to 585; LPS UL	9.3 UL 610 60950	10; Class 2;		
Residual ripple of supply voltage				≤ 5 %					
Current consumption	•			≤ 25 mA					
Life expectancy				> 10 million cycles (0 100 % FS)					
Weight				~ 150 g					
Note: Reverse polarit	ty prote	ection of th	e supply v		ess voltage a	nd short circ	cuit protection		

polarity protection of the supply voltage, excess voltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range B.F.S.L. = Best Fit Straight Line

1) 1000 bar only with mech. connection G1/2 A ISO 1179-2 and vice versa

2) -25 °C with FKM seal, -40 °C on request
3) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1

⁴⁾ With mounted mating connector in corresponding protection class

EN 18.316.4/02.18

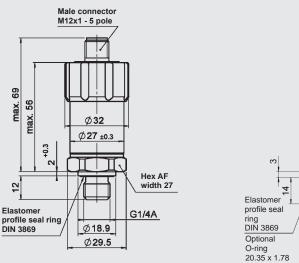
Protocol data for CANopen:

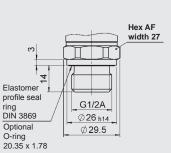
Communication profile	CiA DS 301 V4.2
Device profile	CiA DS 404 V1.3
Layer setting Services and Protocol	CiA DSP 305 V2.2
Automatic bit-rate detection	CiA AN 801
Baud rates	10 kbit 1 Mbit corresp. to DS305 V2.2
Transmission services - PDO - Transfer	Measured value as 16/32 bit and float, status synchronous, asynchronous, cyclical, measured value change, exceeding boundaries
Node ID/baud rate	Can be set via Manufacturer Specific Profile

Protocol data for SAE J1939:

Data Link Layer	SAE J1939-21	
Network Layer	SAE J1939-31	
Network Management	SAE J1939-81	

Dimensions:





Model code:

HDA 4 7 X 8 - F1X - XXXX - 000

Mechanical connection

2 = G1/2 A ISO 1179-2

(only for measuring range ≥ 1000 bar)

4 = G1/4 A ISO 1179-2

Electrical connection

8 = male M12x1, 5 pole

Output signal

F11 = CANopen

F12 = CAN SAE J1939

Measuring ranges in bar 0040; 0100; 0250; 0400; 0600 (only with mech. connection code "4")

1000 (only with mech. connection code "2")

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:

M12x1



Pin	Signal	Description
1	Housing	shield/housing
2	+U _B	supply +
3	0 V	supply -
4	CAN_H	bus line dominant high
5	CAN_L	bus line dominant low

EN 18.316.4/02.18

Additional technical data with temperature measurement option:

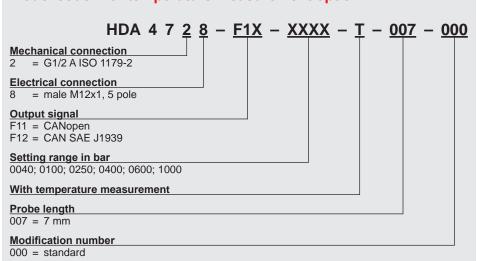
Input data					
Measuring range	-25 +100 °	C			
Probe length	7 mm				
Mechanical connection	G1/2 A ISO	1179-2 with p	orobe		
Tightening torque, recommended	45 Nm				
Measuring ranges pressure in bar	40	100	250	400	600
Output data					
Output signal Pressure	CAN protoco	ol			
Output signal Temperature	The tempera	ature signal is	s available v	ria the CAN b	ous.
Accuracy	≤ ± 1.0 % FS				
	≤ ± 1.5 % FS	S max.			
Temperature drift (environment)	≤ ± 0.02 % F	S/°C			
Rise time acc. to DIN EN 60751	t ₅₀ : ~ 4 s				
	t ₉₀ : ~ 8 s				

Hex AF width 27 HDA 4X2X (PT) Stud end ISO1179-2-G1/2A-S Ф29.5 Ф26 н14 G1/2A

Dimensions with temperature

measurement option:

Model code with temperature measurement option:



Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAD INTERNATIONAL



Pressure Transmitter HDA 7400

Relative pressure

Accuracy 0.5 %



Description:

HDA 7400 with CAN interface is a digital pressure transmitter which is used to measure relative pressures in hydraulics and pneumatics. The measured pressure value is digitised and made available to the CAN field bus system via the CANopen protocol or J1939 protocol. The instrument parameters can be viewed and configured by the user using standard CAN software.

This pressure transmitter, which is based on the HDA 7400 series, has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Due to their outstanding temperature and EMC characteristics, together with their compact dimensions, these instruments can be used in a wide range of applications in the mobile and industrial sectors.

CAN interface

Technical data:

Input data								
Measuring ranges	bar	40	100	250	400	600		
Overload pressure	bar	80	200	500	800	1000		
Burst pressure	bar	200	500	1000	2000	2000		
Mechanical connection	,		G1/4 A ISC	1179-2				
Tightening torque, recomme	ended		20 Nm					
Parts in contact with fluid			Mech. conr Seal: FKM	nection: Stain	less steel			
Output data								
Output signals			depending		1939 protoco	ol,		
Accuracy acc. to DIN 16086 terminal based	5,		≤ ± 0.5 % F ≤ ± 1.0 % F	S max.				
Accuracy, B.F.S.L.			≤ ± 0.25 % ≤ ± 0.5 % F	S max.				
Temperature compensation Zero point			≤ ± 0.015 % ≤ ± 0.025 %	% FS / °C typ % FS / °C ma). ax.			
Temperature compensation Span			≤ ± 0.015 % ≤ ± 0.025 %	% FS / °C typ % FS / °C ma). ax.			
Non-linearity acc. to DIN 16086, terminal based			≤ ± 0.3 % FS max.					
Hysteresis			≤ ± 0.4 % FS max.					
Repeatability			≤ ± 0.1 % FS max.					
Rise time			≤ 2 ms					
Long-term drift			≤ ± 0.3 % FS / year typ.					
Environmental conditions								
Compensated temperature	range		-25 +85 °	C				
Operating temperature rang	e 1)			C / -25 +8	5 °C			
Storage temperature range			-40 +100	°C				
Fluid temperature range 1)			-40 +100 °C / -25 +100 °C					
(€ mark			EN 61000-6-1 / 2 / 3 / 4					
mark 2)			Certificate-No.: E318391					
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz			≤ 20 g					
Protection class acc. to DIN EN 60529			IP 67					
Other data								
Supply voltage when applied acc. to UL spe	ecifications	3	9 35 V D – limited er UL 1310/18		to 9.3 UL 61 60950	010; Class 2;		
Residual ripple of supply vo	ltage		≤ 5 %					
Current consumption			≤ 25 mA					
Life expectancy			> 10 million cycles (0 100 % FS)					
Weight			~ 60 g					
Note: Deverse polarity pr	atantian of	the europh		ana valtara	avarrida an	d abart aireuit		

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit

protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

1) -25 °C with FKM seal, -40 °C on request 2) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1

EN 18.367.3/02.18

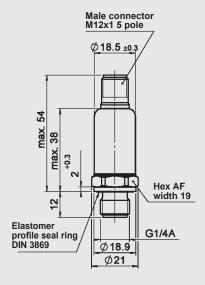
Protocol data for CANopen:

Communication profile	CiA DS 301 V4.2
Device profile	CiA DS 404 V1.3
Layer setting Services and Protocol	CiA DSP 305 V2.2
Automatic bit-rate detection	CiA AN 801
Baud rates	10 kbit 1 Mbit corresp. to DS305 V2.2
Transmission services - PDO - Transfer	Measured value as 16/32 bit and float, status synchronous, asynchronous, cyclical, measured value change, exceeding boundaries
Node ID/baud rate	Can be set via Manufacturer Specific Profile

Protocol data for SAE J1939:

Data Link Layer	SAE J1939-21	
Network Layer	SAE J1939-31	
Network Management	SAE J1939-81	

Dimensions:



Model code:

HDA 7 4 <u>4</u> <u>8</u> - F<u>XX</u> - <u>XXXX</u> - <u>000</u> Mechanical connection = G1/4 A ISO 1179-2 Electrical connection = male M12x1, 5 pole

Signal F11 = CANopen

F12 = CAN SAE J1939

Measuring ranges in bar

0040; 0100; 0250; 0400; 0600

Modification number

 $\overline{000}$ = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:

M12x1



Pin	Signal	Description
1	Housing	shield/housing
2	+UB	supply +
3	0 V	supply -
4	CAN_H	bus line dominant high
5	CAN_L	bus line dominant low

Note:

The information in this brochure relates to the operating conditions and applications described.

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Subject to technical modifications.

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YDAC INTERNATIONAL



Pressure Transmitter HDA 4700

Relative pressure

Accuracy 0.25 %

HART interface Optional temperature measurement



Description:

HDA 4700 with HART interface is a digital pressure transmitter which is used to measure relative pressures in hydraulics and pneumatics. In addition to the analogue output of the measured value, digital communication is possible by means of the HART protocol.

This pressure transmitter, which is based on the HDA 4700 series, has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Due to their outstanding temperature and EMC characteristics, together with their compact dimensions, these instruments can be used in a wide range of applications.

The instrument provides the option of a temperature sensor. The temperature signal is given out as a digital signal via the HART protocol and the pressure signal is still available as an analogue signal (4 .. 20 mA).

Technical data:

roommoar data	•											
Input data												
Measuring ranges	bar	6	16	40	60	100	250	400	600	1000	1600	2000
Overload pressures	bar	12	32	80								
Burst pressure	e bar 100 200 200 300 500 1000 2000 2000 3000 3000 4										4000	
Mechanical connection					G1/4 A							
							EN 837		24/0.0			
Tightening torque, reco		nded					A), 45		1/2 B)		
Parts in contact with flu	Ia				Stainie	ess ste	el, FKI	VI				
Output data	d lood	rooint			4 20	A - O	- condi	otor u	ith IIA	DT pre	toool	
Output signal, permitted	u ioau	162121	ance		$R_{Lmax.} =$	= (U _B -	-condu 12 V) mmuni	/ 20 m/	4 [kΩ]		NOCOI	
HART Communication					Acc. to	HAR	T 7 spe	cificat	ions			
HART Common Practic	e Cor	nmand	ls i.e.		Alterino	g of me	asuring	range	limits (see tab	ole)	
							ustmer					n
Accuracy acc. to DIN 1	6086,				$\leq \pm 0.2$	25 % F	S typ.					
terminal based ≤ ± 0.5 % FS max.												
Accuracy, B.F.S.L. $\leq \pm 0.15 \%$ FS typ. $\leq \pm 0.25 \%$ FS max.												
Temperature compensation $\leq \pm 0.008 \% FS / ^{\circ}C typ.$ Zero point $\leq \pm 0.015 \% FS / ^{\circ}C max.$												
Temperature compensation				≤ ± 0.008 % FS / °C typ. ≤ ± 0.015 % FS / °C max.								
Span Non-linearity acc. to DII	NI 160	86			$\leq \pm 0.0$, IIIax.				
terminal based	100											
Hysteresis					≤ ± 0.1	I % FS	max.					
Repeatability					≤ ± 0.05 % FS							
Rise time					≤ 25 m							
Long-term drift					≤ ± 0.1	l % FS	/ typ.	year				
Environmental condit												
Compensated temperat					-25							
Operating temperature	range	1)					/ -25 .	. +85 °	C			
Storage temperature ra					-40 +100 °C							
Fluid temperature range	e ¹⁾						C / -25		0 °C			
(€ mark					EN 61	000-6-	1/2/	3 / 4				
Vibration resistance acc. to ≤ 20 g DIN EN 60068-2-6 at 10 500 Hz												
Protection class acc. to DIN EN 60529 2) IP 65 male connector EN 175301-803 IP 67 male connector M12x1												
Other data												
Supply voltage					12 3	0 V D0	5					
Residual ripple					46 1	25 Hz:	< 0.2	Vpp				
of supply voltage					> 1	25 Hz:	< 1.2	mV RN				
Life expectancy 3)					> 10 m	nillion (cycles	(0 10	0 % F	S)		
Weight					150 g							
Note: Reverse polarity	prote	ction o	f the s	upply v	oltage/	, exce	ss volta	age, ov	erride	and sh	nort cir	cuit

protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

1) -25 °C with FKM seal, -40 °C on request

2) With mounted mating connector in corresponding protection class 3) Measuring ranges ≥ 1000 bar: > 1 million cycles (0 .. 100 % FS)

EN 18.615.1/02.18

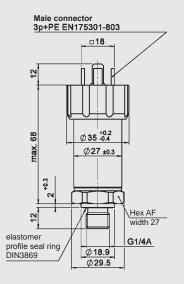
Measuring range limits:

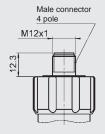
By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits:

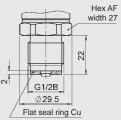
Measuring range limits of the primary variable, pressure:

Lower measuring	ng range limit	Upper measuri	ng range limit	Measuring span		
min	max	min	max	min	max	
0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150% FS	

Dimensions:



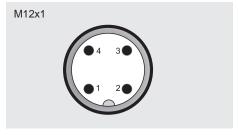




Pin connections:



HDA	4xx5-F
1	Signal +
2	Signal -
3	n.c.
	PE



Pin	HDA 4xx6-F
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Model code:

HDA 4 7 X X - F21 - XXXX - 000

Mechanical connection

- = G1/2 B DIN EN 837
 - (only for measuring ranges ≥ 1600 bar)
- = G1/4 A ISO 1179-2

Electrical connection

- = male, EN 175301-803, 3 pole+PE (IP 67 mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

F21 = 4.. 20 mA, 2-conductor, with HART protocol

Measuring ranges in bar 0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600; 1000 (only with mech. connection code "4") 1600; 2000 (only with mech. connection code "1")

Modification number

 $\overline{000}$ = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

described.

technical department.

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant

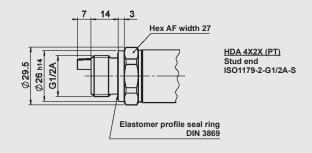
Subject to technical modifications.

EN 18.615.1/02.18

Additional technical data with temperature measurement option:

Input data							
Measuring range	-25 +10	00 °C					
Probe length	7 mm						
Mechanical connection	G½ A ISO	D 1179-2	with pro	be (45 N	m)		
Measuring ranges pressure	16	40	60	100	250	400	600
Output data							
Output signal pressure	4 20 m	A with HA	ART Prot	ocol			
Output signal temperature	Available	via HAR	T protoc	ol as a d	gital sign	al	
Accuracy at room temperature	$\leq \pm 0.4 \%$ $\leq \pm 0.8 \%$	FS typ. FS max	ζ.				
Temperature drift (environment)	≤ ± 0.01	% FS / °0	2				
Reaction time acc. to DIN EN 60751	t ₅₀ : ~ 10 s						
	t ₉₀ : ~ 15 s	3					

Dimensions with temperature measurement option:

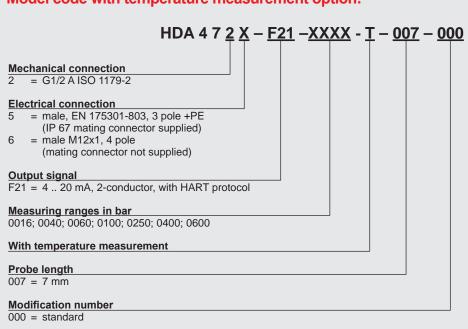


Measuring range limits:

Additional measuring range limits of the secondary variable, temperature:

Lower measuring	ng range limit	Upper measuri	ng range limit	Measuring spa	n
min	max	min	max	min	max
-25 °C	75 °C	0 °C	100 °C	25 °C	125 °C

Model code with temperature measurement option:



HYDAC ELECTRONIC GMBH

Hauptstraße 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 E-mail: electronic@hydac.com Internet: www.hydac.com

DADINTERNATIONAL



Pressure Transmitter HDA 4800 for Iron and Steelworks

Includes test certificate



Description:

This high-precision pressure transmitter was specially developed and adapted for the sophisticated measurement demands of steelworks technology.

The instrument has a very robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Its outstanding specifications in respect of temperature effect (temperature drift for zero point and span are in each case max. ≤ ± 0.01 % FS / °C) and accuracy (≤ ± 0.125 % FS typ.) make it ideally suited for use in the environmental conditions found in steelworks.

The excellent EMC characteristics guarantee signal stability during the harshest highfrequency, electromagnetic interference.

Additional protection against humidity and vibrations is achieved by encapsulation. A heat shrink sleeving is used to protect the sensor from bending.

Technical data:

Input data

Mar data		4.0	00	400	450	050	000	050	400	500	000	1000
Measuring ranges 1)	bar	16	60	100	150	250	300	350	400	500	600	1000
Overload pressures	bar	32	120	200	500	800	900	900	900	1000	1000	1600
Burst pressure Mechanical connectio	bar	200	300			2000 (ISO 1					2000	3000
Mechanical connectio	11 7					(ISO 1						
Tightening torque, rec	omme	ended				(G1/4)					-	
Parts in contact with f		J				connec	-	Stainle		l		
					Seal:			FKM fo			for G1/	2
Output data												
Output signal, permitte	ed loa	d resis	stance		4 20	mA, 2-	conduc	tor				
					0 20	R _{Lmax.} =	(U _B - 1	0 V) / 2	20 mA [kΩ]		
				,		mA, 3-R				O1		
Accuracy acc. to DIN	16086					25 % F		V) / Z	, 111, t [it	22]		
terminal based	10000	,		:	$\leq \pm 0.2$	25 % FS	S max.					
Accuracy, B.F.S.L.						6 % FS						
						25 % F						
Temperature compens	sation					05 % F						
Zero point	notion					1 % FS 05 % F				-	-	
Temperature compens	salion					105 % F 11 % FS						
Non-linearity acc. to D	IN 16	086.				5 % FS		iux.				
terminal based		,				100 ba		% FS	max.)			
Hysteresis					≤ ± 0.1	% FS	max.					
Repeatability			-		≤ ± 0.05 % FS							
Rise time					≤ 1.0 ms							
Long-term drift					≤ ± 0.1 % FS typ. / year							
Environmental cond	itions											
Compensated temper	ature	range			-25 +							
Operating temperature	e rang	je ²⁾				-85 °C /		+85 °C				
Storage temperature						-100 °C						
Fluid temperature ran	ge 2)					-100 °C			°C			
(€ mark					EN 61000-6-1 / 2 / 3 / 4							
գա ՞ս _s mark ³⁾					Certificate-No.: E318391							
Vibration resistance a DIN EN 60068-2-6 at		500 Hz			≤ 25 g							
	Protection class acc. to DIN EN 60529 IP 67 (M12x1 when an IP 67 mating connector is used) IP 68 (jacketed cable)					sed)						
Other data					50 ()		2 00010)					
Supply voltage					10 30	0 V DC	2-cond	ductor /	3-cond	ductor		
when applied acc. to I	JL sp	ecifica	tions		- limite	d energ 10/1585	gy - acc	c. to 9.3	3 UL 61		lass 2;	
Residual ripple of sup	ply vo	ltage			≤ 5 %					•	•	
Current consumption					≤ 25 m	ıΑ						
Additional protection against water, humidity and vibration					Encapsulation of the device, cable outlet with strain relief, heat shrink sleeving						rain	
Life expectancy					>10 million cycles (0 100 % FS)							
Weight						plus 9			/			
Note: Reverse pola	rity pr	otectio	n of th						, overri	ide and	short	circuit
	, nrovi					-		_				

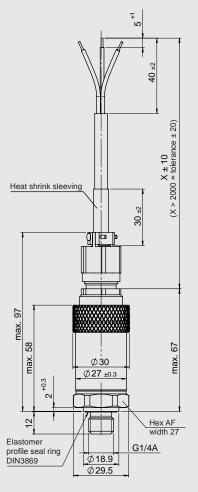
protection are provided.

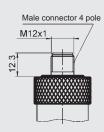
FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

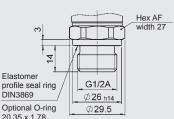
- 1) 1000 bar only with mech. connection G1/2 A ISO1179-2 and vice versa 2) -25 °C with FKM seal, -40 °C on request 3) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1

EN 18.304.1.0/02.18

Dimensions:







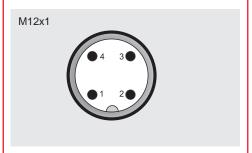
Cable assignment:

Lead	HDA 48X0-A	HDA 48X0-E
black	n.c.	+U _B
Brown	Signal +	Signal
Blue	Signal -	0 V

Cable type:

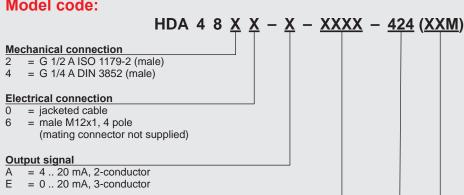
Ölflon cable 3 x 0.75 mm² shielded. Outer sheath FEP black Outer diameter 5.9 ±0.15 mm

Pin connections:



Pin	HDA 48X6-A	HDA 48X6-E	
1	Signal +	+U _B	
2	n.c.	n.c.	
3	Signal -	0 V	
4	n.c.	Signal	

Model code:



Measuring ranges in bar 0016; 0060; 0100; 0150; 0250; 0300; 0350; 0400; 0500; 0600; 1000 (only with mech. connection G1/2")

Modification number

424 = iron and steel works

Cable length in metres

06; 10; 15; 20; 25; 30

On instruments with a different modification number, please read the label or the technical amendment details supplied with the instrument.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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YDAC INTERNATIONAL



Pressure Transmitter HDA 4100

Absolute pressure

Accuracy 0.5 %



Description:

The pressure transmitter series HDA 4100 has a ceramic pressure measurement cell with thick-layer strain gauge which has been specially developed for measuring absolute pressure in the low-pressure range.

The output signals 4 .. 20 mA or 0 .. 10 V allow connection of all HYDAC **ELECTRONIC GMBH measurement and** control devices as well as industry standard open- and closed-loop control instruments.

The main fields of application are lowpressure applications in hydraulics and pneumatics, particularly in refrigeration and air-conditioning technology and pharmaceutical industries.

Technical data:

Input data			
Measuring ranges	bar	1	2.5
Overload pressures	bar	3	8
Burst pressure	bar	5	12
Mechanical connection	G1/4 A I G1/2 B		
Tightening torque, recommended	20 Nm (G1/4);	45 Nm (G1/2)
Parts in contact with fluid	Sensor	cell: Ce	G1/2) / FKM / EPDM
Output data			
Output signal, permitted load resistance	4 20 n R _{Lmax} = (0 10 \ R _{Lmin} = 2	(U _B - 8 ' /, 3-con	onductor V) / 20 mA [kΩ] iductor
Accuracy acc. to DIN 16086, terminal based	≤ ± 0.5 ≤ ± 1.0		
Accuracy, B.F.S.L.	≤ ± 0.25 ≤ ± 0.5	% FS n	nax.
Temperature compensation Zero point	$\leq \pm 0.03$	3 % FS	/ °C typ. / °C max.
Temperature compensation Span	$\leq \pm 0.02$ $\leq \pm 0.03$	2 % FS 3 % FS	/ °C typ. / °C max.
Non-linearity acc. to DIN 16086, terminal based	≤ ± 0.5	% FS n	nax.
Hysteresis	≤ ± 0.4	% FS n	nax.
Repeatability	≤ ± 0.1	% FS	
Rise time	≤ 1 ms		
Long-term drift	≤ ± 0.3	% FS t	yp. / year
Environmental conditions			
Compensated temperature range	-25 +8		
Operating temperature range 1)	-40 +8	35 °C / -	-25 +85 °C
Storage temperature range	-40 +1	100 °C	
Fluid temperature range 1)	-40 +1	100 °C	/ -25 +100 °C
(€ mark	EN 610	00-6-1	/2/3/4
c Mus mark 2)	Certifica	te no.:	E318391
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g		
Shock resistance acc. to DIN EN 60068-2-27	≤ 100 g	/ 6 ms	
Protection class acc. to DIN EN 60529 3)	IP 67 - N	M12x1	(14 M18) male connector onnector EN175301-803
Other data			
Supply voltage when applied acc. to UL specifications	12 30 - limited	V DC 3 energy	2-conductor 3-conductor - acc. to 9.3 UL 61010; Class 2; LPS UL 60950
Residual ripple of supply voltage	≤ 5 %		
Current consumption	≤ 25 mA	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	
Life expectancy			cles (0 100 % FS)
Weight	~ 150 g		,
Note: Reverse polarity protection of the supply			Itage, override and short circuit

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit rotection are provided.

FS (Full Scale) = relative to complete measuring range

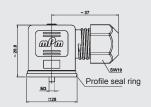
B.F.S.L. = Best Fit Straight Line

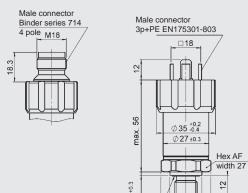
- 1) -25 °C with FKM or EPDM seal, -40 °C on request 2) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1

³⁾ With mounted mating connector in corresponding protection class

EN 18.314.4/02.18

Dimensions:

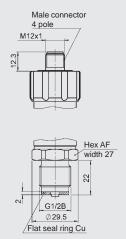




Elastomer

profile seal

ring DIN3869



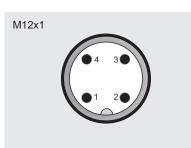
Pin connections:



HDA 41X4-A	HDA 41X4-B	
n.c.	+U _B	
Signal +	Signal	
Signal -	0 V	
n.c.	n.c.	
	n.c. Signal + Signal -	n.c. +U _B Signal + Signal Signal - 0 V



Pin	HDA 41X5-A	HDA 41X5-B	
1	Signal +	+U _B	
2	Signal -	0 V	
3	n.c.	Signal	
<u></u>	Housing	Housing	



Pin	HDA 41X6-A	HDA 41X6-B	
1	Signal +	+U _B	
2	n.c.	n.c.	
3	Signal -	0 V	
4	n.c.	Signal	

Model code:

HDA 4 1 X X - X - XXXX - 000 - X1Mechanical connection

G1/4A

Ø18.9 -0.2

= G1/2 B DIN EN 837

= G1/4 A ISO 1179-2

Electrical connection

- = male, Binder series 714 M18, 4 pole 4 (mating connector not supplied)
- = male, EN175301-803, 3 pole +PE (IP 67 mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

- = 4 .. 20 mA, 2-conductor
- = 0 .. 10 V, 3-conductor

Measuring ranges in bar

01.0; 02.5

Modification number

000 = standard

Sealing material (in contact with fluid)

- = FKM seal (e.g. for hydraulic oils)
- = EPDM seal (e.g. for refrigerants)

Connection material (in contact with fluid)

= stainless steel

Accessories:

Appropriate accessories such as mating connectors can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstraße 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01

Fax +49 (0)6897 509-1726 E-mail: electronic@hydac.com Internet: www.hydac.com

YDAC INTERNATIONAL



Differential Pressure Transmitter HPT 500

Differential pressure

Accuracy 3 %

High pressure resistance

Description:

The HPT differential pressure transmitter series was specially developed to provide an low-cost solution for differential pressure. Via an internal piston movement, the generated differential pressure is detected by means of a Hall sensor.

The sensor reacts to increasing contamination degree of the element by increasing the differential pressure signal.

The media compatibility includes hydraulic oils, lubrication oils, HFA, HFB and HFD as well as all further environment-friendly fluids 1).

The differential pressure transmitter is used in systems requiring a continuous, intelligent monitoring of the differential pressure. It is used both in mobile and in industrial applications.

Technical data:

Input data	1	1	
Measuring ranges	Differential pressu	re 2; 5; 8 bar	
	•	Aluminium	Stainless steel
Pressure resistance		160 bar	420 bar
Overload pressures		200 bar	600 bar
Burst pressure		350 bar	1600 bar
Mechanical connection	G 1/2 HN 28-22		
Tightening torque, recommended		33 Nm	100 Nm
Parts in contact with fluid ²⁾	Mech. connection Seals:	: Aluminium o	r stainless steel
	O-ring:	Standard NE	BR
	Profile seal ring:		ium version) ess steel version)
Output data			
Output signal	4 20 mA, load re 0 10 V 0.5 4.5 x ratiom		U _в -3 V / 0.02 A
Accuracy acc. to DIN 16086, terminal based	≤ ± 3 % FS typ. ≤ ± 5 % FS max. ((in rel. to ∆p)	
Temperature drift	≤ ± 0.05 % / °C m ≤ ± 0.05 % / °C m	ax. zero point	
Long-term drift	≤ ± 0.5 % FS typ.	/ year	
Environmental conditions			
Compensated temperature range	+20 °C +70 °C		
Operating temperature range	-20 °C +85 °C		
Storage temperature range	-40 °C +100 °C		
Fluid temperature range	-20 °C +85 °C		
(€ mark	EN 61000-1 / 2 / 3	3 / 4	
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g		
Shock resistance acc. to DIN EN 60068-2-27 (1 ms)	50 g		
Protection class ³⁾ acc. to DIN EN 60529	IP 67 (M12x1), IP 69 (DT 04)		
ISO 20653	IP 6K9K (DT´04)		
Other data	,	,	
Supply voltage, 3-conductor	8 30 V DC		
Supply voltage ratiometric	5 V DC ± 5 %		
Residual ripple of supply voltage	≤ 5 %		
Current consumption 3-conductor	approx. 25 mA		
Life expectancy	> 1 million cycles		ssure resistance)
Weight	~ 80 g (aluminium ~ 170 g (stainless	steel)	
Note: Reverse polarity protection of the supp	dy voltane evess vo	altane overrid	a and chart circuit

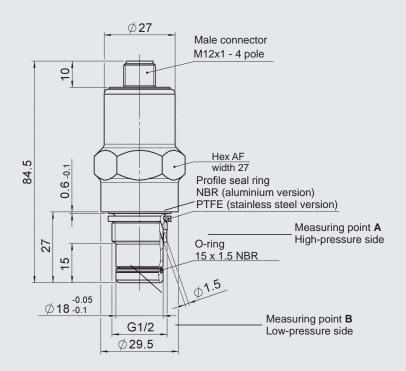
Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

- Medium compatibility with HFC on request
 Other sealing materials on request
 With mounted mating connector in corresponding protection class

EN 18.612.1/02.18

Dimensions:



Model code: HPT 5 0 X - X - XXXX - X - 000**Electrical connection** = male M12x1, 4 pole = male DT04, 3 pole **Output signal** = 0 .. 10 V, 3-conductor = 4 .. 20 mA, 3-conductor = 0.5 .. 4.5 V ratiometric, 3-conductor Differential pressure ranges in bar 02.0; 05.0; 08.0 **Housing material** = aluminium

Modification number

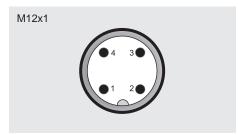
= stainless steel

000 = standard

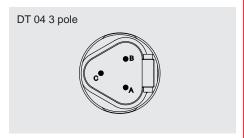
Accessories:

Appropriate accessories, such as connector blocks, available on request

Pin connections:

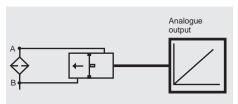


Pin	HPT 506
1	+U _B
2	n.c.
3	0 V
4	Signal

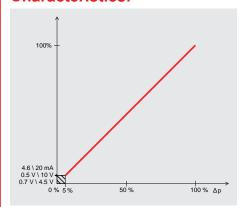


Pin	HPT 50K	
A	+U _B	
W	Signal	
C	0 V	

Function:



Characteristics:



Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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YDAC INTERNATIONAL



Pressure Transmitter HDA 4700 Ex applications

Relative pressure

Accuracy 0.25 %

Flameproof enclosure ATEX, IECEx, CSA, triple approval



Description:

The HDA 4700 electronic pressure transmitter series with flameproof enclosure has triple approval acc. to ATEX, CSA and IECEx which ensures the instrument is universally suitable for use in potentially explosive atmospheres around the world.

Each instrument is certified by the three approvals organizations and is labelled acc. ly. Therefore there is no longer any need to stock multiple devices with separate individual approvals.

As with the industry model of the HDA 4700, those with triple approval have a proven, fully welded sensor cell with a thin-film strain gauge on a stainless stell membrane without internal seal.

The main fields of application are in mining and the oil & gas industry, e.g. in underground vehicles, hydraulic power units, blow-out preventers (BOPs), drill drives or valve actuation stations as well as in areas with high levels of dust contamination.

Protection types and applications:

cCSA{us} Explosionproof - Seal not required Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4

ATEX Flameproof

I M2 ExdIMb

II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 .. 130 °C Db

IECEx Flameproof

Fx d I Mb Ex d IIC T6, T5 Gb

Ex tb IIIC T110 .. 130 $^{\circ}$ C Db

Technical data:

Input data												
Measuring ranges	bar	6	16	40	60	100	250	400	600	1000	1600	2000
Overload pressures	bar	15	32	80	120	200	500	800	1000	1600	2400	3000
Burst pressure	bar 1	00	200	200	300	500	1000	2000	2000	3000	3000	4000
Mechanical connection G1/4 A ISO 1179-2 G1/2 B DIN EN 837												
Tightening torque, re	commer	ndec	1			20 Nm	(G 1/4); 45 N	m (G 1	/2)		
Parts in contact with	fluid					Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301; 1.4548 Seal: FKM				.4404;		
Conduit, housing ma	terial					1.4435	; 1.440)4				
Output data												
Output signal, permit			istance			4 20 R _{Lmax} =	(UB - 8	8 V) / 2		kΩ]		
Accuracy acc. to DIN terminal based	16086,					≤ ± 0.2 ≤ ± 0.5	5 % FS % FS	S typ. max.				
Accuracy, B.F.S.L.						$\leq \pm 0.1$ $\leq \pm 0.2$						
Temperature comper Zero point	sation					$\leq \pm 0.0$ $\leq \pm 0.0$	15 % F	S/°C	max.			
Temperature comper Span	sation					≤ ± 0.008 % FS / °C typ. ≤ ± 0.015 % FS / °C max.						
Non-linearity acc. to learning based	DIN 160	86,				≤ ± 0.3	% FS	max.				
Hysteresis						≤ ± 0.1	% FS	max.				
Repeatability						≤ ± 0.0	5 % FS	3				
Rise time						≤ 1.5 m	าร					
Long-term drift						≤ ± 0.1	% FS	typ./y	ear			
Environmental cond	litions											
Compensated tempe						-25 +						
Operating/ambient te	mperatu	ıre r	ange ²)3)		T6, T11 T5:	T	a = -40			+60 +80	
Storage temperature						-40 +						
Fluid temperature rar	nge ²⁾³⁾					T6, T11 T5:					+60 +80	
(€ mark						EN 610 EN 600			/ 4			
Vibration resistance a DIN EN 60068-2-6 at		00 H	Z			≤ 10 g						
Protection class acc. to DIN EN 60529 IP 65 (Vented Gauge), IP 69 (Sealed Gauge) IP 6K9K (Sealed Gauge)						ige) ———						
Other data												
Supply voltage						8 30	V DC					
						≤ 5 %						
Current consumption ≤ 25 mA												
Life expectancy 4)	Life expectancy ⁴⁾ > 10 million cycles 0 100 % FS											
Weight						~ 300 (
Note: Reverse po	larity pro	otec	tion of	the su	pply vo	oltage, e	excess	voltage	e, over	ride an	d short	circuit

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

0) Other output signals on request T130 °C with Ta = -40 \cdot +80 °C/ -20 \cdot +80 °C with electr. connection

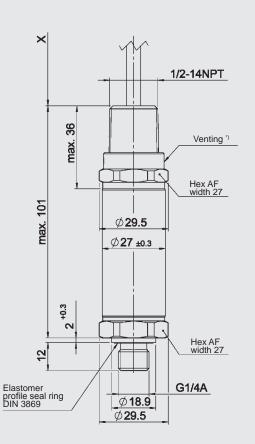
single lead possible
-20 °C with FKM seal, -40 °C on request

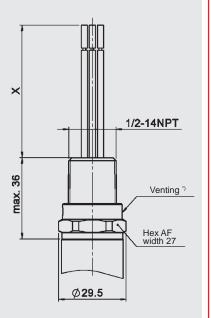
⁴⁾ Measuring ranges ≥ 1000 bar: > 1 million cycles (0 .. 100 % FS)

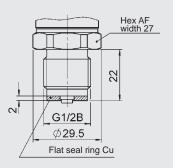
Fields of a	oplication:		
	Single leads Electrical connection "9"		Jacketed cable Electrical connection "G"
CSA		Explosionprod	of (seal not required)
ATEX		Fla	ameproof
IECEx		Fla	ameproof
_c CSA _{us}		Class I Group A Class II Group E Class III Type 4	B, C, D, T6, T5 ;, F, G
ATEX		I M2 ExdI II 2G ExdIIC	
	II 2D Ex tb IIIC T110 130 °C Db		II 2D Ex tb IIIC T110 °C Db
IECEx		Ex d I Mb Ex d IIC T6, T5	Gb
	Ex tb IIIC T110 130 °C Db		Ex tb IIIC T110 °C Db

Model code: HDA 4 7 \times \times - \wedge - \times \times - \wedge - \times \times - \wedge Mechanical connection = G1/2 B DIN EN 837 (only for measuring ranges ≥ 1600 bar) = G1/4 A ISO 1179-2 **Electrical connection** = 1/2-14 NPT Conduit (male thread), single leads = 1/2-14 NPT Conduit (male thread), jacketed cable Output signal A = 4..20 mA, 2-conductorMeasuring ranges in bar 0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600; 1000 (only with mechanical connection code "4") 1600; 2000 (only with mechanical connection code "1") **Approval** = CSA Explosionproof - Seal not required ATEX Flameproof IECEx Flameproof Type of measurement cell S = Sealed Gauge (seale V = Vented Gauge (venter = Sealed Gauge (sealed to atmosphere) ≥ 40 bar = Vented Gauge (vented to atmosphere) < 40 bar Modification number 000 = standard Cable length in m Standard = 2 m

Dimensions:

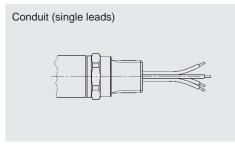




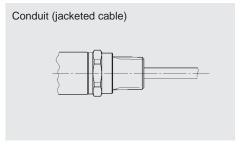


*) optional depending on type "Sealed Gauge" / "Vented Gauge"

Pin connections:



Lead	HDA 47X9-A
red	Signal +
black	Signal -
green-yellow	Housing



Lead	HDA 47XG-A
white	Signal -
brown	Signal +
green	n.c.
yellow	n.c.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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EN 18.343.3/02.18

DAC INTERNATIONAL



Pressure Transmitter HDA 4300 Ex applications

Relative pressure

Accuracy 0.5 %

Intrinsically Safe Non-Incendive **CSA** approval



Description:

The pressure transmitter HDA 4300 in CSA version has been specially developed for the North American market for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4300 in CSA version has a ceramic measurement cell with thick-layer strain gauge for measuring relative pressure in the low pressure range.

Intended fields of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

Protection types and applications: Intrinsically safe:

- Class I Div. 1 Group A, B, C, D T6	[C, US]
 Class I Zone 0 AEx ia IIC T6 	[US]
- Ex ia IIC T6	[C]
Class I, II, IIIDiv. 1Group A, B, C, D, E, F, G T6	[C, US]

Non-incendive:	
- Class I Div. 2 Group A, B, C, D T4A	[C, US]
 Class I Zone 2 AEx nL IIC T4 	[US]
- Class I Zone 2 Ex nL IIC T4	[C]
 Class I, II, III Div. 2 Group A, B, C, D, F, G T4A Class I Zone 2 AEx nA II T4 	[C, US] [US]
 Class I Zone 2 Ex nA II T4 	[C]

Technical data:

Input data										
Measuring ranges 1)	bar	1	2.5	4	6	10	16	25	40	-1 1
Overload pressures	bar	3	8	12	20	32	50	80	120	3
Burst pressure	bar	5	12	18	30	48	75	120	180	5
Mechanical connection	n				G1/4 A	ISO 117	9-2			
Tightening torque, red	ommer	nded			20 Nm					
Parts in contact with f	luid				Sensor:		Ce	ramic Al	203	
					Mech. c	connecti	on: 1.4	301		
					Seal:		FK	M/EPDI	Л	
Output data										
Output signal, permitt	ed load	resista	nce		4 20 r R _{Lmax} =	nA, 2-сс (Uв - 12	onducto 2 V) / 20	r) mA [kʃ	Σ]	
Accuracy acc. to DIN terminal based	16086,				$\leq \pm 0.5$ $\leq \pm 1.0$					
Accuracy, B.F.S.L.					$\leq \pm 0.25$ $\leq \pm 0.5$					
Temperature compens	sation				≤ ± 0.02	2 % FS /	°C typ.			
Zero point					$\leq \pm 0.03$					
Temperature compens	sation				$\leq \pm 0.02$ $\leq \pm 0.03$	2 % FS / 3 % FS /	°C typ.	X.		
Non-linearity acc. to E terminal based	IN 160	86,			≤ ± 0.5	% FS m	ax.			
Hysteresis					≤ ± 0.4 % FS max.					
Repeatability					≤±0.1 % FS					
Rise time					≤ 1.5 m	S				
Long-term drift					≤ ± 0.3	% FS ty	p. / yea	r		
Environmental cond	itions									
Compensated temper	ature ra	ange			-25 +8					
Operating/ambient ter	nperati	ire rang	je		Intrinsic Non-inc			20 +6 20 +8		
Storage temperature	range				-40 +					
Fluid temperature ran						ally safe:				+60 °C +85 °C
Vibration resistance a DIN EN 60068-2-6 at		00 Hz			≤ 10 g (≤ 20 g (IPT Cor	nduit)		
Protection class acc.	to DIN I		29 / NEN	MA 3)	IP 65; NEMA4 (male connector) IP6K9K (1/2-14NPT Conduit)					
Relevant data for Ex					ii ortort	(1/2 11	111 1 01	oria arty		
Supply voltage					12 28	V DC				
Max. input current					li = 100	mA				
Max. input power					up to 28 V: Pi = 1 W					
Connection capacitance of the sensor					Ci ≤ 22 nF					
Inductance of the sensor					Li = 0 m					
Insulation voltage 4)				50 V AC, with integrated overvoltage protection acc. to EN 61000-6-2				rotection		
Other data										
Residual ripple of sup	ply volt	age			≤5%					
Current consumption					≤ 25 m/	4				
Life expectancy > 10 million cycles, 0					les, 0	100 %	FS			
Weight					~ 180 g					
Note: Reverse pola	rity prot	tection of	of the su	pply v						rt circuit

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range; B.F.S.L. = Best Fit Straight Line

- 1) psi measuring ranges on request
- ²⁾ -20 °C with FKM or EPDM seal, -40 °C on request
- 3) With mounted mating connector in corresponding protection class 4) 500 V AC on request

Electrical

connection Code for

model code

Group	1	2	3	4		
Protection type	Intrinsically safe	Intrinsically safe	Non-incendive (with field wiring)	Non-incendive		
••	Gases and dusts	Gases	Gases	Gases and dusts		
Certificate	CSA 1760344					
	Intrinsically safe	Intrinsically safe	Non-incendive	Non-incendive		
	- Class I, II, III Division 1 Group A, B, C, D, E, F, G T6	- Class I Division 1 Group A, B, C, D T6	- Class I Division 2 Group A, B, C, D T4A	- Class I, II, III Division 2 Group A, B, C, D, F, G T4A		
Application fields		- Class I Zone 0 AEx ia IIC T6	- Class I Zone 2 AEx nL IIC T4	- Class I Zone 2 Ex nA II T4		

AEx ia IIC T6 - Ex ia IIC T6

5, 9, A

9

5, 9, A

Zone 2 AEx nA II T4 IP 6x

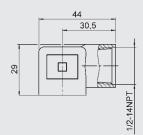
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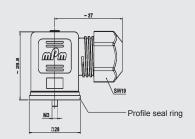
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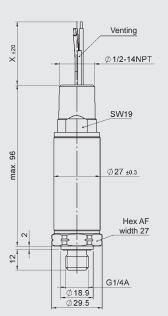
Class I Zone 2 Ex nL IIC T4

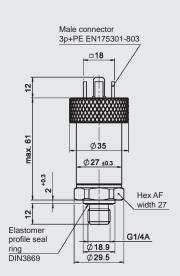
Model code: HDA 4 3 $\frac{4}{3}$ $\frac{X}{3}$ - $\frac{A}{3}$ - $\frac{XXXX}{3}$ - $\frac{C}{3}$ $\frac{N}{3}$ $\frac{X}{3}$ - $\frac{000}{3}$ - $\frac{X}{3}$ $\frac{1}{3}$ $\frac{(2m)}{3}$ **Mechanical connection** 4 = G1/4 A ISO 1179-2**Electrical connection** = male EN175301-803, 3 pole + PE (IP67 mating connector supplied) = 1/2-14 NPT Conduit (male thread), single leads A = male EN175301-8033 pole + PE (1/2" Conduit female thread) Output signal A = 4 .. 20 mA, 2-conductor Measuring ranges in bar 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040; 0001(-1 .. 1) $\frac{\mathsf{Approval}}{\mathsf{C} = \mathsf{CSA}}$ Insulation voltage N = 50 V AC to housingProtection types and applications (code) A = Group 1B = Group 2 and 3C = Group 4Modification number 000 = standard Sealing material (in contact with fluid) = FKM seal (e.g. for hydraulic oils) E = EPDM seal (e.g. for refrigerants) Connection material (in contact with fluid) 1 = stainless steel Cable length in m (only for electr. connection code "9") Standard = 2 m

Dimensions:

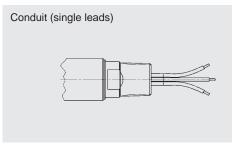








Pin connections:



Lead	HDA 43X9-A
green	Signal +
white	Signal -
green-yellow	Housing



Pin	HDA 43X5-A	HDA 43XA-A
1	Signal +	Signal +
2	Signal -	Signal -
3	n.c.	n.c.
T	Housing	Housing

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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EN 18.342.3/02.18

DAC INTERNATIONAL



Pressure Transmitter HDA 4700 Ex applications

Relative pressure

Accuracy 0.25 %

Intrinsically Safe Non-Incendive **CSA** approval



Description:

The pressure transmitter HDA 4700 in CSA version has been specially developed for the North American market for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4700 in CSA version has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Intended fields of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

Protection types and applications: Intrinsically safe:

- Class I Zone 0 AEx la IIC 16	[บริ]
- Ex ia IIC T6	[C]
Class I, II, III	
Div. 1	
Group A, B, C, D, E, F, G T6	[C, US]

- Class I Div. 1 Group A, B, C, D T6 [C, US]

Non-incendive:

[C, US]
[US]
[C]
[C, US]
[US]
[C]

Technical data:

Input data

Input data										
Measuring ranges 1)	bar	6	16	40	60	100	250	400	600	1000
Overload pressures	bar	15	32	80	120	200	500	800	1000	1600
Burst pressure	bar	100	200	200	300	500	1000	2000	2000	3000
Mechanical connection				G1/4 A	ISO 11	79-2				
Tightening torque, recom	mended			20 Nm						
Parts in contact with fluid				Stainle	ss stee				548; 1.4	4435;
				Seal:		1.440 FKM	04; 1.43	01		
Output data										
Output signal, permitted I	oad resista	ance			mA, 2-с (Uв - 1			kΩ]		
Accuracy acc. to DIN 160	186,				5 % FS					
terminal based					% FS r					
Accuracy, B.F.S.L.					5 % FS 5 % FS					
Temperature compensation Zero point	on				08 % F 15 % F					
Temperature compensation	on				08 % F 15 % F					
Non-linearity acc. to DIN terminal based	16086,			≤ ± 0.3	% FS r	nax.				
Hysteresis				≤ ± 0.1	% FS r	nax.				
Repeatability				≤ ± 0.05 % FS						
Rise time				≤ 1.5 ms						
Long-term drift				≤ ± 0.1 % FS typ. / year						
Environmental conditio	ns									
Compensated temperature	re range			-25 +85 °C						
Operating/ambient tempe	erature rang	ge ²⁾		Intrinsically safe: $T_a = -40 +60 ^{\circ}\text{C} / -20 +60 ^{\circ}\text{C}$ Non-incendive: $T_a = -40 +85 ^{\circ}\text{C} / -20 +85 ^{\circ}\text{C}$						
Storage temperature range				-40 +	100 °C					
Fluid temperature range 2	2)				cally saf				/ -20 + / -20 +	
Vibration resistance acc.					(1/2-14					
DIN EN 60068-2-6 at 10					(male c					
Protection class acc. to D	IN EN 605 SO 20653	29 / NE	EMA ³⁾		NEMA 4 ((1/2-1					,
Relevant data for Ex ap	plications									
Supply voltage				12 28 V DC						
Max. input current				li = 100 mA						
Max. input power	-1			up to 28 V: Pi = 1 W						
Connection capacitance	of the sens	or		Ci ≤ 22 nF						
Inductance of the sensor				Li = 0 mH						
Insulation voltage 4)					C, with EN 610			rvoltage	e proted	ction
Other data										
Residual ripple of supply	voltage			≤ 5 %						
Current consumption				≤ 25 m	Α					
Life expectancy ⁵⁾					illion cy					
Weight				~ 150 g	g; ~ 300	g (1/2	-14 NP	T Cond	uit)	
Note: Reverse polarity	Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit									

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit Note: protection are provided.

FS (Full Scale) = relative to complete measuring range; B.F.S.L. = Best Fit Straight Line

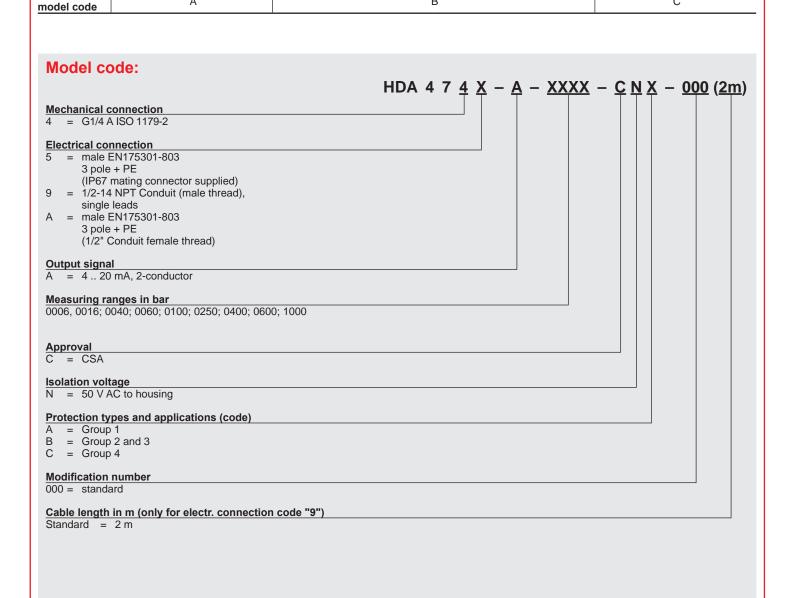
- 1) psi measuring ranges on request 2) -20 °C with FKM seal, -40 °C on request 3) With mounted mating connector in corresponding protection class 4) 500 V AC on request
- ⁵⁾ Measuring range 1000 bar: > 1 million cycles (0 .. 100 % FS)

Code for

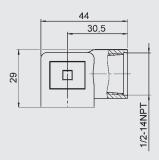
Fields of application:								
Group	1	2	3	4				
Protection	Intrinsically safe	Intrinsically safe	Non-incendive (with field wiring)	Non-incendive				
type	Gases and dusts	Gases	Gases	Gases and dusts				
Certificate		CSA 1	760344					
	Intrinsically safe	Intrinsically safe	Non-incendive	Non-incendive				
Application	- Class I, II, III Division 1 Group A, B, C, D, E, F, G T6	- Class I Division 1 Group A, B, C, D T6	- Class I Division 2 Group A, B, C, D T4A	- Class I, II, III Division 2 Group A, B, C, D, F, G T4A				
fields		- Class I Zone 0 AEx ia IIC T6 - Ex ia IIC T6	- Class I Zone 2 AEx nL IIC T4 - Class I Zone 2 Ex nL IIC T4	- Class I Zone 2 Ex nA II T4 - Class I Zone 2 AEx nA II T4 IP 6x				
Electrical connection	9	5, 9, A	5, 9, A	9				

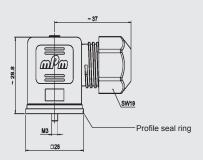
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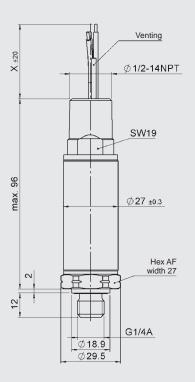
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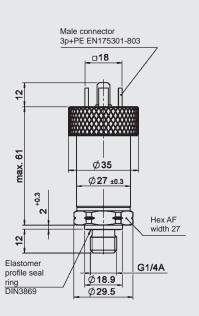


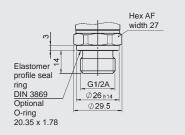
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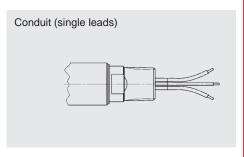




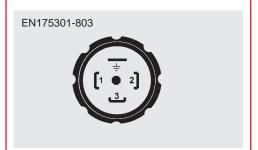




Pin connections:



Lead	HDA 47X9-A
green	Signal +
white	Signal -
green-yellow	Housing



Pin	HDA 47X5-A	HDA 47XA-A
1	Signal +	Signal +
2	Signal -	Signal -
3	n.c.	n.c.
<u></u>	Housing	Housing

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Internet: www.hydac.com

EN 18.342.3/02.18

DACINTERNATIONAL



Pressure Transmitter HDA 4300 Ex applications

Relative pressure

Accuracy 0.5 %

Intrinsically Safe **IECEx Australia approval**



Description:

The pressure transmitter HDA 4300 IECEx intrinsically safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000

As with the industrial version, the HDA 4300 with IECEx intrinsically safe approval has the field-proven ceramic measurement cell with thick-layer strain gauge.

Intended fields of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high dust contamination, e.g. in mills.

Protection types and applications:

Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIC T6 Gb

Technical data:

Input data												
Measuring ranges	bar	1	2.5	4	6	10	16	25	40	-1 1		
Overload pressures	bar	3	8	12	20	32	50	80	120	3		
Burst pressure	bar	5	12	18	30	48	75	120	180	5		
Mechanical connection	1				G1/4 A	ISO 117	9-2					
Tightening torque, reco	mmeno	led			20 Nm							
Parts in contact with flu	uid				Sensor:			Cerami	С			
					Mech. c	onnecti	on:	1.4301				
					Seal:			FKM/EF	PDM			
Output data												
Output signal, permitte	d load r	esistan	ce		4 20 r				_			
) mA [kΩ	2]			
Accuracy acc. to DIN 1	6086,				$\leq \pm 0.5$ $\leq \pm 1.0$	% FS ty	p.					
terminal based Accuracy, B.F.S.L.					≤ ± 1.0 ≤ ± 0.25					-		
Accuracy, B.F.S.L.					$\leq \pm 0.23$ $\leq \pm 0.5$							
Temperature compensation	ation				$\leq \pm 0.02$							
Zero point	allon				$\leq \pm 0.03$							
Temperature compensation	ation				≤ ± 0.02							
Span					$\leq \pm 0.03$			(.				
Non-linearity acc. to DI	N 1608	6,			\leq ± 0.5	% FS m	ax.					
terminal based					4 . 0 4	0/ 50						
Hysteresis					≤±0.4 % FS max.							
Repeatability					≤±0.1% FS							
Rise time					≤ 1.5 ms							
Long-term drift	tions.				≤ ± 0.3 % FS typ. / year							
Environmental condit Compensated tempera		200			25 +0	05 °C						
Operating/ambient tem					-25 +85 °C T _a = -20 +60 °C							
Storage temperature ra		e range			-40 +100 °C							
Fluid temperature rang					T _a = -40 +60 °C / -20 +60 °C							
Vibration resistance ac					≤ 20 g	100	07-20	100 (<u> </u>			
DIN EN 60068-2-6 at 1) Hz			= 20 g							
Protection class acc. to) ³⁾		IP 67		-					
Relevant data for Ex a	applica	tions										
Supply voltage					12 28 V DC							
Max. input current					li = 100 mA							
Max. input power					Pi = 1 V	V						
Connection capacitano	e of the	sensor			Ci ≤ 22 nF							
Inductance of the sens	or				Li = 0 mH							
Insulation voltage 4)					50 V AC, with integrated overvoltage							
					protecti	on acc.	to EN 6	1000-6-2	2			
Other data	L 10				- F 0/							
Residual ripple of supp	iy volta	ge			≤ 5 %		-					
Current consumption					≤ 25 m/			100.07	-0			
1.16					> 1() mi	llion cvc	ies ()	100 % F	-S			
Life expectancy			Life expectancy > 10 million cycles, 0 100 % FS Weight ~ 180 g									

protection are provided.

FS (Full Scale) = relative to complete measuring range B.F.S.L. = Best Fit Straight Line

- 1) -20 °C with FKM or EPDM seal, -40 °C on request 2) With M12x1 male connector, only up to -25 °C
- 3) With mounted mating connector in corresponding protection class

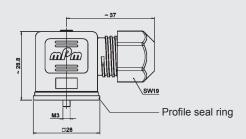
4) 500 V AC on request

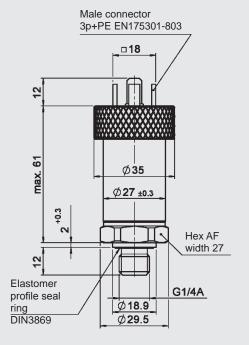
EN 18.105.0/02.18

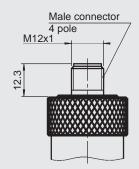
Fields of applicat	ion:		
Certificate		IECEx TSA 09.0041	X
Protection types	Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb	Ex ia IIC T6 Gb
	Mining	Gases	Gases
	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier

Model code: HDA 4 3 $\frac{4}{3}$ $\frac{X}{3}$ - $\frac{A}{3}$ - $\frac{XXXX}{3}$ - $\frac{1}{3}$ $\frac{N}{3}$ $\frac{1}{3}$ - $\frac{000}{3}$ - $\frac{X}{3}$ $\frac{1}{3}$ **Mechanical connection** 4 = G1/4 A ISO 1179-2**Electrical connection** = male, EN 175301-803, 3 pole + PE (IP 67 mating connector supplied) = male M12x1, 4 pole (mating connector not supplied) Output signal A = 4 .. 20 mA, 2-conductor Measuring ranges in bar 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040 0001 (-1 .. 1) Approval = IECEx Australia Insulation voltage N = 50 V AC to housingProtection types and applications (code) = Ex ia I Ma Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIC T6 Gb **Modification number** 000 = standardSeal material (in contact with fluid) F = FKM seal (e.g. for hydraulic oils) E = EPDM seal (e.g. for refrigerants) Connection material (in contact with fluid) 1 = stainless steel

Dimensions:

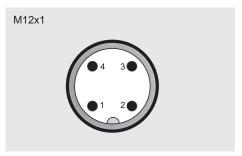








Pin	HDA 4345-A	
1	Signal +	
2	Signal -	
3	n.c.	
<u> </u>	Housing	



Pin	HDA 4346-A	
1	Signal +	
2	n.c.	
3	Signal -	
4	n.c.	

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstraße 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726

E-mail: electronic@hydac.com Internet: www.hydac.com

YDAC INTERNATIONAL



Pressure Transmitter HDA 4700 Ex applications

Relative pressure

Accuracy 0.25 %

Intrinsically Safe **IECEx Australia approval**



Description:

The pressure transmitter HDA 4700 IECEx intrinsically safe version has been especially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model of the HDA 4700, devices with IECEx intrinsically safe approval have a proven, fully welded sensor cell with a thin-film strain gauge on a stainless steel membrane without internal seal.

Intended fields of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high dust contamination, e.g. in mills.

Protection types and applications:

Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIC T6 Gb

Ex ia I Ma

Technical data:

Input data										
Measuring ranges ¹⁾	bar	6	16	40	60	100	250	400	600	1000
Overload pressures	bar	15	32	80	120	200	500	800	1000	1600
Burst pressure	bar	100	200	200	300	500	1000	2000	2000	3000
Mechanical connection				G1/4 A	ISO 11	79-2				
Tightening torque, recomme	nded			20 Nm						
Parts in contact with fluid				Stainle	SS				35; 1.44	104;
				steel:			; 1.454	8		
				Seal:		FKM				
Output data										
Output signal, permitted load		nce		R _{Lmax} =	(Uß -	conduct 12 V) /		[kΩ]		
Accuracy acc. to DIN 16086				≤ ± 0.2						
terminal based				≤ ± 0.5						
Accuracy, B.F.S.L.				≤ ± 0.1						
		,		≤ ± 0.3						
Temperature compensation						S/°Ct				
Zero point Temperature compensation		,				S/°Cı				
Span						3 / C i				
Non-linearity acc. to DIN 160	186				% FS		nux.			
terminal based	,00,			0.0	70.0	max.				
Hysteresis				≤ ± 0.1 % FS max.						
Repeatability				≤±0.05 % FS						
Rise time				≤ 1.5 ms						
Long-term drift				≤ ± 0.1 % FS typ. / year						
Environmental conditions										
Compensated temperature r	ange			-25 +						
Operating/ambient temperat	ure rang	je ¹⁾²⁾		T _a = -40 +60 °C / -20 +60 °C						
Storage temperature range					·100 °C					
Fluid temperature range 1)2)				T _a = -40 +60 °C / -20 +60 °C						
Vibration resistance acc. to				≤ 20 g						
DIN EN 60068-2-6 at 10 5										
Protection class acc. to DIN		29 ³⁾		IP 67			,			
Relevant data for Ex applic	ations									
Supply voltage				12 28 V DC						
Max. input current				li = 100 mA						
Max. input power				Pi = 1 W						
Connection capacitance of the	ne sens	or		Ci ≤ 22 nF						
Inductance of the sensor				Li = 0 mH 50 V AC, with integrated overvoltage protection						
Insulation voltage4)						integra 000-6-2		rvoltag	e prote	ction
Other data										
Residual ripple of supply vol	tage			≤5%						
Current consumption				≤ 25 m						
Life expectancy ⁵⁾						cles (0	100	% FS)		
Weight				~ 150 <u>(</u>						
Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit										

of the supply voltage, excess voltage, override protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

- $^{\mbox{\tiny 1)}}$ -20 °C with FKM seal, -40 °C on request
- ²⁾ With M12x1 male connector, only up to -25 °C
- 3) With mounted mating connector in corresponding protection class 4) 500 V AC on request
- 5) Measuring range 1000 bar: > 1 million cycles (0 .. 100 % FS)

F	اما	ahl	of	an	nl	icat	ion
		ıuə	VI.	ap	νı	ıcaı	.1011

Certificate	IECEx TSA 09.0041X						
Protection types	Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb	Ex ia IIC T6 Gb				
	Mining	Gases	Gases				
	Protection type:	Protection type:	Protection type:				
	intrinsically safe ia	intrinsically safe ia	intrinsically safe ia				
	with barrier	with barrier with barrier with					

Model code:

HDA 4 7 $\frac{4}{9}$ $\frac{X}{9}$ - $\frac{A}{9}$ - $\frac{XXXX}{9}$ - $\frac{1}{9}$ $\frac{N}{9}$ $\frac{1}{9}$ - $\frac{000}{9}$

Mechanical connection

4 = G1/4 A ISO 1179-2

Electrical connection

5 = male, EN175301-803, 3 pole + PE (IP 67 mating connector supplied)

6 = male M12x1, 4 pole (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor

Measuring ranges in bar 0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600; 1000

Approval

= IECEx Australia

Insulation voltage
N = 50 V AC to housing

Protection types and applications (code)

= Ex ia I Ma

Ex ia IIC T6 Ga

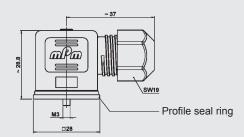
Ex ia IIC T6 Ga/Gb

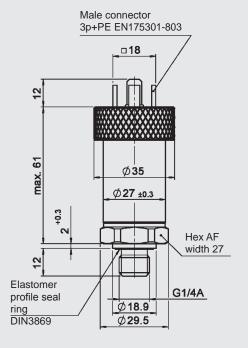
Ex ia IIC T6 Gb

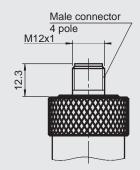
Modification number

 $\overline{000}$ = standard

Dimensions:

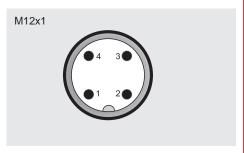








Pin	HDA 4745-A	
1	Signal +	
2	Signal -	
3	n.c.	
I	Housing	



Pin	HDA 4746-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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E-mail: electronic@hydac.com Internet: www.hydac.com

DAC INTERNATIONAL



Pressure Transmitter HDA 4300 Ex applications

Relative pressure

Accuracy 0.5 %

Intrinsically Safe, Dustproof enclosure Non-Sparking ATEX, IECEx, double approval



Description:

The pressure transmitter HDA 4300 is a compact pressure transmitter (intrinsically safe version) which is used to measure relative pressures in hydraulics and pneumatics. The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices in potentially explosive atmospheres.

As with the industry model, the ATEX/IECEx version HDA 4300 has a ceramic measurement cell with thick-layer strain gauge.

Intended fields of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high dust contamination, e.g. in mills.

Protection types and applications:

ATEX

I M1	Fx ia		Ma
I IVI I		•	
II 1G	Ex ia	IIC	T6 Ga
II 1/2G	Ex ia	IIC	T6 Ga/Gb
II 2G	Ex ia	IIC	T6 Gb
II 3G	Ex nA	IIC	T6, T5, T4 Gc
II 3G	Ex ic	IIC	T6, T5, T4 Gc
II 1D	Ex ia	IIIC	T85 °C Da
II 1D	Ex ta	IIIC	T80/90/100 °C
		T_{500}	90/ T ₅₀₀ 100/T ₅₀₀ 110 °C Da
II 2D	Ex tb	IIIC	T80/T90/T100 °C Db
II 3D	Ex tc	IIIC	T80/T90/T100 °C Dc
II 3D	Ex ic	IIIC	T80/T90/T100 °C Dc
IECE x			

Exia I Ma Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIC T6 Gb Ex nA IIC T6,T5,T4 Gc Ex ic IIC T6,T5,T4 Gc Ex ia IIIC T85 °C Da Ex ta IIIC T80/T90/T100 °C Da T₅₀₀90/ T₅₀₀100/T₅₀₀110 °C Da Ex tb IIIC T80/T90/T100 °C Db Ex tc IIIC T80/T90/T100 °C Dc Ex ic IIIC T80/T90/T100 °C Dc

Technical data:

Input data											
Measuring ranges	bar	1	2.5	4	6	10	16	25	40	-1 1	
Overload pressures	bar	3	8	12	20	32	50	80	120	3	
Burst pressure	bar	5	12	18	30	48	75	120	180	5	
Mechanical connection				G1/4 A	ISO 1179	-2					
Tightening torque, recomm	nended			20 Nm							
Parts in contact with fluid				Sensor:		Cer	amic				
				Mech. c	onnectio	n: 1.43	301				
				Seal:		FKN	M/EPDN	1			
Output data											
Output signal, permitted lo	ad resista	ince		4 20 r	nA, 2-cor	nducto	r				
3 .,,,				$R_{Lmax} =$	(U _B - 12	V) / 20	mA [kΩ	2]			
Accuracy acc. to DIN 160	36,				% FS typ						
terminal based					FS max.						
Accuracy, B.F.S.L.					% FS ty						
Tomoroustino como costi					% FS ma						
Temperature compensation Zero point	ori			≤ ± 0.02 ≤ ± 0.03	2 % FS / 9 8 % FS / 9	C typ. C max	Κ.				
Temperature compensation	n				% FS / °						
Span				≤ ± 0.03	8 % FS / °	°C max	Κ.				
Non-linearity acc. to DIN 1 terminal based	6086,			≤ ± 0.5	% FS ma	IX.					
Hysteresis				≤ ± 0.4 % FS max.							
Repeatability				≤±0.1 % FS							
Rise time				≤ 1.5 ms							
Long-term drift				≤ ± 0.3	% FS typ	. / yea	r				
Environmental condition	าร										
Compensated temperatur	e range			-25 +85 °C							
Operating/ambient tempe	rature ranç	ge		T6, T80	/T85 °C,	T ₅₀₀ 90	°C	Ta = -20			
				T5, T90	°C,T ₅₀₀ 1 C, T ₅₀₀ 110	00°C		Ta = -20 Ta = -20) +70	°C	
				T4	, I 500 I I U	C		Ta = -20) +85	°C	
Storage temperature rang	<u></u>			-40 +	100 °C						
Fluid temperature range 1					. +60 °C	/ -20 °(C +60	°C			
				EN 61000-6-1 / 2 / 3 / 4; EN 60079-0 / 11 / 15 / 26 / 31							
(€ mark				EN 50303							
Vibration resistance acc. t DIN EN 60068-2-6 at 10.				≤ 20 g							
Protection class acc. to D		29 ³⁾		IP 67							
Relevant data for Ex app				Ex ia, io	-	Ex n	A, ta, th	, tc			
Supply voltage				12 28	V DC		28 V D0				
Max. input current											
					mA	Max. power consumption ≤1W					
Max. input power				Pi = 1 V		Max.	power	consum	ption ≤ ′	I V V	
	f the sens	or		Pi = 1 V Ci ≤ 22	V	Max.	power	consum	ption ≤ ′	1 VV	
Max. input power Connection capacitance of Inductance of the sensor	f the sens	or			V nF	Max.	power	consum	ption ≤ ′		
Connection capacitance of Inductance of the sensor	f the sens	or	-	Ci ≤ 22 Li = 0 m	V nF nH						
Connection capacitance of Inductance of the sensor Insulation voltage ⁴⁾	f the sens	or		Ci ≤ 22 Li = 0 m 50 V AC	V nF	egrate					
Connection capacitance of Inductance of the sensor Insulation voltage ⁴⁾ Other data		or		Ci ≤ 22 Li = 0 m 50 V AC acc. to l	V nF nH C, with int	egrate					
Connection capacitance of Inductance of the sensor Insulation voltage ⁴⁾ Other data Residual ripple of supply of		or		Ci ≤ 22 Li = 0 m 50 V AC acc. to l ≤ 5 %	V nF nH C, with int EN 61000	egrate					
Connection capacitance of Inductance of the sensor Insulation voltage ⁴⁾ Other data Residual ripple of supply of Current consumption		or		Ci \leq 22 Li = 0 m 50 V AC acc. to l \leq 5 % \leq 25 mA	V nF nH D, with int EN 61000	egrate 0-6-2	d overv	oltage p			
Connection capacitance of Inductance of the sensor Insulation voltage ⁴⁾ Other data Residual ripple of supply of		or		Ci \leq 22 Li = 0 m 50 V AC acc. to l \leq 5 % \leq 25 mA	V nF nH C, with int EN 61000	egrate 0-6-2	d overv	oltage p			

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

 $^{1)}$ -20 °C with FKM seal or EPDM seal, -40 °C on request $^{2)}$ With M12x1 male connector, only up to -25 °C

3) With mounted mating connector in corresponding protection class

4) 500 V AC on request

EN 18.074.0/02.18

	<u> </u>					
Code no. for use in model code	1			9	A	С
ATEX KEMA 05 ATEX 1016X	I M1 Ex ia I Ma	II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ia IIIC T85 °C Da	II 2G Ex ia IIC T6 Gb	II 3G Ex nA IIC T6, T5 Gc	II 1D Ex ta IIIC T80/T90 °C T50090 °C, T500100 °C Da II 2D Ex tb IIIC T80/T90 °C Db	II 3G Ex ic IIC T6, T5 Gc II 3D Ex ic IIIC T80/T90 °C Dc
IECEX KEM 08.0014X	Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIIC T85 °C Da	Ex ia IIC T6 Gb	Ex nA IIC T6, T5 Gc	Ex ta IIIC T80/T90 °C T50090 °C, T500100 °C Da Ex tb IIIC T80/T90 °C Db	Ex ic IIC T6, T5 Gc Ex ic IIIC T80/T90 °C Dc
	Mining	Gases/conductive dust	Gases	Gases	Conductive dust	Gases/conductive dust
Application fields	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: non-sparking nA	Protection type: dustproof enclosure	Protection type: intrinsically safe ic with barrier
Electrical connection (see model code)	5, 6	5, 6	5, 6	6	6	5, 6

Instruments for other protection types and zones (see cover) are available upon request.

Model code:

HDA 4 3 $4 \times - A - XXXX - E \times X - 000 - X 1$

Mechanical connection

= G1/4 A ISO 1179-2

Fields of application:

Electrical connection 5 = male, EN175301

= male, EN175301-803, 3 pole + PE (IP 67 mating connector supplied)

= male M12x1, 4 pole (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor

Measuring ranges in bar

01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040; 0001 (-1 .. 1)

Approval E = ATI = ATEX **IECEx**

Insulation voltage

N = 50 V AC to housing

Protection types and applications (code)

	ATEX		IECEx	
1 =		Ex ia I Ma Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIC T6 Gb Ex ia IIIC T85 °C Da	Ex ia I Ma Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIC T6 Gb Ex ia IIIC T85 °C Da	
9 =	II 3G	Ex nA IIC T6, T5 Gc	Ex nA IIC T6, T5 Gc	
		conjunction with electr. connection leeve (see dimensions)	"6" and the impact protection meta	ıl
A =	II 1D II 2D	Ex ta IIIC T80/T90 °C T ₅₀₀ 90 °C, T ₅₀₀ 100 °C Da Ex tb IIIC T80/T90 °C Db	Ex ta IIIC T80/T90 °C Da T ₅₀₀ 90 °C, T ₅₀₀ 100 °C Da Ex tb IIIC T80/T90 °C Db	
		conjunction with electr. connection leeve (see dimensions)	"6" and the impact protection meta	ıl
C =		x ic IIC T6, T5 Gc x ic IIIC T80/T90 °C Dc	Ex ic IIC T6, T5 Gc Ex ic IIIC T80/T90 °C Dc	

Modification number

000 = standard

Sealing material (in contact with fluid) F = FKM seal (e.g. for hydraulic oils)

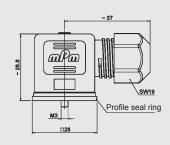
= FKM seal (e.g. for hydraulic oils)

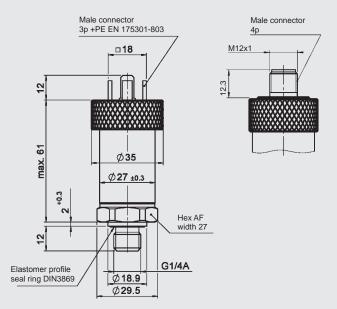
E = EPDM seal (e.g. for refrigerants)

Connection material (in contact with fluid)

= stainless steel

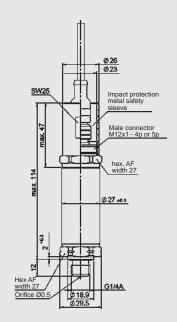
Protection types and applications (code): 1, C





With impact protection metal safety sleeve:

Protection types and applications (code): 9, A

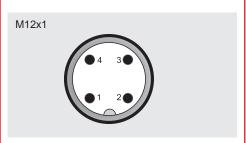


The impact protection metal safety sleeve is included. A straight mating connector is required for electrical connection. E.g. mating connector M12x1, 4 pole, straight, with 3 m shielded cable: ZBE 06S-03, part no. 6098243

Pin connections:



Pin	HDA 4345-A
1	Signal +
2	Signal -
3	n.c.
工	Housing



Pin	HDA 4346-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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DADINTERNATIONAL



Pressure Transmitter HDA 4700 Ex applications

Relative pressure

Accuracy 0.25 %

Intrinsically Safe, Dustproof enclosure Non-Sparking ATEX, IECEx, double approval



Description:

The HDA 4700 is a compact pressure transmitter (intrinsically safe version) which is used to measure relative pressures in hydraulics and pneumatics. The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices in potentially explosive atmospheres.

The pressure is measured by means of a very accurate and robust sensor with a thin-film strain gauge on a stainless steel membrane.

The main fields of application are in the oil & gas industry, gas turbines. The device is also used in mining applications as well as in locations with high dust contamination.

Protection types and applications:

AILA			
I M1	Ex ia	1	Ma
II 1G	Ex ia	IIC	T6 Ga
II 1/2G	Ex ia	IIC	T6 Ga/Gb
II 2G	Ex ia	IIC	T6 Gb
II 3G	Ex nA	IIC	T6, T5, T4 Gc
II 3G	Ex ic	IIC	T6, T5, T4 Gc
II 1D	Ex ia	IIIC	T85 °C Da
II 1D	Ex ta	IIIC	T80/90/100 °C
		T ₅₀₀	90/ T ₅₀₀ 100/T ₅₀₀ 110 °C Da
II 2D	Ex tb	IIIC	T80/T90/T100 °C Db
II 3D	Ex tc	IIIC	T80/T90/T100 °C Dc

ATEY

II 3D Ex ic IIIC T80/T90/T100 °C Dc **IECE**x

Ex ia I Ma Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb

Ex ia IIC T6 Gb Ex nA IIC T6,T5,T4 Gc Ex ic IIC T6,T5,T4 Gc Ex ia IIIC T85 °C Da

Ex ta IIIC T80/T90/T100 °C Da $T_{500}90/T_{500}100/T_{500}110~^{\circ}C~Da$

Ex tb IIIC T80/T90/T100 °C Db Ex tc IIIC T80/T90/T100 °C Dc Ex ic IIIC T80/T90/T100 °C Dc

Technical data:

recililical u	ata.											
Input data												
Measuring ranges	bar 6 16 40 60 100 250 400 600 1000 1600						2000					
Overload pressures	bar	15	32	80	120	200	500	800	1000	1600	2400	3000
Burst pressure	bar	100	200	200	300	500	1000	2000	2000	3000	3000	4000
Mechanical connection G1/4 A ISO 1179-2 G1/2 B DIN EN 837												
Tightening torque, red	commer	nded			20 Nm (G1/4); 45 Nm (G1/2)							
Parts in contact with f	fluid				Stainless steel: 1.4542; 1.4571; 1.4435; 1.4404; 1.4301; 1.4548							
					Seal: F	KM						
Output data												
Output signal, permitted load resistance					4 20 mA, 2-conductor $R_{Lmax.} = (U_B - 12 \text{ V}) / 20 \text{ mA } [k\Omega]$							
Accuracy acc. to DIN 16086, terminal based					≤ ± 0.25 % FS typ. ≤ ± 0.5 % FS max.							
Accuracy, B.F.S.L.					≤ ± 0.15 % FS typ.							

Output signal, permitted load resistance	4 20 mA, 2-conduc	
	$R_{Lmax.} = (U_B - 12 V) / 2$	20 mA [kΩ]
Accuracy acc. to DIN 16086,	\leq ± 0.25 % FS typ.	
terminal based	≤ ± 0.5 % FS max.	
Accuracy, B.F.S.L.	≤ ± 0.15 % FS typ.	
	≤ ± 0.25 % FS max.	
Temperature compensation	≤ ± 0.008 % FS / °C	
Zero point	≤±0.015 % FS / °C	
Temperature compensation	≤ ± 0.008 % FS / °C ≤ ± 0.015 % FS / °C	
Span Non linearity and to DIN 16096	≤±0.015 % FS / C	IIIdx.
Non-linearity acc. to DIN 16086, terminal based		
Hysteresis	≤ ± 0.1 % FS max.	
Repeatability	≤ ± 0.05 % FS	
Rise time	≤ 1.5 ms	
Long-term drift	≤ ± 0.1 % FS / typ. y	ear
Environmental conditions		
Compensated temperature range	-25 +85 °C	
Operating/ambient temperature range 1) 2)	T6, T80/T85 °C, T ₅₀₀ T5, T90 °C, T ₅₀₀ 100 ° T100 °C, T ₅₀₀ 110 °C T4	
Storage temperature range	-40 +100 °C	
Fluid temperature range 1) 2)	Ta = -40 +60 °C / -	20 +60 °C
(€ mark	EN 61000-6-1/2/3/4; EN 60079-0/11/15/20	
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g	
Protection class acc. to DIN EN 60529 3)	IP 67	
Relevant data for Ex applications	Ex ia, ic	Ex nA, ta, tb, tc
Supply voltage	12 28 V DC	12 28 V DC
Max. input current	li = 100 mA	
Max. input power	Pi = 1 W	Max. power consumption ≤1 W
Connection capacitance of the sensor	Ci ≤ 22 nF	
Inductance of the sensor	Li = 0 mH	
Insulation voltage 4)	50 V AC, with integra acc. to EN 61000-6-	ated overvoltage protection 2
Other data		
Residual ripple of supply voltage	≤ 5 %	

Connection capacitance of the sensor	Ci ≤ 22 nF				
Inductance of the sensor	Li = 0 mH				
Insulation voltage 4)	50 V AC, with integrated overvoltage protection acc. to EN 61000-6-2				
Other data					
Residual ripple of supply voltage	≤ 5 %				
Current consumption	≤ 25 mA				
Life expectancy 5)	> 10 million cycles (0 100 % FS)				
Weight	150 g				
Note: Reverse polarity protection of the s	cupply voltage, excess voltage, override and short circuit protection are				

provided.
FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

- 1) -20 °C with FKM seal, -40 °C on request
- 2) With M12x1 male connector, only up to -25 °C
 3) With mounted mating connector in corresponding protection class

4) 500 V AC on request

⁵⁾ Measuring ranges ≥ 1000 bar: > 1 million cycles (0 .. 100 % FS)

EN 18.075.0/02.18

Fields of application:

Code no. for use in model code	1			9	A	С
ATEX KEMA 05 ATEX 1016X	I M1 Ex ia I Ma	II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ia IIIC T85 °C Da	II 2G Ex ia IIC T6 Gb	II 3G Ex nA IIC T6, T5 Gc	II 1D Ex ta IIIC T80/T90 °C T50090 °C, T500100 °C Da II 2D Ex tb IIIC T80/T90 °C Db	II 3G Ex ic IIC T6, T5 Gc II 3D Ex ic IIIC T80/T90 °C Dc
IECEX KEM 08.0014X	Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIIC T85 °C Da	Ex ia IIC T6 Gb	Ex nA IIC T6, T5 Gc	Ex ta IIIC T80/T90 °C T50090 °C, T500100 °C Da Ex tb IIIC T80/T90 °C Db	Ex ic IIC T6, T5 Gc Ex ic IIIC T80/T90 °C Dc
Application fields	Mining Protection type: intrinsically safe ia with barrier	Gases/conductive dust Protection type: intrinsically safe ia with barrier	Gases Protection type: intrinsically safe ia with barrier	Gases Protection type: non-sparking nA	Conductive dust Protection type: dustproof enclosure	Gases/conductive dust Protection type: intrinsically safe ic with barrier
Electrical connection (see model code)	5, 6	5, 6	5, 6	6	6	5, 6

Instruments for other protection types and zones (see cover) are available upon request.

Model code:

Mechanical connection

- = G1/2 B DIN EN 837
- (only for measuring ranges ≥ 1600 bar)
- = G1/4 A ISO 1179-2

- Electrical connection
 5 = male, EN 17530 = male, EN 175301-803, 3 pole + PE (IP 67 mating connector supplied)
- 6 = male M12x1, 4 pole (mating connector not supplied)

Output signal

A = 4 .. 20 mA, 2-conductor

Measuring ranges in bar 0006; 0016; 0040; 0060; 0100;0250; 0400; 0600; 1000 (only with mechanical connection code "4") 1600; 2000 (only with mechanical connection code "1")

Approval E = ATI = ATEX **IECE**x

Insulation voltage

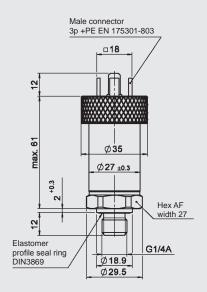
= 50 V AC to housing

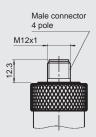
Protection types and applications (code)

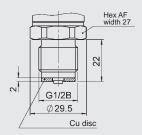
	ATEX	IECEx
1 =	M1	Ex ia I Ma Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIC T6 Gb
9 =	II 1D Ex ia IIIC T85 °C Da II 3G Ex nA IIC T6, T5 Gc	Ex ia IIIC T85 °C Da Ex nA IIC T6, T5 Gc
9 =	Only in conjunction with electr. connection safety sleeve (see dimensions)	•
A =	II 1D	Ex ta IIIC T80/T90 °C Da T ₅₀₀ 90 °C, T ₅₀₀ 100 °C Da Ex tb IIIC T80/T90 °C Db n "6" and the impact protection metal
	safety sleeve (see dimensions)	
C =	II 3G Ex ic IIC T6, T5 Gc II 3D Ex ic IIIC T80/T90 °C Dc	Ex ic IIC T6, T5 Gc Ex ic IIIC T80/T90 °C Dc

Modification number 000 = standard

Protection types and applications (code): 1,C

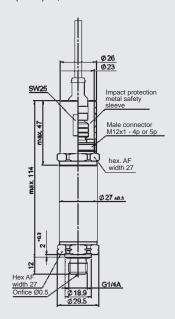






With impact protection metal safety sleeve:

Protection types and applications (code): 9, A

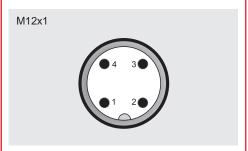


The impact protection metal safety sleeve is included. A straight mating connector is required for electrical connection. E.g. mating connector M12x1, 4 pole, straight, with 3 m shielded cable: ZBE 06S-03, part no. 6098243

Pin connections:



Pin	HDA 47x5-A
1	Signal +
2	Signal -
3	n.c.
<u></u>	Housing



Pin	HDA 47x6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAC INTERNATIONAL



Pressure Transmitter HDA 4700 Ex applications

Relative pressure

Accuracy 0.25 %

Intrinsically Safe, Dustproof enclosure Non-Sparking ATEX, IECEx, double approval redundant



Description:

This version of the pressure transmitter HDA 4700 has been specially developed to increase availability in units and systems in potentially explosive atmospheres.

Thanks to the use of two highly accurate and robust sensor cells with thin-film strain gauge on a stainless steel membrane in combination with redundant electronics, the device has a fully redundant architecture.

The two output signals are output in inverted form (signal 1: 4 .. 20 mA, signal 2: 20 .. 4 mA). This means that the energy in the intrinsically safe current circuit is kept low as the total current of the output signals at any pressure is 24 mA.

Connection is via a two-channel barrier.

The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices in potentially explosive atmospheres.

Thanks to the redundant structure, the sensor is also suitable for safety circuits/safety functions in the oil and gas industry. The device is also used in mining applications as well as in locations with high dust contamination.

Protection types and applications:

-	./\	
1	M1	Ex ia I Ma
Ш	1G	Ex ia IIC T6,T5 Ga
Ш	1/2 (Ex ia IIC T6,T5 Ga/Gb
Ш	2 G	Ex ia IIC T6,T5 Gb
Ш	1D	Ex ia IIIC T85 °C/T95 °C Da
Ш	1D	Ex ta IIIC T85/95/105 °C
		T ₅₀₀ T120/T ₅₀₀ T130/T ₅₀₀ T140 °C Da
Ш	2D	Ex tb IIIC T85/T95/T105 °C Db
Ш	3G	Ex nA IIC T6, T5, T4 Gc
Ш	3G	Ex ic IIC T6, T5, T4 Gc
Ш	3D	Ex tc IIIC T85/T95/T105 °C Dc
Ш	3D	Ex ic IIIC T85/T95/T105 °C Dc

IECEx

Ex	ia	ı	Ma
Ex	ia	IIC	T6,T5 Ga
Ex	ia	IIC	T6,T5 Ga/Gb
Ex	ia	IIC	T6,T5 Gb
Ex	ia	IIIC	T85/T95 °C Da
Ex	ta	IIIC	T85/T95/T105 °C Da
	T_{500}	T120/	T ₅₀₀ T130/T ₅₀₀ T140 °C Da
	tb		T85/T95/T105 °C Db
Ex	nΑ	IIC	T6,T5,T4 Gc
Ex	ic	IIC	T6,T5,T4 Gc
Ex	tc	IIIC	T85/T95/T105 °C Dc
Ex	ic	IIIC	T85/T95/T105 °C Dc

Technical data:

Input data

Measuring range Signal 1	bar	40	60	100	160	250	400	600	
Measuring range Signal 2	bar	40/60	60/100	100/160	160/250	250/400	400/600	600/1000	
Overload pressures	bar	80	120	200	320	500	800	1200	
Burst pressure	bar	200	300	500	800	1250	2000	2000	
Mechanical connection				G1/4 A ISO	1179-2				
Tightening torque, recomme	nded			20 Nm					
Parts in contact with fluid				Stainless stee Seal:	el: 1.4542; 1.4 FKM	4571; 1.443	5; 1.4404; 1.4	301; 1.4548	
Housing material				1.4404					
Output data									
Output signal 1				4 20 mA,	2-conductor			_	
Output signal 2 Permitted load resistance, e	ach			204 mA, $R_{\text{Lmax}} = (\text{LJ}_{\text{R}})$	2-conductor - 12 V) / 20 i	mA [kO]			
Accuracy acc. to DIN 16086				≤ ± 0.25 %	FS tvp.	[]			
terminal based	,			≤ ± 0.5 % F	S max.				
Accuracy, B.F.S.L.				≤ ± 0.15 % ≤ ± 0.25 %	FS max.				
Temperature compensation Zero point				≤ ± 0.008 % ≤ ± 0.015 %	FS / °C typ. FS / °C ma	x.			
Temperature compensation Span				≤ ± 0.008 % ≤ ± 0.015 %	FS / °C typ. FS / °C max	X.			
Non-linearity acc. to DIN 160 terminal based	086			≤ ± 0.3 % F	S max.			·	
Hysteresis				≤ ± 0.1 % F	S max.			-	
Repeatability				≤ ± 0.05 %	FS			-	
Rise time				≤ 2 ms					
Long-term drift ≤ ± 0.1 % FS typ. / year									
Environmental conditions									
Compensated temperature	range			-25 +85 °C	0				
Operating/ambient temperature range 1) 2)				$ \begin{array}{llllllllllllllllllllllllllllllllllll$					
Storage temperature range				-40 +100 °					
Fluid temperature range 1) 2)				$ \begin{array}{llllllllllllllllllllllllllllllllllll$					
(f mark				EN 61000-6	-1/2/3/4; EN	60079-0/11	/15/26/31; I	EN 50303	
Vibration resistance acc. to DIN EN 60068-2-6 at 10 5	00 Hz			≤ 20 g	· · ·				
Protection class acc. to DIN		529 ³⁾		IP 67					
Relevant data for Ex applie				Ex ia, ic Ex nA, ta, tb, tc					
Supply voltage				12 28 V D	C	12 28 V	DC		
Max. input current				li = 100 mA					
Max. input power				Pi = 0.7 W		Max. pow	er consupti	on ≤ 1 W	
Connection capacitance of t	he sen	sor		Ci ≤ 22 nF					
Inductance of the sensor Li = 0 mH									
Intrinsic safety barrier 2-channel, R_{min} = 280 Ω (e.g. Pepperl & Fuchs Z789)									
Insulation voltage 4) 50 V AC, with integrated overvoltage prote to EN 61000-6-2						ge protectio	n acc.		
Other data									
Residual ripple of supply vol	tage			≤ 5 %					
Current consumption ≤ 25 mA									
Life expectancy		·	·	> 10 million	cycles (0 '	100 % FS)			
Weight				~ 300 g					
Note: Reverse polarity p provided.			,		oltage, overri			otection are	

FS (Full Scale) = relative to complete measuring range; B.F.S.L. = Best Fit Straight Line

1) -20 °C with FKM seal, -25 °C on request 2) With M12x1 male connector, only up to -25 °C 3) With mounted mating connector in corresponding protection class 4) 500 V AC on request

EN 18.640.0/02.18

Fields of application:

Code no. for use in model code	1			9	A	С
ATEX KEMA 05 ATEX 1016X	IM1 ExialMa	II 1G Ex ia IIC T6, T5 Ga II 1/2G Ex ia IIC T6, T5 Ga/Gb II 1D Ex ia IIIC T85/T95 °C Da	II 2G Ex ia IIC T6, T5 Gb	II 3G Ex nA IIC T6, T5 Gc	II 1D Ex ta IIIC T85/T95 °C II 2D Ex tb IIIC T85/T95 °C Db	II 3G Ex ic IIC T6, T5 Gc II 3D Ex ic IIIC T85/T95 °C Dc
IECEX KEM 08.0014X	Ex ia I Ma	Ex ia IIC T6, T5 Ga Ex ia IIC T6, T5 Ga/Gb Ex ia IIIC T85/T95 °C Da	Ex ia IIC T6, T5 Gb	Ex nA IIC T6, T5 Gc	Ex ta IIIC T85/T95 °C Ex tb IIIC T85/T95 °C Db	Ex ic IIC T6, T5 Gc Ex ic IIIC T85/T95 °C Dc
	Mining	Gases/conductive dust	Gases	Gases	Conductive dust	Gases/conductive dust
Application fields	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: non-sparking nA	Protection type: dustproof enclosure	Protection type: intrinsically safe ic with barrier

Instruments for other protection types and zones (see cover) are available upon request.

Model code:

HDA 4 7 \times 6 - \times AA - \times XXXX - \times XXXX - \times \times X \times - 000

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

6 = male M12x1, 4 pole

Output signal

AA = signal 1: 4 .. 20 mA, 2-conductor signal 2: 20 .. 4 mA, 2-conductor

<u>Measuring ranges signal 1 in bar (max. operating pressure)</u> 0040; 0060; 0100; 0160; 0250; 0400; 0600

Measuring ranges signal 2 in bar

0040; 0060; 0100; 0160; 0250; 0400; 0600; 1000

Approval E = ATI = ATEX / IECEx

Isolation voltage

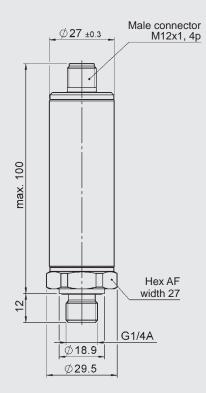
N = 50 V AC to housing

Protection types and applications (code)

	ATEX			IECEx	
1 =	I M1 II 1G	Exia I	Ma T6, T5 Ga	Ex ia I Ma Ex ia IIC T6, T5 Ga	
			T6, T5 Ga/Gb	Ex ia IIC T6, T5 Ga/Gb	
	II 2 G	Ex ia IIC	T6, T5 Gb	Ex ia IIC T6, T5 Gb	
	II 1D	Ex ia IIIC	T85/T95 °C Da	Ex ia IIC T85/T95 °C D	a
9 =	II 3G	Ex nA IIC 7	Γ6, T5 Gc	Ex nA IIC T6, T5 Gc	
			with electrical conn (see dimensions)	ection "6" and the impact pr	otection
A =	II 1D II 2D		T85/T95 °C T85/T95 °C Db	Ex ta IIIC T85/T95 °C Ex tb IIIC T85/T95 °C Db)
			with electrical conn (see dimensions)	ection "6" and the impact pr	otection
C =	II 3G		T6, T5 Gc	Ex ic IIC T6, T5 Gc	
	II 3D	Ex ic IIIC	T85/T95 °C Dc	Ex ic IIIC T85/T95 °C D	С

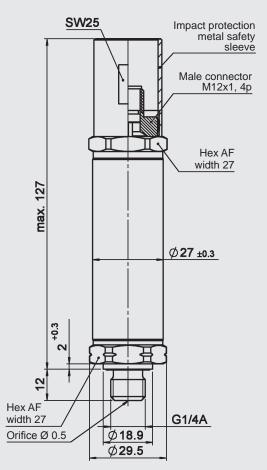
Modification number

 $\overline{000}$ = standard



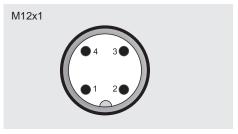
With impact protection metal safety sleeve:

Protection types and applications (code): 9, A



The impact protection metal safety sleeve is included. A straight mating connector is required for electrical connection. E.g. mating connector M12x1, 4 pole, straight, with 3 m shielded cable: ZBE 06S-03, part no. 6098243

Pin connections:



Pin	HDA 4746-AA
1	+ signal 1 (for output signal 1)
2	- signal 1 (for output signal 1)
3	+ signal 2 (for output signal 2)
4	- signal 2 (for output signal 2)

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAD INTERNATIONAL



Pressure Transmitter HDA 4400 Ex applications

Relative pressure

Accuracy 0.5 %

Flameproof enclosure ATEX, IECEx, CSA, triple approval Flush membrane



Description:

The pressure transmitter series HDA 4400 with flush membrane is certified in the ignition protection type flameproof enclosure to ATEX, IECEx and CSA. The devices have triple approval, ensuring that they are universally suitable for use in potentially explosive atmospheres around the world. Therefore it is no longer necessary to stock multiple devices with separate individual approvals.

The pressure port is achieved with a fullysealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure port could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media, or in highly viscous media.

The main fields of application are in the oil & gas industry, e.g. in hydraulic power units, drill drives or valve actuation stations. The device is also used in mining applications as well as in locations with high dust contamination.

Protection types and applications:

cCSA{us} Explosionproof - Seal not required Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4

ATEX Flameproof

I M2 ExdIMb II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 .. 130 °C Db

IECEx Flameproof

Fx d I Mb

Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 130 °C Db

Technical data:

Input data													
Measuring ranges	bar	4	6	10	16	25	40	100	250	400	600	-13	
Overload pressures	bar	8	12	20	32	50	80	200	500	800	1000	8	
Burst pressure	bar	20	30	50	80	125	200	500	1000	2000	2000	20	
Mechanical connection 1)					G1/2 A ISO 1179-2 G1/2 with additional front O-ring seal G1/4 with additional front O-ring seal								
Tightening torque, recommend	ed			20 Nr	n (G 1	/4); 4	5 Nm	(G 1/2	2)				
Parts in contact with fluid				Stainl	ess st	eel:	1.443	5; 1.4	301				
				Seal:			FKM						
				O-ring			FKM						
Conduit, housing material					5; 1.4								
Pressure transfer fluid				Silico	n-free	oil							
Output data													
Output signal, permitted load re	esista	nce ²⁾		R_{Lmax}) mA, = (Uв	- 8 V) / 20		Ω]				
Accuracy acc. to DIN 16086, terminal based					5 % F 0 % F								
Accuracy, B.F.S.L.					25 % 5 % F								
Temperature compensation Zero point					015 % 025 %								
Temperature compensation Span				≤± 0.015 % FS / °C typ. ≤± 0.025 % FS / °C max.									
Non-linearity acc. to DIN 16086, terminal based				≤±0.3 % FS max.									
Hysteresis				≤ ± 0.	4 % F	S ma	Χ.					-	
Repeatability				≤ ± 0.	1 % F	S							
Rise time				≤ 1.5 ms									
Long-term drift				≤ ± 0.3 % FS typ. / year									
Environmental conditions													
Compensated temperature ran				-25 +85 °C									
Operating/ambient temperature	rang	e 3)4)		T6, T110 °C Ta = -30 +60 °C / -20 +60 °C T5 Ta = -30 +80 °C / -20 +80 °C									
Storage temperature range				-40	+100								
Fluid temperature range 3)4)	Fluid temperature range ³⁾⁴⁾ T6, T110 °C Ta = -30 +60 °C / -20 +60 °C T5 Ta = -30 +80 °C / -20 +80 °C					;							
EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 1 / 31													
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500	Hz			≤ 10 ()								
Protection class acc. to DIN EN 60529 IP 65 (Vented Gauge), IP 69 (Sealed Gauge) IP 6K9K (Sealed Gauge)					iuge)								
Other data													
Voltage supply				8 30 V DC									
Residual ripple of supply voltage	je			≤ 5 %									
Life expectancy				> 10 r	nillion	cycle	s, 0	100 %	% FS				
Weight				~300	g								

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

1) Other mechanical connections on request

2) Other output signals on request
3) -20 °C with FKM seal, -30 °C on request
4) T130 °C with Ta = -30 .. +80 °C/ -20 .. +80 °C with electr. connection single lead possible

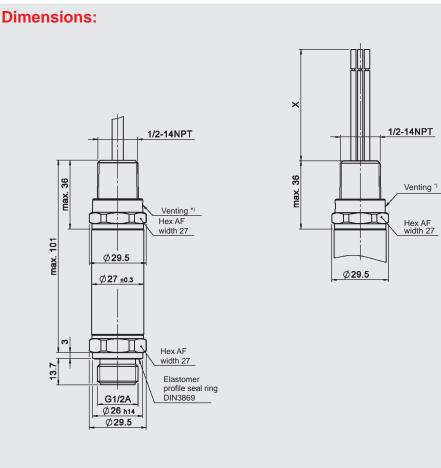
EN 18.632.0/02.18

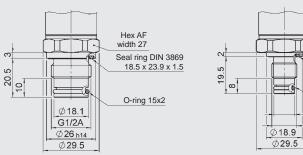
	Single leads Electrical connection "9"		Jacketed cable Electrical connection "G"		
CSA		Explosionprod	of (seal not required)		
ATEX		Fla	ameproof		
IECEx		Flameproof			
_c CSA _{us}		Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4			
ATEX		I M2 ExdI II 2G ExdIIC			
	II 2D Ex tb IIIC T110 130 °C Db		II 2D Ex tb IIIC T110 °C Db		
IECEx		Ex d I Mb Ex d IIC T6, T5	Gb		
	Ex tb IIIC T110 130 °C Db		Ex tb IIIC T110 °C Db		

Model code: HDA 4 4 $\underline{Z} \underline{X} - \underline{A} - \underline{XXXX} - \underline{XXX} - \underline{D} \underline{X} - \underline{000} (\underline{2m})$ Mechanical process connection Z = flush membrane **Electrical connection** = 1/2-14 NPT Conduit (male thread), single leads = 1/2-14 NPT Conduit (male thread), jacketed cable Output signal = 4 .. 20 mA, 2-conductor Measuring ranges in bar 04.0; 06.0; 0010; 0016; 0025; 0040; 0060; 0100; 0250; 0400; 0600 0003 (-1 .. 3) Mechanical connection G01 = G1/2 A ISO 1179-2 G02 = G1/2 with additional front O-ring seal G04 = G1/4 with additional front O-ring seal (only measuring ranges 0040; 0100; 0250; 0400 and 0600) = CSA Explosionproof - Seal not required ATEX Flameproof IECEx Flameproof Type of measurement cell ≥ 40 bar = Sealed Gauge (sealed to atmosphere) V = Vented Gauge (vented to atmosphere) < 40 bar

Cable length in m Standard = 2 m

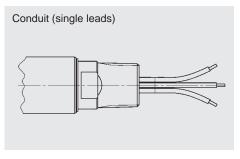
Modification number 000 = standard



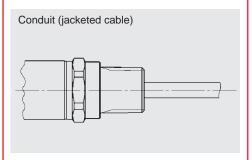


*) optional depending on type "Sealed Gauge" / "Vented Gauge"

Pin connections:



Lead	HDA 44Z9-A
red	Signal +
black	Signal -
green-yellow	Housing



Lead	HDA 44ZG-A	
white	Signal -	
brown	Signal +	
green	n.c.	
yellow	n.c.	

Note:

department.

hex. SW27

Ø10.9

G1/4A

Seal ring DIN3869 11.6 x 16.5 x1.5

O-ring 7.65 x 1.78

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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DAC INTERNATIONAL



Pressure Transmitter HDA 4400 Ex applications

Relative pressure

Accuracy 0.5 %

Intrinsically Safe, Dustproof enclosure Non-Sparking ATEX, IECEx, double approval Flush membrane



Description:

The pressure transmitter HDA 4400 in intrinsically safe version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series. The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices.

The pressure port is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

This device is used for applications in which a standard pressure port could become blocked, clogged or frozen by the particular medium used or in processes where the medium changes regularly and any residues could cause mixing or contamination of the media.

Intended fields of application are, for example, in the oil and gas industry, in mining or in locations with high dust contamination, e.g. in mills.

Protection types and applications:

AIEA			
I M1	Ex ia	1	Ma
II 1G	Ex ia	IIC	T6 Ga
II 1/2G	Ex ia	IIC	T6 Ga/Gb
II 2 G	Ex ia	IIC	T6 Gb
II 1D	Ex ia	IIIC	T85 °C Da
II 1D	Ex ta	IIIC	T80/90/100 °C
		T_{500}	90/ T ₅₀₀ 100/ T ₅₀₀ 110 °C Da
II 2D	Ex tb	IIIC	T80/T90/T100 °C Db
II 3G	Ex nA	IIC	T6, T5, T4 Gc
II 3G	Ex ic	IIC	T6, T5, T4 Gc
II 3D	Ex tc	IIIC	T80/T90/T100 °C Dc
II 3D	Ex ic	IIIC	T80/T90/T100 °C Dc
IECEx			
·LULX	Ex ia	ı	Ma

Ex ia	IIC T6 Ga
Ex ia	IIC T6 Ga/Gb
Ex ia	IIC T6 Gb
Ex ia	IIIC T85 °C Da
Ex ta	IIIC T80/T90/T100 °C
	T ₅₀₀ 90/T ₅₀₀ 100/T ₅₀₀ 110 °C Da
Ex tb	IIIC T80/T90/T100 °C Db
Ex nA	IIC T6,T5,T4 Gc
Ex ic	IIC T6,T5,T4 Gc
Ex tc	IIIC T80/T90/T100 °C Dc
Ex ic	IIIC T80/T90/T100 °C Dc

Technical data:

Input data												
Measuring ranges	bar	4	6	10	16	25	40	100	250	400	600	-13
Overload pressures	bar	8	12	20	32	50	80	200	500	800	1000	8
Burst pressure	bar	20	30	50	80	125	200	500	1000	2000	2000	20
Mechanical connection					ISO 1							
				G1/2 v G1/4 v	vith add	ditiona ditiona	front C	D-ring D-ring	seal seal			
Tightening torque, recommended				20 Nm	(G1/4); 45 N	m (G1/	(2)				
Parts in contact with fluid					ess stee FKM, C		35; 1.4 FKM	301				
Pressure transfer fluid				Silicor	e-free	oil						
Output data												
Output signal, permitted load resista	nce			R _{Lmax.} :		12 V) /	ctor 20 mA	[kΩ]				
Accuracy acc. to DIN 16086, terminal based					% FS) % FS							
Accuracy, B.F.S.L.					25 % FS 5 % FS							
Temperature compensation Zero point				0.0 ± 0.0 0.0 ± 0.0)15 % I)25 % I	FS/°C	typ.					
Temperature compensation Span				≤ ± 0.0)15 % I)25 % I	FS / °C	typ.					
Non-linearity acc. to DIN 16086, terminal based					3 % FS							
Hysteresis				≤ ± 0.4	% FS	max.						
Repeatability				≤ ± 0.1	% FS							
Rise time				≤ 1.5 ms								
Long-term drift				≤ ± 0.3 % FS typ. / year								
Environmental conditions						-71-						
Compensated temperature range				-25 +85 °C								
Operating/ambient temperature range				$ \begin{array}{llllllllllllllllllllllllllllllllllll$						0 °C		
Storage temperature range				-40	+100 °C	<u> </u>						
Fluid temperature range 1) 2)				Ta = -:	30 +6	60 °C/-	20 +	60 °C				
C € mark				EN 61000-6-1/2/3/4; EN 60079-0/11/15/26/31; EN 50303							303	
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz				≤ 20 g								
Protection class acc. to DIN EN 605	29 ³⁾			IP 67								
Relevant data for Ex applications				Ex ia,	ic			Ex n/	A, ta, t	b, tc		
Supply voltage					8 V DC			_	28 V D			
Max. input current				li = 10	0 mA							
Maximum input power				Pi = 1 W Max. power consumption ≤1W						≤1W		
Connection capacitance of the sens	or			Ci ≤ 22 nF								
Inductance of the sensor				Li = 0 mH								
Insulation voltage 4)				50 V AC, with integrated overvoltage protection acc. to EN 61000-6-2								
Other data												
Residual ripple of supply voltage				≤5%								
Current consumption				≤ 25 m	ıΑ							
Life expectancy				> 10 n	nillion c	ycles (0 10	0 % FS	S)			
Weight				150 g					•			
Note: Reverse polarity protection	of th	A CLIPT	dy yelt		VC000 1	oltaga	and ch	ort cir	cuit pr	otection	n ara	

Note: Reverse polarity protection of the supply voltage, excess voltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

- 1) -20 °C with FKM seal, -30 °C on request 2) With M12x1 male connector, only up to -25 °C 3) With mounted mating connector in corresponding protection class
- 4) 500 V AC on request

EN 18.633.0/02.18

Fields of application: Code no. for use in model code II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ta IIIC T80/T90 °C T50090 °C, T500100 °C Da II 3G Ex ic IIC T6, T5 Gc II 3D Ex ic IIIC T80/T90 °C Dc I M1 Ex ia I Ma II 2G Ex ia IIC T6 Gb II 3G Ex nA IIC T6, T5 Gc **KEMA 05 ATEX 1016X** Ex ia IIIC T85 °C Da II 2D Ex tb IIIC T80/T90 °C Db Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ta IIIC T80/T90 °C T50090 °C, T500100 °C Da Ex tb IIIC T80/T90 °C Db Ex ic IIC T6, T5 Gc Ex ic IIIC T80/T90 °C Dc **IFCE**x Ex ia IIC T6 Gb Ex nA IIC T6, T5 Gc Ex ia I Ma **KEM 08.0014X** Ex ia IIIC T85 °C Da Mining Gases/conductive dust Protection type: Protection type: Protection type: Protection type: Protection type: Protection type: Application fields

non-sparking nA

6

intrinsically safe ia

with barrier

Instruments for other protection types and zones (see cover) are available upon request.

intrinsically safe ia

with barrier

5, 6

Model code:

Electrical connection

(see model code)

HDA 4 4 Z X - A - XXXX - GXX - E N X - 000

intrinsically safe ic

with barrier

5, 6

dustproof enclosure

6

Mechanical process connection

= flush membrane

Electrical connection

= male, EN 175301-803, 3 pole + PE (IP 67 mating connector supplied)

intrinsically safe ia

with barrier

= male M12x1, 4 pole (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor

Measuring ranges in bar

04.0; 06.0; 0010; 0016; 0025; 0040; 0060; 0100; 0250; 0400; 0600 0003 (-1 .. 3)

Mechanical connection

G01 = G1/2 A ISO 1179-2

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal (only measuring ranges 0040; 0100; 0250; 0400 and 0600)

Approval

= ATEX **IECEx**

Insulation voltage

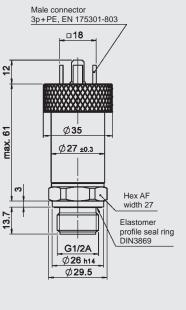
= 50 V AC to housing

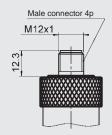
Protection types and applications (code)

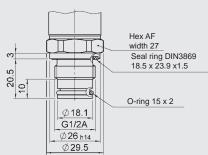
	ATEX	IECEX
1 =	I M1 Ex ia I Ma	Ex ia I Ma
	II 1G Ex ia IIC T6 Ga	Ex ia IIC T6 Ga
	II 1/2 G Ex ia IIC T6 Ga/Gb	Ex ia IIC T6 Ga/Gb
	II 2 G Ex ia IIC T6 Gb	Ex ia IIC T6 Gb
	II 1D Ex ia IIIC T85 °C Da	Ex ia IIIC T85 °C Da
9 =	II 3G Ex nA IIC T6, T5 Gc	Ex nA IIC T6, T5 Gc
	Only in conjunction with electr. connection	n "6" and
	the impact protection metal safety sleeve	
A =	II 1D Ex ta IIIC T80/T90 °C	Ex ta IIIC T80/T90 °C Da
	T ₅₀₀ 90 °C, T ₅₀₀ 100 °C Da	T ₅₀₀ 90 °C, T ₅₀₀ 100 °C Da
	II 2D Ex tb IIIC T80/T90 °C Db	Ex tb IIIC T80/T90 °C Db
	Only in conjunction with electr. connection	n "6" and
	the impact protection metal safety sleeve	
C =	II 3G Ex ic IIC T6, T5 Gc	Ex ic IIC T6, T5 Gc
	II 3D Ex ic IIIC T80/T90 °C Dc	Ex ic IIIC T80/T90 °C Dc
_		

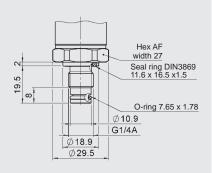
Modification number

000 = standard



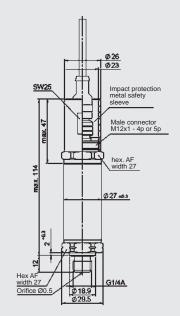






With impact protection metal safety sleeve:

Protection types and applications (code): 9, A

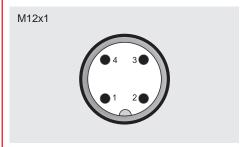


The impact protection metal safety sleeve is included. A straight mating connector is required for electrical connection. E.g. mating connector M12x1, 4 pole, straight, with 3 m shielded cable: ZBE 06S-03, part no. 6098243

Pin connections:



Pin	HDA 44Z5-A
1	Signal +
2	Signal -
3	n.c.
<u> </u>	PE



Pin	HDA 44Z6-A
1	Signal +
2	n.c.
3	Signal -
4	n. c.

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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EN 18.619.0/02.18

YDAC INTERNATIONAL



Pressure Transmitter HDA 4700 Ex applications

Relative pressure

Accuracy 0.25 %

Flameproof enclosure ATEX, IECEx, CSA, triple approval **HART** interface Optional temperature measurement



Description:

HDA 4700 with HART interface is a compact pressure transmitter with flameproof enclosure which is used to measure relative pressures in hydraulics and pneumatics. The triple approval in accordance with ATEX, IECEx and CSA enables universal, worldwide utilisation of the devices in potentially explosive atmospheres.

The pressure is measured by means of a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane. In addition to the analogue 4 .. 20 mA output of the measured value, digital communication is possible by means of the HART protocol.

The instrument provides the option of a temperature sensor. The temperature signal is given out as a digital signal via the HART protocol and the pressure signal is still available as an analogue signal (4 .. 20 mA).

The main fields of application are in the oil & gas industry, e.g. in hydraulic power units, drill drives or valve actuation stations. The device is also used in mining applications as well as in locations with high dust contamination.

Protection types and applications:

cCSA_{us} Explosionproof - Seal not required

Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4

ATEX Flameproof

I M2 ExdIMb

II 2G Ex d IIC T6, T5 Gb

II 2D Ex tb IIIC T110 .. 120 °C Db

IECEx Flameproof

Ex d I Mb

Ex d IIC T6, T5 Gb

Ex tb IIIC T110 .. 120 °C Db

Technical data:

Input data												
Measuring ranges	bar	6	16	40	60	100	250	400	600	1000	1600	2000
Overload pressures	bar	12	32	80	120	200	500	800	1000	1600	2400	3000
Burst pressure	bar	100	100	200	300	500	1000	2000	2000	3000	3000	4000
Mechanical connection		1179-2 EN 837	7									
Tightening torque, reco	omme	nded						Nm (G	31/2 B)			
Parts in contact with flu							el: 1.4	542;1.4 301; 1.4	571; 1.	.4435; ′	1.4404;	
					Seal:		FKI			-		
Conduit, housing mate	rial				1.4435	; 1.44	04					
Output data												
Output signal, permitte	d load	d resis	stance		R _{Lmax.} =	= (U _B -	12 V)	ictor, w / 20 m/ cation r	\ [kΩ]		ocol	
HART Communication					Acc. to	HAR	T 7 spe	cification	ons			
HART Common Praction	ce Co	mmar	nds i.e		Altering	of me	easuring	range	limits (s	ee table)	
								nt within	max. 3	% of the	e span	
Accuracy acc. to DIN 1 terminal based	6086	,			$\leq \pm 0.2$ $\leq \pm 0.5$							
Accuracy, B.F.S.L.					$\leq \pm 0.1$ $\leq \pm 0.2$	5 % F	S typ. S max					
Temperature compens Zero point	ation				≤ ± 0.0 ≤ ± 0.0							
Temperature compens	ation				≤ ± 0.008 % FS/°C typ.							
Span	IN 400	200			$\leq \pm 0.0$	15 %	FS/°C			-		
Non-linearity acc. to Diterminal based	IN 160	J86,			≤ ± 0.3 % FS max.							
Hysteresis					≤ ± 0.1	% FS	max.					
Repeatability					≤ ± 0.05 % FS							
Rise time					≤ 25 ms							
Long-term drift					≤ ± 0.1	% FS	S typ. /	year				
Environmental condi	tions											
Compensated tempera	ature r	ange			-25 +							
Operating/ambient tem	perat	ure ra	nge 1)	2)	T6, T1 ⁻ T5	10 °C		Γa = -40 Γa = -40				
Storage temperature ra	ange				-40 +	·100 °	C					
Fluid temperature rang	je ¹⁾²⁾				T6, T1 ⁻ T5	10 °C		Γa = -40 Γa = -40				
((mark					EN 61000-6-1/ 2/ 3/ 4; EN 60079-0/1/31							
Vibration resistance at DIN EN 60068-2-6 at 1		00 Hz			≤ 10 g							
Protection class acc. to DIN EN 60529 ISO 20653					IP 65 (Vented Gauge) IP 69 (Sealed Gauge) IP 6K9K (Sealed Gauge)							
Other data	100	20000			11 013	11 (000	aica Ce	ugc)				
Supply voltage					12 30) V DO						
Residual ripple of supp	ly vol	tage			acc. to	FSK	Physica	al Laye	r Speci	fication		
Current consumption					(HCF_SPEC-054) ≤ 25 mA							
Life expectancy 3)					> 10 million cycles (0 100 % FS)							
Weight					~ 300							
Note: Reverse polarit	y pro	tection	of the	e supp	oly volta	age, e	xcess	voltage	, overri	de and	short o	ircuit

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection provided.

FS = (Full Scale) = relative to complete measuring range (default calibration)

B.F.S.L. = Best Fit Straight Line

1) -25 °C with FKM seal, -40 °C on request
 2) T120 ° with Ta = -40 .. +70 °C/-20 .. +70 °C with electrical connection, single leads available
 3) Measuring ranges ≥ 1000 bar: > 1 million cycles (0 .. 100 % FS)

Measuring range limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits: Measuring range limits of the primary variable, pressure:

ı	Lower measuring range	limit	Upper measuring range	e limit	Measuring span			
ı	min	max	min	max	min	max		
ı	0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150 % FS		

Fields of application:

	Single leads Electrical connection "9"		Jacketed cable Electrical connection "G"		
CSA		Explosionprod	of (seal not required)		
ATEX		Fla	ameproof		
IECEx		Fla	ameproof		
_c CSA _{us}	Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4				
I M2 Ex d I Mb II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 120 °C Db II 2D Ex tb IIIC T110 °C Db					
IECEx	Ex tb IIIC T110 120 °C Db	Ex d I Mb Ex d IIC T6, T5			

Model code:

HDA 4 7 $\times X \times - F21 - XXXX - D \times - 000 (2m)$

Mechanical connection

= G1/2 B DIN EN 837

(only for measuring ranges ≥ 1600 bar)

4 = G1/4 A ISO 1179-2

Electrical connection

= 1/2-14 NPT Conduit, single leads

G = 1/2-14 NPT Conduit, jacketed cable

Output signal

F21 = 4.. 20 mA, 2-conductor, with HART protocol

Measuring ranges in bar

0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600; 1000

(only with mech. connection code "4")

1600

(only with mech. connection code "1")

Approval

D = **CSA** Explosionproof (seal not required)

ATEX Flameproof

IECEx Flameproof

Type of measurement cell

S = Sealed Gauge (sealed to atmosphere) ≥ 40 bar

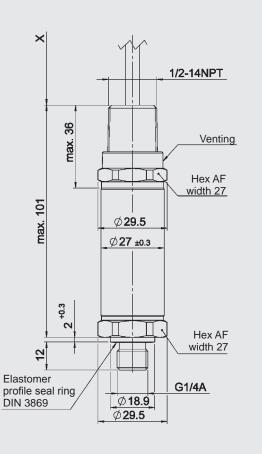
= Vented Gauge (vented to atmosphere) < 40 bar

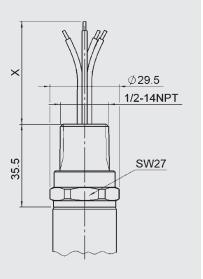
Modification number

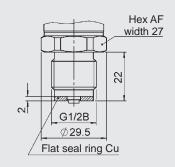
 $\overline{000}$ = standard

Cable length in m

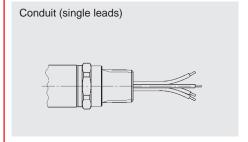
Standard = 2 m



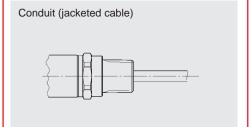




Pin connections:



Lead	HDA 47x9
red	Signal +
black	Signal -
green-yellow	Housing

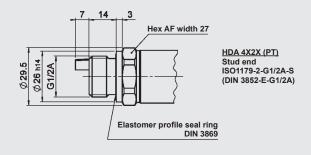


Lead	HDA 47xG
white	Signal -
brown	Signal +
green	n.c.
yellow	n.c.

Additional technical data with temperature measurement option:

Input data							
Measuring range	-25 +1	00 °C					
Probe length	7 mm						
Mechanical connection	G1/2 A I	SO 1179-	2 with pr	obe			
Tightening torque, recommended	45 Nm						
Measuring ranges pressure in bar	16	40	60	100	250	400	600
Output data							
Output signal Pressure	4 20 m	A with H	ART Prot	ocol			
Output signal Temperature	Available	e via HAF	RT protoc	ol as a d	igital sigr	ıal	
Accuracy at room temperature	≤ ± 0.4 %						
	≤ ± 0.8 %	% FS					
Temperature drift (environment)	≤ ± 0.01	% FS / °	C				
Reaction time acc. to DIN EN 60751	t ₅₀ : ≈ 10						
	t ₉₀ : ≈ 15	s					

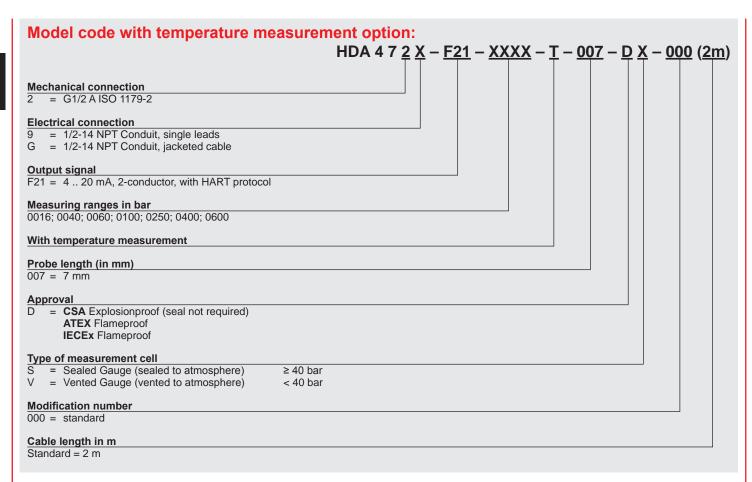
Dimensions with temperature measurement option:



Measuring range limits:

Additional measuring range limits of the secondary variable, temperature:

Lower measuring range limit		Upper measuri	ng range limit	Measuring span		
min	max	min	max	min	max	
-25 °C	75 °C	0 °C 100 °C		25 °C	125 °C	



Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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YDAC INTERNATIONAL



Pressure Transmitter HDA 4700 Ex applications

Relative pressure

Accuracy 0.25 %

Flameproof enclosure ATEX, IECEx, CSA, triple approval With junction box **HART** interface Optional temperature measurement



Description:

HDA 4700 with HART interface is a pressure transmitter with flameproof enclosure which is used to measure relative pressures in hydraulics and pneumatics. The triple approval in accordance with ATEX, IECEx and CSA enables universal, worldwide utilisation of the devices in potentially explosive atmospheres.

The pressure is measured by means of a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane. In addition to the analogue 4 .. 20 mA output of the measured value, digital communication is possible by means of the HART protocol.

The instrument provides the option of a temperature sensor. The temperature signal is given out as a digital signal via the HART protocol and the pressure signal is still available as an analogue signal (4 .. 20 mA).

The main fields of application are in the oil & gas industry, e.g. in hydraulic power units, drill drives or valve actuation stations. The device is also used in mining applications as well as in locations with high dust contamination.

Protection types and applications:

cCSA_{us} Explosionproof - Seal not required

Class I Group B, C, D, T6, T5 Class II Group E, F, G Class III Type 4

ATEX Flameproof

> II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 .. 120 °C Db

IECEx Flameproof

> Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 120 °C Db

Technical data:

Input data

Input data													
Measuring ranges	bar	6	16	40	60	100	250	400	600	1000	1600	2000	
Overload pressures	bar	12	32	80	120	200	500	800	1000	1600	2400	3000	
Burst pressure	bar	100	100	200	300	500	1000	2000	2000	3000	3000	4000	
Mechanical connection		G1/4 A ISO 1179-2 G1/2 B DIN EN 837											
Tightening torque, red	comme	ended						Nm (G1	/2 A)				
Parts in contact with f	_								71; 1.4 ⁴	135: 1.4	404:		
					Seal:		1.43 FKN	01; 1.45	548	,	•		
Conduit, housing mat	erial				1.4435	; 1.440)4						
Output data													
Output signal, permitt	ted loa	d resist	ance		4 20	mA, 2	-conduc	tor, with	n HART	protoco	ol l		
								20 mA [ation mi	kΩ] n. 250 !	Ω			
HART Communicatio	n				Acc. to	HAR1	7 spec	ification	าร				
HART Common Prac	tice Co	omman	ds i.e.		Altering	g of me	easurin	g range	limits (s	see tabl	e)		
											ne span		
Accuracy acc. to DIN	16086	3			≤ ± 0.2								
terminal based					≤ ± 0.5								
Accuracy, B.F.S.L.					$\leq \pm 0.1$ $\leq \pm 0.2$								
Temperature compen	sation						S/°C ty						
Zero point							-S/°C n						
Temperature compen	sation				≤ ± 0.008 % FS/°C typ.								
Span					≤ ± 0.015 % FS/°C max.								
Non-linearity acc. to I terminal based	DIN 16	086,			≤±0.3 % FS max.								
Hysteresis					≤ ± 0.1 % FS max.								
Repeatability					≤ ± 0.05 % FS								
Rise time					≤ 25 m	S							
Long-term drift					≤ ± 0.1	% FS	typ. / ye	ear					
Environmental cond	litions												
Compensated temper	rature	range			-25 +	85 °C							
Operating/ambient te	mpera	ture rar	ige 1) 2)		T6, T11 T5	10					+60 ° +70 °		
Storage temperature	range				-40 +	100 °C							
Fluid temperature ran	ige ^{1) 2)}				T6, T11 T5	10					+60 °		
(€ mark					EN 610	000-6-	1/ 2/ 3/	4; EN 6	0079-0/	1/31			
Vibration resistance a DIN EN 60068-2-6 at		500 Hz			≤ 5 g								
Protection class acc. to DIN EN 60529 ³⁾					IP 65								
Other data	.5 0 114				00								
Supply voltage					12 30) V DC							
Residual ripple of supply voltage					acc. to FSK Physical Layer Specification (HCF_SPEC-054)								
Current consumption					(1101 _ ≤ 25 m		554)						
Life expectancy ⁴⁾	-												
Weight					> 10 million cycles (0 100 % FS) ~ 1000 g (aluminium junction box)								
	16.		(1)		~ 1500	g (sta	inless s	teel jun	ction bo				
Note: Reverse pola	arity pr	otection	n of the	e suppl	y voltag	e, exc	ess volt	age and	a short (circuit p	rotectio	n	

Note: Reverse polarity protection of the supply voltage, excess voltage and short circuit protection

FS = (Full Scale) = relative to complete measuring range (default calibration) B.F.S.L. = Best Fit Straight Line

- $^{1)}$ -25 °C with FKM seal, -40 °C on request $^{2)}$ T120° with Ta = -40 ... +70 °C / -20 ... +70 °C with electrical connection, single leads available $^{3)}$ With mounted 1/2 NPT Conduit screwed fitting in corresponding protection class at
- junction box

 4) Measuring ranges ≥ 1000 bar: > 1 million cycles (0 .. 100 % FS)

Measuring range limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits: Measuring range limits of the primary variable, pressure:

l	Lower measuring range limit		Upper measuring range	e limit	Measuring span			
ı	min	max	min	max	min	max		
ı	0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150 % FS		

Fields of application:

	Junction box Aluminium "J"	Junction box Stainless steel "Q"
CSA		Explosionproof (seal not required)
ATEX		Flameproof
IECEx		Flameproof
_c CSA _{us}	Class I Group B, C, D, T6, T5 Class II Group E, F, G Class III Type 4	Class I Group B, C, D, T6, T5 Class II Group E, F, G
ATEX		II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 120 °C Db
IECEx		Ex d IIC T6, T5 Gb Ex tb IIIC T110 120 °C Db

Model code:

HDA 4 7 $\times X - F21 - XXXX - D \times - 000$

Mechanical connection

= G1/2 B DIN EN 837

(only for measuring ranges ≥ 1600 bar)

= G1/4 A ISO 1179-2

Electrical connection

= aluminium junction box

= stainless steel junction box

Output signal F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Measuring ranges in bar

0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600

(only with mech. connection code "4") 1000; 1600

(only with mech. connection code "1")

Approval D = CS

= CSA Explosionproof (seal not required)
ATEX Flameproof

IECEx Flameproof

Type of measurement cell S = Sealed Gauge (sealed

= Sealed Gauge (sealed to atmosphere) ≥ 40 bar

= Vented Gauge (vented to atmosphere)

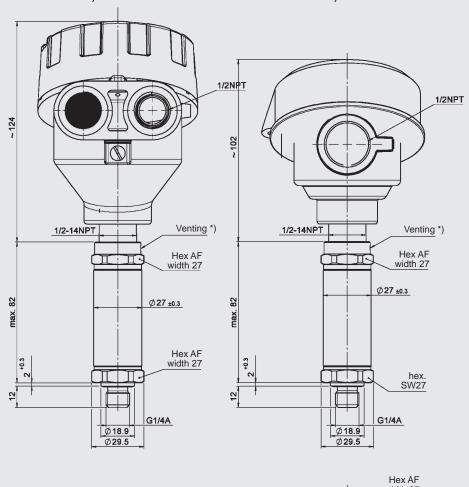
< 40 bar

Modification number

000 = standard

With aluminium junction box:

With stainless steel junction box:



Hex AF width 27 G1/2A Elastomer Ø26 h14 profile seal ring DIN3869 optional O-ring 20.35x1.78 Ø29.5

Additional technical data with temperature measurement option:

Additional teeminear date		cilibei	ataic	incus	ai ciii	one op	tion.
Input data							
Measuring range	-25 +1	00 °C					
Probe length	7 mm						
Mechanical connection	G1/2 A IS	SO 1179-	2 with pr	obe			
Tightening torque, recommended	45 Nm						
Measuring ranges pressure in bar	16	40	60	100	250	400	600
Output data							
Output signal Pressure	4 20 m	A with H	ART Prot	ocol			
Output signal Temperature	Available	via HAF	RT protoc	ol as a d	igital sigr	nal	
Accuracy at room temperature	$\leq \pm 0.4 \%$ $\leq \pm 0.8 \%$						
Temperature drift (environment)	≤ ± 0.01	% FS / °					
Reaction time acc. to DIN EN 60751	t ₅₀ : ≈ 10 :						

Measuring range limits:

Additional measuring range limits of the secondary variable, temperature:

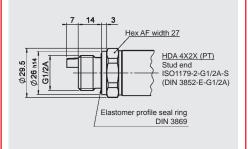
Lower measuring	ng range limit	Upper measuri	ng range limit	Measuring span			
min	max	min	max	min	max		
-25 °C	75 °C	0 °C	100 °C	25 °C	125 °C		

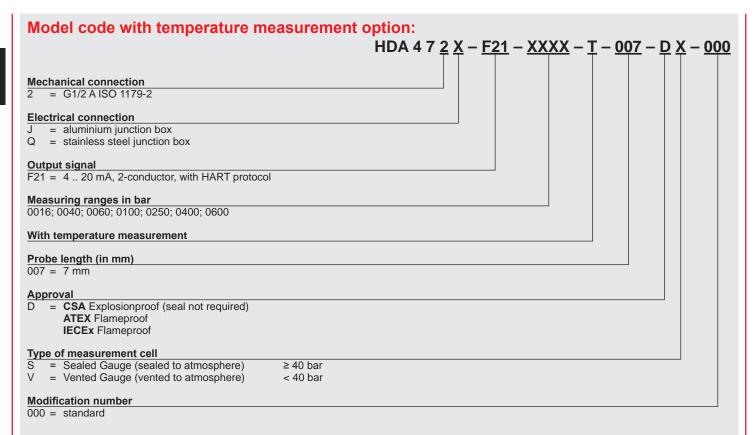
Pin connections:

Single leads in junction box

HDA 47XX
Signal +
Signal -
Housing

Dimensions with temperature measurement option:





Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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EN 18.635.0/02.18

DAC INTERNATIONAL



Pressure Transmitter HDA 4400 Ex applications

Relative pressure

Accuracy 0.5 %

Flameproof Enclosure ATEX, IECEx, CSA, triple approval Flush membrane **HART** interface



Description:

HDA 4400 with flush membrane and HART interface is a compact pressure transmitter in the ignition protection type flameproof enclosure which is used to measure relative pressures in hydraulics and pneumatics. The triple approval in accordance with ATEX, IECEx and CSA enables universal, worldwide utilisation of the devices in potentially explosive atmospheres.

The pressure port is achieved with a fullysealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

In addition to the analogue 4 .. 20 mA output of the measured value, digital communication is possible by means of the HART protocol.

This device is used for applications in which a standard pressure port could become blocked, clogged or frozen by the particular medium used. Further applications include processes where the medium changes regularly and any residues could cause mixing or contamination of the media, or in highly viscous media.

The main fields of application are in the oil & gas industry, e.g. in hydraulic power units, drill drives or valve actuation stations. The device is also used in mining applications as well as in locations with high dust contamination.

Protection types and applications:

cCSAus Explosionproof - Seal not required Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4

ATEX Flameproof

I M2 ExdIMb II 2G Ex d IIC T6, T5 Gb

II 2D Ex tb IIIC T110 .. 120 °C Db

IECEx Flameproof Ex d I Mb

Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 120 °C Db

Technical data:

Input data					,							
Measuring ranges	bar	4	6	10	16	25	40	100	250	400	600	-13
Overload pressures	bar	8	12	20	32	50	80	200	500	800	1000	8
Burst pressure	bar	20	30	50	80	125	200	500	1000	2000	2000	20
Mechanical connection		G1/2 A G1/2 w G1/4 w	ith add	ditional								
Tightening torque, recom	mended				20 Nm	(G 1/4); 45 N	m (G 1	1/2)			
Parts in contact with fluid					Stainle Seal: O-ring:		el: 1.44 FKM FKM	1	1301			
Conduit, housing material	1				1.4435)4	-				
Pressure transfer fluid					Silicon							
Output data							-					
Output data Output signal, permitted load resistance					HART Altering	E (U _B - RT con Commu Comm g of me	12 V) / nmunic unicatio on Pra easurin	20 mA ation r on acc. ctice C g rang	to HAI omma e limits	RT 7 sp nds e.g (see t	able),	
Accuracy acc. to DIN 160 terminal based	86,				∠ero po ≤ ± 0.5 ≤ ± 1.0	% FS	typ.	nt with	in max	. 3 % 0	f the sp	an
Accuracy, B.F.S.L.					≤ ± 0.25 % FS typ. ≤ ± 0.5 % FS max.							
Temperature compensation	on				≤±0.015 % FS / °C typ. ≤±0.025 % FS / °C max.							
Temperature compensation Span					≤ ± 0.015 % FS / °C typ. ≤ ± 0.025 % FS / °C max.							
Non-linearity acc. to DIN terminal based	16086,				≤±0.3 % FS max.							
Hysteresis					≤ ± 0.4 % FS max.							
Repeatability					≤±0.1 % FS							
Rise time					≤ 25 ms							
Long-term drift					≤ ± 0.3 % FS typ. / year							
Environmental conditio						0=00						
Compensated temperature Operating/ambient temperature			1) 2)		-25 +85 °C T6, T110 °C T5 Ta = -30 +60 °C /-20 +60 °C Ta = -30 +70 °C /-20 +70 °C					°C		
Storage temperature range	70				T5	.100 °C		Ia	DU +/1	0 61-2	0 +/0	C
Fluid temperature range ¹					-40 +100 °C T6, T110 °C							
C € mark					EN 61000-6-1/2/3/4; EN 60079-0/11/26/31							
Vibration resistance acc. DIN EN 60068-2-6 at 10.		7			≤ 10 g		, _, _, ,					
Protection class acc. to DIN EN 60529 ISO 20653					IP 65 (Vented Gauge); IP 69 (Sealed Gauge) IP 6K9K (Sealed Gauge)							
Other data								<u> </u>				
Supply voltage					12 30) V DC	;					
Residual ripple of supply voltage					acc. to FSK Physical Layer Specification (HCF_SPEC-054)							
Current consumption					≤ 25 m							
Life expectancy					> 10 m	illion c	ycles (0 100	% FS)		
					~300 q							

protection provided.

FS = Full Scale = relative to complete measuring range (default calibration)

B.F.S.L. = Best Fit Straight Line

 $^{\mbox{\tiny 1)}}$ -20 °C with FKM seal, -30 °C on request

 $^{2)}$ T120 °C with T_a = -30 .. +70 °C/-20 .. +70 °C with electrical connection single leads available

Measuring range limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring ranges:

Lower measuring range limit		Upper measuring range	e limit	Measuring span			
min	max	min	max	min	max		
0 % FS) % FS 112.5 % FS :		150 % FS	37.5 % FS	150 % FS		

Fields of application:

	Single leads Electrical connection "9"		Jacketed cable Electrical connection "G"	
CSA		Explosionprod	of (seal not required)	
ATEX		Fla	ameproof	
IECEx		Fla	ameproof	
_c CSA _{us}	Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4			
ATEX		M2 Exdl 2G ExdlIC		
IECEx	E	x d I Mb x d IIC T6, T5		

Model code:

HDA 4 4 ZX - F21 - XXXX - XXX - DX - 000 (2m)

Mechanical process connection

= flush membrane

Electrical connection

= 1/2-14 NPT Conduit, single leads

G = 1/2-14 NPT Conduit, jacketed cable

Output signal

F21 = 4 .. 20 mA, 2-conductor with HART protocol

Measuring ranges in bar

04.0; 06.0; 0010; 0016; 0025; 0040; 0060; 0100; 0250; 0400; 0600

0003 (-1 .. 3)

Mechanical connection

G01 = G1/2 A ISO 1179-2

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal (only measuring ranges 0040; 0100; 0250; 0400 and 0600)

<u>Approval</u>

= CSA Explosionproof (seal not required)

ATEX Flameproof

IECEx Flameproof

Measurement cell type

= Sealed Gauge (sealed to atmosphere)

≥ 40 bar

= Vented Gauge (vented to atmosphere)

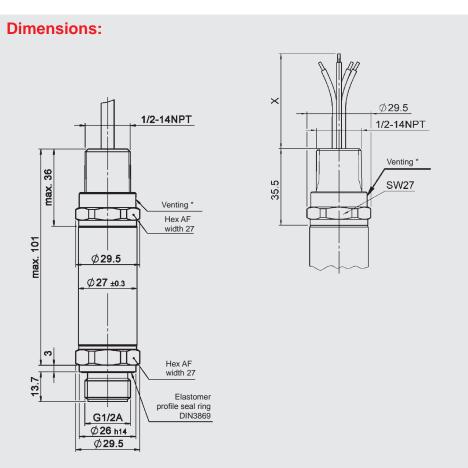
< 40 bar

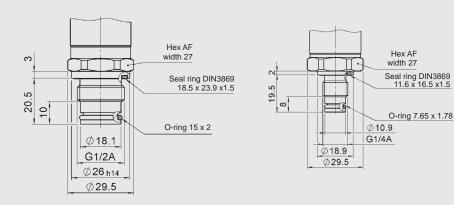
Modification number

000 = standard

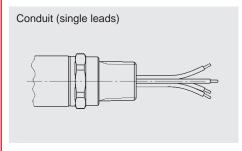
Cable length in m

Standard = 2m

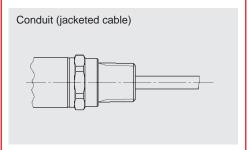




Pin connections:



Lead	HDA 44Z9
red	Signal +
black	Signal -
green-yellow	Housing



Lead	HDA 44Z9	_
white	Signal +	
brown	Signal -	
green	n.c.	
yellow	n.c.	

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAC INTERNATIONAL



Pressure Transmitter HDA 4700 Ex applications

Relative pressure

Accuracy 0.25 %

Intrinsically Safe, Dustproof enclosure Non-Sparking ATEX, IECEx, double approval **HART** interface Optional temperature measurement



Description:

HDA 4700 with HART interface is a compact pressure transmitter (intrinsically safe version) which is used to measure relative pressures in hydraulics and pneumatics. The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices in potentially explosive atmospheres.

The pressure is measured by means of a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

In addition to the analogue 4 .. 20 mA output of the measured value, digital communication is possible by means of the HART protocol.

The instrument provides the option of a temperature sensor. The temperature signal is given out as a digital signal via the HART protocol, the pressure signal is still available as an analogue signal (4 .. 20 mA) .

The main fields of application are in the oil and gas industry. The device is also used in mining applications as well as in locations with high dust contamination.

Protection types and applications:

ATEX

1	M1	Ex ia I Ma
Ш	1G	Ex ia IIC T6,T5 Ga
Ш	1/2 G	Ex ia IIC T6,T5 Ga/Gb
Ш	2 G	Ex ia IIC T6,T5 Gb
Ш	1D	Ex ia IIIC T85 °C/T95 °C Da
Ш	1D	Ex ta IIIC T80/90/100 °C
		T ₅₀₀ 90/T ₅₀₀ 100/T ₅₀₀ 110 °C Da
Ш	2D	Ex tb IIIC T80/T90/T100 °C Db
Ш	3G	Ex nAIIC T6, T5, T4 Gc
Ш	3G	Ex ic IIC T6, T5, T4 Gc
Ш	3D	Ex tc IIIC T80/T90/T100 °C Dc
Ш	3D	Ex ic IIIC T80/T90/T100 °C Dc
ΙE	CEx	

Ex ia I Ma Ex ia IIC T6,T5 Ga Ex ia IIC T6,T5 Ga/Gb Ex ia IIC T6,T5 Gb Ex ia IIC T85/T95 °C Da Ex ta IIIC T80/T90/T100 °C T₅₀₀90/T₅₀₀100/T₅₀₀110 °C Da Ex tb IIIC T80/T90/T100 °C Db Ex nAIIC T6,T5,T4 Gc Ex ic IIC T6,T5,T4 Gc Ex tc IIIC T80/T90/T100 °C Dc Ex ic IIIC T80/T90/T100 °C Dc

Technical data:

Input data

Measuring ranges	bar	6	16	40	60	100	250	400	600	1000	1600 2000
Overload pressures	bar	12	32	80	120	200	500	800	1000	1600	2400 3000
Burst pressure	bar	100	100	200	300		1000	2000	2000		3000 4000
Mechanical connection					G1/4 A	ISO 1	179-2				
					G1/2 E	B DIN E	EN 837				
Tightening torque, reco	mmei	nded							(G1/2 B	3)	
Parts in contact with flu	id				Stainl.	steel: 1.4	4542: 1.	4571: 1	.4435: 1	.4404: 1	1.4301, 1.4548
					Seal: F		- ,	- ,	7	- ,	,
Output data											
Output signal, permitted	loac	resist	ance		420	mA. 2	-condu	ctor. v	vith HAI	RT prot	ocol
3, [12 V) /				
									min. 25	0.0	
HART Communication							Г 7 ѕре			<u> </u>	
HART Common Practic	e Co	mman	ds i.e.						ge limits	s (see t	able)
					Zero n	oint ac	liustme	ent witl	nin max	3 % 0	of the span
Accuracy acc. to DIN 10	6086.				$\leq + 0.2$	25 % F	S tvn	JIIC 111C	IIII III ax	. 0 /0 0	n the opan
terminal based						5 % FS	, ,				
Accuracy, B.F.S.L.			-			15 % F					
Accorded, B.I.O.L.							S max.				
Temperature compensa	ation				< + 0.2	108 %	FS / °C	` tvn			
Zero point							FS / °C				
Temperature compensation							FS / °C				
Span							FS / °C				
Non-linearity acc. to DIN 16086,					$\frac{3}{4} + 0.0$	3 % FS	may	, IIIax.			
terminal based	1 100	,00,			⊒ ± 0.0	7013	illax.				
Hysteresis					< ± 0.1	1 0/ EQ	may				
Repeatability					≤ ± 0.1 % FS max. ≤ ± 0.05 % FS						
Rise time					≤ 25 ms						
Long-term drift					≤ ± 0.1 % FS typ. / year						
Environmental conditi	ions				<u>- 1 0.</u>	7010	typ. /	ycai			
Compensated temperat		ange			-25 -	+85 °C					
Operating/ambient/fluid			e rang				C, T ₅₀₀ 90)°C	Ta = _40	+60 °C	C/-20 +60 °C
oporating/ambionemala		oratai	o rang								C/-20 +70 °C
					T100 °0	$C, T_{500}1$	ס, וייייטור. 10 °ר				C/-20 +80 °C
					T4	O, 15001	10 0				C/-20 +85 °C
Storage temperature ra	nao					+100 °(1a40	+05 (51-20 +05 C
	rige							TNI GOO	70 0/44	/4 E /0 C /	24. FN 50202
C€ mark							/2/3/4, [=14 600	179-0/11	15/20/3	31; EN 50303
Vibration resistance acc					≤ 20 g						
DIN EN 60068-2-6 at 10			500		ID 07						
Protection class acc. to					<u>IP 67</u>			-			
Relevant data for Ex a	pplic	ation	<u> </u>		<u>Ex, ia,</u>				4, ta, tb		
Supply voltage						8 V DC	,	12	28 V DO	زز	
Max. input current					li = 10			N 4			t' 4 1M
Max. input power	(()				Pi = 0.	/ VV		Max.	power (consup	tion ≤ 1 W
Connection capacitance		ne sen	sor		Ci ≤ 22						
Inductance of the sensor					Li = 0 mH						
Insulation voltage 4)					50 V AC, with integrated overvoltage protection					otection	
Otherster					acc. to	EN 6	1000-6	-2			
Other data	10					FOIC !	JI!		0	C 1:	
Residual ripple of supply voltage					acc. to FSK Physical Layer Specification (HCF_SPEC-054)						
Current consumption					≤ 25 m	ıΑ					
Life expectancy 5)					> 10 million cycles (0 100 % FS)						
Weight					150 g						
Note: Reverse polarity	prot	ection	of the	supply	y volta	ge, exc	cess vo	ltage,	overrid	e and s	short circuit

FS (Full Scale) = relative to complete measuring range; B.F.S.L. = Best Fit Straight Line

- 1) -25 °C with FKM seal, -40 °C on request
- 2) With M12x1 male connector, only up to -25 °C
- 3) With mounted mating connector in corresponding protection class
- 4) 500 V AC on request

protection are provided.

⁵⁾ Measuring ranges ≥ 1000 bar: > 1 million cycles (0 .. 100 % FS)

Measuring range limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits: Measuring range limits of the primary variable, pressure:

Lower measuring range limit		Upper measuring range	e limit	Measuring span		
min	max	min	max	min	max	
0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150 % FS	

Fields of application:

Code no. for use in model code		1		9	А	С
ATEX DEKRA 13ATEX0031X DEKRA 13ATEX0032	IM1 ExialMa	II 1G Ex ia IIC T6,T5 Ga II 1/2G Ex ia IIC T6,T5 Ga/Gb II 1D Ex ia IIIC T85/T95°C Da	II 2G Ex ia IIC T6,T5 Gb	II 3G Ex nA IIC T6,T5 Gc	II 1D Ex ta IIIC T80/T90°C T50090/T500100°C Da II 2D Ex tb IIIC T80/T90°C Db	II 3G Ex ic IIC T6,T5 Gc II 3D Ex ic IIIC T80/T90°C Dc
IECEX DEK 14.0011X	Ex ia I Ma	Ex ia IIC T6,T5 Ga Ex ia IIC T6,T5 Ga/Gb Ex ia IIIC T85/T95°C Da	Ex ia IIC T6,T5 Gb	Ex nA IIC T6,T5 Gc	Ex ta IIIC T80/T90°C T ₅₀₀ T90/T ₅₀₀ T100°C Da Ex tb IIIC T80/T90°C Db	Ex ic IIC T6,T5 Gc Ex ic IIIC T80/T90°C Dc
Application fields	Mining Protection type: intrinsically safe ia with barrier	Gases/conductive dust Protection type: intrinsically safe ia with barrier	Gases Protection type: intrinsically safe ia with barrier	Gases Protection type: non-sparking nA	Conductive dust Protection type: dustproof enclosure	Gases/conductive dust Protection type: intrinsically safe ic with barrier
Electrical connection (see model code)	5.6	5.6	5.6	6	6	5.6

Instruments for other protection types and zones (see cover) are available upon request.

Model code:

HDA 4 7 X X - F21 - XXX - E N X - 000

Mechanical connection

- = G1/2 B DIN EN 837
- (only for measuring ranges ≥ 1600 bar)
- = G1/4 A ISO 1179-2

Electrical connection

- = male, EN 175301-803, 3 pole + PE (IP 67 mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Measuring ranges in bar

0006; 0016; 0040, 0060; 0100; 0250; 0400; 0600; 1000 (only with mechanical connection code "4") 1600; 2000 (only with mechanical connection code "1")

Approval E = AT

= ATEX **IECEx**

Insulation voltage

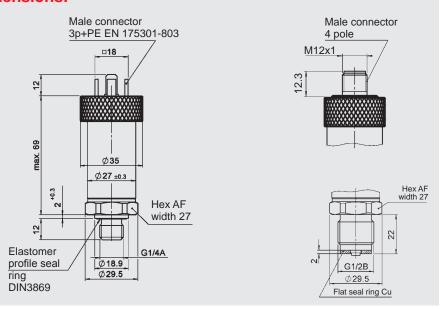
N = 50 V AC to housing

Protection types and applications (code)

	ATEX				IECE x		
1 =	I M1	Ex ia	T	Ма	Ex ia	Τ	Ма
	II 1G	Ex ia	IIC	T6,T5 Ga	Ex ia	IIC	T6,T5 Ga
	II 1/2 G	Ex ia	IIC	T6,T5 Ga/Gb	Ex ia	IIC	T6,T5 Ga/Gb
	II 2 G	Ex ia	IIC	T6,T5 Gb	Ex ia	IIC	T6,T5 Gb
	II 1D	Ex ia	IIIC	T85/T95 °C Da	Ex ia	IIIC	T85/T95 °C Da
9 =	II 3G	Ex nA	IIC	T6, T5 Gc	Ex nA	IIC	T6, T5 Gc
	Only in conjunction with electr. connection "6" and the impact protection metal safety sleeve (see dimensions)						
A =	II 1D	Ex ta	IIIC	T80/T90 °C T ₅₀₀ 90/ T ₅₀₀ 100 °C Da	Ex ta	IIIC	T80/T90 °C T ₅₀₀ 90/ T ₅₀₀ 100 °C Da
	II 2D	Ex tb	IIIC	T80/T90 °C Db	Ex tb	IIIC	T80/T90 °C Db
	Only in conjunction with electr. connection "6" and the impact protection metal safety sleeve (see dimensions)						
C =	II 3G	Ex ic	IIC	T6, T5 Gc	Ex ic	IIC	T6, T5 Gc
	II 3D	Ex ic	IIIC	T80/T90 °C Dc	Ex ic	IIIC	T80/T90 °C Dc

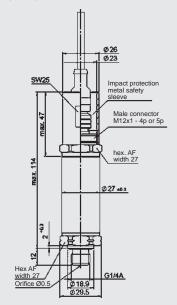
Modification number

 $\overline{000} = standard$



With impact protection metal safety sleeve:

Protection types and applications (code): 9, A



The impact protection metal safety sleeve is included. A straight mating connector is required for electrical connection. E.g. mating connector M12x1, 4 pole, straight, with 3 m shielded cable: ZBE 06S-03, part no. 6098243

Additional technical data with temperature measurement option:

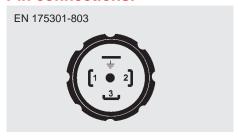
Input data								
Measuring range	-25 +100 °C							
Probe length	7 mm							
Mechanical connection	G 1/2 A ISO 1179-2 with probe (45 Nm)							
Measuring ranges pressure in bar	16 40 60 100 250 400 600							
Output data								
Output signal pressure	4 20 mA with HART Protocol							
Output signal temperature	Available via HART protocol as a digital signal							
Accuracy at room temperature	≤±0.4 % FS typ. ≤±0.8 % FS max.							
Temperature drift (environment)	≤±0.01 % FS/°C							
Reaction time to DIN EN 60751	t ₅₀ : ≈ 10 s t ₉₀ : ≈ 15 s							

Measuring range limits:

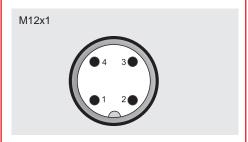
Additional measuring range limits of the secondary variable, temperature:

Lower measuri	ng range limit	Upper measuri	ng range limit	Measuring span		
min	max	min	max	min	max	
-25 °C	75 °C	0 °C	100 °C	25 °C	125 °C	

Pin connections:

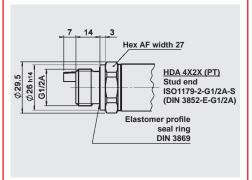


Lead	HDA 47x5-F21
1	Signal +
2	Signal -
3	n.c.
Τ	PE



Lead	HDA 47x6-F21
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Dimensions with temperature measurement option:



Model code with temperature measurement option:

HDA 4 7 $\stackrel{?}{2}$ $\stackrel{X}{X}$ - $\stackrel{F21}{F21}$ - $\stackrel{XXXX}{-}$ $\stackrel{T}{-}$ - $\stackrel{007}{-}$ $\stackrel{E}{-}$ $\stackrel{N}{X}$ $\stackrel{X}{-}$ $\stackrel{XXX}{X}$

Mechanical connection

= G 1/2 A ISO 1179-2

Electrical connection

= male, EN 175301-803, 3 pole + PE (IP 67 mating connector supplied)

= male M12x1, 4 pole (mating connector not supplied)

Output signal

F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Measuring ranges in bar

0016; 0040; 0060; 0100;0250; 0400; 0600

With temperature measurement

Probe length (in mm)

007 = 7 mm

Approval E = AT = ATEX

IECEx

Insulation voltage
N = 50 V AC to housing

Protection types and applications (code)

	ATEX				IECE x		
1 =	I M1	Ex ia	T	Ма	Ex ia	T	Ма
	II 1G	Ex ia	IIC	T6,T5 Ga	Ex ia	IIC	T6,T5 Ga
	II 1/2 G	Ex ia	IIC	T6,T5 Ga/Gb	Ex ia	IIC	T6,T5 Ga/Gb
	II 2 G	Ex ia	IIC	T6,T5 Gb	Ex ia	IIC	T6,T5 Gb
	II 1D	Ex ia	IIIC	T85 °C/T95 °C Da	Ex ia	IIIC	T85 °C/T95 °C Da
9 =	II 3G	Ex nA	IIC	T6, T5 Gc	Ex nA	IIC	T6, T5 Gc
				ith electr. connection "6 nensions)	and th	ne imp	pact protection metal
A =	II 1D	Ex ta	IIIC	T80/T90 °C T ₅₀₀ 90/ T ₅₀₀ 100 °C Da	Ex ta	IIIC	T80/T90 °C T ₅₀₀ T90/ T ₅₀₀ 100 °C Da
	II 2D	Ex tb	IIIC	T80/T90 °C Db	Ex tb	IIIC	T80/T90 °C Db
	Only in conjunction with electr. connection "6" and the impact protection metal safety sleeve (see dimensions)						
C =	II 3G	Ex ic	IIC	T6, T5 Gc	Ex ic	IIC	T6, T5 Gc
	II 3D	Ex ic	IIIC	T80/T90 °C Dc	Ex ic	IIIC	T80/T90 °C Dc

Modification number

000 = standard

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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EN 18.630.0/02.18

DADINTERNATIONAL



Pressure Transmitter HDA 4300 Ex applications

Relative pressure

Accuracy 0.5 %

Intrinsically Safe, Dustproof enclosure Non-Sparking ATEX, IECEx, double approval **HART** interface



Description:

The pressure transmitter HDA 4300 with HART interface is a compact pressure transmitter (intrinsically safe version) which is used to measure relative pressures in hydraulics and pneumatics. The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices in potentially explosive atmospheres.

As with the industry model, the ATEX/IECEx version HDA 4300 has a ceramic measurement cell with thick-layer strain gauge.

In addition to the analogue 4 .. 20 mA output of the measured value, digital communication is possible by means of the HART protocol.

Intended fields of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high dust contamination, e.g. in mills.

Protection types and applications:

I M1 II 1G II 1/2 G II 2 G II 1D II 1D	Ex ia Ex ia Ex ia Ex ia Ex ia Ex ta	IIC IIC IIIC	Ma T6,T5 Ga T6,T5 Ga/Gb T6,T5 Gb T85 °C/T95 °C Da T80/90/100 °C
			T ₅₀₀ 100/ T ₅₀₀ 110 °C Da
II 2D II 3G	Ex tb	IIIC	T80/T90/T100 °C Db T6, T5, T4 Gc
II 3G	Ex ic		T6, T5, T4 Gc
II 3D			T80/T90/T100 °C Dc
II 3D	Ex ic	IIIC	T80/T90/T100 °C Dc
IECEx			

Ex ia	ı	Ma
Ex ia		T6,T5 Ga
Ex ia	IIC	T6,T5 Ga/Gb
Ex ia	IIC	T6,T5 Gb
Ex ia	IIIC	T85/T95 °C Da
Ex ta	IIIC	T80/T90/T100 °C
T ₅₀₀	90/T	500100/T500110 °C Da
Ex tb	IIIC	T80/T90/T100 °C Db
Ex nA	IIC	T6,T5,T4 Gc
Ex ic	IIC	T6,T5,T4 Gc
Ex tc	IIIC	T80/T90/T100 °C Dc
Ex ic	IIIC	T80/T90/T100 °C Dc

Technical data:

Input data

bar bar bar	3	2.5 8	<u>4</u> 12	6 20	10 32	16 50	25 80	40	-1 1
	_	8	12	20	32	I 50	1 00	400	
bar	1				-			120	3
	5	12	18	30	48	75	120	180	5
	G1/4 A ISO 1179-2								
	20 Nm								
				.4301					
	Seal. I	KIVI / E	FDIVI						
	4 20	m A 2	2029116	tor wit	P NVD.	T proto			
	4 20 Rimay =	mA, 2-0 (U₀ - 1	conduc 2 V)/	20 mA	n HAR [kO]	i proto	COI		
	for HAF	RT com	munic	ation m	in. 250	Ω			
	Acc. to	HART	7 spec	cificatio	ns				
	Alterino	of me	asurin	g range	limits	(see ta	ble)		
						`			
						,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
	≤ ± 0.2	5 % FS	typ.						
	≤ ± 0.0	2 % FS	/ °C ty	/p.					
	$\leq \pm 0.0$ $\leq \pm 0.0$	2 % FS 3 % FS	/ °C ty	/p. nax.					
			max.						
	$\leq \pm 0.3$	% FS t	ур. / у	ear					
	T6, T80/T85 °C, T500 90 °C Ta = -20 +60 °C								
	15, 190/195 °C, 1 ₅₀₀ 100 °C								
	T4 Ta = -20 +85 °C								
	-40 +	100 °C							
	T6, T80/T85 °C, T ₅₀₀ 90 °C								
	T5, T90/T95 °C, T ₅₀₀ 100 °C Ta = -20 +70 °C								
	T4 Ta = -20 +80 °C T4 Ta = -20 +85 °C								
		000-6-1	12/3	/ /		- iu -	-20 •	00 0	
	EN 60079-0 / 11 / 15 / 26 / 31								
	- 20 g								
	IP 67								
						tc			
	12 28	V DC		12 2	8 V DC				
				Мах. р	ower c	onsum	ption ≤	1 W	
	Ci ≤ 22	nF							
	Li = 0 mH								
	50 V A0	C, with i	ntegra	ted ove	rvoltag	e prote	ction ac	C.	
	IO LIVE	, , , , , , , ,							
	acc. to	FSK P	nysical	Laver 9	Specific	ation (ICF SE	PEC-05	4)
			, 2.001	, 0. (٥٥ م	(1			
			rcles (f) 100	% FS\				
			3,00 (0	100	/0 i O)				
	-		0.00	rride or	d char	circuit	protec	tion are	
		Mech	Mech. connec Seal: FKM / E 4 20 mA, 2-6 R _{Lmax} = (U _B - 1 for HART com Acc. to HART Altering of me Zero point adju ≤±0.5 % FS1 ≤±0.5 % FS1 ≤±0.02 % FS ≤±0.03 % FS ≤±0.03 % FS ≤±0.03 % FS ≤±0.03 % FS 1 ≤±0.1 % FS ≤±0.03 % FS 1 5±0.03 % FS 1 5±0.078 % FS	Seal: FKM / EPDM 4 20 mA, 2-conduc R _{Lmax} = (U _B - 12 V) / for HART communic Acc. to HART 7 spec Altering of measuring Zero point adjustmen ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS max. ≤ ± 0.02 % FS / °C t ≤ ± 0.03 % FS / °C t 5 ± 0.5 % FS max. ≤ ± 0.1 % FS max. ≤ ± 0.2	Mech. connection: 1. 4301 Seal: FKM / EPDM 4 20 mA, 2-conductor, wit R _{Lmax} = (U _B - 12 V) / 20 mA for HART communication m Acc. to HART 7 specificatio Altering of measuring range Zero point adjustment within ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS typ. ≤ ± 0.5 % FS typ. ≤ ± 0.03 % FS / °C typ. ≤ ± 0.03 % FS / °C max. ≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max. ≤ ± 0.02 % FS / °C max. ≤ ± 0.1 % FS max. ≤ ± 0.4 % FS max. ≤ ± 0.1 % FS ≤ 25 ms ≤ ± 0.1 % FS ≤ 25 ms ≤ ± 0.3 % FS typ. / year -25 +85 °C T6, T80/T85 °C, T ₅₀₀ 100 °C T100 °C, T ₅₀₀ 110 °C T4 -40 +100 °C T6, T80/T85 °C, T ₅₀₀ 100 °C T100 °C, T ₅₀₀ 110 °C T4 EN 61000-6-1/2/3/4 EN 60079-0/11/15/26/3 EN 50303 ≤ 20 g IP 67 Ex ia, ic	Mech. connection: 1.4301 Seal: FKM / EPDM 4 20 mA, 2-conductor, with HAR R _{Lmax} = (U _B - 12 V) / 20 mA [κΩ] for HART communication min. 250 Acc. to HART 7 specifications Altering of measuring range limits Zero point adjustment within max. 3 ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS typ. ≤ ± 0.5 % FS typ. ≤ ± 0.03 % FS / °C typ. ≤ ± 0.03 % FS / °C max. ≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max. ≤ ± 0.4 % FS max. ≤ ± 0.4 % FS max. ≤ ± 0.1 % FS ≤ 25 ms ≤ ± 0.3 % FS typ. / year -25 +85 °C T6, T80/T85 °C, T ₅₀₀ 90 °C T5, T90/T95 °C, T ₅₀₀ 100 °C T100 °C, T ₅₀₀ 110 °C T4 -40 +100 °C T6, T80/T85 °C, T ₅₀₀ 100 °C T100 °C, T ₅₀₀ 110 °C T4 EN 61000-6-1/2/3/4 EN 60079-0 / 11 / 15 / 26 / 31 EN 50303 ≤ 20 g IP 67 Ex ia, ic Ex nA, ta, tb, 12 28 V DC Ii = 100 mA Pi = 0.7 W Max. power c Ci ≤ 22 nF Li = 0 mH 50 V AC, with integrated overvoltag to EN 61000-6-2 acc. to FSK Physical Layer Specific ≤ 25 mA > 10 million cycles (0 100 % FS) ~ 150 g	Mech. connection: 1.4301 Seal: FKM / EPDM 4 20 mA, 2-conductor, with HART proto R _{Lmax} = (U _B - 12 V) / 20 mA [κΩ] for HART communication min. 250 Ω Acc. to HART 7 specifications Altering of measuring range limits (see ta Zero point adjustment within max. 3 % of th ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS typ. ≤ ± 0.5 % FS max. ≤ ± 0.26 % FS V _C typ. ≤ ± 0.03 % FS / °C typ. ≤ ± 0.03 % FS / °C cmax. ≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max. ≤ ± 0.19 % FS max. ≤ ± 0.19 % FS max. ≤ ± 0.1 % FS max. ≤ ± 0.1 % FS sax. ≤ ± 0.1 % FS ≤ 25 ms ≤ ± 0.3 % FS typ. / year -25 +85 °C T6, T80/T85 °C, T ₅₀₀ 100 °C Ta = T5, T90/T95 °C, T ₅₀₀ 100 °C Ta = T6, T80/T85 °C, T ₅₀₀ 100 °C Ta = T6, T80/T85 °C, T ₅₀₀ 100 °C Ta = T100 °C, T ₅₀₀ 110 °C Ta = T4 EN 61000-6-1/2/3/4 EN 60079-0/11/15/26/31 EN 60079-0/11/15/26/31 EN 50303 ≤ 20 g IP 67 Ex ia, ic Ex nA, ta, tb, tc 12 28 V DC Ii = 100 mA Pi = 0.7 W Max. power consum Ci ≤ 22 nF Li = 0 mH 50 V AC, with integrated overvoltage prote to EN 61000-6-2 acc. to FSK Physical Layer Specification (H≤ 25 mA) > 10 million cycles (0 100 % FS) ~ 150 g	Mech. connection: 1.4301 Seal: FKM / EPDM 4 20 mA, 2-conductor, with HART protocol R _{Lmax} = (U _B - 12 V) / 20 mA [κΩ] for HART communication min. 250 Ω Acc. to HART 7 specifications Altering of measuring range limits (see table) Zero point adjustment within max. 3 % of the span ≤±0.5 % FS typ. ≤±1 % FS max. ≤±0.25 % FS typ. ≤±0.5 % FS max. ≤±0.26 % FS / °C typ. ≤±0.03 % FS / °C max. ≤±0.02 % FS / °C max. ≤±0.03 % FS / °C max. ≤±0.1 % FS max. ≤±0.1 % FS max. ≤±0.1 % FS ≤25 ms ≤±0.1 % FS ≤25 ms ≤±0.3 % FS typ. / year -25 +85 °C T6, T80/T85 °C, T ₅₀₀ 90 °C Ta = -20 + T5, T90/T95 °C, T ₅₀₀ 100 °C Ta = -20 + T4 T2 - 20 + T4 T3 - 20 + T4 T5 - 20 T4 T4 T5 - 20 T5 T5 T90/T95 °C, T ₅₀₀ 100 °C T5 T5 T90/T95 °C, T ₅₀₀ 100 °C T5 T5 T90/T95 °C, T ₅₀₀ 100 °C T5 T5 T90/T95 °C, T ₅₀₀ 110 °C T5 T5 T90/T95 °C, T ₅₀₀ 110 °C T5 T6	Mech. connection: 1.4301 Seal: FKM / EPDM 4 20 mA, 2-conductor, with HART protocol R _{Lmax} = (U _B - 12 V) / 20 mA [kΩ] for HART communication min. 250 Ω Acc. to HART 7 specifications Altering of measuring range limits (see table) Zero point adjustment within max. 3 % of the span ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS typ. ≤ ± 0.36 % FS / °C typ. ≤ ± 0.03 % FS / °C typ. ≤ ± 0.03 % FS / °C max. ≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max. ≤ ± 0.19 % FS max. ≤ ± 0.4 % FS max. ≤ ± 0.4 % FS max. ≤ ± 0.1 % FS ≤ 25 ms ≤ ± 0.3 % FS typ. / year -25 +85 °C T6, T80/T85 °C, T ₅₀₀ 90 °C Ta = -20 +60 °C T5, T90/T95 °C, T ₅₀₀ 100 °C Ta = -20 +80 °C T4 T100 °C, T ₅₀₀ 110 °C T6, T80/T85 °C, T ₅₀₀ 90 °C T7 = -20 +80 °C T4 T100 °C, T ₅₀₀ 110 °C T6, T80/T85 °C, T ₅₀₀ 90 °C T6, T80/T85 °C, T500 90 °C T7 T8 = -20 +80 °C T8 = -20 +80 °C T9, T80/T85 °C, T500 90 °C T8 = -20 +80 °C T9, T90/T85 °C, T500 90 °C T9, T80/T85 °C, T500 90 °C T9, T80/T85 °C, T500 90 °C T8 = -20 +80 °C T9, T80/T85 °C, T500 90 °C T8 = -20 +80 °C T

FS (Full Scale) = relative to complete measuring range B.F.S.L. = Best Fit Straight Line

1) -20 °C with FKM seal or EPDM seal, -40 °C on request

2) With M12x1 male connector, only up to -25 °C
3) With mounted mating connector in corresponding protection class
4) 500 V AC on request

Measuring range limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits:

١	Lower measuring range limit		Upper measuring range	e limit	Measuring span		
١	min	max	min	max	min	max	
١	0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150 % FS	

Fields of application:

Code no. for use in model code	1			9	А	С
ATEX DEKRA 13ATEX0031X DEKRA 13ATEX0032	I M1 Ex ia I Ma	II 1G Ex ia IIC T6,T5 Ga II 1/2G Ex ia IIC T6,T5 Ga/Gb II 1D Ex ia IIIC T85/T95 °C Da	II 2G Ex ia IIC T6,T5 Gb	II 3G Ex nA IIC T6,T5 Gc	II 1D Ex ta IIIC T80/T90 °C T500T90/T500T100 °C Da II 2D Ex tb IIIC T80/T90 °C Db	II 3G Ex ic IIC T6,T5 Gc II 3D Ex ic IIIC T80/T90 °C Dc
IECEX DEK 14.0011X	Ex ia I Ma	Ex ia IIC T6,T5 Ga Ex ia IIC T6,T5 Ga/Gb Ex ia IIIC T85/T95 °C Da	Ex ia IIC T6,T5 Gb	Ex nA IIC T6,T5 Gc	Ex ta IIIC T80/T90 °C T50090/T500100 °C Da Ex tb IIIC T80/T90 °C Db	Ex ic IIC T6,T5 Gc Ex ic IIIC T80/T90 °C Dc
Application fields	Mining	Gases/conductive dust	Gases	Gases	Conductive dust	Gases/conductive dust
	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: non-sparking nA	Protection type: dustproof enclosure	Protection type: intrinsically safe ic with barrier
Electrical connection (see model code)	5, 6	5, 6	5, 6	6	6	5, 6

Instruments for other protection types and zones (see cover) are available upon request.

Model code:

HDA 4 3 $\frac{4}{3}$ $\frac{X}{3}$ - $\frac{F21}{3}$ - $\frac{XXXX}{3}$ - $\frac{E}{3}$ $\frac{N}{3}$ $\frac{N}{3}$ - $\frac{000}{3}$ - $\frac{N}{3}$ $\frac{1}{3}$

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

= male, EN175301-803, 3 pole + PE (IP 67 mating connector supplied)

= male M12x1, 4 pole

(mating connector not supplied)

Output signal

F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Measuring ranges in bar

01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040; 0001 (-1 .. 1)

Approval

= ATEX **IECEx**

Insulation voltage

= 50 V AC to housing

Protection types and applications (code)

	ATEX			IECEx	
1 =	I M1	Exia I	Ma	Ex ia I Ma	
	II 1G		T6,T5 Ga	Ex ia IIC T6,T5 Ga	
	II 1/2 G	Ex ia IIC	T6,T5 Ga/Gb	Ex ia IIC T6,T5 Ga/Gb	
	II 2 G	Ex ia IIC	T6,T5 Gb	Ex ia IIC T6,T5 Gb	
	II 1D	Ex ia IIIC	T85 °C/T95 °C Da	Ex ia IIIC T85 °C/T95 °C E)a
9 =	II 3G	Ex nA IIC	T6,T5 Gc	Ex nA IIC T6,T5 Gc	
	Only in o	coniunction	with electrical conne	ection "6" and the impact	
			ety sleeve (see dim		
A =	II 1D	Ex ta IIIC	T80 °C/90 °C	Ex ta IIIC T 80 °C/90 °C	
		$T_{500}90/T_{500}$	100 °C Da	T ₅₀₀ 90/T ₅₀₀ 100 °C Da	
	II 2D			Ex tb IIIC T80 °C/90 °C Db	
	Only in o	conjunction	with electrical conne	ection "6" and the impact	
	protection	on metal saf	ety sleeve (see dim	ensions)	
C =	II 3G		T6,T5 Gc		
	II 3D	Ex ic IIIC	T80 °C/90 °C Dc	Ex ic IIIC T80 °C/90 °C Do	;

Modification number

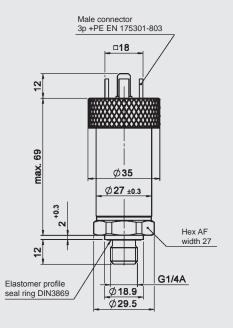
000 = standard

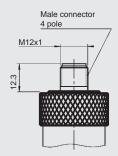
Sealing material (in contact with fluid) F = FKM seal (e.g. for budgettis in the

= FKM seal (e.g. for hydraulic oils) = EPDM seal (e.g. for refrigerants)

Connection material (in contact with fluid)

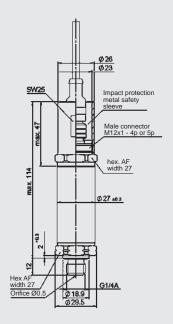
= stainless steel





With impact protection metal safety sleeve:

Protection types and applications (code): 9, A

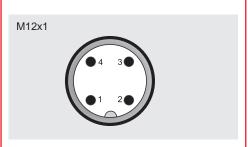


The impact protection metal safety sleeve is included. A straight mating connector is required for electrical connection. E.g. mating connector M12x1, 4 pole, straight, with 3 m shielded cable: ZBE 06S-03, part no. 6098243

Pin connections:



Pin_	HDA 4345-F21	
1	Signal +	
2	Signal -	
3	n.c.	
	PE	



Pin	HDA 4346-F21
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Internet: www.hydac.com

DAC INTERNATIONAL



Pressure Transmitter HDA 4400 Ex applications

Relative pressure

Accuracy 0.5 %

Intrinsically Safe, Dustproof enclosure Non-Sparking ATEX, IECEx, double approval Flush membrane **HART** interface



Description:

The pressure transmitter HDA 4400 in intrinsically safe version has been specially developed for use in potentially explosive atmospheres and is based on the HDA 4000 series. The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices.

The pressure port is achieved with a fully-sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid. In addition to the analogue 4 .. 20 mA output of the measured value, digital communication is possible by means of the HART protocol.

This device is used for applications in which a standard pressure port could become blocked, clogged or frozen by the particular medium used or in processes where the medium changes regularly and any residues could cause mixing or contamination of the media.

Intended fields of application are, for example, in the oil and gas industry, in mining or in locations with high dust contamination, e.g. in mills.

Protection types and applications:

Ma

ATEX M1

IECEx

Technical data:

Input data

input uata												
Measuring ranges	bar	4	6	10	16	25	40	100	250	400	600	-13
Overload pressures	bar	8 20	12 30	20 50	32	50	80	200	500	800	1000	8
Burst pressure	80 125 200 500 1000 2000 2000 20											
Mechanical connection					G1/2 A							
								ont O-ri ont O-ri				
Tightening torque, recomm	nended							(G 1/2)				
Parts in contact with fluid	nenaca					<u> </u>		i; 1.430				
T dito iii oonlaat wiiii liala					Seal: F							
Pressure transfer fluid					Silicone	e-free o	il					
Output data												
Output signal, permitted lo	ad resis	stance						or, with		rotocol		
								0 mA [k				
								tion min		7 anaaif	iontiona	
								acc. to		<u> </u>	ications	
								ice Com range li			١	
					Zero po	oint adju	ustment	within r	nax. 3 %	% of the	span	
Accuracy acc. to DIN 1608	36,				≤ ± 0.5							
terminal based				,	≤ ± 1.0							
Accuracy, B.F.S.L.					$\leq \pm 0.25$ $\leq \pm 0.5$							
Temperature compensatio Zero point	n				$\leq \pm 0.07$ $\leq \pm 0.02$							
Temperature compensation	n				≤ ± 0.0°	15 % F	S / °C ty	/p.				
Non-linearity acc. to DIN 16	086 torr	ninal ha	need.		≤±0.025 % FS / °C max. ≤±0.3 % FS max.							
Hysteresis	ooo, ten	IIII lai be	35CU		≤±0.4 % FS max.							
Repeatability					≤±0.1 % FS							
Rise time					≤ 25 ms							
Long-term drift					≤ ± 0.3 % FS typ. / year							
Environmental condition	15				= = 0.0	70101	yp. 7 yo	ui .				
Compensated temperature					-25 +	85 °C						
Operating/ambient/												
fluid temperature range 1) 2	2)				T5, T90/T95 °C, T ₅₀₀ 100 °C Ta = -30 +70 °C/-20 +70 °C							
					T100 °C, T ₅₀₀ 110 °C							
Storage temperature rang					-40 +100 °C							
	<u> </u>				EN 61000-6-1/2/3/4; EN 60079-0/11/15/26/31; EN 50303							
(€ mark	_				≤ 20 g							
Vibration resistance acc. to DIN EN 60068-2-6 at 10					≤ 20 g							
Protection class acc. to DI				,	IP 67							
Relevant data for Ex appl					Ex ia, i	c			Ex nA	, ta, tb,	tc	
Supply voltage					12 28					8 V DC		
Max. input current					li = 100) mA						
Max. input power					Pi = 0.7	7 W			Max. p	ower cor	nsumptio	n ≤1W
Connection capacitance o	f the sei	nsor			Ci ≤ 22 nF							
Inductance of the sensor					Li = 0 mH							
Insulation voltage 4)					50 V AC, with integrated overvoltage protection							
					acc. to							
Other data												
Residual ripple of supply v	/oltage				acc. to FSK Physical Layer Specification (HCF_SPEC-054)							
Current consumption					≤ 25 mA							
Life expectancy > 10 million cycles (0 100 % FS)							FS)					
Weight					180 g							
Note: Reverse polarity	protect	ion of t										tion are

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection provided.

FS (Full Scale) = relative to complete measuring range

PS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

1) -20 °C with FKM seal, -30 °C on request

2) With M12x1 male connector, only up to -25 °C

3) With mounted mating connector in corresponding protection class

4) 500 V AC on request



Measuring range limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring ranges:

Lower measuring range limit		Upper measuring range	e limit	Measuring span		
min	max	min	max	min max		
0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150 % FS	

Fields of application:

Code no. for use in model code	1			9	A	С
ATEX DEKRA 13ATEX0031X DEKRA 13ATEX0032	I M1 Ex ia I Ma	II 1G	II 2G Ex ia IIC T6,T5 Gb	II 3G Ex nA IIC T6,T5 Gc	II 1D Ex ta IIIC T80/T90 °C T500T90/T500T100 °C Da II 2D Ex tb IIIC T80/T90 °C Db	II 3G Ex ic IIC T6, T5 Gc II 3D Ex ic IIIC T80/T90 °C Dc
IECEx DEK 14.0011X	Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIIC T85 °C Da	Ex ia IIC T6,T5 Gb	Ex nA IIC T6,T5 Gc	Ex ta IIIC T80/T90 °C T500T90/T500T100 °C Da Ex tb IIIC T80/T90 °C Db	Ex ic IIC T6,T5 Gc Ex ic IIIC T80/T90 °C Dc
Application fields	Mining Protection type: intrinsically safe ia with barrier	Gases/conductive dust Protection type: intrinsically safe ia with barrier	Gases Protection type: intrinsically safe ia with barrier	Gases Protection type: non-sparking nA	Conductive dust Protection type: dustproof enclosure	Gases/conductive dust Protection type: intrinsically safe ic with barrier
Electrical connection (see model code)	5, 6	5, 6	5, 6	6	6	5, 6

Instruments for other protection types and zones (see cover) are available upon request.

Model code:

HDA 4 4 <u>Z X - F21 - XXXX - GXX - E N X - 000</u>

Mechanical process connection

Z = flush membrane

Electrical connection

- 5 = male, EN 175301-803, 3 pole +PE (IP 67 mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Measuring ranges in bar

04.0; 06.0; 0010; 0016; 0025; 0040; 0060; 0100; 0250; 0400; 0600 0003 (-1 .. 3)

Mechanical connection

G01 = G1/2 A ISO 1179-2

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal (only measuring ranges 0040; 0100; 0250; 0400 and 0600)

Approval

= ATEX **IECEx**

Insulation voltage

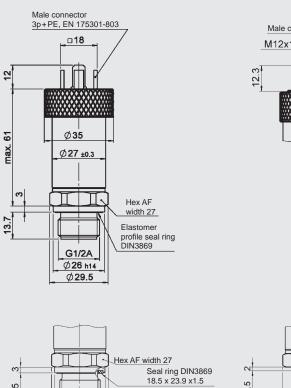
N = 50 V AC to housing

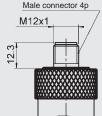
Protection types and applications (code)

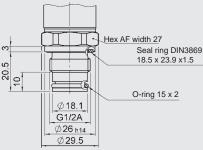
	ATEX	IECEx
1 =	I M1 Ex ia I Ma II 1G Ex ia IIC T6,T5 Ga II 1/2 G Ex ia IIC T6,T5 Ga/Gb II 2 G Ex ia IIC T6,T5 Gb II 1D Ex ia IIIC T85/T95 °C Da	Ex ia I Ma Ex ia IIC T6,T5 Ga Ex ia IIC T6,T5 Ga/Gb Ex ia IIC T6,T5 Gb Ex ia IIIC T85/T95 °C Da
9 =	II 3G Ex nA IIC T6, T5 Gc	Ex nA IIC T6, T5 Gc
	Only in conjunction with electr. connection the impact protection metal safety sleever	
A =	II 1D Ex ta IIIC T80/T90 °C T ₅₀₀ 90/ T ₅₀₀ 100 °C Da II 2D Ex tb IIIC T80/T90 °C Db	Ex ta IIIC T80/T90 °C T ₅₀₀ 90/ T ₅₀₀ 100 °C Da Ex tb IIIC T80/T90 °C Db
	Only in conjunction with electr. connection the impact protection metal safety sleever	on "6" and e (see dimensions)
C =	II 3G Ex ic IIC T6, T5 Gc II 3D Ex ic IIIC T80/T90 °C Dc	Ex ic IIC T6, T5 Gc Ex ic IIIC T80/T90 °C Dc

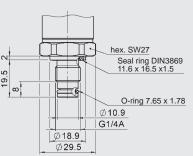
Modification number

000 = standard



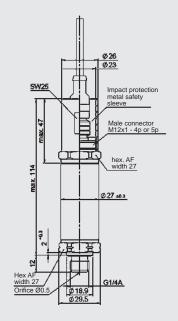






With impact protection metal safety sleeve:

Protection types and applications (code): 9, A

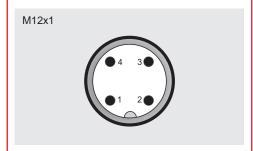


The impact protection metal safety sleeve is included. A straight mating connector is required for electrical connection. E.g. mating connector M12x1, 4 pole, straight, with 3 m shielded cable: ZBE 06S-03, part no. 6098243

Pin connections:



Pin	HDA 4425-F21	
1	Signal +	
2	Signal -	
3	n.c.	
<u> </u>	PE	



	115.4 / / / / / / / / / / / / / / / / / / /
Pin	HDA 4426-F21
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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EN 18.344.3/02.18

YDAC INTERNATIONAL



Pressure Transmitter HDA 4100 Ex applications

Absolute pressure

Accuracy 0.5 %

Intrinsically Safe Non-Incendive **CSA** approval



Description:

The pressure transmitter HDA 4100 in CSA version has been specially developed for the North American market for use in potentially explosive atmospheres and is based on the HDA 4000 series.

As with the industry model, the HDA 4100 in CSA version has a ceramic measurement cell with thick-layer strain gauge for measuring absolute pressure in the low pressure range.

Intended fields of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

Protection types and applications: Intrinsically safe:

 Class I Div. 1 Group A, B, C, D T6 Class I Zone 0 AEx ia IIC T6 Ex ia IIC T6 	[C, US] [US] [C]
- Class I, II, III Div. 1 Group A, B, C, D, E, F, G T6	[C, US]
Non-incendive:	
Class I Div. 2 Group A, B, C, D T4A	[C, US]

Non-incendive:	
- Class I Div. 2 Group A, B, C, D T4A	[C, US]
 Class I Zone 2 AEx nL IIC T4 	[US]
 Class I Zone 2 Ex nL IIC T4 	[C]
 Class I, II, III Div. 2 Group A, B, C, D, F, G T4A Class I Zone 2 AEx nA II T4 Class I Zone 2 Ex nA II T4 	[C, US] [US] [C]

Technical data:

Input data						
Measuring ranges ¹⁾	bar	1	2.5			
Overload pressures	bar	3	8			
Burst pressure	bar	5	12			
Mechanical connection	G1/4 A ISO 11	79-2				
Tightening torque, recommended	20 Nm					
Parts in contact with fluid	Sensor:	Ceramio	C Al203			
	Mech. connec	tor: 1.4301				
	Seal:	FKM/EF	PDM			
Output data						
Output signal, permitted load resistance	$4 20 \text{ mA}, 2-0 \text{ R}_{Lmax} = (U_B - 1)$	2 V) / 20 m/	A [kΩ]			
Accuracy acc. to DIN 16086, terminal based	≤ ± 0.5 % FS 1 ≤ ± 1.0 % FS 1	yp.				
Accuracy, B.F.S.L.	≤ ± 0.25 % FS ≤ ± 0.5 % FS i					
Temperature compensation Zero point	≤ ± 0.02 % FS ≤ ± 0.03 % FS	/ °C typ. / °C max.				
Temperature compensation Span	≤ ± 0.02 % FS ≤ ± 0.03 % FS	/ °C typ.				
Non-linearity acc. to DIN 16086, terminal based	≤ ± 0.5 % FS i					
Hysteresis	≤ ± 0.4 % FS ı	max.				
Repeatability	≤ ± 0.1 % FS					
Rise time	≤ 1.5 ms					
Long-term drift	≤ ± 0.3 % FS typ. / year					
Environmental conditions						
Compensated temperature range	-25 +85 °C					
Operating/ambient temperature range	Intrinsically sa					
	Non-incendive	: Ta = -20) +85 °C			
Storage temperature range	-40 +100 °C					
Fluid temperature range ²⁾	Non-incendive	: Ta = -40	+60 °C / -20 +60 °C +85 °C / -20 +85 °C			
Vibration resistance acc. to	≤ 10 g (1/2-14		it)			
DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g (male c					
Protection class acc. to DIN EN 60529 / NEMA ³ ISO 20653	IP 65; NEMA4 IP6K9K (1/2-1					
Relevant data for Ex applications						
Supply voltage	12 28 V DC					
Max. input current	li = 100 mA					
Max. input power	up to 28 V: Pi	= 1 W				
Connection capacitance of the sensor	Ci ≤ 22 nF					
Inductance of the sensor	Li = 0 mH					
Insulation voltage ⁴⁾	50 V AC, with acc. to EN 610	integrated o 000-6-2	vervoltage protection			
Other data						
Residual ripple of supply voltage	≤ 5 %					
Current consumption	≤ 25 mA					
Life expectancy	> 10 million cy					
Weight	~ 180 g; ~ 300					
Note: Reverse polarity protection of the supply	voltage, excess	voltage, over	erride and short circuit			

protection are provided.

FS (Full Scale) = relative to complete measuring range, B.F.S.L. = Best Fit Straight Line

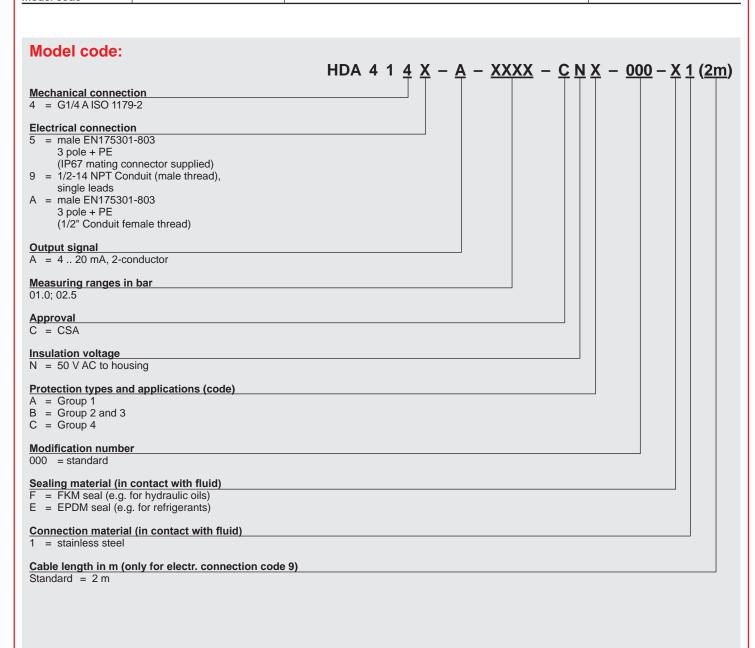
- 1) psi measuring ranges on request 2) -20 °C with FKM or EPDM seal, -40 °C on request 3) With mounted mating connector in corresponding protection class

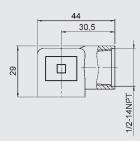
4) 500 V AC on request

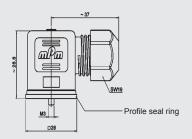
Fields of application:

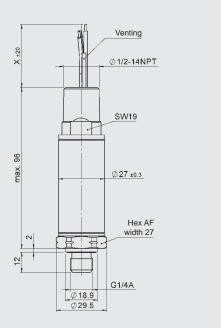
u
7
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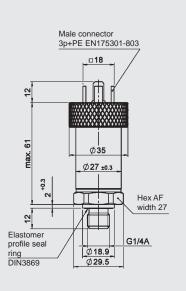
Group	1	2	3	4	
Protection type	Intrinsically safe	Intrinsically safe	Non-incendive (with field wiring)	Non-incendive	
,,	Gases and dusts	Gases	Gases	Gases and dusts	
Certificate		C	CSA 1760344		
	Intrinsically safe	Intrinsically safe	Non-incendive	Non-incendive	
Application fields	- Class I, II, III Division 1 Group A, B, C, D, E, F, G T6	- Class I Division 1 Group A, B, C, D T6 - Class I Zone 0 AEx ia IIC T6 - Ex ia IIC T6	- Class I Division 2 Group A, B, C, D T4A - Class I Zone 2 AEx nL IIC T4 - Class I Zone 2 Ex nL IIC T4	- Class I, II, III Division 2 Group A, B, C, D, F, G T4A - Class I Zone 2 Ex nA II T4 - Class I Zone 2 AEx nA II T4 IP 6x	
Electrical connection	9	5, 9, A	5, 9, A	9	
Code for model code	A		В	С	



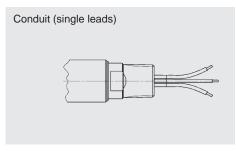








Pin connections:



Lead	HDA 41X9-A
green	Signal +
white	Signal -
green-yellow	Housing



Pin	HDA 41X5-A	HDA 41XA-A
1	Signal +	Signal +
2	Signal -	Signal -
3	n.c.	n.c.
<u> </u>	Housing	Housing

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAC INTERNATIONAL



Pressure Transmitter HDA 4100 Ex applications

Absolute pressure

Accuracy 0.5 %

Intrinsically Safe, Dustproof enclosure Non-Sparking ATEX, IECEx, double approval



Description:

The pressure transmitter HDA 4100 is a compact pressure transmitter (intrinsically safe version) which is used to measure absolute pressures in hydraulics and pneumatics. The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices in potentially explosive atmospheres.

As with the industry model, the ATEX/IECEx version HDA 4100 has a ceramic measurement cell with thick-layer strain gauge.

Intended fields of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high dust contamination, e.g. in mills.

Protection types and applications:

ATEY

AIEA			
I M1	Ex ia	1	Ma
II 1G	Ex ia	IIC	T6 Ga
II 1/2G	Ex ia	IIC	T6 Ga/Gb
II 2G	Ex ia	IIC	T6 Gb
II 3G	Ex nA	IIC	T6, T5, T4 Gc
II 3G	Ex ic	IIC	T6, T5, T4 Gc
II 1D	Ex ia	IIIC	T85 °C Da
II 1D	Ex ta	IIIC	T80/90/100 °C
		T_{500}	90/T ₅₀₀ 100/T ₅₀₀ 110 °C Da
II 2D	Ex tb	IIIC	T80/T90/T100 °C Db
II 3D	Ex tc	IIIC	T80/T90/T100 °C Dc
II 3D	Ex ic	IIIC	T80/T90/T100 °C Dc
IECEx			

Ex ia	1	Ма	
Ex ia	IIC	T6 Ga	
Ex ia	IIC	T6 Ga/Gb	
Ex ia	IIC	T6 Gb	
Ex nA	IIC	T6,T5,T4 Gc	
Ex ic	IIC	T6,T5,T4 Gc	
Ex ia	IIIC	T85 °C Da	
Ex ta	IIIC	T80/T90/T100 °C Da	
	T ₅₀₀	90/T ₅₀₀ 100/T ₅₀₀ 110 °C [Da
Ex tb	IIIC	T80/T90/T100 °C Db	
Ex tc	IIIC	T80/T90/T100 °C Dc	
Ex ic	IIIC	T80/T90/T100 °C Dc	

Technical data:

Input data					
Measuring ranges	bar	1		2.5	
Overload pressures	bar	3		8	
Burst pressure bar		5 12			
Mechanical connection		G1/4 A ISO 1179	9-2		
Tightening torque, recommended		20 Nm			
Parts in contact with fluid		Sensor: Ceramic			
		Mech. connection: 1.4301			
		Seal: FKM/EPD	<u>M</u>		
Output data					
Output signal, permitted load resistance	9	4 20 mA, 2-co $R_{\text{Lmax}} = (U_{\text{B}} - 12)$	V) / 20 mA	[kΩ]	
Accuracy acc. to DIN 16086, terminal based		≤±0.5 % FS typ. ≤±1 % FS max.			
Accuracy, B.F.S.L.		≤ ± 0.25 % FS ty ≤ ± 0.5 % FS ma			
Temperature compensation		≤ ± 0.02 % FS /	°C typ.		
Zero point		≤ ± 0.03 % FS /	°C max.		
Temperature compensation Span		$\leq \pm 0.02 \% FS / $ $\leq \pm 0.03 \% FS / $	°C typ. °C max.		
Non-linearity acc. to DIN 16086, terminal based		≤ ± 0.5 % FS ma	ax.		
Hysteresis		≤ ± 0.4 % FS max.			
Repeatability		≤ ± 0.1 % FS			
Rise time		≤ 1.5 ms			
Long-term drift		≤ ± 0.3 % FS typ. / year			
Environmental conditions					
Compensated temperature range		-25 +85 °C			
Operating/ambient temperature range		T5, T90 °C,T ₅₀₀ 100 °C		Ta = -20 +60 °C Ta = -20 +70 °C Ta = -20 +80 °C Ta = -20 +85 °C	
Storage temperature range		-40 +100 °C			
Fluid temperature range 1)2)		-40 +60 °C / -2	20 +60 °C	;	
C € mark		EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 15 / 26 / 31 EN 50303			
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz		≤ 20 g			
Protection class acc. to DIN EN 60529	3)	IP 67			
Relevant data for Ex applications		Ex ia, ic	Ex nA, ta, tb, tc		
Supply voltage		12 28 V DC	12 28 V DC		
Max. input current		li = 100 mA			
Max. input power	Pi = 1 W	Max. power consumption ≤1 W			
Connection capacitance of the sensor		Ci ≤ 22 nF			
Inductance of the sensor		Li = 0 mH			
Insulation voltage 4) 50 V AC, with integrated overvoltage acc. to EN 61000-6-2				ervoltage protection	
Other data					
Residual ripple of supply voltage ≤ 5 %					
Current consumption	≤ 25 mA				
Life expectancy		> 10 million cycles (0 100 % FS)			
Weight	~ 150 g				

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range; B.F.S.L. = Best Fit Straight Line

19 -20 °C with FKM seal or EPDM seal, -40 °C on request
2 With M12x1 male connector, only up to -25 °C
3 With mounted mating connector in corresponding protection class
4 500 V AC on request

Note:



Fields of app	olication:					
Code no. for use in model code	1			9	A	С
ATEX KEMA 05 ATEX 1016X	I M1 Ex ia I Ma	II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ia IIIC T85 °C Da	II 2G Ex ia IIC T6 Gb	II 3G Ex nA IIC T6, T5 Gc	II 1D Ex ta IIIC T80/T90 °C T50090 °C, T500100 °C Da II 2D Ex tb IIIC T80/T90 °C Db	II 3G Ex ic IIC T6, T5 Gc II 3D Ex ic IIIC T80/T90 °C Dc
IECEX KEM 08.0014X	Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIIC T85 °C Da	Ex ia IIC T6 Gb	Ex nA IIC T6, T5 Gc	Ex ta IIIC T80/T90 °C T50090 °C, T500100 °C Da Ex tb IIIC T80/T90 °C Db	Ex ic IIC T6, T5 Gc Ex ic IIIC T80/T90 °C Dc
	Mining	Gases/conductive dust	Gases	Gases	Conductive dust	Gases/conductive dust
Application fields	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: non-sparking nA	Protection type: dustproof enclosure	Protection type: intrinsically safe ic with barrier
Electrical connection (see model code)	5, 6	5, 6	5, 6	6	6	5, 6

Instruments for other protection types and zones (see cover) are available upon request.

Model code:

HDA 4 1 $\frac{4}{3}$ $\frac{X}{3}$ - $\frac{A}{3}$ - $\frac{XXXX}{3}$ - $\frac{E}{3}$ $\frac{N}{3}$ - $\frac{000}{3}$ - $\frac{X}{3}$ $\frac{1}{3}$

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection 5 = male, EN175301

= male, EN175301-803, 3 pole + PE (IP 67 mating connector supplied)

= male M12x1, 4 pole (mating connector not supplied)

Output signal

A = 4 .. 20 mA, 2-conductor

Measuring ranges in bar

01.0; 02.5

Approval E = ATI = ATEX IECEx

Insulation voltage

N = 50 V AC to housing

Protection types and applications (code)

	ATEX	IECEx
1 =	I M1 Ex ia I Ma	Ex ia I Ma
	II 1G Ex ia IIC T6 Ga	Ex ia IIC T6 Ga
	II 1/2 G Ex ia IIC T6 Ga/Gb	Ex ia IIC T6 Ga/Gb
	II 2 G Ex ia IIC T6 Gb	Ex ia IIC T6 Gb
	II 1D Ex ia IIIC T85 °C Da	Ex ia IIIC T85 °C Da
9 =	II 3G Ex nA IIC T6, T5 Gc	Ex nA IIC T6, T5 Gc
	Only in conjunction with electr. connection	"6" and
	the impact protection metal safety sleeve (
A =	II 1D Ex ta IIIC T80/T90 °C	Ex ta IIIC T80/T90 °C Da
	T ₅₀₀ 90 °C, T ₅₀₀ 100 °C Da	T ₅₀₀ 90 °C, T ₅₀₀ 100 °C Da
	II 2D Ex tb IIIC T80/T90 °C Db	Ex tb IIIC T80/T90 °C Db
	Only in conjunction with electr. connection	"6" and
	the impact protection metal safety sleeve (see dimensions)
C =	II 3G Ex ic IIC T6, T5 Gc	Ex ic IIC T6, T5 Gc
	II 3D Ex ic IIIC T80/T90 °C Dc	Ex ic IIIC T80/T90 °C Dc

Modification number

000 = standard

Sealing material (in contact with fluid) F = FKM seal (e.g. for hydraulic oils)

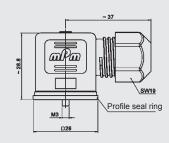
= FKM seal (e.g. for hydraulic oils)

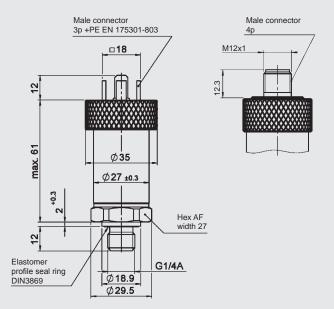
E = EPDM seal (e.g. for refrigerants)

Connection material (in contact with fluid)

= stainless steel

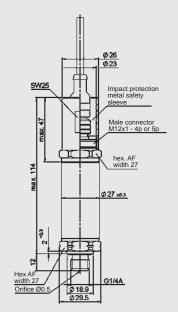
Protection types and applications (code): 1, C





With impact protection metal safety sleeve:

Protection types and applications (code): 9, A

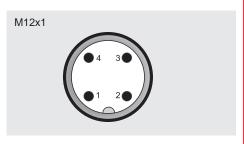


The impact protection metal safety sleeve is included. A straight mating connector is required for electrical connection. E.g. mating connector M12x1, 4 pole, straight, with 3 m shielded cable: ZBE 06S-03, part no. 6098243

Pin connections:



Pin	HDA 4145-A
1	Signal +
2	Signal -
3	n.c.
Τ	Housing



Pin	HDA 4146-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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DAD INTERNATIONAL



Pressure Transmitter HDA 4100 Ex applications

Absolute pressure

Accuracy 0.5 %

Intrinsically Safe, Dustproof enclosure Non-Sparking ATEX, IECEx, double approval **HART** interface



Description:

The pressure transmitter HDA 4100 with HART interface is a compact pressure transmitter (intrinsically safe version) which is used to measure absolute pressures in hydraulics and pneumatics. The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices in potentially explosive atmospheres.

As with the industry model, the ATEX/IECEx version HDA 4100 has a ceramic measurement cell with thick-layer strain gauge.

In addition to the analogue 4 .. 20 mA output of the measured value, digital communication is possible by means of the HART protocol.

Intended fields of application are, for example, in the oil and gas industry, in mining, on gas turbines or in locations with high dust contamination, e.g. in mills.

Protection types and applications:

	M1	Ex ia	1	Ma
-			!	
Ш	1G	Ex ia	IIC	T6,T5 Ga
Ш	1/2 G	Ex ia	IIC	T6,T5 Ga/Gb
Ш	2 G	Ex ia	IIC	T6,T5 Gb
Ш	1D	Ex ia	IIIC	T85 °C/T95 °C Da
Ш	1D	Ex ta	IIIC	T80/90/100 °C
		T ₅₀₀	90/ 1	₅₀₀ 100/ T ₅₀₀ 110 °C Da
Ш	2D	Ex tb	IIIC	T80/T90/T100 °C Db
Ш	3G	Ex nA	IIC	T6, T5, T4 Gc
Ш	3G	Ex ic	IIC	T6, T5, T4 Gc
Ш	3D	Ex tc	IIIC	T80/T90/T100 °C Dc
Ш	3D	Ex ic	IIIC	T80/T90/T100 °C Dc
ΙE	CEx			

Ex ia	ı	Ма
Ex ia	IIC	T6,T5 Ga
Ex ia	IIC	T6,T5 Ga/Gb
Ex ia		T6,T5 Gb
Ex ia	IIIC	T85/T95 °C Da
Ex ta	IIIC	T80/T90/T100 °C
T ₅₀	090/T	₅₀₀ 100/T ₅₀₀ 110 °C Da
T ₅₀ Ex tb		₅₀₀ 100/T ₅₀₀ 110 °C Da T80/T90/T100 °C Db
Ex tb Ex nA	IIIC	T80/T90/T100 °C Db T6,T5,T4 Gc
Ex tb Ex nA	IIIC	T80/T90/T100 °C Db
Ex tb Ex nA Ex ic	IIIC IIC IIC	T80/T90/T100 °C Db T6,T5,T4 Gc
Ex tb Ex nA Ex ic Ex tc	IIIC IIC IIC	T80/T90/T100 °C Db T6,T5,T4 Gc T6,T5,T4 Gc

Technical data:

Input data

1 3 3 5 5 6 1/4 A ISO 1179-20 Nm Sensor: Ceramic Mech. connection Seal: FKM / EPDI 4 20 mA, 2-cond RLmax = (U _B - 12 V for HART commu Acc. to HART 7 sl Altering of measu Zero point adjustm ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS typ. ± 0.25 % FS max.	: 1.4301 ductor, with HAR ') / 20 mA [kΩ] nication min. 250 pecifications ring range limits ent within max. 3	Ω (see table)
5 G1/4 A ISO 1179- 20 Nm Sensor: Ceramic Mech. connection Seal: FKM / EPDI 4 20 mA, 2-cone RLmax = (UB - 12 V for HART commun Acc. to HART 7 sy Altering of measu Zero point adjustm ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS tyr.	: 1.4301 ductor, with HAR ') / 20 mA [kΩ] nication min. 250 pecifications ring range limits ent within max. 3	T protocol) Ω (see table)
G1/4 A ISO 1179- 20 Nm Sensor: Ceramic Mech. connection Seal: FKM / EPDI 4 20 mA, 2-cone RLmax = (UB - 12 V for HART commul Acc. to HART 7 s Altering of measu Zero point adjustm ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS typ.	: 1.4301 M ductor, with HAR ') / 20 mA [kΩ] nication min. 250 pecifications ring range limits ent within max. 3	T protocol) Ω (see table)
20 Nm Sensor: Ceramic Mech. connection Seal: FKM / EPDI 4 20 mA, 2-cone RLmax = (UB - 12 V for HART commu Acc. to HART 7 s Altering of measu Zero point adjustm ≤ ± 0.5 % FS typ. ≤ ± 1% FS max. ≤ ± 0.25 % FS tys FS tys.	: 1.4301 M ductor, with HAR ') / 20 mA [kΩ] nication min. 250 pecifications ring range limits ent within max. 3	Ω (see table)
Sensor: Ceramic Mech. connection Seal: FKM / EPDI 4 20 mA, 2-cone RLmax = (U _B - 12 V for HART commu. Acc. to HART 7 s; Altering of measu Zero point adjustm ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS tys.	ductor, with HAR) / 20 mA [kΩ] nication min. 250 pecifications ring range limits pent within max. 3	Ω (see table)
Mech. connection Seal: FKM / EPDI 4 20 mA, 2-cone R _{Lmax} = (U _B - 12 V for HART commu Acc. to HART 7 sy Altering of measu Zero point adjustm ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS tys	ductor, with HAR) / 20 mA [kΩ] nication min. 250 pecifications ring range limits pent within max. 3	Ω (see table)
$R_{L_{max}} = (U_B - 12 \text{ V} $ for HART commu Acc. to HART 7 s Altering of measu Zero point adjustm $\leq \pm 0.5 \%$ FS typ. $\leq \pm 1\% \text{ FS max}$. $\leq \pm 0.25 \% \text{ FS typ.}$	') / 20 mA [kΩ] nication min. 250 pecifications ring range limits pent within max. 3	Ω (see table)
$R_{L_{max}} = (U_B - 12 \text{ V} $ for HART commu Acc. to HART 7 s Altering of measu Zero point adjustm $\leq \pm 0.5 \%$ FS typ. $\leq \pm 1\% \text{ FS max}$. $\leq \pm 0.25 \% \text{ FS typ.}$	') / 20 mA [kΩ] nication min. 250 pecifications ring range limits pent within max. 3	Ω (see table)
Zero point adjustm ≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS typ	ent within max. 3	· /
≤ ± 0.5 % FS typ. ≤ ± 1 % FS max. ≤ ± 0.25 % FS typ		% of the span
≤ ± 1 % FS max. ≤ ± 0.25 % FS typ		·
≤ ± 0.02 % FS / °0 ≤ ± 0.03 % FS / °0	C max.	
≤ ± 0.03 % FS / °0	C max.	
≤ 25 ms		
≤ ± 0.3 % FS typ.	/ year	
T6, T80/T85 °C, T T5, T90/T95 °C, T T100, T ₅₀₀ 110 °C T4	500 90 °C 500 100 °C	Ta = -20 +60 °C Ta = -20 +70 °C Ta = -20 +80 °C Ta = -20 +85 °C
-40 +100 °C		
15, 190/195 °C, 1	500 TOO TO	Ta = -20 +60 °C Ta = -20 +70 °C Ta = -20 +80 °C Ta = -20 +85 °C
EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 15 / 26 / 31 EN 50303		
≤ 20 g		
IP 67		
Ex ia, ic	Ex nA, ta, tb,	, tc
12 28 V DC	12 28 V DC	
li = 100 mA		
Pi = 0.7 W	Max. power c	onsumption ≤1W
Ci ≤ 22 nF		
Li = 0 mH		
50 V AC, with integ EN 61000-6-2	grated overvoltag	e protection acc. to
acc. to FSK Phys	cal Layer Specif	ication (HCF_SPEC-054)
≤ 25 mA		
> 10 million cycles (0 100 % FS)		
~ 150 g		
	≤±0.03 % FS / °C ≤±0.5 % FS max ≤±0.4 % FS max ≤±0.1 % FS ≤25 ms ≤±0.3 % FS typ. -25+85 °C T6, T80/T85 °C, T T5, T90/T95 °C, T T100, T500 110 °C T4 -40+100 °C T6, T80/T85 °C, T T5, T90/T95 °C, T T100 °C, T500 110 T4 EN 61000-6-1 / 2 EN 60079-0 / 111 / EN 50303 ≤ 20 g IP 67 Ex ia, ic 1228 V DC Ii = 100 mA Pi = 0.7 W Ci ≤ 22 nF Li = 0 mH 50 V AC, with integ EN 61000-6-2 acc. to FSK Physi ≤ 25 mA > 10 million cycles ~150 g	≤ 25 ms ≤ ± 0.3 % FS typ. / year -25 +85 °C T6, T80/T85 °C, T500 90 °C T5, T90/T95 °C, T500 100 °C T100, T500 110 °C T4 -40 +100 °C T6, T80/T85 °C, T500 90 °C T5, T90/T95 °C, T500 90 °C T5, T90/T95 °C, T500 90 °C T5, T90/T95 °C, T500 90 °C T4 EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 15 / 26 / 31 EN 50303 ≤ 20 g IP 67 Ex ia, ic Ex nA, ta, tb 12 28 V DC II = 100 mA Pi = 0.7 W Max. power of C1 ≤ 22 nF Li = 0 mH 50 V AC, with integrated overvoltag EN 61000-6-2 acc. to FSK Physical Layer Specified S 25 mA > 10 million cycles (0 100 % FS)

FS (Full Scale) = relative to complete measuring range B.F.S.L. = Best Fit Straight Line

- 19 -20 °C with FKM seal or EPDM seal, -40 °C on request
 2 With M12x1 male connector, only up to -25 °C
 3 With mounted mating connector in corresponding protection class
 4 500 V AC on request

Measuring range limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits:

Lower measuring range limit		Upper measuring range	e limit	Measuring span	
min max		min	max	min	max
0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150 % FS

Fields of application:

Code no. for use in model code	1			9	A	С
ATEX DEKRA 13ATEX0031X DEKRA 13ATEX0032	I M1 Ex ia I Ma	II 1G Ex ia IIC T6,T5 Ga II 1/2G Ex ia IIC T6,T5 Ga/Gb II 1D Ex ia IIIC T85/T95°C Da	II 2G Ex ia IIC T6,T5 Gb	II 3G Ex nA IIC T6,T5 Gc	II 1D Ex ta IIIC T80/T90°C T500T90/T500T100°C Da II 2D Ex tb IIIC T80/T90°C Db	II 3G Ex ic IIC T6,T5 Gc II 3D Ex ic IIIC T80/T90°C Dc
IECEX DEK 14.0011X	Ex ia I Ma	Ex ia IIC T6,T5 Ga Ex ia IIC T6,T5 Ga/Gb Ex ia IIIC T85/T95°C Da	Ex ia IIC T6,T5 Gb	Ex nA IIC T6,T5 Gc	Ex ta IIIC T80/T90°C T500T90/T500T100°C Da Ex tb IIIC T80/T90°C Db	Ex ic IIC T6,T5 Gc Ex ic IIIC T80/T90°C Dc
Application fields	Mining	Gases/conductive dust	Gases	Gases	Conductive dust	Gases/conductive dust
	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: non-sparking nA	Protection type: dustproof enclosure	Protection type: intrinsically safe ic with barrier
Electrical connection (see model code)	5, 6	5, 6	5, 6	6	6	5, 6

Instruments for other protection types and zones (see cover) are available upon request.

Model code:

HDA 4 1 $4 \times - F21 - XXXX - E \times X - 000 - X 1$

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

- = male, EN175301-803, 3 pole + PE (IP 67 mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Measuring ranges in bar

01.0; 02.5

Approval

= ATEX **IECEx**

Insulation voltage

= 50 V AC to housing

Protection types and applications (code)

	AIEX			IECEX
1 =	I M1	Exia I	Ма	Ex ia I Ma
	II 1G	Ex ia IIC	T6, T5 Ga	Ex ia IIC T6 Ga
	II 1/2 G		T6, T5 Ga/Gb	Ex ia IIC T6 Ga/Gb
	II 2 G	Ex ia IIC	T6, T5 Gb	Ex ia IIC T6 Gb
	II 1D	Ex ia IIIC	T85/T95 °C Gb Da	Ex ia IIIC T85/T95 °C Gb
9 =	II 3G	Ex nA IIC	T6, T5 Gc	Ex nA IIC T6, T5 Gc
	Only in	conjunction	with electrical conne	ction "6" and the impact
	protection	on metal sat	fety sleeve (see dime	nsions)
A =	II 1D	Ex ta IIIC	T80/T90 °C Da	Ex ta IIIC T T80/T90 °C Da
		T ₅₀₀ T90	/T ₅₀₀ T100 °C Da	T ₅₀₀ T90/T ₅₀₀ T100 °C Da
	II 2D	Ex tb IIIC	T80/T90 °C Db	Ex tb IIIC T80/T90 °C Db
	Only in	conjunction	with electrical conne	ction "6" and the impact
	protection	on metal sat	fety sleeve (see dime	nsions)
C =	II 3G	Exic IIC	T6, T5 Gc	Ex ic IIC T6, T5 Gc
	II 3D	Ex ic IIIC	T80/T90 °C Dc	Ex ic IIIC T80/T90 °C Dc

Modification number

000 = standard

Sealing material (in contact with fluid) F = FKM seal (e.g. for bydravitic 11)

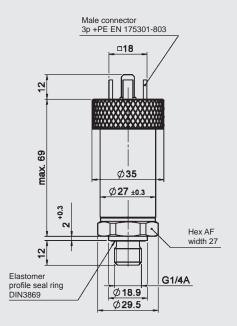
- = FKM seal (e.g. for hydraulic oils) = EPDM seal (e.g. for refrigerants)

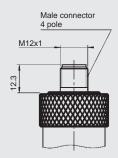
Connection material (in contact with fluid)

= stainless steel

EN 18.629.0/02.18

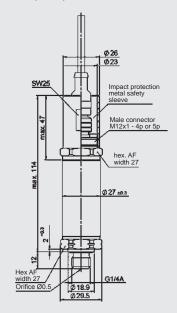
Dimensions:





With impact protection metal safety sleeve:

Protection types and applications (code): 9, A

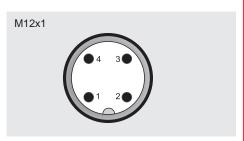


The impact protection metal safety sleeve is included. A straight mating connector is required for electrical connection. E.g. mating connector M12x1, 4 pole, straight, with 3 m shielded cable: ZBE 06S-03, part no. 6098243

Pin connections:



	115 4 4 4 5 5 5 4	
<u>Pin</u>	HDA 4145-F21	
1	Signal +	
2	Signal -	
3	n.c.	
	PE	



Pin	HDA 4146-F21
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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YDAC INTERNATIONAL



Pressure Transmitter HDA 8400

Relative pressure

Accuracy 0.5 %

For the medium hydrogen (Minimum order quantity 500 units)



Description:

The pressure transmitter series HDA 8400 has been specially developed for use with hydrogen and for series applications, e.g. in the mobile sector. Like most of our pressure transmitter series, the HDA 8400 is based on a robust and long-life thin-film sensor.

All of the parts in contact with the fluid (sensor and pressure port) are made of stainless steel and are welded together. This means that there are no sealing points in the interior of the sensor. The possibility of leakage is excluded.

Due to the specially selected material, this HDA 8400 is especially suitable for use in hydrogen applications.

Technical data:

Input data

input data												
Measuring ranges	bar	25	40	60	100	160	250	400	600	900	1050	
Overload pressures	bar	50	80	120	200	320	500	800	1000	1400	1400	
Burst pressure	bar	125	200	300	500	800	1250	2000	3000	3000	3000	
Mechanical connectio	n				SF2500	CX20, a	utoclav	e (7/16	-20 UN	F 2B)		
(Tightening torque, re-	comm	ended)		((15 Nm	, 20 Nn	n at 900	bar)				
							N 837 (
							A (ISO					
Parts in contact with fl	uid						1.4435					
										urcon®2	2	
					(polyure	ethane)	(9/16-1	18 UNF	2A)			
Output data												
Output signal								others	availab	le on red	quest	
Accuracy acc. to DIN	16086	i ,			≤ ± 0.5							
terminal based					≤ ± 1.0							
Accuracy, B.F.S.L.					≤ ± 0.25		- J I					
- .					≤ ± 0.5							
Temperature compens	sation						S / °C ty					
Zero point							S / °C m					
Temperature compens	sation						S / °C ty					
Span Span to F	INI 4C	000			$\leq \pm 0.02$ $\leq \pm 0.3$		S / °C m	iax.				
Non-linearity acc. to D terminal based	IIIV 16	086,			≤ ± 0.3	% F5 II	nax.					
Hysteresis					≤ ± 0.4	0/ EQ n	nav					
							ııax.					
Repeatability Rise time					≤±0.1 % FS ≤2 ms							
					≤ ± 0.3 % FS typ. / year							
Long-term drift					≤ ± 0.3	% FS t	yp. / ye	ar				
Environmental cond					05	05.00						
Compensated temper					-25 +8							
Operating temperature		e			-40 +							
Storage temperature					-40 +							
Fluid temperature ran	ge				-40 +100 °C							
(€ mark				EN 61000-6-1 / 2 / 3 / 4								
Vibration resistance a				:	≤ 25 g							
DIN EN 60068-2-6 at		00 Hz										
Shock resistance acc.	to						half-sin					
DIN EN 60068-2-27						1 ms /	half-sin	e				
Protection class acc. t					IP 67	,						
	ISO	20653 1			IP 6K9k	<u> </u>						
Other data												
Electrical connection 2	:)			,	version); Metri	-Pack s	eries 1	50, 3 pc		solid	
Supply voltage							V DC :					
when applied acc. to UL specifications					 limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950 							
Residual ripple of sup	ply vo	Itage		≤ 5 %								
Life expectancy	, ,			> 1 million cycles (0 100 % FS)								
Weight				~ 55 g								
Note: Reverse pola	rity pro	otection (of the s			excess	voltag	e. overi	ride and	short o	ircuit	

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit Note: protection are provided.

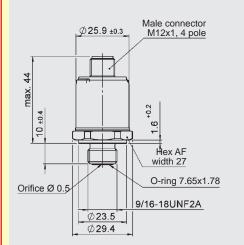
FS (Full Scale) = relative to complete measuring range

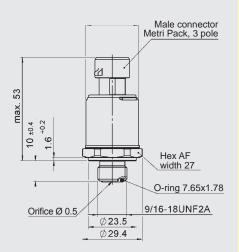
B.F.S.L. = Best Fit Straight Line

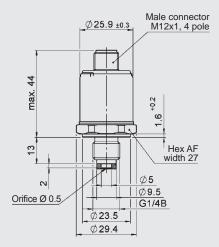
- 1) With mounted mating connector in corresponding protection class
- ²⁾ Other connection types/options available on request

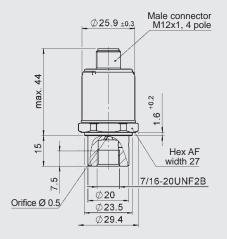
EN 18.636.0/02.18

Dimensions:

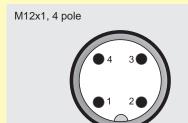




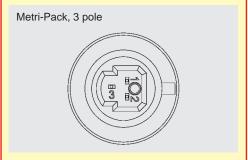




Pin connections:



Pin	
1	Signal +
2	n.c.
3	Signal -
4	n.c.



Pin	
1	Signal -
2	Signal +
3	n.c.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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E-mail: electronic@hydac.com Internet: www.hydac.com

YDAC INTERNATIONAL



Pressure Transmitter HDA 8400

Relative pressure

Accuracy 0.5 %

For the medium hydrogen Tested to EC 79 (Minimum order quantity 500 units)



Description:

The pressure transmitter series HDA 8400 has been specially developed for use with hydrogen and for series applications, e.g. in the mobile sector. Like most of our pressure transmitter series, the HDA 8400 is based on a robust and long-life thin-film sensor.

All of the parts in contact with the fluid (sensor and pressure port) are made of stainless steel and are welded together. This means that there are no sealing points in the interior of the sensor. The possibility of leakage is excluded.

Due to the specially selected material, this HDA 8400 is suited especially for the use in hydrogen applications.

Component testing for type approval acc. to EC 79-2009 / V0 406-2010 has been concluded successfully.

Technical data:

Input data		
Measuring ranges	bar	900
Nominal operating pressure 1)	bar	700 1)
Maximum permitted operating pressure 1)	bar	875 ¹⁾
Burst pressure	bar	3000
Mechanical connection		SF250CX20, autoclave (7/16-20 UNF 2B) (20 Nm)
(Tightening torque, recommended)		G 1/4 B DIN EN 837 (20 Nm)
		9/16-18 UNF 2A (ISO 8434-3) (25 Nm)
Parts in contact with fluid		Stainless steel 1.4435 (Ni content ≥ 13%)
		Seal: Copper (Cu-DHP) (G 1/4 B); Zurcon®22
		(polyurethane) (9/16-18 UNF 2A)
Output data		4 00 4 1 1 1
Output signal		4 20 mA, ratiometric, others available on request
Accuracy acc. to DIN 16086,		≤ ± 0.5 % FS typ.
terminal based		≤ ± 1.0 % FS max.
Accuracy, B.F.S.L.		≤ ± 0.25 % FS typ. ≤ ± 0.5 % FS max.
Temperature compensation		≤ ± 0.015 % FS / °C typ.
Zero point		≤ ± 0.015 % FS / ℃ typ. ≤ ± 0.025 % FS / °C max.
Temperature compensation		≤ ± 0.015 % FS / °C typ.
Span		≤ ± 0.025 % FS / °C max.
Non-linearity acc. to DIN 16086,		≤ ± 0.3 % FS max.
terminal based		
Hysteresis		≤ ± 0.4 % FS max.
Repeatability		≤±0.1% FS
Rise time		≤ 2 ms
Long-term drift		≤ ± 0.3 % FS typ. / year
Environmental conditions		
Compensated temperature range		-25 +85 °C
Operating temperature range		-40 +100 °C
Storage temperature range		-40 +100 °C
Fluid temperature range		-40 +100 °C
(€ mark		EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to		≤ 25 g
DIN EN 60068-2-6 at 5 2000 Hz		
Shock resistance acc. to		100 g / 6 ms / half-sine
DIN EN 60068-2-27		500 g / 1 ms / half-sine
Protection class acc. to DIN EN 60529 2)		IP 67
ISO 20653		IP 6K9K
Other data		
Electrical connection		M12x1, 4 pole, available in plastic or metal
O. and be self-		(solid version); Metri-Pack series 150, 3 pole
Supply voltage		8 30 V DC; 5 V DC ± 5 % (ratiometric)
when applied acc. to UL specifications		- limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage		≤ 5 %
Life expectancy		> 1 million cycles (0 100 % FS)
Weight		~ 55 g
		voltage, excess voltage, override and short circuit

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

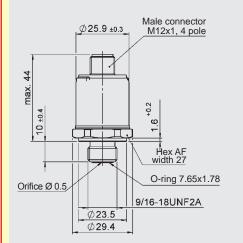
FS (Full Scale) = relative to complete measuring range

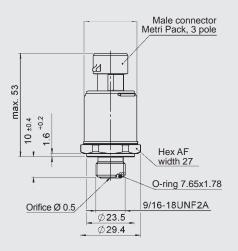
B.F.S.L. = Best Fit Straight Line

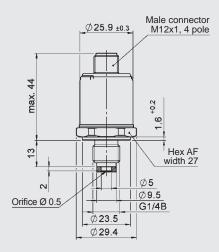
- 1) Tested/validated acc. to EC 79/2009, nominal operation pressure 700 bar at reference temperature 20 °C, max. permitted operating pressure 875 bar
- 2) With mounted mating connector in corresponding protection class

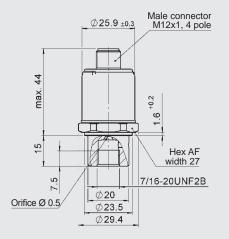
EN 18.637.0/02.18

Dimensions:

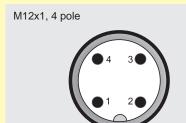




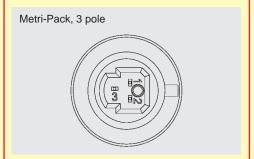




Pin connections:



Pin		
1	Signal +	
2	n.c.	
3	Signal -	
4	n.c.	



Pin	
1	Signal -
2	Signal +
3	n.c.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAC INTERNATIONAL



Pressure Transmitter HDA 4400 Ex applications

Relative pressure

Accuracy 0.5 %

Intrinsically Safe, Dustproof enclosure Non-Sparking ATEX, IECEx, double approval For the medium hydrogen



Description:

This intrinsically safe version of the pressure transmitter HDA 4400 has been specially developed for the use in hydrogen applications and potentially explosive atmospheres and it is based on the HDA 4000 series. The dual approval in accordance with ATEX and IECEx enables universal, almost world-wide utilisation of the devices in potentially explosive atmospheres.

As with the industry model, the HDA 4400 has a pressure measurement cell with thin-film strain gauge on a stainless steel membrane.

The main fields of application are hydrogen fuelling stations.

Due to the specially selected material, this HDA 4400 is suited for the use in hydrogen applications.

Protection types and applications:

ATEX

I M1	Ex ia	1	Ma
II 1G	Ex ia	IIC	T6 Ga
II 1/2G	Ex ia	IIC	T6 Ga/Gb
II 2G	Ex ia	IIC	T6 Gb
II 1D	Ex ia	IIIC	T85 °C Da

IECEx

Ex ia	1	Ma
Ex ia	IIC	T6 Ga
Ex ia	IIC	T6 Ga/Gb
Ex ia	IIC	T6 Gb
Fx ia	IIIC	T85 °C Da

Technical data:

Input data

Input data										
Measuring range	bar	16	25	40	200	250	400	500	600	1050
Overload pressures	bar	50	50	80	500	500	800	1000	1000	1400
Burst pressure	bar	125	125	200	1250	1250	2000	3000	3000	3000
Mechanical connection				SF2500	CX20, a	utocla	e (7/16	-20 UN	F 2B)	
(Tightening torque, recomi	mended)			(15	Nm for	measu	ring ran	nge < 10	000 bar)
	,			(20	Nm for	measu	ring ran	iğe 105	0 bar)	
				G 1/4 E						
								nge < 10 nge 105	000 bar) 0 bar))
Parts in contact with fluid				Stainle Seal: C	ss steel opper (1.4435 Cu-DH	Ni co P) (G 1	ntent ≥ /4 B)	13 %)	
Output data										
Output signal, permitted load resistance				4 20 R _{Lmax} =	mA, 2-α (U _B - 1	onduct 2 V) / 2	or 20 mA [l	κΩ]		
Accuracy acc. to DIN 1608 terminal based	36,			≤ ± 0.5 ≤ ± 1 %	% FS to FS ma	yp. ix.				
Accuracy, B.F.S.L.				≤ ± 0.2 ≤ ± 0.5	5 % FS	typ.				
Temperature compensatio Zero point	n			≤ ± 0.0 ≤ ± 0.0			yp. nax.			
Temperature compensatio Span	n			≤ ± 0.0 ≤ ± 0.0						
Non-linearity acc. to DIN 1 terminal based	6086,			≤ ± 0.3						
Hysteresis				≤ ± 0.4	% FS r	nax.				
Repeatability				≤±0.1% FS						
Rise time				≤ 2 ms						
Long-term drift				≤ ± 0.3	% FS t	yp. / ye	ar			
Environmental condition	ıs									
Compensated temperature	e range			-25 +	85 °C					
Operating/ambient temper	ature ran	ge		Ta = -25 +60 °C						
Storage temperature range	е			-40 +100 °C						
Fluid temperature range				Ta = -2	5 +60	°C				
(€ mark				EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 EN 50303						
Vibration resistance acc. to DIN EN 60068-2-6 at 10	500 Hz			≤ 20 g						
Protection class acc. to DI	N EN 605	529 ¹⁾		IP 67						
Relevant data for Ex app	lications			Ex ia						
Supply voltage				12 28	V DC					
Max. input current				li = 100	mA					
Max. input power				Pi = 1 \	N					
Connection capacitance of the sensor				Ci ≤ 22 nF						
Inductance of the sensor Li = 0 mH										
Insulation voltage				50 V Ao acc. to	C, with EN 610	integrat 000-6-2	ed ove	rvoltage	protec	tion
Other data										
Residual ripple of supply v	oltage			≤ 5 %						
Current consumption				≤ 25 mA						
Life expectancy				> 1 million cycles (0 100 % FS)						
Weight ~ 150 g										
Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.										

protection are provided.

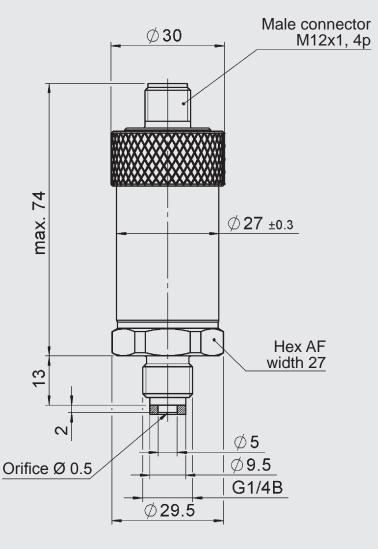
FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

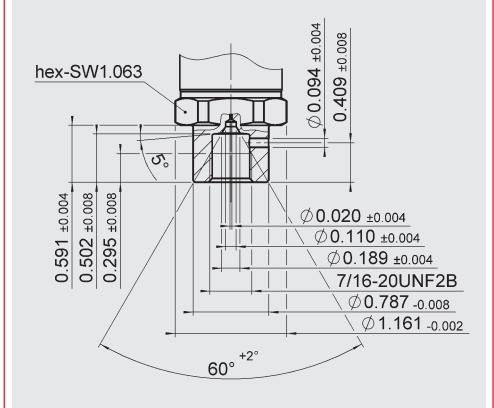
1) With mounted mating connector in corresponding protection class

EN 18.639.0/02.18

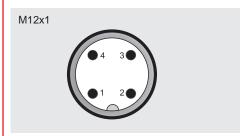
Fields of application:							
Code no. for use in model code		1					
ATEX KEMA 05 ATEX 1016X	I M1 Ex ia I Ma	II 1G Ex ia IIC T6 Ga II 1/2G Ex ia IIC T6 Ga/Gb II 1D Ex ia IIIC T85 °C Da	II 2G Ex ia IIC T6 Gb				
IECEX KEM 08.0014X	Ex ia I Ma	Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIIC T85 °C Da	Ex ia IIC T6 Gb				
	Mining	Gases/conductive dust	Gases				
Application fields	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier				

Model code: HDA 4 4 \times 6 - \wedge - \times - \times - \times - \times 1 - \times 1 - \times 1 - \times 1 Mechanical connection C = SF250CX20, autoo = SF250CX20, autoclave (7/16-20 UNF 2B) G = G1/4 B DIN EN 837**Electrical connection** = male M12x1, 4 pole (mating connector not supplied) Output signal A = 4 .. 20 mA, 2-conductor Measuring ranges in bar 0016; 0025; 0040; 0200; 0250; 0400; 0500; 0600; 1050 = ATEX / IECEx Insulation voltage N = 50 V AC to housing Protection types and applications (code) ATEX IECEx Ex ia I Ma Ex ia IIC T6 Ga Ex ia IIC T6 Ga/Gb Ex ia IIC T6 Gb Ex ia IIIC T85 °C Da Modification number H00 = standard





Pin connections:



Pin	HDA 44X6-A
1	+ Sig
2	n.c.
3	- Sig
4	n.c.

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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EN 18.638.0/02.18

DAC INTERNATIONAL



Pressure Transmitter HDA 4400 Ex applications

Relative pressure

Accuracy 0.5 %

Intrinsically Safe, Dustproof enclosure ATEX, IECEx, double approval For the medium hydrogen Redundant



Description:

This intrinsically safe version of the pressure transmitter has been specially developed for use in hydrogen applications and potentially explosive atmospheres and it is based on the HDA 4000 series.

Thanks to the use of two highly accurate and robust pressure measurement cells with thin-film strain gauge on a stainless steel membrane, each with their own electronics, the device has a fully redundant architecture and thus two separate and independent output signals.

The two output signals are output in inverted form (signal 1 = 4 .. 20 mA and signal 2 = 20 ... 4 mA). This means that the energy in the intrinsically safe current circuit is kept constant as the sum of the output signals at any pressure is 24 mA. Connection is via a two-channel barrier.

The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices in potentially explosive atmospheres.

Thanks to the redundant structure, the sensor is also suitable for safety circuits/functions in the oil and gas industry. The device is also used in mining applications as well as in locations with high dust contamination.

The fields of application are thus in safetyoriented systems.

Due to the specially selected material, this HDA 4400 is suitable for use in hydrogen applications.

Protection types and applications:

ATEX

I M1	Ex ia	ı	Ма
II 1G	Ex ia	IIC	T6, T5 Ga
II 1/2G	Ex ia	IIC	T6, T5 Ga/Gb
II 2G	Ex ia		T6, T5 Gb
II 1D	Ex ia	IIIC	T85/T95 °C Da

IECEx

Ex ia	ı	Ma
Ex ia	IIC	T6, T5 Ga
Ex ia	IIC	T6, T5 Ga/Gb
Ex ia	IIC	T6, T5 Gb
Ex ia	IIIC	T85/T95 °C Da

Technical data:

Input data												
Measuring range Signal 1	bar	16	25	40	200	250	400	500	600	1050		
Measuring range Signal 2	bar	16	25	40	200	250	400	500	600	1050		
Overload pressures	bar	50	50	80	500	500	800	1000	1000	1400		
Burst pressure	bar	125	125	200	1250	1250	2000	3000	3000	3000		
Mechanical connection				SF2500	CX20, a	utocla	/e (7/16	6-20 UN	F 2B)			
(Tightening torque, recomme	nded)			15 Nm 20 Nm	for mea	asuring asuring	range <	< 1000 1050 ba	bar ır			
Parts in contact with fluid				Stainle	ss steel	1.443	(Ni co	ntent ≥	13 %)			
Output data												
Output signal 1 Output signal 2 Permitted load resistance, ea	ach			4 20 20 4 R _{Lmax} =	mA, 2-c	onduct	or or 20 mA [l	κΩ]				
Accuracy acc. to DIN 16086, terminal based				≤ ± 0.5 ≤ ± 1 %	% FS to FS ma	yp. ix.						
Accuracy, B.F.S.L.				≤ ± 0.2 ≤ ± 0.5	5 % FS % FS r	typ. nax.						
Temperature compensation Zero point				≤ ± 0.0 ≤ ± 0.0	15 % F	S / °C t	yp. nax.					
Temperature compensation Span				≤ ± 0.0 ≤ ± 0.0								
Non-linearity acc. to DIN 160 terminal based	86,			≤ ± 0.3								
Hysteresis				≤ ± 0.4	% FS r	nax.	-					
Repeatability				≤±0.1 % FS								
Rise time				≤ 2 ms								
Long-term drift				≤ ± 0.3 % FS typ. / year								
Environmental conditions					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	<i>)</i> <i>)</i> -	-					
Compensated temperature ra	ange			-25 +	85 °C							
Operating/ambient temperatu		ge		T6, T85		T	a = -25 a = -25	60 °C	3	-		
Storage temperature range				-40 +100 °C								
Fluid temperature range				T6, T85 °C Ta = -25 60 °C T5, T95 °C Ta = -25 70 °C								
(€ mark			EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 EN 50303									
Vibration resistance acc. to DIN EN 60068-2-6 at 10 50	00 Hz			≤ 20 g								
Protection class acc. to DIN	EN 605	529 ¹⁾		IP 67								
Relevant data for Ex applic	ations	1		Ex ia								
Supply voltage				12 28	V DC							
Max. input current				li = 100 mA								
Max. input power				Pi = 0.7 W								
Connection capacitance of the sensor				Ci ≤ 22 nF								
Inductance of the sensor				Li = 0 mH								
Intrinsic safety barrier				2-chan (e.g. Pe	nel, R _{mir} epperl 8	= 280 Fuchs	Ω S Z789)					
Insulation voltage		50 V AC, with integrated overvoltage protection acc. to EN 61000-6-2										
Other data												
Residual ripple of supply volt	age			≤5%								
Current consumption				≤ 25 mA								
Life expectancy				> 1 million cycles (0 100 % FS)								
Weight				~ 200 g								

Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

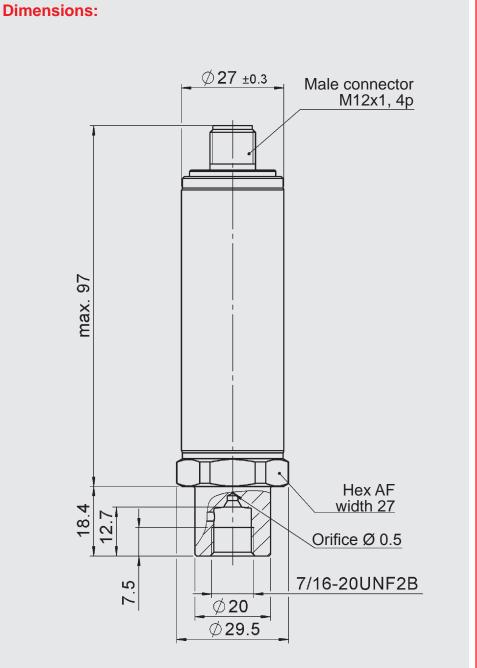
FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

¹⁾ With mounted mating connector in corresponding protection class

Fields of appli	ication:		
Code no. for use in model code		1	
ATEX KEMA 05 ATEX 1016X	I M1 Ex ia I Ma	II 1G Ex ia IIC T6, T5 Ga II 1/2G Ex ia IIC T6, T5 Ga/Gb II 1D Ex ia IIIC T85/T95 °C Da	II 2G Ex ia IIC T6, T5 Gb
IECEX KEM 08.0014X	Ex ia I Ma	Ex ia IIC T6, T5 Ga Ex ia IIC T6, T5 Ga/Gb Ex ia IIIC T85/T95 °C Da	Ex ia IIC T6, T5 Gb
Application fields	Mining Protection type: intrinsically safe ia with barrier	Gases/conductive dust Protection type: intrinsically safe ia with barrier	Gases Protection type: intrinsically safe ia with parrier

Model code: HDA 4 4 C 6 - AA - XXXX - XXXX - E N 1 - H00Mechanical connection C = SF250CX20, autoc = SF250CX20, autoclave (7/16-20 UNF 2B) **Electrical connection** = male M12x1, 4 pole (mating connector not supplied) Output signal 1 = 4 .. 20 mA, 2-conductor Output signal 2 A = 20 .. 4 mA, 2-conductor Measuring ranges in bar (output signal 1) 0016; 0025; 0040; 0200; 0250; 0400; 0500; 0600; 1050 Measuring ranges in bar (output signal 2) 0016; 0025; 0040; 0200; 0250; 0400; 0500; 0600; 1050 Approval E = ATI = ATEX / IECEx Insulation voltage = 50 V AC to housing Protection types and applications (code) ATEX **IECE**x Ex ia I Ma Ex ia IIC T6, T5 Ga Ex ia IIC T6, T5 Ga/Gb Ex ia IIC T6, T5 Gb Ex ia IIC T85/T95 °C Da **Modification number** $\overline{H00}$ = standard



Pin connections:



Pin	HDA 44C6-AA
1	+ Sig 1 (for output signal 1)
2	- Sig 1 (for output signal 1)
3	+ Sig 2 (for output signal 2)
4	- Sig 2 (for output signal 2)

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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YDAC INTERNATIONAL



Pressure Transmitter HDA 4300 shipping applications

Relative pressure

Accuracy 0.5 %



Description:

This pressure transmitter has been specially developed for shipbuilding applications and is based on the HDA 4000 series.

The HDA 4300 has a ceramic measurement cell with thick-layer strain gauge for measuring relative pressure in the low pressure range.

The evaluation electronics converts the measured pressure into a proportional analogue signal of 4 .. 20 mA.

The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing.

For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

Approvals:

 American Bureau of Shipping

Lloyds Register of

Ships

ABS

 Det Norske Veritas/ Germanischer Lloyd



Bureau Veritas



Other approvals on request

Technical data:

Input data													
Measuring ranges	bar	1	2.5	4	6	10	16	25	40	-1 5	-1 9		
Overload pressures	bar	3	8	12	20	32	50	80	120	20	32		
Burst pressure	bar	5	12	18	30	48	75	120	180	30	48		
Mechanical connection					G1/4 A	ISO 1	179-2						
Tightening torque, reco	mmen	ded			20 Nm								
Parts in contact with flu	iid							Stainles	ss stee	el .			
						r cell: C KM/EF		IC					
						mode)					
Output data					(<i>,</i>					
Output signal, permitte	d load	resistar	nce		4 20	mA, 2-	condu	ctor					
								20 mA	[kΩ]				
Accuracy acc. to DIN 1	6086,					% FS							
terminal based						6 FS m							
Accuracy, B.F.S.L.					≤±0.2	5 % FS % FS	s typ.						
Temperature compensa	ation					2 % FS		tvn					
Zero point	ation				⊒ ± 0.0 ≤ ± 0.0	3 % FS	3 / °C	max.					
Temperature compensa	ation					2 % FS							
Span					≤ ± 0.03 % FS / °C max.								
Non-linearity acc. to DI terminal based	N 1608	86,			≤ ± 0.5 % FS max.								
Hysteresis		< + 0.4	% FS	may									
Repeatability		≤ ± 0.1 % FS											
Rise time		≤ 1 ms											
Long-term drift						% FS	tvp./	vear					
Environmental condit	ions					,,,,,	-	,					
Compensated tempera		-25 +	-85 °C										
Operating temperature					-30 +85 °C / -25 +85 °C								
Storage temperature ra					-30 +100 °C								
Fluid temperature rang	e 1)				-30 +100 °C /-25 +100 °C								
(€ mark					EN 61000-6-1 / 2 / 3 / 4								
Vibration resistance ac DIN EN 60068-2-6 at 5		Hz			≤ 20 g								
Protection class acc. to DIN EN 60529 2)					IP 67								
Other data													
Supply voltage					10 32	2 V DC					'		
Residual ripple of supp	ly volta	ge			≤ 5 %								
Life expectancy					> 10 million cycles, 0 100 % FS								
Weight					~ 150 g								
N (D)					14		Tr.			1 1			

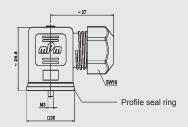
Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

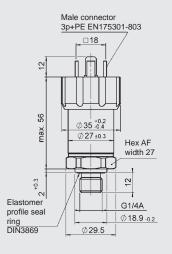
1) -25 °C with FKM or EPDM seal, -30 °C on request

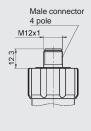
²⁾ With mounted mating connector in corresponding protection class

EN 18.324.3/02.18

Dimensions:



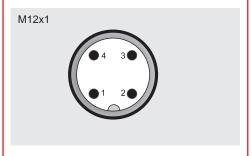




Pin connections:



Pin	HDA 4345-A
1	Signal +
2	Signal -
3	n.c.
<u> </u>	Housing



Pin	HDA 4346-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Model code:

HDA 4 3 4 X - A - XXXX - S00 - X 1

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

- = male, EN175301-803, 3 pole + PE (IP 67 mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor

Measuring ranges in bar 01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040 0005 (-1 .. 5); 0009 (-1 .. 9)

Modification number

S00 = with approvals for shipping

Sealing material (in contact with fluid)

= FKM seal (e.g. for hydraulic oils)

= EPDM seal (e.g. for refrigerants)

Connection material (in contact with fluid)

= stainless steel

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DADINTERNATIONAL



Pressure Transmitter HDA 4400 shipping applications

Relative pressure

Accuracy 0.5 %



Description:

This pressure transmitter has been specially developed for shipbuilding applications and is based on the HDA 4000 series.

The HDA 4400 is designed to measure relative pressures in the high pressure range by means of its sensor measurement cell with thin-film strain gauge on a stainless steel membrane.

The evaluation electronics converts the measured pressure into a proportional analogue signal of 4 .. 20 mA.

The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing.

For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

Approvals:

- American Bureau of Shipping
- Lloyds Register of Ships



Det Norske Veritas/ Germanischer Lloyd



Bureau Veritas



Other approvals on request

Technical data:

Input data													
Measuring ranges	bar	6	16	40	60	100	250	400	600	1000 ¹⁾	1600¹)		
Overload pressures	bar	15	32	80	120	200	500	800	1000	1600	2400		
Burst pressure	bar	100	200	200	300	500		2000	2000	3000	3000		
Mechanical connection					G1/4 A								
Tables in the same and					G1/2 B			(04/	2)				
Tightening torque, reco		nded			20 Nm					-			
Parts in contact with flu	IIa				Mech. Seal: I		ction: S	tainies	s steei				
Output data					Ocai. i	TXIVI							
Output signal, permitte	d load	resista	ance		4 20	mA, 2-	conduc	ctor					
					$R_{Lmax} =$			20 mA	[kΩ]				
Accuracy acc. to DIN 1	6086,				≤ ± 0.5								
terminal based					$\leq \pm 1 \%$ $\leq \pm 0.2$								
Accuracy, B.F.S.L.					$\leq \pm 0.2$ $\leq \pm 0.5$								
Temperature compensa	ation				≤ ± 0.0								
Zero point					$\leq \pm 0.0$								
Temperature compensa	ation				≤ ± 0.015 % FS / °C typ.								
Span	NI 460				≤ ± 0.025 % FS / °C max. ≤ ± 0.3 % FS max.								
Non-linearity acc. to DIN 16086, terminal based					≥ ± 0.3	% F3	шах.						
Hysteresis		≤ ± 0.4	% FS	max.									
Repeatability		≤ ± 0.1 % FS											
Rise time		≤ 1 ms											
Long-term drift					$\leq \pm 0.3$	% FS	typ. / y	ear					
Environmental conditions													
Compensated tempera					-25 +85 °C								
Operating temperature		e ²⁾			-40 +85 °C / -25 +85 °C								
Storage temperature ra					-40 +100 °C								
Fluid temperature rang	e ²⁾				-40 +100 °C / -25 +100 °C								
(€ mark					EN 61000-6-1 / 2 / 3 / 4								
Vibration resistance acc. to DIN EN 60068-2-6 at 5 500 Hz					≤ 20 g								
Protection class acc. to DIN EN 60529 3)					IP 67								
Other data													
Supply voltage					10 32	V DC							
Residual ripple of supp	ly volt	tage			≤ 5 %								
Life expectancy 4)					> 10 million cycles, 0 100 % FS								
Weight					~ 150 <u>(</u>	9							
					1.		1.						

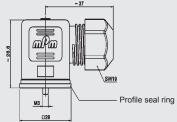
Reverse polarity protection of the supply voltage, excess voltage, override and short circuit rotection are provided.

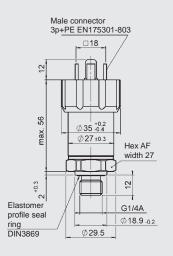
FS (Full Scale) = relative to complete measuring range

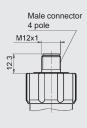
B.F.S.L. = Best Fit Straight Line

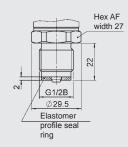
1) Measuring ranges: approval for Lloyds Register on request
2) -25 °C with FKM seal, -40 °C on request
3) With mounted mating connector in corresponding protection class
4) Measuring ranges ≥ 1000 bar: > 1 million cycles (0 .. 100 % FS)

EN 18.317.4/02.18

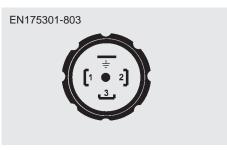




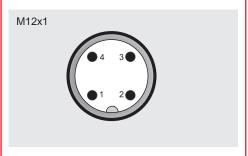




Pin connections:



Pin	HDA 44X5-A
1	Signal +
2	Signal -
3	n.c.
工	Housing



Pin	HDA 44X6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Model code:

HDA 4 4 X X - A - XXXX - S00

Electrical connection

Mechanical connection = G1/2 B DIN EN 837 = G1/4 A ISO 1179-2

- = male, EN175301-803, 3 pole + PE (IP 67 mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor

Measuring ranges in bar

0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600 1000; 1600 bar (only with mech. connection code "1")

Modification number

S00 = with approvals for shipping

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01

Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com



Pressure Transmitter HDA 4700 shipping applications

Relative pressure

Accuracy 0.25 %



Description:

This pressure transmitter has been specially developed for shipbuilding applications and is based on the HDA 4000 series.

The HDA 4700 is designed to measure relative pressures in the high pressure range by means of its sensor measurement cell with thin-film strain gauge on a stainless steel membrane.

The evaluation electronics converts the measured pressure into a proportional analogue signal of 4 .. 20 mA.

The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing.

For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

Approvals:

- American Bureau of Shipping
- Lloyds Register of Ships



Det Norske Veritas/ Germanischer Lloyd



Bureau Veritas



Other approvals on request

Technical data:

Input data												
Measuring ranges	bar	6	16	40	60	100	250	400	600	1000 ¹⁾	1600 ¹⁾	
Overload pressures	bar	15	32	80	120	200	500	800	1000	1600	2400	
Burst pressure	bar	100	200	200	300		1000	2000	2000	3000	3000	
Mechanical connection					G1/4 A							
Timbtonia a tonovia na co					G1/2 B			(04/0)				
Tightening torque, reco		aea			20 Nm							
Parts in contact with flu	ICI				Mech. (Seal: F		tion: St	ainiess	steei			
Output data												
Output signal, permitted	d load	resista	nce		4 20 R _{Lmax} =				:O1			
Accuracy acc. to DIN 10	6086				≤ ± 0.2			0 1111 ([1				
terminal based					$\leq \pm 0.5$							
Accuracy, B.F.S.L.					≤ ± 0.1	5 % FS	typ.					
					≤ ± 0.2							
Temperature compensa Zero point	ation				≤ ± 0.0 ≤ ± 0.0	08 % F	S/°Ct	yp.				
Temperature compensa	ation				$\leq \pm 0.0$						-	
Span	ation				$\leq \pm 0.0$							
Non-linearity acc. to DIN 16086, terminal based					≤ ± 0.3 % FS max.							
Hysteresis						≤ ± 0.1 % FS max.						
Repeatability					≤ ± 0.05 % FS							
Rise time					≤ 1 ms							
Long-term drift					≤ ± 0.1 % FS typ. / year							
Environmental conditions												
Compensated temperat					-25 +85 °C							
Operating temperature					-40 +85 °C / -25 +85 °C							
Storage temperature ra					-40 +100 °C							
Fluid temperature range	e ²⁾				-40 +100 °C / -25 +100 °C							
← mark					EN 61000-6-1 / 2 / 3 / 4							
Vibration resistance acc. to DIN EN 60068-2-6 at 5 500 Hz					≤ 20 g							
Protection class acc. to	DIN E	N 6052	29 3)		IP 67							
Other data												
Supply voltage					10 32	V DC						
Residual ripple of suppl	ly volta	age			≤ 5 %							
Life expectancy 4)					> 10 million cycles, 0 100 % FS							
Weight						~ 150 g						

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

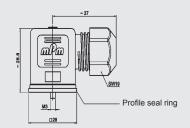
B.F.S.L. = Best Fit Straight Line

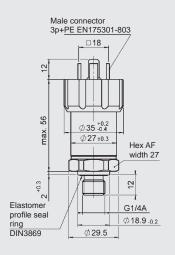
¹⁾ Measuring ranges: approval for Lloyds Register on request, 1000 bar and above only with connection G 1/2 B DIN EN 837 ²⁾ -25 °C with FKM seal, -40 °C on request

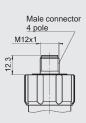
³⁾ With mounted mating connector in corresponding protection class ⁴⁾ Measuring ranges ≥ 1000 bar: > 1 million cycles (0 .. 100 % FS)

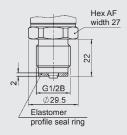
EN 18.322.3/02.18

Dimensions:

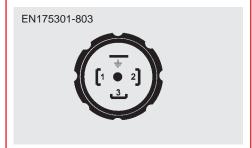




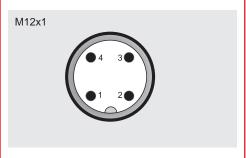




Pin connections:



Pin	HDA 47X5-A
1	Signal +
2	Signal -
3	n.c.
<u> </u>	Housing



Pin	HDA 47X6-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Model code:

HDA 4 7 \times \times - \wedge - \times \times - \times - \times

Electrical connection

Mechanical connection = G1/2 B DIN EN 837 = G1/4 A ISO 1179-2

- = male, EN175301-803, 3 pole + PE (IP 67 mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor

Measuring ranges in bar

0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600 1000; 1600 bar (only with mech. connection code "1")

Modification number

S00 = with approvals for shipping

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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e-mail: electronic@hydac.com Internet: www.hydac.com



Pressure Transmitter HDA 4100 shipping applications

Absolute pressure

Accuracy 0.5 %



Description:

This pressure transmitter has been specially developed for shipbuilding applications and is based on the HDA 4000 series.

The HDA 4100 has a ceramic measurement cell with thick-layer strain gauge for measuring absolute pressure in the low pressure range.

The evaluation electronics converts the measured pressure into a proportional analogue signal of 4 .. 20 mA.

The electronic module is completely potted to protect it against humidity, vibrations and shock, and is enclosed in a solid stainless steel housing.

For use in the shipping industry, these pressure transmitters have been approved by the following organisations.

Approvals:

- American Bureau of Shipping
- ARS
- Lloyds Register of Ships



Det Norske Veritas/ Germanischer Lloyd



Bureau Veritas



Other approvals on request

Technical data:

Input data					
Measuring ranges	bar 1 2.5				
Overload pressures	bar 3 8				
Burst pressure	bar 5 12				
Mechanical connection	G1/4 A ISO 1179-2				
Tightening torque, recommended	20 Nm				
Parts in contact with fluid	Mech. connection: Stainless steel Sensor cell: Ceramic Seal: FKM/EPDM (as per model code)				
Output data					
Output signal, permitted load resistance	4 20 mA, 2-conductor $R_{Lmax} = (U_B - 10 \text{ V}) / 20 \text{ mA } [k\Omega]$				
Accuracy acc. to DIN 16086,	≤ ± 0.5 % FS typ.				
terminal based	≤ ± 1 % FS max.				
Accuracy, B.F.S.L.	≤ ± 0.25 % FS typ.				
Temperature compensation	≤ ± 0.5 % FS max. ≤ ± 0.02 % FS / °C typ.				
Zero point	≤ ± 0.02 % F37 C typ. ≤ ± 0.03 % FS / °C max.				
Temperature compensation Span	≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max.				
Non-linearity acc. to DIN 16086, terminal based	≤ ± 0.5 % FS max.				
Hysteresis	≤ ± 0.4 % FS max.				
Repeatability	≤ ± 0.1 % FS				
Rise time	≤ 1 ms				
Long-term drift	≤ ± 0.3 % FS typ. / year				
Environmental conditions					
Compensated temperature range	-25 +85 °C				
Operating temperature range 1)	-30 +85 °C / -25 +85 °C				
Storage temperature range	-30 +100 °C				
Fluid temperature range 1)	-30 +85 °C / -25 +85 °C				
← mark	EN 61000-6-1 / 2 / 3 / 4				
Vibration resistance acc.to DIN EN 60068-2-6 at 5 500 Hz	≤ 20 g				
Protection class acc. to DIN EN 60529 2)	IP 67				
Other data					
Supply voltage	10 32 V DC				
Residual ripple of supply voltage	≤ 5 %				
Life expectancy	> 10 million cycles, 0 100 % FS				
Weight	~ 150 g				

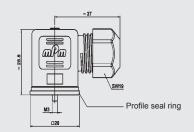
Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.
FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

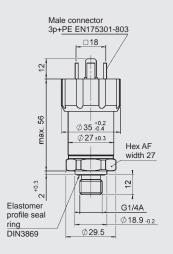
1) -25 °C with FKM or EPDM seal, -30 °C on request

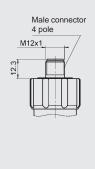
²⁾ With mounted mating connector in corresponding protection class

EN 18.325.3/02.18

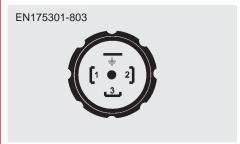
Dimensions:



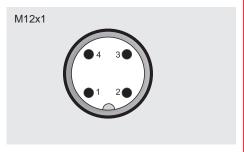




Pin connections:



HDA 4145-A	
Signal +	
Signal -	
n.c.	
Housing	
	Signal + Signal - n.c.



Pin	HDA 4146-A
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Model code:

HDA 4 1 4 X - A - XXXX - S00 - X 1 = G1/4 A ISO 1179-2

Electrical connection 5 = male, EN17530

Mechanical connection

- = male, EN175301-803, 3 pole + PE (IP 67 mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor

Measuring ranges in bar

01.0; 02.5

Modification number

S00 = with approvals for shipping

Sealing material (in contact with fluid) F = FKM seal (e.g. for hydraulic oils)

= FKM seal (e.g. for hydraulic oils)

= EPDM seal (e.g. for refrigerants) Connection material (in contact with fluid)

= stainless steel

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Internet: www.hydac.com

PRESSURE							
PRESSURE SWI	TCHES [2]						Page
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EDS 3300	Display						157
EDS 3400	Display						161
EDS 410						OEM	165
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EDS 3300	Display	Flush membrane					173
EDS 3400	Display	Flush membrane					177
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EDS 4400							183
EDS 3300	Display		IO-Link				185
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Absolute pre	essure			manufactury care	, tt = / t	0	
EDS 4100	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			Intrinsically safe	ATEX		215
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SHIP							
Relative pres	ssure						
EDS 300	Display						221
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Pressure Switch EDS 1700

Relative pressure

Display

Description:

With its integrated pressure measurement cell, four-digit display and four switching outputs, the EDS 1700 offers the user all the advantages of a modern electronic pressure switch.

Four switch points and switch-back points can be adjusted very simply and independently of one another using the key pad.

For optimum integration in monitoring systems (e.g. with PLC), an analogue output (4 .. 20 mA or 0 .. 10 V) is also available.

The main fields of application of the EDS 1700 are in hydraulics and pneumatics. The instrument is ideal for use where frequent switching cycles (several million), stable switch point accuracy or simple and precise adjustability are required.

4 switching outputs Analogue output

Technical data:

Innut data

Input data								
Measuring ranges	bar	16	40	100	250	400	600	
Overload pressures	bar	32	80	200	500	800	1000	
Burst pressure	bar	200	200	500	1000	2000	2000	
Mechanical connection	n			Threaded por	rt G1/4 DIN 3	3852		
Tightening torque, red	comm	ended		20 Nm				
Parts in contact with f	luid			Mech. conne	ction: Stainle	ss steel		
Output data								
Switching outputs				4 relay outputs with change-over contacts (2 groups, common supply of each group connected) Switching current: 0.01 2 A per switching output Switching voltage: 0.1 250 V AC, 12 32 V DC Switching capacity: 500 VA, 64 W (for inductive load, use varistors) Switching cycles (ohmic resistance):				
						llion minimum 10 maximum l		
Analogue output, perr			ance	Selectable: 4 20 mA lo 0 10 V lo	ad resist. ma ad resist. mi	ax. 400 Ω n. 2 kΩ	oau (typ.)	
Accuracy acc. to DIN terminal based	16086	6, 		EDS 1700-P: EDS 1700-N:				
Temperature compensation, zero point EDS 1700-P EDS 1700-N				≤ ± 0.01 % FS / °C typ. / ≤ ± 0.02 % FS / °C max. ≤ ± 0.02 % FS / °C typ. / ≤ ± 0.03 % FS / °C max.				
Temperature compensa	ation, s	span						
EDS 1700-P EDS 1700-N				≤±0.01 % FS / °C typ. /≤±0.02 % FS / °C max. ≤±0.02 % FS / °C typ. /≤±0.03 % FS / °C max.				
Repeatability				EDS 1700-P: EDS 1700-N:				
Reaction time				approx. 20 m	S			
Long-term drift				≤ 0.3 % FS typ. / year				
Environmental cond	itions	5						
Compensated temper	ature	range		-10 +70 °C				
Operating temperatur	e ranç	ge		-25 +60 °C				
Storage temperature	range			-40 +80 °C				
Fluid temperature ran	ge			-25 +80 °C				
(€ mark				EN 61000-6-1 / 2 / 3 / 4				
Vibration resistance a DIN EN 60068-2-6 (0				≤ 5 g				
Shock resistance acc DIN EN 60068-2-27 (,		≤ 10 g				
Protection class acc.		NEN 60529		IP 65				
Other data								
Electrical connection				Plug-in termir	nal block, 14	pole		
Supply voltage				22 32 V DC	;	•		
Residual ripple of sup	ply vo	oltage		≤ 10 %				
Current consumption				approx. 200 r	nΑ			
Display				4-digit, LED, 7 segment, red, height of digits 13 mm				
Weight				~ 800 g				
Note: Reverse pola								

protection are provided.

FS (Full Scale) = relative to complete measuring range

Setting options:

The core of the unit is a microprocessor which provides many useful extra functions in addition to normal pressure switch operation. It is possible, for example, to activate switching delay times to prevent fast pressure peaks from triggering an unwanted reversal process. All settings are made using the key pad.

Setting ranges of the switch points:

- Switch point, relay 1 to 4: 1.5 % .. 100 % FŚ
- Switch-back point, relay 1 to 4: 1 % .. 99 % FS or alternatively switch-back hysteresis 1 to 4: 1 % .. 99 % FS

Note:

FS (Full Scale) = relative to complete measuring range

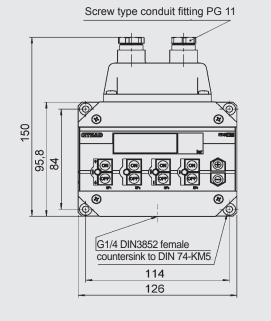
Additional setting options:

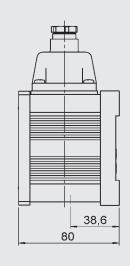
- Switching direction of relays 1 to 4 (N/C or N/O function)
- Switch-on delay, relays 1 to 4 in the range 0.00 .. 90 seconds
- Switch-off delay relays 1 to 4 in the range 0.00 .. 90 seconds
- Switch-back mode (alternatively switch-back point or switch-back hysteresis)
- Display of the actual pressure, a switch point or the peak value
- Display filter (slow / medium / fast)
- Display range individually selectable (bar, psi, user-selectable)
- Display of the measurement unit (bar, psi)
- Analogue output (4 .. 20 mA or 0 .. 10 V)
- Programming lock

Terminal assignment:

Pin	
1	+U _B
2	0 V
3	Analogue output Signal +
4	Analogue output Signal - (0 V)
5	Relay 1 N/C
6	Relay 1 N/O
7	Centre relay 1 and 2
8	Relay 2 N/C
9	Relay 2 N/O
10	Relay 3 N/C
11	Relay 3 N/O
12	Centre relay 3 and 4
13	Relay 4 N/C
14	Relay 4 N/O

Dimensions:





Model code:

EDS 1 7 $9 \times - \times - \times \times - 000$

Mechanical connection

= threaded port G1/4 DIN 3852

Display

= 4-digit bar

= 4-digit psi

$\frac{Accuracy}{P} = 0.9$

= 0.5 %

= 1%

Measuring ranges in bar

016; 040; 100; 250; 400; 600

Modification number

000 = standard

Accessories available (not supplied with instrument)

Vibration mounts Part no.: 257492

More detailed information on accessories can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Description:

The EDS 300 is a compact, electronic pressure switch with integrated digital display. The integrated pressure sensor is based on a measurement cell with thin-film strain gauge on a stainless steel membrane.

Four different output models are available: with one switch point or with two switch points and both models can also have an additional analogue output signal 4 .. 20 mA.

The switch points and the associated hystereses can be adjusted using the key pad. For optimum adaptation to a particular application, the instrument has many additional adjustment parameters, e.g. switching delay times, N/O / N/C function of

The main applications of the EDS 300 are to indicate pressures and limits in hydraulics and pneumatics and anywhere where high switching frequency or constant switching accuracy would overburden a mechanical pressure switch.

Pressure Switch EDS 300

Relative pressure

Display

Up to 2 switching outputs Analogue output

Technical data:

Input data								
Measuring ranges	bar	16	40	100	250	400	600	
Overload pressures	bar	32	80	200	500	800	1000	
Burst pressure	bar	200	200	500	1000	2000	2000	
Mechanical connection				G1/4 A ISO 1179-2				
Tightening torque, recomm		20 Nm						
Parts in contact with fluid				Mech. conn Seal: FKM	ection: Stair	nless steel		
Output data								
Switching outputs				1 or 2 PNP transistor outputs Switching current: max. 1.2 A per switching output				
Analogue output, permitte	4 100	d racietane		Switching cy		00 million ist. max. 40	0.0	
Accuracy acc. to DIN 1608 terminal based		1 Tesisianio	3	4 20 mA ≤ ± 0.5 % F3 ≤ ± 1 % FS	S typ.	St. IIIax. 40	0 12	
Temperature compensation	n, zer	ro point		≤ ± 0.02 % ≤ ± 0.03 %	FS / °C typ. FS / °C max	······································		
Temperature compensation		≤±0.02 % FS / °C typ. ≤±0.03 % FS / °C max.						
Repeatability				≤ ± 0.5 % FS max.				
Reaction time				approx. 10 ms				
Long-term drift				≤ ± 0.3 % FS typ. / year				
Environmental condition	าร							
Compensated temperature	e ranç	је		-10 +70 °C	2			
Operating temperature rar	nge			-25 +80 °C				
Storage temperature rang	e			-40 +80 °C	2			
Fluid temperature range				-25 +80 °C				
(€ mark				EN 61000-6-1 / 2 / 3 / 4				
Vibration resistance acc. t DIN EN 60068-2-6 at 10		Hz		≤ 10 g				
Shock resistance acc. to DIN EN 60068-2-27 (11 m	ıs)			≤ 50 g				
Protection class acc. to DI	N EN	60529 1)		IP 65				
Other data								
Supply voltage				20 32 V D	ıC			
Residual ripple of supply v	/oltag	<u>e</u>		≤ 5 %				
Current consumption				approx. 100			output)	
Display				3-digit, LED, 7 segment, red, height of digits 9.2 mm				
Weight				~ 300 g				
Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit								

protection are provided.

FS (Full Scale) = relative to complete measuring range

1) With mounted mating connector in corresponding protection class

Setting options:

All settings available on the EDS 300 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switching outputs:

Switch point function

Meas.	Switch point	Hysteresis	Increment*
range in bar	in bar	in bar	in bar
0 16	0.3 16	0.1 15.8	0.1
0 40	0.6 40	0.2 39.6	0.2
0100	1.5 100	0.5 99.0	0.5
0 250	3.0 250	1.0 248	1.0
0400	6.0 400	2.0 396	2.0
0600	15.0 600	5.0 590	5.0

Window function

Meas. range	Lower switch value	Upper switch value	n Increment*
in bar	in bar	in bar	in bar
0 16	0.2 15.9	0.3 16	0.1
0 40	0.4 39.8	0.6 40	0.2
0 100	1.0 99.5	1.5 100	0.5
0 250	2.0 249.0	3.0 250	1.0
0 400	4.0 398.0	6.0 400	2.0
0 600	10.0 595.0	15.0 600	5.0

* All ranges given in the table can be adjusted by the increments shown.

Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.0 .. 75.0 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display
- Optional analogue output signal 4 .. 20 mA
- Subsequent correction of zero point in the range ± 3 % FS possible

Pin connections:

Binder series 714 M18



Pin	EDS 344-2	EDS 344-3	
1	+U _B	+U _B	
2	0 V	0 V	
3	SP1	SP1	
4	SP2	Analogue	

EN175301-803



Pin	EDS 345-1
1	+U _B
2	0 V
3	SP1
<u></u>	Housing

M12x1, 4 pole

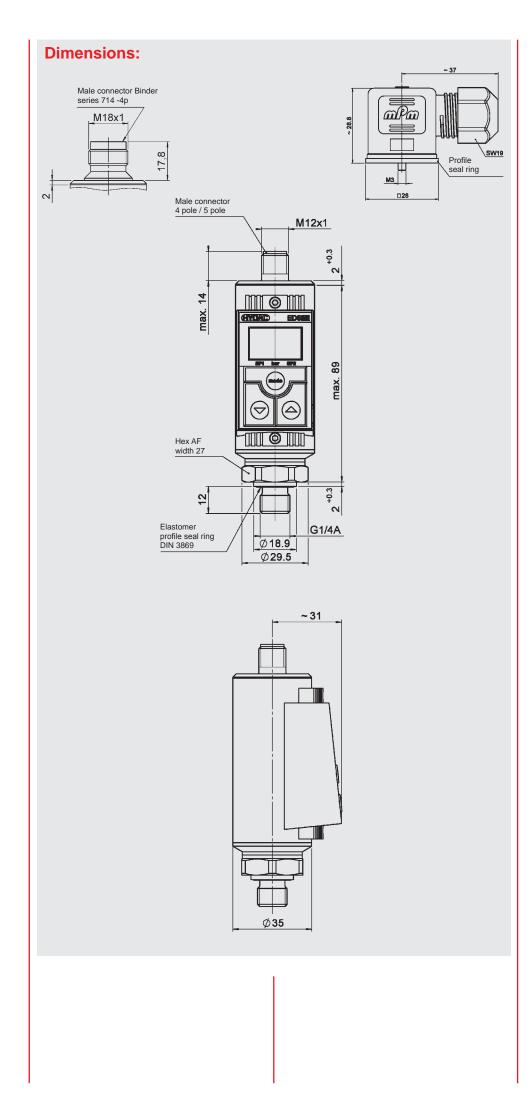


Pin	EDS 346-1	EDS 346-2	EDS 346-3
1	+U _B	+U _B	+U _B
2	n.c.	SP2	Analogue
3	0 V	0 V	0 V
4	SP1	SP1	SP1

M12x1, 5 pole



Pin	EDS 348-5
1	+U _B
2	Analogue
3	0 V
4	SP1
5	SP2



Model code:

EDS 3 $\underline{4}$ \underline{X} - \underline{X} - \underline{XXX} - $\underline{000}$

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

- = male, Binder series 714 M18, 4 pole only possible on output models "2" and "3" (mating connector not supplied)
- 5 = male, EN175301-803, 3 pole + PE only possible on output model "1" (mating connector supplied)
- = male M12x1, 4 pole 6 only possible on output models "1", "2" and "3" (mating connector not supplied)
- = male M12x1, 5 pole only possible on output model "5" (mating connector not supplied)

Output

- = 1 switching output
 - only in conjunction with electrical connection type "5" or "6"
- 2 = 2 switching outputs
 - only in conjunction with electrical connection type "4" or "6"
- = 1 switching output and 1 analogue output 3
- only in conjunction with electrical connection type "4" or "6"
- = 2 switching outputs and 1 analogue output 5 only in conjunction with electrical connection type "8"

Measuring ranges in bar

016; 040; 100; 250; 400; 600

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, mechanical adapters, splash guards and clamps for wall-mounting etc, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Pressure Switch EDS 3300

Relative pressure

Display

Up to 2 switching outputs Analogue output



Description:

The EDS 3300 is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the low pressure range.

It has a ceramic measurement cell with thick-layer strain gauge. Depending on the particular version, the instrument can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

A special design feature of the EDS 3300 is that the display can be moved in two planes. The device can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter.

The 4-digit display can indicate the pressure in bar, psi or MPa. The user can select the particular measurement unit. When changing to a different measurement unit, the device automatically converts all the switching settings to the new unit of

The EDS 3300 is also available in a variant with menu navigation in accordance with VDMA.

The main applications of the EDS 3300 are primarily in low-pressure ranges in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

Technical data:

Input data

Measuring ranges	bar	-11	1	2.5	6	10	16
Overload pressures	bar	3	3	8	18	30	48
Burst pressure	bar	5	5	12	30	50	80
Mechanical connection		See model code					
Tightening torque, recommended		20 Nm (G	1/4); 45	Nm (G1	/2)		
Parts in contact with fluid		Mech. cor Sensor ce Seal:	ell: (Ceramic Copper (less stee G1/2) / F nodel co	KM / EF	PDM
Output data							
Switching outputs		1 or 2 PN Switching Switching	current	: max. 1.	.2 A per	output	
Analogue output, permitted load resistance		Selectable 4 20 m/2 0 10 V	load re			Σ	
Accuracy acc. to DIN 16086, terminal based		$\leq \pm 0.5 \%$ $\leq \pm 1 \% F$	FS typ. S max.				
Temperature compensation, zero point		≤ ± 0.015 ≤ ± 0.025	% FS /		·		
Temperature compensation, span		≤ ± 0.015 ≤ ± 0.025	% FS /	°C typ.			
Repeatability		≤ ± 0.25 %					
Reaction time		< 10 ms					
Long-term drift		≤ ± 0.3 %	FS typ.	/ year			
Environmental conditions							
Compensated temperature range		-10 +70	°C				
Operating temperature range		-25 +80	°C (-25	+60 °	C for UL	spec.)	
Storage temperature range		-40 +80	°C				
Fluid temperature range		-25 +80	°C				
(€ mark		EN 61000	-6-1 / 2	/3/4			
™ us mark¹)		Certificate	no.: E3	18391			
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz		≤ 10 g					
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)		≤ 50 g					
Protection class acc. to DIN EN 60529 ²⁾		IP 67					
Other data							
Supply voltage		9 35 V 18 35 V	DC wit	h analog	que outp	ut	
when applied acc. to UL specifications		 limited 6 UL 1310/1 	energy – I 585; LF	acc. to S UL 60	9.3 UL 6 950	1010; C	lass 2;
Residual ripple of supply voltage		≤ 5 %					
Current consumption		max. 2.45 max. 35 m max. 55 m	nA with in A with i	nactive s	switching		
Display		4-digit, LE height of a			ed,		
Weight		~ 120 g					
Note: Overvoltage override short circuit	nrotec	tion are nr	ovided				

Overvoltage, override, short circuit protection are provided FS (Full Scale) = relative to complete measuring range Note:

2) With mounted mating connector in corresponding protection class

¹⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1

Setting options standard design:

All settings offered by the EDS 3300 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switching outputs:

Switch point function

Meas. range	Switch	point	Hyster	esis	Incre- ment*
in bar	in bar		in bar		in bar
-11	- 0.97	1	- 0.99	0.98	0.01
01	0.016	1	0.006	0.99	0.002
0 2.5	0.04	2.5	0.015	2.475	0.005
06	0.09	6	0.3	5.94	0.01
0 10	0.16	10	0.06	9.9	0.02
0 16	0.25	16	0.1	15.8	0.05

Window function

Meas. range in bar	Lower value in bar	switch	Upper value in bar	switch	Incre- ment* in bar
-11	- 0.97	0.96	- 0.95	0.98	0.01
01	0.016	0.982	0.024	0.99	0.002
0 2.5	0.04	2.455	0.06	2.475	0.005
06	0.09	5.89	0.14	5.94	0.01
010	0.16	9.82	0.24	9.9	0.02
0 16	0.25	15.7	0.4	15.8	0.05

^{*} All ranges given in the table can be adjusted by the increments shown.

Setting options menu navigation acc. to

All terms and symbols used for setting the EDS 3300 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-1) for pressure switches.

The EDS 3300 can easily be adjusted via three buttons.

Setting ranges for the switching outputs:

Measuring range in bar	Lower limit of RP / FL in bar	Upper limit of SP / FH in bar
-1 1	-0.98	1.00
0 1	0.010	1.000
0 2.5	0.025	2.500
0 6	0.06	6.00
0 10	0.10	10.00
0 16	0.20	16.00

Measuring range in bar	Min. difference betw. RP and SP & FL and FH	Incre- ment* in bar
-1 1	0.02	0.01
0 1	0.010	0.002
0 2.5	0.025	0.005
0 6	0.06	0.01
0 10	0.10	0.02
0 16	0.20	0.05

^{*} All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

FL = pressure window lower value FH = pressure window upper value

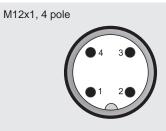
Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

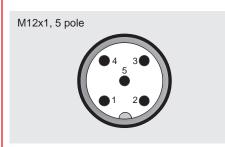
Additionally in the standard design:

- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display
- Display filter for smoothing the display value during pressure pulsations

Pin connections:

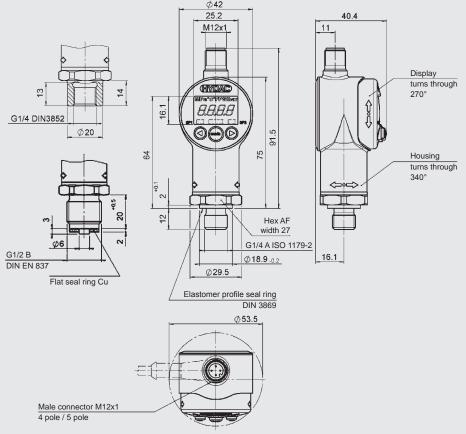


Pin	EDS	EDS	EDS
	33X6-1	33X6-2	33X6-3
1	+U _B	+U _B	+U _B
2	n.c.	SP2	Analogue
3	0 V	0 V	0 V
4	SP1	SP1	SP1



Pin	EDS
	33X8-5
1	+U _B
2	Analogue
3	0 V
4	SP1
5	SP2

Dimensions: Ø42 25.2 M12x1



Model code:

EDS 3 3 X X - X - XXXX - X00 - X 1

Mechanical connection

- = G1/2 B DIN-EN 837 only for modification "000"
- = G1/4 A ISO 1179-2
- = threaded port DIN 3852-G1/4 9

Electrical connection

- = male M12x1, 4 pole
- only possible on output models "1", "2" and "3"
- = male M12x1, 5 pole
 - only possible on output model "5" and modification "000"

Output

- = 1 switching output
- only in conjunction with electrical connection type "6"
- 2 = 2 switching outputs
- only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analogue output
- only in conjunction with electrical connection type "6"
- = 2 switching outputs and 1 analogue output only in conjunction with electrical connection type "8" and modification "000"

Measuring ranges in bar

0001 (-1 .. 1); 01.0; 02.5; 06.0; 0010; 0016

Modification number

000 = standard

V00 = menu navigation acc. to VDMA (standard sheet 24574)

Seal material (in contact with fluid)

= FKM seal (e.g. for hydraulic oils)

= EPDM seal (e.g. for water, refrigerants)

Connection material (in contact with fluid)

= stainless steel

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

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Pressure Switch EDS 3400

Relative pressure

Display

Up to 2 switching outputs Analogue output



Description:

The EDS 3400 is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the high pressure range.

The instrument has a measurement cell with thin-film strain gauge on a stainless steel membrane. Depending on the particular version, the instrument can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

A special design feature of the EDS 3400 is that the display can be moved in two planes. The device can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter.

The 4-digit display can indicate the pressure in bar, psi or MPa. The user can select the particular measurement unit. When changing to a different measurement unit, the device automatically converts all the switching settings to the new unit of measurement.

The EDS 3400 is also available in a variant with menu navigation in accordance with

The main applications of the EDS 3400 are primarily in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

Technical data:

Input data								
Measuring ranges ¹⁾	bar	40	100	250	400	600	1000	
Overload pressures	bar	80	200	500	800	1000	1600	
Burst pressure	bar	200	500	1000	2000	2000	3000	
Mechanical connection			See mode	el code				
Tightening torque, recommended			20 Nm					
Parts in contact with fluid			Mech. cor Seal:	nnection:	Stainless s FKM	steel		
Output data								
Switching outputs			1 or 2 PNI Switching Switching	P transisto current: m cycles: >	nax. 1.2 A ı	per output		
Analogue output, permitted load re	esistan	ce		e: \ load resi: load resi:				
Accuracy acc. to DIN 16086, terminal based			≤±0.5 % ≤±1 % F					
Temperature compensation, zero	ooint		≤ ± 0.015 ≤ ± 0.025	% FS / °C % FS / °C	typ. max.			
Temperature compensation, span			≤ ± 0.015	% FS / °C % FS / °C	typ.			
Repeatability			≤ ± 0.25 %	6 FS max.				
Reaction time			< 10 ms					
Long-term drift			≤ ± 0.3 % FS typ. / year					
Environmental conditions								
Compensated temperature range			-10 +70	°C				
Operating temperature range			-25 +80 °C (-25 +60 °C for UL spec.)					
Storage temperature range			-40 +80 °C					
Fluid temperature range			-25 +80	<u>°C</u>				
C € mark			EN 61000	-6-1 / 2 / 3	3 / 4			
c Mius mark ²⁾			Certificate	no.: E318	391			
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz			≤ 10 g					
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)			≤ 50 g					
Protection class acc. to DIN EN 60)529 ³⁾		IP 67					
Other data								
Supply voltage				DC without DC with a				
when applied acc. to UL specifications			- limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950					
Residual ripple of supply voltage			≤ 5 %					
Current consumption				nA with ina nA with ina		hing outpu hing outpu out		
Display			4-digit, LED, 7 segment, red, height of digits 7 mm					
Weight			~ 120 g					
Note: Overvoltage override pro-	taction	and sho	rt circuit pr	ataction ar	a provided	1		

Overvoltage, override protection and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range

- 1) 1000 bar only with mechanical connection G1/4A ISO 1179-2
- ²⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1
- With mounted mating connector in corresponding protection class

Setting options standard design:

All settings offered by the EDS 3400 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switching outputs:

Switch point function

Meas. range in bar	Switch point in bar	Hysteresis in bar	Incre- ment* in bar
0 40	0.6 40	0.2 39.6	0.1
0100	1.6 100	0.6 99.0	0.2
0 250	4.0 250	1.5 247.5	0.5
0 400	6.0 400	2.0 396	1
0 600	9.0 600	3.0 594	1
0 1000	16 1000	6 990	2

Window function

Meas. range in bar	Lower switch value in bar	Upper switch value in bar	Incre- ment* in bar
0 40	0.6 39.2	0.9 39.6	0.1
0100	1.6 98.2	2.4 99	0.2
0 250	4.0 245.5	6.0 247.5	0.5
0 400	6.0 392	9.0 396	1
0 600	9.0 589	14 594	1
0 1000	16 982	24 990	2

^{*} All ranges given in the table can be adjusted by the increments shown.

Setting options menu navigation acc. to VDMA:

All terms and symbols used for setting the EDS 3400 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-1) for pressure switches.

The EDS 3400 can easily be adjusted via three

Setting ranges for the switching outputs:

Measuring range in bar	Lower limit of RP / FL in bar	Upper limit of SP / FH in bar
0 40	0.4	40.0
0 100	1.0	100.0
0 250	2.5	250.0
0 400	4	400
0 600	6	600
0 1000	10	1000

Measuring range in bar	Min. difference betw. RP and SP & FL and FH	Incre- ment* in bar
0 40	0.4	0.1
0 100	1.0	0.2
0 250	2.5	0.5
0 400	4	1
0 600	6	1
0 1000	10	2

* All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

FL = pressure window lower value

FH = pressure window upper value

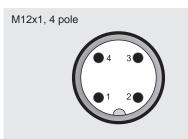
Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, ect.

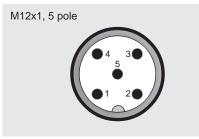
Additionally in the standard design:

- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display
- Display filter for smoothing the display value during pressure pulsations

Pin connections:

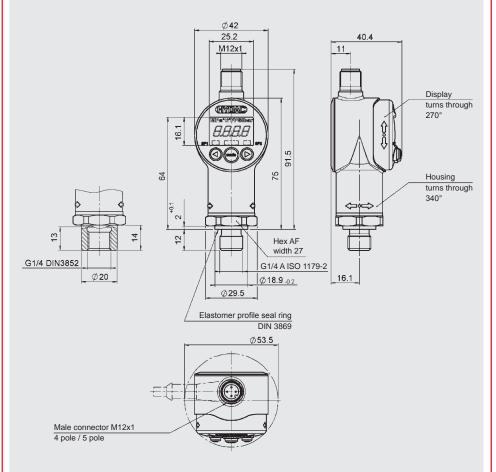


Pin	EDS 34X6-1	EDS 34X6-2	EDS 34X6-3
1	+U _B	+U _B	+U _B
2	n.c.	SP2	Analogue
3	0 V	0 V	0 V
4	SP1	SP1	SP1



Pin	EDS
	34X8-5
1	+U _B
2	Analogue
3	0 V
4	SP1
5	SP2

Dimensions:



Model code:

EDS 3 4 \times \times - \times - \times - \times

Mechanical connection

- = G1/4 A ISO 1179-2
- = threaded port DIN 3852-G1/4

Electrical connection

- = male M12x1, 4 pole
- only possible on output models "1", "2" and "3"
- = male M12x1, 5 pole
 - only possible on output model "5" and modification "000"

Output

- = 1 switching output
 - only in conjunction with electrical connection type "6"
- 2 = 2 switching outputs
 - only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analogue output
- only in conjunction with electrical connection type "6"
- = 2 switching outputs and 1 analogue output only in conjunction with electrical connection type "8" and modification "000"

Measuring ranges in bar

0040; 0100; 0250; 0400; 0600

1000 (only with mech. connection code "4")

Modification number

000 = standard

V00 = menu navigation acc. to VDMA (standard sheet 24574)

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

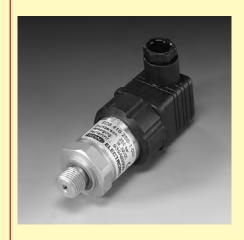
For applications or operating conditions not described, please contact the relevant technical

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Pressure Switch EDS 410 for series applications

Factory-set Relative pressure

Customised designs thanks to diverse electrical and mechanical connections Up to 2 switching outputs

Description:

The electronic pressure switch EDS 410 has been specially developed for use in series applications, and is based on the EDS 4000 pressure switch series.

The EDS 410 is available with one or two transistor outputs (PNP), which can be defined as either N/C or N/O.

The switch and switch-back points of the EDS 410 are factory-set acc. to customer specification (not field-adjustable). As with the EDS 4000 standard model, the EDS 410 has a ceramic measurement cell with thicklayer strain gauge for measuring relative pressure in the low pressure range, and a measurement cell with thin-film strain gauge on a stainless steel membrane for measuring in the high pressure range.

Various pressure ranges between 0 .. 1 bar and 0 .. 600 bar as well as different electrical and mechanical connection types are

Technical data:

Innut data

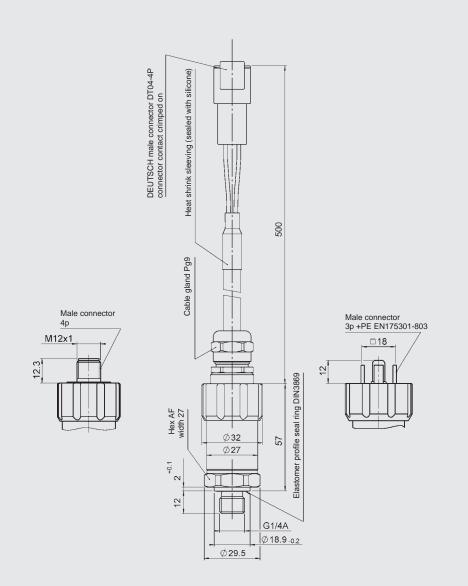
Input data												
Measuring ranges	bar	1	2.5	6	10	16	40	60	100	250	400	600
Overload pressures	bar	3	8	18	30	48	80	120	200	500	800	1000
Burst pressure	bar	5	12	30	50	80	180	300	500	1250	2000	2000
Mechanical connection						G1/4 A	ISO 11	179-2				
Tightening torque, red	comm	ende	d			20 Nm						
Parts in contact with f	luid					Senso Seal: F	cell: C KM or	ction: S ceramic EPDM model o	or sta		steel	
Output data						,						
Switching outputs						1 or 2 transistor outputs PNP or NPN Switching current: PNP: max. 1.2 A with 1 switching output max. 1 A each with 2 switching outputs NPN: max. 0.5 A with 1 switching output max. 0.3 A each with 2 switching output switching cycles: > 100 million Switch points/switch-back points: acc. to customer specification Switch-on and switch-off delay: 8 2000 ms (standard 32 ms); factory-set acc. to customer specification						
Accuracy acc. to DIN terminal based	16086	6,				≤ ± 1 %	% FS % FS m	áx.				
Temperature compen	sation	, zer	o point			≤±0.02 % FS / °C typ. ≤±0.03 % FS / °C max.						
Temperature compen	sation	, spa	ın			≤±0.02 % FS / °C typ. ≤±0.03 % FS / °C max.						
Repeatability						≤ 0.1 % FS max.						
Long-term drift						≤ ± 0.3 % FS typ. / year						
Environmental cond	itions	3										
Compensated temper	ature	rang	е			-25 +85 °C						
Operating temperatur	e rang	ge ²⁾				-40 +85 °C / -25 +85 °C						
Storage temperature	range					-40 +100 °C						
Fluid temperature ran	ge ²⁾					-40 +100 °C / -25 +100 °C						
(€ mark						EN 61000-6-1 / 2 / 3 / 4						
Vibration resistance a DIN EN 60068-2-6 at			Нz			≤ 20 g						
Shock resistance acc DIN EN 60068-2-27 (≤ 100 g						
Protection class acc.	to DIN	I EN	60529°	3)		IP 65 IP 67						
Other data												
Electrical connection ¹⁾						e.g. EN175301-803 M12x1 (4 pole) jacketed cable						
Supply voltage						8 42 V DC						
Residual ripple of sup	ply vo	oltage)			≤ 5 %						
Current consumption						≤ 25 mA with inactive switching outputs ≤ 1.225 A with 1 switching output ≤ 2.425 A with 2 switching outputs						
Weight						~ 145						
Note: Reverse polari	ty pro	Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit										

protection are provided.

FS (Full Scale) = relative to complete measuring range

- 1) Additional connection options available on request 2) -25 °C with FKM or EPDM seal, -40 °C on request 3) With mounted mating connector in corresponding protection class

Dimensions:



Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany

Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com

Order details:

The electronic pressure switch EDS 410 has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type.

For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.



Description:

The electronic pressure switch EDS 710 has been specially developed for use in series applications.

The highly compact unit has a very robust pressure sensor with thin-film strain gauge on a stainless steel membrane.

The EDS 710 is available with 1 transistor output (PNP) which can be defined either as N/C or N/O.

The switch and switch-back point of the EDS 710 each are factory-set acc. to customer specification (not field-adjustable).

Various pressure ranges between 0 .. 16 bar and 0 .. 600 bar are available.

Pressure Switch EDS 710 for series applications

Relative pressure

Factory-set

Customised designs thanks to diverse electrical and mechanical connections

1 switching output

Technical data:

Input data									
Measuring ranges	bar	40	60	100	160	250	400	600	
Overload pressures	bar	80	120	200	320	500	800	1000	
Burst pressure	bar	200	300	500	800	1250	2000	2000	
Mechanical connection			G1/4 A I	SO 1179	9-2				
Tightening torque, recommended			20 Nm						
Parts in contact with fluid ¹⁾			Mech. c Seal: F		n: Stain	ess stee) l		
Output data									
Switching output			1 PNP transistor output Switching current: 400 mA Switching cycles: > 100 million Switch point/switch-back point: acc. to customer specification Switch-on and switch-off delay: 8 2000 ms (standard 32 ms); factory-set acc. to customer specification						
Accuracy acc. to DIN 16086, terminal based			≤ ± 0.5 ° ≤ ± 1 %	FS max					
Temperature compensation, zero po	int		≤ ± 0.02 ≤ ± 0.03	% FS / % FS /	°C typ. °C max.				
Temperature compensation, span			≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max.						
Repeatability			≤ 0.1 % FS max.						
Long-term drift			≤ ± 0.3 % FS typ. / year						
Environmental conditions									
Compensated temperature range			-25 +85 °C						
Operating temperature range ²⁾			-40 +85 °C / -25 +85 °C						
Storage temperature range			-40 +100 °C						
Fluid temperature range ²⁾	_		-40 +100 °C / -25 +100 °C						
(€ mark			EN 61000-6-1 / 2 / 3 / 4						
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz			≤ 20 g						
Shock resistance acc. to DIN EN 60068-2-27 (1 ms)			≤ 100 g						
Protection class acc. to DIN EN 605293)				IP 67					
Other data									
Electrical connection ⁴⁾			e.g. M12 jack	2x1 (4 po ceted cal					
Supply voltage			8 32 V	DC DC					
Residual ripple of supply voltage			≤ 5 %						
Current consumption			max. 0.42 A total max. 20 mA with inactive switching output						
Weight			~ 60 g						
Note: Payarea polarity protection of the supply voltage, overvoltage, override and short circuit									

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

Other seal materials on request
 -25 °C with FKM seal, -40 °C on request
 With mounted mating connector in corresponding protection class (M12x1)

4) Additional electrical connection options, such as cables with various connector variants, available on request

Dimensions:

+0.3

12

Elastomer profile seal ring DIN3869

Ø 18.5

Ø21-0.05

M12x1

52.6

G1/4A Ø18.9-0.2

width 19

Order details:

The electronic pressure switch EDS 710 has been specially developed for OEM customers and is available for minimum order quantities of 100 units per type.

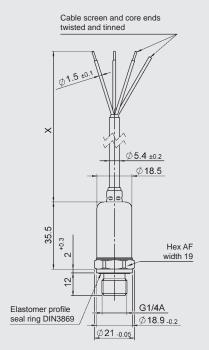
For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

Note:

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Pressure Switch EDS 810 for series applications

Relative pressure

Factory-set

Customised designs thanks to diverse electrical and mechanical connections Up to 2 switching outputs



Description:

The electronic pressure switch EDS 810 has been specially developed for use in series applications.

The highly compact unit has a very robust pressure sensor with thin-film strain gauge.

All of the parts in contact with the fluid (sensor and pressure port) are made of stainless steel and are welded together. This means that there are no sealing points in the interior of the sensor. The risk of leakage has been eliminated.

The transistor output is available with either an N/C or a N/O function. The switch and switch-back point of the EDS 810 each are factory-set acc. to customer specification (not field-adjustable). Various pressure ranges between 0 and 40 bar and 0 and 600 bar are available.

Especially for the use in public traffic vehicles, EDS 810 has (E13) approval (approved for road vehicles) in accordance with ECE type approval.

Technical data:

Input data

mpat aata									
Measuring ranges	bar	40	60	100	160	250	400	600	
Overload pressures	bar	80	120	200	320	500	800	1000	
Burst pressure	bar	200	300	500	800	1250	2000	2000	
Mechanical connection				G1/4 A ISC	1179-2				
	7/16-20 UNF 2A 9/16-18 UNF 2A								
Tightening torque, recomm	mended	t		15 Nm (7/1 20 Nm (G1	16-20 UNF		6-18 UNF 2	2A)	
Parts in contact with fluid ¹)			Mech. con Seal: FKN	nection: St				
Output data				Oodi. Tita	v I				
Switching output -1 PNP or 1 NPN transistor output									
				- 2 PNP tra	ansistor ou	tputs (only	in		
				M12	junction wi 2x1, 4 nole	DT04-4p	I connection	5-4n)	
				Switching	current:	≤ 500 mA	per switch	ng output	
				Switching	cycles:	> 100 mill			
						back point er specific			
				Switch-or	n and switc	:h-off delay	' :		
						standard 3	2 ms); ner specific	ation	
Accuracy acc. to DIN 1608	6			≤ ± 0.5 % l		. to custon	ner specific	alion	
terminal based				≤ ± 1 % FS	S max.				
Temperature compensation	on, zero	point		≤ ± 0.02 % ≤ ± 0.03 %	FS/°C m	ax.			
Temperature compensation	on, spa	n		≤ ± 0.02 % ≤ ± 0.03 %	FS/°C ty FS/°C m	p. ax.			
Repeatability				≤ 0.1 % FS max.					
Long-term drift				≤ ± 0.3 % I	FS typ. / ye	ear			
Environmental condition	ns								
Compensated temperatur	e range	9		-25 +85 °	°C				
Operating temperature rai	nge ²⁾			-40 +100 °C / -25 +100 °C					
Storage temperature rang	je			-40 +100 °C					
Fluid temperature range ²⁾				-40 +125 °C / -25 +125 °C					
(€ mark				EN 61000-6-1 / 2 / 3 / 4					
c 🕦 us mark3)				Certificate	no.: E3183	391			
E ¹³ mark				E13*10R0	0*1DR03*3	3969*01			
Vibration resistance acc. t DIN EN 60068-2-6	to			≤ 25 g (at 5 2000 Hz)					
Shock resistance acc. to DIN EN 60068-2-27				100 g / 6 ms / half-sine 500 g / 1 ms / half-sine					
Protection class ⁴⁾ acc. to [DIN EN			IP 65, IP 67 IP 6K9K					
Other data									
Electrical connection				Various male connectors e.g. M12x1, Packard Metri Pack, Deutsch DT 04, AMP Superseal, AMP Junior Power Timer, jacketed cable					
Supply voltage when applied acc. to UL s	pecific	ations		8 36 V DC - limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950					
Residual ripple of supply	voltage			≤ 5 %					
Current consumption				1 PNP max	x. 0.52 A to	tal / max. 2	20 mA with		
·				inactive switching output 2 PNP max. 1.02 A total /max. 20 mA with inactive switching outputs					
				NPN max.	20 mA tota	al Ö'			
Weight				~ 55 g					
Note: Reverse polarity p are provided.	rotectic	n of the su	ipply volta	ige, overvolt	age, overr	ide and sh	ort circuit p	rotection	

are provided.
FS (Full Scale) = relative to complete measuring range

- 1) Other seal materials on request 2) -25 °C with FKM seal, -40 °C on request 3) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1 4) With mounted mating connector in corresponding protection class



Dimensions:

Male connector DIN 72585 3 pole/4 pole



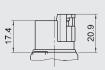
Male connector Junior Power Timer 3 pole



Male connector DIN EN175301-803 3 pole



Male connector Deutsch DT 04 3 pole



Male connector Metri-Pack series 150 3 pole

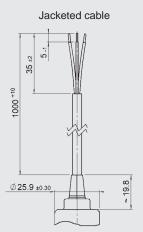


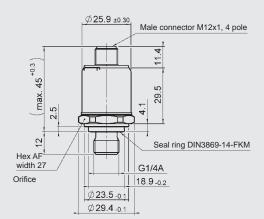
Male connector Superseal series 1.5 3 pole

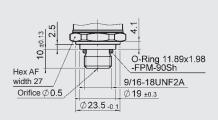


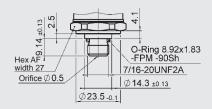
Male connector Deutsch DT 04











Order details:

The electronic pressure switch EDS 810 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type.

For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

Note:

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Pressure Switch EDS 8000

Relative pressure Display



Description:

EDS 8000 is an electronic pressure switch in compact design which is simple to adjust. Models with one or two transistor outputs (PNP or NPN) are available.

The switch points are set using the two keys and a four-digit display. During operation the switching position is indicated by either a red or a green backlight in the display.

For optimum adaptation to a particular application, the instrument has many additional adjustment parameters, e.g. switching delay times, N/O / N/C function of the outputs.

EDS 8000 is available in various pressure ranges between 0 .. 25 bar and 0 .. 600 bar.

The main applications of the EDS 8000 are to indicate pressures and limits in hydraulics and pneumatics, or any application where high switching frequency or constant switching accuracy would overburden a mechanical pressure switch.

Up to 2 switching outputs

Technical data:

Input data

input data								
Measuring ranges	bar	25	40	100	250	400	600	
Overload pressures	bar	80	80	200	500	800	1000	
Burst pressure	bar	200	200	500	1000	2000	2000	
Mechanical connection	·		G1/4 A IS	O 1179-2	•			
Tightening torque, recommend	ded		20 Nm					
Parts in contact with fluid			Mech. cor Seal:		Stainless FKM	steel		
Output data	'							
Switching outputs	1 or 2 trai Switching Switching	nsistor out current: cycles:	max. 250) mA per (output			
Accuracy acc. to DIN 16086, terminal based			≤±0.5 % ≤±1 % F	S max.				
Temperature compensation, ze	ero point		$\leq \pm 0.02^{\circ}$ $\leq \pm 0.03^{\circ}$	% FS / °C % FS / °C	typ. max.			
Temperature compensation, s	pan		$\leq \pm 0.02^{\circ}$ $\leq \pm 0.03^{\circ}$	% FS / °C % FS / °C	typ. max.			
Repeatability			≤ ± 0.5 %	FS max.				
Reaction time			< 10 ms					
Long-term drift			≤ ± 0.25 % FS max. / year					
Environmental conditions								
Compensated temperature rar	nge		-25 +85 °C					
Operating temperature range ¹)		-40 +100 °C / -25 +100 °C					
Nominal temperature range of	display (re	ad-out)	-15 + 70 °C					
Storage temperature range			-40 85 °C					
Fluid temperature range ¹⁾			-40 +125 °C / -25 +125 °C					
(€ mark			EN 61000-6-1 / 2 / 3 / 4					
cM°us mark2)			Certificate no.: E318391					
Vibration resistance acc. to DIN EN 60068-2-6 (0 500 Hz	z)		approx. 10 g					
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)			approx. 50 g					
Protection class acc. to DIN E	N 60529 ³⁾		IP 67					
Other data			≤ 5 %					
Supply voltage when applied acc. to UL speci	9.6 32 V DC - limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950							
Residual ripple of supply volta	ge							
Current consumption			max. 0.535 A total max. 35 mA (with inactive switching output)					
Display	4-digit, LED, 7-segment, height of digits 4.5 mm							
Weight			~ 70 g					
Note: Reverse polarity protec	tion of the	supply yo		voltane o	verride an	d short ci	rcuit	

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) -25 °C with FKM seal, -40 °C on request

² Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1 ³ With mounted mating connector in corresponding protection class

Setting options:

All the terms and symbols used for setting the EDS 8000 as well as menu structure comply with the specifications of the German Engineering Federation Standard (VDMA 24574-1) for pressure switches. The EDS 8000 is easy and convenient to set up using the two buttons.

Setting ranges for the switching outputs:

range	Lower limit of RP / FL	Upper limit of SP / FH
in bar	in bar	in bar
0 25	0.25	25.00
0 40	0.4	40.0
0 100	1.0	100.0
0 250	2.5	250.0
0 400	4	400
0 600	6	600

Measuring range in bar	Min. difference betw. RP and SP & FL and FH	Incre- ment* in bar
0 25	0.25	0.05
0 40	0.4	0.1
0 100	1.0	0.2
0 250	2.5	0.5
0 400	4	1
0 600	6	1

* All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

FL = pressure window lower value

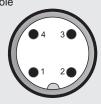
FH = pressure window upper value

Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Display filter for smoothing the display value during pressure pulsations
- Pressure can be displayed in bar, psi, MPa

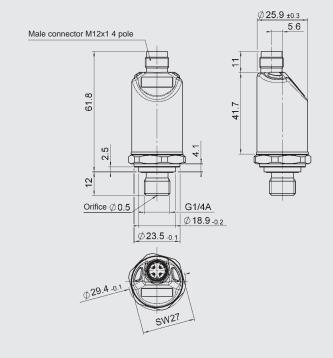
Pin connections:





Pin	EDS 8446-1	EDS 8446-2
1	+U _B	+U _B
2	n.c.	SP2
3	0 V	0 V
4	SP1	SP1

Dimensions:



Model code:

EDS 8 4 <u>4</u> <u>6</u> - <u>X</u> - <u>XXXX</u> - <u>X00</u>

Mechanical connection

= G 1/4 A ISO 1179-2

Electrical connection

= male M12x1, 4 pole (mating connector not supplied)

Output

= 1 switching output

= 2 switching outputs

Measuring ranges in bar

0025; 0040; 0100; 0250; 0400; 0600

Modification number

000 = standard

N00 = version with NPN switching outputs

Accessories:

Appropriate accessories, such as mating connectors and mechanical adapters, can be found in the Accessories brochure.

Note:

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Subject to technical modifications.

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Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com



Pressure Switch EDS 3300

Relative pressure

Display

Flush membrane Up to 2 switching outputs Analogue output



Description:

The electronic pressure switch EDS 3300 with a flush membrane was designed specifically for applications in which a standard pressure port could become blocked, clogged or frozen by the particular medium used.

Further applications include processes where the medium changes frequently and any residues could cause mixing or contamination of the media.

Like the standard model, the EDS 3300 with flush membrane has a ceramic measurement cell with a thick-layer strain gauge for relative pressure measurement in a low pressure range.

The pressure port is achieved with a fully sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

Depending on the type, the instrument can have up to two switching outputs and a switchable analogue output (4 .. 20 mA or 0 .. 10 V).

Technical data:

Input data

input data							
Measuring ranges	bar	-11	1	2.5	6	10	16
Overload pressures	bar	3	3	8	18	30	48
Burst pressure	bar	5	5	12	30	50	80
Mechanical connection		See mode	el code				
Tightening torque, recommended		20 Nm (G	1/4); 45	Nm (G	1/2)		
Parts in contact with fluid		Mech. cor Sensor ce Seal: O-ring:	ell: (: Stair Ceramio FKM FKM		I	
Pressure transfer fluid		Silicone-fr	ree oil				
Output data							
Switching outputs		1 or 2 PN Switching Switching	current	max. 1	.2 A per o	output	
Analogue output, permitted load resistance		Selectable	0 10		oad resist. oad resist.		
Accuracy acc. to DIN 16086,		≤ ± 0.5 %	FS typ.				
terminal based		≤±1%F	S max.	^			
Temperature compensation, zero point		≤ ± 0.015 ≤ ± 0.025	% FS /	°C max			
Temperature compensation, span		$\leq \pm 0.015$ $\leq \pm 0.025$					
Repeatability		≤ ± 0.25 %	% FS ma	ax.			
Reaction time		< 10 ms					
Long-term drift		≤ ± 0.3 %	FS typ.	/ year			
Environmental conditions							
Compensated temperature range		-10 +70	°C				
Operating temperature range		-25 +80	°C (-25	+60°	C for UL	spec.)	
Storage temperature range		-40 +80	°C				
Fluid temperature range		-25 +80	°C / -25	+150	°C with	cooling	section
C € mark		EN 61000)-6-1 / 2	/3/4			
c M mark 1)		Certificate	no.: E3	18391			
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz		≤ 10 g					
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)		≤ 50 g					
Protection class acc. to DIN EN 60529 ²⁾		IP 67					
Other data					-1		
Supply voltage		9 35 V 18 35 V			alogue ou		
when applied acc. to UL specifications		– limited 6 UL 1310/1	energy -	acc. to	9.3 UL ['] 6	1010; C	lass 2;
Residual ripple of supply voltage		≤ 5 %					
Current consumption		max. 2.45 max. 35 m max. 55 m	nA with i nA with i	nactive nactive			
Display		4-digit, LE height of o	D, 7-se	gment,			
Weight		~ 150 g					
Note: Overvoltage override short circuit	protec	tion are nr	ovided				

Overvoltage, override, short circuit protection are provided FS (Full Scale) = relative to complete measuring range Note:

2) With mounted mating connector in corresponding protection class

¹⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1

Setting options:

All settings offered by the EDS 3300 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switching outputs:

Switch point function

Meas. range in bar	Switch point in bar	Hysteresis in bar	Incre- ment* in bar
-1 1	-0.97 1	-0.99 0.98	0.01
0 1	0.016 1	0.006 0.99	0.002
0 2.5	0.04 2.5	0.015 2.475	0.005
0 6	0.09 6	0.3 5.94	0.01
0 10	0.16 10	0.06 9.9	0.02
0 16	0.25 16	0.1 15.8	0.05

Window function

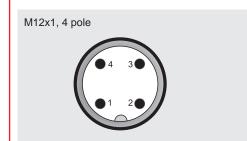
Meas. range in bar	Lower switch value in bar	Upper switch value in bar	
-1 1	-0.97 0.96	-0.95 0.98	0.01
0 1	0.016 0.982	0.024 0.99	0.002
0 2.5	0.04 2.455	0.06 2.475	0.005
0 6	0.09 5.89	0.14 5.94	0.01
0 10	0.16 9.82	0.24 9.9	0.02
0 16	0.25 15.7	0.4 15.8	0.05

* All ranges given in the table can be adjusted by the increments shown.

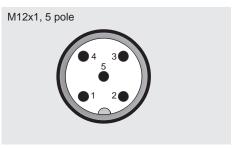
Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display
- Display filter for smoothing the display value during pressure pulsations
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

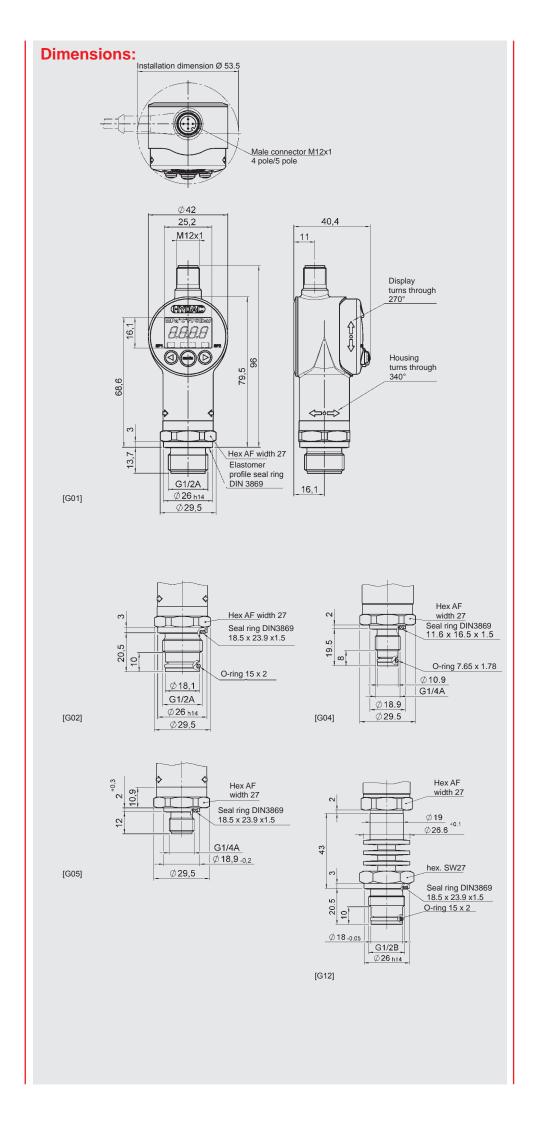
Pin connections:



Pin	EDS	EDS	EDS
	33Z6-1	33Z6-2	33Z6-3
1	+U _B	+U _B	+U _B
2	n.c.	SP2	Analogue
3	0 V	0 V	0 V
4	SP1	SP1	SP1



Pin	EDS
	33Z8-5
1	+U _B
2	Analogue
3	0 V
4	SP1
5	SP2



Model code:

EDS 3 3 Z X - X - XXXX - XXX - 000

Mechanical process connection Z = flush membrane

= flush membrane

Electrical connection

= male M12x1, 4 pole

only possible on output models "1", "2" and "3"

= male M12x1, 5 pole

only possible on output model "5"

Output

= 1 switching output

only in conjunction with electrical connection type "6"

= 2 switching outputs

only in conjunction with electrical connection type "6"

= 1 switching output and 1 analogue output

only in conjunction with electrical connection type "6"

= 2 switching outputs and 1 analogue output

only in conjunction with electrical connection type "8"

Measuring ranges in bar

01.0; 02.5; 06.0; 0010; 0016

0001 (-1 .. 1)

Mechanical connection

G01 = G1/2 A ISO 1179-2

G02 = G1/2 with additional front O-ring seal

G04 = G1/4 with additional front O-ring seal

G05 = G1/4 A ISO 1179-2

G12 = G1/2 with additional front O-ring seal and cooling section

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

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Pressure Switch EDS 3400

Relative pressure

Display

Flush membrane Up to 2 switching outputs Analogue output



Description:

The electronic pressure switch EDS 3400 with a flush membrane was designed specifically for applications in which a standard pressure port could become blocked, clogged or frozen by the particular medium used.

Further applications include processes where the medium changes frequently and any residues could cause mixing or contamination of the media.

Like the standard model, the EDS 3400 with flush membrane has a measurement cell with a thin-film strain gauge on a stainless steel membrane for relative pressure measurement in the high pressure range.

The pressure port is achieved with a fully sealed stainless steel front membrane filled internally with a pressure transfer fluid. The process pressure is transmitted hydrostatically to the measurement cell via the pressure transfer fluid.

Depending on the type, the instrument can have up to two switching outputs and one switchable analogue output (4 .. 20 mA or 0 .. 10 V).

Technical data:

Input data

Measuring ranges	bar	40	100	250	400	600
Overload pressures	bar	80	200	500	800	1000
Burst pressure	bar	200	500	1000	2000	2000
Mechanical connection			See model c			
Tightening torque, recommend	ed		20 Nm (G 1/4	4); 45 Nm (C	3 1/2)	
Parts in contact with fluid				ction: Stair KM KM	nless steel	
Pressure transfer fluid			Silicone-free	oil		
Output data						
Switching outputs			1 or 2 PNP tr Switching cu Switching cy	rrent: max.	1.2 A per out	put
Analogue output, permitted loa	d resist	ance		10 V	oad resist. n oad resist. n	
Accuracy acc. to DIN 16086, terminal based			≤ ± 0.5 % FS ≤ ± 1 % FS n	náx.		
Temperature compensation, ze	ro poin	t	≤ ± 0.015 % ≤ ± 0.025 %	FS / °C max	ί.	
Temperature compensation, sp	an		≤ ± 0.015 % ≤ ± 0.025 %		ζ.	
Repeatability			≤ ± 0.25 % F	S max.		
Reaction time			< 10 ms			
Long-term drift			≤ ± 0.3 % FS typ. / year			
Environmental conditions						
Compensated temperature ran	ge		-10 +70 °C			
Operating temperature range			-25 +80 °C	(-25 +60	°C for UL sp	ec.)
Storage temperature range			-40 +80 °C			
Fluid temperature range			-25 +80 °C	/ -25 +15	0 °C with coo	oling section
C € mark			EN 61000-6-	1/2/3/4		
c M ¹ us mark ¹⁾			Certificate no	o.: E318391		
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500	Hz		≤ 10 g			
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)			≤ 50 g			
Protection class acc. to DIN EN	N 60529) ²⁾	IP 67			
Other data			'			'
Supply voltage when applied acc. to UL specif	ications		9 35 V DC 18 35 V DC – limited ene UL 1310/158	with analo	alogue output gue output 9.3 UL 610	
Residual ripple of supply voltage	ae		≤ 5 %	,		
Current consumption	<i>,</i> -		max. 2.455 A max. 35 mA max. 55 mA	with inactive	switching ou	
Display			4-digit, LED, 7 segment, red, height of digits 7 mm			
			Height of digi	13 / 111111		

FS (Full Scale) = relative to complete measuring range

- ¹⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1 ²⁾ With mounted mating connector in corresponding protection class

Setting options:

All settings available on the EDS 3400 are grouped in 2 easy-to-navigate menus.
In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switching outputs:

Switch point function

Measuring range	Switch point	Hysteresis	Incre- ment*
in bar	in bar	in bar	in bar
0 40	0.6 40	0.2 39.6	0.1
0 100	1.6 100	0.6 99.0	0.2
0 250	4.0 250	1.5 247.5	0.5
0 400	6.0 400	2.0 396	1
0 600	9.0 600	3.0 594	1

Window function

Measuring range in bar	Lower switch value in bar	Upper switch value in bar	Incre- ment* in bar
0 40	0.6 39.2	0.9 39.6	0.1
0 100	1.6 98.2	2.4 99	0.2
0 250	4.0 245.5	6.0 247.5	0.5
0 400	6.0 392	9.0 396	1
0 600	9.0 589	14 594	1

* All ranges given in the table can be adjusted by the increments shown.

Additional functions:

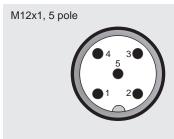
- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display
- Display filter for smoothing the display value during pressure pulsations
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

Pin connections:

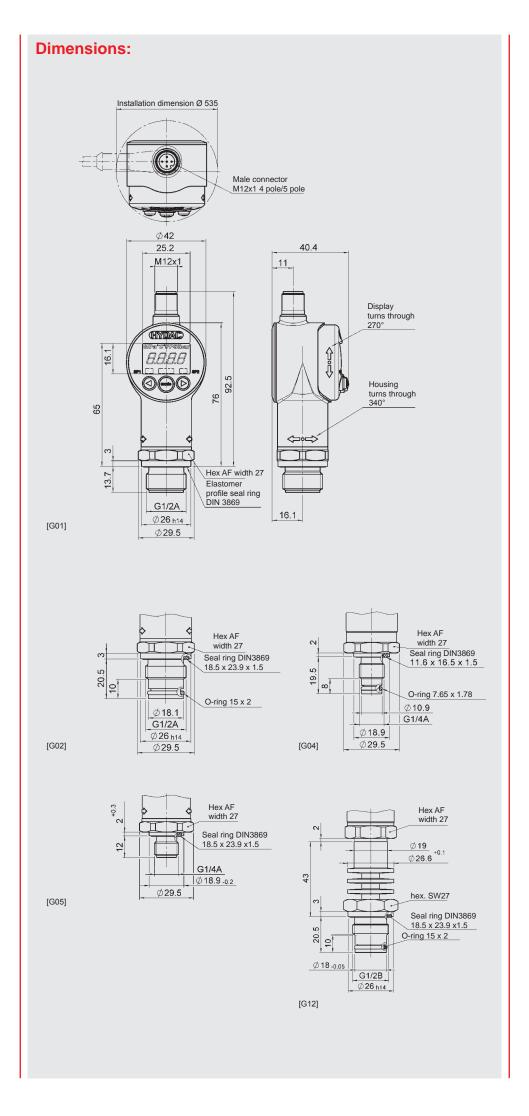
M12x1, 4 pole



Pin	EDS 34Z6-1	EDS 34Z6-2	EDS 34Z6-3
1	+U _B	+U _B	+U _B
2	n.c.	SP2	Analogue
3	0 V	0 V	0 V
4	SP1	SP1	SP1



Pin	EDS	
	34Z8-5	
1	+U _B	
2	Analogue	
3	0 V	
4	SP1	
5	SP2	



Model code:

EDS 3 4 <u>Z X - X - XXXX - XXX</u> - <u>000</u>

Mechanical process connection Z = flush membrane

= flush membrane

Electrical connection

- = male M12x1, 4 pole only possible on output models "1", "2" and "3"
- = male M12x1, 5 pole only possible on output model "5"

Output

- = 1 switching output
 - only in conjunction with electrical connection type "6"
- = 2 switching outputs
 - only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analogue output
 - only in conjunction with electrical connection type "6"
- = 2 switching outputs and 1 analogue output only in conjunction with electrical connection code type "8"

Measuring ranges in bar

0040; 0100; 0250; 0400; 0600

Mechanical connection

- G01 = G1/2 A ISO 1179-2
- G02 = G1/2 with additional front O-ring seal
- G04 = G1/4 with additional front O-ring seal
- G05 = G1/4 A ISO 1179-2
- G12 = G1/2 with additional front O-ring seal and cooling section

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

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For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

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Pressure Switch EDS 4300

Relative pressure

Programmable

Up to 2 switching outputs



Description:

The programmable electronic pressure switch in the series EDS 4300 was specially developed to combine the advantages of a compact, robust and costeffective instrument with the benefits of a programmable pressure switch.

The EDS 4300 can be easily programmed using the HYDAC HPG 3000 Programming Unit. Once the programming unit is disconnected from the EDS 4300, the pressure switch retains all the settings. This prevents unauthorised or incorrect adjustment of the settings.

The following parameters can be changed:

- Switch point
- Hysteresis
- Switching direction (N/O / N/C)
- Switching delay times

The EDS 4300 is suitable for low-pressure applications (up to 16 bar) and is equipped with a pressure measurement cell with thicklayer strain gauge on a ceramic membrane.

In contrast to pressure switches which are factory-set acc. to customer requirements and not field-adjustable, the programmable EDS 4300 is highly versatile and replaces a wide range of models. This is advantageous in respect of stock management.

An ATEX version of the EDS 4300 is also available for use in potentially explosive atmospheres.

Technical data:

Input data

input data									
Measuring ranges	bar	1	2.5	6	10	16	-1 1	-1 9	
Overload pressures	bar	3	8	20	32	50	3	32	
Burst pressure	bar	5	12	30	48	75	5	48	
Mechanical connection				G1/4 A ISO 1179-2					
Tightening torque, reco		ded		20 Nm					
Parts in contact with flu	iid			Mech. co Sensor c		: Stainles:	s steel		
							nodel code)		
Output data				000	.,	(40 00			
Switching outputs			1 or 2 transistor outputs PNP or NPN Switching current: PNP: max. 1.2 A with 1 switching output max. 1.4 each with 2 switching outputs NPN: max. 0.5 A with 1 switching output max. 0.3 A each with 2 switching outputs Switching cycles: > 100 million Switch points/hysteresis: user-programmable with HYDAC Programming Unit HPG 3000 Switch-on and switch-off delay: 8 2000 ms; user-programmable with HYDAC Programming Unit HPG 3000						
Accuracy acc. to DIN 1 terminal based	6086,			≤ ± 0.5 % ≤ ± 1 % F	FS tvn				
Temperature compensation	ation, z	ero poin	i	≤±0.02 % FS / °C typ. ≤±0.03 % FS / °C max.					
Temperature compensation	ation, s	pan		≤ ± 0.02 °	≤± 0.02 % FS / °C typ. ≤± 0.03 % FS / °C max.				
Repeatability	`			≤ ± 0.1 %	FS max				
Long-term drift				≤ ± 0.3 %	≤ ± 0.3 % FS typ. / year				
Environmental condit	ions								
Compensated tempera	ture ra	nge		-25 +85	5 °C				
Operating temperature	range	1)		-40 +85	5 °C / -25	+85 °C			
Storage temperature ra	ange			-40 +10	00 °C				
Fluid temperature rang	e ¹⁾			-40 +10	00 °C / -2	5 +100	°C		
(€ mark				EN 6100	0-6-1/2/	/3/4			
₽¶°us mark²)				Certificate no.: E318391					
Vibration resistance ac DIN EN 60068-2-6 at 1		0 Hz		≤ 20 g					
Shock resistance acc. DIN EN 60068-2-27 (1	to			≤ 100 g					
Protection class acc. to	IP 67								
Other data									
Supply voltage when applied acc. to U	8 32 V DC - limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950								
Residual ripple of supp	ly volta	age		≤ 5 %					
Current consumption	≤ 25 mA with inactive switching outputs ≤ 1.225 A with 1 switching output ≤ 2.025 A with 2 switching outputs								
Weight				~ 145 g					
Note: Reverse po	larity p	rotection	of the su	pply voltage	, overvol	tage, ove	rride and sh	nort circuit	

protection are provided.

FS (Full Scale) = relative to complete measuring range

- 1) -25 °C with FKM seal, -40 °C on request
- ²⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1
- 3) With mounted mating connector in corresponding protection class

In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

Setting ranges for the switching outputs:

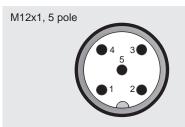
Measuring range in bar	Increment in bar	
-1 1	0.01	
0 1	0.002	
0 2.5	0.005	
06	0.01	
-1 9	0.02	
0 10	0.02	
0 16	0.05	

The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

	Minimum value in ms	Maximum value in ms
Switch-on delay Ton1/Ton2	8	2040
Switch-off delay ToF1/ToF2	8	2040

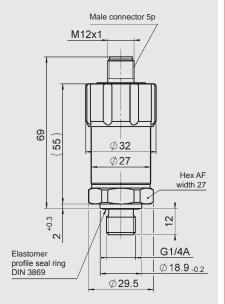
The increment for all instruments is 8 ms.

Pin connections:



Pin	Process connection	HPG connection	
	0011110001011	0011110011011	
1	+U _B	+U _B	
2	Out 2	n.c.	
3	0 V	0 V	
4	Out 1	n.c.	
5	n.c.	Comport	

Dimensions:

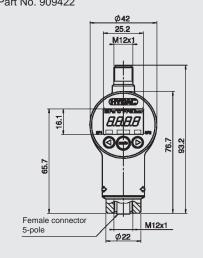


Programming Unit:

(to be ordered separately)

HPG 3000 - 000

Portable Programming Unit Part No. 909422



Model code:



Mechanical connection = G1/4 A ISO 1179-2

Electrical connection = male M12x1, 5 pole

Measuring ranges in bar

01.0; 02.5; 06.0; 0010; 0016 0001(-1 .. 1); 0009(-1 .. 9)

Number of switching outputs

= 1 switching output

= 2 switching outputs

Output technology
P = programmable = programmable switching output

Output technology 2

= PNP switching output

= NPN switching output

Modification number

000 = standard

Seal material (in contact with fluid)

= FKM seal (e.g. for hydraulic oils)= EPDM seal (e.g. for water or refrigerants)

Connection material (in contact with fluid)

= stainless steel

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

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Subject to technical modifications.

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Pressure Switch EDS 4400

Relative pressure

Programmable

Up to 2 switching outputs



Description:

The programmable electronic pressure switch in the series EDS 4400 was specially developed to combine the advantages of a compact, robust and costeffective instrument with the benefits of a programmable pressure switch.

The EDS 4400 can be easily programmed using the HYDAC HPG 3000 Programming Unit. Once the programming unit is disconnected from the EDS 4400, the pressure switch retains all the settings. This prevents unauthorised or incorrect adjustment of the settings.

The following parameters can be changed:

- Switch point
- Hysteresis
- Switching direction (N/O / N/C)
- Switching delay times

The EDS 4400 is suitable for high-pressure applications (starting at 40 bar) and has a pressure measurement cell with thin-film strain gauge on a stainless steel membrane.

In contrast to pressure switches which are factory-set acc. to customer requirements and not field-adjustable, the programmable EDS 4400 is highly versatile and replaces a wide range of models. This is advantageous in respect of stock management.

An ATEX version of the EDS 4400 is also available for use in potentially explosive atmospheres.

Technical data:

Input data

input dutu								
Measuring ranges	bar	40	100	250	400	600	1000	
Overload pressures	bar	80	200	500	800	1000	1600	
Burst pressure	bar	200	500	1000	2000	2000	3000	
Mechanical connection			G1/4 A ISC	1179-2		_		
Tightening torque, recomm	nended		20 Nm					
Parts in contact with fluid			Mech. con	nection: Sta	inless stee	I		
Output data								
Switching outputs		Switching of PNP: m MPN: m MPN: m Switching of Switch poir user-pro Program Switch-on 8 2000 user-pro Program	ax. 1.2 A wi ax. 1 A eac ax. 0.5 A wi ax. 0.3 A ea cycles: > 10 nts/hysteres grammable ming Unit H and switch- 0 ms; grammable ming Unit H	th 1 switch h with 2 sw th 1 switch ach with 2 s 0 million sis: with HYDA HPG 3000 off delay: with HYDA wi	ing output itching outp ing output switching ou			
Accuracy acc. to DIN 1608 terminal based	36,		≤±0.5 % F ≤±1 % FS					
Temperature compensation	n, zero	point	≤±0.02 % FS / °C typ. ≤±0.03 % FS / °C max.					
Temperature compensation	n, span		≤±0.02 % FS / °C typ. ≤±0.03 % FS / °C max.					
Repeatability			≤ ± 0.1 % FS max.					
Long-term drift			≤ ± 0.3 % FS typ. / year					
Environmental condition	s							
Compensated temperature	range		-25 +85 °	С				
Operating temperature ran			-40 +85 °	C / -25 +8	35 °C			
Storage temperature range			-40 +100	°C				
Fluid temperature range ¹⁾			-40 +100 °C / -25 +100 °C					
(€ mark			EN 61000-6-1 / 2 / 3 / 4					
mark ²⁾			Certificate no.: E318391					
Vibration resistance acc. to DIN EN 60068-2-6 at 10		<u> </u>	≤ 20 g					
Shock resistance acc. to DIN EN 60068-2-27 (1 ms)			≤ 100 g					
Protection class acc. to DII		05293)	IP 67					
Other data								
Supply voltage			8 32 V D	C				
when applied acc. to UL specifications			- limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950					
Residual ripple of supply v	oltage		≤ 5 %					
Current consumption			≤ 25 mA with inactive switching outputs ≤ 1.225 A with 1 switching output ≤ 2.025 A with 2 switching outputs					
Weight			~ 145 g					
Note: Reverse polarit			e supply volt	age, overvo	oltage, over	ride and sh	nort circuit	

protection are provided.

FS (Full Scale) = relative to complete measuring range

- 1) -25 °C with FKM seal, -40 °C on request
- ²⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1

²⁾ With mounted mating connector in corresponding protection class

In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

Setting ranges for the switching outputs:

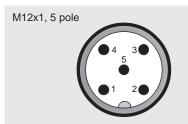
Measuring range in bar	Increment in bar
0 40	0.1
0 100	0.2
0 250	0.5
0 400	1
0 600	1
0 1000	2

The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

	Minimum value in ms	Maximum value in ms
Switch-on delay Ton1/Ton2	8	2040
Switch-off delay	8	2040

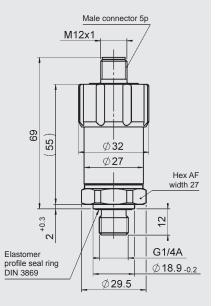
The increment for all instruments is 8 ms.

Pin connections:



Pin	Process	HPG	
	connection	connection	
1	+U _B	+U _B	
2	Out 2	n.c.	
3	0 V	0 V	
4	Out 1	n.c.	
5	n.c.	Comport	

Dimensions:

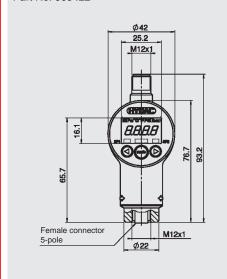


Programming Unit:

(to be ordered separately)

HPG 3000 - 000

Portable Programming Unit Part No. 909422



Model code:



Measuring ranges in bar 0040; 0100; 0250; 0400; 0600; 1000

Number of switching outputs

= 1 switching output = 2 switching outputs

Output technology
P = programmable = programmable switching output

Output technology 2

= PNP switching output

= NPN switching output

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

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Pressure Switch EDS 3300

Relative pressure

Display



Description:

The EDS 3300 with IO-Link communication interface is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the lowpressure range.

The instrument has a switching output and an additional output that can be configured as switching or analogue output (4 .. 20 mA or 0 .. 10 V).

IO-Link is the communication between the sensor/actuator (IO-Link device) and an IO-Link master based on a point-to-point interface.

The advantages:

Process data, parameters and diagnostic information of the pressure switch can be transmitted via a standard cable (SDCI mode). The integrated LED display provides information on the operating mode and the switching statuses.

Simple exchange, the IO-Link master saves the parameters of the connected pressure switch and transmits them to the newly connected pressure transmitter when replaced. Thus, time-consuming new parameterisations will no longer be required.

If IO-Link is not used, the sensor still functions as a pressure switch with two switching outputs (SIO mode).

To create customer-specific small series or to duplicate sensor settings across the system, the sensor can also be easily adjusted outside the system to suit the particular application, with the HYDAC Programming Device HPG P1-000, the HYDAC Programming Adapter ZBE P1-000 or by means of the Portable Data Recorder HMG 4000.

Typical fields of application for EDS 3300 IO-Link are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Technical data:

IO-Link

Technical data:										
Input data										
Measuring ranges	bar	-1 1	1	2.5	6	10	16			
Overload pressures	bar	3	3	8	18	30	48			
Burst pressure	bar	5	5	12	30	50	80			
Mechanical connection		G1/4 A IS0) 1179-2							
		Threaded	port DIN 3	8852-G1/4						
Tightening torque, recommended		20 Nm								
Parts in contact with fluid				tainless ste	el					
		Seal: FKM		: as per mod	el code)					
Output data		Oodi. i ravi	/ LI DIVI (ao por moa	Ji 0000)					
Switching outputs		PNP trans	istor outpu	ıts						
		Switching			250 mA pe	r switching	output			
Analogue output, permitted load resistance		Selectable								
	4 20 mA load resist. max. 500 Ω 0 10 V load resist. min. 1 k Ω									
Accuracy acc. to DIN 16086,		≤ ± 0.5 %				-				
terminal based		≤±1%F								
Temperature compensation, zero point		≤ ± 0.015	% FS / °C	typ.						
To the contract of the contract of		≤ ± 0.025								
Temperature compensation, span		$\leq \pm 0.015$ $\leq \pm 0.025$	% FS / °C % FS / °C	typ. max						
Repeatability		≤ ± 0.25 %		max.						
Reaction time		< 10 ms	7 1 0 111dx							
Long-term drift		≤ ± 0.3 %	FS tvp. / v	rear						
Environmental conditions		0.0 /0								
Compensated temperature range		-10 +70	°C							
Operating temperature range				+60 °C for	UL spec.)					
Storage temperature range		-40 +80								
Fluid temperature range										
(€ mark	EN 61000-6-1 / 2 / 3 / 4									
• Rus mark 1)		Certificate	-No : F31	8391						
Vibration resistance acc. to		≤ 10 g								
DIN EN 60068-2-6 (0 500 Hz)		- 10 g								
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	Shock resistance acc. to ≤ 50 g									
Protection class acc. to DIN EN 60529 2)		IP 67								
IO-Link specific data										
IO-Link revision		V1.1 / sup	port V1.0							
Transmission rate, baud rate 3)		38.4 kBau	d * (COM	2)						
Minimum cycle time		2.5 ms								
Process data width		16 bit								
SIO mode supported		Yes								
M-sequence capability		PREOPER		TYPE_0 TYPE_2_2						
		OPERATE ISDU:	::	Supported						
IO Device Description (IODD) download at: https://doi.org/10.1001/j.j.j.j.j.j.j.j.j.j.j.j.j.j.j.j.j.j.j.	s://ioddfinderi		/#/	- 4 - 100						
Other data	aaaa									
Supply voltage		9 35 V	DC. if	PIN 2 = SP	2					
		18 35 V	DC, if	PIN 2 = ana	alogue out	put				
when applied acc. to UL specifications		- limited ei	nergy – ac 1585: I P	c. to 9.3 UI S UL 60950	_ 61010; C	Jass 2;				
Residual ripple of supply voltage		≤5%	. 5555, ET	J J L 30330						
Current consumption		≤ 0.535 A	with ac	tive switchi	na outnuts					
Canada Control Priori		≤ 35 mA	with ina	active switch	hing outpu	ıts				
		≤ 55 mA	with ina	active switch	hing outpu	ıt				
Diaplay		4 digit I F		alogue outp	ut					
Display 4-digit, LED, 7-segment, red, height of digits 7 mm										
Weight		~ 120 g	J 1 11111			-				
		9								

Overvoltage, override protection and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range Note:

- 1) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1
- 2) With mounted mating connector in corresponding protection class
 3) Connection with unshielded standard sensor line possible up to a maximum line length of 20 m.

All terms and symbols used for setting the EDS 3300 as well as the menu structure comply with the specifications in the VDMA Standard for pressure switches.

Setting ranges for the switching outputs:

Measuring range in bar	Lower limit of RP / FL in bar	Upper limit of SP / FH in bar
-1 1	-0.98	1.00
0 1	0.010	1.000
0 2.5	0.025	2.500
0 6	0.06	6.00
0 10	0.10	10.00
0 16	0.20	16.00

Measuring range in bar	Min. difference betw. RP and SP & FL and FH	Incre- ment* in bar
-1 1	0.02	0.01
0 1	0.010	0.002
0 2.5	0.025	0.005
0 6	0.06	0.01
0 10	0.10	0.02
0 16	0.20	0.05

* All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

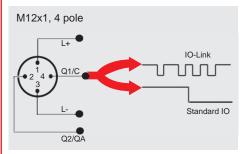
FL = pressure window lower value

FH = pressure window upper value

Additional functions:

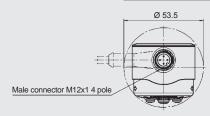
- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in bar, psi, MPa.

Pin connections:



Pin	Signal	Description
1	L+	+U _B
2	Q2/QA	Switching output (SP2) / analogue output
3	L-	0 V
4	Q1/C	IO-Link communication / switching output (SP1)

Dimensions: Ø 42 M12x1 11 Display turns through 270° (HIMIDIANC: 8888 64 Housing turns through 340° 40.7 width 27 G1/4 A ISO 1179-2 G1/4 DIN3852 Ø 18.9 -0.2 Ø20 Ø 29.5 Elastomer profile seal ring DIN 3869



Model code:

EDS 3 3 X 6 - F31 - XXXX - 000 - X 1

Mechanical connection

= G1/4 A ISO 1179-2

= threaded port DIN 3852-G1/4

Electrical connection

= male M12x1, 4 pole (mating connector not supplied)

Output

F31 = IO-Link interface

Measuring ranges in bar

0001 (-1 .. 1 bar); 01.0; 02.5; 06.0; 0010; 0016

Modification number

000 = standard

Seal material (parts in contact with fluid)

= FKM seal (e.g. for hydraulic oils)

= EPDM seal (e.g. for water, refrigerants)

Connection material (parts in contact with fluid)

= stainless steel

Accessories:

Appropriate accessories, such as mating connectors, mechanical adapters, splash guards, clamps for wall-mounting and programming units, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Pressure Switch EDS 3400

Relative pressure

Display



Description:

The EDS 3400 with IO-Link communication interface is a compact electronic pressure switch with integrated digital display for relative pressure measurement in the highpressure range.

The instrument has a switching output and an additional output that can be configured as switching or analogue output (4 .. 20 mA or 0 .. 10 V).

IO-Link is the communication between the sensor/actuator (IO-Link device) and an IO-Link master based on a point-to-point interface.

The advantages:

Process data, parameters and diagnostic information of the pressure switch can be transmitted via a standard cable (SDCI mode). The integrated LED display provides information on the operating mode and the switching statuses.

Simple exchange, the IO-Link master saves the parameters of the connected pressure switch and transmits them to the newly connected pressure transmitter when replaced. Thus, time-consuming new parameterisations will no longer be required.

If IO-Link is not used, the sensor still functions as a pressure switch with two switching outputs (SIO mode).

To create customer-specific small series or to duplicate sensor settings across the system, the sensor can also be easily adjusted outside the system to suit the particular application, with the HYDAC Programming Device HPG P1-000, the HYDAC Programming Adapter ZBE P1-000 or by means of the Portable Data Recorder HMG 4000

Typical fields of application for EDS 3400 IO-Link are machine tools, handling and assembly automation, intralogistics or the packaging industry.

IO-Link

Technical data:

Input data							,
Measuring ranges 1)	bar	40	100	250	400	600	1000
Overload pressures	bar	80	200	500	800	1000	1600
Burst pressure	bar	200	500	1000	2000	2000	3000
Mechanical connection		See mode	code				
Fightening torque, recommended		20 Nm					
Parts in contact with fluid Mech. connection: Stainless steel Seal: FKM							
Output data							
Switching outputs	outputs PNP transistor outputs Switching current: max. 250 mA per switching output						
Analogue output, permitted load resistance Selectable: 4 20 mA load resist. max. 500 Ω 0 10 V load resist. min. 1 kΩ							
Accuracy acc. to DIN 16086, terminal based		≤ ± 0.5 % ≤ ± 1 % F\$	FS typ. S max.				
Temperature compensation, zero point			% FS / °C	max.			
Temperature compensation, span		≤ ± 0.015 ≤ ± 0.025	% FS / °C	typ. max.	,	,	
Repeatability		≤ ± 0.25 %	FS max.				
Reaction time		< 10 ms					
Long-term drift		≤ ± 0.3 %	FS typ. / y	ear			
Environmental conditions							
Compensated temperature range		-10 +70					
Operating temperature range		-25 +80		+60 °C for	UL spec.)		
Storage temperature range		-40 +80					
	temperature range -25 +80 °C						
(e mark		EN 61000	-6-1 / 2 / 3	/ 4			
N us mark ²⁾	Certificate-No.: E318391						
Vibration resistance acc. to DIN EN 60068-2-6 (0 500 Hz)		≤ 10 g					
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)		≤ 50 g					
Protection class acc. to DIN EN 60529 3)		IP 67					
O-Link specific data							
O-Link revision		V1.1 / sup					
Fransmission rate, baud rate 4)			d * (COM2	2)			
Minimum cycle time		2.5 ms					
Process data width		16 bit					
SIO mode supported		Yes					
M-sequence capability		PREOPER OPERATE ISDU:	:	TYPE_0 TYPE_2_2 Supported			
IO Device Description (IODD) download at: https:	://ioddfinder.i						
Other data							
Supply voltage		9 35 V	DC, if F	PIN 2 = SF	2		
when applied acc. to UL specifications		18 35 V	DC, if F	PIN 2 = an c. to 9.3 U S UL 60950	I 61010· (put Class 2;	
Residual ripple of supply voltage		≤5 %	. 555, E. C	3= 30000	-		
Current consumption		≤ 0.535 A ≤ 35 mA ≤ 55 mA	with ina with ina	tive switchi active switch active switch alogue out	thing outpu thing outpu	ıts	
Display		4-digit, LE height of c	D, 7-segm digits 7 mm	ent, red,			
Weight		~ 120 g					
Note: Overvoltage, override protection and sl FS (Full Scale) = relative to complete n			re provided	d.			

- 1) 1000 bar only with mechanical connection G 1/4 A ISO 1179-2
 2) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1
 3) With mounted mating connector in corresponding protection class
 4) Connection with unshielded standard sensor line possible up to a maximum line length of 20 m.

All terms and symbols used for setting the EDS 3400 as well as the menu structure comply with the specifications in the VDMA Standard for pressure switches.

Setting ranges for the switching outputs:

	<u> </u>	
Measuring range	Lower limit of RP / FL	Upper limit of SP / FH
in bar	in bar	in bar
0 40	0.4	40.0
0 100	1.0	100.0
0 250	2.5	250.0
0 400	4	400.0
0 600	6	600.0
0 1000	10	1000.0

Measuring range in bar	Min. difference betw. RP and SP & FL and FH	Incre- ment* in bar
0 40	0.4	0.1
0 100	1.0	0.2
0 250	2.5	0.5
0 400	4	1
0 600	6	1
0 1000	10	2

* All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

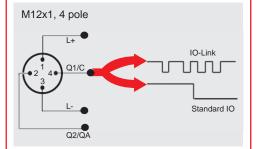
FL = pressure window lower value

FH = pressure window upper value

Additional functions:

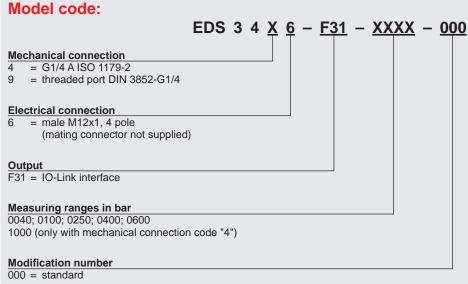
- Switching mode of the switching outputs adjustable (switch point function or window
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in bar, psi, MPa.

Pin connections:



Pin	Signal	Description
1	L+	+U _B
2	Q2/QA	Switching output (SP2) / analogue output
3	L-	0 V
4	Q1/C	IO-Link communication / switching output (SP1)

Dimensions: Ø 42 40.4 M12x1 11 Display turns through 270° (HIMIDIANCE 16 RARR 64 Housing turns through 340° +0.1 Hex AF width 27 G1/4 A ISO 1179-2 G1/4 DIN3852 Ø 18.9 -0.2 Ø20 Ø 29.5 Elastomer profile seal ring DIN 3869 Ø 53 5 Male connector M12x1 4 pole



Accessories:

Appropriate accessories, such as mating connectors, mechanical adapters, splash guards, clamps for wall-mounting and programming units, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

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Pressure Switch EDS 820

Relative pressure

Status display

IO-Link



Description:

IO-Link is the communication between the sensor/actuator (IO-Link device) and an IO-Link master based on a point-topoint interface. This technology has been integrated into the pressure switch series EDS 820.

The advantages:

Process data, parameters and diagnostic information of the pressure switch can be transmitted via a standard cable (SDCI mode). An integrated LED display provides information on the operating mode and the switching statuses.

Simple exchange – the IO-Link master saves the parameters of the connected pressure switch and transmits them to the newly connected pressure transmitter when replaced. Thus, time-consuming new parameterisations will no longer be required.

If IO-Link is not used, the sensor functions as a pressure switch with two switching outputs (SIO mode).

To create customer-specific small series or to duplicate sensor settings across the system, the sensor can also be easily adjusted outside the system to suit the particular application, with the HYDAC Programming Device HPG P1-000, the HYDAC Programming Adapter ZBE P1-000 or by means of the Portable Data Recorder HMG 4000.

Typical fields of application are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Technical data:

Input data									
Measuring ranges	bar	16	25	40	60	100	250	400	600
Overload pressures	bar	32	50	80	120	200	500	800	1000
Burst pressure	bar	80	100	200	300	500	1250	2000	2000
Mechanical connection				G 1/4 A I	SO 1179	-2 with 0	.5 mm o	rifice	
Tightening torque, recor	nmende	ed		20 Nm					
Parts in contact with fluid Mech. connection: Stainless steel Seal: FKM									
Output data									
Switching outputs				PNP tran) mA each	n switching	a ontont
Accuracy acc. to DIN 16 terminal based	6086,			$\leq \pm 0.5 \%$ $\leq \pm 1.0 \%$	6 FS typ.		1111110001	Townorm	<u>y output</u>
Temperature compensa	tion, zer	o point		≤ ±0.02 ° ≤ ±0.03 °	% FS / °0 % FS / °0	C typ. C max.			
Temperature compensa	tion, spa	an		≤ ±0.02 ° ≤ ±0.03 °					
Repeatability				≤ ± 0.1 %	6 FS max	Κ.			
Reaction time				< 10 ms					
Long-term drift				≤ ± 0.3 %	6 FS typ.	/ year			
Environmental conditi	ons								
Compensated temperate	ure rang	je		-25 +8	5 °C				
Operating temperature r	ange1)			-40 +8	5 °C / -25	5 +85 °	С		
Storage temperature rar	nge			-40 +1	00 °C				
Fluid temperature range	¹⁾			-40 +1	25 °C / -2	25 +12	5 °C		
(€ mark				EN 6100	0-6-1 / 2	/3/4			
Vibration resistance acc DIN EN 60068-2-6 at 10				≤ 25 g					
Shock resistance acc. to DIN EN 60068-2-27 (11				≤ 50 g					
Protection class acc. to	DIN EN	60529 ³⁾		IP 67					
IO-Link specific data									
IO-Link revision				V1.1 / su	pport V1	.0			
Transmission rate, baud	l rate ²⁾			38.4 kBa	ud (COI	M2)			
Minimum cycle time				2.5 ms	,				
Process data width				16 bit					
SIO mode supported				Yes					
M-sequence capability				PREOPE OPERAT ISDU su	E = TYP)		
IO Device Description (I	ODD) d	ownload				c.com/#/			
Other data									
Supply voltage				10 32 \	V DC				
Residual ripple of supply	y voltage	9		≤5%					
Power consumption				≤ 1 W wi	thout act	ive outpu	ıts		
Weight				~ 65 g					
Note: Reverse polarity	y protec	tion of the	supply	voltage,	overvolta	age, over	ride and	short circ	cuit

ection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

- 1) -25 °C with FKM seal, -40 °C on request
- 2) Connection with unshielded standard sensor line possible up to a maximum line length of 20 m.
- 3) With mounted mating connector in corresponding protection class

The EDS 820 IO-Link has 2 switching outputs whose switching characteristics are parameterisable.

Setting ranges for the switching outputs:

Measuring range	Lower limit of RP / FL	Upper limit of SP / FH
in bar	in bar	in bar
0 16	0.15	16.00
0 25	0.25	25.00
0 40	0.4	40.0
0 100	1.0	100.0
0 250	2.5	250.0
0 400	4	400
0 600	6	600

Measuring	Min. difference	Incre-
range	betw. RP and SP	ment*
in bar	& FL and FH	in bar
0 16	0.15	0.05
0 25	0.25	0.05
0 40	0.4	0.1
0 100	1.0	0.2
0 250	2.5	0.5
0 400	4	1
0 600	6	1

* All ranges given in the table can be adjusted by the increments shown.

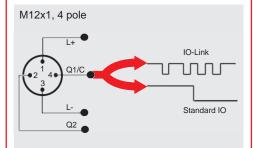
SP = switch point

RP = switch-back point

FL = pressure window lower value

FH = pressure window upper value

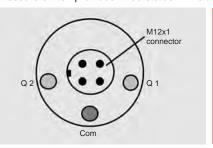
Pin connections:



Pin	Signal	Description
1	L+	+U _B
2	Q2	Switching output (SP2)
3	L-	0 V
4	Q1/C	IO-Link communication / switching output (SP1)

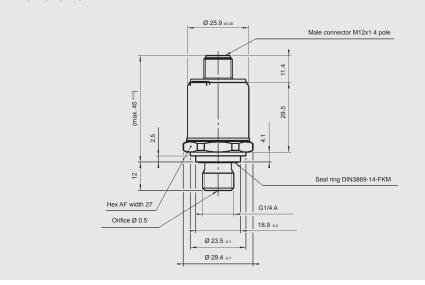
Status LEDs:

The pressure switch provides three status LEDs at the electrical connection:



LED 1 (Q 1)	Yellow	Switching output 1 active (high)
LED 2 (Q 2)	Yellow	Switching output 2 active (high)
LED 3 (Com)	Green, continuous	Switch in SIO mode
	Green, flashing	Switch in IO-Link mode (SDCI)

Dimensions:





EDS 8 2 <u>4</u> - <u>F31</u> - <u>XXXX</u> - <u>000</u>

Mechanical connection

= G 1/4 A ISO 1179-2

Output F31 = IO-Link interface

Measuring ranges in bar

0016; 0025; 0040; 0060; 0100; 0250; 0400; 0600

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors and programming units, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

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Subject to technical modifications.

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Pressure Switch EDS 3100

Absolute pressure

Display

Up to 2 switching outputs Analogue output



Description:

The EDS 3100 is a compact electronic pressure switch with integrated digital display for absolute pressure measurement in the low pressure range.

It has a ceramic measurement cell with thick-layer strain gauge. Depending on the particular version, the instrument can have one or two switching outputs, and there is the option of an additional switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

A special design feature of the EDS 3100 is that the display can be moved in two planes. The device can be installed in almost any mounting position and the display can be turned to the optimum position without the usual additional expense of a mechanical adapter.

The 4-digit display can indicate the pressure in bar, psi or MPa. The user can select the particular measurement unit. When changing to a different measurement unit, the device automatically converts all the switching settings to the new unit of measurement.

The EDS 3100 is also available in a variant with menu navigation in accordance with

The main applications of the EDS 3100 are primarily in low-pressure ranges in hydraulics and pneumatics, as well as in refrigeration and air conditioning technology.

Technical data:

Input data				
Measuring ranges	bar	1	2.5	
Overload pressures	bar	3	8	
Burst pressure	bar	5	12	
Mechanical connection		See model code		
Tightening torque, recommended		20 Nm (G1/4); 45 Nm (G	1/2)	
Parts in contact with fluid		Mech. connection: Stainless steel Sensor cell: Ceramic Seal: Copper (G1/2) / FKM / EPDM (as per model code)		
Output data				
Switching outputs		1 or 2 PNP transistor out Switching current: max. Switching cycles: > 100	1.2 A per output	
Analogue output, permitted load resista	ance	Selectable: 4 20 mA lo	pad resist. max. 500 Ω pad resist. min. 1 k Ω	
Accuracy acc. to DIN 16086, terminal based		≤ ± 0.5 % FS typ. ≤ ± 1 % FS max.		
Temperature compensation, zero point		≤ ± 0.015 % FS / °C typ. ≤ ± 0.025 % FS / °C max	ζ .	
Temperature compensation, span		≤±0.015 % FS / °C typ. ≤±0.025 % FS / °C max.		
Repeatability		≤ ± 0.25 % FS max.		
Reaction time		< 10 ms		
Long-term drift		≤ ± 0.3 % FS typ. / year		
Environmental conditions		= = 0.0 /0 : 0 typ://jour		
Compensated temperature range		-10 +70 °C		
Operating temperature range		-25 +80 °C (-25 +60 °	°C for UL spec.)	
Storage temperature range		-40 +80 °C		
Fluid temperature range		-25 +80 °C		
(€ mark		EN 61000-6-1/2/3/4		
s mark 1)		Certificate no.: E318391		
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz		≤ 10 g		
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)		≤ 50 g		
Protection class acc. to DIN EN 60529	2)	IP 67		
Other data		•.		
Supply voltage		9 35 V DC without an	alogue output	
when applied acc. to UL specifications		18 35 V DC with analo – limited energy – acc. to UL 1310/1585; LPS UL 6	gue output o 9.3 UL 61010; Class 2;	
Residual ripple of supply voltage		≤ 5 %		
Current consumption		max. 2.455 A total max. 35 mA with inactive max. 55 mA with inactive and analogu	switching output	
Display		4-digit, LED, 7 segment, height of digits 7 mm		
Weight		~ 120 g		
Note: Overvoltage override short ci	rcuit prote			

Note: Overvoltage, override, short circuit protection are provided **FS** (Full **S**cale) = relative to complete measuring range

2) With mounted mating connector in corresponding protection class

¹⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1

Setting options, standard design:

All settings offered by the EDS 3100 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switching outputs:

Switch point function

Meas.	Switch point	Hysteresis	Incre- ment*
range in bar	in bar	in bar	in bar
0 1	0.016 1	0.006 0.99	0.002
0 2.5	0.04 2.5	0.015 2.475	0.005

Window function

Meas. range in bar	Lower switch value in bar	Upper switch value in bar	Incre- ment* in bar
0 1	0.016 0.982	0.024 0.99	0.002
0 2.5	0.04 2.455	0.06 2.475	0.005

* All ranges given in the table can be adjusted by the increments shown.

Setting options menu navigation acc. to

All terms and symbols used for setting the EDS 3100 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-1) for pressure switches.

The EDS 3100 can easily be adjusted via three buttons.

Setting ranges for the switching outputs:

Measuring	Lower limit of	Upper limit of SP / FH		
range in bar	RP / FL	SP'/FH		
in bar	in bar	in bar		
0 1	0.010	1.000		
0 2.5	0.025	2.500		

Measuring range in bar	Min. difference betw. RP and SP & FL and FH	Incre- ment* in bar
0 1	0.010	0.002
0 2.5	0.025	0.005

* All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

FL = pressure window lower value

FH = pressure window upper value

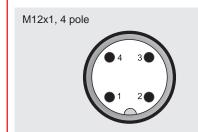
Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in measurement units bar, psi, MPa. The scaling can also be adapted to indicate force, weight, etc.

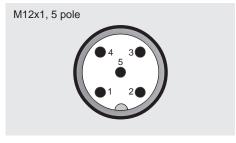
Additionally in the standard design:

- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display
- Display filter for smoothing the display value during pressure pulsations

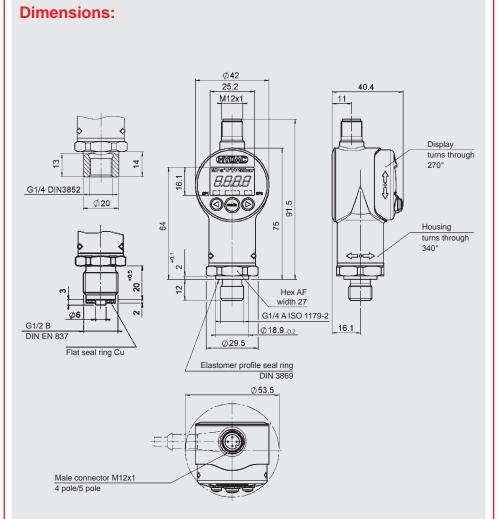
Pin connections:



Pin	EDS	EDS	EDS
	31X6-1	31X6-2	31X6-3
1	+U _B	+U _B	+U _B
2	n.c.	SP2	Analogue
3	0 V	0 V	0 V
4	SP1	SP1	SP1



Pin	EDS
	31X8-5
1	+U _B
2	Analogue
3	0 V
4	SP1
5	SP2





The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

Model code:

EDS 3 1 X X - X - XXXX - X00 - X 1

Mechanical connection

- = G1/2 B DIN-EN 837
- only for modification "000"
- = G1/4 A ISO 1179-2
- = threaded port DIN 3852-G1/4 9

Electrical connection

- = male M12x1, 4 pole
 - only possible on output models "1", "2" and "3"
- = male M12x1, 5 pole
 - only possible on output model "5" and modification "000"

Output

- = 1 switching output
- only in conjunction with electrical connection type "6"
- 2 = 2 switching outputs
- only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analogue output only in conjunction with electrical connection type "6"
- = 2 switching outputs and 1 analogue output only in conjunction with electrical connection type "8" and modification "000"

Measuring ranges in bar

01.0; 02.5

Modification number

000 = standard

V00 = menu navigation acc. to VDMA (standard sheet 24574)

Seal material (in contact with fluid)

= FKM seal (e.g. for hydraulic oils)

= EPDM seal (e.g. for water, refrigerants)

Connection material(in contact with fluid)

= stainless steel

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

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E-mail: electronic@hydac.com Internet: www.hydac.com



Pressure Switch EDS 3100

Absolute pressure

Display



Description:

The EDS 3100 with IO-Link communication interface is a compact electronic pressure switch with integrated digital display for absolute pressure measurement in the low pressure range.

The instrument has a switching output and an additional output that can be configured as switching or analogue output (4 .. 20 mA or 0 .. 10 V).

IO-Link is the communication between the sensor/actuator (IO-Link device) and an IO-Link master based on a point-to-point interface.

The advantages:

Process data, parameters and diagnostic information of the pressure switch can be transmitted via a standard cable (SDCI mode). The integrated LED display provides information on the operating mode and the switching statuses.

Simple exchange, the IO-Link master saves the parameters of the connected pressure switch and transmits them to the newly connected pressure transmitter when replaced. Thus, time-consuming new parameterisations will no longer be required.

If IO-Link is not used, the sensor still functions as a pressure switch with two switching outputs (SIO mode).

To create customer-specific small series or to duplicate sensor settings across the system, the sensor can also be easily adjusted outside the system to suit the particular application, with the HYDAC Programming Device HPG P1-000, the HYDAC Programming Adapter ZBE P1-000 or by means of the Portable Data Recorder HMG 4000

Typical fields of application for EDS 3100 IO-Link are machine tools, handling and assembly automation, intralogistics or the packaging industry.

IO-Link

Technical data:

Input data				
Measuring ranges	bar	1	2.5	
Overload pressures	bar	3	8	
Burst pressure	bar	5	12	
Mechanical connection		G1/4 A ISO 1179-2 Threaded port DIN 3852-G1/4		
Tightening torque, recommended		20 Nm		
Parts in contact with fluid	3 44 3 44 44 44 44 44 44 44 44 44 44 44			
Output data				
Switching outputs		PNP transistor outputs Switching current: max. 250 mA	per switching output	
Analogue output, permitted load resistance		Selectable: 4 20 mA load resist. max. 500 0 10 V load resist. min. 1 kg		
Accuracy acc. to DIN 16086, terminal based		≤ ± 0.5 % FS typ. ≤ ± 1 % FS max.		
Temperature compensation, zero point		≤ ± 0.015 % FS / °C typ. ≤ ± 0.025 % FS / °C max.		
Temperature compensation, span		≤ ± 0.015 % FS / °C typ. ≤ ± 0.025 % FS / °C max.		
Repeatability		≤ ± 0.25 % FS max.		
Reaction time		< 10 ms		
Long-term drift	≤ ± 0.3 % FS typ. / year			
Environmental conditions				
1		-10 +70 °C		
erating temperature range		-25 +80 °C (-25 +60 °C for U	JL spec.)	
orage temperature range		-40 +80 °C		
uid temperature range -25 +80 °C				
(€ mark EN 61000-6-1/2/3/4		EN 61000-6-1 / 2 / 3 / 4		
c Al us mark 1)		Certificate-No.: E318391		
Vibration resistance acc. to DIN EN 60068-2-6 (0 500 Hz)		≤ 10 g		
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)		≤ 50 g		
Protection class acc. to DIN EN 60529 2)		IP 67		
IO-Link specific data				
IO-Link revision		V1.1 / support V1.0		
Transmission rate, baud rate 3)		38.4 kBaud * (COM2)		
Minimum cycle time		2.5 ms		
Process data width		16 bit		
SIO mode supported		Yes		
M-sequence capability		PREOPERATE: TYPE_0 OPERATE: TYPE_2_2 ISDU: Supported		
IO Device Description (IODD) download at: https://doi.org/10.1001/j.j.j.j.j.j.j.j.j.j.j.j.j.j.j.j.j.j.j.	s://ioddfinder.	io-link.com/#/		
Other data				
Supply voltage when applied acc. to UL specifications	18 35 V DC, if PIN 2 = analogue output			
Posidual ripple of supply voltage		< 5 %		

Overvoltage, override protection and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range Note:

when applied acc. to UL specifications Residual ripple of supply voltage

Current consumption

Display

Weight

- 1) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1
- 2 With mounted mating connector in corresponding protection class
 3 Connection with unshielded standard sensor line possible up to a maximum line length of 20 m.

≤5% ≤ 0.535 A

≤ 35 mA ≤ 55 mA

~ 120 g

with active switching outputs with inactive switching outputs with inactive switching output

and analogue output

4-digit, LED, 7-segment, red, height of digits 7 mm

All terms and symbols used for setting the EDS 3100 as well as the menu structure comply with the specifications in the VDMA Standard for pressure switches.

Setting ranges for the switching outputs:

Measuring range in bar	Lower limit of RP / FL in bar	Upper limit of SP / FH in bar
0 1	0.010	1.000
0 2.5	0.025	2.500

Measuring range in bar	Min. difference betw. RP and SP & FL and FH	Incre- ment* in bar
0 1	0.010	0.002
0 2.5	0.025	0.005

* All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

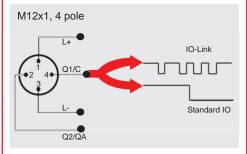
FL = pressure window lower value

FH = pressure window upper value

Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Pressure can be displayed in bar, psi, MPa

Pin connections:



Pin	Signal	Description
1	L+	+U _B
2	Q2/QA	Switching output (SP2) / analogue output
3	L-	0 V
4	Q1/C	IO-Link communication / switching output (SP1)

Dimensions: Ø 42 M12x1 11 Display turns through 270° (HIMIDIANC: 8888 64 Housing turns through 340° +0.1 Hex AF width 27 G1/4 A ISO 1179-2 G1/4 DIN3852 Ø 18.9 -0.2 Ø20 Ø 29.5 Elastomer profile seal ring DIN 3869 Ø 53 5 Male connector M12x1 4 pole





Mechanical connection = G1/4 A ISO 1179-2

= threaded port DIN 3852-G1/4

Electrical connection

= male M12x1, 4 pole (mating connector not supplied)

Output

F31 = IO-Link interface

Measuring ranges in bar

01.0; 02.5

Modification Number

000 = standard

Seal material (parts in contact with fluid)

= FKM seal (e.g. for hydraulic oils)

= EPDM seal (e.g. for water, refrigerants)

Connection material (parts in contact with fluid)

= stainless steel

Accessories:

Appropriate accessories, such as mating connectors, mechanical adapters, splash guards, clamps for wall-mounting and programming units, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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EN 18.386.2/02.18

DAD INTERNATIONAL



Pressure Switch EDS 4400 Ex applications

Relative pressure

Programmable

Flameproof enclosure ATEX, CSA, IECEx, triple approval Up to 2 switching outputs



Description:

The programmable electronic pressure switch EDS 4400 with flameproof enclosure has triple approval acc. to ATEX, CSA and IECEx which ensures the instrument is universally suitable for use in potentially explosive atmospheres worldwide.

Each instrument is certified by the three approvals organizations and is labelled accordingly. Therefore there is no longer any need to stock multiple devices with separate individual approvals.

As with the industry model of the EDS 4400, those with triple approval have a proven, fully-welded sensor cell with a thin-film strain gauge on a stainless steel membrane without internal seal.

The instrument is programmed conveniently and simply using the HYDAC Programming Unit HPG 3000.

The main fields of application are in mining and the oil & gas industry, e.g. in underground vehicles, hydraulic power units, blow-out preventers (BOPs), drill drives or valve actuation stations as well as in locations with high levels of dust contamination.

Protection types and applications:

CSA_{us}

Explosionproof - Seal not required Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4

ATEX

Flameproof M2 Ex d I Mb

2G Ex d IIC T6, T5 Gb 2D Ex tb IIIC T110 .. 130 °C Db

IECEx

Flameproof Ex d I Mb Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 130 °C Db

Technical data:

Input data										
Measuring ranges	bar	6	16	40	60	100	250	400	600	1000
Overload pressures	bar	15	32	80	120	200	500	800	1000	1600
Burst pressure	bar	100	200	200	300	500	1000	2000	2000	3000
Mechanical connection				G1/4 A	ISO 11	79-2				
Tightening torque, recomm	ended			20 Nm						
			1.4301 Seal: F	, 1.454 KM	8	12; 1.45	571; 1.4	435; 1.	4404;	
Conduit, housing material				1.4435	; 1.440 ₁	4				
Output data										
Switching output 1)				1 or 2 I PNP	PNP tra	nsistor	output	S:		
				max. max.	ing curr 1.2 A v 1 A ead	vith 1 s ch with	2 switc	ching o	ıt utputs	
					ing cycl			ion		
				user-	points/ prograi rammin	mmable	e with F			
				Switch-on and switch-off delay: 8 2000 ms; User-programmable with HYDAC Programming Unit HPG 3000						
Accuracy acc. to DIN 1608	6.			≤±0.5 % FS typ.						
terminal based	-,			≤ ± 1.0 % FS max.						
Temperature compensation Zero point			≤±0.02 % FS / °C typ. ≤±0.03 % FS / °C max.							
Temperature compensation Span				≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max.						
Repeatability				≤ ± 0.1	% FS ı	max.				
Long-term drift			-	≤ ± 0.3	% FS 1	yp. / ye	ear			
Environmental conditions										
Compensated temperature	range			-25 +	85 °C					
Operating / ambient tempe	rature rar	nge ²⁾³⁾		T6, T110 °C: Ta = -40 +60 °C / -20 +60 °C T5: Ta = -40 +80 °C / -20 +80 °C						
Storage temperature range	:			-40 +100 °C						
Fluid temperature range 2)33				T6, T110 °C: Ta = -40 +60 °C / -20 +60 °C T5: Ta = -40 +80 °C / -20 +80 °C						
(€ mark				EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 1 / 31						
Vibration resistance acc. to DIN EN 60068-2-6 at 10				≤ 10 g						
Protection class acc. to DIN EN 60529 ISO 20653				Vented K (Seal			(Seale	ed Gau	ge)	
Other data					,					
Supply voltage				12 30	V DC					
Residual ripple of supply voltage				≤ 5 %						
Current consumption			≤ 25 mA with inactive switching outputs ≤ 1.225 A with 1 switching output ≤ 2.025 A with 2 switching outputs							
Weight				~ 300 g	9					
	tection of	the su	pply vo	oltage, c	vervolt	age, ov	erride	and sho	ort circu	it
Current consumption $\leq 25 \text{ r}$ ≤ 1.22 ≤ 2.02				≤ 25 m ≤ 1.225 ≤ 2.025 ~ 300 g	A with A with	1 swite 2 swite	ching o	utput utputs		iit

ction of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

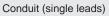
 $^{1)}$ NPN switching outputs on request $^{2)}$ T130 $^{\circ}$ C with Ta = -40 .. +80 $^{\circ}$ C / -20 .. +80 $^{\circ}$ C with electrical connection

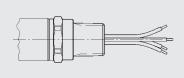
single leads possible 3) -20 °C with FKM seal, -40 °C on request

Setting ranges for the switching outputs:

- Switch point or upper switch value 5 % .. 100 % of the measurement range
- Hysteresis or lower switch value 1 % .. 96 % of the measurement range

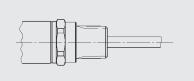
Pin connections:





EDS 44x9-*-1P	EDS 44x9-*-2P
+U _B	+U _B
Switching output 1	Switching output 1
	Switching output 2
0 V	0 V
SDA ¹⁾	SDA ¹⁾
	+UB Switching output 1 0 V

Conduit (jacketed cable)



Lead	EDS 44xG-*-1P	EDS 44xG-*-2P
white	Switching output 1	Switching output 1
brown	n.c.	Switching output 2
green	SDA ¹⁾	SDA ¹⁾
yellow	0 V	0 V
grey	+U _B	+UB

¹⁾ Programming line

Fields of application:

	Single leads Electrical connection "9"	Jacketed cable Electrical connection "G"		
CSA	Explosionproof (seal not required)		
ATEX	Flam	eproof		
IECEx	Flam	eproof		
_c CSA _{us}	Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4			
ATEX		d IIC T6, T5 Gb		
IECEx	II 2D Ex tb IIIC T110 130 °C Db II 2D Ex tb IIIC T110 °C Db Ex d I Mb Ex d IIC T6, T5 Gb			
	Ex tb IIIC T110 130 °C Db	Ex tb IIIC T110 °C Db		

Model code:

EDS $4.4 \times X - XXXX - XP - DX - 000 (2m)$

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection
9 = 1/2-14 NPT Conduit (male thread), single leads

= 1/2-14 NPT Conduit (male thread), jacketed cable

Measuring ranges in bar 0006; 0016; 0040; 0060; 0100; 0250; 0400; 0600; 1000

Number of switching outputs

= 1 switching output

= 2 switching outputs

Output technology
P = programmable = programmable

Approval

= CSA Explosionproof - Seal not required ATEX Flameproof IECEx Flameproof

Type of measurement cell

= Sealed Gauge (sealed to atmosphere) ≥ 40 bar = Vented Gauge (vented to atmosphere) < 40 bar

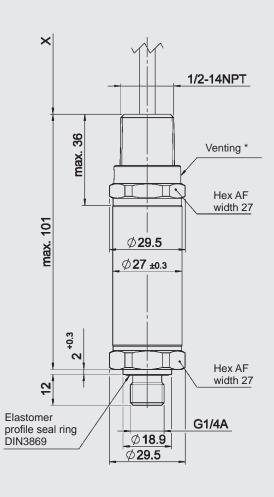
Modification number

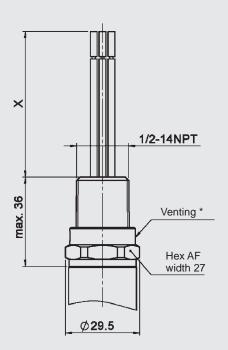
000 = standard

Cable length in m

Standard = 2 m

Dimensions:





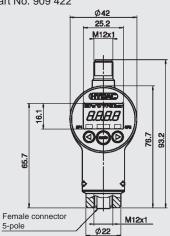
* Optional depending on type "Sealed Gauge" / "Vented Gauge"

Programming Unit:

(to be ordered separately)

HPG 3000 - 000

Portable Programming Unit Part No. 909 422



For simple connection of the pressure switch to the HPG 3000, please use the UVM 3000 Connection Adapter (see Accessories Brochure).

CAUTION!

The HPG 3000 Programming Unit may only be used outside the explosion risk zone.

Note:

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Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Pressure Switch EDS 4400 Ex series applications

Relative pressure

Factory-set

Flameproof enclosure ATEX, CSA, IECEx, triple approval Customised designs thanks to diverse electrical and mechanical connections Up to 2 switching outputs



Description:

The electronic pressure switch EDS 4400 with flameproof enclosure and triple approval acc. to ATEX, CSA and IECEx ensures the instrument is universally suitable for use in potentially explosive atmospheres worldwide.

Each instrument is certified by the three approvals organizations and is labelled accordingly. Therefore there is no longer any need to stock multiple devices with separate individual approvals. The switch point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are factory-set acc. to customer requirement (not field-adjustable).

As with the industry model of the EDS 4400, those with triple approval have a proven, fully-welded sensor cell with a thin-film strain gauge on a stainless steel membrane without internal seal.

The main fields of application are in mining and the oil and gas industry, e.g. in underground vehicles, hydraulic assemblies, blow-out preventers (BOPs), drill drives or valve actuation stations and in locations with high dust contamination.

Protection types and applications:

cCSA{us}

Explosionproof - Seal not required Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4

ATEX

M2 Ex d I Mb 2G Ex d IIC T6, T5 Gb 2D Ex tb IIIC T110 .. 130 °C Db

IECEx

Flameproof Ex d I Mb Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 130 °C Db

Technical data:

Innut data

Input data								,			
Measuring ranges	bar	6	16	40	60	100	250	400	600	1000	
Overload pressures	bar	15	32	80	120	200	500	800	1000	1600	
Burst pressure	bar	100	200	200	300	500	1000	2000	2000	3000	
Mechanical connection				G1/4 A	ISO 11	79-2					
Tightening torque, recommer	nded			20 Nm							
Parts in contact with fluid					, 1.4548		12; 1.45	571; 1.4	435; 1.	4404;	
Conduit, housing material				1.4435	; 1.440 ⁴	1					
Output data											
Switching output 1)				1 or 2 F PNP	PNP tra	nsistor	output	s:			
					1 A ead ng cycl ch point	vith 1 so ch with es: > 1 s/hyste	2 swite 00 milli resis:				
				Switch- 32 m	to custo on and s stand	switch ard	-off del	lay:			
							o custo	omer sp	ec.)		
Accuracy acc. to DIN 16086, terminal based				≤±0.5 % FS typ. ≤±1.0 % FS max.							
Temperature compensation Zero point				≤±0.02 % FS / °C typ. ≤±0.03 % FS / °C max.							
Temperature compensation Span				≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max.							
Repeatability				≤ ± 0.1 % FS max.							
Long-term drift				≤ ± 0.3 % FS typ. / year							
Environmental conditions											
Compensated temperature ra	ange			-25 +85 °C							
Operating / ambient temperar	ture rar	ige ²⁾³⁾		T6, T110 °C: Ta = -40 +60 °C / -20 +60 °C T5: Ta = -40 +80 °C / -20 +80 °C							
Storage temperature range				-40 +100 °C							
Fluid temperature range ²⁾³⁾				T6, T110 °C: Ta = -40 +60 °C / -20 +60 °C T5: Ta = -40 +80 °C / -20 +80 °C							
(€ mark				EN 61000-6-1/2/3/4 EN 60079-0/1/31							
Vibration resistance acc. to DIN EN 60068-2-6 at 10 50	0 Hz			≤ 10 g							
Protection class acc. to DIN EN 60529 ISO 20653					IP 65 (Vented Gauge), IP 69 (Sealed Gauge) IP 6K9K (Sealed Gauge)						
Other data											
Supply voltage				12 30	V DC						
Residual ripple of supply volta	age			≤ 5 %							
Current consumption					≤ 25 mA with inactive switching outputs ≤ 1.225 A with 1 switching output ≤ 2.025 A with 2 switching outputs						
Weight				~ 300 g							
Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit											

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

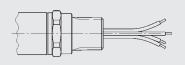
 $^{1)}$ NPN switching outputs on request $^{2)}$ T130 °C with Ta = -40 .. +80 °C / -20 .. +80 °C with electrical connection single leads possible

3) -20 °C with FKM seal, -40 °C on request

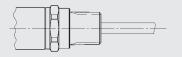
Pin connections:

Pin connections are configured acc. to customer specification.

Conduit (single leads)



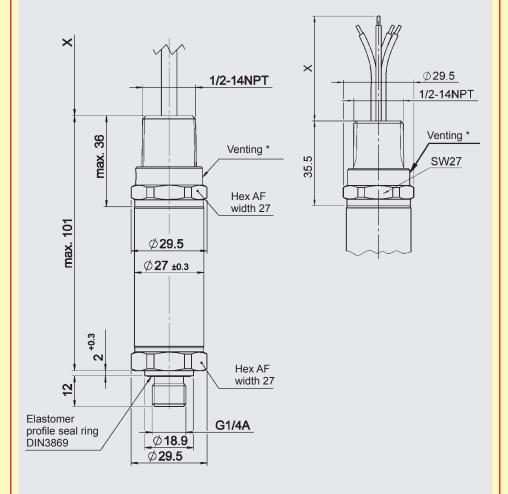
Conduit (jacketed cable)



Fields of application:

		acketed cable Electrical connection "G"							
CSA	Explosionproof (sea	Explosionproof (seal not required)							
ATEX	Flamep	Flameproof							
IECEx	Flameproof								
_c CSA _{us}	Class I Group A Class II Group Class III Type 4								
ATEX	I M2 Ex d II 2G Ex d II 2D Ex tb IIIC T110 130 °C Db II	IIC T6, T5 Gb							
IECEx	Ex d I Mb Ex d IIC T6, T5 Gb Ex tb IIIC T110 130 °C Db Ex tb IIIC T110 °C Db								

Dimensions:



^{*} Optional depending on type "Sealed Gauge" / "Vented Gauge"

Order details:

The electronic pressure switch EDS 4400 with triple approval has been specially developed for OEM customers and is available for minimum order quantities of 50 units per type. For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Internet: www.hydac.com



Pressure Switch EDS 4300 Ex applications

Relative pressure

Programmable

Intrinsically Safe **ATEX** approval 1 switching output



Description:

The programmable pressure switch EDS 4300 in ATEX version was specially developed for use in potentially explosive atmospheres and is based on the EDS 4000

The switch point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are user-programmable in conjunction with the HYDAC Programming Unit HPG 3000.

As with the industry model, the programmable EDS 4300 in ATEX version has a ceramic measurement cell with thicklayer strain gauge for measuring relative pressure in the low pressure range.

The main fields of application are in the oil and gas industry, in mining and in locations with high dust contamination.

Protection types and applications:

I	M1	Ex ia	1	
Ш	1G	Ex ia	IIC	T4, T5, T6
Ш	1/2G	Ex ia	IIC	T4, T5, T6
Ш	2G	Ex ia	IIC	T4, T5, T6
Ш	1D	Ex iaD	20	T100 °C

Technical data:

Input data

input data	,			,							
Measuring ranges	bar	1	2.5	4	6	10	16	25	40		
Overload pressures	bar	3	8	12	20	32	50	80	120		
Burst pressure	bar	5	12	18	30	48	75	120	180		
Mechanical connection				G1/4 A I	SO 1179)-2					
Tightening torque, recomm	ended			20 Nm							
Parts in contact with fluid				Sensor: Mech. co Seal: FK	onnectio	n: 1.430	1 er mode	l code)			
Output data						т (ас р	0				
Switching output				1 transis	tor outp	ut: PNP					
3 - 4							operation	on: I _{max} ≤	34 mA		
				Switchin	•	_					
				Switch p	oint/hys	teresis:					
				user	-progran	nmable v	with HYE PG 3000				
				Switch-c							
				8 2 HVC	2000 ms	; user-pr	ogramm a Unit H	able with PG 3000))		
Accuracy acc. to DIN 1608	6			≤ ± 0.5 %			g Onit 11	1 0 3000	<u>, </u>		
terminal based				≤±1%	FS máx.						
Temperature compensation Zero point	1			$\leq \pm 0.02$ $\leq \pm 0.03$	% FS / '	°C max.					
Temperature compensation Span	1			≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max.							
Repeatability				≤ ± 0.1 %							
Long-term drift				≤ ± 0.3 %	% FS typ	. / year					
Environmental conditions	s										
Compensated temperature	range			-25 +85 °C							
Operation, ambient, fluid temperature range				T6: Ta = -20 +60 °C T5, T4, T100: Ta = -20 +70 °C							
Storage temperature range)			-40 +100 °C							
(€ mark				EN 61000-6-1/2/3/4							
				EN 60079-0 / 11 / 26 EN 61241-0 / 11 EN 50303							
Vibration resistance acc. to DIN EN 60068-2-6 at 10				≤ 20 g							
Shock resistance acc. to DIN EN 60068-2-27 (1 ms)				≤ 100 g							
Protection class acc. to DIN		0529 ¹⁾		IP 67							
Relevant data for Ex appl											
				I M1 II 1G, 1/2	2G, 2G		II 1 D				
Supply voltage				14 28	V DC						
Max. input current				100 mA			93 mA				
Max. input power				0.7 W 0.65 W							
Max. internal capacity				33 nF			33 nF				
Max. internal inductance				0 mH			0 mH				
Insulation voltage to housing	ng ²⁾			50 V AC, with integrated overvoltage protection acc. to EN 61000-6-2							
Approved intrinsic safety barriers				Pepperl & Fuchs: Z 787 Telematic Ex STOCK: MTL 7087							
Other data											
Residual ripple of supply vo	oltage			≤5%							
Weight				~ 150 g							
Note: Reverse polarity pro	Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit										

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

 $^{1)}$ With mounted mating connector in corresponding protection class $^{2)}$ 500 V AC on request



In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

Setting ranges for the switching outputs:

Measuring r	ange Increment	
in bar	in bar	
0 1	0.002	
0 2.5	0.005	
0 4	0.01	
0 6	0.01	
0 10	0.02	
0 16	0.05	
0 25	0.1	
0 40	0.1	

The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

	Minimum value in ms	Maximum value in ms
Switch-on delay Ton1/Ton2	8	2040
Switch-off delay ToF1/ToF2	8	2040

The increment for all instruments is 8 ms.

Pin connections:

M12x1, 5 pole



Pin	Process connection	HPG connection
1	+U _B	+U _B
2	0 V	Comport 1*
3	0 V	0 V
4	Out 1	n.c.
5	0 V	Comport 2*

^{*} Comport = programming connection

| Fields of application:

Code no. for use in model code	1	2	3	8
Protection type	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C
Certificate		DEKRA EXAM	BVS 07 ATEX E 041 X	
Application fields	Group I Category M1	Group II Category 1G	Group II Category 2G, 1/2G	Group II Category 1D
	Mining	Gases	Gases	Dusts
	Protection type: intrinsically safe ia with barrier			
		For use in Zone 0, 1, 2	For use in Zone 1, 2 For mounting to Zone 0	For use in Zone 20, 21, 22 For mounting to Zone 20

Model code:

EDS 4 3 <u>4 8</u> - <u>XXXX</u> - <u>P</u> - <u>A</u> <u>N</u> <u>X</u> - <u>000</u> - <u>X</u> <u>1</u>

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

= male M12x1, 5 pole (mating connector not supplied)

Measuring ranges in bar

01.0; 02.5; 04.0; 06.0; 0010; 0016; 0025; 0040

Output technology

= programmable

Approval

3

= ATEX

Insulation voltage

= 50 V AC to housing

Protection types and applications (code)

= I M1 Ex ia I

= II 1G Ex ia IIC T4, T5, T6 = II 2G Ex ia IIC T4, T5, T6 / II 1/2G Ex ia IIC T4, T5, T6 = II 1D Ex iaD 20 T100 °C

Modification number

000 = standard

Sealing material (in contact with fluid)

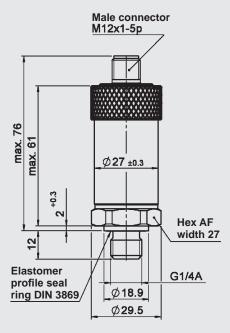
= FKM seal (e.g. for hydraulic oils)

= EPDM seal (e.g. for refrigerants)

Connection material (in contact with fluid)

= stainless steel

Dimensions:

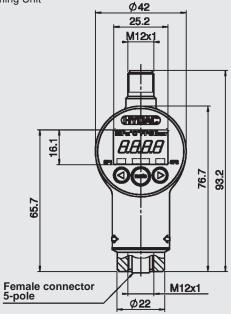


Programming Unit:

(to be ordered separately)

HPG 3000 - 000

Portable Programming Unit Part No. 909422



Important note:

The HPG 3000 Programming Unit may only be used outside the explosion risk zone.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Pressure Switch EDS 4300 Ex series applications

Relative pressure

Factory-set

Intrinsically Safe ATEX approval

Customised designs thanks to diverse electrical and mechanical connections 1 switching output



Description:

The pressure switch EDS 4300 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the EDS 4000 series.

The switch point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are factory-set acc. to customer requirement (not fieldadjustable).

As with the industry model, the EDS 4300 in ATEX version has a ceramic measurement cell with thick-layer strain gauge for measuring relative pressure in the low pressure range.

The main fields of application are in the oil and gas industry, in mining and in locations with high dust contamination.

Protection types and applications:

Ι	M1	Ex ia	1	
Ш	1G	Ex ia	IIC	T4, T5, T6
Ш	1/2G	Ex ia	IIC	T4, T5, T6
Ш	2G	Ex ia	IIC	T4, T5, T6
Ш	1D	Ex iaD	20	T100 °C

Technical data:

Input data

mput dutu											
Measuring ranges	bar	1	2.5	4	6	10	16	25	40		
Overload pressures	bar	3	8	12	20	32	50	80	120		
Burst pressure	bar	5	12	18	30	48	75	120	180		
Mechanical connection				G1/4 A I	SO 1179)-2					
Tightening torque, recomm	mended			20 Nm							
Parts in contact with fluid				Sensor: Mech. co Seal: FK	onnectio	n: 1.430	1				
Output data											
Switching output				1 transis	tor outp	ut: PNP					
				Switchin	g curren	it: during	operation	on: I _{max} ≤	34 mA		
				Switchin	g cycles	: > 100 ı	million				
					to custo	mer spe	cification	า			
					ns stand	ard	delay: custome	er spec)			
Accuracy acc. to DIN 160	86.						Cactorne	эг ороо.,			
terminal based	,			≤ ± 0.5 % ≤ ± 1 %	FS max.						
Temperature compensation Zero point	on			≤ ± 0.02 ≤ ± 0.03	% FS /	°C max.					
Temperature compensation Span	on			$\leq \pm 0.02$ $\leq \pm 0.03$	% FS / % FS /	°C typ. °C max.					
Repeatability				≤ ± 0.1 %	% FS						
Long-term drift				≤ ± 0.3 % FS typ. / year							
Environmental condition	าร										
Compensated temperatur	e range			-25 +85 °C							
Operation, ambient, fluid temperature range				T6: Ta = -20 +60 °C T5, T4, T100: Ta = -20 +70 °C							
Storage temperature rang	e			-40 +100 °C							
(€ mark				EN 61000-6-1/2/3/4 EN 60079-0/11/26 EN 61241-0/11 EN 50303							
Vibration resistance acc. t DIN EN 60068-2-6 at 10.		<u>.</u>		≤ 20 g							
Shock resistance acc. to DIN EN 60068-2-27 (1 ms	s)			≤ 100 g							
Protection class acc. to D	IN EN 6	0529 1)		IP 67							
Relevant data for Ex app	olication	าร									
				I M1 II 1G, 1/	2G, 2G		II 1 D				
Supply voltage				14 28	V DC			-			
Max. input current				100 mA 93 mA							
Max. input power				0.7 W 0.65 W							
Max. internal capacity				33 nF			33 nF				
Max. internal inductance				0 mH 0 mH							
Insulation voltage to hous	ing ²⁾			50 V AC acc. to E	, with int EN 6100	egrated 0-6-2	overvolt	age prot	ection		
Approved intrinsic safety I	Pepperl & Fuchs: Z 787 Telematic Ex STOCK: MTL 7087										
Other data											
Residual ripple of supply	voltage			≤5%							
Weight				~ 150 g							
Note: Reverse polarity pr	otection	of the s	v vlagu	oltage, ov	ervoltag	e. overri	de and s	hort circ	uit		

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class ²⁾ 500 V AC on request

Fields of application:

Protection type	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C
Certificate		DEKRA EXAM	BVS 07 ATEX E 041 X	
Application fields	Group I Category M1	Group II Category 1G	Group II Category 2G, 1/2G	Group II Category 1D
	Mining	Gases	Gases	Dusts
	Protection type: intrinsically safe ia with barrier			
		For use in Zone 0, 1, 2	For use in Zone 1, 2 For mounting to Zone 0	For use in Zone 20, 21, 22 For mounting to Zone 20

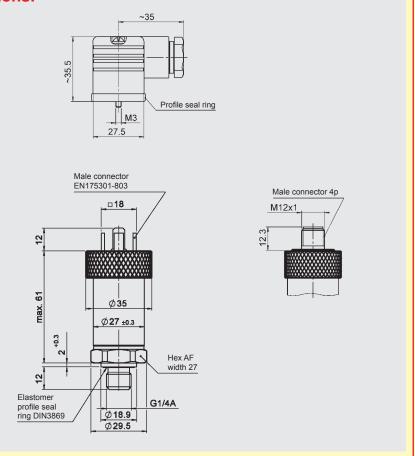
Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

Dimensions:



Order details:

The electronic pressure switch EDS 4300 in ATEX version has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type. For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

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Pressure Switch EDS 4400 Ex applications

Relative pressure

Programmable

Intrinsically Safe **ATEX** approval 1 switching output



Description:

The programmable pressure switch EDS 4400 in ATEX version was specially developed for use in potentially explosive atmospheres and is based on the EDS 4000

The switch point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are user-programmable in conjunction with the HYDAC Programming Unit HPG 3000.

As with the industry model, the programmable EDS 4400 in ATEX version has a measurement cell with thin-film strain gauge on a stainless steel membrane for measuring relative pressure in the high pressure range.

The main fields of application are in the oil and gas industry, in mining and in locations with high dust contamination.

Protection types and applications:

ı	M1	Ex ia	1	
Ш	1G	Ex ia	IIC	T4, T5, T6
Ш	1/2G	Ex ia	IIC	T4, T5, T6
Ш	2G	Ex ia	IIC	T4, T5, T6
Ш	1D	Ex iaD	20	T100 °C

Technical data:

Input data

Managemen			400	050	400	000	
	bar	60	100	250	400	600	
	bar	120	200	500	800	1000	
	bar	300	G1/4 A ISO	1000	2000	2000	
Mechanical connection	od		20 Nm	1179-2			
Tightening torque, recommender Parts in contact with fluid	eu			ol: 1.4542:	1 4571: 1 44	25: 1 4404:	
Parts in contact with huid			Stainless ste	1.4301,	1.4548	135, 1.4404,	
			Seal:	FKM			
Output data							
Switching output			1 transistor	output: PNP			
			Switching cu	-	•	_{max} ≤ 34 mA	
			Switching cy		million		
			Switch point				
			Program	grammable iming Unit H	with HYDAC PG 3000		
			Switch-on ar				
			8 2000) ms; user-pr	ogrammable	with	
					g Unit HPG	3000	
Accuracy acc. to DIN 16086, terminal based			≤ ± 0.5 % FS ≤ ± 1 % FS r	typ.			
Temperature compensation			≤ ± 0.02 % F		-		
Zero point			≤ ± 0.03 % F	S / °C max.			
Temperature compensation			≤ ± 0.02 % F ≤ ± 0.03 % F	S / °C typ.			
Span							
Repeatability			≤±0.1 % FS max.				
Long-term drift			≤ ± 0.3 % FS	s typ. / year			
Environmental conditions			0F +0F °C				
Compensated temperature range	ge		-25 +85 °C		100 °C		
Operation, ambient, fluid temperature range			T6: T5, T4, T100	Ta = -20 Ta = -20			
Storage temperature range			-40 +100 °		7,00		
(f mark			EN 61000-6				
			EN 60079-0 / 11 / 26				
			EN 61241-0 EN 50303	/ 11			
Vibration resistance acc. to			≤ 20 g				
DIN EN 60068-2-6 at 10 500	Hz		- 20 g				
Shock resistance acc. to			≤ 100 g				
DIN EN 60068-2-27 (1 ms)							
Protection class acc. to DIN EN		9 1)	IP 67				
Relevant data for Ex applicat	ions						
			I M1 II 1G, 1/2G,	2G	II 1 D		
Supply voltage			14 28 V D		1		
Max. input current			100 mA		93 mA	-	
Max. input power			0.7 W		0.65 W		
Max. internal capacity			33 nF		33 nF		
Max. internal inductance			0 mH		0 mH		
Insulation voltage to housing 2)			50 V AC, wit acc. to EN 6	h integrated 1000-6-2	overvoltage	protection	
Approved intrinsic safety barrie	rs		Pepperl & Fuchs: Z 787 Telematic Ex STOCK: MTL 7087				
Other data							
Residual ripple of supply voltag	e		≤ 5 %				
Weight			~ 150 g				
Note: Reverse polarity prote	ction o	f the supply	voltage, over	voltage, over	rride and sho	ort circuit	

protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class ²⁾ 500 V AC on request



In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

Setting ranges for the switching outputs:

Measuring range in bar	Increment in bar
0 60	0.1
0 100	0.2
0 250	0.5
0 400	1
0 600	1

The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

	Minimum value in ms	Maximum value in ms
Switch-on delay Ton1/Ton2	8	2040
Switch-off delay ToF1/ToF2	8	2040

The increment for all instruments is 8 ms.

Pin connections:

M12x1, 5 pole



Pin	Process	HPG
	connection	connection
1	+U _B	+U _B
2	0 V	Comport 1*
3	0 V	0 V
4	Out 1	n.c.
5	0 V	Comport 2*

^{*} Comport = programming connection

| Fields of application:

Code no. for use in model code	1	2	3	8
Protection type	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C
Certificate		DEKRA EXAM E	BVS 07 ATEX E 041 X	
Application fields	Group I Category M1	Group II Category 1G	Group II Category 2G, 1/2G	Group II Category 1D
	Mining	Gases	Gases	Dusts
	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier
		For use in Zone 0, 1, 2	For use in Zone 1, 2 For mounting to Zone 0	For use in Zone 20, 21, 22 For mounting to Zone 20

Model code:

EDS 4 4 <u>4</u> <u>8</u> – <u>XXXX</u> – <u>P</u> – <u>A</u> <u>N</u> <u>X</u> – <u>000</u>

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

= male M12x1, 5 pole (mating connector not supplied)

Measuring ranges in bar

0060; 0100; 0250; 0400; 0600

Output technology

= programmable

Approval

= ATEX

Insulation voltage

= 50 V AC to housing

Protection types and applications (code)

= I M1 Ex ia I

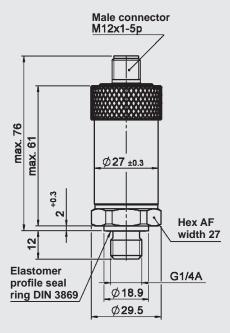
= II 1G Ex ia IIC T4, T5, T6 3

= II 2G Ex ia IIC T4, T5, T6 / II 1/2G Ex ia IIC T4, T5, T6 = II 1D Ex iaD 20 T100 °C

Modification number

000 = standard

Dimensions:

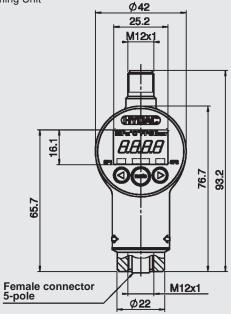


Programming Unit:

(to be ordered separately)

HPG 3000 - 000

Portable Programming Unit Part No. 909422



Important note:

The HPG 3000 Programming Unit may only be used outside the explosion risk zone.

Note:

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Subject to technical modifications.

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Pressure Switch EDS 4400 Ex series applications

Relative pressure

Factory-set

Intrinsically Safe ATEX approval

Customised designs thanks to diverse electrical and mechanical connections 1 switching output



Description:

The pressure switch EDS 4400 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the EDS 4000 series.

The switch point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are factory-set acc. to customer requirement (not fieldadjustable).

As with the industry model, the EDS 4400 in ATEX version has a measurement cell with thin-film strain gauge on a stainless steel membrane for measuring relative pressure in the high pressure range.

The main fields of application are in the oil and gas industry, in mining and in locations with high dust contamination.

Protection types and applications:

1	M1	Ex ia	1	
Ш	1G	Ex ia	IIC	T4, T5, T6
Ш	1/2G	Ex ia	IIC	T4, T5, T6
Ш	2G	Ex ia	IIC	T4, T5, T6
Ш	1D	Ev iaD	20	T100 °C

Technical data:

Input data

input data						
Measuring ranges	bar	60	100	250	400	600
Overload pressures	bar	120	200	500	800	1000
Burst pressure	bar	300	500	1000	2000	2000
Mechanical connection			G1/4 A ISO 1	1179-2		
Tightening torque, recommend	ded		20 Nm			
Parts in contact with fluid			Stainless ste	el: 1.4542; 1: 1.4301, 1	.4571; 1.443 4548	35; 1.4404;
			Seal:	FKM	.4340	
Output data						
Switching output			1 transistor o	output: PNP		
			Switching cu	rrent: during	operation: I _r	_{max} ≤ 34 mA
			Switching cy	cles: > 100 r	million	
			Switch point acc. to c	switch-back ustomer spe		
			Switch-on ar 32 ms st (8 200	andard	delay: customer sp	ec.)
Accuracy acc. to DIN 16086, $\leq \pm 0.5 \%$ FS typ. terminal based $\leq \pm 1 \%$ FS max.						
Temperature compensation Zero point			≤ ± 0.02 % F ≤ ± 0.03 % F	S / °C typ. S / °C max.		
Temperature compensation Span			≤ ± 0.02 % F ≤ ± 0.03 % F	S / °C typ		
Repeatability			≤ ± 0.1 % FS			
Long-term drift			≤ ± 0.3 % FS	typ. / year		
Environmental conditions						
Compensated temperature rai	nge		-25 +85 °C	;		
Operation, ambient, fluid temperature range			T6: T5, T4, T100	Ta = -20 Ta = -20	+60 °C +70 °C	
Storage temperature range			-40 +100 °			
(€ mark			EN 61000-6- EN 60079-0 EN 61241-0 EN 50303	-1 / 2 / 3 / 4 / 11 / 26 / 11		
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500) Hz		≤ 20 g			
Shock resistance acc. to DIN EN 60068-2-27 (1 ms)			≤ 100 g			
Protection class acc. to DIN E	N 60529	9 ¹⁾	IP 67			
Relevant data for Ex applica	tions					
			I M1 II 1G, 1/2G,	2G	II 1 D	
Supply voltage			14 28 V D	2		
Max. input current			100 mA		93 mA	
Max. input power			0.7 W		0.65 W	
Max. internal capacity			33 nF		33 nF	
Max. internal inductance			0 mH		0 mH	
Insulation voltage to housing ²)		50 V AC, with acc. to EN 6	h integrated 1000-6-2	overvoltage	protection
Approved intrinsic safety barriers Pepperl & Fuchs: Z 787 Telematic Ex STOCK: MTL 7087						
Other data						
Residual ripple of supply volta	ge		≤ 5 %			
Weight			~ 150 g			
Note: Reverse polarity protection are provide		f the supply v	oltage, over	voltage, over	ride and sho	rt circuit

protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class ²⁾ 500 V AC on request

Fields of application:

Protection type	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C		
Certificate		DEKRA EXAM	BVS 07 ATEX E 041 X	(
Application fields	Group I Category M1	Group II Category 1G	Group II Category 2G, 1/2G	Group II Category 1D		
	Mining	Gases	Gases	Dusts		
	Protection type: intrinsically safe ia with barrier					
		For use in Zone 0, 1, 2	For use in Zone 1, 2 For mounting to Zone 0	For use in Zone 20, 21, 22 For mounting to Zone 20		

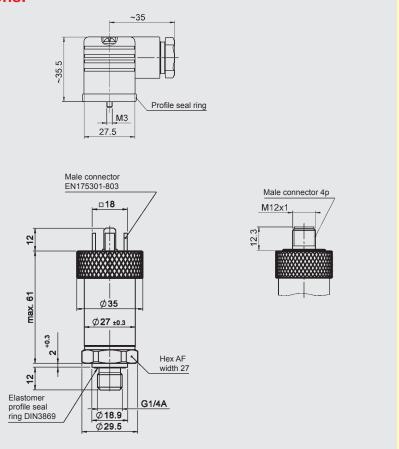
Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

Dimensions:



Order details:

The electronic pressure switch EDS 4400 in ATEX version has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type. For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

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Pressure Switch EDS 4100 Ex applications

Absolute pressure

Programmable

Intrinsically Safe **ATEX** approval 1 switching output



Description:

The programmable pressure switch EDS 4100 in ATEX version was specially developed for use in potentially explosive atmospheres and is based on the EDS 4000

The switch point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are user-programmable in conjunction with the HYDAC Programming Unit HPG 3000.

As with the industry model, the programmable EDS 4100 in ATEX version has a ceramic measurement cell with thicklayer strain gauge for measuring absolute pressure in the low pressure range.

The main fields of application are in the oil and gas industry, in mining and in locations with high dust contamination.

Protection types and applications:

I	M1	Ex ia	I	
Ш	1G	Ex ia	IIC	T4, T5, T6
Ш	1/2G	Ex ia	IIC	T4, T5, T6
Ш	2G	Ex ia	IIC	T4, T5, T6
Ш	1D	Ex iaD	20	T100 °C

Technical data:

Input data

input data	,	+		
Measuring ranges	bar	1	2.5	
Overload pressures	bar	3	8	
Burst pressure	bar	5	12	
Mechanical connection		G1/4 A ISO 1179-2		
Tightening torque, recommende	d	20 Nm		
Parts in contact with fluid		Sensor: Ceramic Mech. connection: 1.430 Seal: FKM / EPDM (as p		
Output data				
Switching output		1 transistor output: PNP		
		Switching current: during	operation: I _{max} ≤ 34 mA	
		Switching cycles: > 100 r	nillion	
		Switch point/hysteresis: user-programmable v Programming Unit HI		
		Switch-on and switch-off 8 2000 ms; user-pr HYDAC Programmin	ogrammable with	
Accuracy acc. to DIN 16086, terminal based		≤ ± 0.5 % FS typ. ≤ ± 1 % FS max.		
Temperature compensation $\leq \pm 0.02 \% FS / ^{\circ}C \text{ typ.}$ Zero point $\leq \pm 0.03 \% FS / ^{\circ}C \text{ max.}$				
Temperature compensation Span		\leq ± 0.02 % FS / °C typ. \leq ± 0.03 % FS / °C max.		
Repeatability ≤ ± 0.1 % FS max.				
Long-term drift ≤ ± 0.3 % FS typ. / year				
Environmental conditions				
Compensated temperature range	e	-25 +85 °C		
Operation, ambient, fluid temperature range		T6: Ta = -20 T5, T4, T100: Ta = -20		
Storage temperature range		-40 +100 °C		
((mark		EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 EN 61241-0 / 11 EN 50303		
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 H	Нz	≤ 20 g		
Shock resistance acc. to DIN EN 60068-2-27 (1 ms)		≤ 100 g		
Protection class acc. to DIN EN	60529 ¹⁾	IP 67		
Relevant data for Ex application	ons			
		I M1 II 1G, 1/2G, 2G	II 1 D	
Supply voltage		14 28 V DC		
Max. input current		100 mA	93 mA	
Max. input power		0.7 W	0.65 W	
Max. internal capacity		33 nF	33 nF	
Max. internal inductance		0 mH	0 mH	
Insulation voltage to housing 2)		50 V AC, with integrated acc. to EN 61000-6-2	overvoltage protection	
Approved intrinsic safety barrier	S	Pepperl & Fuchs: Z 787 Telematic Ex STOCK: MTL 7087		
Other data				
Residual ripple of supply voltage	9	≤ 5 %		
Weight	_	~ 150 g		
Note: Reverse polarity protection	on of the supply vo	oltage, overvoltage, overri	de and short circuit	

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) With mounted mating connector in corresponding protection class

2) 500 V AC on request



In conjunction with the HYDAC Programming Unit HPG 3000, all the settings are combined in an easy-to-follow menu.

Setting ranges for the switching outputs:

	inge Increment	
in bar	in bar	
0 1	0.002	
0 2.5	0.005	
T. 14 1		

The switch point (upper switch value) on all instruments is between 5 % and 100 % of the measuring range and the switch-back point (lower switch value) is between 1 % and 96 % of the measuring range.

	Minimum value in ms	Maximum value in ms
Switch-on delay Ton1/Ton2	8	2040
Switch-off delay ToF1/ToF2	8	2040

The increment for all instruments is 8 ms.

Pin connections:

M12x1, 5 pole



Pin	Process connection	HPG connection
1	+U _B	+U _B
2	0 V	Comport 1*
3	0 V	0 V
4	Out 1	n.c.
5	0 V	Comport 2*

^{*} Comport = programming connection

| Fields of application:

Code no. for use in model code	1	2	3	8
Protection type	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C
Certificate	,	DEKRA EXAM	BVS 07 ATEX E 041 X	
Application fields	Group I Category M1	Group II Category 1G	Group II Category 2G, 1/2G	Group II Category 1D
	Mining	Gases	Gases	Dusts
	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier
		For use in Zone 0, 1, 2	For use in Zone 1, 2 For mounting to Zone 0	For use in Zone 20, 21, 22 For mounting to Zone 2

Model code:

EDS 4 1 <u>4 8</u> - <u>XXXX</u> - <u>P</u> - <u>A</u> <u>N</u> <u>X</u> - <u>000</u> - <u>X</u> <u>1</u>

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

= male M12x1, 5 pole (mating connector not supplied)

Measuring ranges in bar

01.0; 02.5

Output technology

= programmable

Approval

= ATEX

Insulation voltage

= 50 V AC to housing

Protection types and applications (code)

= I M1 Ex ia I

= II 1G Ex ia IIC T4, T5, T6 3

= II 2G Ex ia IIC T4, T5, T6 / II 1/2G Ex ia IIC T4, T5, T6 = II 1D Ex iaD 20 T100 °C

Modification number

000 = standard

Sealing material (in contact with fluid)

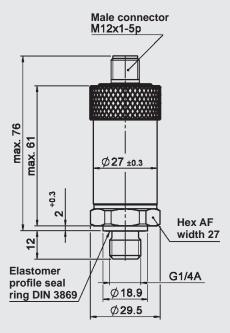
= FKM seal (e.g. for hydraulic oils)

= EPDM seal (e.g. for refrigerants)

Connection material (in contact with fluid)

= stainless steel

Dimensions:

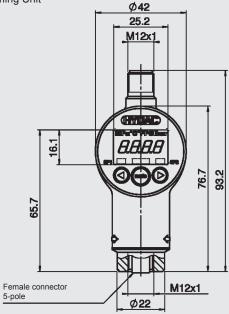


Programming Unit:

(to be ordered separately)

HPG 3000 - 000

Portable Programming Unit Part No. 909422



Important note:

The HPG 3000 Programming Unit may only be used outside the explosion risk zone.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Pressure Switch EDS 4100 Ex series applications

Absolute pressure

Factory-set

Intrinsically Safe **ATEX** approval

Customised designs thanks to diverse electrical and mechanical connections 1 switching output



Description:

The pressure switch EDS 4100 in ATEX version has been specially developed for use in potentially explosive atmospheres and is based on the EDS 4000 series.

The switch point and switch-back point, the function of the switching outputs as N/C or N/O and the switching delay are factory-set acc. to customer requirement (not fieldadjustable).

As with the industry model, the EDS 4100 in ATEX version has a ceramic measurement cell with thick-layer strain gauge for measuring absolute pressure in the low pressure range.

The main fields of application are in the oil and gas industry, in mining and in locations with high dust contamination.

Protection types and applications:

I	M1	Ex ia	1	
Ш	1G	Ex ia	IIC	T4, T5, T6
Ш	1/2G	Ex ia	IIC	T4, T5, T6
Ш	2G	Ex ia	IIC	T4, T5, T6
ш	1D	Ev iaD	20	T100 °C

Technical data:

Input data

input data					
Measuring ranges	bar	1	2.5		
Overload pressures	bar	3	8		
Burst pressure	bar	5	12		
Mechanical connection		G1/4 A ISO 1179-2			
Tightening torque, recommende	d	20 Nm			
Parts in contact with fluid		Sensor: Ceramic Mech. connection: 1.430 Seal: FKM / EPDM	1		
Output data					
Switching output		1 transistor output: PNP			
		Switching current: during	g operation: I _{max} ≤ 34 mA		
		Switching cycles: > 100	million		
		Switch point/switch-back acc. to customer spe	point: ecification		
		Switch-on and switch-off 32 ms standard (8 2000 ms acc. to	•		
Accuracy acc. to DIN 16086, terminal based		≤ ± 0.5 % FS typ. ≤ ± 1 % FS max.			
Temperature compensation Zero point		≤±0.02 % FS / °C typ. ≤±0.03 % FS / °C max.			
Temperature compensation Span		≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max.			
Repeatability		≤±0.1 % FS			
Long-term drift		≤ ± 0.3 % FS typ. / year			
Environmental conditions					
Compensated temperature rang	je	-25 +85 °C	'		
Operation, ambient, fluid temperature range		T6: Ta = -20 . T5, T4, T100: Ta = -20 .	. +60 °C . +70 °C		
Storage temperature range		-40 +100 °C			
(€ mark		EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 11 / 26 EN 61241-0 / 11 EN 50303			
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 h	Нz	≤ 20 g			
Shock resistance acc. to DIN EN 60068-2-27 (1 ms)		≤ 100 g			
Protection class acc. to DIN EN		IP 67			
Relevant data for Ex application	ons		1		
		I M1 II 1G, 1/2G, 2G	II 1 D		
Supply voltage		14 28 V DC			
Max. input current		100 mA	93 mA		
Max. input power		0.7 W	0.65 W		
Max. internal capacity		33 nF	33 nF		
Max. internal inductance		0 mH	0 mH		
Insulation voltage to housing 2)		50 V AC, with integrated acc. to EN 61000-6-2			
Approved intrinsic safety barrier	S	Pepperl & Fuchs: Z Telematic Ex STOCK: M	. 787 ITL 7087		
Other data					
Residual ripple of supply voltage	9	≤ 5 %			
Weight		~ 150 g			
Note: Reverse polarity protection	on of the supply vo	oltage, overvoltage, overr	de and short circuit		

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

¹⁾ With mounted mating connector in corresponding protection class ²⁾ 500 V AC on request

Fields of application:

Protection type	I M1 Ex ia I	II 1G Ex ia IIC T4, T5, T6	II 2G Ex ia IIC II 1/2G Ex ia IIC T4, T5, T6	II 1D Ex iaD 20 T100 °C
Certificate		DEKRA EXAM	BVS 07 ATEX E 041 X	
Application fields	Group I Category M1	Group II Category 1G	Group II Category 2G, 1/2G	Group II Category 1D
	Mining	Gases	Gases	Dusts
	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier
		For use in Zone 0, 1, 2	For use in Zone 1, 2 For mounting to Zone 0	For use in Zone 20, 21, 22 For mounting to Zone 20

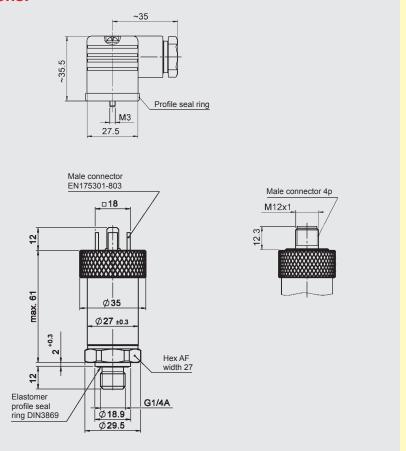
Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

Dimensions:



Order details:

The electronic pressure switch EDS 4400 in ATEX version has been specially developed for OEM customers and is available for minimum order quantities of 50 pieces per type. For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

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Pressure Switch EDS 300 shipping applications

Relative pressure

Display

2 switching outputs Analogue output



Description:

The EDS 300 is a compact, electronic pressure switch with digital display. The pressure measurement is based on a strain gauge sensor cell in stainless steel. All parts in contact with fluid are in stainless steel, and are welded together. Since no seals are required in the sensor interior, leakage is eliminated. Two relay switching outputs with N/O function and an additional analogue output signal (4 .. 20 mA) enable the pressure switch to be incorporated into modern control systems. The switch points and the corresponding hystereses can easily be adjusted via the key pad.

For optimum adaptation to a particular application, the instrument has many additional setting parameters, e.g. switching direction of the relays or switching delay

Fields of application are pressure or limit monitoring on marine transmissions, diesel engines, pumps and general hydraulic and pneumatic systems.

Approvals:

 American Bureau of Shipping



 Lloyds Register of Ships



 Det Norske Veritas Germanischer Lloyd



Bureau Veritas



Other approvals on request

Technical data:

Input data									
Measuring ranges	bar	6	16	40	100	250	400	600	-1 5
Overload pressures	bar	15	32	80	200	500	800	1000	15
Burst pressure	bar	100	200	200	500	1000	2000	2000	100
Mechanical connection				G1/4 A I	SO 1179	9-2			•
Tightening torque, recomme	nded			20 Nm					
Parts in contact with fluid	Parts in contact with fluid				onnectio (M	n: Stain	less stee	el	
Output data									
Switching outputs					ontacts				
				Switchin	g currer	nt: 0.01 r	nA 1 A		
				Switchin	g voltag	e: 10 m	V 60 V	(AC/DC	()
				Switching					
				Switchin					
					5 - 7	20 milli	on at mi	nimum l	
						0.5 mill	ion at m		
Analogue output, permitted I		sistance		4 20 m			Load re	sist. max	α. 400 Ω
Accuracy acc. to DIN 16086 terminal based	,			$\leq \pm 0.5\%$ $\leq \pm 1\%$	FS máx.				
Temperature compensation,	zero p	oint		≤± 0.02 % FS / °C typ. ≤± 0.03 % FS / °C max.					
Temperature compensation,	span			≤ ± 0.02 % FS / °C typ. ≤ ± 0.03 % FS / °C max.					
Repeatability				≤ ± 0.5 % FS max.					
Reaction time				approx.	10 ms				
Long-term drift				≤ ± 0.3 % FS / year					
Environmental conditions									
Compensated temperature r	ange			-10 +7	0 °C				
Operating temperature range	е			-25 +8	0 °C				
Storage temperature range				-40 +8	0 °C				
Fluid temperature range				-25 +80 °C					
(€ mark				EN 6100	0-6-1/	2/3/4			
Vibration resistance acc. to				5 25 H	z: 3.2 m	ım			
DIN EN 60068-2-6 at 10 5	00 Hz			25 500) Hz: 4 g	1			
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)				≤ 50 g					
Protection class acc. to DIN	EN 60	529 ¹⁾		IP 65					
Other data									
Supply voltage				20 32	V DC				
Residual ripple of supply vol	tage			≤5%					
Current consumption				approx.	100 mA				
Display				4-digit, L	ED, 7 s	egment,	red,		
Weight				~ 300 q					
Note: Reverse polarity pro	tection	of the si	innly v		ervoltac	ie overr	ide and	short cir	cuit

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit

protection are provided.

FS (Full Scale) = relative to complete measuring range

1) With mounted mating connector in corresponding protection class

Setting options:

All settings available on the EDS 300 are grouped in 2 easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switching outputs:

Switch point function

Measuring range in bar	Switch point in bar	Hysteresis in bar	Incre- ment* in bar
-1 5	-0.85 5	0.05 5.9	0.05
0 6	0.15 6	0.05 5.9	0.05
0 16	0.3 16	0.1 15.8	0.1
0 40	0.6 40	0.2 39.6	0.2
0 100	1.5 100	0.5 99.0	0.5
0 250	3.0 250	1.0 248.0	1.0
0 400	6.0 400	2.0 396.0	2.0
0 600	15.0 600	5.0 590.0	5.0

* All ranges given in the table can be adjusted by the increments shown.

Additional functions:

- Scale of the measuring range adjustable (bar
- Switching direction of the relays adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.0 .. 75.0 seconds
- Choice of display (actual pressure, peak value, switch point 1, switch point 2, display
- Subsequent correction of zero point in the range ± 3 % FS possible

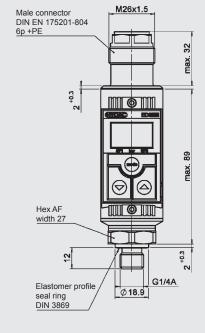
Pin connections:

DIN EN 175201-804



Pin	EDS 347-4
1	+U _B
2	Centre relay 1 and 2
3	Relay contact 1 (SP1)
4	0 V
5	Analogue
6	Relay contact 2 (SP2)
<u> </u>	Housing

Dimensions:







Model code:

EDS 3 <u>4</u> <u>7</u> – <u>4</u> – <u>XXX</u> – <u>SXX</u>

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

= male DIN EN 175201-804, 6 pole + PE (ZBE 10 mating connector not supplied)

Output

= 2 switching outputs and 1 analogue output

Measuring ranges in bar

006; 016; 040; 100; 250; 400; 600

Modification number

S00 = version in bar (except -1 .. 5 bar)

S13 = vacuum version -1 .. 5 bar (in connection with measuring range "006")

Accessories available: (not supplied with instrument)

ZBE 10 mating connector DIN EN 175201-804, 6 pole + PE, right-angle Part no.: 654527

ZBM 300 clamp for wall-mounting - screw-type fitting -Part no.: 906385 ZBM 310 clamp for wall-mounting - weld-type fitting -Part no.: 6011511

More detailed information on accessories as well as on further accessories such as mating connectors can be found in the Accessories brochure.

Note:

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Subject to technical modifications.

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TEMP	PERATURE						
TEMI	PERATURE 1	TRANSMITTERS [3]					Page
GE	NERAL APP	LICATIONS					
	ETS 4100						225
	ETS 4500						227
	ETS 7000						229
	HTT 8000					OEM	231
	ETS 4100		CAN				233
	ETS 4100		HART				235
PO	TENTIALLY I	EXPLOSIVE ATMOSPHERE					
	ETS 4500			Flameproof enclosure	ATEX, IECEx, CSA		239
	ETS 4100		HART	Flameproof enclosure	ATEX, IECEx, CSA		243
	ETS 4100	Junction-Box	HART	Flameproof enclosure	ATEX, IECEx, CSA		247
	ETS 4100		HART	Intrinsically safe	ATEX, IECEx		251



Temperature Transmitter ETS 4100

Integrated temperature probe

Accuracy 0.4 %

Description:

The ETS 4100 is a robust electronic temperature transmitter which is particularly suited to measuring temperature in hydraulic applications in industry.

The temperature sensor, based on a PT 1000 and corresponding evaluation electronics, is capable of measuring temperatures in the range of -25 °C .. +100 °C.

The sensor has analogue output signals of 4 .. 20 mA and 0 .. 10 V available as standard for integration in modern control systems. The pressure resistance of up to 600 bar and excellent EMC characteristics make the ETS 4100 ideal for use in harsh conditions.

Technical data:

Innut data

Input data						
Measuring range	-25 +	100 °C				
Probe length	mm	6	50	100	250	350
Probe diameter	mm	4.5	8	8	8	8
Pressure resistance	bar	600	125	125	125	125
Mechanical connection	G1/4 A	ISO 1179-2	2			
Tightening torque, recommended	20 Nm					
Parts in contact with fluid 1)	Mech. connection: Stainless steel Seal: FKM					
Output data						
Output signal, permitted load resistance	R _{Lmax.} =	mA, 2-cond (U _B - 8 V) / V, 3-conduct 2 kΩ	20 mA	[kΩ]		
Accuracy (at room temperature)	≤ ± 0.4 % FS typ. ≤ ± 0.8 % FS max.					
Temperature drift (environment)	≤ ± 0.01 % FS / °C					
Response time acc. to DIN EN 60751	t ₅₀ : ~ 4 s t ₉₀ : ~ 8 s					
Environmental conditions						
Operating temperature range 2)	-40 +8	85 °C / -25	+85 °	С		
Storage temperature range	-40 +	100 °C				
Fluid temperature range 2)	-40 +	125 °C / -2	5 +12	5 °C		
(€ mark	EN 610	00-6-1 / 2	/3/4			
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 25 g					
Shock resistance acc. to DIN EN 60068-2-27		6 mm prol for all other		h		
Protection class acc. to DIN EN 60529 3)	IP 67 -	Binder 714 male conne male conne	ector M1		1-803	
Other data						
Supply voltage		V DC 2-c V DC 3-c				
Residual ripple of supply voltage	≤ 5 %					
Current consumption 3-conductor	~ 25 m/	4				
Weight	~ 215 g ~ 235 g ~ 280 g	(probe len (probe len (probe len (probe len (probe len	ngth 50 ngth 100 ngth 250	mm) mm)		
Note: Reverse polarity protection of the sup					short cir	cuit

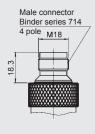
protection are provided.

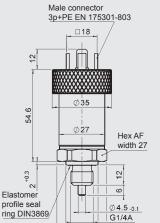
FS (Full Scale) = relative to complete measuring range

- 1) Other seal materials on request
- $^{2)}$ -25 °C with FKM seal, -40 °C on request
- 3) With mounted mating connector in corresponding protection class

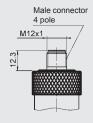
EN 18.302.1.1/02.18

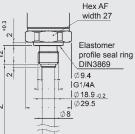
Dimensions:





Ø29.5





Ø 18.9 _{-0.2}

Probe length (Z) [mm]	Probe diameter [mm]
6	4.5
50	8
100	8
250	8
350	8

Model code:

ETS 4 1 4 X - X - XXX - 000

Mechanical connection = G 1/4 A ISO 1179-2

Electrical connection

- = male, Binder series 714 M18, 4 pole (mating connector not supplied)
- = male EN 175301-803, 3 pole + PE 5 (mating connector supplied)
- 6 = male M12x1, 4 pole (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor = 0 .. 10 V, 3-conductor

Probe length

 $006 = 6 \, \text{mm}$

050 = 50 mm

 $100 = 100 \, \text{mm}$ 250 = 250 mm

350 = 350 mm

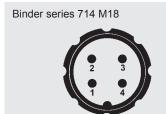
Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	ETS 4144-A	ETS 4144-B	
1	n.c.	+U _B	
2	Signal +	Signal	
3	Signal -	0 V	
4	n.c.	n.c.	



Pin	ETS 4145-A	ETS 4145-B
1	Signal +	+U _B
2	Signal -	0 V
3	n.c.	Signal
I	Housing	Housing



Pin	ETS 4146-A	ETS 4146-B	
1	Signal +	+U _B	
2	n.c.	n.c.	
3	Signal -	0 V	
4	n.c.	Signal	
3 4			

Note:

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Subject to technical modifications.

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Temperature Transmitter ETS 4500

Integrated temperature probe

Accuracy 1 %

Description:

The ETS 4500 is a robust electronic temperature transmitter which is particularly suited to measuring temperature in hydraulic applications in industry.

Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures within a range of -25 °C .. +100 °C.

The sensor has analogue output signals of 4 .. 20 mA and 0 .. 10 V available as standard for integration in modern control systems. The pressure resistance up to 600 bar and excellent EMC characteristics make the ETS 4500 ideal for use in harsh conditions.

Technical data:

Input data						
Measuring range	-25	+100 °C				
Probe length	mm	10.7	50	100	250	350
Probe diameter	mm	8	8	8	8	8
Pressure resistance	bar	600	125	125	125	125
Mechanical connection	G1/4	A ISO 11	79-2			
Tightening torque, recommended	20 Nr	n				
Parts in contact with fluid 1)		. connec	tion: Stai	nless ste	eel	
Output data						
Output signal, permitted load resistance	R _{Lmax.} : 0 10		conductor V) / 20 m nductor			
Accuracy (at room temperature)	≤ ± 2.	0 % FS t 0 % FS r	nax.			
Temperature drift (environment)	≤ ± 0.	02 % FS	/°C			
Response time acc. to DIN EN 60751	t ₅₀ : ~ t ₉₀ : ~ t					
Environmental conditions						
Operating temperature range 2)			-25 +8	5 °C		
Storage temperature range		+100 °C				
Fluid temperature range ²⁾	-40	+125 °C	/ -25 +	125 °C		
C € mark	EN 6	1000-6-1	/2/3/4	1		
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 25 (9				
Shock resistance acc. to DIN EN 60068-2-27	< 20 (9				
Protection class acc. to DIN EN 60529 3)	IP 67					
Other data						
Supply voltage			2-condu 3-condu			
Residual ripple of supply voltage	≤ 5 %					
Current consumption 3-conductor	~ 25 r	nΑ				
Note: Reverse polarity protection of the supp	~ 215 ~ 235 ~ 280 ~ 315	g (probe g (probe g (probe g (probe	e length e length e length 1 e length 2 e length 3	50 mm) 00 mm) 250 mm) 350 mm)	,	

Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

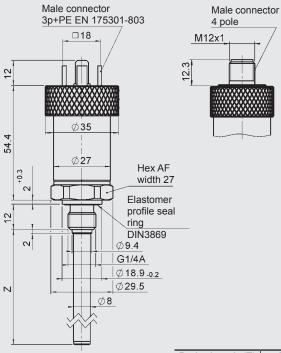
FS (Full Scale) = relative to complete measuring range

1) Other seal materials on request

²⁾ -25 °C with FKM seal, -40 °C on request ³⁾ With mounted mating connector in corresponding protection class

EN 18.302.2.1/02.18

Dimensions:

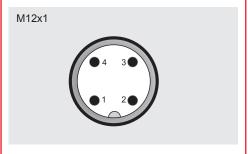


Probe length (Z) [mm]	Probe diameter [mm]
10.7	8
50	8
100	8
250	8
350	8

Pin connections:



Pin	ETS 4545-A	ETS 4545-B	
1	Signal +	+U _B	
2	Signal -	0 V	
3	n.c.	Signal	
工	Housing	Housing	



			_
Pin	ETS 4546-A	ETS 4546-B	
1	Signal +	+U _B	
2	n.c.	n.c.	
3	Signal -	0 V	
4	n.c.	Signal	

Model code:

ETS 4 5 4 X - X - XXX - 000

Mechanical connection

= G 1/4 A ISO 1179-2

Electrical connection

- = male, EN 175301-803, 3 pole + PE (mating connector supplied)
- = male M12x1, 4 pole (mating connector not supplied)

Output signal

- = 4 .. 20 mA, 2-conductor
- = 0 .. 10 V, 3-conductor

Probe length

- 010 = 10.7 mm 050 = 50 mm
- 100 = 100 mm250 = 250 mm
- 350 = 350 mm

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

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For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Temperature Transmitter ETS 7200

Integrated temperature probe

Accuracy 1 %

Description:

The ETS 7200 is an electronic temperature transmitter which, because of its compact design, is particularly suited to measuring temperature in hydraulic applications in the industrial and mobile sectors. Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures in the range -25 .. +100 °C.

Various analogue output signals, e.g. 4 .. 20 mA or 0 .. 10 V, are available on the standard version for integration into modern controls. These can be output to the periphery via an M12x1 connector.

The pressure resistance up to 600 bar and excellent EMC characteristics make the ETS 7000 ideal for use in harsh conditions.

Technical data:

Input data	·
Measuring range	-25 +100 °C
Probe length	10 mm
Probe diameter	6.7 mm
Pressure resistance	600 bar
Mechanical connection	G1/4 A ISO 1179-2
Tightening torque, recommended	20 Nm
Parts in contact with fluid	Mech. connection: Stainless steel Seal: FKM
Output data	
Output signal, permitted load resistance	4 20 mA, 2-conductor $R_{Lmax} = (U_B - 8 \text{ V}) / 20 \text{ mA } [k\Omega] \\ 0 10 \text{ V}, 3-conductor \\ R_{Lmin.} = 2 \text{ k}\Omega$
Accuracy (at room temperature)	≤ ± 1.0 % FS typ. ≤ ± 2.0 % FS max.
Temperature drift (environment)	≤ ± 0.02 % FS / °C
Response time acc. to DIN EN 60751	t50: 4 s t90: 8 s
Environmental conditions	
Operating temperature range	-25 +80 °C
Storage temperature range	-40 +100 °C
Fluid temperature range 1)	-40 +100 °C / -25 +100 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
c N us mark 2)	Certificate no. E318391
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g
Shock resistance acc. to DIN EN 60068-2-27	100 g / 6 ms
Protection class acc. to DIN EN 60529 3)	IP 67
Other data	
Supply voltage	8 30 V DC 2-conductor 12 30 V DC 3-conductor
when applied acc. to UL specifications	- limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple supply voltage	≤ 5 %
Current consumption	≤ 25 mA
Weight	~ 50 g

Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

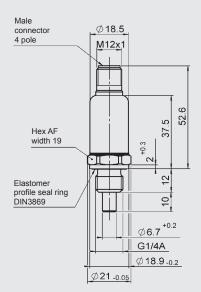
FS (Full Scale) = relative to complete measuring range

1) -25 °C with FKM seal, -40 °C on request

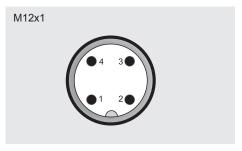
²⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1

3) With mounted mating connector in corresponding protection class

Dimensions:

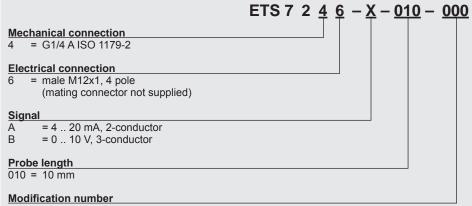


Pin connections:



			_
Pin	ETS 7246-A	ETS 7246-B	
1	Signal +	+U _B	
2	n.c.	n.c.	
3	Signal -	0 V	
4	n.c.	Signal	

Model code:



Accessories:

000 = standard

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726



Temperature Transmitter HTT 8000 for series applications

Integrated temperature probe

Accuracy 1 %

Customised designs thanks to diverse electrical and mechanical connections and a large number of output signals



Description:

The HTT 8000 series of temperature transmitters was specifically developed for OEM applications e.g. in mobile applications. It is based on a silicon semiconductor device with corresponding evaluation electronics.

All parts in contact with fluid are in stainless steel, and are welded together.

For integration into modern controls, standard analogue output signals are available, e.g. 4 .. 20 mA, 0 .. 5 V, 1 .. 6 V or 0 .. 10 V. Ratiometric output signals are also available.

For the electrical connection, various built-in connection plugs are available.

The pressure resistance up to 600 bar and excellent EMC characteristics make the HTT 8000 ideal for use in harsh conditions.

Technical data:

Input data					
Measuring range 1)	-25	+125 °C			
Probe length	mm	16	40		
Probe diameter	mm	6.7	6.7		
Pressure resistance	bar	600	600		
Mechanical connection 2)	G1/4 A	NISO 1179-2			
Tightening torque, recommended	20 Nm	1			
Parts in contact with fluid	Mech. Seal:	connection: Stainless FKM	s steel		
Output data					
Output signal	4 20 ratiom	ls signals: 1 mA, 0 5 V, 1 6 V, etric: 0.5 4.5 V for U 90 % Uв ± 5 %)	0 10 V, J _B = 5 V DC		
Accuracy (at room temperature)	≤ ± 1.0 ≤ ± 2.0) % FS typ.) % FS max.			
Temperature drift (environment)	≤ ± 0.0	02 % FS / °C			
Response time acc. to DIN EN 60751	t ₅₀ : ~ 2 t ₉₀ : ~ 8				
Environmental conditions					
Operating temperature range 3)		+85 °C / -25 +85 °C			
Storage temperature range	-40	+100 °C			
Fluid temperature range 3)	-40 +125 °C / -25 +125 °C				
(€ mark	EN 61	000-6-1 / 2 / 3 / 4			
c Nius mark 4)	Certifi	cate no. E318391			
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 25 g				
Shock resistance acc. to		/ 6 ms / half-sine			
DIN EN 60068-2-27		/ 1 ms / half-sine			
Protection class ⁵⁾ acc. to DIN EN 60529 ISO 20653	IP 67 IP 6K9	or IP 69 (depending o 9K	n electr. connection)		
Other data					
Electrical connection	M12x	is male connectors: 1, Packard Metri Pack seal, AMP Junior Pov	x, Deutsch DT 04, AMP ver Timer, jacketed		
Supply voltage	12 3 5 V D	V DC 0 V DC for 0 10 V, C ± 5 % (ratiometric)			
when applied acc. to UL specifications	UL 13	10/1585; LPS UL 609	3 UL 61010; Class 2; 950		
Residual ripple supply voltage	≤ 5 %				
Current consumption	≤ 25 ı	mA			
Weight	~ 145	<u> </u>			
Note: Reverse polarity protection of the supply ve	oltage,	overvoltage, override	and short circuit		

protection are provided.

FS (Full Scale) = relative to complete measuring range

- 1) Other measuring ranges on request

- 2) Other measuring ranges of request
 3) -25 °C with FKM seal, -40 °C on request
 4) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1
 5) With mounted mating connector in corresponding protection class

Dimensions: Male connector Male connection Male connector DIN 72585-3 pole Metri-Pack DT04 3 pole series 150 3 pole Jacketed cable Male connector Male connector Junior Power Timer Superseal series 1.5 3 pole 3 pole ις. 35 ±2 1000 +10 Male connector EN175301-803 3 pole + PE Ø35.5 Ø25.9 ±0.3 Male connector M12x1 - 4 pole 46 29.5-0.1 max. Hex AF 5

Order details:

The electronic temperature transmitter HTT 8000 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type.

Ø6.7 | G1/4A | | | Ø 18.9 _{-0.2}

For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

Ø23.5 Ø29.4

Note:

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Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726



Temperature Transmitter ETS 4100

Integrated temperature probe

Accuracy 0.4 %

CAN interface



Description:

The ETS 4100 is a robust electronic temperature transmitter which is particularly suited to measuring temperature in hydraulic applications in industry.

The measured temperature value is digitised and made available to the CAN field bus system via the CANopen protocol or SAE J1939 protocol. The instrument parameters can be viewed and configured by the user using standard CAN software.

The temperature sensor, based on a PT 1000 and corresponding evaluation electronics, is capable of measuring temperatures in the range of -25 °C .. +100 °C.

The pressure resistance up to 600 bar and excellent EMC characteristics make the ETS 4100 ideal for use in harsh conditions.

Technical data:

Innut data

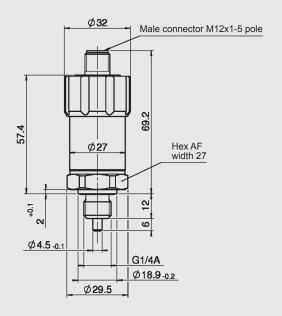
Input data								
Measuring range	-25 +100 °C							
Probe length	mm	mm 6 50 100 250 3						
Probe diameter	mm	4.5	8	8	8	8		
Pressure resistance	bar	600	125	125	125	125		
Mechanical connection	G1/4 A	ISO 117	9-2					
Tightening torque, recommended	20 Nn	1						
Parts in contact with fluid 1)	Mech Seal:		ion: Stai	nless ste	el			
Output data	Jeai.	1 IXIVI						
Output signal	deper	ding on			tocol,			
Accuracy (at room temperature)			+85 °0 +105 °					
Response time acc. to DIN EN 60751	t ₅₀ : ~4 t ₉₀ : ~8							
Environmental conditions								
Operating temperature range 2)			-25 +8	5 °C				
Storage temperature range	-40	+100 °C						
Fluid temperature range 2)	-40	+125 °C	/ -25 +	125 °C				
(€ mark	EN 61	000-6-1	/2/3/4					
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 25 g							
Protection class acc. to DIN EN 60529 3)	IP 67							
Protocol data for CANopen:								
Communication profile	CiA D	S 301 V	1.2			1		
Device profile	CiA D	S 404 V1	1.3					
Layer setting Services and Protocol		SP 305 \						
Automatic bit-rate detection	CiA A	N 801						
Baud rates	10 kbi	t 1 Mbi	t corresp	to DS3	05 V2.2			
Transmission services								
- PDO	Meas	ured valu	ie as 16/3	32 bit and	d float, st	atus		
- Transfer			asynchro exceedir		clical, me aries	asured		
Node ID/baud rate					ecific Pro	file		
Protocol data for SAE J1939								
Data Link Layer	SAE	1939-21						
Network Layer	SAE	1939-31						
Network Management	SAE	1939-81						
Other data								
Supply voltage	9 35	V DC						
Residual ripple of supply voltage	≤5%							
Current consumption 3-conductor	~ 25 r	nA						
Weight			length	6 mm)				
· ·	~ 200 g (probe length 6 mm) ~ 215 g (probe length 50 mm)							
	~ 235 g (probe length 100 mm)							
	~ 280 g (probe length 250 mm)							
	~ 315	g (probe	length 3	50 mm)				

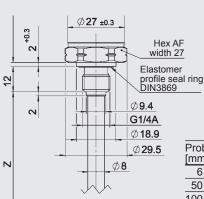
Reverse polarity protection of the supply voltage, overvoltage, override and short circuit Note: protection are provided.

FS (Full **S**cale) = relative to complete measuring range

- 1) Other seal materials on request
- ²⁾ -25 °C with FKM seal, -40 °C on request
- 3) With mounted mating connector in corresponding protection class

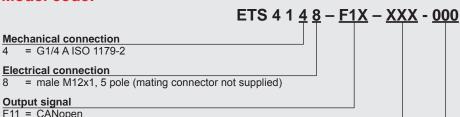
Dimensions:





Probe length (Z) [mm]	Probe diameter [mm]
6	4.5
50	8
100	8
250	8
350	8

Model code:



Output signal

F11 = CANopen F12 = CAN SAE J1939

Probe lengths

006 = 6 mm 050 = 50 mm

100 = 100 mm

250 = 250 mm

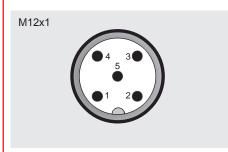
350 = 350 mm

Modification number

000 = standard

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	Signal	Description
1	Housing	Shield/housing
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not

described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany

Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com



Temperature Transmitter ETS 4100

Integrated temperature probe

Accuracy 0.4 %

HART interface Optional pressure measurement



Description:

The ETS 4100 with HART interface is an electronic temperature transmitter for monitoring of temperature in hydraulic systems.

Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures within a range of -25 °C .. +100 °C.

In addition to the analogue 4 .. 20 mA output of the measured value, digital communication is possible by means of the HART protocol.

The instrument provides the option of a pressure sensor. The pressure signal is given out as a digital signal via the HART protocol and the temperature signal is still available as an analogue signal (4 .. 20 mA).

The main fields of application are condition monitoring and power plant technology.

Technical data:

Input data						
Measuring range	-25 +	100 °C				
Probe length	mm	10.7	50	100	250	350
Probe diameter	mm	8	8	8	8	8
Pressure resistance	bar	600	125	125	125	125
Mechanical connection	G1/4 A	ISO 1179	9-2			
Tightening torque, recommended	20 Nm					
Parts in contact with fluid	Stainles Seal: F					
Output data						
Output signal, permitted load resistance	$R_{Lmax} =$	mA, 2-co (U _B - 12 \ RT comm	V) / 20 m	ıA [kΩ]	•	col
HART Communication	Acc. to	HART 7	specifica	ations		
HART Common Practice Commands i.e.	Altering (see tal	of meas ole)	suring rai	nge limits	S	
Accuracy (at room temperature)	≤ ± 0.4 % FS typ. ≤ ± 0.8 % FS max.					
Temperature drift (environment)	≤ ± 0.0′	1 % FS /	°C			
Response time acc. to DIN EN 60751	t ₅₀ : ~ 10 t ₉₀ : ~ 15					
Environmental conditions						
Operating temperature range 1)	-40 +	85 °C /-	25 +85	5 °C		
Storage temperature range	-40 +					
Fluid temperature range 1)		125 °C /		25 °C		
(€ mark	EN 610	00-6-1 /	2/3/4			
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g					
Protection class acc. to DIN EN 60529 2)	IP 67					
Other data						
Supply voltage	12 30	V DC				
Residual ripple of supply voltage	Acc. to FSK Physical Layer Specification (HCF SPEC 054)					
Current consumption	≤ 25 m/					
Nete: Deverse polarity protection of the even	~ 315 g ~ 350 g ~ 385 g	(probe I (probe I (probe I	ength 50 ength 25 ength 35	0 mm, 10 50 mm) 50 mm)		-oit
Note: Reverse polarity protection of the supp	ny voitade.	overvolta	aue. ovel	riue and	SHORT CIL	CUIT

Reverse polarity protection of the supply voltage, overvoltage, override and short circuit

protection are provided.

FS (Full Scale) = relative to complete measuring range
B.F.S.L. = Best Fit Straight Line

1) -25 °C with FKM seal, -40 °C on request

²⁾ With mounted mating connector in corresponding protection class

Measuring range limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits;

Measuring range limits of the primary variable, temperature:

Lower Upper measuring range limit measuring range limit			Measuring span		
min	max	min	max	min	max
-25 °C	75 °C	0 °C	100 °C	25 °C	125 °C

Model code:

ETS 4 1 4 X - F21 - XXX - 000

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

= male, EN 175301-803, 3 pole + PE (IP 67 mating connector supplied)

= male M12x1, 4 pole (mating connector not supplied)

Output signal

F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Probe lengths

010 = 10.7 mm 050 = 50 mm

100 = 100 mm250 = 250 mm

350 = 350 mm

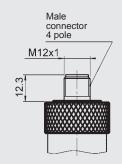
Modification number:

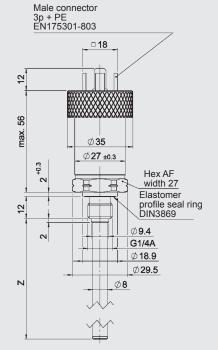
000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Dimensions:



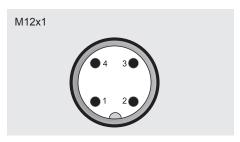


Probe length (Z) 10.7 mm 50 mm 100 mm 250 mm 350 mm

Pin connections:

EN 175301-803

Pin	ETS 41x5-F21
1	Signal +
2	Signal -
3	n.c.
I	PE



Pin	ETS 41x6-F21	
1	Signal +	
2	n.c.	
3	Signal -	
4	n.c.	

Additional technical data with pressure measurement option:

Additional technic	ai ua	ıa wii	n pre	55ui e	illea	sureili	ent of	Juon.
Input data								
Measuring ranges	bar	16	40	60	100	250	400	600
Overload pressures	bar	32	80	120	200	500	800	1000
Burst pressure	bar	200	200	300	500	1000	2000	2000
Mechanical connection				G 1/2 A I	SO 1179	9-2 with pr	obe	
Tightening torque, recommend	ded			45 Nm				
Probe length				7 mm				
Output data								
Output signal Temperature				4 20 m	A with H	ART Prote	ocol	
Output signal Pressure				available digital sig		RT protoco	ol as a	
Accuracy acc. to DIN 16086, terminal based				≤ ± 0.25 ≤ ± 0.5 %	% FS ty	p. x.		
Accuracy, B.F.S.L.				≤± 0.15 % FS typ. ≤± 0.25 % FS max.				
Temperature compensation Zero point				≤ ± 0.008 ≤ ± 0.018		°C typ. °C max.		
Temperature compensation Span				≤ ± 0.008 ≤ ± 0.018				
Non-linearity acc. to DIN 1608 terminal based	6,			≤ ± 0.3 %	6 FS ma	Х.		
Hysteresis				≤ ± 0.1 %	6 FS ma	Χ.		
Repeatability				≤ ± 0.05	% FS			
Long-term drift				≤ ± 0.1 %	6 FS typ.	. / year		
Environmental conditions								
Compensated temperature rar	nae			-25 +8	5 °C			

6kt / hex. -SW27

G1/2A Ø**26** h14 Ø29.5

Dimensions with pressure

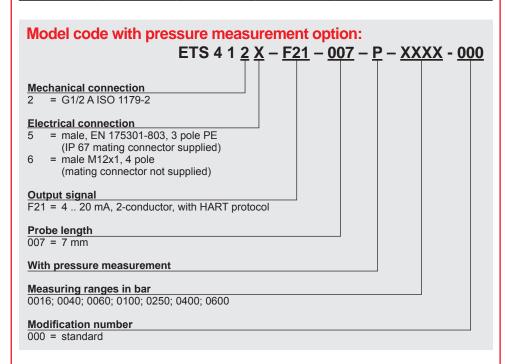
measurement option:

Measuring range limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits;

Measuring range limits of the secondary variable, pressure:

Lower measuring range limit		Upper measuri	ng range limit	Measuring span	
min	max	min	max	min	max
0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150 % FS



Note:

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Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstraße 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726

E-mail: electronic@hydac.com Internet: www.hydac.com



Temperature Transmitter ETS 4500 Ex applications

Integrated temperature probe

Accuracy 1 %

Flameproof enclosure ATEX, CSA, IECEx, triple approval



Description:

The temperature transmitter series ETS 4500 with flameproof enclosure has triple approval according to ATEX, CSA and IECEx which ensures that the device is universally suitable for use in potentially explosive atmospheres worldwide. Each instrument is certified by the three approvals organizations and is labelled accordingly. Therefore there is no longer any need to stock multiple devices with separate individual approvals.

Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures within a range of -25 °C .. +100 °C.

The main fields of application are in mining and the oil & gas industry, e.g. in underground vehicles, hydraulic power units, blow-out preventers (BOPs), drill drives or valve actuation stations as well as in locations with high dust contamination.

Protection types and applications:

cCSA{us}

Explosionproof - Seal not required Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4

ATEX

Flameproof I M2 ExdIMb II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 .. 130 °C Db

IECEx

Flameproof Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 130 °C Db

Technical data:

Input data	
Measuring range	-25 +100 °C
Probe length	10.7; 100; 250; 350 mm
Pressure resistance	600 bar (probe length 10.7 mm) 125 bar (probe length 100 mm) 125 bar (probe length 250 mm) 125 bar (probe length 350 mm)
Mechanical connection	G1/4 A ISO 1179-2
Tightening torque, recommended	20 Nm
Parts in contact with fluid	Stainless steel: 1.4571; 1.4301 Seal: FKM
Conduit, housing material	1.4435; 1.4404
Output data	
Output signal 1) permitted load resistance	4 20 mA, 2-conductor $R_{Lmax} = (U_B - 8 \text{ V}) / 20 \text{ mA } [k\Omega]$
Accuracy (at room temperature)	≤ ± 1.0 % FS typ. ≤ ± 2.0 % FS max.
Temperature drift (environment)	≤ 0.02 % FS / °C
Response time acc. to DIN EN 60751	t ₅₀ : ~ 10 s t ₉₀ : ~ 15 s
Environmental conditions	
Operating/ambient temperature range ²⁾³⁾	T6, T110 °C Ta = -40 +60 °C / -20 +60 °C T5: Ta = -40 +80 °C / -20 +80 °C
Storage temperature range	-40 +100 °C
Fluid temperature range ²⁾³⁾	T6, T110 °C Ta = -40 +60 °C / -20 +60 °C T5: Ta = -40 +80 °C / -20 +80 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4 EN 60079-0 / 1 / 31
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 10 g
Protection class acc. to DIN EN 60529 ISO 20653	IP 69 IP 6K9K
Other data	
Supply voltage	8 30 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	≤ 25 mA
Weight	~ 280 g (probe length 10.7 mm) ~ 315 g (probe length 100 mm) ~ 350 g (probe length 250 mm) ~ 385 g (probe length 350 mm)
11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 11 11 11 11 11

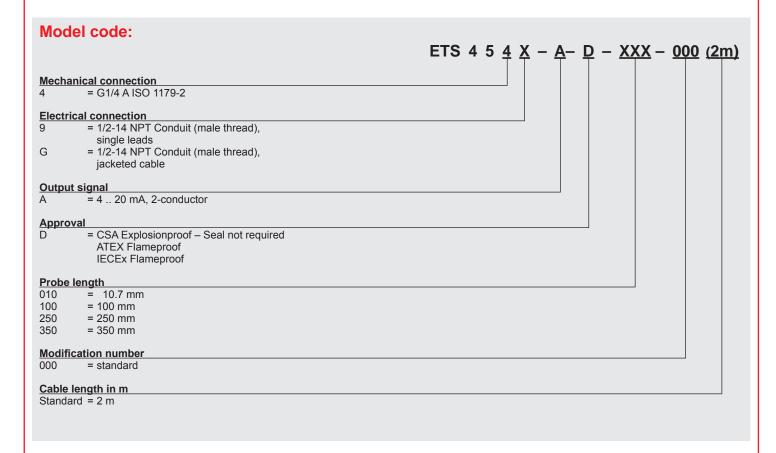
Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

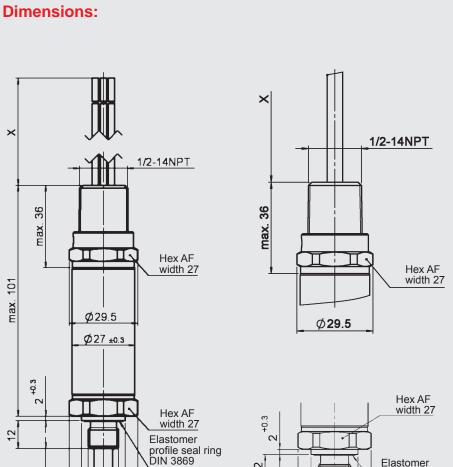
FS (Full Scale) = relative to complete measuring range

 $^{1)}$ Other output signals on request $^{2)}$ -20 °C with FKM seal, -40 °C on request $^{3)}$ T130 °C with Ta = : -40 .. +80 °C / -20 .. +80 °C with electr. connection single leads possible

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١	٦		
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Fields of ap	pplication:	
	Single leads Electrical connection "9"	Jacketed cable Electrical connection "G"
CSA		Explosionproof (seal not required)
ATEX		Flameproof
IECEx		Flameproof
_c CSA _{us}		Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4
ATEX		I M2 Ex d I Mb II 2G Ex d IIC T6, T5 Gb
	II 2D Ex tb IIIC T110 130 °C Db	II 2D Ex tb IIIC T110 °C Db
IECEx		Ex d I Mb Ex d IIC T6, T5 Gb
	Ex tb IIIC T110 130 °C Db	Ex tb IIIC T110 °C Db

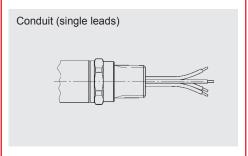




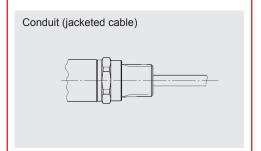
ر ا	wid	x AF th 27
12	Elasto	mer seal ring 369
7		- <u>0.2</u> -

Probe length (Z)
10.7 mm
100 mm
250 mm
350 mm

Pin connections:



Lead	ETS 4549-A
red	Signal +
black	Signal -
green-yellow	Housing



Lead	ETS 454G-A
white	Signal +
brown	Signal -
green	n.c.
yellow	n.c.

Note:

10.7

Ø8 G1/4A

Ø18.9 Ø29.5

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com

DADINTERNATIONAL



Temperature Transmitter ETS 4100 Ex applications

Integrated temperature probe

Accuracy 0.4 %

Flameproof enclosure ATEX, IECEx, CSA, triple approval **HART** interface Optional pressure measurement



Description:

The ETS 4100 with HART interface is an electronic temperature transmitter in the ignition protection type having flameproof enclosure.

The triple approval in accordance with ATEX, CSA and IECEx enables universal, worldwide utilisation of the devices in potentially explosive atmospheres.

Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures within a range of -25 .. +100 °C.

The sensor has an analogue output signal of 4 .. 20 mA available as standard to enable integration into modern controls. In addition to the analogue output of the measured value, digital communication is possible by means of the HART protocol.

The instrument provides the option of a pressure sensor. The pressure signal is given out as a digital signal via the HART protocol and the temperature signal is still available as an analogue signal (4 .. 20 mA).

The main fields of application are in the oil & gas industry, e.g. in hydraulic power units, drill drives or valve actuation stations. The device is also used in mining applications as well as in locations with high dust contamination.

Protection types and applications:

CSA

Explosionproof - Seal not required Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III

ATEX

Flameproof I M2 Ex d I Mb II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 .. 120 °C Db

IECEx

Flameproof Ex d I Mb Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 120 °C Db

Technical data:

Input data Measuring range -25 +100 °C Probe lengths 10.7; 50; 100; 250; 350 mm Probe diameter 8 mm Pressure resistance 600 bar (probe length ≥ 50 mm) Mechanical connection G¹/₄ A ISO 1179-2 Tightening torque, recommended 20 Nm Parts in contact with fluid Stainless steel: 1.4571; 1.4301 Seal: FKM Conduit- / Housing material 1.4404, 1.4435 Output data 0.0 Unit data 0.0 Unit data Output data 0.0 Unit data 0.0 Unit data Output data 0.0 Unit data 0.0 Unit data 0.0 Unit data Output data 0.0 Unit data 0.0 Unit data 0.0 Unit data Output data 0.0 Unit data			
Probe lengths 10.7; 50; 100; 250; 350 mm Probe diameter 8 mm Pressure resistance 600 bar (probe length 10.7 mm) Mechanical connection G¼ A ISO 1179-2 Tightening torque, recommended 20 Nm Parts in contact with fluid Stainless steel: 1.4571; 1.4301 Seal: FKM Conduit- / Housing material Output data 1.4404, 1.4435 Output signal, permitted load resistance 4 20 mA, 2-conductor, with HART protocol R _{Lmax} = (Us - 12 V) / 20 mA (RQ) HART Communication Acc. to HART 7 specifications HART Common Practice Commands i.e. Altering of measuring range limits (see table) Accuracy (at room temperature) ≤ ± 0.4 % FS typ. ≤ ± 0.8 % FS max. Stainless steel: 1.4571; 1.4301 Temperature drift (environment) ≤ ± 0.01 % FS / °C Response time acc. to DIN EN 60751 tso: ~ 10 s tso: ~ 15 s Environmental conditions T6, T110 Ta = -40 +60 °C / -20 +60 °C T5 Ta = -40 +70 °C / -20 +70 °C C € mark EN 61000-6-1 / 2 / 3 / 4; EN 60079-0 / 1 / 31 Vibration resistance acc. to DIN EN 60529 ISO 20653 IP 69 IB 60	Input data		
Probe diameter 8 mm Pressure resistance 600 bar (probe length 10.7 mm) 125 bar (probe length ≥ 50 mm) Mechanical connection G¼ A ISO 1179-2 Gy/A ISO 1179-2 Tightening torque, recommended 20 Nm Parts in contact with fluid Stainless steel: 1.4571; 1.4301 Seal: FKM Conduit- / Housing material 1.4404, 1.4435 Output data 4 20 mA, 2-conductor, with HART protocol Rumax = (Ua - 12 V) / 20 mA [kΩ] for HART communication min. 250 Ω HART Communication Acc. to HART 7 specifications HART Common Practice Commands i.e. Actering of measuring range limits (see table) Accuracy (at room temperature) ≤ ± 0.4 % FS typ. ≤ ± 0.8 % FS max. Stemperature drift (environment) Response time acc. to DIN EN 60751 tso: ~ 10 s tso: ~ 15 s Environmental conditions Ta = -40 +60 °C / -20 +60 °C Operating / ambient temperature range 102 T6, T110 Ta = -40 +60 °C / -20 +60 °C T5 Ta = -40 +70 °C / -20 +70 °C T6, T110 Ta = -40 +60 °C / -20 +60 °C T6, T110 Ta = -40 +70 °C / -20 +70 °C T6, T110 Ta = -40 +70 °C / -20 +70 °C T6 Ta = -40 +70 °C / -20 +70 °C	Measuring range	-25 +100 °C	
Pressure resistance 600 bar (probe length 10.7 mm) 125 bar (probe length ≥ 50 mm) Mechanical connection G½A ISO 1179-2 Tightening torque, recommended 20 Nm Parts in contact with fluid Stainless steel: 1.4571; 1.4301 Seal: FKM Conduit- / Housing material 1.4404, 1.4435 Output data 1.4404, 1.4435 Output signal, permitted load resistance 4 20 mA, 2-conductor, with HART protocol Rumax = (Ua - 12 V) / 20 mA [kΩ] for HART communication min. 250 Ω HART Common Practice Commands i.e. Altering of measuring range limits (see table) Acc. to HART 7 specifications Altering of measuring range limits (see table) Acc. to HART 7 specifications Altering of measuring range limits (see table) Acc. to HART 7 specifications Altering of measuring range limits (see table) Acc. to HART 7 specifications Altering of measuring range limits (see table) Acc. to HART 7 specifications Altering of measuring range limits (see table) Acc. to HART 7 specifications Altering of measuring range limits (see table) Acc. to HART 7 specification Ta = -40 +60 °C / -20 +60 °C Temperature diff (environment) Ta = -40 +60 °C / -20 +60 °C Temperature range	Probe lengths	10.7; 50; 100; 250; 350 mm	
Mechanical connection G½ A ISO 1179-2	Probe diameter	8 mm	
Tightening torque, recommended Parts in contact with fluid Stainless steel: 1.4571; 1.4301 Seal: FKM 1.4404, 1.4435 Output data Output signal, permitted load resistance HART Communication HART Communication HART Common Practice Commands i.e. Acc. to HART 7 specifications Acturacy (at room temperature) \$\frac{\pmax}{\pmax} = \text{0.1 \pm FS \pmax}\$ CC Response time acc. to DIN EN 60751 Storage temperature range Tightening torque, recommended 20 Nm 1.4404, 1.4435 4 20 mA, 2-conductor, with HART protocol RLmax = (U _B - 12 V) / 20 mA [kΩ] for HART communication min. 250 Ω Acc. to HART 7 specifications Altering of measuring range limits (see table) \$\frac{\pmax}{\pmax}\$ \text{ + 0.4 \pm FS \pm max.}\$ Femperature drift (environment) \$\frac{\pmax}{\pm 1.0 \pm N	Pressure resistance		
Parts in contact with fluid Stainless steel: 1.4571; 1.4301 Seal: FKM Conduit- / Housing material 1.4404, 1.4435 Output data Output signal, permitted load resistance Output signal, permitted load resistance A: 20 mA, 2-conductor, with HART protocol $R_{L_{max}} = (U_B - 12 \text{ V}) / 20 \text{ mA} [k\Omega]$ for HART communication $R = (U_B - 12 \text{ V}) / 20 \text{ mA} [k\Omega]$ for HART communication $R = (U_B - 12 \text{ V}) / 20 \text{ mA} [k\Omega]$ for HART communication min. 250 Ω Acc. to HART 7 specifications HART Common Practice Commands i.e. Altering of measuring range limits (see table) Accuracy (at room temperature) $\leq \pm 0.4 \text{ \% FS typ.}$ $\leq \pm 0.8 \text{ \% FS max.}$ Temperature drift (environment) $\leq \pm 0.01 \text{ \% FS} / \text{ °C}$ Response time acc. to DIN EN 60751 $\leq \pm 0.01 \text{ \% FS} / \text{ °C}$ Response time acc. to DIN EN 60751 $\leq \pm 0.01 \text{ \% FS} / \text{ °C}$ Storage temperature range $\leq \pm 0.01 \text{ \% FS} / \text{ °C}$ Storage temperature range $\leq \pm 0.01 \text{ °C} / \text$	Mechanical connection	G¼ A ISO 1179-2	
	Tightening torque, recommended	20 Nm	-
Output data Output signal, permitted load resistance 4 20 mA, 2-conductor, with HART protocol Rumax. = (UB - 12 V) / 20 mA [Ω] for HART communication min. 250 Ω HART Communication Acc. to HART 7 specifications HART Common Practice Commands i.e. Altering of measuring range limits (see table) Accuracy (at room temperature) ≤ ± 0.4 % FS typ. ≤ ± 0.8 % FS max. Temperature drift (environment) ≤ ± 0.4 % FS vp. ≤ ± 0.8 % FS max. Response time acc. to DIN EN 60751 tso: ~ 10 s tso: ~ 10 s tso: ~ 15 s Environmental conditions T6, T110 Ta = -40 +60 °C / -20 +60 °C Ta = -40 +70 °C / -20 +70 °C Storage temperature range -40 °C +100 °C Fluid temperature range 1)2) T6, T110 Ta = -40 +60 °C / -20 +60 °C Ta = -40 +70 °C / -20 +70 °C C € mark EN 61000-6-1 / 2 / 3 / 4; EN 60079-0 / 1 / 31 Vibration resistance acc. to DIN EN 60529 ISO 20653 IP 69 IP 6K9K Other data IP 69 IP 6K9K Other data Acc. to FSK Physical Layer Specification (HCF_SPEC_054) Current consumption ≤ 25 mA Weight 280 g (probe length 010), 315 g (probe length 050, 100), 350 g (probe length 050), 000, 350 g (probe length 050), 100), 350 g (probe length 050), 100), 350 g (probe length 050), 100 <td>Parts in contact with fluid</td> <td></td> <td></td>	Parts in contact with fluid		
$\begin{array}{lll} \text{Output signal, permitted load resistance} & 4 20 \text{ mA, } 2\text{-conductor, with HART protocol} \\ \text{R}_{\text{Lmax.}} = (U_{\text{B}} - 12 \text{ V}) / 20 \text{ mA} [\text{k}\Omega] \\ \text{for HART communication} & \text{Acc. to HART 7 specifications} \\ \text{ARRT Common Practice Commands i.e.} & \text{Altering of measuring range limits (see table)} \\ \text{Accuracy (at room temperature)} & \leq \pm 0.4 \% \text{ FS typ.} \\ \leq \pm 0.8 \% \text{ FS max.} \\ \text{Environment diff (environment)} & \leq \pm 0.01 \% \text{ FS / °C} \\ \text{Response time acc. to DIN EN 60751} & t_{90} \sim 15 \text{ s} \\ \text{Environmental conditions} & \text{T6, T110} & \text{Ta = -40 +60 °C / -20 +60 °C} \\ \text{T5} & \text{Ta = -40 +70 °C / -20 +70 °C} \\ \text{Storage temperature range} & -40 °C +100 °C \\ \text{Fluid temperature range} & -40 °C +100 °C \\ \text{Fluid temperature range} & -40 °C +100 °C \\ \text{T6, T110} & \text{Ta = -40 +60 °C / -20 +60 °C} \\ \text{T6 mark} & \text{EN 61000-6-1 / 2 / 3 / 4; EN 60079-0 / 1 / 31} \\ \text{Vibration resistance acc. to DIN EN 60529} & \text{IP 69} \\ \text{ISO 20653} & \text{IP 66} \\ \text{Other data} & \text{Voltage supply} & 12 30 V DC} \\ \text{Residual ripple} & \text{Acc. to FSK Physical Layer Specification} \\ \text{Other Josuphy voltage} & \text{Current consumption} & \leq 25 \text{ mA} \\ \text{Weight} & 280 \text{ g (probe length 010),} \\ 315 \text{ g (probe length 050, 100),} \\ 350 \text{ g (probe length 050, 100),} \\ 350 \text{ g (probe length 050, 100),} \\ \text{S0 probe length 050, 100),} \\ \text{S0 probe length 250,} & Constant of the properties of the properties$	Conduit- / Housing material	1.4404, 1.4435	
$\begin{array}{c} R_{Lmax} = \left(U_B - 12 \text{ V}\right) / 20 \text{ mA} \left[k\Omega\right] \\ \text{for HART communication min. } 250 \ \Omega \\ \text{Acc. to HART 7 specifications} \\ \text{Accuracy (at room temperature)} \\ \text{Accuracy (at room temperature range limits (see table)} \\ \text{Accuracy (at room temperature range limits (see table)} \\ \text{Accuracy (at room temperature range limits (see table)} \\ \text{Accuracy (at room temperature limits (see table)} \\ A$	Output data		
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	Output signal, permitted load resistance	$R_{Lmax} = (U_B - 12 \text{ V}) / 20 \text{ mA } [k\Omega]$	
Accuracy (at room temperature) \$\leq \dots 0.4 \% FS typ.\$\$\leq \dots 0.8 \% FS max.\$\$ Temperature drift (environment) \$\leq \dots 0.01 \% FS \cdot °C\$ Response time acc. to DIN EN 60751 \$\leq \dots 0.1 \% FS \cdot \cdot 0.5 \\ \dots \dots 0.5 \\ \dots \dots 0.5 \\ \dots 0.5 \\dots 0.5 \\ \dots 0.5	HART Communication	Acc. to HART 7 specifications	
$ \leq \pm 0.8 \ \text{F S max}. $ Temperature drift (environment) $ \leq \pm 0.01 \ \text{W FS / °C} $ Response time acc. to DIN EN 60751 $ t_{50} \approx 10 \ \text{s} $ $ t_{50} \approx 15 \ \text{s} $ $ \text{Environmental conditions} $ Operating / ambient temperature range $ t_{10} \approx 100 \ \text{C} $ To	HART Common Practice Commands i.e.	Altering of measuring range limits (see table)	
Response time acc. to DIN EN 60751 t_{50} : ~ 10 s t_{20} : ~ 15 s t_{20} : ~ 16 °C / -20 +60 °C / -20 +60 °C / -20 +70 °C /	Accuracy (at room temperature)		
Environmental conditions Operating / ambient temperature range $^{1/2}$) T6, T110 Ta = -40 +60 °C / -20 +60 °C T5 Ta = -40 +70 °C / -20 +70 °C Storage temperature range $^{-40}$ °C +100 °C Fluid temperature range $^{-40}$ °C +100 °C Fluid temperature range $^{-1/2}$ T6, T110 Ta = -40 +60 °C / -20 +60 °C T5 Ta = -40 +70 °C / -20 +60 °C T5 Ta = -40 +70 °C / -20 +70 °C C	Temperature drift (environment)	≤ ± 0.01 % FS / °C	
Operating / ambient temperature range T6, T110 Ta = -40 +60 °C / -20 +60 °C Storage temperature range -40 °C +100 °C Fluid temperature range T6, T110 Ta = -40 +60 °C / -20 +60 °C Fluid temperature range $^{1)2}$ T6, T110 Ta = -40 +60 °C / -20 +60 °C T5 Ta = -40 +70 °C / -20 +70 °C C € mark EN 61000-6-1 / 2 / 3 / 4; EN 60079-0 / 1 / 31 Vibration resistance acc. to DIN EN 60529 ISO 20653 IP 69 Protection class acc. to DIN EN 60529 ISO 20653 IP 69 P6K9K P6K9K Other data Acc. to FSK Physical Layer Specification (HCF_SPEC_054) Current consumption ≤ 25 mA Weight 280 g (probe length 050, 100), 315 g (probe length 050, 100), 350 g (probe length 250),	Response time acc. to DIN EN 60751		
T5	Environmental conditions		
Fluid temperature range $^{(1)2)}$	Operating / ambient temperature range 1)2)	T5 Ta = -40 +70 °C / -20 +7	
T5	Storage temperature range	-40 °C +100 °C	
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz ≤ 10 g Protection class acc. to DIN EN 60529 ISO 20653 IP 69 IP 6K9K Other data 12 30 V DC Residual ripple of supply voltage Acc. to FSK Physical Layer Specification (HCF_SPEC_054) Current consumption ≤ 25 mA Weight 280 g (probe length 010), 315 g (probe length 050, 100), 350 g (probe length 250),	Fluid temperature range 1) 2)		
DIN EN 60068-2-6 at 10 500 Hz Protection class acc. to DIN EN 60529 ISO 20653 IP 69 IP 6K9K Other data Voltage supply 12 30 V DC Residual ripple of supply voltage Acc. to FSK Physical Layer Specification (HCF_SPEC_054) Current consumption ≤ 25 mA Weight 280 g (probe length 010), 315 g (probe length 050, 100), 350 g (probe length 250),	(€ mark	EN 61000-6-1 / 2 / 3 / 4; EN 60079-0 / 1 / 31	
ISO 20653 IP 6K9K Other data Voltage supply 12 30 V DC Residual ripple of supply voltage Acc. to FSK Physical Layer Specification (HCF_SPEC_054) Current consumption ≤ 25 mA Weight 280 g (probe length 010), 315 g (probe length 050, 100), 350 g (probe length 250),		≤ 10 g	
Voltage supply 12 30 V DC Residual ripple of supply voltage Acc. to FSK Physical Layer Specification (HCF_SPEC_054) Current consumption ≤ 25 mA Weight 280 g (probe length 010), 315 g (probe length 050, 100), 350 g (probe length 250),			
Residual ripple of supply voltage (HCF_SPEC_054) Current consumption ≤ 25 mA Weight 280 g (probe length 010), 315 g (probe length 050, 100), 350 g (probe length 250),	Other data		
of supply voltage (HCF_SPEC_054) Current consumption ≤ 25 mA Weight 280 g (probe length 010), 315 g (probe length 050, 100), 350 g (probe length 250),	Voltage supply	12 30 V DC	
Weight 280 g (probe length 010), 315 g (probe length 050, 100), 350 g (probe length 250),			
315 g (probe length 050, 100), 350 g (probe length 250),	Current consumption	≤ 25 mA	
	Weight	315 g (probe length 050, 100), 350 g (probe length 250),	

Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided. FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

 $^{1)}$ -25 °C with FKM seal, $^{-4}$ 0 °C on request $^{2)}$ T120° with Ta = -40 .. 70 °C/-20 .. 70 °C with electrical connection single leads available

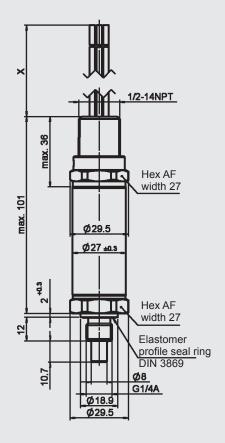
Measuring Range Limits:By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits. Measuring range limits of the primary variable, temperature:

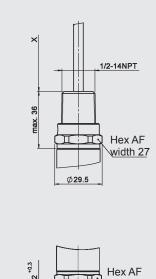
Lower measuring range limit		Upper measuring range	e limit	Measuring span		
min	max	min	max	min	max	
-25 °C	75 °C	0 °C	100 °C	25 °C	125 °C	

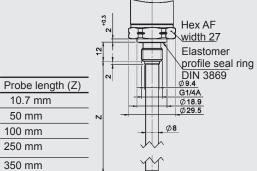
Fields of application:

	Single leads Electrical connection "9"	Jacketed cable Electrical connection "G"			
CSA		Explosionproof (seal not required)			
ATEX	Flameproof				
IECEx	Flameproof				
_c CSA _{us}	Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4				
ATEX	II 2D Ex tb IIIC T110 120 °C Db	I M2 Ex d I Mb II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 °C Db			
IECEx	Ex tb IIIC T110 120 °C Db	Ex d I Mb Ex d IIC T6, T5 Gb Ex tb IIIC T110 °C Db			

Dimensions:







Model code:

ETS 4 1 4 X - F21 - XXX - D - 000 (2m)

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

= 1/2-14 NPT Conduit, single leads

= 1/2-14 NPT Conduit, jacketed cable

Output signal

F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Probe length

010 = 10.7 mm 050 = 50 mm

100 = 100 mm

250 = 250 mm350 = 350 mm

Approval

= CSA Explosionproof (seal not required)

ATEX Flameproof

IECEx Flameproof

Modification number:

000 = standard

Cable length in m:

Standard = 2 m

Additional technical data with pressure measurement option:

Input data								
Measuring ranges	bar	16	40	60	100	250	400	600
Overload pressures	bar	32	80	120	200	500	800	1000
Burst pressure	bar	200	200	300	500	1000	2000	2000
Mechanical connection		G1/2 A	ISO 117	79-2 wit	h probe	!		
Tightening torque, recommended		45 Nm						
Probe length 7 mm								
Output data								
Output signal Temperature 4 20 mA with HART Protocol								
Output signal Pressure available via HART protocol as a digital signal					al			
Accuracy acc. to DIN 16086, $\leq \pm 0.25 \%$ FS typ.								
terminal based ≤ ± 0.5 % FS max.								
Accuracy, B.F.S.L. $\leq \pm 0.15 \%$ FS typ.								
≤ ± 0.25 % FS max.								
Temperature compensation		≤ ± 0.00	08 % / °	C typ.				
Zero point		≤ ± 0.0						
Temperature compensation		≤ ± 0.00						
Span		≤ ± 0.0						
Non-linearity acc. to DIN 16086, terminal based		≤ ± 0.3	% FS n	nax.				
Hysteresis		≤ ± 0.1	% FS n	nax.				
Repeatability		≤ ± 0.0	5 % FS					
Long-term drift		≤ ± 0.1	% FS ty	/p. / yea	ar			
Environmental conditions								
Compensated temperature range		-25 +	85 °C					
Protection class acc. to DIN EN 60529 ISO 20653			/ented (< (Seale			Sealed	Gauge)	

Measuring range limits:

Additional measuring range limits of the secondary variable, pressure:

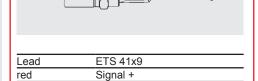
Lower measuring range limit Upper measuring			ng range limit	Measuring spa	n
min	max	min	max	min	max
0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150 % FS

Pin connections:

black

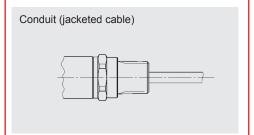
green-yellow





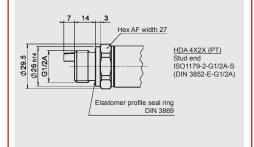
Signal -

Housing



Lead	ETS 41xG
white	Signal -
brown	Signal +
green	n.c.
yellow	n.c.

Dimensions with pressure measurement option:



Model code with pressure measuremen	t option:				
model dode with pressure measuremen	ETS 4 1 <u>2 X</u> –	F21 – 007 -	P – XXXX	- D X - 00	0 (2m)
		<u> </u>			<u> </u>
Mechanical connection 2 = G1/2 A ISO 1179-2					
Electrical connection					
9 = 1/2-14 NPT Conduit, single leads G = 1/2-14 NPT Conduit, jacketed cable					
Output signal					
F21 = 4 20 mA, 2-conductor with HART protocol					
Probe length					
007 = 7 mm					
With pressure measurement			J		
Measuring ranges in bar					
0016; 0040; 0060; 0100; 0250; 0400; 0600					
Approval D = CSA Explosionproof (seal not required)				_	
ATEX Flameproof					
IECEx Flameproof					
Type of measurement cell:					
S = Sealed Gauge (sealed to atmosphere) ≥ 40 bar V = Vented Gauge (vented to atmosphere) < 40 bar					
Modification number:					
000 = standard					
Cable length in m:					
Standard = 2 m					

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Temperature Transmitter ETS 4100 Ex applications

Integrated temperature probe

Accuracy 0.4 %

Flameproof enclosure ATEX, IECEx, CSA, triple approval With junction box **HART** interface Optional pressure measurement



Description:

The ETS 4100 with HART interface is an electronic temperature transmitter in the ignition protection type having flameproof enclosure. The triple approval in accordance with ATEX, CSA and IECEx enables universal, worldwide utilisation of the devices in potentially explosive atmospheres.

Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures within a range of -25 .. +100 °C.

The sensor has an analogue output signal of 4 .. 20 mA available as standard to enable integration into modern controls. In addition to the analogue output of the measured value, digital communication is possible by means of the HART protocol.

The instrument provides the option of a pressure sensor. The pressure signal is given out as a digital signal via the HART protocol, the temperature signal is still available as an analogue signal (4 .. 20 mA) .

The main fields of application are in the oil & gas industry, e.g. in hydraulic power units, drill drives or valve actuation stations. The device is also used in mining applications as well as in locations with high dust contamination.

Protection types and applications:

cCSA{us}

Explosionproof - Seal not required Class I Group B, C, D, T6, T5 Class II Group E, F, G Class III Type 4

ATEX

Flameproof II 2G Ex d IIC T6, T5 Gb II 2D Ex tb IIIC T110 .. 120 °C Db

IECEx

Flameproof Ex d IIC T6, T5 Gb Ex tb IIIC T110 .. 120 $^{\circ}$ C Db

Technical data:

Input data					
Measuring range	-25 +100 °C				
Probe lengths	10.7; 50; 100; 250; 350 mm				
Probe diameter	8 mm				
Pressure resistance	600 bar (probe length 10.7 mm) 125 bar (probe length ≥ 50 mm)				
Mechanical connection	G¼ A ISO 1179-2				
Tightening torque, recommended	20 Nm				
Parts in contact with fluid	Stainless steel: 1.4571; 1.4301 Seal: FKM				
Conduit / housing material	1.4435; 1.4404				
Output data					
Output signal, permitted load resistance	4 20 mA, 2-conductor, with HART protocol R _{Lmax.} = (U _B - 12 V) / 20 mA [k Ω] for HART communication min. 250 Ω				
HART Communication	Acc. to HART 7 specifications				
HART Common Practice Commands i.e.	Altering of measuring range limits (see table)				
Accuracy (at room temperature)	≤ ± 0.4 % FS typ. ≤ ± 0.8 % FS max.				
Temperature drift (environment)	≤ ± 0.01 % FS / °C				
Response time acc. to DIN EN 60751	t ₅₀ : ~ 10 s t ₉₀ : ~ 15 s				
Environmental conditions					
Operating/ ambient temperature range 1)2)	T6, T110 °C Ta = -40 +60 °C / -20 +60 °C T5 Ta = -40 +70 °C / -20 +70 °C				
Storage temperature range	-40 °C +100 °C				
Fluid temperature range 1)2)	T6, T110 °C Ta = -40 +60 °C / -20 +60 °C T5 Ta = -40 +70 °C / -20 +70 °C				
(€ mark	EN 61000-6-1/ 2/ 3/ 4; EN 60079-0/ 11/ 15/ 26/ 31				
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 10 g				
Protection class acc. to DIN EN 60529 3)	IP 65				
Other data					
Supply voltage	12 30 V DC				
Residual ripple of supply voltage	Acc. to FSK Physical Layer Specification (HCF_SPEC_054)				
Life expectancy	> 10 million cycles (0 100 % FS)				
Weight	280 g (probe length 010), 315 g (probe length 050, 100), 350 g (probe length 250), 385 g (probe length 350)				

Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

1) -25 °C with FKM seal, -40 °C on request

2) T120 °C with Ta = -40 .. +70 °C / -20 .. +70 °C with electrical connection, single leads

possible
3) For mounted 1/2 NPT Conduit screwed fitting in corresponding protection class at iunction box

Measuring Range Limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits. Measuring range limits of the primary variable, temperature:

Lower measuring range limit Upper measuring range		e limit	Measuring span		
min	max	min	max	min	max
-25 °C	75 °C	0 °C	100 °C	25 °C	125 °C

Fields of application:

	Junction box Aluminium "J"	Junction box Stainless steel "Q"				
CSA	Explos	ionproof (seal not required)				
ATEX	Flameproof					
IECEx	Flameproof					
_c CSA _{us}	Class I Group B, C, D, T6, T5 Class II Group E, F, G Class III Type 4	Class I Group B, C, D, T6, T5 Class II Group E, F, G Type 4				
ATEX	II 2G Ex d IIC T6, T5 Gb					
	II 2D Ex tb IIIC T110 120 °C Db					
IECEx	Ex d IIC T6, T5 Gb					
	Ex tb IIIC T11) 120 °C Db				

Model code:

ETS 4 1 <u>4 X - F21 - XXX - D - 000</u>

Mechanical connection

= G1/4 A ISO 1179-2

Electrical connection

J = aluminium junction box
Q = stainless steel junction box

Output signal F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Probe length

010 = 10.7 mm 050 = 50 mm

100 = 100 mm250 = 250 mm

350 = 350 mm

Approval
D = CS = CSA Explosionproof (seal not required)

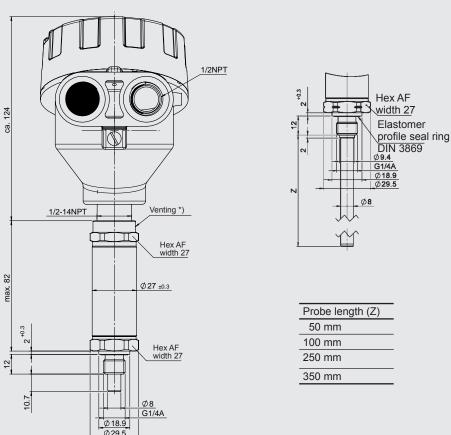
ATEX Flameproof

IECEx Flameproof

Modification number

 $\overline{000}$ = standard

Dimensions:

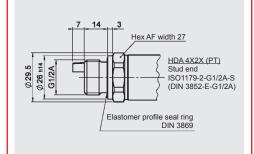


Pin connections:

Single leads in junction box

Lead	ETS 41XX
red	Signal +
black	Signal -
green-yellow	Housing

Dimensions with pressure measurement option:



Additional technical data with pressure measurement option:

Input data								
Measuring ranges	bar	16	40	60	100	250	400	600
Overload pressures	bar	32	80	120	200	500	800	1000
Burst pressure	bar	200	200	300	500	1000	2000	2000
Mechanical connection		G1/2 A	ISO 117	79-2 wit	h probe			
Tightening torque, recommended		45 Nm						
Probe length		7 mm						
Output data								
Output signal Temperature		4 20 r	nA with	HART	Protoco	l		
Output signal Pressure		availab	e via H	ART pro	otocol a	s a digit	al signa	ıl
Accuracy acc. to DIN 16086, $\leq \pm 0.25 \%$ FS typ. $\leq \pm 0.5 \%$ FS max.								
Accuracy, B.F.S.L.	Accuracy, B.F.S.L. $\leq \pm 0.15 \%$ FS typ. $\leq \pm 0.25 \%$ FS max.							
Temperature compensation Zero point				S / °C ty S / °C m				
Temperature compensation				S / °C ty				
Span				S / °C m	ах.			
Non-linearity acc. to DIN 16086, terminal based		≤ ± 0.3	% FS n	nax.				
Hysteresis		≤ ± 0.1	% FS n	nax.				
Repeatability		≤ ± 0.0	5 % FS					
Long-term drift	Long-term drift ≤ ± 0.1 % FS typ. / year							
Environmental conditions								
Compensated temperature range		-25 +	35 °C					

Measuring range limits:

Additional measuring range limits of the secondary variable, pressure:

Lower measurii	ng range limit	Upper measuri	ng range limit	Measuring spa	n
min	max	min	max	min	max
0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150 % FS

Model code with pressure measurement op	ETS 4 1 2 X	– <u>F21</u> – <u>C</u>	<u> 07</u> - <u>P</u>	- <u>XXXX</u>	<u>(- Þ X</u>	<u> - 000</u>
Mechanical connection						
2 = G1/2 A ISO 1179-2						
Electrical connection						
J = aluminium junction box Q = stainless steel junction box						
Output signal F21 = 4 20 mA, 2-conductor, with HART protocol						
Probe length						
007 = 7 mm			_			
With pressure measurement						
Measuring ranges in bar						
0016; 0040; 0060; 0100; 0250; 0400; 0600						
Approval						
D = CSA Explosionproof (seal not required) ATEX Flameproof IECEx Flameproof						
·						
Type of measurement cell: S = Sealed Gauge (sealed to atmosphere) ≥ 40 bar						
V = Vented Gauge (vented to atmosphere) < 40 bar						
Modification number: 000 = standard						

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Temperature Transmitter ETS 4100 Ex applications

Integrated temperature probe

Accuracy 0.4 %

Intrinsically Safe, Dustproof enclosure Non-Sparking, ATEX, IECEx, double approval HART interface Optional pressure measurement



Description:

The ETS 4100 with HART interface is an intrinsically safe electronic temperature transmitter for monitoring of temperature in hydraulic systems.

The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices in potentially explosive atmospheres.

Based on a silicon semiconductor device and corresponding evaluation electronics, the temperature sensor is designed to measure temperatures within a range of -25 °C .. +100 °C.

In addition to the analogue 4 .. 20 mA output of the measured value, digital communication is possible by means of the HART protocol.

The instrument provides the option of a pressure sensor. The pressure signal is given out as a digital signal via the HART protocol and the temperature signal is still available as an analogue signal (4 .. 20 mA).

The main fields of application are in the oil & gas industry, gas turbines. The device is also used in mining applications as well as in locations with high dust contamination.

Protection types and applications:

A	TEX			
I	M1	Ex ia	1	Ма
Ш	1G	Ex ia	IIC	T6,T5 Ga
Ш	1/2G	Ex ia	IIC	T6,T5 Ga/Gb
Ш	2G	Ex ia	IIC	T6,T5 Gb
Ш	1D	Ex ia	IIIC	T85 °C/T95 °C Da
II	1D	Ex ta	IIIC	$T80/90/100\ ^{\circ}C$ $T_{500}90/\ T_{500}100/\ T_{500}110\ ^{\circ}C$ Da
Ш	2D	Ex tb	IIIC	T80/T90/T100 °C Db
Ш	3G	Ex nA	IIC	T6, T5, T4 Gc
Ш	3G	Ex ic	IIC	T6, T5, T4 Gc
Ш	3D	Ex tc	IIIC	T80/T90/T100 °C Dc
Ш	3D	Ex ic	IIIC	T80/T90/T100 °C Dc
IE	CEx			
		Ex ia	1	Ма
		Ex ia	IIC	T6,T5 Ga
		Ex ia	IIC	T6,T5 Ga/Gb
		Ex ia	IIC	T6,T5 Gb
		Ex ia	IIIC	T85/T95 °C Da
		Ex ta	IIIC	T80/T90/T100 °C Da T ₅₀₀ 90/T ₅₀₀ 100/T ₅₀₀ 110 °C Da
		Ex tb	IIIC	T80/T90/T100 °C Db
		Ex nA	IIC	T6,T5,T4 Gc
		Ex ic	IIC	T6,T5,T4 Gc

Ex tc IIIC T80/T90/T100 °C Dc

Ex ic IIIC T80/T90/T100 °C Dc

Technical data:

Input data					
Measuring range	-25 +100 °C				
Probe lengths	10.7; 50; 100; 250; 350 m	nm			
Probe diameter	8 mm				
Pressure resistance	600 bar (probe length 10.7 mm) 125 bar (probe length ≥ 50 mm)				
Mechanical connection	G1/4 A ISO 1179-2				
Tightening torque, recommended	20 Nm				
Parts in contact with fluid	Stainless steel: 1.4571; 1 Seal: FKM	.4301			
Output data					
Output signal, permitted load resistance	4 20 mA, 2-conductor, with HART protocol R_{Lmax} =(U _B - 12 V) / 20 mA [k Ω] for HART communication min. 250 Ω				
HART Communication	Acc. to HART 7 specificat	ions			
HART Common Practice Commands i.e.	Altering of measuring ran	ge limits (see table)			
Accuracy (at room temperature)	≤ ± 0.4 % FS typ. ≤ ± 0.8 % FS max.				
Temperature drift (environment)	≤ ± 0.01 % FS / °C				
Response time acc. to DIN EN 60751	t ₅₀ : ~ 10 s t ₉₀ : ~ 15 s				
Environmental conditions					
Operating/ambient/ fluid temperature range 1) 2)	T6, T80/T85 °C, T ₅₀₀ 90 °C T5, T90/T95 °C, T ₅₀₀ 100 °C T100, T ₅₀₀ 110 °C T4	Ta = -40 +60 °C / -20 +60 °C Ta = -40 +70 °C / -20 +70 °C Ta = -40 +80 °C / -20 +80 °C Ta = -40 +85 °C / -20 +85 °C			
Storage temperature range	-40 °C +100 °C				
(€ mark	EN 61000-6-1 / 2 / 3 / 4; EN 60079-0 / 11 / 15 / 26 / 31; EN 50303				
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g				
Protection class acc. to DIN EN 60529 3)	IP 67				
Relevant data for Ex applications	EX ia, ic	Ex nA, ta, tb,tc			
Supply voltage	12 28 V DC	12 28 V DC			
Max. input current	li = 100 mA				
Max. input power	Pi = 0.7 W	Max. power consumption ≤ 1W			
Connection capacitance of the sensor	Ci = ≤ 22 nF				
Inductance of the sensor	Li = 0 mH				
Insulation voltage	ulation voltage 50 V AC, with integrated overvoltage protection acc. to EN 61000-6-2				
Other data					
Residual ripple of supply voltage	Acc. to FSK Physical Layer Specification (HCF_SPEC_054)				
Current consumption	≤ 25 mA				
Weight	~ 280 g (probe length 010) ~ 315 g (probe length 050,100) ~ 350 g (probe length 250) ~ 385 g (probe length 350)				
Note: Reverse polarity protection of the	supply voltage, overvoltage	e, override and short circuit			

protection are provided.

FS (Full Scale) = relative to complete measuring range

1) -20 °C with FKM seal, -40 °C on request
 2) With M12x1 male connector, only up to -25 °C
 3) With mounted mating connector in corresponding protection class

B.F.S.L. = Best Fit Straight Line

EN 18.617.0/02.18

Measuring range limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits: Measuring range limits of the primary variable, temperature:

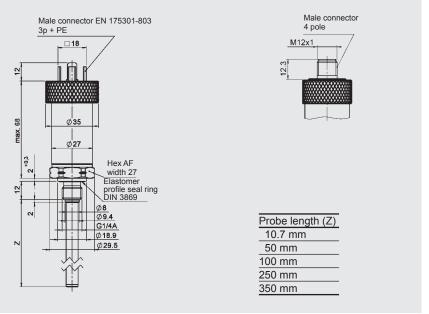
Lower measuring range limit		Upper measuring range	e limit	Measuring span		
min	max	min	max	min	max	
-25 °C	75 °C	0 °C	100 °C	25 °C	125 °C	

Fields of application:

Code no. for use in model code	1			9	Α	С
ATEX DEKRA 13ATEX0031X DEKRA 13ATEX0032	I M1 Ex ia I Ma	II 1G Ex ia IIC T6,T5 Ga II 1/2G Ex ia IIC T6,T5 Ga/Gb II 1D Ex ia IIIC T85/T95 °C Da	II 2G Ex ia IIC T6,T5 Gb	II 3G Ex nA IIC T6,T5 Gc	II 1D Ex ta IIIC T80/T90 °C T50090/T500100 °C Da II 2D Ex tb IIIC T80/T90 °C Db	II 3G Ex ic IIC T6,T5 Gc II 3D Ex ic IIIC T80/T90 °C Dc
IECEX DEK 14.0011X	Ex ia I Ma	Ex ia IIC T6,T5 Ga Ex ia IIC T6,T5 Ga/Gb Ex ia IIIC T85/T95 °C Da	Ex ia IIC T6,T5 Gb	Ex nA IIC T6,T5 Gc	Ex ta IIIC T80/T90 °C T50090/T500100 °C Da Ex tb IIIC T80/T90 °C Db	Ex ic IIC T6,T5 Gc Ex ic IIIC T80/T90 °C Dc
Application fields	Mining	Gases/conductive dust	Gases	Gases	Conductive dust	Gases/conductive dust
	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: intrinsically safe ia with barrier	Protection type: non-sparking nA	Protection type: dustproof enclosure	Protection type: Intrinsically safe ic with barrier
Electrical connection (see model code)	5, 6	5, 6	5, 6	6	6	5, 6

Instruments for other protection types and zones (see cover) are available upon request.

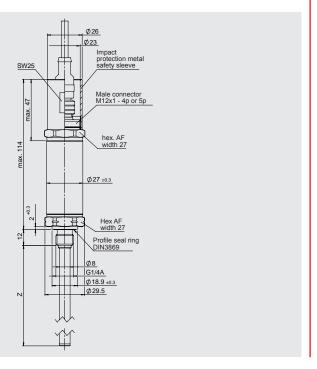
Dimensions:



With impact protection metal safety sleeve:

Protection types and applications (code): 9,A

The impact protection metal safety sleeve is included. A straight mating connector is required for electrical connection. E.g. mating connector M12x1, 4 pole, straight, with 3 m shielded cable: ZBE 06S-03, part no. 6098243



Model code:

ETS 4 1 X X - F21 - XXX - E N X - 000

Mechanical connection

4 = G1/4 A ISO 1179-2

Electrical connection

= male, EN 175301-803, 3 pole+PE (IP 67 mating connector supplied)

= male M12x1, 4 pole

Output signal

F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Probe lengths

010 = 10.7 mm

050 = 50 mm

100 = 100 mm

250 = 250 mm

350 = 350 mm

Approval

E = ATEX; IECEx

Insulation voltage:

N = 50 V AC to housing

Protection types and applications (code)

	ATEX				IECE x		
1 =	I M1	Ex ia	T	Ма	Ex ia	I	Ma
	II 1G	Ex ia	IIC	T6,T5 Ga	Ex ia	IIC	T6,T5 Ga
	II 1/2 G	Ex ia	IIC	T6,T5 Ga/Gb	Ex ia	IIC	T6,T5 Ga/Gb
	II 2 G	Ex ia	IIC	T6,T5 Gb	Ex ia	IIC	T6,T5 Gb
	II 1D	Ex ia	IIIC	T85 °C/T95 °C Da	Ex ia	IIIC	T85 °C/T95 °C Da
9 =	II 3G	Ex nA	IIC.	T6. T5 Gc	Ex nA	IIC	T6, T5 Gc
	11 00	LX 11/ (110	10, 10 00	L/(11/ (10, 10 00
	Only in	conjunct	ion w	-,			impact protection metal
A =	Only in	conjunct	ion w ee dir	ith electrical connection			•
	Only in o	conjunct leeve (se	ion w ee dir IIIC	ith electrical connection nensions) T80/T90 °C	n "6" and	IIIC	impact protection metal T80/T90 °C Da
	Only in o safety si II 1D II 2D Only in o	conjunct leeve (so Ex ta Ex tb conjunct	ion wee dir IIIC IIIC	ith electrical connection nensions) T80/T90 °C T ₅₀₀ 90/ T ₅₀₀ 100 Da T80/T90 °C Db	Ex ta	IIIC	T80/T90 °C Da T ₅₀₀ 90/ T ₅₀₀ 100 °C Da
	Only in o safety si II 1D II 2D Only in o	conjunct leeve (so Ex ta Ex tb conjunct	ion wee dir IIIC IIIC	ith electrical connection nensions) T80/T90 °C T ₅₀₀ 90/ T ₅₀₀ 100 Da T80/T90 °C Db ith electrical connection	Ex ta	IIIC	T80/T90 °C Da T ₅₀₀ 90/ T ₅₀₀ 100 °C Da T80/T90 °C Db

000 = standard Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Additional technical data with pressure measurement option:

		10.00						
Input data								
Measuring ranges	bar	16	40	60	100	250	400	600
Overload pressures	bar	32	80	120	200	500	800	1000
Burst pressure	bar	200	200	300	500	1000	2000	2000
Mechanical connection		G1/2 A	ISO 117	79-2 wit	h probe)		
Tightening torque, recommended		45 Nm						
Probe length		7 mm						
Output data								
Output signal Temperature		4 20 ı	mA with	HART	Protoco	ol		
Output signal Pressure		availab	le via H	ART pro	otocol a	ıs a digi	tal sign	al
Accuracy acc. to DIN 16086, terminal based		$\leq \pm 0.25$ $\leq \pm 0.5$						
Accuracy, B.F.S.L.		≤ ± 0.19 ≤ ± 0.29						
Temperature compensation		$\leq \pm 0.23$ $\leq \pm 0.00$				-		-
Zero point		$\leq \pm 0.00$	15 % / °	C max.				
Temperature compensation		≤ ± 0.00	08 % / °	C typ.				
Span		≤ ± 0.0	15 % / °	C max.				
Non-linearity acc. to DIN 16086, terminal based		≤ ± 0.3	% FS n	nax.				
Hysteresis		≤ ± 0.1	% FS n	nax.				
Repeatability		≤ ± 0.0						
Long-term drift ≤ ± 0.1 % FS typ. / year					ar			
Environmental conditions								
Compensated temperature range		-25 +	85 °C					

Measuring range limits:

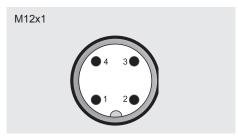
Additional measuring range limits of the secondary variable, pressure:

Lower measuring range limit		Upper measuri	ng range limit	Measuring span		
min	max	min	max	min	max	
0 % FS	112.5 % FS	37.5 % FS	150 % FS	37.5 % FS	150 % FS	

Pin connections:

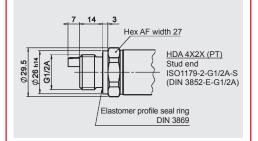


Pin	ETS 4xx5-F21	
1	Signal +	
2	Signal -	
3	n.c.	
<u></u>	PE	



Pin	ETS 4xx6-21	
1	Signal +	
2	n.c.	
3	Signal -	
4	n.c.	

Dimensions with pressure measurement option:



Model code with temperature measurement option:

ETS 4 1 $\frac{2}{2} \times -\frac{F21}{F21} - \frac{007}{F21} - \frac{P}{F21} - \frac{XXXX}{F21} - \frac{E}{F21} \times \frac{N}{F21} \times \frac{N}{F21} = \frac{N}{F21} \times \frac{$

Mechanical connection

= G1/2 A ISO 1179-2

Electrical connection

= male EN 175301-803, 3 pole+PE,

= male M12x1, 4 pole

Output signal
F21 = 4 .. 20 mA, 2-conductor, with HART protocol

Probe length

007 = 7 mm

With pressure measurement

Measuring ranges in bar

0016; 0040; 0060; 0100; 0250; 0400; 0600

Approval E = AT

= ATEX

IECEx

Insulation voltage

= 50 V AC to housing

Protection types and applications (code)

	ATEX				IECEx		
1 =	I M1	Ex ia	1	Ма	Ex ia	1	Ма
	II 1G	Ex ia	IIC	T6,T5 Ga	Ex ia	IIC	T6,T5 Ga
	II 1/2 G	Ex ia	IIC	T6,T5 Ga/Gb	Ex ia	IIC	T6,T5 Ga/Gb
	II 2 G	Ex ia	IIC	T6,T5 Gb	Ex ia	IIC	T6,T5 Gb
	II 1D	Ex ia	IIIC	T85 °C/T95 °C Da	Ex ia	IIIC	T85 °C/T95 °C Da
9 =	II 3G	Ex nA	IIC	T6, T5 Gc	Ex nA	IIC	T6, T5 Gc
	Only in o	conjuncti eeve (se	ion wi ee din	th electrical connection nensions)	"6" and	the in	npact protection metal
A =	II 1D	Ex ta	IIIC	T80/T90 °C Da T ₅₀₀ 90/ T ₅₀₀ 100 °C Da	Ex ta	IIIC	T80/T90 °C Da T ₅₀₀ 90/ T ₅₀₀ 100 °C Da
	II 2D	Ex tb	IIIC	T80/T90 °C Db	Ex tb	IIIC	T80/T90 °C Db
				th electrical connection nensions)	"6" and	the in	npact protection metal
C =	II 3G	Ex ic	IIC	T6, T5 Gc	Ex ic	IIC	T6, T5 Gc
	II 3D	Ex ic	IIIC	T80/T90 °C Dc	Ex ic	IIIC	T80/T90 °C Dc

Modification number: 000 = standard

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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TEMPERATURE SWITCHES [4]

Page

GENERAL APPLICATIONS

ETS 1700	Display		For separ. temperature probe		257
ETS 320	Display		Pressure-resistant		259
ETS 380	Display		For separ. temperature probe		261
ETS 3200	Display		Pressure-resistant		263
ETS 3800	Display		For separ. temperature probe		267
HTS 8000				OEM	271
ETS 3200	Display	IO-Link	Pressure-resistant		273
ETS 3800	Display	IO-Link	For separ. temperature probe		275
TFP 100	Temperature probe				277



Temperature Switch ETS 1700

Separate temperature probe

Description:

The electronic temperature switch ETS 1700 is used mainly together with the temperature probe TFP 100, which was specially developed for tank mounting.

The 4-digit display can indicate the actual temperature, one of the switch points or the maximum temperature value.

The maximum temperature indicates the highest temperature which has occurred since the unit was switched on or was last

The four switching outputs can be used to control heating and cooling processes in hydraulic systems, for example. Four switch and switch-back points which are independent of each other can be adjusted very simply via the key pad.

For integration into monitoring systems (e.g. with PLC), an analogue output (4 .. 20 mA or 0 .. 10 V) is also available.

Analogue output **Technical data:**

4 switching outputs

Input data	
Measuring element	PT 100 (TFP 100)
Connection, separate temperature probe	Male connector 5 pole Binder series 423/723
Measuring range 1)	0 +100 °C (+32 +212 °F)
Output data	
Switching outputs	4 relays with change-over contacts in 2 groups (common supply of each group connected)
	Switching current: 0.01 2 A per switching output
	Switching voltage: 0.1 250 V AC, 12 32 V DC
	Switching capacity: 500 VA, 64 W (for inductive load, use varistors)
	Switching cycles (ohmic resistance): ≥ 20 million at minimum load ≥ 400000 at maximum load (typ.)
Analogue output, permitted load resistance	Selectable: 4 20 mA load resist. max. 400 Ω 0 10 V load resist. min. 2 k Ω corresponds in each case to 0 +100 °C
Accuracy (at room temperature)	≤ ± 1.0 °C (≤ ± 2.0 °F) (+error separate temperature probe)
Temperature drift (environment)	≤ ± 0.03 % FS / °C
Repeatability	≤ ± 0.25 % FS
Environmental conditions	
Operating temperature range	-25 +60 °C
Storage temperature range	-40 +80 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 (0 500 Hz)	≤ 5 g
Shock resistance acc. to DIN EN 60068-2-27 (1 ms)	≤ 10 g
Protection class acc. to DIN EN 60529	IP 65
Other data	
Electrical connection	Plug-in terminal block, 14 pole
Supply voltage	22 32 V DC
Residual ripple of supply voltage	≤ 10 %
Current consumption	~ 200 mA
Display	4-digit, LED, 7-segment, red, height of digits 13 mm
Weight	~ 800 g
Note: Devene relevity made sties of the events	cualtage evenueltage evenuels and short circuit

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

Depending on the fluid temperature range of the connected temperature sensor, the measuring range of the ETS 1700 may be reduced.

EN 18.303.5/02.18

Pin

 $\overline{2}$

3

4

5

+U_B

n.c.

0 V

Signal +

Signal -

Setting options:

The microprocessor integrated into the ETS 1700 enables many useful extra functions in addition to the switching functions, when compared with a normal mechanical temperature switch. It is possible, for example, to activate switching delay times or to change the relay switching direction. All settings are made via the key pad.

Setting ranges of the switch points and switch-back hystereses:

- Switch point, relay 1 .. 4: 1.5 .. 100 % of the measuring span
- Switch-back point, relay 1 .. 4: 1 .. 99 % of the measuring span or alternatively
- Switch-back hysteresis 1 .. 4: 1 .. 99 % of the measuring span

Additional functions:

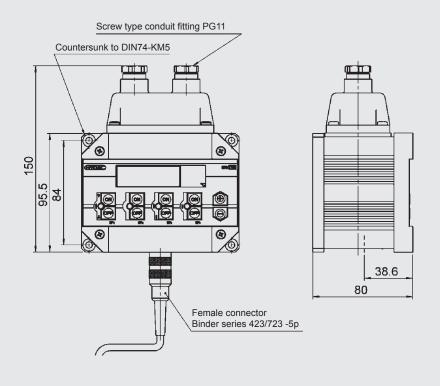
- Switching direction of the relays 1 .. 4 (N/C or N/O function)
- Switch-on delay, relays 1 .. 4 in the range 0.0 .. 900.0 seconds
- Switch-off delay, relays 1 .. 4 in the range 0.0 .. 900.0 seconds
- Switch-back mode (alternatively switch-back point or switch-back hysteresis)
- Display of the actual temperature, a switch point or the peak value
- Measuring range individually selectable in °C or °F
- Display of the measurement unit (°C, °F)
- Analogue output (4 .. 20 mA or 0 .. 10 V)
- Programming lock

Terminal assignment:

Device connection

Pin	
1	+U _B
2	0 V
3	Analogue output Signal +
2 3 4 5	Analogue output Signal - (0 V)
	Relay 1 N/C
6	Relay 1 N/O
7	Centre relay 1 and 2
8	Relay 2 N/C
9	Relay 2 N/O
10	Relay 3 N/C
11	Relay 3 N/O
12	Centre relay 3 and 4
13	Relay 4 N/C
14	Relay 4 N/O
Probe	connection

Dimensions:



Model code:

ETS 1 7 <u>0</u> <u>X</u> - <u>100</u> - <u>000</u>

Type of sensor

= for PT 100 sensors

Display

= 4-digit display °C

= 4-digit display °F

Measuring range

0 .. +100 °C (+32 .. +212 °F)

Modification number

000 = standard

Accessories (supplied with instrument):

5 pole mating connector (Binder series 423/723 or Amphenol series C091A) to connect the separate temperature probe and a 3 m sensor cable (LIYCY 4 x 0.25 mm²)

Accessories available (not supplied with instrument)

Vibration mounts Part no.: 257492

Separate temperature probe:

• TFP 104 - 000 with male 4 pole, Binder series 714 M18 Part no. 904696

(including mating connector)

with male 4 pole M12x1 Part no.: 921330 • TFP 106 - 000

(mating connector not included)

 Tank installation sleeve for TFP 100 Part no.: 906170

More detailed information on accessories can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Temperature Switch ETS 320

Integrated temperature probe Display

Up to 2 switching outputs Analogue output

Description:

The ETS 320 is a compact electronic temperature switch with a 3-digit display.

Pressure-resistant to 600 bar with an integrated 18 mm temperature probe, this model can be installed directly inline or on the hydraulic block and has a measuring range of -25 .. +100 °C.

Different output models with one or two switching outputs, and with the possible option of an additional 4 .. 20 mA analogue output signal, offer a variety of application possibilities.

The switch points and the associated hystereses can be adjusted very quickly and easily using the key pad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function).

Technical data:

Input data	
Measuring range	-25 +100 °C (-13 +212 °F)
Probe length	18 mm
Probe diameter	6 mm
Pressure resistance	600 bar
Mechanical connection	G1/2 A ISO 1179-2
Tightening torque, recommended	45 Nm
Parts in contact with fluid	Mech. connection: Stainless steel Seal: FKM
Output data	
Switching outputs	1 or 2 PNP transistor outputs Switching current: max. 1.2 A per switching output Switching cycles: > 100 million
Analogue output, permitted load resistance	4 20 mA; load resist. max. 400 Ω corresponds to -25 +100 °C
Accuracy (at room temperature)	≤ ± 1.0 °C (≤ ± 2.0 °F)
Temperature drift (environment)	≤ ± 0.015 % FS / °C max.
Response time acc. to DIN EN 60751	t_{50} : 3 s t_{90} : 9 s
Repeatability	≤ ± 0.5 % FS max.
Environmental conditions	
Operating temperature range	-25 +80 °C (-13 +176 °F)
Storage temperature range	-40 +80 °C (-40 +176 °F)
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 (0 500 Hz)	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529 1)	IP 65
Other data	
Supply voltage	20 32 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	~ 100 mA without switching output
Display	3-digit, LED, 7-segment, red, height of digits 8.4 mm
Weight	~ 300 g
Note: Peverse polarity protection of the suppl	v voltage, overvoltage, override and short circuit

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) With mounted mating connector in corresponding protection class

Setting options:

All settings available on the ETS 320 are grouped in two easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges of the switch points and switch-back hystereses:

Switch point function

Unit	Switch point	Hysteresis	Incre- ment*
°C	-22.0 100.0	1.0 123.0	1.0
°F	-10.0 212.0	1.0 223.0	1.0

Window function

Unit	Lower switch value	Upper switch value	Incre- ment*
°C	-23.0 99.0	-22.0 100.0	1.0
°F	-11.0 211.0	-10.0 212.0	1.0

All ranges given in the table can be adjusted by the increments shown.

Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0 .. 750 seconds
- Choice of display (actual temperature, peak temperature, switch point 1, switch point 2, display off)

Pin connections:

M12x1, 4 pole



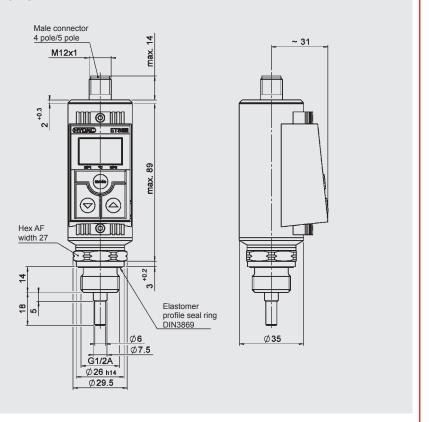
Pin	ETS 326-2	ETS 326-3	
1	+U _B	+U _B	
2	SP2	Analogue	
3	0 V	0 V	
4	SP1	SP1	

M12x1, 5 pole



Pin	ETS 328-5	
1	+U _B	
2	Analogue	
3	0 V	
4	SP1	
5	SP2	

Dimensions:



Model code:

ETS 3 $\frac{2}{2} \times - \frac{X}{100} - \frac{X00}{100}$

Mechanical connection

= G1/2 A ISO 1179-2

Electrical connection

= male M12x1, 4 pole

only possible on output models "2" and "3"

= male M12x1, 5 pole only possible on output model "5"

Output

8

3

= 2 switching outputs

only in conjunction with electrical connection type "6"

= 1 switching output and 1 analogue output only in conjunction with electrical connection type "6"

= 2 switching outputs and 1 analogue output only in conjunction with electrical connection type "8"

Measuring range

-25 .. +100 °C (-13 .. +212 °F)

Modification number

000 = display in °C

400 = display in °F

Accessories:

Appropriate accessories, such as mating connectors and clamps for wall-mounting etc., can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Temperature Switch ETS 380

Separate temperature probe Display

Up to 2 switching outputs Analogue output

Description:

The ETS 380 is a compact electronic temperature switch with a 3-digit display.

The version for a separate temperature probe has a measuring range of -30 .. +150 °C and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation.

It is also possible, however, to evaluate commonly available PT 100 temperature probes. Different output models with one or two switching outputs, and with the possible option of an additional 4 .. 20 mA analogue output signal, offer a variety of application possibilities.

The switch points and the associated hystereses can be adjusted very quickly and easily using the key pad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function).

Technical data:

Input data	
Measuring element	PT 100 (TFP 100)
Connection, separate temperature probe	Female cable connector M12x1, 4 pole
Measuring range 1)	-30 +150 °C (-22 +302 °F)
Output data	
Switching outputs	1 or 2 PNP transistor outputs
	Switching current: max. 1.2 A per switching output
	Switching cycles: > 100 million
Analogue output, permitted load resistance	4 20 mA; load resist. max. 400 Ω corresponds to -30 +150 °C
Accuracy (at room temperature)	≤ ± 1.0 °C (≤ ± 2.0 °F) (+error separate temperature probe)
Temperature drift (environment)	≤ ± 0.015 % FS / °C max.
Repeatability	≤ ± 0.5 % FS max.
Environmental conditions	
Operating temperature range	-25 +80 °C (-13 +176 °F)
Storage temperature range	-40 +80 °C (-40 +176 °F)
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 (0 500 Hz)	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529 2)	IP 65
Other data	
Supply voltage	20 32 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	~ 100 mA without switching output
Display	3-digit, LED, 7-segment, red, height of digits 8.4 mm
Weight	~ 300 g

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) Depending on the fluid temperature range of the connected temperature sensor, the measuring range of the ETS 380 may be reduced.

2) With mounted mating connector in corresponding protection class

EN 18.329.3/02.18

Setting options:

All settings available on the ETS 380 are grouped in two easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges of the switch points and switch-back hystereses:

Switch point function

Unit	Switch point	Hysteresis	Incre- ment*
°C	-27.0 150.0	1.0 178.0	1.0
°F	-16.0 302.0	2.0 320.0	2.0

Window function

Unit	Lower switch value	Upper switch value	Incre- ment*
°C	-28.0 149.0	-27.0 150.0	1.0
°F	-18.0 300.0	-16.0 302.0	2.0

All ranges given in the table can be adjusted by the increments shown.

Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0 .. 750 seconds
- Choice of display (actual temperature, peak temperature, switch point 1, switch point 2, display off)

Pin connections:

M12x1, 4 pole



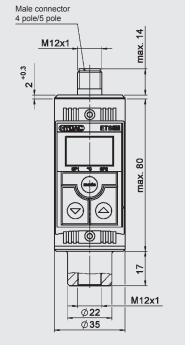
Pin	ETS 386-2	ETS 386-3	
1	+U _B	+U _B	
2	SP2	Analogue	
3	0 V	0 V	
4	SP1	SP1	

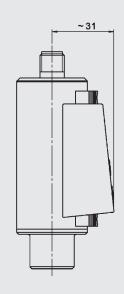
M12x1, 5 pole



Pin	ETS 388-5	
1	+U _B	
2	Analogue	
3	0 V	
4	SP1	
5	SP2	

Dimensions:





Model code:

ETS 3 8 X - X - 150 - X00

Mechanical connection

= electrical connection for separate temperature probe

Electrical connection

= male M12x1, 4 pole

only possible on output models "2" and "3"

= male M12x1, 5 pole

only possible on output model "5"

Output

= 2 switching outputs

only in conjunction with electrical connection type "6"

= 1 switching output and 1 analogue output

only in conjunction with electrical connection type "6"

5 = 2 switching outputs and 1 analogue output only in conjunction with electrical connection type "8"

<u>Measuring range</u> -30 .. +150 °C (-22 .. +302 °F)

Modification number

000 = display in °C

400 = display in °F

Accessories (supplied with instrument):

A male cable connector M12x1, 4 pole, to connect the separate temperature probe and a 3 m sensor cable, LIYY 4 x 0.5 mm².

Accessories available (not supplied with instrument)

Separate temperature probe:

with male 4 pole, Binder series 714 M18 • TFP 104 - 000

(including mating connector) • TFP 106 - 000 With male 4 pole M12x1

(mating connector not included)

Tank installation sleeve for TFP 100

Further information on accessories as well as further accessories, such as mating connectors and clamps for wall-mounting etc., can be found in the Accessories brochure.

Note:

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Subject to technical modifications.

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Temperature Switch ETS 3200

Integrated temperature probe

Up to 2 switching outputs Analogue output



Description:

The ETS 3200 is a compact electronic temperature switch with a 4-digit display.

With its integrated temperature probe, the ETS 3200 is particularly suitable for direct tank installation and is available in various lengths.

Pressure-resistant up to 600 bar with an integrated 18 mm temperature probe, this model can be mounted directly inline or on the hydraulic block.

Different output models with one or two switching outputs, optionally with an additional analogue output signal, offer a variety of application possibilities.

The switch points and the associated hystereses can be adjusted very quickly and easily using the key pad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function).

The ETS 3200 is also available in a variant with menu navigation in accordance with VDMA.

Technical data:

Input data					
Measuring range		-25 +100 °C	(-13 +212 °F	-)	
Probe length	mm	18	100	250	350
Probe diameter	mm	6	8	8	8
Pressure resistance	bar	600	50 ¹⁾	50 ¹⁾	50 ¹⁾
Mechanical connection	•	G1/2 A ISO 11	79-2	•	
Tightening torque, recommended		45 Nm	-		
Parts in contact with fluid		Mech. connec Seal: FKM	tion: Stainless	steel	
Output data					
Switching outputs		Switching curr	nsistor outputs ent: max. 1.2 A es: > 100 millio	A per output	
Analogue output, permitted load resistance		Selectable: 4 20 mA 0 10 V	load resist. m		
Accuracy (at room temperature)		≤ ± 1.0 °C (≤ ±	2.0 °F)		
Temperature drift (environment)		≤ ± 0.015 % F	S/°C		
Response time acc. to DIN EN 60751	t ₅₀ :	3 s 9 s	8 s 15 s	8 s 15 s	8 s 15 s
Repeatability		≤ ± 0.25 % FS	max.		
Environmental conditions					
Operating temperature range			-13 +176 °F) [-13 +140 °l		ec.)
Storage temperature range		-40 +80 °C (-40 +176 °F)			
Fluid temperature range 2)			/ -25 +100 °(- / -13 +212 °		
(€ mark		EN 61000-6-1	/ -2 / -3 / -4		
□¶us mark 3)		Certificate-No.	: E318391		
Vibration resistance acc. to DIN EN 60068-2-6 at 0 500 Hz		≤ 10 g			
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)		≤ 50 g			
Protection class acc. to DIN EN 60529 4)		IP 67			
Other data					
Supply voltage		9 35 V DC, 18 35 V DC,		llogue output	
when applied acc. to UL specifications		- limited energ	y – acc. to 9.3 5; LPS UL 609	UL 61010; C	lass 2;
Residual ripple of supply voltage		≤ 5 %			
Current consumption		≤ 55 mA wit	al th inactive swite th inactive swite d analogue out	ching output	
Display		4-digit, LED, 7 height of digits	s 7 mm		
Weight	g	~ 135	~ 150	~ 185	~ 210

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are

provided.

FS (Full Scale) = relative to complete measuring range

1) Higher pressure resistance on request 2) -25 °C with FKM seal, -40 °C on request 3) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1 4) With mounted mating connector in corresponding protection class

Setting options: Standard design

All the settings available on the ETS 3200 are combined in two easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switching outputs:

Switch point function

Unit	Switch point	Hysteresis	Incre- ment*
°C	-23.0 100.0	1.0 123.5	0.5
°F	-10 212	2 222	1

Window function

Unit	Lower switch value	Upper switch value	Incre- ment*
°C	-23.0 97.5	-22.0 98.5	0.5
°F	-10 208	-7 209	1

* All ranges given in the table can be adjusted by the increments shown.

Setting options: menu navigation acc. to VDMA

All terms and symbols used for setting the ETS 3200 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-2) for temperature switches.

The ETS 3200 can easily be adjusted via three push-buttons.

Setting ranges for the switching outputs:

Magauring	Min difference	Increment*	
		'	
-13 +212 °F	-11 °F	212 °F	
-25 +100 °C	-23.5 °C	100.0 °C	
Measuring range	Lower limit of RP / FL	Upper limit of SP / FH	

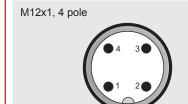
Measuring range	Min. difference Increment* betw. RP and SP & FL and FH	
-25 +100 °C	1.5 °C	0.5 °C
-13 + 212 °F	2 °F	1°F

- * All ranges given in the table can be adjusted by the increments shown.
- SP = switch point
- RP = switch-back point
- FL = temperature window lower value
- FH = temperature window upper value

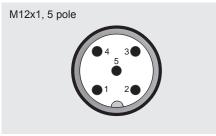
Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Display of the actual temperature in °C or °F.
- Choice of display (actual temperature, peak temperature, switch point 1, switch point 2; additional, in standard version, display off)

Pin connections:



ETS 3226-2	ETS 3226-3	
+U _B	+U _B	
SP2	Analogue	
0 V	0 V	
SP1	SP1	
	+U _B SP2 0 V	+U _B +U _B SP2 Analogue 0 V 0 V



Pin	ETS 3228-5	
1	+U _B	
2	Analogue	
3	0 V	
4	SP1	
5	SP2	

Dimensions: Display turns through M12x1 Display turns through Chica 8.8.8.8 **9**(+)(0) 76 76 Hex AF width 27, O-ring 20.35x1.78-NBR O-ring 20.35x1.78-Probe length (dim. Z) G1/2A 100 Ø26 h14 250 Ø29.5 Ø26 h14 Installation dimension Ø 53.5 350



ETS 3 <u>2 2 X - X - XXX - X00</u>

Type 2 =

= with integrated temperature probe

Mechanical connection

= G1/2 A ISO 1179-2

Electrical connection

- = male M12x1, 4 pole only possible on output models "2" and "3" (mating connector not supplied)
- 8 = male M12x1, 5 pole only possible on output model "5" and modification "000" (mating connector not supplied)

Male connection M12x1

Output

- = 2 switching outputs
- only in conjunction with electrical connection type "6"
- 3 = 1 switching output and 1 analogue output only in conjunction with electrical connection type "6"
- 5 = 2 switching outputs and 1 analogue output only in conjunction with electrical connection code type "8" and modification "000"

Probe length in mm

018; 100; 250; 350

Modification number

000 = standard

V00 = menu navigation acc. to VDMA (standard sheet 24574)

Appropriate accessories, such as mating connectors, protective sleeves for tank installation and splash guards, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Temperature Switch ETS 3800

Separate temperature probe

Up to 2 switching outputs Analogue output



Description:

The ETS 3800 is a compact electronic temperature switch with a 4-digit display.

The version for a separate temperature probe has a measuring range of -30 .. +150 °C and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation. It is also possible, however, to evaluate commonly available PT 100 temperature probes. Different output models with one or two switching outputs, optionally with an additional analogue output signal, offer a variety of application possibilities.

The switch points and the associated hystereses can be adjusted very quickly and easily using the key pad.

For optimum adaptation to the particular application, the instrument has many additional adjustment parameters (e.g. switching delay times, N/C / N/O function etc.).

The ETS 3800 is also available in a variant with menu navigation in accordance with

Technical data:

Input data		
Measuring element	PT 100 (TFP 100)	
Connection, separate temperature probe	Female cable connector M12x1, 4 pole	
Measuring range 1)	-30 +150 °C (-22 +302 °F)	
Output data		
Switching outputs	1 or 2 PNP transistor outputs Switching current: max. 1.2 A per switching output Switching cycles: > 100 million	
Analogue output, permitted load resistance	Selectable: 4 20 mA load resist. max. 500 Ω 0 10 V load resist. min. 1 k Ω corresp. in each case to -30 +150 °C	
Accuracy (at room temperature)	≤±1.0 °C (≤±2.0 °F) (+error separate temperature probe)	
Temperature drift (environment)	≤ ± 0.015 % FS / °C	
Repeatability	≤ ± 0.25 % FS max.	
Environmental conditions		
Operating temperature range	-25 +80 °C (-13 +176 °F) (-25 +60 °C [-13 +140 °F] for UL-Spec.)	
Storage temperature range	-40 +80 °C (-40 +176 °F)	
(€ mark	EN 61000-6-1 / -2 / -3 / -4	
c Al us mark ²⁾	Certificate-No.: E318391	
Vibration resistance acc. to DIN EN 60068-2-6 at 0 500 Hz	≤ 10 g	
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g	
Protection class acc. to DIN EN 60529 3)	IP 67	
Other data		
Supply voltage when applied acc. to UL specifications	9 35 V DC, without analogue output 18 35 V DC, with analogue output - limited energy – acc. to 9.3 UL 61010; Class 2; UL 1310 / 1585; LPS UL 60950	
Residual ripple of supply voltage	≤ 5 %	
Current consumption	≤ 2.455 A total ≤ 35 mA with inactive switching outputs ≤ 55 mA with inactive switching output and analogue output	
Display	4-digit, LED, 7-segment, red, height of digits 7 mm	
Weight	~ 87 g (excluding cable connector and probe)	

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

- Depending on the fluid temperature range of the connected temperature sensor, the measurement range of the ETS 3000 may be reduced.
 Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1
 With mounted mating connector in corresponding protection class

EN 18.093.0/02.18

Setting options: Standard design

All the settings available on the ETS 3800 are combined in two easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges for the switching outputs:

Switch point function

Unit	Switch point	Hysteresis	Incre- ment*
°C	-27.0 150.0	1.0 178.0	0.5
°F	-17 302	2 320	1

Window function

Unit	Lower switch value	Upper switch value	Incre- ment*
°C	-27.0 146.5	-25.5 148.0	0.5
°F	-17 296	-14 298	1

^{*} All ranges given in the table can be adjusted by the increments shown.

Setting options: menu navigation acc. to **VDMA**

All terms and symbols used for setting the ETS 3800 as well as the menu structure comply with the specifications in the VDMA Standard (VDMA 24574-2) for temperature switches.

The ETS 3800 can easily be adjusted via three push-buttons.

Setting ranges for the switching outputs:

Measuring range	Lower limit of RP / FL	Upper limit of SP / FH
-30 +150 °C	-28.0 °C	150.0 °C
-22 +302 °F	-19 °F	302 °F
Measuring range	Min. difference betw. RP and SF & FL and FH	
-30 +150 °C	2.0 °C	0.5 °C
-22 +302 °F	3 °E	1 °F

All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

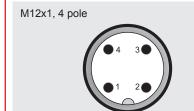
FL = temperature window lower value

FH = temperature window upper value

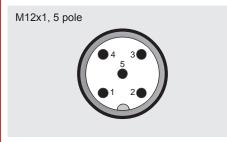
Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Display of the actual temperature in °C or °F.
- Choice of display (actual temperature, peak temperature, switch point 1, switch point 2; additional, in standard version, display off)

Pin connections:



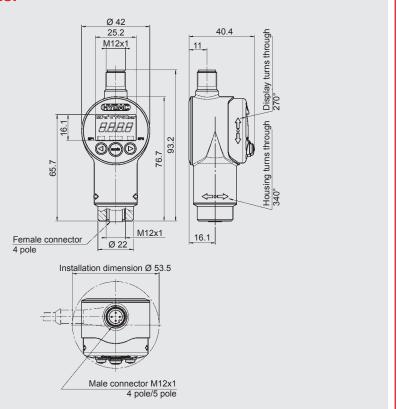
Pin	ETS 3866-2	ETS 3866-3	
1	+U _B	+U _B	
2	SP2	Analogue	
3	0 V	0 V	
4	SP1	SP1	



Pin	ETS 3868-5	
1	+U _B	
2	Analogue	
3	0 V	
4	SP1	
5	SP2	

EN 18.093.0/02.18

Dimensions:



Model code:

ETS 3 8 6 X - X - 000 - X00

Part no.: 921330

= for separate temperature probe

Mechanical connection

= female cable connector M12x1, 4 pole

Electrical connection

= male M12x1, 4 pole

only possible on output models "2" and "3" (mating connector not supplied)

= male M12x1, 5 pole only possible on output model "5" and modification "000" (mating connector not supplied)

Output

= 2 switching outputs

only in conjunction with electrical connection type "6"

3 = 1 switching output and 1 analogue output

only in conjunction with electrical connection type "6"

5 = 2 switching outputs and 1 analogue output only in conjunction with electrical connection code type "8" and modification "000"

Probe length in mm

000 = separate temperature probe

Modification number

000 = standard

V00 = menu navigation acc. to VDMA (standard sheet 24574)

Accessories (supplied with instrument):

A male cable connector M12x1, 4 pole, to connect the separate temperature probe and a 3 m sensor cable, LIYCY 4 x 0.25 mm².

Accessories available (not supplied with instrument):

Separate temperature probe: • TFP 106 - 000

with male 4 pole M12x1

(mating connector not included)

 Tank installation sleeve for TFP 100 Part no.: 906170

Further information on accessories as well as further accessories, such as mating connectors, splash guards and clamps for wall-mounting etc., can be found in the Accessories brochure.

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Note:

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described, please contact the relevant technical

For applications or operating conditions not

Subject to technical modifications.

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Temperature Switch HTS 8000 for series applications

Integrated temperature probe

Customised designs thanks to diverse electrical and mechanical connections Up to 2 switching outputs



Description:

The temperature transmitter series HTS 8000 has been specifically developed for the OEM market, e.g. in mobile applications. It is based on a silicon semiconductor device with corresponding evaluation electronics.

All parts in contact with fluid are in stainless steel, and are welded together.

The transistor output is available with either an N/C or an N/O function. The switch and switch-back point of the HTS 8000 is factoryset acc. to customer specification.

For the electrical connection, various built-in connection plugs are available.

The pressure resistance up to 600 bar and excellent EMC characteristics make the HTS 8000 ideal for use in harsh conditions.

Technical data:

Input data

Measuring range 1)	-25 +125 °C	(-13 +257 °F)		
Probe length	mm	16	40	
Probe diameter	mm	6.7	6.7	
Pressure resistance	bar	600	600	
Mechanical connection 2)	G1/4 A ISO 1179-2			
Tightening torque, recommended	20 Nm			
Parts in contact with fluid	Mech. connect Seal: FKM	ction: Stainless ste	el	
Output data				
Switching output	4 pole) Switching cur Switching cyc Switch points acc. to custor Switch-on and 32 ms standa	istor outputs unction with electr. rent: ≤ 500 mA pereles: > 100 million / switch-back poin mer specification d switch-off delay: rd	output ts:	
Acquiracy (at room tomporature)	(8 2000 ms factory-set acc. to customer spec.) ≤ ± 1.5 °C (≤ ± 2.7 °F)			
Accuracy (at room temperature) Temperature drift (environment)	≤±0.02 % FS / °C			
Response time acc. to DIN EN 60751	t ₅₀ =	4 s	4 s	
Response time acc. to DIN LN 00751	t ₉₀ =	8 s	8 s	
Repeatability	≤ ± 1 % FS m	ax.		
Environmental conditions				
Operating temperature range ³⁾		/ -25 +85 °C F/ -13 +185 °F)		
Storage temperature range	-40 +100 °C	(-40 +212 °F)		
(€ mark	EN 61000-6-1	1/2/3/4		
c Sus mark 4)	Certificate no	. E318391		
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 25 g			
Shock resistance acc. to DIN EN 60068-2-27	100 g / 6 ms / 500 g / 1 ms /			
Protection class acc. to DIN EN 60529 5)	IP 67			
Other data				
Electrical connection	Various male connectors, e.g.: M12x1, Packard Metri Pack, Deutsch DT 04, AMP Superseal, AMP Junior Power Timer, jacketed cable			
Supply voltage when applied acc. to UL specifications	8 32 V DC - limited energy - acc. to 9.3 UL 61010; Class 2; UL 1310/1585; LPS UL 60950			
Residual ripple of supply voltage	≤ 5 %			
Current consumption	≤ 0.52 A with ≤ 1.02 A with	inactive switching 1 switching output 2 switching output		
Weight	~ 145 g			
Note: Reverse polarity protection of the supply v	oltage, overvol	tage, override and	short circuit	

on of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

- 1) Other measuring ranges on request

- To Other medaning ranges on request
 Other mechanical connections on request

 -25 °C with FKM seal, -40 °C on request
 Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No 61010-1

 With mounted mating connector in corresponding protection class

Dimensions:

Male connector DIN 72585-3 pole



Male connector Junior Power Timer 3 pole



Male connector EN175301-803 3 pole + PE



Male connector Metri-Pack series 150 3 pole

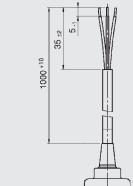


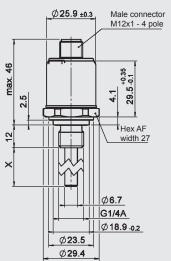
DT04 3 pole

Male connection



Jacketed cable Male connector Superseal series 1.5 3 pole





Order details:

The electronic temperature switch HTS 8000 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type.

For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com



Temperature Switch ETS 3200

Display

Integrated temperature probe



Description:

The ETS 3200 with IO-Link communication interface is a compact, electronic temperature switch with an integrated 4-digit display.

With its integrated temperature probe, the ETS 3200 is particularly suitable for direct tank installation and is available in various lengths.

Pressure-resistant up to 600 bar with an integrated 18 mm temperature probe, this model can be mounted directly inline or on the hydraulic block.

The instrument has a switching output and an additional output that can be configured as switching or analogue output (4 .. 20 mA or 0 .. 10 V).

IO-Link is the communication between the sensor/actuator (IO-Link device) and an IO-Link master based on a point-to-point

The advantages:

Process data, parameters and diagnostic information of the temperature switch can be transmitted via a standard cable (SDCI mode). The integrated LED display provides information on the operating mode and the switching statuses.

Simple exchange, the IO-Link master saves the parameters of the connected temperature switch and transmits them to the newly connected temperature switch when replaced. Thus, time-consuming new parameterisations will no longer be required.

If IO-Link is not used, the sensor still functions as a temperature switch with two switching outputs (SIO mode). To create customer-specific small series or to duplicate sensor settings across the system, the sensor can also be easily adjusted outside the system to suit the particular application, with the HYDAC Programming Device HPG P1-000, the HYDAC Programming Adapter ZBE P1-000 or by means of the Portable Data Recorder HMG 4000.

Typical fields of application for ETS 3200 IO-Link are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Technical data:

IO-I ink

Innut data		-			
Input data		05 1400	°C / 42 + 24	2 0 - 1	
Measuring range	T	1	°C (-13 +212	<u> </u>	250
Probe length	mm	18	100	250 8	350 8
Probe diameter	mm	6	8 50 ¹)	50 ¹⁾	50 ¹⁾
Pressure resistance	bar	600		50 %	50 %
Mechanical connection		G1/2 A ISO	1179-2		
Tightening torque, recommended Parts in contact with fluid		45 Nm	nection: Stainle	an ataal	
Parts in contact with huid		Seal: FKN		ess sieei	
Output data					
Switching outputs		PNP transis Switching of	stor outputs current: max. 2	50 mA per swi	tching output
Analogue output, permitted load resistance		Selectable: 4 20 mA 0 10 V	load resist	. max. 500 Ω . min. 1 kΩ	
Accuracy (at room temperature)		≤ ± 1.0 °C ((≤ ± 2.0 °F)		
Temperature drift (environment)		≤ ± 0.015 %	6 FS / °C		
Response time acc. to DIN EN 60751	t ₅₀ :	3 s 9 s	8 s 15 s	8 s 15 s	8 s 15 s
Repeatability		≤ ± 0.25 %	FS max.		
Environmental conditions					'
Operating temperature range		-25 +80 ° (-25 +60	C (-13 +176 °C [-13 +14	°F) :0 °F] for UL-S	pec.)
Storage temperature range			C (-40 +176		
Fluid temperature range 2)		-40 +100	°C / -25 +10 2 °F / -13 +21	0 °C	
(€ mark			6-1 / -2 / -3 / -4		
Mus mark 3)		Certificate-	No.: E318391		
Vibration resistance acc. to DIN EN 60068-2-6 at 0 500 Hz		≤ 10 g			
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)		≤ 50 g			
Protection class acc. to DIN EN 60529 4)		IP 67			
IO-Link specific data					
IO-Link revision		V1.1 / supp	ort V1.0		
Transmission rate, baud rate 5)		38.4 kBaud	I (COM2)		
Minimum cycle time		2.5 ms			
Process data width		16 bit			
SIO mode supported		Yes			
M-sequence capability		PREOPER OPERATE: ISDU:	ATE: TYPE_0 TYPE_2 Supporte		
IO Device Description (IODD) download at: https:	·//ioddfir			,u	
Other data	.,, ioduill	IGOLIO-III IK.U	<u> </u>		
Supply voltage		9 35 V E	DC, if PIN 2		-
when applied acc. to UL specifications		18 35 V E		= analogue ou 9.3 UL 61010;	tput Class 2;
Residual ripple of supply voltage		≤5%	1000, LI 0 0L 0	30000	
Current consumption		≤ 0.535 A ≤ 35 mA ≤ 55 mA	with active sw with inactive s with inactive s and analogue	witching outpu witching outpu	ıts
Display), 7-segment, r		
Weight	g	~ 135	~ 150	~ 185	~ 210
		4-digit, LED height of di ~ 135	and analogue), 7-segment, r gits 7 mm ~ 150	output red,	~ 2

Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are

provided.

FS (Full Scale) = relative to complete measuring range

- 19 Higher pressure resistance on request
 21-25 °C with FKM seal, -40 °C on request
 31 Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1
 4 With mounted mating connector in corresponding protection class
 5 Connection with unshielded standard sensor line possible up to a maximum line length of 20 m.

Setting options:

All terms and symbols used for setting the ETS 3200 as well as the menu structure comply with the specifications in the VDMA Standard for temperature switches.

Setting ranges for the switching outputs:

Measuring range	Lower limit of RP / FL	Upper limit of SP / FH
-25 +100 °C	-23.5 °C	100.0 °C
-13 +212 °F	-11 °F	212 °F

Measuring range	Min. difference betw. RP and SF & FL and FH	
-25 +100 °C	1.5 °C	0.5 °C
-13 +212 °F	2 °F	1 °F

All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

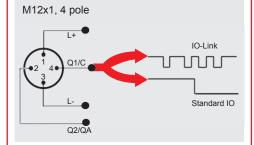
FL = temperature window lower value

FH = temperature window upper value

Additional functions:

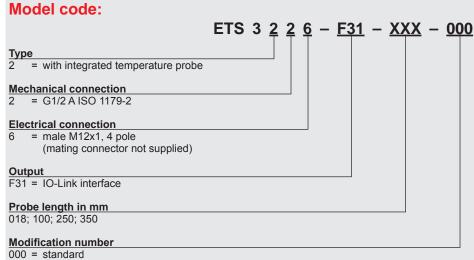
- Switching mode of the switching outputs adjustable (switch point function or window
- Switching direction or switching outputs adjustable (N/C or N/O function)
- Switch-on or switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Choice of display (actual temperature, peak temperature, switch point 1, switch point 2, display off)

Pin connections:



Pin	Signal	Description
1	L+	+U _B
2	Q2/QA	Switching output (SP2) / analogue output
3	L-	0 V
4	Q1/C	IO-Link communication / switching output (SP1)

Dimensions: M12x1 8.8.8.6 8.8.8.8 @Hex AF width 27 O-ring 20.35x1.78-NBR Probe length (dim. Z) 100 Ø26 h14 250 Installation dimension Ø 53.5 350 ector M12x1 4 pole Male connector M12x1 4 pole



Accessories:

Appropriate accessories, such as mating connectors, mechanical adapters, splash guards, clamps for wall-mounting and programming units, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Temperature Switches ETS 3800

Separate temperature probe



Description:

The ETS 3800 with IO-Link communication interface is a compact, electronic temperature switch with an integrated 4-digit display. The version for a separate temperature probe has a measuring range of -30 .. +150 °C and is used primarily with the TFP 100 temperature probe which was specially developed for tank installation.

It is also possible, however, to evaluate commonly available PT 100 temperature probes.

The instrument has a switching output and additional output that can be configured as switching or analogue output (4 .. 20 mA or 0 .. 10 V).

IO-Link is the communication between the sensor/actuator (IO-Link device) and an IO-Link master based on a point-to-point interface.

The advantages:

Process data, parameters and diagnostic information of the temperature switch can be transmitted via a standard cable (SDCI mode). The integrated LED display provides information on the operating mode and the switching statuses.

Simple exchange, the IO-Link master saves the parameters of the connected temperature switch and transmits them to the newly connected temperature switch when replaced. Thus, time-consuming new parameterisations will no longer be required.

If IO-Link is not used, the sensor still functions as a temperature switch with two switching outputs (SIO mode). To create customer-specific small series or to duplicate sensor settings across the system, the sensor can also be easily adjusted outside the system to suit the particular application, with the HYDAC Programming Device HPG P1-000, the HYDAC Programming Adapter ZBE P1-000 or by means of the Portable Data Recorder HMG 4000.

Typical fields of application for ETS 3800 IO-Link are machine tools, handling and assembly automation, intralogistics or the packaging industry.

IO-Link

Technical data:

Input data	
Measuring element	PT 100 (TFP 100)
Connection, separate temperature probe	Female cable connector M12x1, 4 pole
Measuring range 1)	-30 +150 °C (-22 +302 °F)
Output data	· · · · · · · · · · · · · · · · · · ·
Switching outputs	PNP transistor outputs Switching current: max. 250 mA per switching output
Analogue output, permitted load resistance	Selectable: 4 20 mA load resist. max. 500 Ω 0 10 V load resist. min. 1 k Ω corresp. in each case to -30 +150 °C
Accuracy (at room temperature)	\leq ± 1.0 °C (\leq ± 2.0 °F) (+error separate temperature probe)
Temperature drift (environment)	≤ ± 0.015 % FS / °C
Repeatability	≤ ± 0.25 % FS max.
Environmental conditions	
Operating temperature range	-25 +80 °C (-13 +176 °F) (-25 +60 °C [-13 +140 °F] for UL-Spec.)
Storage temperature range	-40 +80 °C (-40 +176 °F)
(€ mark	EN 61000-6-1 / -2 / -3 / -4
c Mus mark 2)	Certificate-No.: E318391
Vibration resistance acc. to DIN EN 60068-2-6 at 0 500 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529 3)	IP 67
IO-Link specific data	
IO-Link revision	V1.1 / support V1.0
Transmission rate, baud rate 4)	38.4 kBaud (COM2)
Minimum cycle time	2.5 ms
Process data width	16 bit
SIO mode supported	Yes
M-sequence capability	PREOPERATE: TYPE_0 OPERATE: TYPE_2_2 ISDU: Supported
IO Device Description (IODD) download at: https://	
Other data	
Supply voltage	9 35 V DC, if PIN 2 = SP2 18 35 V DC, if PIN 2 = analogue output
when applied acc. to UL specifications	- limited energy – acc. to 9.3 UL 61010; Class 2; UL 1310 / 1585; LPS UL 60950
Residual ripple of supply voltage	≤ 5 %
Current consumption	 ≤ 0.535 A with active switching outputs ≤ 35 mA with inactive switching outputs ≤ 55 mA with inactive switching output and analogue output
Display	4-digit, LED, 7-segment, red, height of digits 7 mm
Weight	~ 87 g (excluding cable connector and probe)
Note: Reverse polarity protection of the supply vo	oltage, overvoltage, override and short circuit protection

ity protection of the supply voltage, overvoltage, override and short circuit protection

FS (Full Scale) = relative to complete measuring range

- 1) Depending on the fluid temperature range of the connected temperature sensor, the measurement Depending on the fluid temperature range of the connected temperature sensor, the measurer range of the ETS 3000 may be reduced.
 Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1
 With mounted mating connector in corresponding protection class
 Connection with unshielded standard sensor line possible up to a maximum line length of 20 m.

EN 18.328.2.1/02.18

Setting options:

All terms and symbols used for setting the ETS 3800 as well as the menu structure comply with the specifications in the VDMA Standard for temperature switches.

Setting ranges for the switching outputs:

Measuring range	Lower limit of RP / FL	Upper limit of SP / FH
-30 +150 °C	-28.0 °C	150.0 °C
-22 +302 °F	-19 °F	302 °F

Measuring range	Min. difference betw. RP and SP & FL and FH	Increment*
-30 +150 °C	2.0 °C	0.5 °C
-22 +302 °F	3 °F	1°F

All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

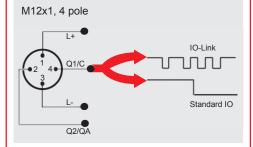
FL = temperature window lower value

FH = temperature window upper value

Additional functions:

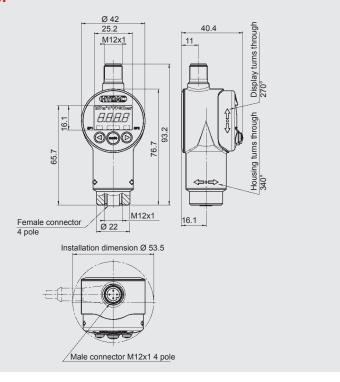
- Switching mode of the switching outputs adjustable (switch point function or window function)
- Switching direction or switching outputs adjustable (N/C or N/O function)
- Switch-on or switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Choice of display (actual temperature, peak temperature, switch point 1, switch point 2, display off)

Pin connections:



Pin	Signal	Description
1	L+	+U _B
2	Q2/QA	Switching output (SP2) / analogue output
3	L-	0 V
4	Q1/C	IO-Link communication / switching output (SP1)

Dimensions:



Model code:

ETS 3 8 6 6 - F31 - 000 - 000

Part no : 921330

Type

= for separate temperature probes

Mechanical connection

= female cable connector M12x1, 4 pole

Electrical connection

= male M12x1, 4 pole (mating connector not supplied)

Output

F31 = IO-Link interface

Probe length in mm

000 = separate temperature probe

Modification number

000 = standard

Accessories (supplied with instrument):

A male cable connector M12x1, 4 pole, to connect the separate temperature probe and a 3 m sensor cable, LIYCY 4 x 0.25 mm2.

Accessories available (not supplied with instrument): Separate temperature probe:

with male 4 pole M12x1 • TFP 106 - 000

(mating connector not included)

• Tank installation sleeve for TFP 100 Part no.: 906170

Further information on accessories as well as further accessories, such as mating connectors, splash guards, clamps for wall-mounting and programming units, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

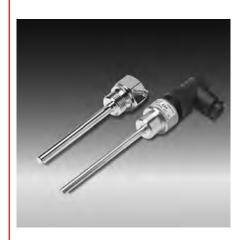
For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Temperature Probe TFP 100

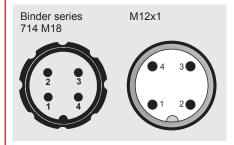
Description:

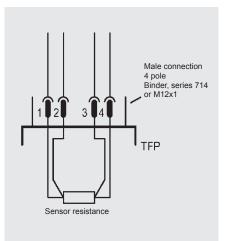
The TFP 100 temperature probe was developed primarily for tank installation. The PT 100 precision resistor in 4-conductor design can be connected directly to HYDAC temperature switches ETS 3800, ETS 380 and ETS 1700.

The standardised electrical connection also means that other evaluation or control systems (e.g. PLC) can easily be connected.

For adaptation to different applications and fluids, a nickel-plated brass installation sleeve which is pressure-resistant up to 10 bar is available as an accessory.

Pin connections:





Technical data:

Temperature probe	
Measuring element	PT 100
Measuring range	-40 +125 °C (-40 +257 °F)
Probe length	95.5 mm
Probe diameter	6 mm
Parts in contact with fluid	Brass
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Sensor current	0.3 1.0 mA
Tank installation sleeve for TFP 100 (Accessory	, not supplied)
Pressure resistance	10 bar
Parts in contact with fluid	CuZn39Pb3 (brass), nickel-plated

Model code:

Separate temperature probe

Electrical connection

= male, 4 pole Binder series 714 M18 (mating connector supplied)

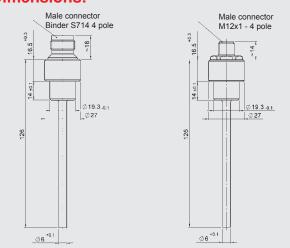
= male, 4 pole M12x1 (mating connector not supplied)

Modification number

000 = standard

TFP 104-000 Part no.: 904696 TFP 106-000 Part no.: 921330

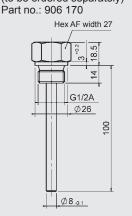
Dimensions:



Tank installation sleeve for TFP 100

TFP 10X - 000

(to be ordered separately)



Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

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Internet: www.hydac.com

EN 18.330.3/02.18

	DISTANCE AND POS					
STANCE						Paç
CYLINDER-INTE	GRATED INSTALLATION					
Magnetostricti						
HLT 1100-R2		Analogue	Rod	for full integration		2
HLT 1100-R2		CAN	Rod	for full integration		2
HLT 2100-R1		Analogue	Rod	for partial integration		2
HLT 2100-R1		CAN	Rod	for partial integration		2
HLT 2100-R1		Profibus	Rod	for partial integration		2
HLT 2100-R1		SSI	Rod	for partial integration		2
HLT 2100-R1		EtherCAT	Rod	for partial integration		2
HLT 2150-R1		Analogue	Rod	for partial integration		:
HLT 2150-R1		CAN	Rod	for partial integration		2
HLT 2150-R1		SSI	Rod			
	Dauble / triple reduced and			for partial integration		2
HLT 2102/3	Double / triple redundancy	Analogue	Rod	for partial integration		
HLT 1100-R2	Functional safety	Analogue	Rod	for full integration		,
HLT 1100-R2	Functional safety	CAN	Rod	for full integration		;
Magnetic-indu	ctive					
HLT 724		Analogue	Rod	for full integration		;
EXTERNALLY M						
Magnetostrict	ive					
HLT 2500-L2		Analogue	Profile			;
HLT 2500-L2		CAN	Profile			;
HLT 2500-L2		Profibus	Profile			;
HLT 2500-L2		SSI	Profile			;
HLT 2500-L2		EtherCAT	Profile			;
HLT 2550-L2		Analogue	Profile			;
HLT 2550-L2		CAN	Profile			;
HLT 2550-L2		SSI	Profile			;
HLT 2500-F1		Analogue	Flat housing			;
HLT 2500-F1		CAN	Flat housing			;
HLT 2500-F1		Profibus	Flat housing			;
HLT 2500-F1		SSI	Flat housing			;
HLT 2500-F1		EtherCAT	Flat housing			;
Inductive						
IWE 40					OEM	;
COLTION						
OSITION						
Ultrasound						
HLS 528	Display					3
Magnetic						
HLS 100	Functional safety				OEM	3
Inductive						
IES 2010 /					OFM	
2015 / 2020					OEM	3
IR light barrier	•					
ik ildir barrier						



Linear Position Transmitter HLT 1100-R2

Magnetostrictive

For full integration

Resolution min. 0.1 mm

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Based on this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant stainless steel housing For full integration in hydraulic

The different output signals (analogue) enable connection to all HYDAC **ELECTRONIC GmbH measurement and** control devices as well as connection to standard evaluation systems (e.g. to PLC controls).

The main fields of application are in mobile hydraulics.

Analogue

Technical data:

Input data	1			
Measuring ranges	50 2500	mm		
Model	Operating	Rod Ø 10 mm for cylinder full integration ¹) Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar		
Material		Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301		
Seal		O-ring: NBR Backup ring: PTFE		
Output data				
Output signal, permitted load resistance	Current: Voltage:	420 mA or 204 mA, Load resist.: 200500 Ω 010 V or 100 V $0.254.75$ V or $4.750.25$ V $0.59.5$ V $0.54.5$ V Load resist.: min. 2 kΩ		
Resolution	12 bit, min	n. 0.1 mm		
Non-linearity	≤ ± 0.05 %			
Hysteresis	≤ ± 0.1 %	FS		
Repeatability	≤ ± 0.1 %	≤±0.1 % FS		
Temperature coefficient	≤ ± 0.01 %	≤ ± 0.01 % FS / °C		
Sampling rate	2 ms			
Environmental conditions	'			
Operating temperature range	-40 +85 °	°C		
Storage temperature range	-40 +100) °C		
Fluid temperature range	-40 +120) °C		
(€ mark	EN 61000-	-6-1 / 2 / 3 / 4		
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz at 5 kHz	≤ 20 g ≤ 15 g			
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g			
Protection class acc. to DIN EN 60529	IP 67 (cabl IP 6K9K ²⁾	le outlet) (separate male flange connector M12x1)		
Installation position	No restricti	ions		
Other data				
Supply voltage	9 36 V D	С		
Residual ripple of supply voltage	≤ 250 mV _{pp}	p		
Current consumption without output	< 100 mA			
Weight	100 mm (2500 mm (g on length: (with 1 m cable): ~310 g (with 1 m cable): ~1030 g		
Note: Reverse polarity protection of the sur	pply voltage, ove	ervoltage, and short circuit protection		

Note: Reverse polarity protection of the supply voltage, overvoltage, and short circuit protection are provided.

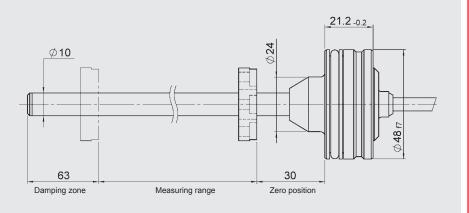
FS (Full Scale) = relative to complete measuring range

1) Other variants available on request.

2) With mounted mating connector in corresponding protection class

EN 18.372.4/02.18

Dimensions:



Model code:

HLT 1 $\underline{1}$ 0 0 - $\underline{R2}$ - \underline{XXX} - \underline{XXX} - \underline{XXXX} - $\underline{000}$

Design / geometry type

= rod

Model

R2 = rod for cylinder full integration

Electrical connection

Cable output

K01 = jacketed cable, length 1 m

K02 = jacketed cable, length 2 m

K05 = jacketed cable, length 5 m

K10 = jacketed cable, length 10 m

Separate male flange connector M12x1, 4 pole

L06 = 60 mm lead length

L18 = 180 mm lead length

L24 = 240 mm lead length

Output signal

C01 = analogue 4 .. 20 mA, 3-conductor

C02 = analogue 20 .. 4 mA, 3-conductor

B01 = analogue 0 .. 10 V

B02 = analogue 10 .. 0 V

G01 = analogue 0.25 .. 4.75 V

G02 = analogue 4.75 .. 0.25 V G03 = analogue 0.5 .. 9.5 V

G04 = analogue 0.5 .. 4.5 V

Measuring range in mm (50 .. 2500 mm)

Example

0150 = 150 mm

Modification

000 = standard

003 = modified pin assignment

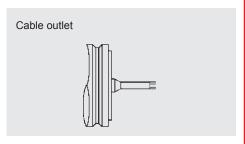
004 = modified pin assignment

Accessories available: (not supplied with instrument)

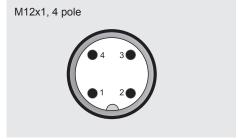
ZBL MR17.4 position magnet part no.: 6119372 ZBL MR22 position magnet part no.: 6084453 part no.: 6084207 ZBL MR33 position magnet

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Lead		
brown	+U _B	
white	0 V	
green	Signal	



Pin	Mod. 000	Mod. 003	Mod. 004
1	+U _B	+U _B	n.c.
2	n.c.	Signal	+U _B
3	0 V	0 V	0 V
4	Signal	n.c.	Signal

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Linear Position Transmitter HLT 1100-R2

Magnetostrictive

For full integration

Resolution min. 0.1 mm

CANopen



Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Based on this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant stainless steel housing For full integration in hydraulic

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The main fields of application are in mobile hydraulics.

Technical data:

Input data	
Measuring ranges	50 2500 mm
Model	Rod Ø 10 mm for cylinder full integration 1)
	Operating pressure: ≤ 450 bar
NA-4	Peak pressure acc. to DIN EN ISO 19879: 630 bar
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301
Seal	O-ring: NBR Backup ring: PTFE
Output data	
Output signal	CANopen
Resolution	0.1 mm
Non-linearity	≤ ± 0.02 % FS
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.1 mm
Temperature coefficient	≤ ± 0.003 % FS / °C
Sampling rate	2 ms
Environmental conditions	
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +100 °C
Fluid temperature range	-40 +120 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to	
DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g
at 5 kHz	≤ 15 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529	IP 67 (cable outlet) IP 6K9K ²⁾ (separate male flange connector M12x1)
Installation position	No restrictions
Protocol data for CANopen	
Communication profile	CiA DS 301 V4.2
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s 1 Mbit/s acc. to DS305 V2.2
Transmission services	
- PDO	Measured value as 32 bit and float
- Transfer	synchronous, asynchronous, cyclical
Node ID/baud rate	Adjustable via LSS
Other data	0.001/100
Supply voltage	9 36 V DC
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 100 mA
Weight	Depending on length:
	100 mm (with 1 m cable): ~310 g 2500 mm (with 1 m cable): ~1030 g
Note: Reverse polarity protection of the supply	voltage, overvoltage and short circuit protection

Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

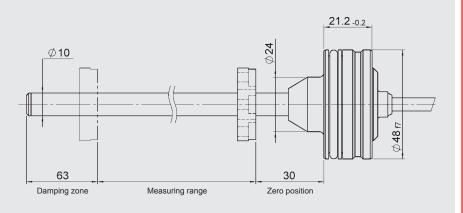
FS (Full Scale) = relative to complete measuring range

1) Other variants available on request.

2) With mounted mating connector in corresponding protection class

EN 18.372.3.0/02.18

Dimensions:



Model code:

HLT 1 $\underline{1}$ 0 0 - $\underline{R2}$ - \underline{XXX} - $\underline{F11}$ - \underline{XXXX} - $\underline{000}$

Design / geometry type

= rod

Model

= rod for cylinder full integration

Electrical connection

Cable output

K01 = jacketed cable, length 1 m = jacketed cable, length 2 m

= jacketed cable, length 5 m K05

= jacketed cable, length 10 m

Separate male flange connector M12x1, 5 pole

L06 = 60 mm lead length

L18 = 180 mm lead length = 240 mm lead length L24

Output signal

= CANopen

Measuring range in mm (50 .. 2500 mm)

Example

0150 = 150 mm

Modification

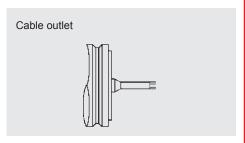
= standard

Accessories available: (not supplied with instrument)

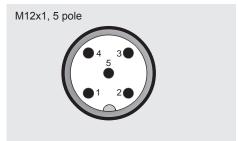
ZBL MR17.4 part no.: 6119372 position magnet ZBL MR22 position magnet part no.: 6084453 ZBL MR33 position magnet part no.: 6084207

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Lead	
brown	+U _B
white	0 V
green	CAN_L
yellow	CAN_H



Pin	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	0 V	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 2100-R1

Magnetostrictive

For partial integration

Resolution 5 µm

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders.

The different output signals (analogue current / voltage) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as connection to standard evaluation systems (e.g. to PLC controls).

External set inputs for the analogue start point and end point offer an additional possibility of a customised adjustment.

HLT 2100 is primarily used in stationary applications as partially integrated solutions in hydraulic cylinders.

Analogue

Technical data:

Input data		
Measuring ranges	50 4000 mm	
Model	Rod with M18x1 acc. to ISO 6149	.5 screw-in flange
	Operating pressi	
		cc. to DIN EN ISO 19879: 750 bar
Tightening torque, recommended	≤ 50 Nm	
Material	Rod: Stainless s	
	Housing: Alumin	ium
Output data		
Output signal, permitted load resistance		. 20 mA or 20 4 mA,
		ad resist.: 200 500 Ω . 10 V or 10 0 V.
		ad resist.: min. 2 kΩ
Resolution	16 bit; min. 0.00	5 mm
Non-linearity		easuring range ≤ 1500 mm)
		easuring range > 1500 mm)
Hysteresis		leasuring range ≤ 1500 mm) leasuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0	0.05 mm (depends on length)
Temperature coefficient	≤±0.004 % FS /	∕ °C
Sampling rate	Depending on le	ength:
	≤ 1 m: 0.5 ms ≤ 2 m: 1.0 ms	
	≤ 4 m: 2.0 ms	
Environmental conditions		
Operating temperature range	0 +70 °C	
Storage temperature range	-30 +85 °C	
(€ mark	EN 61000-6-1 / 2	2/3/4
Vibration resistance acc. to	≤ 10 g	
DIN EN 60068-2-6 at 50 2000 Hz		
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g	
Protection class acc. to DIN EN 60529 1)	IP 65	
Installation position	No restrictions	
Other data		
Supply voltage	24 V DC ± 10 %	
Residual ripple of supply voltage	≤ 250 mV _{PP}	
Current consumption without output	≤ 100 mA	
Weight	Depending on le	
	50 mm: 500 4000 mm: 1400	
Note: Powerse polarity protection of the suppl		0

Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

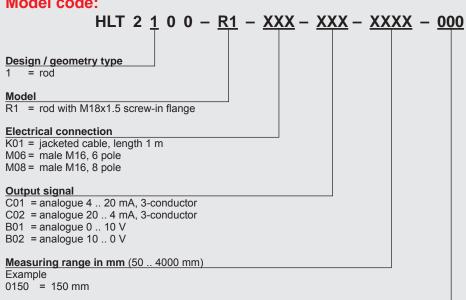
FS (Full Scale) = relative to complete measuring range Note:

1) With mounted mating connector in corresponding protection class

EN 18.373.3/02.18

Dimensions: Rod length Measuring range Zero pos. = 28 Damping zone = 62 6/8pol. M16

Model code:

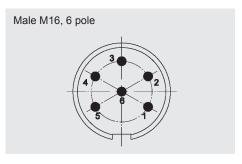


Accessories available: (not supplied with instrument)

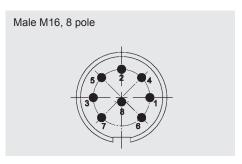
ZBL MR17.4 position magnet part no.: 6119372 part no.: 6084453 ZBL MR22 position magnet ZBL MR33 part no.: 6084207 position magnet ZBL MV63 position magnet part no.: 6084454 ZBL MU38-20 position magnet part no.: 6084455 Intermediate ring AD17.4xID13.5x5 part no.: 3903233 Intermediate ring AD33xID13.5x5 part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	
1	Signal
2	0 V (analogue output)
3	Start point
4	End point
5	0 V
6	+U _B



Pin	
1	n.c.
2	0 V (analogue output)
3	Start point
4	End point
5	Signal
6	0 V
7	+U _B
8	n.c.

Cable outlet

Lead	
brown	0 V (analogue output)
green	Start point
yellow	End point
grey	Signal
pink	0 V
blue	+U _B
	·

Note:

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For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Modification 000 = standard



Linear Position Transmitter HLT 2100-R1

Magnetostrictive

For partial integration

Resolution 5 µm

CANopen

Innut data



Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

HLT 2100 is primarily used in stationary applications as partially integrated solutions in hydraulic cylinders.

Technical data:

Input data	
Measuring ranges	50 4000 mm
Model	Rod with M18x1.5 screw-in flange
	acc. to ISO 6149 Operating pressure: ≤ 450 bar
	Peak pressure acc. to DIN EN ISO 19879: 750 bar
Tightening torque, recommended	≤ 50 Nm
Material	Rod: Stainless steel 1.4571
	Housing: Aluminium
Output data	
Output signal	CANopen
Resolution	16 bit; 0.005 mm ¹⁾
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm)
	± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length:
	≤ 1 m: 1.0 ms ≤ 2 m: 2.0 ms
	≤ 2.5 m; 2.5 ms
	> 2.5 m: 3.0 ms
Environmental conditions	
Operating temperature range	0 +70°C
Storage temperature range	-30 +85°C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 2)	IP 65
Installation position	No restrictions
Protocol data for CANopen	
Communication profile	CiA DS 301 V4.2
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s 1 Mbit/s acc. to DS305 V2.2
Transmission services	Management walks as 00 kg = 1.0 kg
- PDO - Transfer	Measured value as 32 bit and float
Node ID/baud rate	synchronous, asynchronous, cyclical
Other data	Adjustable via LSS
Supply voltage	24 V DC ± 10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
	≤ 250 mA
Current consumption without output Weight	·
vveignt	Depending on length: 50 mm: 500 g
	4000 mm: 1500 g
Note: Deverse relegible protection of the co-	unalitationa arramatanti ana analahantanti analahantanti ana

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

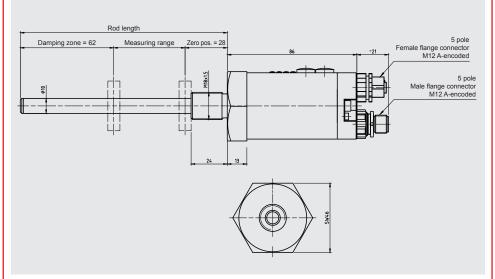
FS (Full Scale) = relative to complete measuring range

- 1) Other models on request
- 2) With mounted mating connector in corresponding protection class



EN 18.126.0/02.18

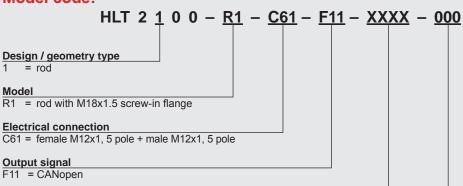
Dimensions:



Model code:

= rod

Model



Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

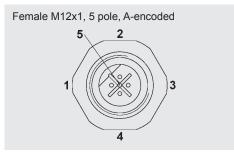
000 = standard

Accessories available: (not supplied with instrument)

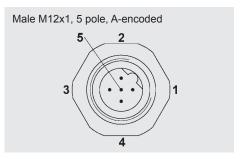
ZBL MR17.4 position magnet part no.: 6119372 position magnet part no.: 6084453 ZBL MR22 ZBL MR33 position magnet part no.: 6084207 ZBL MV63 position magnet part no.: 6084454 ZBL MU38-20 position magnet part no.: 6084455 Intermediate ring AD17.4xID13.5x5 part no.: 3903233 Intermediate ring part no.: 3887829 AD33xID13.5x5

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	CANopen_OUT	
1	Housing	Shield/housing
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low



Pin	CANopen_IN	
1	Housing	Shield/housing
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

The information in this brochure relates to the operating conditions and applications described.

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Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Internet: www.hydac.com



Linear Position Transmitter HLT 2100-R1

Magnetostrictive

For partial integration

Resolution 1 µm

Profibus

PROFI

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders.

In the Profibus version, the measured value is digitised and made available to the field bus system via the Profibus protocol.

HLT 2100 is primarily used in stationary applications as partially integrated solutions in hydraulic cylinders.

Technical data:

Input data		
Measuring ranges	50 4000 mm	
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149 Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 750 bar	
Tightening torque, recommended	≤ 50 Nm	
Material	Rod: Stainless steel 1.4571 Housing: Aluminium	
Output data		
Output signal	Profibus	
Resolution	0.001 mm ¹⁾	
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)	
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)	
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)	
Temperature coefficient	≤ ± 0.0015 % FS / °C	
Sampling rate	Depending on length: ≤ 1 m: 1.0 ms ≤ 1.5 m: 1.5 ms ≤ 2 m: 2.0 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 3.0 ms	
Environmental conditions		
Operating temperature range	0 +70 °C	
Storage temperature range	-30 +85 °C	
(€ mark	EN 61000-6-1 / 2 / 3 / 4	
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g	
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g	
Protection class acc. to DIN EN 60529 2)	IP 65	
Installation position	No restrictions	
Protocol data for Profibus		
Profibus DP V0	IEC 61158, IEC 61784	
PNO encoder profile	Class 1 and 2	
Transmission rate parameter	9.6 12000 kbit/s	
Other data		
Supply voltage	24 V DC ± 10 %	
Residual ripple of supply voltage	≤ 250 mV _{PP}	
Current consumption without output	≤ 150 mA	
Weight	Depending on length: 50 mm: 600 g 4000 mm: 1500 g	
Note: Reverse polarity protection of the supp	ly voltage, overvoltage and short circuit protection	

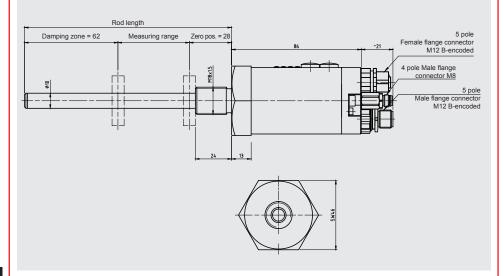
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection reverse points protection of the supply voltage, overvare provided.

FS (Full Scale) = relative to complete measuring range

1) Other models on request

EN 18.125.0/02.18

Dimensions:



Model code:

HLT 2 1 0 0 - R1 - P61 - F41 - XXXX - 000

Design / geometry type 1 = rod

Model

R1 = rod with M18x1.5 screw-in flange

Electrical connection

P61 = female M12x1, 5 pole + male M12x1, 5 pole + male M8, 4 pole

Output signal F41 = Profibus

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

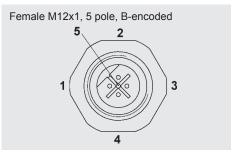
000 = standard

Accessories available: (not supplied with instrument)

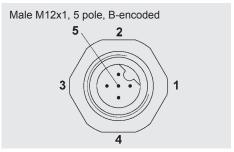
ZBL MR17.4 part no.: 6119372 position magnet ZBL MR22 position magnet part no.: 6084453 ZBL MR33 part no.: 6084207 position magnet ZBL MV63 position magnet part no.: 6084454 ZBL MU38-20 part no.: 6084455 position magnet Intermediate ring AD17.4xID13.5x5
Intermediate ring AD33xID13.5x5 part no.: 3903233 Intermediate ring part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

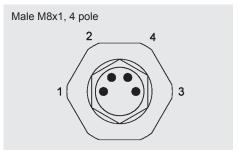
Pin connections:



Pin	Profibus OUT	
1	VP, +5 V DC	
2	Profibus, Data A	
3	0 V	
4	Profibus, Data B	
5	n.c.	
screw connection	Shield/housing	



Pin	Profibus_IN	
1	n.c.	
2	Profibus, Data A	
3	n.c.	
4	Profibus, Data B	
5	n.c.	
screw connection	Shield/housing	



Pin	Profibus IN
1	+U _B
2	n.c.
3	0 V
4	n.c.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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e-mail: electronic@hydac.com Internet: www.hydac.com



Linear Position Transmitter HLT 2100-R1

Magnetostrictive

For partial integration

Resolution 1 µm

Synchronous serial interface



Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders.

In the version with synchronous serial interface, the measured value is made available via synchronous and symmetrical clock and data signals.

HLT 2100 is primarily used in stationary applications as partially integrated solutions in hydraulic cylinders.

Technical data:

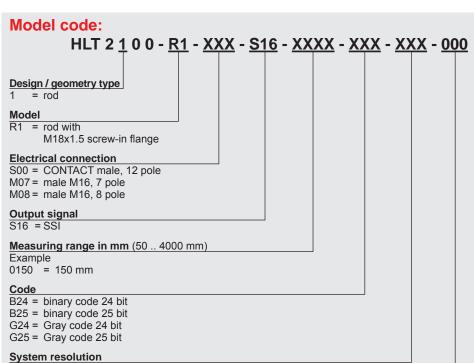
Input data			
Measuring ranges	50 4000 mm		
Model	Rod with M18x1.5 screw-in flange		
	acc. to ISO 6149		
	Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 750 bar		
Tightening torque, recommended	≤ 50 Nm		
Material	Rod: Stainless steel 1.4571		
	Housing: Aluminium		
Output data			
Output signal	SSI		
Resolution	0.001 mm ¹⁾		
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)		
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)		
Repeatability	\leq 0.005 mm - \leq 0.05 mm (depends on length)		
Temperature coefficient	≤ ± 0.0015 % FS / °C		
Sampling rate	Depending on length:		
	≤ 1.0 m: 0.5 ms ≤ 2.0 m: 1.0 ms		
	≤ 4.0 m: 2.0 ms		
Environmental conditions			
Operating temperature range	0 +70 °C		
Storage temperature range	-30 +85 °C		
(€ mark	EN 61000-6-1 / 2 / 3 / 4		
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g		
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g		
Protection class acc. to DIN EN 60529 2)	IP 65		
Installation position	No restrictions		
Relevant data for SSI			
SSI clock input	Optocoupler		
SSI data output	RS-422, 2-wire		
SSI clock frequency	95 1000 kHz		
SSI monotime, typical	20 μs		
Other data			
Supply voltage	24 V DC ± 10 %		
Residual ripple of supply voltage	≤ 250 mV _{PP}		
Current consumption without output	≤ 100 mA		
Weight	Depending on length:		
	50 mm: 500 g 4000 mm: 1400 g		
Note: Reverse polarity protection of the su	pply voltage, overvoltage and short circuit protection		

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

- 1) Other models on request
- $^{\rm 2)}$ With mounted mating connector in corresponding protection class

Dimensions: Rod length Zero pos. = 28 Damping zone = 62 Measuring range 12pol. M23 M18x1.5 7/8pol. M16



$001 = 1 \, \mu m$

 $002 = 2 \mu m$

 $005 = 5 \mu m$

 $010 = 10 \, \mu m$

 $100 = 100 \, \mu \text{m}$

Modification

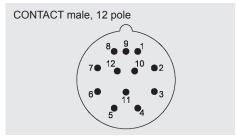
000 = standard

Accessories available: (not supplied with instrument)

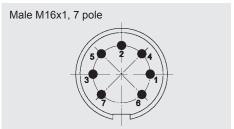
ZBL MR17.4 position magnet part no.: 6119372 ZBL MR22 position magnet part no.: 6084453 ZBL MR33 position magnet part no.: 6084207 ZBL MV63 position magnet part no.: 6084454 ZBL MU38-20 position magnet part no.: 6084455 Intermediate ring AD17.4xID13.5x5 part no.: 3903233 Intermediate ring AD33xID13.5x5 part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

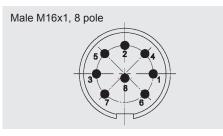
Pin connections:



Pin	
1	SSI_ClockIN
2	SSI_Clock+_IN
3	SSI_DATA+_OUT
4	SSI_DATAOUT
5	RS 485 +_IN/OUT
6	RS 485IN/OUT
7	n.c.
8	Direction IN
9	Preset1_IN
10	n.c.
11	+U _B _ IN
12	0 V _IN



Pin	Signal	Description
1	SSI_DATAOUT	Data output -
2	SSI_DATA+_OUT	Data output +
3	SSI_Clock+_IN	Clock input +
4	SSI_ClockIN	Clock input -
5	Supply Voltage IN	Supply voltage
6	Ground IN	Ground
7	not connected	



Pin	Signal	Description
1	SSI_Clock+_IN	Clock input +
2	SSI_DATA+_OUT	Data output +
3	SSI_ClockIN	Clock input -
4	Ser.Program+_IN/OUT	Ser. programming interface RS485
5	SSI_DATAOUT	Data output -
6	Ground IN	Ground
7	Supply Voltage IN	Supply voltage
8	Ser.ProgramIN/OUT	Ser. programming interface RS485

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Linear Position Transmitter HLT 2100-R1

Magnetostrictive

For partial integration

Resolution 1 µm

EtherCAT

Innut data

EtherCAT.

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant, tubular casing in stainless steel, for direct installation into hydraulic cylinders.

In the EtherCAT version, the measured value is digitised and made available to the field bus system via the EtherCAT protocol.

HLT 2100 is primarily used in stationary applications as partially integrated solutions in hydraulic cylinders.

Technical data:

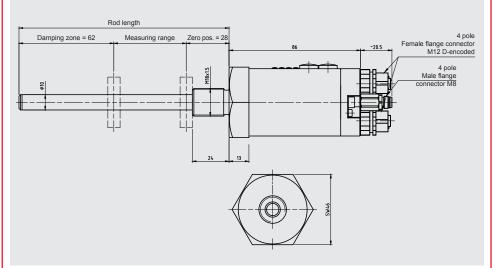
Input data		
Measuring ranges	50 4000 mm	
Model	Rod with M18x1.5 screw-in flange	
	acc. to ISO 6149 Operating pressure: ≤ 450 bar	
	Peak pressure acc. to DIN EN ISO 19879: 750 bar	
Tightening torque, recommended	≤ 50 Nm	
Material	Rod: Stainless steel 1.4571	
	Housing: Aluminium	
Output data		
Output signal	EtherCAT	
Resolution	0.001 mm ¹⁾	
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)	
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)	
Repeatability	\leq 0.005 mm - \leq 0.05 mm (depends on length)	
Temperature coefficient	≤ ± 0.0015 % FS / °C	
Sampling rate	Depending on length:	
	≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms	
	≤ 2.0 m: 1.5 ms	
	> 2.0 m: 2.0 ms	
Environmental conditions		
Operating temperature range	0 +70 °C	
Storage temperature range	-30 +85 °C	
(€ mark	EN 61000-6-1 / 2 / 3 / 4	
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g	
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g	
Protection class acc. to DIN EN 60529 2)	IP 65	
Installation position	No restrictions	
Protocol data for EtherCAT		
EtherCAT	IEC 61158-1-6, IEC 61784-2	
Physical Layer	Fast Ethernet, ISO/IEC 8802-3	
Device profile	CoE, CiA DS-406	
Transmission rate	400 4 11 111	
parameter	100 Mbit/s	
Cycle time	100 20000 μs	
Other data	041/100 + 40.0/	
Supply voltage	24 V DC ± 10 %	
Residual ripple of supply voltage	≤ 250 mV _{PP}	
Current consumption without output	≤ 300 mA	
Weight	Depending on length: 50 mm: 600 g	
Note: Reverse polarity protection of the su	4000 mm: 1500 g	

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) Other models on request

Dimensions:



Model code:

HLT 2 <u>1</u> 0 0 - <u>R1</u> - <u>E51</u> - <u>F51</u> - <u>XXXX</u> - <u>000</u>

Design / geometry type = rod

Model

R1 = rod with M18x1.5 screw-in flange

Electrical connection

E51 = 2 female M12x1, 4 pole + male M8, 4 pole

Output signal F51 = EtherCAT

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

Modification

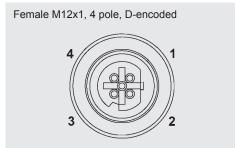
000 = standard

Accessories available: (not supplied with instrument)

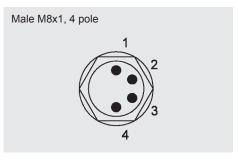
ZBL MR17.4 position magnet part no.: 6119372 position magnet part no.: 6084453 ZBL MR22 ZBL MR33 position magnet part no.: 6084207 ZBL MV63 position magnet part no.: 6084454 ZBL MU38-20 position magnet part no.: 6084455 Intermediate ring AD17.4xID13.5x5 part no.: 3903233 Intermediate ring part no.: 3887829 AD33xID13.5x5

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Port IN / Port OUT	
Transmission data +	
Receive data +	
Transmission data -	
Receive data -	
	Transmission data + Receive data + Transmission data -



Pin		
1	+U _B	
2	n.c.	
3	0 V	
4	n.c.	

Note:

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For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Internet: www.hydac.com



Linear Position Transmitter HLT 2150-R1

Magnetostrictive

For partial integration

Resolution 0.1 mm

Description:

The HLT 2150 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. A wide range of accessories such as magnets is available for individual adaptation to the particular application.

The HLT 2150 is suited for measuring ranges up to 2.5 m.

The different output signals (analogue current / voltage) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as connection to standard evaluation systems (e.g. to PLC controls).

The main fields of application for the HLT 2150 are, for example, general positioning tasks in mechanical engineering and in mobile and stationary hydraulics, as a partially integrated solution in hydraulic

Analogue

Technical data:

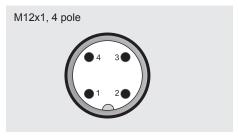
Input data			
Measuring ranges	50 2500 :	mm	
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149 Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar		
Tightening torque, recommended	50 Nm		
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301		
Output data			
Output signal, permitted load resistance	Current:	4 20 mA or 20 4 mA Load resist.: 200 500 Ω	
	Voltage:	0 10 V or 10 0 V 0.25 4.75 V or 4.75 0.25 V 0.5 9.5 V 0.5 4.5 V Load resist.: min 2 kΩ	
Resolution	12 bit, ≥ 0.1	1 mm	
Non-linearity	≤±0.05 % FS		
Hysteresis	≤ ± 0.1 % F	S	
Repeatability	≤ ± 0.1 % F		
Temperature coefficient	≤ ± 0.01 % FS / °C		
Sampling rate	2 ms		
Environmental conditions			
Operating temperature range	-40 +85 °	C	
Storage temperature range	-40 +100 °C		
Fluid temperature range	-40 +120 °C		
(€ mark	EN 61000-6-1 / 2 / 3 / 4		
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz at 5 kHz	≤ 20 g ≤ 15 g		
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g		
Protection class acc. to DIN EN 605291)	IP 67	IP 67	
Installation position	No restricti	No restrictions	
Other data			
Supply voltage	9 30 V D	C	
Residual ripple of supply voltage	≤ 250 mV _{pp}	≤ 250 mV _{pp}	
Current consumption without output	< 100 mA	< 100 mA	
Weight	Depending 50 mm: 2500 mm:	~ 400 g	
Note: Reverse polarity protection of the si	innly voltage ov	ervoltage and short circuit protection	

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

Dimensions: M18x1.5 Measuring range

Pin connections:



Pin		
1	+U _B	
2	n.c.	
3	0 V	
4	Signal	

Model code:

HLT $2 \underline{1} 5 0 - \underline{R1} - \underline{006} - \underline{XXX} - \underline{XXXX} - \underline{000}$

Design / geometry type = rod

Model

R1 = rod with M18x1.5 screw-in flange

Electrical connection

006 = male M12x1, 4 pole

Output signal

C01 = analogue 4 .. 20 mA, 3-conductor

C02 = analogue 20 .. 4 mA, 3-conductor

B01 = analogue 0 .. 10 V

B02 = analogue 10 .. 0 V

G01 = analogue 0.25 .. 4.75 V

G02 = analogue 4.75 .. 0.25 V

G03 = analogue 0.5 .. 9.5 V

G04 = analogue 0.5 .. 4.5 V

Measuring range in mm (50 .. 2500 mm)

0150 = 150 mm

Modification

000 = standard

The position magnet must be ordered separately.

Scope of delivery:

- HLT 2150
- Operating manual

Accessories available: (not supplied with instrument)

position magnet part no.: 6119372 **ZBL MR17.4** ZBL MR22 position magnet part no.: 6084453 ZBL MR33 position magnet part no.: 6084207 ZBL MV63 position magnet part no.: 6084454 Intermediate ring AD33xID13.5x5 part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 2150-R1

Magnetostrictive

For partial integration

Resolution 0.1 mm

CANopen

CANOPER

Description:

The HLT 2150 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. A wide range of accessories such as magnets is available for individual adaptation to the particular application.

The HLT 2150 is suited for measuring ranges up to 2.5 m.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The main fields of application for the HLT 2150 are, for example, general positioning tasks in mechanical engineering and in mobile and stationary hydraulics, as a partially integrated solution in hydraulic cylinders.

Technical data:

Input data	
Measuring ranges	50 2500 mm
Model	Rod with M18x1.5 screw-in flange
	acc. to ISO 6149
	Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar
Tightening torque, recommended	50 Nm
Material	Rod: Stainless steel 1.4571
Waterial	Housing: Stainless steel 1.4301
Output data	
Output signal	CANopen
Resolution	0.1 mm
Non-linearity	≤±0.02 % FS
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.1 mm
Temperature coefficient	≤ ± 0.003 % FS / °C
Sampling rate	2 ms
Environmental conditions	
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +100 °C
Fluid temperature range	-40 +120 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to	
DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g
at 5 kHz	≤ 15 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 605291)	IP 67
Installation position	No restrictions
Protocol data for CANopen	
Communication profile	CiA DS 301 V4.2
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s 1 Mbit/s acc. to DS305 V2.2
Transmission services	
- PDO	Measured value as 32 bit and float
- Transfer Node ID/baud rate	synchronous, asynchronous, cyclical
	Adjustable via LSS
Other data	12 30 V DC
Supply voltage Residual ripple of supply voltage	
	≤ 250 mV _{pp}
Current consumption without output	< 100 mA
Weight	Depending on length: 50 mm: ~ 400 g
	2500 mm: ~ 1100 g

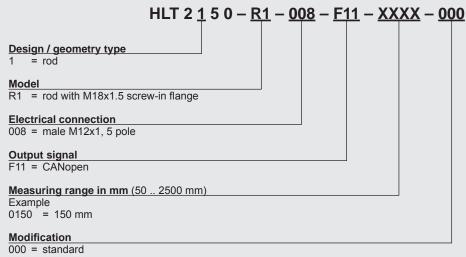
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection

are provided.

FS (Full Scale) = relative to complete measuring range

Dimensions: M18x1.5

Model code:



Measuring range

Notes:

The position magnet must be ordered separately.

Scope of delivery:

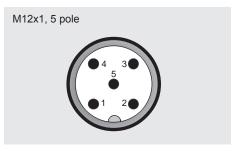
- HLT 2150
- Operating manual

Accessories available: (not supplied with instrument)

ZBL MR17.4 position magnet part no.: 6119372 ZBL MR22 position magnet part no.: 6084453 ZBL MR33 position magnet part no.: 6084207 ZBL MV63 position magnet part no.: 6084454 Intermediate ring AD33xID13.5x5 part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	0 V	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

The information in this brochure relates to the operating conditions and applications described.

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Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Linear Position Transmitter HLT 2150-R1

Magnetostrictive

For partial integration

Resolution 0.1 mm

Synchronous serial interface



Description:

The HLT 2150 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. A wide range of accessories such as magnets is available for individual adaptation to the particular application.

The HLT 2150 is suited for measuring ranges up to 2.5 m.

In the version with synchronous serial interface, the measured value is made available via synchronous and symmetrical clock and data signals.

The main fields of application for the HLT 2150 are, for example, general positioning tasks in mechanical engineering and in mobile and stationary hydraulics, as a partially integrated solution in hydraulic cylinders.

Technical data:

Invest data	
Input data	50 0500
Measuring ranges	50 2500 mm
Model	Rod with M18x1.5 screw-in flange acc. to ISO 6149
	Operating pressure: ≤ 450 bar
	Peak pressure acc. to DIN EN ISO 19879: 630 bar
Tightening torque, recommended	50 Nm
Material	Rod: Stainless steel 1.4571
	Housing: Stainless steel 1.4301
Output data	
Output signal	SSI
Resolution	0.1 mm
Non-linearity	≤ ± 0.02 % FS
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.1 mm
Temperature coefficient	≤ ± 0.003 % FS / °C
Sampling rate	2 ms
Environmental conditions	
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +100 °C
Fluid temperature range	-40 +120 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to	
DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g
at 5 kHz	≤ 15 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g
Protection class acc. to DIN EN 60529¹)	IP 67
Installation position	No restrictions
Relevant data for SSI	NO TESTITICTIONS
SSI clock input	Optocoupler
SSI data output	RS 422, 2-wire
SSI clock frequency	95 1000 kHz
SSI monotime, typical	20 µs
Other data	20 μs
	12 30 V DC
Supply voltage	
Residual ripple of supply voltage	≤ 250 mV _{pp} < 100 mA
Current consumption without output	
Weight	Depending on length: 50 mm: ~ 400 g
	2500 mm: ~ 1100 g

Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection

FS (Full Scale) = relative to complete measuring range

Dimensions: M18x1.5 Measuring range

Model code:



= rod with M18x1.5 screw-in flange

Electrical connection

00P = male M12x1, 8 pole

Output signal S16 = SSI

Measuring range in mm (50 .. 2500 mm)

Example

0150 = 150 mm

Code

B24 = binary code 24 bit

B25 = binary code 25 bit

G24 = Gray code 24 bit

G25 = Gray code 25 bit

System resolution

100 = 100 μm

200 = 200 μm $300 = 300 \, \mu m$

Modification

000 = standard

The position magnet must be ordered separately.

Scope of delivery:

• HLT 2150

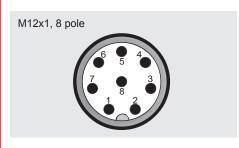
Operating manual

Accessories available: (not supplied with instrument)

ZBL MR17.4 position magnet part no.: 6119372 ZBL MR22 position magnet part no.: 6084453 part no.: 6084207 ZBL MR33 position magnet position magnet ZBL MV63 part no.: 6084454 Intermediate ring AD33xID13.5x5 part no.: 3887829

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	Signal	Description
1	Ground IN	Ground
2	Supply Voltage IN	Supply voltage
3	SSI_ClockIN	Clock input -
4	SSI_Clock+_IN	Clock input +
5	SSI_DATAOUT	Data output -
6	SSI_DATA+_OUT	Data output +
7	not connected	
8	not connected	

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 2102 / HLT 2103

Magnetostrictive

For partial integration

Resolution 0.04 mm

Description:

The linear position transmitters with a multiredundant measuring system HLT 2102 (double redundancy) and HLT 2103 (triple redundancy) were particularly designed for applications where access to the built-in measuring systems is extremely difficult, which increases the requirements for the availability and the safety of the system.

The measuring systems HLT 2102 and HLT 2103 are designed with 2 or 3 independent sensor elements which enables separate utilisation of each element or use in safety circuits, for example as a system with double or triple redundancy.

The linear position sensors are available for measuring ranges up to 2 m. The measured values are given out via an analogue output signal. External set inputs for the analogue start point and end point offer an additional possibility of a customised adjustment.

The main fields of application for the HLT 2102 and HLT 2103 are, for example, general positioning tasks in stationary hydraulics, as a partially integrated solution in hydraulic cylinders.

Double or triple redundancy Analogue

Technical data:

Input data		
Measuring ranges 1)	50 2000 mm	
Model	Rod with M18x1.5 screw-in flange	
	acc. to ISO 6149	
	Operating pressure: ≤ 600 bar Peak pressure acc. to DIN EN ISO 19879: 750 bar	
Tightening torque, recommended	50 Nm	
Material	Rod: Stainless steel 1.4571	
Waterial	Housing: Stainless steel 1.4301	
Output data		
Output signal, permitted load resistance	4 20 mA or 0 20 mA, load resist.: 200 500 Ω	
Resolution	16 bit; 0.04 mm	
Non-linearity	± 0.10 mm (measuring range ≤ 1500 mm)	
	± 0.15 mm (measuring range > 1500 mm)	
Hysteresis	± 0.02 mm (measuring range ≤ 1500 mm) ± 0.1 mm (measuring range > 1500 mm)	
Repeatability	0.04 mm	
Temperature coefficient	≤ ± 0.004 % FS / °C	
Sampling rate	Depending on length:	
	1.5 ms (measuring range ≤ 500 mm)	
	3.0 ms (measuring range 500 2000 mm) 4.5 ms (measuring range > 2000 mm)	
Environmental conditions		
Operating temperature range	0 +70 °C, optionally -20 +70 °C	
Storage temperature range	-30 +85 °C	
(€ mark	EN 61000-6-1 / 2 / 3 / 4	
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g	
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 100 g	
Protection class acc. to DIN EN 60529 2)	IP 65	
Installation position	No restrictions	
Other data		
Supply voltage	24 V DC ± 10 %	
Residual ripple of supply voltage	≤ 250 mV _{pp}	
Current consumption without output	≤ 100 mA per channel	
Weight	Depending on length:	
	50 mm: ~ 800 g	
	2000 mm: ~1400 g	

Note:

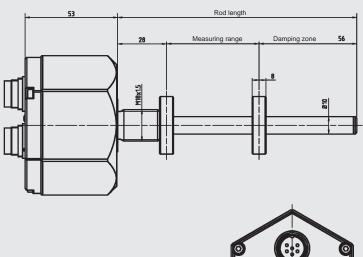
Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) Other measuring lengths on request.

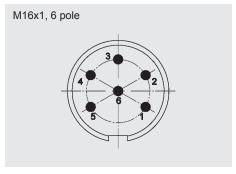
EN 18.094.0/02.18

Dimensions:



6pol. M16

Pin connections:



Pin	(each connector)
1	Signal
2	0 V (analogue output)
3	Set input start point
4	Set input end point
5	+U _B
6	0 V

Model code:

HLT 2 <u>1</u> 0 <u>X</u> - <u>R1</u> - <u>M06</u> - <u>XXX</u> - <u>XXXX</u> - <u>000</u> Design / geometry type

= rod

Output variants

= double redundancy = triple redundancy

R1 = rod with M18x1.5 screw-in flange

Electrical connection

M06 = male M16, 6 pole

Output signal

C01 = analogue 4 .. 20 mA, 3-conductor E01 = analogue 0 .. 20 mA, 3-conductor

Measuring range in mm (50 .. 2000 mm in steps of 50 mm)

Example

0150 = 150 mm

Modification

000 = standard

Accessories available: (not supplied with instrument)

ZBL MR33 position magnet part no.: 6084207 part no.: 6084453 ZBL MR22 position magnet part no.: 6119372 **ZBL MR17.4** position magnet

More detailed information on accessories as well as on further accessories, such as intermediate rings and mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Linear Position Transmitter HLT 1100-R2

Magnetostrictive

For full integration

Resolution min. 0.1 mm

Analogue **Increased Functional Safety**



Description:

This version of the linear position sensor HLT 1100 has been developed specifically for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to SIL 2 (IEC 61508) or PL d (ISO 13849).

The sensor works on the principle of magnetostriction. This measuring principle determines with high accuracy the position, distance and/or speed and is based on elapsed time measurement.

Based on this non-contact and wear-free measuring system, HYDAC offers this version in a pressure-resistant stainless steel housing For full integration in hydraulic

Technical data:

Innut data

Input data	
Measuring ranges	200 2500 mm
Model	Rod Ø 10 mm for cylinder full integration ¹) Operating pressure: ≤ 450 bar Peak pressure acc. to DIN EN ISO 19879: 630 bar
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301
Seal	O-ring: NBR Backup ring: PTFE
Output data	
Output signal, permitted load resistance	4 20 mA, load resist.: 200 500 Ω
Resolution	12 bit, min. 0.1 mm
Non-linearity	≤ ± 0.05 % FS
Hysteresis	≤ ± 0.1 % FS
Repeatability	≤ ± 0.1 % FS
Temperature coefficient	≤ ± 0.01 % FS / °C
Sampling rate	≤ 30 ms (10 90 %)
Environmental conditions	
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +100 °C
Fluid temperature range	-40 +120 °C
(f mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to	
DIN EN 60068-2-6 at 5 8.2 Hz at 8.2 150 Hz	≤ 7.5 mm ≤ 2.0 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 20 g
Protection class acc. to DIN EN 60529	IP 67 (cable outlet) IP 6K9K ²⁾ (separate male flange connector M12x1)
Installation position	No restrictions
Safety-related data	
Performance level	
Based on	DIN EN ISO 13849-1:2008
PL	d
Architecture	Category 2
Safety Integrity Level	
Based on	DIN EN 61508:2002
SIL	2
Other data	
Supply voltage	9 36 V DC
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 100 mA
Weight	Depending on length: 100 mm (with 1 m cable): ~310 g 2500 mm (with 1 m cable): ~1030 g
Note: Reverse polarity protection of the supr	oly voltage, overvoltage and short circuit protection

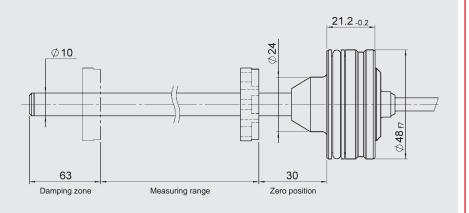
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) Other variants available on request.

EN 18.372.1.1/02.18

Dimensions:



Model code:

HLT 1 $\underline{1}$ 0 0 - $\underline{R2}$ - \underline{XXX} - $\underline{C01}$ - \underline{XXXX} - $\underline{S2PD}$ - $\underline{000}$

Design / geometry type

= rod

Model

= rod for cylinder full integration R2

Electrical connection

Cable output

K01 = jacketed cable, length 1 m = jacketed cable, length 2 m K05 = jacketed cable, length 5 m = jacketed cable, length 10 m

Separate male flange connector M12x1, 4 pole

L06 = 60 mm lead length L18 = 180 mm lead length = 240 mm lead length L24

Output signal

= analogue 4 .. 20 mA, 3-conductor

Measuring range in mm (200 .. 2500 mm)

Example

0250 = 250 mm

Functional safety

S2PD = SIL 2 acc. to IEC 61508

and PLd - Cat 2 acc. to DIN EN 13849-1

Modification

000 = standard

003 = modified pin assignment

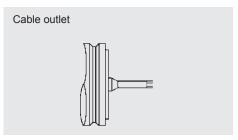
004 = modified pin assignment

Accessories available: (not supplied with instrument)

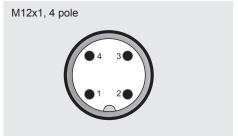
ZBL MR17.4 position magnet part no.: 6119372 ZBL MR22 position magnet part no.: 6084453 ZBL MR33 part no.: 6084207 position magnet

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Lead		
brown	+U _B	
white	0 V	
green	Signal	



Pin	Mod. 000	Mod. 003	Mod. 004
1	+U _B	+U _B	n.c.
2	n.c.	Signal	+U _B
3	0 V	0 V	0 V
4	Signal	n.c.	Signal

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 1100-R2

Magnetostrictive

For full integration

Resolution min. 0.1 mm

CANopen Safety Increased Functional Safety



Description:

This version of the linear position sensor HLT 1100 has been developed specifically for use in safety circuits / safety functions as part of the functional safety of machinery and equipment up to SIL 2 (IEC 61508) or PL d (ISO 13849).

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Based on this non-contact and wear-free measuring system, HYDAC offers this version in a pressure-resistant stainless steel housing For full integration in hydraulic cylinders.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

Technical data:

Input data	
Measuring ranges	200 2500 mm
Model	Rod Ø 10 mm for cylinder full integration 1)
	Operating pressure: ≤ 450 bar
	Peak pressure acc. to DIN EN ISO 19879: 630 bar
Material	Rod: Stainless steel 1.4571 Housing: Stainless steel 1.4301
Seal	O-ring: NBR
CCAI	Backup ring: PTFE
Output data	
Output signal	CANopen Safety
Resolution	0.1 mm
Non-linearity	≤ ± 0.02 % FS
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.1 mm
Temperature coefficient	≤ ± 0.003 % FS / °C
Sampling rate	≤ 10 ms (0 100 %)
Environmental conditions	,
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +100 °C
Fluid temperature range	-40 +120 °C
(f mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to	
DIN EN 60068-2-6 at 5 8.2 Hz	≤ 7.5 mm
at 8.2 150 Hz	≤ 2.0 g
Shock resistance acc. to	≤ 50 g
DIN EN 60068-2-27 (11 ms)	
Protection class acc. to DIN EN 60529	IP 67 (cable outlet) IP 6K9K ²⁾ (separate male flange connector
	M12x1)
Installation position	No restrictions
Protocol data for CANopen	
Communication profile	CiA DS 301 V4.2 / DS 304 V1.0.1
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s 1 Mbit/s acc. to DS305 V2.2
Transmission services	
- PDO	Measured value as 32 bit and float
- Transfer	synchronous, asynchronous, cyclical
Node ID/baud rate	Adjustable via LSS
Safety-related data	
Performance level	
Based on	DIN EN ISO 13849-1:2008
PL	d
Architecture	Category 2
Safety Integrity Level	
Based on	DIN EN 61508:2002
SIL	2
Other data	
Supply voltage	9 36 V DC
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 100 mA
Weight	Depending on length:
	100 mm (with 1 m cable): ~310 g 2500 mm (with 1 m cable): ~1030 g
Note: Reverse polarity protection of the supply are provided.	voltage, overvoltage and short circuit protection

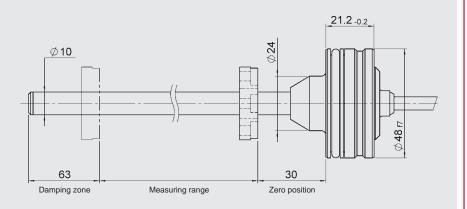
are provided.

FS (Full Scale) = relative to complete measuring range

1) Other variants available on request.

EN 18.372.2.0/02.18

Dimensions:



Model code:

HLT 1 $\underline{1}$ 0 0 - $\underline{R2}$ - \underline{XXX} - $\underline{F13}$ - \underline{XXXX} - $\underline{S2PD}$ - $\underline{000}$

Design / geometry type

= rod

Model

= rod for cylinder full integration R2

Electrical connection

Cable output

K01 = jacketed cable, length 1 m = jacketed cable, length 2 m

K05 = jacketed cable, length 5 m = jacketed cable, length 10 m

Separate male flange connector M12x1, 5 pole

L06 = 60 mm lead length

L18 = 180 mm lead length

= 240 mm lead length L24

Output signal

F13 = CANopen Safety

Measuring range in mm (200 .. 2500 mm)

Example

0250 = 250 mm

Functional safety

S2PD = SIL 2 acc. to IEC 61508

and PLd - Cat 2 acc. to DIN EN 13849-1

Modification

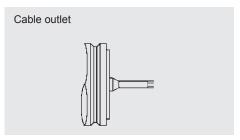
000 = standard

Accessories available: (not supplied with instrument)

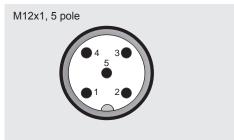
ZBL MR17.4 position magnet part no.: 6119372 ZBL MR22 part no.: 6084453 position magnet ZBL MR33 position magnet part no.: 6084207

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Lead		
brown	+U _B	
white	0 V	
green	CAN_L	
yellow	CAN_H	



Pin	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	0 V	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Linear Position Transmitter HLT 724 for series applications

Magnetic-inductive

For full integration

Resolution 0.1 %

Customised designs thanks to diverse electrical connections Analogue

Description:

The the sensor's measuring principle for determination of position or distance is based on magnetic-inductive measurement.

Based on this non-contact and wear-free measuring system, HYDAC offers a version in a pressure-resistant housing For full integration in hydraulic cylinders.

The different output signals (analogue) enable connection to all HYDAC **ELECTRONIC GmbH measurement and** control devices as well as connection to standard evaluation systems (e.g. to PLC controls).

The main fields of application are in mobile hydraulics.

Technical data:

Institute de Co		
Input data	50, 400	
Measuring ranges	50 400 mm	
Model	Rod Ø 8 mm, sensor head Ø 24 mm ¹⁾ for cylinder full integration	
	Operating pressure: ≤ 450 bar	
	Peak pressure acc. to DIN EN ISO 19879:	630 bar
Material	Rod: Stainless steel 1.4571	
	Housing: Stainless steel 1.4057	
Seal	O-ring: PU P5008	
Output data		
Output signal, permitted load resistance	Current: 4 20 mA, 3-conducto	r
	20 4 mA, 3-conducto Load resist.: 200 500	
	Voltage: 0.25 4.75 V, 4.75 0	
	0.5 4.5 V, 4.5 0.5 V	
	Load resist.: min. 2 kΩ	
Resolution	0.1 % FS	
Non-linearity	≤±1%FS	
Hysteresis	≤ ± 0.25 % FS	
Repeatability	≤ ± 0.125 % FS	
Sampling rate	≤ 20 ms (10 90 %)	
Environmental conditions		
Operating temperature range	-40 +85 °C	
Storage temperature range	-55 +105 °C	
Fluid temperature range	-40 +120 °C	
(€ mark	EN 61000-6-1 / 2 / 3 / 4	
Vibration resistance acc. to		
DIN EN 60068-2-6 at 10 90 Hz	≤ 1.5 mm	
at 91 2000 Hz	≤ 17 g ≤ 50 q	
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)	≤ 50 g	
Protection class acc. to DIN EN 60529	IP 67 (single leads)	
	IP 6K9K (separate male flange connecto	
	separate male connector Molex in cor	
	with ZBE 50 (accessory male flange DT04-3p Molex))	connector
Installation position	No restrictions	
Other data	NO restrictions	
Electrical connection	Single leads 3 x 0.25 mm ²	
Liectrical confrection	Separate male flange connector M12x1	4 pole
	Separate male connector Molex, 3 pole	,
Supply voltage (Vin) nominal	9 32 V DC	
Residual ripple of supply voltage	≤ 5 %	
Power consumption without output	≤ 320 mW	
Weight	(dependent on measuring range and lea	ad lengths)
	50 mm: ~50 g	- ,
N	400 mm: ~130 g	

Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

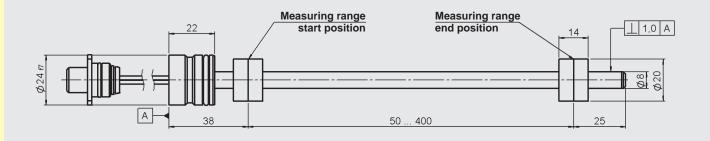
FS (Full Scale) = relative to complete measuring range

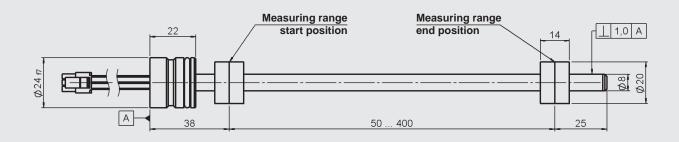
1) Further head diameters available on request.

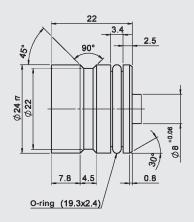
EN 18.095.0/02.18

Dimensions:









Order details:

The linear position transmitter HLT 724 has been specially developed for OEM customers and is available for minimum order quantities of 500 units per type.

For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

Note:

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Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Linear Position Transmitter HLT 2500-L2

Magnetostrictive

For external mount

Resolution 5 µm

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slides or with a sliding magnet for positioning by the operator.

The different output signals (analogue current / voltage) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as standard evaluation systems (e.g. PLC controls)

External set inputs for the analogue start point and end point offer an additional possibility of a customised adjustment.

The HLT 2500-L2 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

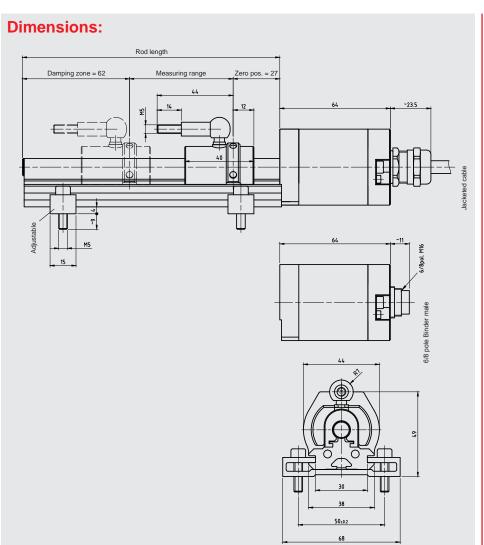
Analogue

Technical data:

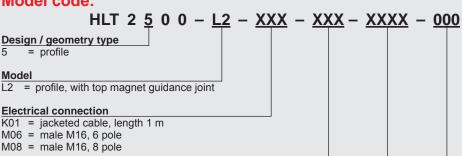
Input data		
Measuring ranges	50 4000 mr	n
Model	Profile, with top magnet guidance joint	
Housing	Measuring body: Aluminium	
Output data	'	
Output signal, permitted load resistance	Current:	4 20 mA or 20 4 mA Load resist. 200 500 Ω
	Voltage:	$0 \dots 10 \ V$ or $10 \dots 0 \ V$ Load resist.: min. $2 \ k\Omega$
Resolution	16 bit; ≥ 0.00	5 mm
Non-linearity	± 0.1 mm ± 0.15 mm	(measuring range ≤ 1500 mm) (measuring range > 1500 mm)
Hysteresis	0.02 mm 0.1 mm	(measuring range ≤ 1500 mm) (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)	
Temperature coefficient	≤ ± 0.004 % F	FS / °C
Sampling rate	Depending or ≤ 1 m: 0.5 ms ≤ 2 m: 1.0 ms > 2 m: 1.5 ms	3 3
Environmental conditions		
Operating temperature range	0 +70 °C:	optionally -20 +70 °C
Storage temperature range	-30 +85 °C	
(€ mark	EN 61000-6-1	1/2/3/4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g	
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g	
Protection class acc. to DIN EN 60529 1)	IP 65	
Installation position	No restriction	S
Other data		
Supply voltage	24 V DC ± 10) %
Residual ripple of supply voltage	≤ 250 mV _{PP}	
Current consumption without output	< 100 mA	
Weight	Depending or 50 mm: 4 4000 mm: 40	50 g 50 g
Note: Doverse polarity protection of the cupr	du voltago overv	altage and short sirewit protection

Reverse polarity protection of the supply voltage, overvoltage and short circuit protection Note: are provided.

FS (Full Scale) = relative to complete measuring range



Model code:



Output signal

C01 = analogue 4 .. 20 mA, 3-conductor

C02 = analogue 20 .. 4 mA, 3-conductor B01 = analogue 0 .. 10 V

B02 = analogue 10 .. 0 V

Measuring range in mm (50 .. 4000 mm)

Example

 $0150 = 150 \, \text{mm}$

Modification

000 = standard

Accessories: (supplied with instrument)

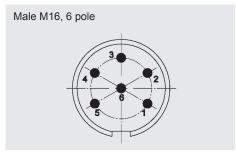
ZBL MS35-39 magnet slide part no.: 6105654

Accessories: (not supplied with instrument)

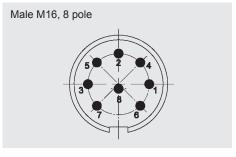
part no.: 6084454 ZBL MV63 position magnet ZBL MU38-20 position magnet part no.: 6084455 ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	
1	Signal
2	0 V (analogue output)
3	Start point
4	End point
5	0 V
6	+U _B



Pin	
1	n.c.
2	0 V (analogue output)
3	Start point
4	End point
5	Signal
6	0 V
7	+U _B
8	n.c.

Cable outlet

Lead	
brown	0 V (analogue output)
green	Start point
yellow	End point
grey	Signal
pink	0 V
blue	+U _B

Note:

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Subject to technical modifications.

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Linear Position Transmitter HLT 2500-L2

Magnetostrictive

For external mount

Resolution 1 µm

CANopen

CANOPER

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slide or with a sliding magnet for positioning by the operator.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

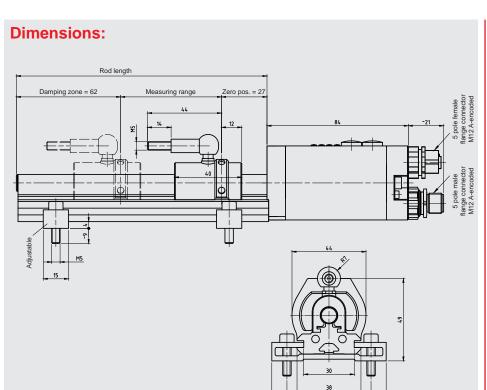
The HLT 2500-L2 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

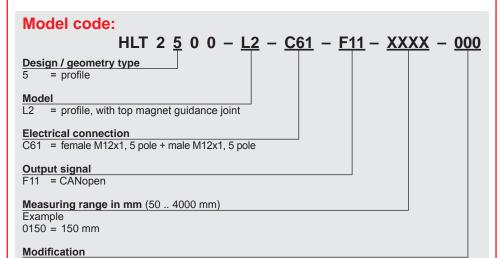
Technical data:

Input data	
Measuring ranges	50 4000 mm
Model	Profile, with top magnet guidance joint
Housing	Measuring body: Aluminium
Output data	
Output signal	CANopen
Resolution	0.001 mm
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	\leq 0.005 mm - \leq 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1.0 m: 1.0 ms ≤ 1.5 m: 1.5 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 3.0 ms
Environmental conditions	
Operating temperature range	0 +70 °C; optionally -20 +70 °C
Storage temperature range	-30 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 1)	IP 65
Installation position	No restrictions
Protocol data for CANopen	
CANopen	EN 50325-4
Bus connection	ISO 11898-1, ISO 11898-2
CAN Specification 2.0 A	11-bit identifier
Device profile for encoder	CiA DS406
Layer Setting Services, LSS	CiA DS305
Layer Management Services, LMT	CiA DS205-1, DS205-2
Transmission rate parameter	10, 20, 50, 100, 125, 250, 500, 800, 1000 kbit/s Default: 500 kbit/s
Adjustability	via DIP switch via LS service, LMT service
Other data	
Supply voltage	24 V DC -20 +10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 150 mA
Weight	Depending on length: 50 mm: 450 g 4000 mm: 4150 g

Reverse polarity protection of the supply voltage, overvoltage and short circuit protection Note: are provided.

FS (Full Scale) = relative to complete measuring range





Accessories: (supplied with instrument) ZBL MS35-39 magnet slide

000 = standard

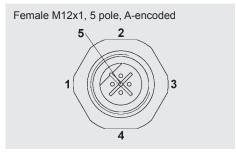
magnet slide part no.: 6105654

Accessories: (not supplied with instrument)

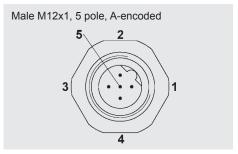
ZBL MV63 position magnet part no.: 6084454 ZBL MU38-20 part no.: 6084455 position magnet ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	CANopen_OUT	
1	Housing	Shield/housing
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low



Pin	CANopen_IN	
1	Housing	Shield/housing
2	+U _B	Supply +
2 3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Linear Position Transmitter HLT 2500-L2

Magnetostrictive

For external mount

Resolution 1 µm

Profibus

PROFI

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slide or with a sliding magnet for positioning by the operator.

In the Profibus version, the measured value is digitised and made available to the field bus system via the Profibus protocol.

The HLT 2500-L2 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

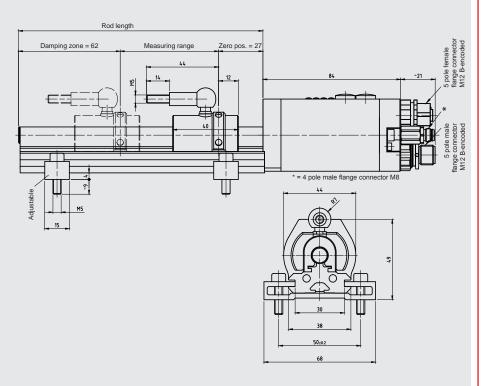
Technical data:

Input data	
Measuring ranges	50 4000 mm
Model	Profile, with top magnet guidance joint
Housing	Measuring body: Aluminium
Output data	
Output signal	Profibus
Resolution	0.001 mm
Non-linearity	\pm 0.1 mm (measuring range \leq 1500 mm) \pm 0.15 mm (measuring range $>$ 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1.0 m: 1.0 ms ≤ 1.5 m: 1.5 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 3.0 ms
Environmental conditions	
Operating temperature range	0 +70 °C; optionally -20 +70 °C
Storage temperature range	-30 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 1)	IP 65
Installation position	No restrictions
Protocol data for Profibus	
Profibus DP V0	IEC 61158, IEC 61784
PNO encoder profile	Class 1 and 2
Transmission rate	
parameter	9.6 12000 kbit/s
Other data	
Supply voltage	24 V DC -20 +10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 150 mA
Weight	Depending on length: 50 mm: 450 g 4000 mm: 4150 g

Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

Dimensions:



Model code:



Design / geometry type
5 = profile = profile

Model

= profile, with top magnet guidance joint

Electrical connection

P61 = female M12x1, 5 pole + male M12x1, 5 pole

+ male M8, 4 pole

Output signal F41 = Profibus

Measuring range in mm (50 .. 4000 mm)

Example 0150 = 150 mm

Modification

000 = standard

Accessories: (supplied with instrument)

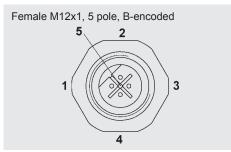
ZBL MS35-39 magnet slide part no.: 6105654

Accessories: (not supplied with instrument)

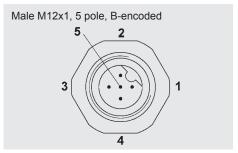
ZBL MV63 position magnet part no.: 6084454 ZBL MU38-20 part no.: 6084455 position magnet ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

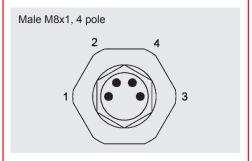
Pin connections:



Pin	Profibus_OUT
1	VP, +5 V DC
2	Profibus, Data A
3	0 V
4	Profibus, Data B
5	n.c.
screw connection	Shield/housing



Profibus_IN
n.c.
Profibus, Data A
n.c.
Profibus, Data B
n.c.
Shield/housing



Profibus_IN	
+U _B	
n.c.	
0 V	
n.c.	
	+U _B n.c. 0 V

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Linear Position Transmitter HLT 2500-L2

Magnetostrictive

For external mount

Resolution 1 µm

Synchronous serial interface



Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slide or with a sliding magnet for positioning by the operator.

In the version with synchronous serial interface, the measured value is made available via synchronous and symmetrical clock and data signals.

The HLT 2500-L2 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

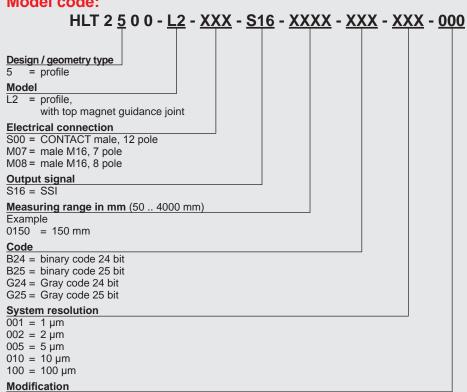
Input data	
Measuring ranges	50 4000 mm
Model	Profile, with top magnet guidance joint
Housing	Measuring body: Aluminium
Output data	
Output signal	SSI
Resolution	0.001 mm
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1.0 m: 0.50 ms ≤ 1.5 m: 0.75 ms ≤ 2.0 m: 1.00 ms > 2.0 m: 2.00 ms
Environmental conditions	
Operating temperature range	0 +70 °C; optionally -20 +70 °C
Storage temperature range	-30 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 1)	IP 65
Installation position	No restrictions
Relevant data for SSI	
SSI clock input	Optocoupler
SSI data output	RS-422, 2-wire
SSI clock frequency	95 1000 kHz
SSI monotime, typical	20 µs
Other data	
Supply voltage	24 V DC -20 + 10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 250 mA
Weight	Depending on length: 50 mm: 450 g 4000 mm: 4150 g

Reverse polarity protection of the supply voltage, overvoltage and short circuit protection

FS (Full Scale) = relative to complete measuring range

Dimensions: Damping zone = 62 Measuring range Zero pos. = 27

Model code:



000 = standard

Accessories: (supplied with instrument) ZBL MS35-39 magnet slide part no.: 6105654

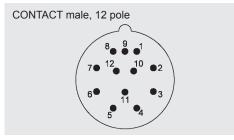
Accessories: (not supplied with instrument)

ZBL MV63 position magnet part no.: 6084454 ZBL MU38-20 position magnet part no.: 6084455 ZBL mounting kit part no.: 6105653

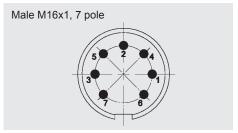
More detailed information on accessories as well as on further accessories, such as mating

connectors, can be found in the Accessories brochure.

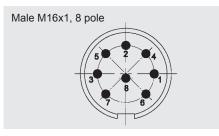
Pin connections:



Pin	
1	SSI_ClockIN
2	SSI_Clock+_IN
3	SSI_DATA+_OUT
4	SSI_DATAOUT
5	RS 485 +_IN/OUT
6	RS 485IN/OUT
7	n.c.
8	Direction IN
9	Preset1_IN
10	n.c.
11	+U _B _ IN
12	0 V _IN
	'



Pin	Signal	Description
1	SSI_DATAOUT	Data output -
2	SSI_DATA+_OUT	Data output +
3	SSI_Clock+_IN	Clock input +
4	SSI_ClockIN	Clock input -
5	Supply Voltage IN	Supply voltage
6	Ground IN	Ground
7	not connected	



Pin	Signal	Description
1	SSI_Clock+_IN	Clock input +
2	SSI_DATA+_OUT	Data output +
3	SSI_ClockIN	Clock input -
4	Ser.Program+_IN/OUT	Ser. programming interface RS485
5	SSI_DATAOUT	Data output -
6	Ground IN	Ground
7	Supply Voltage IN	Supply voltage
8	Ser.ProgramIN/OUT	Ser. programming interface RS485

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department

Subject to technical modifications.

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Linear Position Transmitter HLT 2500-L2

Magnetostrictive

For external mount

Resolution 1 µm

EtherCAT

EtherCAT.

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a version in an aluminium profile housing with external measuring slide or with a sliding magnet for positioning by the operator.

In the EtherCAT version, the measured value is digitised and made available to the field bus system via the EtherCAT protocol.

The HLT 2500-L2 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

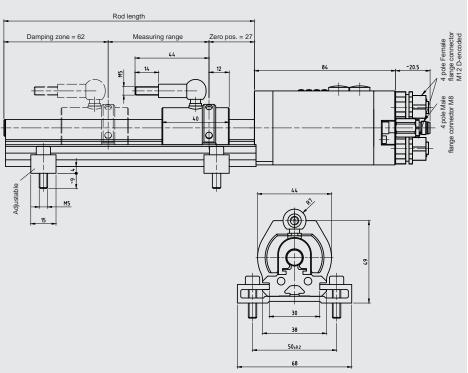
Technical data:

Model Housing Output data Output signal Resolution Non-linearity Hysteresis Repeatability Temperature coefficient Sampling rate	50 4000 mm Profile, with top magnet guidance joint Measuring body: Aluminium EtherCAT 0.001 mm ± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm) 0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm) ≤ 0.05 mm - ≤ 0.05 mm (depends on length) ≤ ± 0.0015 % FS / °C Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
Housing Output data Output signal Resolution Non-linearity Hysteresis Repeatability Temperature coefficient Sampling rate	Measuring body: Aluminium EtherCAT 0.001 mm ± 0.1 mm
Output data Output signal Resolution Non-linearity Hysteresis Repeatability Temperature coefficient Sampling rate	EtherCAT 0.001 mm ± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm) 0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm) ≤ 0.005 mm - ≤ 0.05 mm (depends on length) ≤ ± 0.0015 % FS / °C Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
Output signal Resolution Non-linearity Hysteresis Repeatability Temperature coefficient Sampling rate	0.001 mm ± 0.1 mm ± 0.1 mm ± 0.15 mm (measuring range ≤ 1500 mm) 0.02 mm 0.1 mm (measuring range ≤ 1500 mm) (measuring range ≤ 1500 mm) (measuring range ≤ 1500 mm) ≤ 0.005 mm - ≤ 0.05 mm (depends on length) ≤ ± 0.0015 % FS / °C Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
Resolution Non-linearity Hysteresis Repeatability Temperature coefficient Sampling rate	0.001 mm ± 0.1 mm ± 0.1 mm ± 0.15 mm (measuring range ≤ 1500 mm) 0.02 mm 0.1 mm (measuring range ≤ 1500 mm) (measuring range ≤ 1500 mm) (measuring range ≤ 1500 mm) ≤ 0.005 mm - ≤ 0.05 mm (depends on length) ≤ ± 0.0015 % FS / °C Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
Non-linearity Hysteresis Repeatability Temperature coefficient Sampling rate	\pm 0.1 mm (measuring range ≤ 1500 mm) \pm 0.15 mm (measuring range > 1500 mm) 0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm) ≤ 0.005 mm - ≤ 0.05 mm (depends on length) ≤ \pm 0.0015 % FS / °C Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 2.0 ms
Hysteresis Repeatability Temperature coefficient Sampling rate	± 0.15 mm (measuring range > 1500 mm) 0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm) ≤ 0.005 mm - ≤ 0.05 mm (depends on length) ≤ ± 0.0015 % FS / °C Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
Repeatability Temperature coefficient Sampling rate	0.1 mm (measuring range > 1500 mm) ≤ 0.005 mm - ≤ 0.05 mm (depends on length) ≤ ± 0.0015 % FS / °C Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
Temperature coefficient Sampling rate	≤ ± 0.0015 % FS / °C Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
Sampling rate	Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
	≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms
	0 +70 °C: ontionally -20 +70 °C
Environmental conditions	0 +70 °C: ontionally -20 +70 °C
Operating temperature range	0 :: 170 0; optionally 20 :: 170 0
Storage temperature range	-30 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 1)	IP 65
Installation position	No restrictions
Protocol data for EtherCAT	
	IEC 61158-1-6, IEC 61784-2
Physical Layer	Fast Ethernet, ISO/IEC 8802-3
Device profile	CoE, CiA DS-406
Transmission rate parameter	100 Mbit/s
Cycle time	100 20000 μs
Other data	
Supply voltage	24 V DC -20 +10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 300 mA
	Depending on length: 50 mm: 450 g 4000 mm: 4150 g

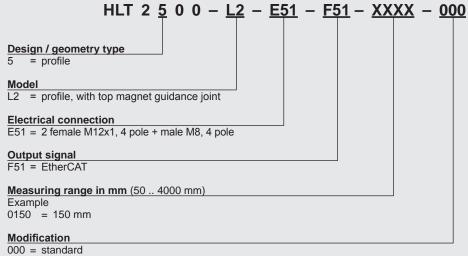
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

Dimensions:



Model code:



Accessories: (supplied with instrument)

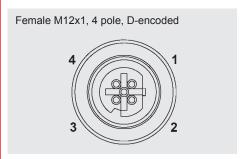
ZBL MS35-39 magnet slide part no.: 6105654

Accessories: (not supplied with instrument)

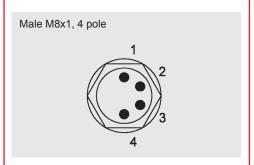
ZBL MV63 position magnet part no.: 6084454 part no.: 6084455 ZBL MU38-20 position magnet ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



on data +
ta +
on data -
ta -



Pin		
1	+U _B	
2	n.c.	
3	0 V	
4	n.c.	

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Linear Position Transmitter HLT 2550-L2

Magnetostrictive

For external mount

Resolution 0.05 mm

Description:

The HLT 2550 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. The measuring profile can be individually adapted to various mounting conditions by means of spacers.

The HLT 2550 is suited for measuring ranges up to 3 m.

The different output signals (analogue current / voltage) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as connection to standard evaluation systems (e.g. to PLC

The main fields of application for the HLT 2550 are, for example, general positioning tasks in mechanical engineering and in stationary hydraulics, or as a wear-free alternative for existing measuring equipment such as potentiometers.

Analogue

Technical data:

Input data	
Measuring ranges 1)	30 3000 mm in steps of 50 mm
Model	Profile, with top magnet guidance joint
Material	Measuring body: Aluminium
Output data	
Output signal, permitted load resistance	Current: 4 20 mA or 20 4 mA Load resist.: 200 500 Ω
	Voltage: 0 10 V or 10 0 V Load resist.: min. 2 kΩ
Resolution	12 bit, ≥ 0.05 mm
Non-linearity	≤ ± 0.01 % FS, ≥ 0.06 mm
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.005 % FS, ≥ 0.05 mm
Temperature coefficient	≤ ± 0.01 % FS / °C typ.
Sampling rate	Depending on length: 0.5 ms (measuring range ≤ 1200 mm) 1.0 ms (measuring range ≤ 2400 mm) 2.0 ms (measuring range ≤ 3000 mm)
Environmental conditions	
Operating temperature range	-20 +75 °C, optionally -40 +75 °C
Storage temperature range	-30 +85 °C
C € mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 2)	IP 67
Installation position	No restrictions
Other data	
Supply voltage	24 V DC ± 20 %
Residual ripple of supply voltage	≤ 250 mVpp
Current consumption without output	< 100 mA
Weight	Depending on length: 30 mm: ~ 300 g 3000 mm: ~ 3900 g
Note: Reverse polarity protection of the supply	voltage excess voltage

Reverse polarity protection of the supply voltage, excess voltage and short circuit protection are provided.

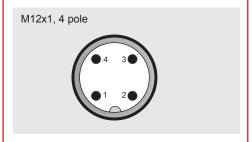
FS (Full Scale) = relative to complete measuring range Note:

¹⁾ Other measuring ranges on request.

²⁾ With mounted mating connector in corresponding protection class

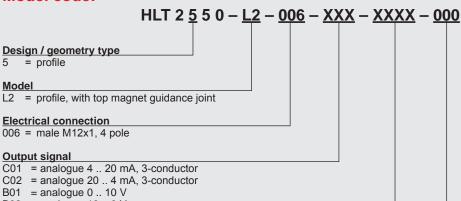
Dimensions: Rod length Damping zone = 62 Damping zone = 27 Measuring range Adjustable 50,

Pin connections:



Pin		
1	+U _B	
2	n.c.	
3	0 V	
4	Signal	

Model code:



B02 = analogue 10 .. 0 V

Measuring range in mm (30 .. 3000 mm in steps of 50 mm) Example

0130 = 130 mm

Modification

000 = standard

The position magnet must be ordered separately.

Scope of delivery:

- HLT 2550
- Operating manual

Accessories: (not supplied with instrument)

ZBL MVS35-39 part no.: 6105654 magnet slide ZBL MV63 position magnet part no.: 6084454 ZBL MF38-18 position magnet part no.: 6084456 ZBL MU38-20 position magnet part no.: 6084455 Mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

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Linear Position Transmitter HLT 2550-L2

Magnetostrictive

For external mount

Resolution 0.05 mm

CANopen

CANOPER

Description:

The HLT 2550 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. The measuring profile can be individually adapted to various mounting conditions by means of spacers.

The HLT 2550 is suited for measuring ranges up to 3 m.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The main fields of application for the HLT 2550 are, for example, general positioning tasks in mechanical engineering and in stationary hydraulics, or as a wearfree alternative for existing measuring equipment such as potentiometers.

Technical data:

ModelProfile, with topMaterialMeasuring bodyOutput dataCANopenResolution 0.05 mm Non-linearity $\leq \pm 0.01 \% \text{ FS}$,Hysteresis $\leq \pm 0.1 \text{ mm}$ Repeatability $\leq \pm 0.05 \% \text{ FS}$ Temperature coefficient $\leq \pm 0.01 \% \text{ FS}$ Sampling rateDepending on I 0.5 ms (mea 1.0 ms (mea 2.0 ms (mea 2.0 ms (meaEnvironmental conditions	≥ 0.06 mm 6, ≥ 0.05 mm / °C typ.
Model Profile, with top Material Measuring bod Output data CANopen Resolution 0.05 mm Non-linearity ≤ ± 0.01 % FS, Hysteresis ≤ ± 0.1 mm Repeatability ≤ ± 0.005 % FS Temperature coefficient ≤ ± 0.01 % FS, Sampling rate Depending on I 0.5 ms (mea 1.0 ms (mea 2.0	o magnet guidance joint y: Aluminium ≥ 0.06 mm S, ≥ 0.05 mm / °C typ. length: lesuring range ≤ 1200 mm) lesuring range ≤ 2400 mm) lesuring range ≤ 3000 mm)
Output data CANopen Resolution 0.05 mm Non-linearity ≤ ± 0.01 % FS, Hysteresis ≤ ± 0.1 mm Repeatability ≤ ± 0.005 % FS Temperature coefficient ≤ ± 0.01 % FS, Sampling rate Depending on I 0.5 ms (mea 1.0 ms (mea 2.0 ms (mea	≥ 0.06 mm S, ≥ 0.05 mm / °C typ. length: lesuring range ≤ 1200 mm) lesuring range ≤ 2400 mm) lesuring range ≤ 3000 mm)
Output signal CANopen Resolution 0.05 mm Non-linearity ≤ ± 0.01 % FS, Hysteresis ≤ ± 0.1 mm Repeatability ≤ ± 0.005 % FS Temperature coefficient ≤ ± 0.01 % FS, Sampling rate Depending on I 0.5 ms (mea 1.0 ms (mea 2.0 ms (me	S, ≥ 0.05 mm / °C typ. length: suring range ≤ 1200 mm) suring range ≤ 2400 mm) suring range ≤ 3000 mm)
Resolution 0.05 mm Non-linearity ≤±0.01 % FS, Hysteresis ≤±0.1 mm Repeatability ≤±0.005 % FS Temperature coefficient ≤±0.01 % FS, Sampling rate Depending on I 0.5 ms (mea 1.0 ms (mea 2.0 ms (m	S, ≥ 0.05 mm / °C typ. length: suring range ≤ 1200 mm) suring range ≤ 2400 mm) suring range ≤ 3000 mm)
Non-linearity ≤ ± 0.01 % FS, Hysteresis ≤ ± 0.1 mm Repeatability ≤ ± 0.005 % FS Temperature coefficient ≤ ± 0.01 % FS, Sampling rate Depending on I 0.5 ms (mea 1.0 ms (mea 2.0 ms (mea 2	S, ≥ 0.05 mm / °C typ. length: suring range ≤ 1200 mm) suring range ≤ 2400 mm) suring range ≤ 3000 mm)
Hysteresis ≤±0.1 mm Repeatability ≤±0.005 % FS Temperature coefficient ≤±0.01 % FS Sampling rate Depending on I 0.5 ms (mea 1.0 ms (mea 2.0 ms	S, ≥ 0.05 mm / °C typ. length: suring range ≤ 1200 mm) suring range ≤ 2400 mm) suring range ≤ 3000 mm)
Repeatability ≤±0.005 % FS Temperature coefficient ≤±0.01 % FS Sampling rate Depending on I 0.5 ms (mea 1.0 ms (mea 2.0 ms	/ °C typ. length: Issuring range ≤ 1200 mm) Issuring range ≤ 2400 mm) Issuring range ≤ 3000 mm)
Temperature coefficient ≤ ± 0.01 % FS / Depending on I 0.5 ms (mea 1.0 ms (mea 2.0 ms	/ °C typ. length: Issuring range ≤ 1200 mm) Issuring range ≤ 2400 mm) Issuring range ≤ 3000 mm)
Depending on I 0.5 ms (mea 1.0 ms (mea 2.0 ms 2.0 ms 2.0 ms (mea 2.0 ms 2.0	length: isuring range ≤ 1200 mm) isuring range ≤ 2400 mm) isuring range ≤ 3000 mm)
0.5 ms	isuring range ≤ 1200 mm) isuring range ≤ 2400 mm) isuring range ≤ 3000 mm)
Operating temperature range -20 +75 °C, o Storage temperature range -30 +85 °C (€ mark Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine) Protection class acc. to DIN EN 60529 ²) IP 67 Installation position Protocol data for CANopen Communication profile -20 +75 °C, o SN, communication end ≤ 100 g Vibration set 100 g IP 67 Installation position No restrictions Protocol data for CANopen	ptionally -40 +75 °C
Storage temperature range -30 +85 °C (€ mark EN 61000-6-1 / Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine) Protection class acc. to DIN EN 60529 ²) IP 67 Installation position Protocol data for CANopen Communication profile CiA DS 301 V4	ptionally -40 +75 °C
C € mark EN 61000-6-1 / Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz ≤ 10 g Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine) ≤ 100 g Protection class acc. to DIN EN 60529 ²) IP 67 Installation position No restrictions Protocol data for CANopen Communication profile CiA DS 301 V4	
Vibration resistance acc. to ≤ 10 g DIN EN 60068-2-6 at 50 2000 Hz ≤ 100 g Shock resistance acc. to ≤ 100 g DIN EN 60068-2-27 (11 ms / half sine) IP 67 Protection class acc. to DIN EN 60529 ²) IP 67 Installation position No restrictions Protocol data for CANopen CiA DS 301 V4	
DIN EN 60068-2-6 at 50 2000 Hz Shock resistance acc. to ≤ 100 g DIN EN 60068-2-27 (11 ms / half sine) Protection class acc. to DIN EN 60529 ² IP 67 Installation position No restrictions Protocol data for CANopen Communication profile CiA DS 301 V4	2/3/4
DIN EN 60068-2-27 (11 ms / half sine) Protection class acc. to DIN EN 60529 ²⁾ Installation position Protocol data for CANopen Communication profile CiA DS 301 V4	
Protection class acc. to DIN EN 60529 2) IP 67 Installation position No restrictions Protocol data for CANopen Communication profile CiA DS 301 V4	
Protocol data for CANopen Communication profile CiA DS 301 V4	
Communication profile CiA DS 301 V4	
NMT-Services CiA DSP 302 V	.2
	4.1
Layer setting services and protocol CiA DSP 305 V	2.2
Encoder Device Profile CiA DS 406 V3	.2
Baud rates 10 kbit/s 1 Mb	bit/s acc. to DS305 V2.2
- Transfer synchronous, a	e as 32 bit and float asynchronous, cyclical
Node ID/baud rate Adjustable via I	LSS
Other data	
Supply voltage 12 24 V DC ±	: 10 %
Residual ripple of supply voltage ≤ 100 mA	
Current consumption without output < 100 mA	
Weight Depending on I 30 mm: ~ 3 3000 mm: ~ 39 Note: Reverse polarity protection of the supply voltage excess	600 g

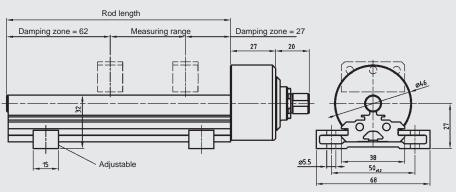
Reverse polarity protection of the supply voltage, excess voltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range Note:

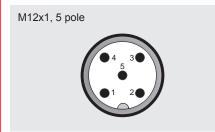
1) Other measuring ranges on request.

EN 18.108.0/02.18

Dimensions:

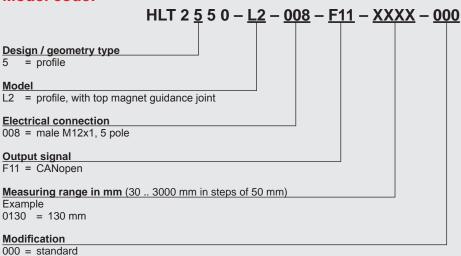


Pin connections:



Pin	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	0 V	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Model code:



Notes: The position magnet must be ordered separately.

Scope of delivery:

- HLT 2550
- Operating manual

Accessories: (not supplied with instrument)

ZBL MVS35-39 magnet slide part no.: 6105654 ZBL MV63 position magnet part no.: 6084454 ZBL MF38-18 position magnet part no.: 6084456 part no.: 6084455 ZBL MU38-20 position magnet Mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01

Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com



Linear Position Transmitter HLT 2550-L2

Magnetostrictive

For external mount

Resolution 0.05 mm

Synchronous serial interface



Description:

The HLT 2550 is a linear position transmitter which, due to its compact design, was developed in particular for use in applications where space is very limited. The measuring profile can be individually adapted to various mounting conditions by means of spacers.

The HLT 2550 is suited for measuring ranges up to 3 m.

In the version with synchronous serial interface, the measured value is made available via synchronous and symmetrical clock and data signals.

The main fields of application for the HLT 2550 are, for example, general positioning tasks in mechanical engineering and in stationary hydraulics, or as a wearfree alternative for existing measuring equipment such as potentiometers.

Technical data:

Input data	
Measuring ranges 1)	30 3000 mm in steps of 50 mm
Model	Profile, with top magnet guidance joint
Material	Measuring body: Aluminium
Output data	
Output signal	SSI
Resolution	0.05 mm
Non-linearity	≤ ± 0.01 % FS, ≥ 0.06 mm
Hysteresis	≤ ± 0.1 mm
Repeatability	≤ ± 0.005 % FS, ≥ 0.05 mm
Temperature coefficient	≤ ± 0.01 % FS / °C typ.
Sampling rate	Depending on length: 0.5 ms (measuring range ≤ 1200 mm) 1.0 ms (measuring range ≤ 2400 mm) 2.0 ms (measuring range ≤ 3000 mm)
Environmental conditions	
Operating temperature range	-20 +75 °C, optionally -40 +75 °C
Storage temperature range	-30 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 2)	IP 67
Installation position	No restrictions
Relevant data for SSI	
SSI clock input	Optocoupler
SSI data output	RS-422, 2-wire
SSI clock frequency	95 1000 kHz
SSI monotime, typical	20 μs
Other data	
Supply voltage	24 V DC ± 20 %
Residual ripple of supply voltage	≤ 100 mA
Current consumption without output	< 100 mA
Weight	Depending on length: 30 mm: ~ 300 g 3000 mm: ~ 3900 g

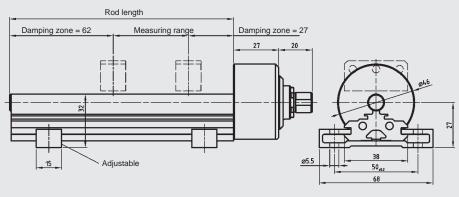
Reverse polarity protection of the supply voltage, excess voltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) Other measuring ranges on request.

EN 18.112.0/02.18

Dimensions:



Model code:

HLT 2 <u>5</u> 5 0 - <u>L2</u> - <u>00P</u> - <u>S16</u> - <u>XXXX</u> - <u>XXX</u> - <u>XXX</u> - <u>XXX</u> - <u>000</u>

Design / geometry type = profile

Model

L2 = profile,

with top magnet guidance joint

Electrical connection

00P = male M12x1, 8 pole

Output signal

S16 = SSI

Measuring range in mm (30 .. 3000 mm in steps of 50 mm)

Example

0130 = 130 mm

Code

B24 = binary code 24 bit

B25 = binary code 25 bit

G24 = Gray code 24 bit

G25 = Gray code 25 bit

System resolution

 $050 = 50 \, \mu \text{m}$

 $100 = 100 \, \mu \text{m}$

 $150 = 150 \, \mu m$

 $200 = 200 \, \mu m$

Modification

000 = standard

Notes:

The position magnet must be ordered separately.

Scope of delivery:

HLT 2550

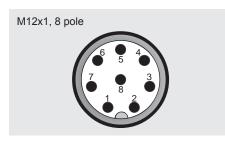
Operating manual

Accessories: (not supplied with instrument)

ZBL MVS35-39 magnet slide part no.: 6105654 ZBL MV63 position magnet part no.: 6084454 part no.: 6084456 ZBL MF38-18 position magnet ZBL MU38-20 position magnet part no.: 6084455 Mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	Description
1	Clock input +
2	Clock input -
2 3	Data output +
4	Data output -
5	n.c.
6	n.c.
7	+ U _B
8	0 V

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Hauptstr. 27, 66128 Saarbrücken Germany

Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com



Linear Position Transmitter HLT 2500-F1

Magnetostrictive

For external mount

Resolution 50 µm

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a flat profile housing version in aluminium.

The different output signals (analogue current / voltage) enable connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as standard evaluation systems (e.g. PLC controls)

External set inputs for the analogue start point and end point offer an additional possibility of a customised adjustment.

The HLT 2500-F1 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Analogue

Technical data:

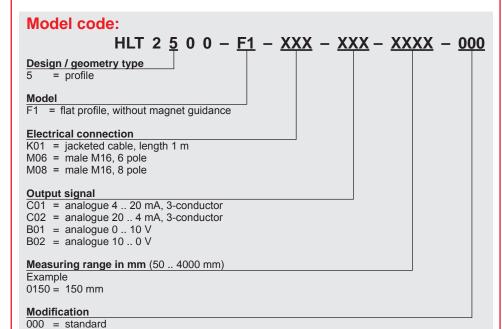
Input data		
Measuring ranges	50 4000 mm	
Model	Flat profile, wit	hout magnet guidance
Housing	Aluminium	
Output data		
Output signal, permitted load resistance	Current:	4 20 mA or 20 4 mA Load resist. 200 500 Ω
	Voltage:	0 10 V or 10 0 V Load resist.: min. 2 kΩ
Resolution	12 bit; ≥ 0.05 mm	
Non-linearity	± 0.15 mm ± 0.2 mm	(measuring range ≤ 1500 mm) (measuring range > 1500 mm)
Hysteresis	0.1 mm	
Repeatability	≤ 0.05 mm - ≤ 0	0.5 mm (depends on length)
Temperature coefficient	≤ ± 0.004 % FS	S/°C
Sampling rate	Depending on ≤ 1 m: 1.0 ms ≤ 2 m: 2.0 ms ≤ 3 m: 3.0 ms > 3 m: 3.5 ms	length:
Environmental conditions		
Operating temperature range	0 +70 °C; c	optionally -20 +70 °C
Storage temperature range	-30 +85 °C	
(€ mark	EN 61000-6-1	/2/3/4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g	
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g	
Protection class acc. to DIN EN 60529 1)	IP 65	
Installation position	No restrictions	
Other data		
Supply voltage	24 V DC ± 10 9	%
Residual ripple of supply voltage	≤ 250 mV _{PP}	
Current consumption without output	< 100 mA	
Weight	Depending on 100 mm: 450 4000 mm: 390	0 g

Reverse polarity protection of the supply voltage, overvoltage and short circuit protection Note:

are provided.

FS (Full Scale) = relative to complete measuring range

Dimensions: Damping zone = 65 Zero pos. = 75 6/8 pole Binder male 0

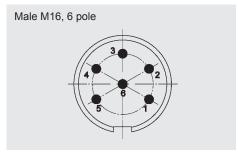


Accessories: (not supplied with instrument)

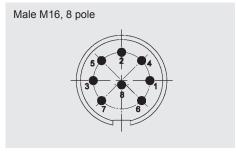
ZBL MU38-18 position magnet part no.: 6084456 ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	
1	Signal
2	0 V (analogue output)
3	Start point
4	End point
5	0 V
6	+U _B



Pin	
1	n.c.
2	0 V (analogue output)
3	Start point
4	End point
5	Signal
6	0 V
7	+U _B
8	n.c.

Cable outlet

Lead	
brown	0 V (analogue output)
green	Start point
yellow	End point
grey	Signal
pink	0 V
blue	+U _B

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

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Linear Position Transmitter HLT 2500-F1

Magnetostrictive

For external mount

Resolution 1 µm

CANopen

CANOPER

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a flat profile housing version in aluminium.

In the CANopen version, the measured value is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The HLT 2500-F1 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

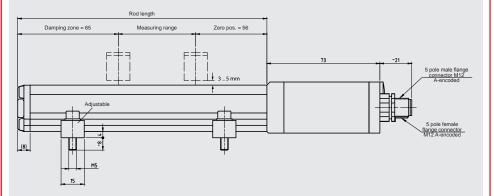
Technical data:

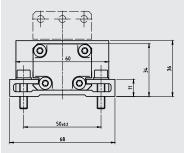
Measuring ranges 50 4000 mm Model Flat profile, without magnet guidance Housing Aluminium Output data CANopen Resolution 0.001 mm Non-linearity ± 0.15 mm (measuring range ≤ 1500 mm) ± 0.2 mm (measuring range > 1500 mm) Hysteresis ≤ 0.1 mm Repeatability ≤ 0.005 mm - ≤ 0.05 mm (depends on length) Temperature coefficient ≤ ± 0.0015 % FS / °C Sampling rate Depending on length: ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 2.5 ms > 2.5 m: 3.0 ms Environmental conditions 0 +70 °C; optionally -20 +70 °C Storage temperature range 0 +70 °C; optionally -20 +70 °C Storage temperature range -30 +85 °C C € mark EN 61000-6-1 / 2 / 3 / 4 Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz Shock resistance acc. to Shock resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz Shock resistance acc. to DIN EN 60529 ¹¹ IP 65 Installation position Protection class acc. to DIN EN 60529 ¹¹ <th>Input data</th> <th></th>	Input data	
Model Flat profile, without magnet guidance Housing Aluminium Output data CANopen Resolution 0.001 mm Non-linearity ± 0.15 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm) Hysteresis ≤ 0.1 mm Repeatability ≤ 0.005 mm - ≤ 0.05 mm (depends on length) Temperature coefficient ≤ ± 0.0015 % FS / °C Sampling rate Depending on length: ≤ 1.0 m: 1.0 ms ≤ 2.5 m: 2.5 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 3.0 ms Environmental conditions 0 +70 °C; optionally -20 +70 °C Storage temperature range 0 +70 °C; optionally -20 +70 °C Storage temperature range -30 +85 °C € (€ mark EN 61000-6-1 / 2 / 3 / 4 Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz Shock resistance acc. to ≤ 10 g DIN EN 60068-2-27 (11 ms / half sine) Protection class acc. to DIN EN 60529 ¹) IP 65 Installation position No restrictions Protocol data for CANopen Bus connection ISO 11898-1, ISO 11898-2 <tr< td=""><td>Measuring ranges</td><td>50 4000 mm</td></tr<>	Measuring ranges	50 4000 mm
Aluminium		Flat profile, without magnet guidance
Output signal CANopen Resolution 0.001 mm Non-linearity ± 0.15 mm ± 0.2 mm (measuring range ≤ 1500 mm) (measuring range > 1500 mm) Hysteresis ≤ 0.1 mm Repeatability ≤ 0.005 mm - ≤ 0.05 mm (depends on length) Temperature coefficient ≤ ± 0.0015 % FS / °C Sampling rate Depending on length: ≤ 1.0 m: 1.0 ms ≤ 2.0 ms ≤ 2.5 m: 2.5 ms ≥ 2.5 m: 3.0 ms Environmental conditions ≤ 0 +70 °C; optionally -20 +70 °C Operating temperature range 0 +70 °C; optionally -20 +70 °C Storage temperature range -30 +85 °C (€ mark EN 61000-6-1 / 2 / 3 / 4 Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz ≤ 10 g Shock resistance acc. to DIN EN 60529 ¹¹ IP 65 Installation position No restrictions Protocol data for CANopen ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier	Housing	
Resolution 0.001 mm Non-linearity ± 0.15 mm ± 0.2 mm (measuring range ≤ 1500 mm) Hysteresis ≤ 0.1 mm Repeatability ≤ 0.005 mm - ≤ 0.05 mm (depends on length) Temperature coefficient ≤ ± 0.0015 % FS / °C Sampling rate Depending on length: ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms ≥ 2.5 m: 3.0 ms Environmental conditions 0 +70 °C; optionally -20 +70 °C Storage temperature range 0 +70 °C; optionally -20 +70 °C Storage temperature range -30 +85 °C (€ mark EN 61000-6-1 / 2 / 3 / 4 Vibration resistance acc. to ≤ 10 g DIN EN 60068-2-6 at 50 2000 Hz ≤ 100 g Shock resistance acc. to ≤ 100 g DIN EN 60068-2-27 (11 ms / half sine) Protection class acc. to DIN EN 60529 ¹) Protocol data for CANopen IP 65 Bus connection ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier	Output data	
Resolution 0.001 mm Non-linearity ± 0.15 mm ± 0.2 mm (measuring range ≤ 1500 mm) Hysteresis ≤ 0.1 mm Repeatability ≤ 0.005 mm - ≤ 0.05 mm (depends on length) Temperature coefficient ≤ ± 0.0015 % FS / °C Sampling rate Depending on length: ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms ≥ 2.5 m: 3.0 ms Environmental conditions 0 +70 °C; optionally -20 +70 °C Operating temperature range 0 +70 °C; optionally -20 +70 °C Storage temperature range -30 +85 °C C € mark EN 61000-6-1 / 2 / 3 / 4 Vibration resistance acc. to ≤ 10 g DIN EN 60068-2-6 at 50 2000 Hz ≤ 100 g Shock resistance acc. to ≤ 100 g DIN EN 60068-2-27 (11 ms / half sine) Protection class acc. to DIN EN 60529 ¹) Installation position No restrictions Protocol data for CANopen Bus connection ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier	Output signal	CANopen
# 0.2 mm (measuring range > 1500 mm) Hysteresis ≤ 0.1 mm Repeatability ≤ 0.005 mm - ≤ 0.05 mm (depends on length) Temperature coefficient ≤ ± 0.0015 % FS / °C Sampling rate		
Repeatability $\leq 0.005 \text{ mm} - \leq 0.05 \text{ mm} \text{ (depends on length)}$ Temperature coefficient $\leq \pm 0.0015 \% \text{ FS} / ^{\circ}\text{C}$ Sampling rate Depending on length: $\leq 1.0 \text{ m} : 1.0 \text{ ms}$ $\leq 2.0 \text{ m} : 2.0 \text{ ms}$ $\leq 2.5 \text{ m} : 2.5 \text{ ms}$ $\geq 2.5 \text{ m} : 2.5 \text{ ms}$ $\geq 2.5 \text{ m} : 3.0 \text{ ms}$ Environmental conditions Operating temperature range $0 : -70 \text{ °C}$; optionally -20 +70 °C Storage temperature range $-30 : -85 \text{ °C}$ (€ mark EN 61000-6-1 / 2 / 3 / 4 Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz Shock resistance acc. to $0 : -100 \text{ g}$ DIN EN 60068-2-27 (11 ms / half sine) Protection class acc. to DIN EN 60529 10 Protection class acc. to DIN EN 60529 11 Installation position No restrictions Protocol data for CANopen Bus connection ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier	Non-linearity	
Temperature coefficient $≤ \pm 0.0015 \% FS / °C$ Sampling rateDepending on length: $≤ 1.0 \text{ m}: 1.0 \text{ ms}$ $≤ 2.0 \text{ m}: 2.0 \text{ ms}$ $≤ 2.5 \text{ m}: 2.5 \text{ ms}$ $> 2.5 \text{ m}: 3.0 \text{ ms}$ Environmental conditions $0 \text{ measure} = 0 \text{ measure} $	Hysteresis	≤ 0.1 mm
Sampling rate Depending on length: ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms ≥ 2.5 m: 3.0 ms Environmental conditions 0 +70 °C; optionally -20 +70 °C Operating temperature range 0 +85 °C Storage temperature range -30 +85 °C (€ mark EN 61000-6-1 / 2 / 3 / 4 Vibration resistance acc. to Sh 61000-6-1 / 2 / 3 / 4 Vibration resistance acc. to 5 10 g DIN EN 60068-2-6 at 50 2000 Hz 5 100 g Shock resistance acc. to 5 100 g DIN EN 60068-2-27 (11 ms / half sine) IP 65 Installation position No restrictions Protocol data for CANopen Bus connection ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier	Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
\(\leq \frac{1.0 \text{ m: 1.0 ms}}{2.0 \text{ m: 2.0 ms}} \) \(\leq 2.5 \text{ m: 2.5 ms} \) \(\leq 2.5 \text{ m: 3.0 ms} \) \(Temperature coefficient	≤ ± 0.0015 % FS / °C
Operating temperature range 0 +70 °C; optionally -20 +70 °C Storage temperature range -30 +85 °C C € mark EN 61000-6-1 / 2 / 3 / 4 Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz ≤ 10 g Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine) ≤ 100 g Protection class acc. to DIN EN 60529 ¹¹) IP 65 Installation position No restrictions Protocol data for CANopen ISO 11898-1, ISO 11898-2 Bus connection ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier	Sampling rate	≤ 1.0 m: 1.0 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms
Storage temperature range -30 +85 °C (€ mark EN 61000-6-1 / 2 / 3 / 4 Vibration resistance acc. to ≤ 10 g DIN EN 60068-2-6 at 50 2000 Hz ≤ 100 g Shock resistance acc. to ≤ 100 g DIN EN 60068-2-27 (11 ms / half sine) IP 65 Installation position No restrictions Protocol data for CANopen ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier	Environmental conditions	
C € mark EN 61000-6-1 / 2 / 3 / 4 Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz ≤ 10 g Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine) ≤ 100 g Protection class acc. to DIN EN 60529 ¹¹ IP 65 Installation position No restrictions Protocol data for CANopen ISO 11898-1, ISO 11898-2 Bus connection ISO 11-bit identifier	Operating temperature range	0 +70 °C; optionally -20 +70 °C
Vibration resistance acc. to ≤ 10 g DIN EN 60068-2-6 at 50 2000 Hz ≤ 100 g Shock resistance acc. to ≤ 100 g DIN EN 60068-2-27 (11 ms / half sine) IP 65 Installation position No restrictions Protocol data for CANopen ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier	Storage temperature range	-30 +85 °C
DIN EN 60068-2-6 at 50 2000 Hz Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine) Protection class acc. to DIN EN 60529 ¹) Installation position Protocol data for CANopen Bus connection ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier	(€ mark	EN 61000-6-1 / 2 / 3 / 4
DIN EN 60068-2-27 (11 ms / half sine) Protection class acc. to DIN EN 60529 1) Installation position Protocol data for CANopen Bus connection ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier		≤ 10 g
Installation position No restrictions Protocol data for CANopen Bus connection ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier		≤ 100 g
Protocol data for CANopen Bus connection ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier	Protection class acc. to DIN EN 60529 1)	IP 65
Bus connection ISO 11898-1, ISO 11898-2 CAN Specification 2.0 A 11-bit identifier	Installation position	No restrictions
CAN Specification 2.0 A 11-bit identifier	Protocol data for CANopen	
	Bus connection	ISO 11898-1, ISO 11898-2
	CAN Specification 2.0 A	11-bit identifier
Device profile for encoder CiA DS406	Device profile for encoder	CiA DS406
Layer Setting Services, LSS CiA DS305	Layer Setting Services, LSS	CiA DS305
Layer Management Services, LMT CiA DS205-1, DS205-2	Layer Management Services, LMT	CiA DS205-1, DS205-2
Baud rates 800, 1000 kbit/s	Baud rates	800, 1000 kbit/s
Transmission services - PDO Measured value as 32 bit and float - Transfer synchronous, asynchronous, cyclical	- PDO	
Node ID/baud rate Adjustable via LSS	Node ID/baud rate	
Other data	Other data	
Supply voltage 24 V DC -20 +10 %	Supply voltage	24 V DC -20 +10 %
Residual ripple of supply voltage ≤ 250 mV _{PP}		≤ 250 mV _{PP}
Current consumption without output ≤ 150 mA		≤ 150 mA
Weight Depending on length: 100 mm: 550 g 4000 mm: 4000 g	Weight	100 mm: 550 g

Reverse polarity protection of the supply voltage, overvoltage and short circuit protection

FS (Full Scale) = relative to complete measuring range

Dimensions:





Model code:

HLT 2 $\frac{5}{2}$ 0 0 - $\frac{F1}{2}$ - $\frac{C61}{2}$ - $\frac{F11}{2}$ - $\frac{XXXX}{2}$ - $\frac{000}{2}$

Design / geometry type

5 = profile = profile

Model

F1 = flat profile, without magnet guidance

Electrical connection

C61 = female M12x1, 5 pole + male M12x1, 5 pole

Output signal F11 = CANopen

Measuring range in mm (50 .. 4000 mm)

Example

0150 = 150 mm

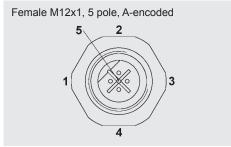
Modification 000 = standard

Accessories: (not supplied with instrument)

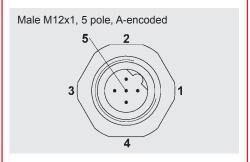
ZBL MU38-18 position magnet part no.: 6084456 ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	CANopen_OUT	
1	Housing	Shield/housing
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low



Pin	CANopen_IN	
1	Housing	Shield/housing
2 3	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

department.

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Fax +49 (0)6897 509-1726 E-mail: electronic@hydac.com Internet: www.hydac.com



Linear Position Transmitter HLT 2500-F1

Magnetostrictive

For external mount

Resolution 1 µm

Profibus

Description: The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a flat profile housing version in aluminium.

In the Profibus version, the measured value is digitised and made available to the field bus system via the Profibus protocol.

The HLT 2500-F1 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.



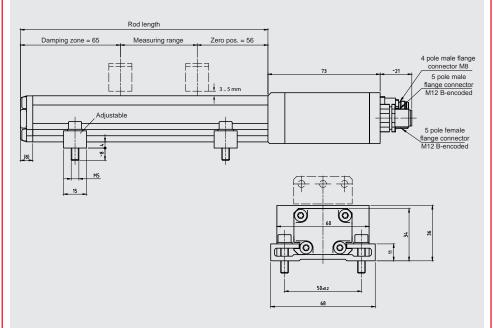
Technical data:

Input data	
Measuring ranges	50 4000 mm
Model	Flat profile, without magnet guidance
Housing	Aluminium
Output data	
Output signal	Profibus
Resolution	0.001 mm
Non-linearity	± 0.1 mm (measuring range ≤ 1500 mm) ± 0.15 mm (measuring range > 1500 mm)
Hysteresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)
Repeatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length: ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 2.0 ms ≤ 2.5 m: 2.5 ms > 2.5 m: 3.0 ms
Environmental conditions	
Operating temperature range	0 +70 °C; optionally -20 +70 °C
Storage temperature range	-30 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 1)	IP 65
Installation position	No restrictions
Protocol data for Profibus	
Profibus DP V0	IEC 61158, IEC 61784
PNO encoder profile	Class 1 and 2
Transmission rate parameter	9.6 12000 kbit/s
Other data	
Supply voltage	24 V DC -20 +10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	< 150 mA
Weight	Depending on length: 100 mm: 550 g 4000 mm: 4000 g

Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

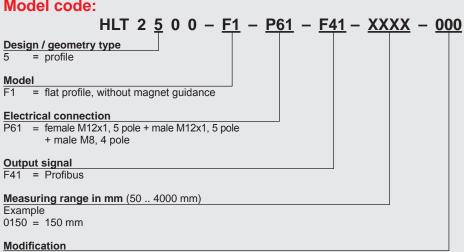
FS (Full Scale) = relative to complete measuring range

Dimensions:



Model code:

000 = standard

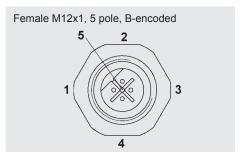


Accessories: (not supplied with instrument)

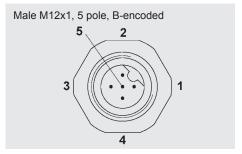
position magnet part no.: 6084456 ZBL MU38-18 ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

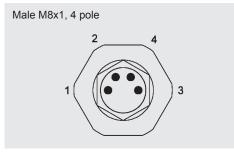
Pin connections:



Pin	Profibus_OUT
1	VP, +5 V DC
2	Profibus, Data A
3	0 V
4	Profibus, Data B
5	n.c.
screw connection	Shield/housing



Pin	Profibus_IN
1	n.c.
2	Profibus, Data A
3	n.c.
4	Profibus, Data B
5	n.c.
screw connection	Shield/housing



Pin	Profibus_IN
1	+U _B
2	n.c.
3	0 V
4	n.c.

Note:

department.

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstraße 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726

E-mail: electronic@hydac.com Internet: www.hydac.com



Linear Position Transmitter HLT 2500-F1

Magnetostrictive

For external mount

Resolution 50 µm

Synchronous serial interface



Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a flat profile housing version in aluminium.

In the version with synchronous serial interface, the measured value is made available via synchronous and symmetrical clock and data signals.

The HLT 2500-F1 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

Technical data:

Input data	
Measuring ranges	50 4000 mm
Model	Flat profile, without magnet guidance
Housing	Aluminium
Output data	Aluminium
Output data Output signal	SSI
Resolution	0.05 mm ¹⁾
Non-linearity	± 0.2 mm (measuring range > 1500 mm)
Hysteresis	≤ 0.1 mm
Repeatability	≤ 0.05 mm - ≤ 0.5 mm (depends on length)
Temperature coefficient	≤ ± 0.0015 % FS / °C
Sampling rate	Depending on length:
	≤ 1.0 m: 1.0 ms
	≤ 2.0 m: 1.5 ms ≤ 3.0 m: 2.0 ms
	> 3.0 m: 2.5 ms
Environmental conditions	
Operating temperature range	0 +70 °C; optionally -20 +70 °C
Storage temperature range	-30 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 50 2000 Hz	≤ 10 g
Shock resistance acc. to DIN EN 60068-2-27 (11 ms / half sine)	≤ 100 g
Protection class acc. to DIN EN 60529 2)	IP 65
Installation position	No restrictions
Relevant data for SSI	
SSI clock input	Optocoupler
SSI data output	RS-422, 2-wire
SSI clock frequency	95 1000 kHz
SSI monotime, typical	20 μs
Other data	
Supply voltage	24 V DC -20 +10 %
Residual ripple of supply voltage	≤ 250 mV _{PP}
Current consumption without output	≤ 250 mA
Weight	Depending on length: 100 mm: 550 g 4000 mm: 4000 g
 	3

Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

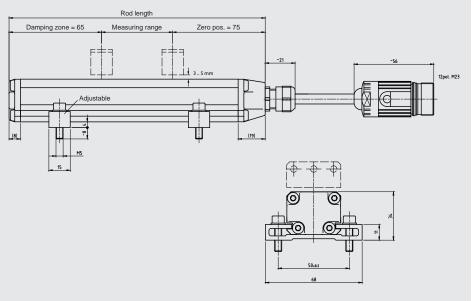
FS (Full Scale) = relative to complete measuring range

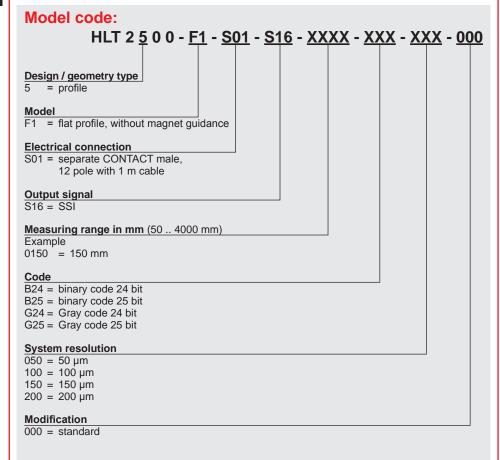
¹⁾ Other models on request.

 $^{^{\}rm 2)}$ With mounted mating connector in corresponding protection class

EN 18.122.0/02.18

Dimensions:



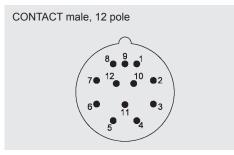


Accessories: (not supplied with instrument)

ZBL MU38-18 part no.: 6084456 position magnet ZBL mounting kit part no.: 6105653

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	
1	SSI_ClockIN
2	SSI_Clock+_IN
3	SSI_DATA+_OUT
3 4 5	SSI_DATAOUT
	RS 485 +_IN/OUT
6	RS 485IN/OUT
7	n.c.
8	Direction IN
9	Preset1_IN
10	n.c.
11	+U _B _ IN
12	0 V _IN

Note:

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described, please contact the relevant technical department.

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Fax +49 (0)6897 509-1726 E-mail: electronic@hydac.com Internet: www.hydac.com



Linear Position Transmitter HLT 2500-F1

Magnetostrictive

For external mount

Resolution 1 µm

EtherCAT

Ether CAT.

Description:

The sensor works on the principle of magnetostriction.

This measuring principle determines with high accuracy the position, distance and/ or speed and is based on elapsed time measurement.

Utilising this non-contact and wear-free measuring system, HYDAC offers a flat profile housing version in aluminium.

In the EtherCAT version, the measured value is digitised and made available to the field bus system via the EtherCAT protocol.

The HLT 2500-F1 is primarily used in stationary applications, especially when a partially integrated solution in hydraulic cylinders is not possible.

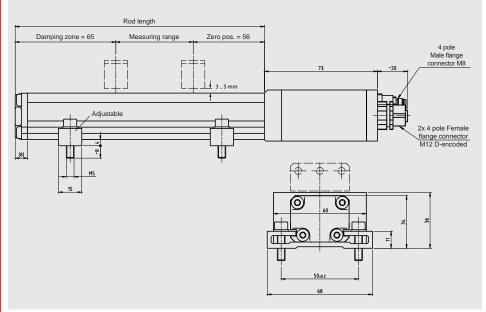
Technical data:

t data					
suring ranges	50 4000 mm				
el	Flat profile, without magnet guidance				
sing	Aluminium				
out data					
out signal	EtherCAT				
olution	0.001 mm				
linearity	\pm 0.1 mm (measuring range \leq 1500 mm) \pm 0.15 mm (measuring range $>$ 1500 mm)				
eresis	0.02 mm (measuring range ≤ 1500 mm) 0.1 mm (measuring range > 1500 mm)				
eatability	≤ 0.005 mm - ≤ 0.05 mm (depends on length)				
perature coefficient	≤ ± 0.0015 % FS / °C				
pling rate	Depending on length: ≤ 0.5 m: 0.5 ms ≤ 1.0 m: 1.0 ms ≤ 2.0 m: 1.5 ms > 2.0 m: 2.0 ms				
ironmental conditions					
rating temperature range	0 +70 °C; optionally -20 +70 °C				
age temperature range	-30 +85 °C				
nark	EN 61000-6-1 / 2 / 3 / 4				
ation resistance acc. to EN 60068-2-6 at 50 2000 Hz	≤ 10 g				
ck resistance acc. to EN 60068-2-27 (11 ms / half sine)	≤ 100 g				
rotection class acc. to DIN EN 60529 1) IP 65					
allation position	No restrictions				
ocol data for EtherCAT					
rCAT	IEC 61158-1-6, IEC 61784-2				
sical Layer	Fast Ethernet, ISO/IEC 8802-3				
ce profile	CoE, CiA DS-406				
smission rate meter	100 Mbit/s				
e time	100 20000 μs				
er data					
oly voltage	24 V DC -20 +10 %				
dual ripple of supply voltage	≤ 250 mV _{PP}				
ent consumption without output	≤ 300 mA				
ght	Depending on length: 100 mm: 550 g 4000 mm: 4000 g				
oly voltage dual ripple of supply voltage ent consumption without output	≤ 250 mV _{PP} ≤ 300 mA Depending on length: 100 mm: 550 g 4000 mm: 4000 g				

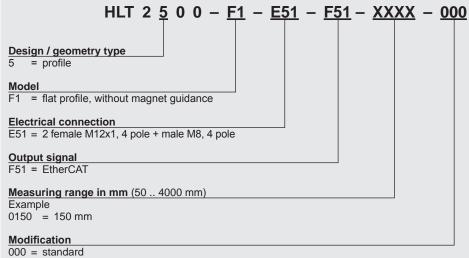
Note: Reverse polarity protection of the supply voltage, overvoltage and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

Dimensions:



Model code:

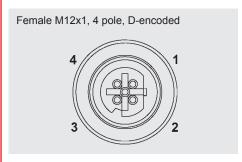


Accessories: (not supplied with instrument)

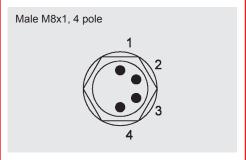
part no.: 6084456 ZBL MU38-18 position magnet part no.: 6105653 ZBL mounting kit

More detailed information on accessories as well as on further accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:



Pin	Port IN / Port OUT	
1	Transmission data +	
2	Receive data +	
3	Transmission data -	
4	Receive data -	



Pin		
1	+U _B	
2	n.c.	
3	0 V	
4	n.c.	

Note:

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For applications or operating conditions not described, please contact the relevant technical department.

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Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com

IAC) INTERNATIONAL



Distance Switch HLS 528

Ultrasound Display

Description:

The distance sensor HLS 528 is a noncontact, highly compact sensor for measuring distances to fluids and objects.

By definition, its functional principle (measurement of sound transmission time) means that it operates with an extremely high resolution and sampling rate.

Thanks to the integrated temperature compensation, the sensors can be used in a wide temperature range.

The HLS 528 is available for measuring ranges up to 6000 mm, in three signal output versions (2 switching outputs; 1 analogue output, either 4 .. 20 mA or 0 .. 10 V, plus 1 or 2 switching outputs).

The sensor can be adjusted simply and conveniently using two push-buttons and a self-explanatory menu structure. A 3-digit display indicates the most recent distance and two three-colour LEDs also show the operating condition.

Up to 2 switching outputs | Technical data:

rechnical data	l.						
Input data							
Operating range	mm	250	350	1300	3400	6000	
Blind zone	mm	0 30	0 85	0 200	0 350	0 600	
Maximum range	mm	350	600	2000	5000	8000	
Resolution			≤ 0.18 mm				
Mechanical connection	1		M30x1.5				
Output data							
Switching outputs			1; 2 PNP transistor outputs				
			Switching current: 1 SP: max. 200 mA				
				2 SP:	max. 200 m	A per output	
			Switching cy	/cles: > 100	million		
Analogue output, permitted load resistance			Selectable (invertible):				
			4 20 mA, R_{Lmax} = 100 Ω (U _B ≤ 20 V)				
			$R_{Lmax} = 500 \Omega (U_B > 20 V)$				
			0 10 V,	$R_{Lmin} = 100 k$	Ω (U _B ≥ 18 \	/)	
Accuracy			≤ ± 1 % of the actual measured value				
Repeatability			± 0.15 % of	the actual m	easured valu	ıe	
D				110	100		

Reaction time 70 **Environmental conditions** Ambient temperature range -25 °C .. +70 °C Storage temperature range -40 °C .. +85 °C Max. tank pressure Only for depressurised vessels € mark DIN EN 60947-5-2 DIN EN 60947-5-7 Vibration resistance acc. to ≤ 2 g DIN EN 60068-2-6 (5 .. 2000 Hz) ≤ 30 g Shock resistance acc. to DIN EN 60068-2-27 (11 ms) Protection class acc. to DIN EN 605291) IP 67 Other data 9 .. 30 V DC without analogue output Supply voltage 18 .. 30 V DC with analogue output Residual ripple of supply voltage ± 10 % Current consumption ≤ 80 mA Brass, nickel-plated; Housing ultrasonic transducer with PEEK film Display 3-digit LED display, 2 three-colour LEDs Weight ~ 150 ~ 150 ~ 150 ~ 210

Note: Reverse polarity protection of the supply voltage and load short circuit protection are

Setting options:

All the settings available on the HLS 528 are grouped in two easy-to-navigate menus.

In order to prevent unauthorised adjustment of the instrument, a key-lock can be set.

Setting ranges of the switch points and switch-back hystereses:

Switch point function distance

Operating range	Switch point*	Hysteresis*
250 mm	30 350 mm	1 320 mm
350 mm	85 600 mm	1 515 mm
1300 mm	200 999 mm	1 999 mm
	100 200 cm	100 180 cm
3400 mm	350 999 mm	1 999 mm
	100 500 cm	100 465 cm
6000 mm	600 999 mm	1 999 mm
	100 800 cm	100 740 cm

Window function distance

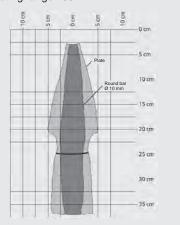
Operating	Lower	Upper
range	switch value*	switch value*
250 mm	30 348 mm	32 350 mm
350 mm	85 598 mm	87 600 mm
1300 mm	200 999 mm	202 999 mm
	100 198 cm	100 200 cm
3400 mm	350 999 mm	352 999 mm
	100 498 cm	100 500 cm
6000 mm	600 999 mm	602 999 mm
	100 798 cm	100 800 cm

^{*} The increment for all devices is 1 mm or cm

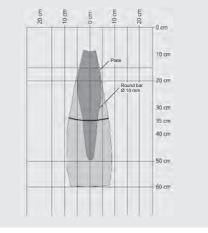
Recording ranges (for different objects):

The dark-grey areas specify the range in which the normal reflector (round bar) is detected safely. This is the typical working range of the sensors. The light grey areas illustrate the range in which a very large reflector, e.g. a very large plate, is still detected, provided it is aligned optimally to the sensor. Ultrasonic reflections cannot be evaluated outside the light grey area.

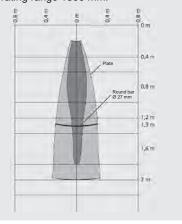
Operating range 250 mm:



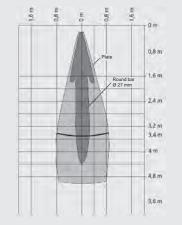
Operating range 350 mm:



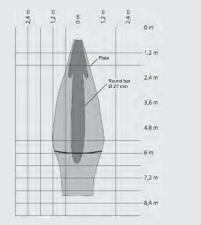
Operating range 1300 mm:



Operating range 3400 mm:



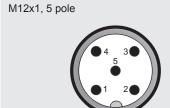
Operating range 6000 mm:



Additional functions:

- Switching mode of the switching outputs adjustable (switch point function or window
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on delay adjustable from 0 to 20 seconds
- Energy saving mode

Pin connections:



HLS 528-2
+U _B
D1 (switching output 1)
-U _B (0 V)
D2 (switching output 2)
Synchronisation
HLS 528-3
+U _B
Analogue
-U _B (0 V)
D (switching output)
Synchronisation
HLS 528-5
+U _B
Analogue
-U _B (0 V)
D2 (switching output 2)
D1 (switching output 1)

Dimensions: Operating range: 250 mm 350 mm,1300 mm AF width 36 Touch Control AF width 36 LED display M 30x1.5 Touch Control LED display -2 buttons M 30x1.5 2 duo LEDs 2 huttons 2 duo LEDs 84 Operating range: 3400 mm 6000 mm AF width 36 SW 36 Touch Control Touch Control M 30x1.5 LED display LED display 2 buttons M 30x1.5 2 buttons 2 duo LEDs 2 duo I FDs 047.5 990

_19.5

33

69

Model code: HLS 5 2 8 - X - XXXX - 000 - F **Mechanical connection** = M30x1.5Electrical connection = male M12x1, 5 pole (mating connector not supplied) $\frac{\text{Output}}{2} = 2$ = 2 switching outputs 3 = 1 switching output and 1 analogue output = 2 switching outputs and 1 analogue output Operating range in mm 0250; 0350; 1300, 3400, 6000 Modification number 000 = standardDesign, front face of sensor = foil Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

HYDAC ELECTRONIC GMBH

Note:

department.

22.5

36

105

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For applications or operating conditions not

Subject to technical modifications.

described, please contact the relevant technical

Hauptstraße 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 E-mail: electronic@hydac.com Internet: www.hydac.com



Position Switch HLS 100 for series applications



Description:

The position switch series HLS 100 has been specifically developed to detect the end position of safety-related devices on mobile machinery.

The position switches are designed for continuous use in safety circuits/safety functions as part of the functional safety of machines up to SIL 2 (IEC 61508) or PL d (ISO 13849).

The HLS 100 consists of two parts, the encoder magnet and the sensor unit.

Using two Hall sensors integrated into the sensor unit, the sensor detects the defined position (end position) of the magnet and transmits the switching condition "ON" if this position is detected, or otherwise the switching condition "OFF".

Switching conditions are output as permanent PWM signals.

During stable normal operation, the position switch cyclically performs internal diagnostic steps, which identify systematic and random

Errors which occur are therefore detected immediately. The output signal is then deactivated completely and the sensor is restarted.

Special features:

- Compact design
- Robust housing suitable for mobile applications
- High operating temperature range
- PWM output
- IP 67 male connector
- SIL 2 / PL d certification

Technical data:

Increased Functional Safety

Input data				
Switching range 1)	± 3 ± 9 mm			
Switching distance magnet–sensor 1)	0 11 mm			
Lateral offset magnet–sensor 1)	± 6 mm			
Plate thickness	Magnet: min. 5 mm			
	Sensor: 6 8 mm			
Output data				
Туре	PWM 50 Hz ± 3 % (push-pull)			
Duty cycle of the output signal OFF	26 ± 1 %			
(magnet outside the switching range)				
Duty cycle of the output signal ON	74 ± 1 %			
(magnet within the switching range)				
Output current consumption				
High level	60 mA min. / 150 mA max.			
Low level	30 mA min. / 110 mA max.			
Output voltage				
High level	$> +U_B - 1.2 \text{ V with I} = 10 \text{ mA}$			
Low level	< GND + 0.2 V with I = 10 mA			
Response times after activation	0.5 1.5 s			
Output signal response time	< 100 ms			
Internal diagnosis interval	≤ 500 ms typ. (hardware)			
	≤ 1 s (memory`elements)			
Environmental conditions				
Nominal temperature range (function)	-30 +85 °C			
Operating temperature range (failsafe)	-40 +100 °C			
Storage temperature range	-60 +110 °C			
(€ mark	EN 61000-6-1 / 2 / 3 / 4			
Functional safety	SIL 2 acc. to EN 61508			
,,	PL d acc. to ISO 13849			
Vibration resistance acc. to	25 g			
DIN EN 60068-2-6 at 10 500 Hz				
Shock resistance acc. to	50 g (half sine)			
DIN EN 60068-2-27 (6 ms)				
Protection class acc. to DIN EN 60529	IP 67			
Other data				
Electrical connection 2)	Male connector ITT Canon Sure Seal, 3 pole			
Supply voltage	8 32 V DC			
Current consumption	< 10 mA (inactive output)			
Residual ripple of supply voltage	≤ 5 %			
Life expectancy	10 years			
Weight	Sensor ~ 75 g			
	Magnet ~ 25 g			
Safety-related data				
Performance level				
Based on	DIN EN ISO 13849-1: 2008			
PL	d			
Architecture	Category 2			
Safety Integrity Level				
Based on	DIN EN 61508: 2001 1001 - B			
SIL	2			
***	ply voltage, overvoltage, override and short circuit			
Torongo polarity proteotion of the supp	-,			

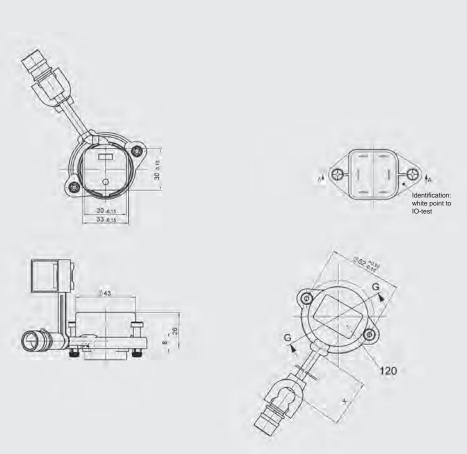
in of the supply voltage, overvoltage, override and short circuit protection are provided.

- FS (Full Scale) = relative to complete measuring range

 1) All values apply to installation in magnetic steel plate of the required plate thickness. If installed in thicker steel plates or other materials, the entire system must be tested in detail.

2) Other connectors available on request

Dimensions:

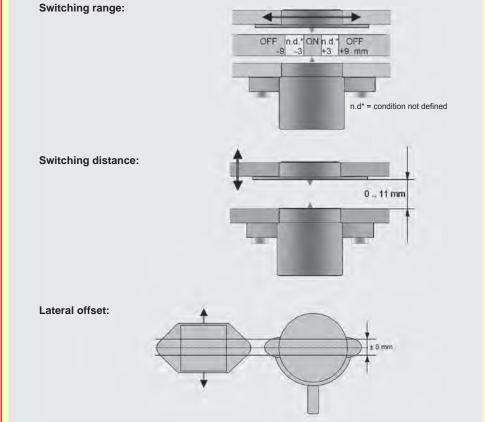


Order details:

The electronic positioning switch HLS 100 has been especially developed for OEM customers and is available for minimum order quantities of 100 units per type.

For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

Switching ranges:



Note:

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Special Products

Position Sensors and Position Switches

The position sensors and switches have been developed for short distance monitoring and can be used on the one hand for monitoring valve settings and on the other as part of a closed loop control. Based on different measuring techniques, HYDAC provides different variants for a diverse range of



Position switch IES 2010 / 2015 / 2020

The position switch for monitoring valve settings (end or centre position) is primarily used in stationary applications such as:

- Hydraulic presses
- Plastics machinery
- Machine tools

Special features:

- Pressure-resistant up to 400 bar
- Inductive measurement (LVDT)
- Various stroke sizes
- Output: 2 switching outputs with changeover function
- Electrical connection: M12x1 (4 pole)



The IWE 40 position sensors for short distance detection are primarily used in stationary applications such as:

- Hydraulic presses
- Plastics machinery
- Machine tools

Special features:

- Pressure-resistant up to 400 bar
- Inductive measurement (LVDT)
- Different measuring ranges (up to max. ±7 mm)
- Output: analogue 4 .. 20 mA
- Electrical connection: M12x1 (4 pole)



Position switch HLS 200 with increased functional safety

The position switch HLS 200 is used for reliable detection of valve centre positions. They are used both in mobile and in stationary applications.



- PL d certification
- Measuring technique: IR light barriers
- Output: 2 switching outputs with changeover function
- Electrical connection: M12x1 (4 pole); Deutsch DT 04 (4 pole)



Order details:

The position sensors and position switches are OEM products which have been especially developed for volume production customers.

For precise specifications, please contact the Sales Department of HYDAC ELECTRONIC.

Note:

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LEVEL SENSO	RS [6]		
LEVEL TRANSM	ITTERS		Page
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HNT 1100		CAN	347
LEVEL SWITCHE	ES		
GENERAL APP	PLICATIONS		
Capacitive			
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ENS 3000	Display	IO-Link	353
Magnetostrio	ctive		
HNS 3000	Display		355
HNS 3000	Display	IO-Link	359
Ultrasonic			
HNS 526	Display		361



Electronic Level Transmitter HNT 1200

Magnetostrictive

Description:

The level transmitter HNT 1200 is a floatbased sensor for highly accurate measuring of fluid levels.

The sensor is available with rod lengths from 250 .. 730 mm. Rod lengths of up to 2500 mm are possible.

HYDAC offers the HNT 1200 in a pressureresistant stainless steel housing for in-tank installation. Depending on the application, several different floats are available, e.g. stainless steel for aggressive media or

The output signals enable the connection to all HYDAC ELECTRONIC GmbH measurement and control devices as well as connection to standard evaluation systems (e.g. PLC controls).

Technical data:

Input data							
Measuring ranges	mm	178	208	298	338	448	658
Rod length 1)	mm	250	280	370	410	520	730
Max. speed of change in fluid level			No restric	tions			
Mechanical connection			G ¾ A ISO	O 1179-2			
Tightening torque, recommended			30 Nm				
Parts in contact with fluid				Rod: Stainless steel (1.4301 / 1.4571) Float: PP (polypropylene) 0.6 kg/dm³ Seal: Seal ring DIN 3869-27-FKM			
Fluids 2)			Hydraulic	oils, cool	ing lubrica	ınts	
Output data							
Analogue output, permitted load resistance			4 20 m/ 0 10 V,				
Accuracy 3)			≤±1%F	S			
Temperature coefficient			≤ ± 0.01 %	% FS / °C			
Non-linearity			≤±1% FS				
Repeatability			≤±1% FS				
Environmental conditions							
Ambient temperature range			-25 +85 °C				
Storage temperature range			-40 +10				
Fluid temperature range 4)			-40 +12				
Max. tank pressure			3 bar (sho			1 min)	
(€ mark			EN 61000)-6-1 / 2 /	3 / 4		
Vibration resistance acc. to DIN EN 60068-2-6			7.5 mm (5 8.2 Hz) 2.0 g (8.2 150 Hz)				
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)			20 g				
Protection class acc. to DIN EN 60	529 ⁵⁾		IP 67				
Other data							
Supply voltage (U _B)			9 36 V DC				
Residual ripple supply voltage			≤ 250 mV	ss			
Current consumption (without outp	ut)		≤ 100 mA				
Weight			Depending on length: 425 g (250 mm); 570 g (730 mm)				

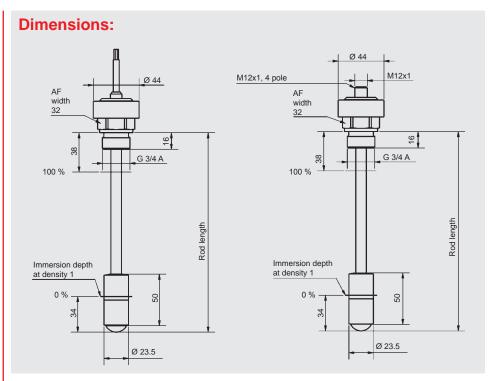
Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

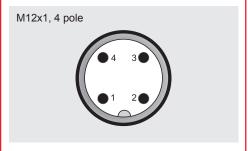
- 1) Other rod lengths on request
- 2) Other fluids on request

- 3) Specified at calm, non-turbulent fluid
 4) -25 °C with FKM seal, -40 °C on request
 5) With mounted mating connector in corresponding protection class

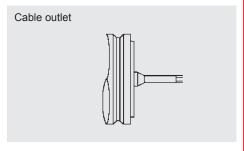
EN 18.604.1.1/02.18



Pin connections:



Pin	HNT 1226	
1	+U _B	
2	n.c.	
3	0 V	
4	Signal	



Lead	HNT 1221
brown	+U _B
white	0 V
green	Signal

Model code:

	HNT 1 2 <u>2</u> <u>X</u> – <u>X</u> – <u>XXXX</u> – <u>000</u>
Mechanical connection 2 = G 3/4 A ISO 1179-2	
2 = G % A ISO 1179-2	
Electrical connection	
1 = jacketed cable, 2 m	
6 = male M12x1, 4 pole	
Output signal	
B = 0 10 V, 3-conductor	
C = 4 20 mA, 3-conductor	
Rod length (physical) in mm	
0250; 0280; 0370; 0410; 0520; 0730	
Modification number	
000 = standard	

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DADINTERNATIONAL



Electronic Level Transmitter HNT 1100

Magnetostrictive

With temperature measurement



Description:

The level transmitter HNT 1100 is a floatbased sensor for highly accurate measuring of fluid levels.

The sensor is available with rod lengths from 250 .. 730 mm. Rod lengths of up to 2500 mm are possible.

HYDAC offers the HNT 1100 in a pressureresistant stainless steel housing for in-tank installation.

The integrated temperature sensor makes it possible for both fill level and temperature to be measured at one single measuring point. Depending on the application, several different floats are available, e.g. stainless steel for aggressive media or plastic.

In the CANopen version, the measured level is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

Technical data:

Input data

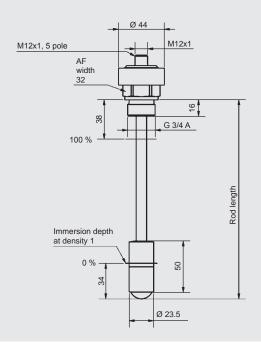
Measuring ranges	mm	178	208	298	338	448	658
Rod length 1)	mm	250	280	370	410	520	730
Max. speed of change in fluid level			No restric	tions			
Mechanical connection			G ¾ A ISO	1179-2			
Tightening torque, recommended			30 Nm				
Parts in contact with fluid			Rod: Stair Float: PP Seal: Sea	(nolyprop	vlene) 0 6	3 ka/dm³	
Fluids 2)			Hydraulic	oils, cooli	ing lubrica	ants	
Temperature							
Measuring range 3)			-25 +10	0 °C			
Output data							
Output signal			CANopen				
Accuracy 4)			Level: ≤ ± Temperate		°C		
Temperature coefficient			≤ ± 0.003	% FS / °C)		
Non-linearity			≤±1%F	S			
Repeatability			Level: ≤ ± Temperat		.5 °C		
Response time acc. to DIN EN 607 (temperature probe)	'51 		t ₉₀ ~ 100 s	3			
Environmental conditions							
Ambient temperature range			-40 +85				
Storage temperature range			-40 +10	0 °C			
Fluid temperature range 5)			-40 +12	0 °C / -25	+120 °0	С	
Max. tank pressure			3 bar (sho	ort-term 10) bar, t < 1	1 min)	
(€ mark			EN 61000	-6-1/2/	3 / 4		
Vibration resistance acc. to DIN EN 60068-2-6			7.5 mm (5	8.2 Hz) / 2.0 g (8	3.2 150	Hz)
Shock resistance acc. to DIN EN 600	68-2-27	(11 ms)	20 g				
Protection class acc. to DIN EN 60529 6)		IP 67					
Protocol data for CANopen:							
Communication profile			CiA DS 30	01 V4.2			
Device profile			CiA DS 40	04 V1.3			
Layer setting services and protocol			CiA DSP	305 V2.2			
Baud rates			10 kbit '	1 Mbit acc	: to DS30	5 V2.2	
Transmission services							
- PDO - Transfer			Measured synchrono measured	ous, asynd	chronous,	, float, stat cyclical,	us
Node ID/baud rate		Adjustable	e via LSS				
Other data							
Supply voltage (U _B)			9 36 V [DC .			
Residual ripple supply voltage			≤ 250 mV _{ss}				
Current consumption (without outp	ut)		≤ 100 mA				
Weight			Dependin 425 g (25			mm)	
Note: Reverse polarity protection	of the si	innly volt					cuit

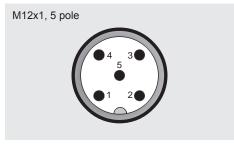
Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

- 1) Other rod lengths on request
- 2) Other fluids on request
- 3) Observe ambient temperature range
- 4) Specified at calm, non-turbulent fluid
- 5) -25 °C with FKM seal, -40 °C on request
 6) With mounted mating connector in corresponding protection class

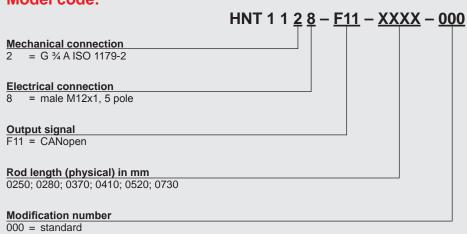
Dimensions:





Pin	Signal	Description
1	n.c.	
2	+U _B	Supply +
3	0 V	Supply -
4	CAN_H	bus line dominant high
5	CAN_L	bus line dominant low

Model code:



Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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EN 18.061.5/02.18

DAD INTERNATIONAL



Level Switch ENS 3000

Capacitive Display

Up to 4 switching outputs Up to 2 analogue outputs Optional temperature measurement



Description:

The ENS 3000 is an electronic level switch with integrated display. The instrument has 1, 2 or 4 switching outputs and an analogue output signal is available as an option.

In addition to the standard minimum and maximum switching signals, with the 4 switching output version it is possible to set additional warning signals to prevent problems such as tank overflow or aeration of the pump.

Using the device is easy, thanks to the menu-guided key operation, so adjusting the user-specific parameters takes little time.

The ENS 3000 can be used not only for oil but also for water; the type of fluid can be selected in an menu item.

One of the other advantages of the ENS 3000 is that no moving parts are used that come into contact with the fluid.

The main applications of the ENS 3000 are primarily in hydraulics, e.g. for fluid level monitoring of a tank.

The ENS 3000 is available in standard rod lengths of 250 mm, 410 mm, 520 mm and 730 mm. The instrument is also available with or without temperature probe.

When the device is used with temperature probe, the switching outputs can be individually assigned to the level or temperature variables.

Technical data:

Toolillioal data:					
Input data					
Measuring ranges	mm	170	290	390	590
Rod length	mm	250	410	520	730
Max. speed of change in fluid level	mm/s	40	60	80	100
Mechanical connection		Collar 22 mr	m for cutting	ring fitting	
Parts in contact with fluid		Rod: Ceram	ic, coated		
Fluids ¹⁾		Hydraulic oil synth. oils, f	ls (mineral ba luids contain	ased), ing water	
Temperature					
Measuring range 2)		-25 +100 °	°C		
Output data					
Switching outputs		Switching cu Switching cy	cles: > 100 n	b: max. 1.2 A max. 0.25 A p nillion	er output
Analogue output, permitted load resistance		0 . 4 SP: 0 .	. 10 V loa	d resist. max d resist. min. d resist. min.	1 kΩ
Accuracy		Level: ≤ ± 2 Temperature			
Temperature drift (enviroment)		≤ 0.0 15 % F	S/°C		
Repeatability ³⁾		Level: ≤ ± 2 Temperature			
Response time acc. to DIN EN 60751 (temperature probe)		t ₉₀ ~ 180 s			
Environmental conditions					
Ambient temperature range		0 +60 °C	;		
Storage temperature range		-40 +80 °C	;		
Fluid temperature range		0 +60 °C	;		
Max. tank pressure		0.5 bar (sho	rt-term 3 bar,	t < 1 min)	
(€ mark		EN 61000-6	-1/2/3/4		-
s mark ⁴⁾		Certificate n	o. E318391		
Vibration resistance acc. to DIN EN 60068-2-6 (0 500 Hz)		≤ 5 g			
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)		≤ 25 g			
Protection class acc. to DIN EN 60529 ³⁾		IP 67	-		-
Other data		1			
Supply voltage			C without an		ıt
when applied acc. to UL specifications		- limited ene	C with analog ergy - acc. to 85; LPS UL 6	9.3 UL 6101	0; Class 2;
Residual ripple of supply voltage		≤ 5 %			
Current consumption			tal n inactive swi l 2 analogue		İs
Display		4-digit, LED height of dig	, 7-segment, jits 7 mm	red,	
Weight	g	180	220	250	300
Note: Doverse polarity protection of the cu	ınnlı vo	ltaga avanya	Itaaa ayarri	do and abort	oirouit

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

- 1) Other fluids on request
- 2) Observe ambient temperature range
- 3) Specified at calm, non-turbulent fluid
- 4) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1

Setting options:

All settings available on the ENS 3000 are combined in two easy-to-navigate menus. In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges of the switch points and switch-back hystereses:

Fluid level switch point function

Rod length	Measuring range	Switch point	Hysteresis
in cm	in cm	in cm *	in cm *
25.0	17.0	0.3 17.0	0.1 16.8
41.0	29.0	0.5 29.0	0.2 28.7
52.0	39.0	0.6 39.0	0.2 38.6
73.0	59.0	0.9 59.0	0.3 58.4

The increment for all units is 0.1 cm.

Fluid level window function

Rod length in cm	Lower switch value in cm *	Upper switch value in cm *
25.0	0.3 16.7	0.4 16.8
41.0	0.5 28.4	0.7 28.7
52.0	0.6 38.3	0.9 38.6
73.0	0.9 57.9	1.4 58.4

The increment for all units is 0.1 cm.

Fluid level offset function

Rod length	Measuring range	Offset
in cm	in cm *	in cm *
25.0	17.0	0 68.0
41.0	29.0	0 116.0
52.0	39.0	0 156.0
73.0	59.0	0 177.0

The increment for all units is 0.1 cm.

Temperature switch point function

	Measuring range	Switch point	Hysteresis
°C	-25 +100	-23.0 +100.0	1.0 123.5

The increment for all units is 0.5 °C.

Temperature window function

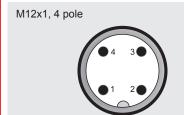
Unit	Lower switch value	Upper switch value	
°C	-23.5 +97.5	-22.0 +98.5	

The increment for all units is 0.5 °C.

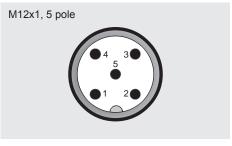
Additional functions:

- Switching mode of the swiching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switching outputs can be assigned to the fluid level or to the temperature
- Switch-on and switch-off delay adjustable from 0.00 .. 9999 seconds
- Choice of display (current level, current temperature, peak values, switch point 1, 2, 3, 4 or display off)
- Analogue output can be assigned to fluid level or temperature as required (depending

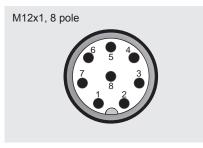
Pin connections:



Pin	ENS	ENS	
	3X16-2	3X16-3	
1	+U _B	+U _B	
2	SP2	Analogue	
3	0 V	0 V	
4	SP1	SP1	



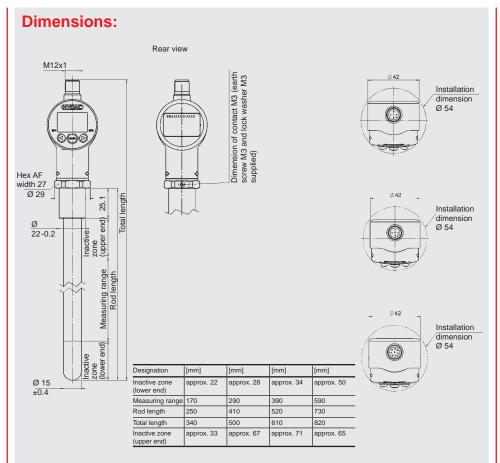
ENS
3X18-5
+U _B
Analogue
0 V
SP1
SP2



Pin	ENS
	3X1P-8
1	+U _B
2	SP2
2	0 V
4	SP1
5	SP3
6	SP4
7	Analogue fluid level
8	Analogue temperature

^{*} All ranges given in the table can be adjusted by the increments shown.





Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

Model code:

ENS 3 X 1 X - X - XXXX - 000 - K

Temperature probe

- = with temperature probe
- = without temperature probe

Mechanical connection

= 22 mm collar for cutting ring fitting G22L

Electrical connection

- = male M12x1, 4 pole
 - only possible on output models "2" and "3"
- male M12x1, 5 pole
 - only possible on output model "5"
- = Male M12x1, 8 pole
 - only possible on output model "8"

Output

- = 2 switching outputs
- only in conjunction with electrical connection type "6"
- = 1 switching output and 1 analogue output 3 only in conjunction with electrical connection type "6"
- 5 = 2 switching outputs and 1 analogue output
- only in conjunction with electrical connection type "8"
- 8 = 4 switching outputs and 2 analogue outputs only in conjunction with electrical connection type "P" and temperature probe "1"

Rod length (physical) in mm

0250; 0410; 0520; 0730

Modification number

000 = standard

Probe material

= ceramic

Accessories:

Appropriate accessories, such as mating connectors, splash guards, etc. can be found in the Accessories brochure.

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Level Switch ENS 3000

Capacitive Display

IO-Link Optional temperature measurement



Description:

The ENS 3000 with IO-Link communication interface is an electronic level switch with integrated display. The instrument has a switching output and an additional output that can be configured as switching or analogue output (4 .. 20 mA or 0 .. 10 V). The ENS 3000 can be used not only for oil but also for water; and is available with or without temperature probe.

IO-Link is the communication between the sensor/actuator (IO-Link device) and an IO-Link master based on a point-to-point interface.

The advantages:

Process data, parameters and diagnostic information of the level switch can be transmitted via a standard cable (SDCI mode). The integrated LED display provides information on the operating mode and the switching statuses.

Simple exchange: the IO-Link master saves the parameters of the connected level switch and transmits them to the newly connected level switch when replaced. Thus, timeconsuming new parameterisations will no longer be required.

If IO-Link is not used, the sensor still functions as a level switch with two switching outputs (SIO mode).

To create customer-specific small series or to duplicate sensor settings across the system, the sensor can also be easily adjusted outside the system to suit the particular application, with the HYDAC Programming Device HPG P1-000, the HYDAC Programming Adapter ZBE P1-000 or by means of the Portable Data Recorder HMG 4000.

Typical fields of application for ENS 3000 IO-Link are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Technical data:

Input data					
Measuring ranges	mm	170	290	390	590
Rod length	mm	250	410	520	730
Max. speed of change in fluid level	mm/s	40	60	80	100
Mechanical connection	1	Collar 22 mm fo			
Parts in contact with fluid		Rod: Ceramic, c		9	
Fluids 1)		Hydraulic oils (m		synth oils	
Tiddo		fluids containing		syriai. Oilo,	
Temperature					
Measuring range 2)		-25 +100 °C			
Output data					
Switching outputs		PNP transistor of Switching currer		per switching o	utput
Analogue output, permitted load resistance		Selectable: 4 20 mA load 0 10 V load	resist. max. 50 resist. min. 1 k		
Accuracy		Level: ≤ ± 2 % F Temperature: ±	S		
Temperature drift (environment)		≤ 0.015 % FS / °			
Repeatability 3)		Level: ≤ ± 2 % F			
		Temperature: ≤:			
Response time acc. to DIN EN 60751 (temperature probe)		t ₉₀ ~180 s			
Environmental conditions					
Ambient temperature range		0 +60 °C			
Storage temperature range		-40 +80 °C			
Fluid temperature range		0 +60 °C			
Max. tank pressure		0.5 bar (short-term 3 bar, t < 1 min)			
(€ mark		EN 61000-6-1 / 2 / 3 / 4			
• Nus mark 4)		Certificate-No.: I			
Vibration resistance acc. to DIN EN 60068-2-6 (0 500 Hz)		≤ 5 g			
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)		≤ 25 g			
Protection class acc. to DIN EN 60529 5)		IP 67			
IO-Link specific data					
IO-Link revision		V1.1 / support V	1.0		
Transmission rate, baud rate 6)		38.4 kBaud (CO	M2)		
Minimum cycle time		20 ms			
Process data width		Version without temperature sensor: 16 Bit Version with temperature sensor: 32 Bit			
SIO mode supported		Yes			-
M-sequence capability		PREOPERATE: TYPE_0 OPERATE: TYPE_2 (level) TYPE_2_V (level / temperature) ISDU: Supported			
IO Device Description (IODD) download at: https://ioddfinde	er.io-link.c				
Other data					
Supply voltage		9 35 V DC,	if PIN 2 = SI	2	
when applied acc. to UL specifications		18 35 V DC, if PIN 2 = analogue output - limited energy – acc. to 9.3 UL 61010; Class 2; UL 1310 / 1585; LPS UL 60950			
Residual ripple of supply voltage		<u>0L 13107 1363,</u> ≤ 5 %	L. G GL 00930		
Current consumption		≤ 0.535 A with	active switching	outnute	
Gurrant consumption		≤ 35 mA with	nactive switchir		nalogue output
Display		4-digit, LED, 7 segment, red, height of digits 7 mm			
Weight	g	180	220	250	300

FS (Full Scale) = relative to complete measuring range

- 1) Other fluids on request
 - 2) Observe ambient temperature range
 - 3) Specified at calm, non-turbulent fluid
 - ⁴⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 No. 61010-1
 - 5) With mounted mating connector in corresponding protection class
 6) Connection with unshielded standard sensor line possible up to a maximum line length of 20 m.

EN 18.061.1.1/02.18

Setting options:

All terms and symbols used for setting the ENS 3000 as well as the menu structure comply with the specifications in the VDMA Standard for level switches.

Setting ranges for the switching outputs:

Measuring range/ rod length in cm	Lower limit of RP (FL) in cm	Upper limit of SP (FH) in cm
17.0 / 25.0	0.2	17.0
29.0 / 41.0	0.3	29.0
39.0 / 52.0	0.4	39.0
59.0 / 73.0	0.6	59.0

Measuring range/ rod length	Min. difference betw. RP & SP and FL & FH	Increment*
in cm	in cm	in cm
17.0 / 25.0	0.2	0.1
29.0 / 41.0	0.3	0.1
39.0 / 52.0	0.4	0.1
59.0 / 73.0	0.6	0.1

Measuring range Temperature	Lower limit of RP (FL)	Upper limit of SP (FH)
-25 +100 °C	-23.5 °C	100.0 °C

Measuring	Min. difference	
range	betw. RP and SP)
Temperature	& FL and FH	
-25 +100 °C	1.5 °C	0.5 °C

* All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

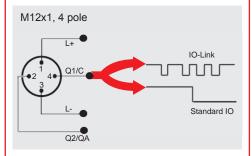
FL = level/temperature window lower value

FH = level/temperature window upper value

Additional functions:

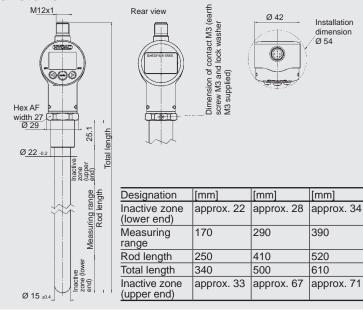
- Switching mode of the swiching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switching outputs can be assigned to the fluid level or to the temperature
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Analogue output can be assigned to fluid level or temperature as required (depending on model)

Pin connections:

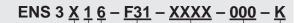


Pin	Signal	Description
1	L+	+U _B
2	Q2/QA	Switching output (SP2) / analogue output
3	L-	0 V
4	Q1/C	IO-Link communication / switching output (SP1)

Dimensions:



Model code:



Installation

dimension

[mm]

590

730

820

approx. 50

approx. 65

Temperature probe

= with temperature probe

= without temperature probe

Mechanical connection

= 22 mm collar for cutting ring fitting G22L

Electrical connection

= male M12x1, 4 pole

(mating connector not supplied)

Output

F31 = IO-Link interface

Rod length, physical

0250; 0410; 0520; 0730 mm

Modification number

000 = standard

Probe material

= ceramic

Accessories:

Appropriate accessories, such as mating connectors, mechanical adapters, splash guards and programming units, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DADINTERNATIONAL



Level Switch HNS 3000

Magnetostrictive Display

Up to 4 switching outputs Up to 2 analogue outputs Optional temperature measurement

Description:

The HNS 3000 is an electronic level switch with integrated display.

The float-based sensor for high-precision analogue monitoring of the fluid level has 1, 2 or 4 switching outputs and an analogue output signal is available as an option.

In addition to the standard minimum and maximum switching signals, with the 4 switching output version it is possible to set additional warning signals to prevent problems such as tank overflow or aeration of the pump.

Using the device is easy, thanks to the menu-guided key operation, so adjusting the user-specific parameters takes little time.

The main applications of the HNS 3000 are primarily in hydraulics, e.g. for fluid level monitoring of a tank.

The sensor is available in rod lengths of 250 .. 730 mm as standard. Rod lengths of up to 2500 mm are possible. The instrument is also available with or without temperature

Depending on the application, several different floats are available, e.g. stainless steel for aggressive media or plastic.

When the device is used with temperature probe, the switching outputs can be individually assigned to the level or temperature variables.

Technical data:

Innut data

Input data							
Measuring ranges	mm	178	208	298	338	448	658
Rod length 1)	mm	250	280	370	410	520	730
Max. speed of change in fluid level			No restric	tions			
Mechanical connection			G ¾" ISO	1179-2			
Tightening torque, recommended			30 Nm				
Parts in contact with fluid			Rod: Stair Float: PP Seal: Sea	(polypropy I ring DIN	ylene); 0.6 3869-27-F	KM	
Fluids ²⁾			Hydraulic synth. oils				
Temperature							
Measuring range 3)			-25 +10	0 °C			
Output data							
Switching outputs			1; 2; 4 PN Switching Switching	4	; 2 SÞ: ma SP: max.	0.25 A pe	
Analogue output, permitted load r	esistar	nce	Ć	1 20 mA 0 10 V 0 10 V	load resis	st. max. 50 st. min. 1 k st. min. 1 k	(Ω
Accuracy			Level: ≤ ± Temperatu	1.0 % FS ure: ± 1.5 °	C.		
Temperature drift (environment)			≤ 0.04 % F				
Repeatability 4)			Level: ≤ ± Temperatu	1.0 % FS ure: ≤ ± 0.5	5 °C		
Response time acc. to DIN EN 60 (temperature probe)	751		t ₉₀ ~100 s				
Environmental conditions							
Ambient temperature range			-25 +80	°C			
Storage temperature range			-40 +80	°C			
Fluid temperature range 5)			-40 +120	0 °C / -25	+120 °C		
Max. tank pressure			3 bar (sho	ort-term 10	bar, t < 1	min)	
(€ mark			EN 61000)-6-1 / 2 / 3	3 / 4		
Vibration resistance acc. to DIN EN 60068-2-6 (0 500 Hz)			≤ 2 g				
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)			≤ 20 g				
Protection class acc. to DIN EN 6	0529 6)	IP67				
Other data							
Supply voltage				DC without DC with a			
Residual ripple of supply voltage			≤ 5 %				
Current consumption			≤ 2.470 A ≤ 150 mA			ning outpu	its and
Display			4-digit, LE height of o				
Weight			500 100	00 g (depe	nding on I		
Note: Reverse polarity protection	of the	supply v	oltage, over	rvoltage, c	verride a	nd short c	ircuit

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

- 1) Other rod lengths on request
- 2) Other fluids on request
- 3) Observe ambient temperature range
- 4) Specified at calm, non-turbulent fluid 5) -25 °C with FKM seal, -40 °C on request
- 6) With mounted mating connector in corresponding protection class

EN 18.061.2.1/02.18

Setting options:

All settings available on the HNS 3000 are combined in two easy-to-navigate menus.

In order to prevent unauthorised adjustment of the device, a programming lock can be set.

Setting ranges of the switch points and switch-back hystereses:

Fluid level switch point function

Rod length in cm	Meas. range in cm	Switch point in cm *	Switch hysteresis in cm *
25.0	17.8	0.3 17.8	0.1 17.6
28.0	20.8	0.4 20.8	0.2 20.5
37.0	29.8	0.5 29.8	0.2 29.5
41.0	33.8	0.6 33.8	0.2 33.4
52.0	44.8	0.7 44.8	0.3 44.3
73.0	65.8	1.0 65.8	0.4 65.1

The increment for all units is 0.1 cm.

Fluid level window function

Rod length in cm	Lower switch value in cm *	Upper switch value in cm *
25.0	0.3 17.4	0.4 17.6
28.0	0.4 20.4	0.5 20.5
37.0	0.5 29.2	0.7 29.5
41.0	0.6 33.2	0.8 33.4
52.0	0.7 44.0	1.0 44.3
73.0	1.0 64.6	1.5 65.1

The increment for all units is 0.1 cm.

Fluid level offset function

Rod length	Measuring range	Offset
in cm	in cm	in cm *
25.0	17.8	0.0 71.2
28.0	20.8	0.0 83.2
37.0	29.8	0.0 119.2
41.0	33.8	0.0 135.2
52.0	44.8	0.0 179.2
73.0	65.8	0.0 263.2

The increment for all units is 0.1 cm.

Temperature switch point function

Unit	Measuring range	Switch point	Hysteresis
°C	-25 +100	-23.0 +100.0	0.8 123.6

The increment for all units is 0.2 °C.

Temperature window function

Unit	Lower switch value	Upper switch value
°C	-23.0 +97.8	-22.2 +98.6

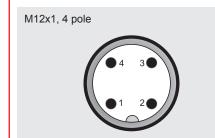
The increment for all units is 0.2 °C.

* All ranges given in the table can be adjusted by the increments shown.

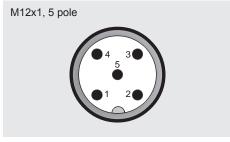
Additional functions:

- Switching mode of the swiching outputs adjustable (switch point function or window function)
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switching outputs can be assigned to the fluid level or to the temperature
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Choice of display (current level, current temperature, peak values, switch point 1, 2, 3, 4 or display off)
- Analogue output can be assigned to fluid level or temperature as required (depending

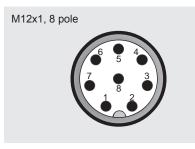
Pin connections:



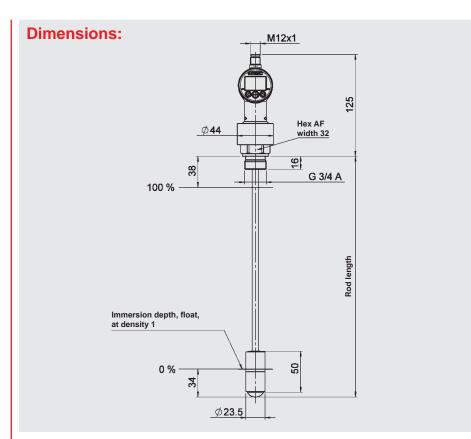
Pin	HNS 3X26-2	HNS 3X26-3
1	+U _B	+U _B
2	SP2	Analogue
3	0 V	0 V
4	SP1	SP1



HNS 3X28-5	
+U _B	
Analogue	
0 V	
SP1	
SP2	
	+U _B Analogue 0 V SP1



Pin	HNS 3X2P-8
1	+U _B
2	SP2
3	0 V
4	SP1
5	SP3
6	SP4
7	Analogue fluid level
8	Analogue temperature



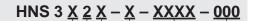
Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

Model code:



Temperature probe

= with temperature probe = without temperature probe

Mechanical connection

= G3/4 A ISO 1179-2

Electrical connection

= male M12x1, 4 pole

only possible on output models "2" and "3"

= male M12x1, 5 pole

only possible on output model "5"

= male M12x1, 8 pole

only possible on output model "8"

Output

= 2 switching outputs

only in conjunction with electrical connection type "6"

3 = 1 switching output and 1 analogue output

only in conjunction with electrical connection type "6"

= 2 switching outputs and 1 analogue output 5

only in conjunction with electrical connection type "8"

= 4 switching outputs and 2 analogue outputs only in conjunction with electrical connection type "P" and temperature probe "1"

Rod length (physical) in mm

0250; 0280; 0370; 0410; 0520; 0730

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, splash guards, etc. can be found in the Accessories brochure.

HYDAC ELECTRONIC GMBH

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E-mail: electronic@hydac.com Internet: www.hydac.com



Level Switch HNS 3000

Magnetostrictive

Display

IO-Link Optional temperature measurement



Description:

The HNS 3000 with IO-Link communication interface is an electronic level switch with integrated display. The instrument has a switching output and an additional output that can be configured as switching or analogue output (4 .. 20 mA or 0 .. 10 V) The HNS 3000 can be used not only for oil but also for water, and is available with or without temperature probe.

IO-Link is the communication between the sensor/actuator (IO-Link device) and an IO-Link master based on a point-to-point interface.

The advantages:

Process data, parameters and diagnostic information of the level switch can be transmitted via a standard cable (SDCI mode). The integrated LED display provides information on the operating mode and the switching statuses.

Simple exchange: the IO-Link master saves the parameters of the connected level switch and transmits them to the newly connected level switch when replaced. Thus, timeconsuming new parameterisations will no longer be required.

If IO-Link is not used, the sensor still functions as a level switch with two switching outputs (SIO mode).

To create customer-specific small series or to duplicate sensor settings across the system, the sensor can also be easily adjusted outside the system to suit the particular application, with the HYDAC Programming Device HPG P1-000, the HYDAC Programming Adapter ZBE P1-000 or by means of the Portable Data Recorder HMG 4000.

Typical fields of application for HNS 3000 IO-Link are machine tools, handling and assembly automation, intralogistics or the packaging industry.

Technical data:

Input data							
Measuring ranges	mm	178	208	298	338	448	658
Rod length 1)	mm	250	280	370	410	520	730
Max. speed of change in the fluid level No restrictions							
Mechanical connection G ¾" ISO 1179-2							
Tightening torque, recommended 30 Nm							
Parts in contact with fluid		Rod: Stainless steel 1.4571 Float: PP (Polypropylene); 0.6 kg/dm³ Seal: Seal ring DIN 3869-27-FKM					
Fluids ²⁾		Hydraulic oil synth. oils, fl					
Temperature							
Measuring range 3)		-25 +100 °	С				
Output data							
Switching outputs		PNP transist Switching cu		s c. 250 mA pe	r switching	output	
Analogue output, permitted load resistance		Selectable: 4 20 mA le 0 10 V					
Accuracy		Level: ≤ ± 1. Temperature					
Temperature drift (environment)		≤ 0.04 % FS					
Repeatability 4)		Level: ≤ ± 1. Temperature					
Response time acc. to DIN EN 60751 (temperature probe)		t ₉₀ ~100 s					
Environmental conditions							
Ambient temperature range		-25 +80 °C	;				
Storage temperature range		-40 +80 °C	;				
Fluid temperature range 5)		-40 +120 °	C / -25 +	+120 °C			
Max. tank pressure		3 bar (short-	term 10 ba	ar, t < 1 min)			
(€ mark EN 61000-6-1/2/3/4			4				
Vibration resistance acc. to DIN EN 60068-2-6 (0 500 Hz)		≤ 2 g					
Shock resistance acc. to DIN EN 60068-2-27 (11 ms)		≤ 20 g					
Protection class acc. to DIN EN 60529 6)		IP 67					
IO-Link specific data							
IO-Link revision		V1.1 / suppo	rt V1.0				
Transmission rate, baud rate 7)		38.4 kBaud	(COM2)				
Minimum cycle time		20 ms					
Process data width		Version with Version with		rature sensor ure sensor:	r: 16 Bi 32 Bi		
SIO mode supported		Yes					
M-sequence capability		PREOPERA OPERATE:		TYPE_0 TYPE_2_2 (I TYPE_2_V (perature)	
IO Device Description (IODD) deviced at Literature 115.	nia II. I	ISDU:		Supported			
IO Device Description (IODD) download at: https://ioddfinde	ı.ıo-lini	k.com/#/					
Other data		0 25 \/ D	0 :4.5	PIN 2 = SP2			
Supply voltage		9 35 V Do		PIN 2 = SP2 PIN 2 = analo	gue output		
Residual ripple of supply voltage		≤ 5 %	***				
Current consumption		≤ 0.535 A ≤ 35 mA ≤ 55 mA	with inac	ive switching ctive switchin ctive switchin	g outputs	nd analogue	outnut
Display		4-digit, LED, height of dig	7 segmer		g output a	na analogue	Juipul
Weight		500 1000		ina on lenath)		

- 1) Other rod lengths on request
- 2) Other fluids on request 3) Observe ambient temperature range
- 4) Specified at calm, non-turbulent fluid
- 5) -25 °C with FKM seal, -40 °C on request
 6) With mounted mating connector in corresponding protection class
- 7) Connection with unshielded standard sensor line possible up to a maximum line length of 20 m.

EN 18.061.3.0/02.18

Setting options:

All terms and symbols used for setting the HNS 3000 as well as the menu structure comply with the specifications in the VDMA Standard for level switches.

Setting ranges for the switching outputs:

	5	
Measuring range/ rod length in cm	Lower limit of RP (FL) in cm	Upper limit of SP (FH) in cm
17.8 / 25.0	0.3	17.8
20.8 / 28.0	0.4	20.8
29.8 / 37.0	0.5	29.8
33.8 / 41.0	0.6	33.8
44.8 / 52.0	0.7	44.8
65.8 / 73.0	1.0	65.8
	·	

Measuring range/ rod length	Min. difference betw. RP & SP and FL & FH	Increment*
in cm	in cm	in cm
17.8 / 25.0	0.1	0.1
20.8 / 28.0	0.2	0.1
29.8 / 37.0	0.2	0.1
33.8 / 41.0	0.2	0.1
44.8 / 52.0	0.3	0.1
65.8 / 73.0	0.4	0.1

Measuring range Temperature	Lower limit of RP (FL)	Upper limit of SP (FH)
-25 +100 °C	-23.5 °C	100.0 °C

Measuring	Min. difference	Increment*	
range Temperature	betw. RP and SP & FL and FH		
remperature	Q I L and I II		
-25 +100 °C	1 5 °C	0.5 °C	

* All ranges given in the table can be adjusted by the increments shown.

SP = switch point

RP = switch-back point

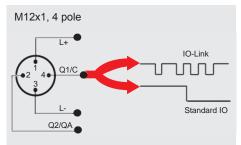
FL = level/temperature window lower value

FH = level/temperature window upper value

Additional functions:

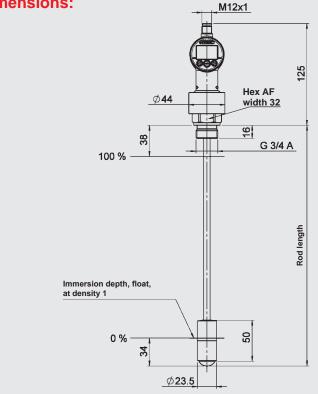
- Switching mode of the swiching outputs adjustable (switch point function or window
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switching outputs can be assigned to the fluid level or to the temperature
- Switch-on and switch-off delay adjustable from 0.00 .. 99.99 seconds
- Analogue output signal selectable 4 .. 20 mA or 0 .. 10 V
- Analogue output can be assigned to fluid level or temperature as required (depending on model)

Pin connections:



Pin	Signal	Description
1	L+	+U _B
2	Q2/QA	Switching output (SP2) / analogue output
3	L-	0 V
4	Q1/C	IO-Link communication / switching output (SP1)

Dimensions:



Model code:

HNS 3 X 2 6 - F31 - XXXX - 000

Temperature probe

= with temperature probe = without temperature probe

Mechanical connection

= G 3/4 A ISO 1179-2

Electrical connection

= male M12x1, 4 pole (mating connector not supplied)

Output

F31 = IO-Link interface

Rod length, physical

0250; 0280; 0370; 0410; 0520; 0730 mm

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, mechanical adapters, splash guards and programming units, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAC INTERNATIONAL



Level Switch HNS 526

Ultrasound Display

Up to 2 switching outputs



Description:

The level switch HNS 526 is a non-contact, highly compact sensor for fluid level measurement in stationary applications. By definition, its functional principle (measurement of sound transmission time) means that it operates with an extremely high resolution and sampling rate.

Thanks to the integrated temperature compensation, the sensors can be used in a wide temperature range.

The HNS 526 is available for measuring ranges up to 6400 mm and is obtainable in different signal output variants (2 switching outputs; 1 switching output plus 1 analogue output, either 4 .. 20 mA or 0 .. 10 V).

The sensor can be adjusted simply and conveniently via two push-buttons and a self-explanatory menu structure according to

The actual fluid level can be displayed in a 3-digit digital display either in absolute value or in percent (selectable); 2 three-colour LEDs also indicate the operating status.

Technical data:

Input data								
Operating range	mm	280	480	1600	4000	6400		
Blind zone	mm	0 30	0 85	0 200	0 350	0 600		
Maximum range	mm	350	600	2000	5000	8000		
Resolution			≤ 0.18 mm					
Mechanical connection			M30x1.5					
Output data								
Switching outputs				ınsistor outpu				
				urrent: max. 2		output		
				/cles: > 100 ı	million			
Analogue output, permitted I	oad resist	ance	Selectable:	D 400.0	2 (11 - 4 00) (1			
				$R_{Lmax} = 100 \Omega$ $R_{Lmax} = 500 \Omega$				
				$R_{Lmin} = 300 \text{ k}$				
Accuracy				ne actual me				
Repeatability				the actual m				
Reaction time	ms	32	64	92	172	240		
Environmental conditions	1110	,			,			
Ambient temperature range			-25 °C +70 °C					
Storage temperature range			-40 °C +85 °C					
Max. tank pressure			Only for dep	ressurised v	essels			
€ mark			DIN EN 60947-5-2					
			DIN EN 60947-5-7					
Vibration resistance acc. to			≤ 2 g					
DIN EN 60068-2-6 (5 2000	Hz)							
Shock resistance acc. to			≤ 30 g					
DIN EN 60068-2-27 (11 ms)	=11.00=00	4)						
Protection class acc. to DIN	EN 60529) ¹⁾	IP 67					
Other data			0.001/.0	0 ''' '				
Supply voltage			9 30 V DC without analogue output					
Decidual ripple of augusty volt			20 30 V DC with analogue output ± 10 %					
Residual ripple of supply vol								
Current consumption			≤ 80 mA					
Housing			Brass, nickel-plated; ultrasonic transducer with PEEK film					
Display			3-digit, LED-display, 2 three-colour-LEDs					
Weight	g	~ 150	~ 150	~ 150	~ 210	~ 270		
Weight		- 100	~ 130			210		

Note: Reverse polarity protection of the supply voltage and load short circuit protection are

1) With mounted mating connector in corresponding protection class

EN 18.604.1/02.18

Setting options:

All the terms and symbols used for setting the HNS 526 as well as the menu structure comply with the specifications of the German Engineering Federation Standard (VDMA 24574-4) for level switches.

In order to prevent unauthorised adjustment of the device, a key-lock can be set.

Setting ranges of the switch points or switch-back points:

Switch point function distance and window function distance

Operating range	SP1, SP2, FH1, FH2 *	RP1, RP2, FL1, FL2*
280 mm	2 32 cm 2 13 inch	1 31 cm 1 12 inch
480 mm	2 59 cm 2 23 inch	1 58 cm 1 22 inch
1600 mm	2 180 cm 2 71 inch	1 179 cm 1 70 inch
4000 mm	2 465 cm 2 183 inch	1 464 cm 1 182 inch
6400 mm	2 740 cm 2 291 inch	1 739 cm 1 290 inch

Switch point function:

SP1, SP2 = switch point 1 or 2

RP1, RP2 = switch-back point 1 or 2

Window function.

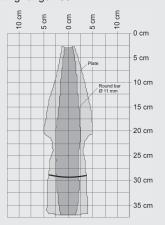
FH1, FH2 = upper switch values 1 or 2 FL1, FL2 = lower switch values 1 or 2

* The increment for all devices is 1 cm or 1 inch

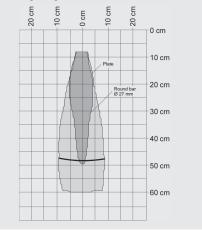
Recording ranges (for different objects):

The grey areas show the detection range for a very large reflector, e.g. a fluid surface, providing the sensor is ideally positioned. Outside the grey area, it is not possible to evaluate the ultrasonic reflections.

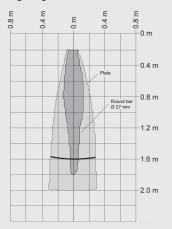
Operating range 280 mm:



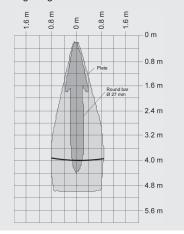
Operating range 480 mm:



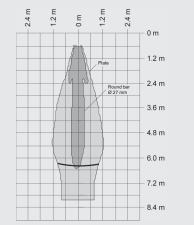
Operating range 1600 mm:



Operating range 4000 mm:



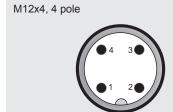
Operating range 6400 mm:



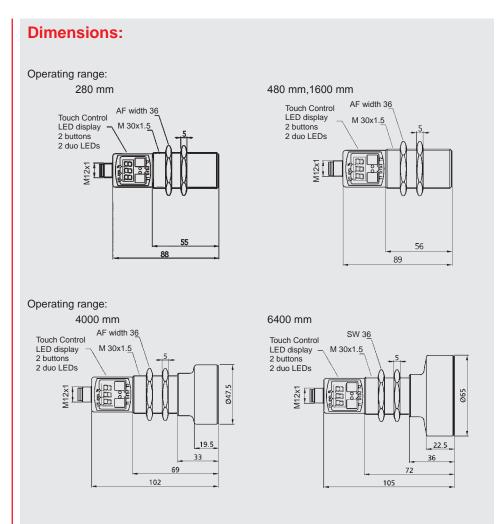
Additional functions:

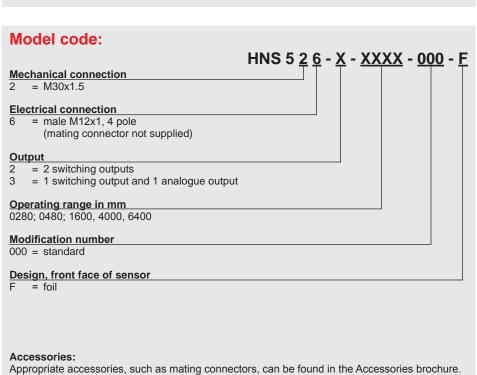
- Switching mode of the swiching outputs adjustable (switch point function or window
- Switching direction of the switching outputs adjustable (N/C or N/O function)
- Switch-on delay adjustable from 0 .. 20 seconds
- Energy saving mode

Pin connections:



Pin	HNS 526-2	HNS 526-3	
1	+U _B	+U _B	
2	SP2	I/U	
3	0 V	0 V	
4	SP1	SP1	





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Note:

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described, please contact the relevant technical

Subject to technical modifications.

Hauptstraße 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 E-mail: electronic@hydac.com

FLOW RATE T	RANSMITTERS / FI	LOW SWITCH	IES [7]		
FLOW RATE AN	D FLOW TRANSMITTER	lS .			Page
GENERAL APP	LICATIONS				
Turbine					
EVS 3100	Aluminium				367
EVS 3110	Stainless steel				369
Float					
HFT 2100					371
HFT 2500					375
POTENTIALLY	EXPLOSIVE ATMOSPH	ERE			
Turbine					
HFT 3100		HART	Flameproof enclosure	ATEX, IECEx, CSA	379
HFT 3100		HART	Intrinsically safe	ATEX, IECEx	383
	_				
FLOW SWITCHE	.S				
GENERAL APP	LICATIONS				
Float					
HFS 2100	Display				387
HFS 2500	Display				391
POTENTIALLY	EXPLOSIVE ATMOSPH	ERE			
Float					
HFS 2100	Display		Intrinsically safe	ATEX	395
HFS 2500	Display		Intrinsically safe	ATEX	399

YDAC INTERNATIONAL



Flow Rate Transmitter **EVS 3100**

Turbine High accuracy Additional measuring connections

Description:

The flow rate transmitters of the EVS 3100 series (aluminium series) are specially designed for use in hydraulic and other fluid power systems. They operate in accordance with the turbine principle, which means that the rpm of an impeller wheel rotating in the flow of the media is measured and converted into a 4 .. 20 mA analogue signal.

Two further G1/4 threaded holes in the turbine housing allow additional units to be connected, e.g. temperature and pressure sensors.

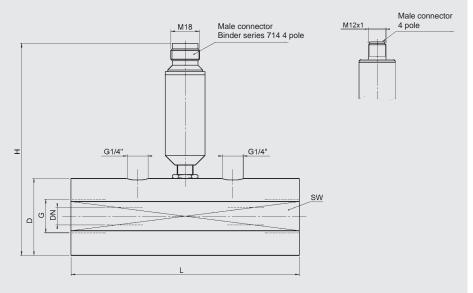
For oils / viscous fluids

Technical data:

Input data	
Measuring ranges 1) and operating pressure	
1.2 20.0 l/min	400 bar
6.0 60.0 l/min	400 bar
15.0 300.0 l/min	400 bar
40.0 600.0 l/min	315 bar
Additional connection options	2 x G1/4 female threads for pressure and/or temperature sensors
Housing material	Aluminium
Output data	
Output signal, permitted load resistance	4 20 mA, 2-conductor $R_{Lmax} = \left(U_B - 10 \text{ V}\right) / 20 \text{ mA } [k\Omega]$
Accuracy	≤ 2 % of the actual value
Environmental conditions	
Compensated temperature range	-20 +70 °C
Operating temperature range	-20 +70 °C
Storage temperature range	-40 +100 °C
Fluid temperature range	-20 +90 °C
C € mark	EN 61000-6-1 / 2 / 3 / 4
Protection class acc. to DIN EN 60529 2)	IP 65 (Binder male connector 714 M18) IP 67 (M12x1 male connector)
Other data	
Measuring medium 3)	Hydraulic oils
Viscosity range	1 100 cSt
Calibration viscosity	30 cSt
Supply voltage	10 32 V DC
Residual ripple of supply voltage	≤ 5 %

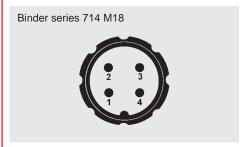
Note: 1) Other measuring ranges on request.
2) With mounted mating connector in corresponding protection class
3) Other measuring media on request

Dimensions:

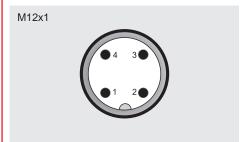


Model	Measuring	L	Н	D/SW	G	Torque,	DN
	range [l/min]	[mm]	[mm]	[mm]		recommended [Nm]	[mm]
EVS 310X-A-0020	1.2 20	117	135	47 / 46	G1/4"	60	7
EVS 310X-A-0060	6 60	144	135	48.5 / 46	G1/2"	130	11
EVS 310X-A-0300	15 300	155	150	63.5 / 60	G1¼"	500	22
EVS 310X-A-0600	40 600	181	150	63.5 / 60	G1½"	600	30

Pin connections:



Pin	EVS 3104-A
1	Reserved
2	Signal +
3	Signal -
4	Reserved



Pin	EVS 3106-A
1	Signal +
2	Reserved
3	Signal -
4	Reserved

Model code:

EVS 3 1 <u>0 X - A - XXXX - 000</u> **Housing material** = aluminium **Electrical connection**

= male, 4 pole Binder series 714 M18 (mating connector not supplied) male M12x1, 4 pole

(mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor (4 mA ≜ 0 l/min)

Measuring range

0020 = 1.2 .. 20 l/min 0060 = 6.0 .. 60 l/min 0300 = 15.0 .. 300 l/min 0600 = 40.0 .. 600 l/min

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAC INTERNATIONAL



Flow Rate Transmitter **EVS 3110**

connections
COI

Description:

The flow rate transmitters in the EVS 3110 series (stainless steel series) are specially designed for use in hydraulic and other fluid power systems. They operate in accordance with the turbine principle, which means that the rpm of an impeller wheel rotating in the flow of the media is measured and converted into a 4 .. 20 mA analogue signal.

In the EVS 3110 stainless steel series, the impeller has a carbide bearing and the resulting increased robustness also makes it suitable for use in pulsating, dynamic applications.

Two further G1/4 threaded holes in the turbine housing allow additional units to be connected, e.g. temperature and pressure sensors.

For water-based media

Technical data:

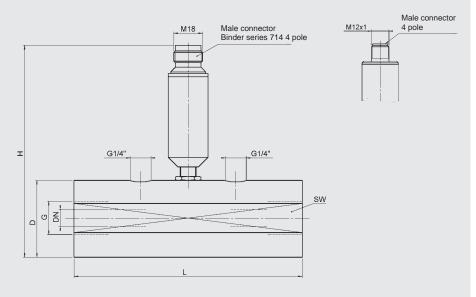
Input data	
Measuring ranges 1) and operating pressure	
1.2 20.0 l/min	400 bar
6.0 60.0 l/min	400 bar
15.0 300.0 l/min	400 bar
40.0 600.0 l/min	400 bar
Additional connection options	2 x G1/4 female threads for pressure and/or temperature sensors
Housing material	Stainless steel
Output data	
Output signal, permitted load resistance	4 20 mA, 2-conductor $R_{Lmax} = \left(U_B - 10 \text{ V}\right) / 20 \text{ mA } [k\Omega]$
Accuracy	≤ 2 % of the actual value
Environmental conditions	
Compensated temperature range	-20 +70 °C
Operating temperature range	-20 +70 °C
Storage temperature range	-40 +100 °C
Fluid temperature range	-20 +90 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Protection class acc. to DIN EN 60529 2)	IP 65 (Binder male connector 714 M18) IP 67 (M12x1 male connector)
Other data	
Measuring medium 3)	Water-based media
Viscosity range	1 100 cSt
Calibration viscosity	5 cSt
Supply voltage	10 32 V DC

≤5%

Residual ripple of supply voltage

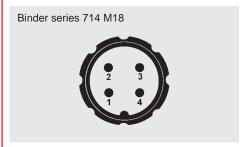
Note: 1) Other measuring ranges on request.
2) With mounted mating connector in corresponding protection class
3) Other measuring media on request

Dimensions:

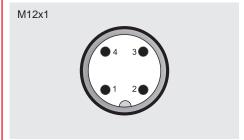


Model	Measuring	L	Н	D/SW	G	Torque, recommended	DN
	range [l/min]	[mm]	[mm]	[mm]		[Nm]	[mm]
EVS 311X-A-0020	1.2 20	117	135	47 / 46	G¼"	60	7
EVS 311X-A-0060	6 60	144	135	48.5 / 46	G½"	130	11
EVS 311X-A-0300	15 300	155	150	63.5 / 60	G1¼"	500	22
EVS 311X-A-0600	40 600	181	150	63.5 / 60	G1½"	600	30

Pin connections:



Pin	EVS 3114-A
1	Reserved
2	Signal +
3	Signal -
4	Reserved



Pin	EVS 3116-A
1	Signal +
2	Reserved
3	Signal -
4	Reserved

Model code:

EVS 3 1 1 X - A - XXXX - 000

Housing material

= stainless steel

Electrical connection

= male, 4 pole Binder series 714 M18 (mating connector not supplied)

male M12x1, 4 pole (mating connector not supplied)

Output signal

= 4 .. 20 mA, 2-conductor (4 mA ≜ 0 l/min)

Measuring range

0020 = 1.2 .. 20 l/min 0060 = 6.0 .. 60 l/min 0300 = 15.0 .. 300 l/min 0600 = 40.0 .. 600 l/min

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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YDAC INTERNATIONAL



Flow Transmitter HFT 2100

Float	Any installation position	30-600 cSt
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Description:

The HYDAC flow transmitters of the HFT 2100 series are based on a variablearea float principle.

Irrespective of the installation position, the measuring medium deflects a spring-loaded float in the direction of flow, depending on the flow rate. A Hall sensor detects the position of the float and is fitted to the outside of the device therefore separated from the fluid circuit. In proportion to the deflection of the float, the sensor produces an analogue signal which corresponds to the particular measuring range.

The device is calibrated for vertical installation and for an upwards flow direction. The measurement transmitter is designed to give reliable measurements within its accuracy range, even with changes in viscosity. The kinematic viscosity may vary between 30 and 600 cSt.

The fields of application include:

- Central lubrication systems
- Circulation oil lubrication systems
- Transformers
- · Cooling systems and circuits
- Lubrication circuits
- Hydraulic systems
- Pumps
- Welding machines and laser plants
- Chemical industry
- Research and development

For oils / viscous fluids

Tachnical data

Input data	0: 4	0: 0
Measuring ranges [I/min]	Size 1	Size 2
	0.5 1.6	0.5 1.5
	0.8 3.0	1 4
	2.0 7.0	2 8
		5 15
		8 24
		10 30
		15 45
		20 60
		30 90
		35 110
Operating pressure		
Brass version [bar]	300	250
Stainless steel version [bar]	350	300
Pressure drop [bar]	0.02 0.2	0.02 0.4
Mechanical connection	see dimensions	
Parts in contact with fluid	Ot -t1 4 4574; EKM 1)	haran alabahata
Brass version	St. steel 1.4571; FKM ¹⁾ ; brass; hard ferrite	brass nickel-pl.;
Stainless steel version	Stainless steel 1.4571; F	KM 1); hard ferrite
Housing material		
Measuring parts	Brass (nickel-plated) or s	stainless steel 1.4571
Transmitter	Brass, nickel-plated	
Output data		
Output signal, max. load resist.	4 20 mA, 3-conductor,	R _{Lmax} ~ 500 Ω
max. current	0 10 V, 3-conductor, I _{ma}	_{ax} ~ 10 mA
Accuracy 2)	≤ ± 10 % FS	
Repeatability	≤ 1 % FS max.	
Environmental conditions		
Operating temperature range	-20 +70 °C	
Fluid temperature range	-20 +70 °C	
Viscosity range	30 600 cSt	
(€ mark	Directive 2014 / 30 / EU	
Protection class acc. to DIN EN 60529 3)	IP 67	
Other data		
Supply voltage	18 30 V	
Power consumption	< 1 W	

Note: FS (Full Scale) = relative to complete measuring range

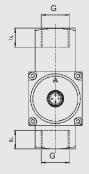
- 1) Other seal materials on request
- $^{2)}$ ± 5 % possible with calibration to a certain viscosity
- 3) With mounted mating connector in corresponding protection class

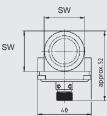
Dimensions:

Size 1

Type [l/min]	Installat dimensi [mm]			Weight (approx.) [g]	
	DN	SW	G	L	
	8	24	1/4"	98	610
0.5 1.6	10	24	3/8"	119	660
	15	30	1/2" *)	90	560
0.8 3.0	15	30	1/2"	90	560
2.0 7.0	15	30	1/2	90	300

^{*)} Standard



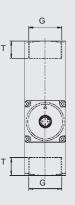


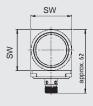


Size 2

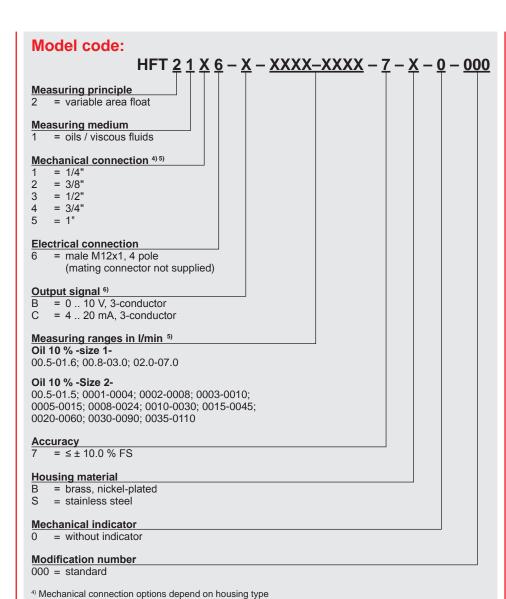
OIZ								
Тур	е		Installation dimensions					Weight (approx.)
[l/m	in]		[mm]					[g]
			DN	SW	G	L	Т	
0.5	5	1.5	8 15	34 34	1/4" 1/2"	152 152	10 14	1510 1435
1	to	4	20 25	34 40	3/4" 1" *)	152 130	15 17	1350 1170
2	to	8						
3	to	10	15	34 34	1/2" 3/4"	152 152	14 15	1435 1350
5	to	15	20	40	1" *)	130	17	1170
8	to	24]	10		100	l ''	''''
10	to	30	00	0.4	0/4"	450	4.5	4050
15	to	45	20 25	34 40	3/4" 1" *)	152 130	15 17	1350 1170
20	to	60	25	40	'	130	''	1170
30	to	90	25	40	1"	130	17	1170
35	to	110	25	40		130	17	1170

^{*)} Standard









Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

(see Dimensions)

Accessories:

5) Other types available on request 6) 0 V or 4 mA resp. correspond to 0 l/min

Pin connections:

M12x1



Pin	HFT 21X6-C	HFT 21X6-B
1	+U _B	+U _B
2	Reserved	Reserved
3	GND	GND
4	4 20 mA	0 10 V

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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YDAC INTERNATIONAL



Flow Transmitter HFT 2500

Float Any installation position Two accuracy classes

Description:

The HYDAC flow transmitters of the HFT 2500 series are based on a variable-area float principle.

Irrespective of the installation position, the measuring medium deflects a spring-loaded float in the direction of flow, depending on the flow rate. A Hall sensor detects the position of the float and is fitted to the outside of the device therefore separated from the fluid circuit. In proportion to the deflection of the float, the sensor produces an analogue signal which corresponds to the particular measuring range.

The device is calibrated for vertical installation and for an upwards flow direction.

Fields of application are to monitor flow rate in fluids (water / water-based) in the following areas, amongst others:

- Cooling systems and circuits
- Hydraulic systems
- Pumps
- Welding machines and laser plants
- Medical technology
 Pharmaceutical industry
- Chemical industry
- Research and development

For water / water-based media

Technical data:

0.04	nput data							
0.005 0.06 0.02 0.2 10 30 0.2 4.0 8 9	leasuring ranges [l/min]		10 % accuracy		5 % ac	curacy		
0.04		Size 1	Size 2	Size 3	Siz			
0.1 0.6 0.4 1.8 20 60 0.5 8.0 10 19 0.2 1.2 0.8 3.2 30 90 1 14 35 25 0.4 2.0 2 7 60 150 1 28 35 25 0.5 3.0 3 13 2 40 1.0 5.0 4 20 4 55 8 30 300 250 200 Stainless steel version [bar] 350 350 300 300 Pressure drop [bar] 0.02 0.2 0.02 0.3 0.02 0.4 0.02 0.8 Mechanical connection see dimensions Parts in contact with fluid see dimensions Brass version Stainless steel 1.4571; NBR ¹); br. nickel-plated; br.; hard from the stainless steel version Housing material Stainless steel 1.4571; FKM ¹); hard ferrite Housing material Brass (nickel-plated) or stainless steel 1.4571 Measuring parts Brass (nickel-plated) Output data Output signal, max. load resist. max. current <td< td=""><td></td><td>0.005 0.06</td><td>0.02 0.2</td><td>10 30</td><td>0.2 4.0</td><td>8 90</td></td<>		0.005 0.06	0.02 0.2	10 30	0.2 4.0	8 90		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		0.04 0.13	0.2 0.6	15 45	0.6 5.0	5 110		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		0.1 0.6	0.4 1.8	20 60	0.5 8.0	10 150		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		0.2 1.2	0.8 3.2	30 90	1 14	35 220		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		0.4 2.0	2 7	60 150	1 28	35 250		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		0.5 3.0	3 13		2 40			
Operating pressure300300250200Stainless steel version [bar]350350300300Pressure drop [bar] $0.020.2$ $0.020.3$ $0.020.4$ $0.020.8$ Mechanical connectionsee dimensionsParts in contact with fluidBrass versionStainless steel 1.4571; NBR ¹¹; br. nickel-plated; br.; hard from the stainless steel versionHousing materialMeasuring partsBrass (nickel-plated) or stainless steel 1.4571TransmitterBrass, nickel-platedOutput dataOutput dataOutput signal, max. load resist. max. current 420 mA, 3-conductor, $R_{l.max} \sim 500$ Ω 010 V, 3-conductor, $I_{max} \sim 10$ mAAccuracy $\leq \pm 10$ % $l \leq \pm 5$ % (size 4)Repeatability $1.\%$ FS		1.0 5.0	4 20		4 55			
Brass version [bar]300300250200Stainless steel version [bar]350350300300Pressure drop [bar] $0.020.2$ $0.020.3$ $0.020.4$ $0.020.8$ Mechanical connectionsee dimensionsParts in contact with fluidBrass versionStainless steel 1.4571; NBR ¹); br. nickel-plated; br.; hard from the stainless steel versionStainless steel versionStainless steel 1.4571; FKM ¹); hard ferriteHousing materialBrass (nickel-plated) or stainless steel 1.4571TransmitterBrass, nickel-platedOutput dataOutput dataOutput signal, max. load resist. max. current 420 mA, 3-conductor, $R_{lmax} \sim 500$ Ω 010 V, 3-conductor, $I_{lmax} \sim 10$ mAAccuracy $\leq \pm 10$ % $l \leq \pm 5$ % (size 4)Repeatability $1.\%$ FS			8 30		1 70			
Stainless steel version [bar]350350300300Pressure drop [bar] $0.020.2$ $0.020.3$ $0.020.4$ $0.020.8$ Mechanical connectionsee dimensionsParts in contact with fluidBrass versionStainless steel 1.4571; NBR ¹¹; br. nickel-plated; br.; hard from the stainless steel versionHousing materialMeasuring partsBrass (nickel-plated) or stainless steel 1.4571TransmitterBrass, nickel-platedOutput dataOutput dataOutput signal, max. load resist. max. current 420 mA, 3-conductor, $R_{l.max} \sim 500$ Ω 010 V, 3-conductor, $I_{lmax} \sim 10$ mAAccuracy≤ ± 10 % / ≤ ± 5 % (size 4)Repeatability1 % FS	Operating pressure							
Pressure drop [bar] 0.02 0.2 0.02 0.3 0.02 0.4 0.02 0.8 Mechanical connection see dimensions Parts in contact with fluid Brass version Stainless steel 1.4571; NBR 1 ; br. nickel-plated; br.; hard for Stainless steel version Stainless steel 1.4571; FKM 1 ; hard ferrite Housing material Measuring parts Brass (nickel-plated) or stainless steel 1.4571 Transmitter Brass, nickel-plated Output data Output data Output signal, max. load resist.		300	300	250	20	00		
Mechanical connectionsee dimensionsParts in contact with fluidStainless steel 1.4571; NBR 1 ; br. nickel-plated; br.; hard from Stainless steel versionStainless steel versionStainless steel 1.4571; FKM 1 ; hard ferriteHousing materialBrass (nickel-plated) or stainless steel 1.4571TransmitterBrass, nickel-platedOutput dataOutput signal, max. load resist. max. current4 20 mA, 3-conductor, R _{Lmax} ~ 500 Ω 0 10 V, 3-conductor, I _{max} ~ 10 mAAccuracy≤ ± 10 % / ≤ ± 5 % (size 4)Repeatability1 % FS	Stainless steel version [bar]	350	350	300	30	00		
Parts in contact with fluid Brass version Stainless steel 1.4571; NBR $^{1)}$; br. nickel-plated; br.; hard from Stainless steel version Housing material Measuring parts Brass (nickel-plated) or stainless steel 1.4571 Transmitter Brass, nickel-plated Output data Output signal, max. load resist. max. current Accuracy	ressure drop [bar]	0.02 0.2	0.02 0.3	0.02 0.4	0.02	0.8		
Brass versionStainless steel 1.4571; NBR 1 ; br. nickel-plated; br.; hard fr.Stainless steel versionStainless steel 1.4571; FKM 1 ; hard ferriteHousing materialHousing partsMeasuring partsBrass (nickel-plated) or stainless steel 1.4571TransmitterBrass, nickel-platedOutput dataOutput signal, max. load resist. max. current $4 20$ mA, 3 -conductor, $R_{Lmax} \sim 500 \Omega$ $0 10$ V, 3 -conductor, $I_{max} \sim 10$ mAAccuracy $\leq \pm 10 \% / \leq \pm 5 \%$ (size 4)Repeatability 1% FS	Nechanical connection		see dimension	ns				
$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	Parts in contact with fluid							
Housing material Measuring parts Brass (nickel-plated) or stainless steel 1.4571 Transmitter Brass, nickel-plated Output data Output signal, max. load resist. max. current $4 20 \text{ mA}$, 3-conductor, $R_{Lmax} \sim 500 \Omega$ or $0 10 \text{ V}$, 3-conductor, $0 10 \text{ V}$, 3-conductor, $0 10 \text{ mA}$ Accuracy $1 \times 10 \times $	3rass version		Stainless steel	1.4571; NBR 1)	; br. nickel-plated	; br.; hard ferrite		
$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	Stainless steel version		Stainless steel 1.4571; FKM 1); hard ferrite					
$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	lousing material							
	Лeasuring parts		Brass (nickel-	plated) or staii	nless steel 1.457	71		
			Brass, nickel-	plated				
max. current0 10 V, 3-conductor, $I_{max} \sim 10 \text{ mA}$ Accuracy $\leq \pm 10 \% / \leq \pm 5 \% \text{ (size 4)}$ Repeatability1 % FS								
Accuracy $\leq \pm 10 \% / \leq \pm 5 \% \text{ (size 4)}$ Repeatability 1 % FS		st.						
Repeatability 1 % FS					- 10 mA			
				5 % (SIZE 4)				
			1 % FS					
Environmental conditions			00 .70 00					
Operating temperature range -20 +70 °C	1 0 1							
		-20 +70 °C						
	• •		Directive 2014 / 30 / EU					
Protection class acc. to DIN EN 60529 2) IP 67		EN 60529 ²⁾	IP 67					
Other data								
	11 2		18 30 V DC					
Power consumption < 1 W								

Note: FS (Full Scale) = relative to complete measuring range

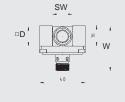
- 1) Other seal materials on request
- 2) With mounted mating connector in corresponding protection class

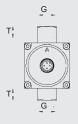
Dimensions:

Туре	Install							Weight
	dimen	sions						(approx.)
[l/min]	[mm]							[g]
	SW	D	W	G	DN	Т	L	

Size 1

<u> </u>								
0.005 0.06								
0.04 0.13								
0.1 0.6								
0.2 1.2	17	17	39	1/4"	8	10	65	210
0.4 2.0								
0.5 3.0								
1.0 5.0								

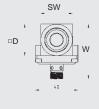


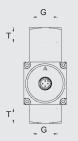




Size 2

0.02 0.2								
0.2 0.6								
0.4 1.8								
0.8 3.2	30	30	62	1/2"	15	14	90	560
2.0 7.0	30	30	02	1/2	13	14	90	300
3.0 13.0								
4.0 20.0								
8.0 30.0								







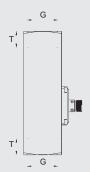
Size 3

10 30								
15 45	34	40	00	3/4" 1" *)	20	15	152	1240
20 60	34 41	40	62	1" *)	25	17	130	1030
30 90	1							
60 150	40	40	62	1"	25	17	130	1050

*) Standard





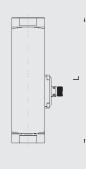


Size 4

3126 4								
0.2 4.0								
0.6 5.0				1/4"	8	10		
0.5 8.0	27	40	52	3/8"	10	15	131	900
1 14				1/2"	15	14		
1 28								
2 40	27	40	52	1/2"	15	14	146	950
4 55	32	40	52	3/4"	20	15	174	950
1 70		4.0	00	0/4"	-00	4.5	450	4.400
8 90	34 40	40 40	62 62	3/4" 1"	20 25	15 17	152 156	1420 1120
5 110	40	40	02	'	25	''	130	1120
10 150	50	50	72	1 1/4"	32	20	200	2770
35 220	50	50	72	1 1/4"	32	20	200	3020
35 250	60	60	72	1 1/2"	40	20	200	3820







Model code: HFT $\underline{2} \underline{5} \underline{X} \underline{6} - \underline{X} - \underline{X} \underline{X} \underline{X} \underline{X} - \underline{X} \underline{X} \underline{X} - \underline{X} - \underline{0} - \underline{000}$ Measuring principle = variable area float Measuring medium = water / water-based Mechanical connection 3) = 1/4" = 3/8" = 1/2" 3 = 3/4" 4 = 1" 5 = 1 1/4" 6 = 1 1/2" **Electrical connection** = male M12x1, 4 pole (mating connector not supplied)

Output signal 4)

= 0 .. 10 V, 3-conductor = 4 .. 20 mA, 3-conductor

03.0-0013; 04.0-0020; 08.0-0030

.005-0.06; 0.04-0.13; 00.1-00.6; 00.2-01.2; 00.4-02.0;

0.02-00.2; 00.2-00.6; 00.4-01.8; 00.8-03.2; 02.0-07.0;

00.2-04.0; 00.6-05.0; 00.5-08.0; 01.0-0014; 01.0-0028;

3) Mechanical connection options depend on housing type

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

01.0-0070; 08.0-0090; 0005-0110; 0010-0150;

= \leq ± 5.0 % FS (only for size "4")

4) 0 V or 4 mA resp. correspond to 0 I/min

0010-0030; 0015-0045; 0020-0060; 0030-0090; 0060-0150

Measuring ranges in I/min

00.5-03.0; 01.0-05.0

02.0-0040; 04.0-0055;

0035-0220; 0035-0250

 $= \le \pm 10.0 \% FS$

Modification number 000 = standard

(see Dimensions)

Accessories:

Housing material B = brass, nickel-plated = stainless steel Mechanical indicator = without indicator

Size 2

Size 3

Size 4

Accuracy

Pin connections:

M12x1



Pin	HFT 25X6-C	HFT 25X6-B
1	+U _B	+U _B
2	Reserved	Reserved
3	GND	GND
4	4 20 mA	0 10 V

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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HYDAC 377

DAC INTERNATIONAL



Flow Rate Transmitter HFT 3100 Ex applications

High accuracy **Turbine** Additional measuring connections

Flameproof enclosure ATEX, IECEx, CSA, triple approval **HART** interface



Description:

HFT 3100 with HART interface is a compact flow rate transmitter with flameproof enclosure specially developed for applications in hydraulic systems and other fluid power systems.

The triple approval in accordance with ATEX, IECEx and CSA enables universal, worldwide utilisation of the devices in potentially explosive atmospheres.

The HFT 3100 operates in accordance with the turbine principle, which means that the rpm of an impeller wheel rotating in the flow of the media is measured and converted into a 4 .. 20 mA analogue signal. In addition with the analogue output of the measured value, digital communication is possible by means of the HART protocol.

Two additional G1/4 threaded bore holes in the turbine housing provide the flow rate transmitter with additional connection options, e.g. for temperature and pressure sensors.

Protection types and applications:

cCSAus Explosionproof - Seal not required

Class I Group A, B, C, D, T6, T5 Class II Group E, F, G

Class III Type 4

ATEX Flameproof

I M2 ExdIMb

2G Ex d IIC T6, T5 Gb

II 2D Ex tb IIIC T110 .. 120 °C Db

IECEx Flameproof

Ex d I Mb

Ex d IIC T6. T5 Gb

Ex tb IIIC T110 .. 120 °C Db

Technical data:

Input data	
Measuring range and operating pressure	1.2 20.0 l/min 420 bar
	6.0 60.0 l/min 420 bar
	15.0 300.0 l/min 420 bar
	40.0 600.0 l/min 420 bar
Additional connection options 1)	2x G 1/4 female threads for pressure or temperature sensors with relevant approvals
Housing material	Stainless steel 1.4404
Parts in contact with fluid	Stainless steel: 1.4404, 1.4460, tungsten carbide
Output data	
Output signal, permitted load resistance	4 20 mA, 2-conductor, with HART protocol $R_{Lmax}=$ (U $_B$ - 12 V) / 20 mA [k Ω] for HART communication min. 250 Ω
	HART communication acc. to HART 7 specifications
	HART Common Practice Commands, e.g. altering of measuring range limits (see table)
Accuracy	≤ 2 % of the actual value
Environmental conditions	
Operating/ambient temperature range 2)	T6, T110 °C Ta = -40 +60 °C T5 Ta = -40 +70 °C
Storage temperature range	-40 +100 °C
Fluid temperature range ²⁾	T6, T110 °C Ta = -40 +60 °C T5 Ta = -40 +70 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4, EN 60079-0 / 1 / 31
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 10 g
Protection class acc. to DIN EN 60529 ISO 20653	IP 69
Other data	
Measuring medium	Hydraulic oil, water based fluid
Viscosity range	1 100 cSt
Calibration viscosity	30 cSt
Supply voltage	12 30 V DC
Residual ripple of supply voltage	acc. to FSK Physical Layer Specification (HCF_SPEC_054)
Current consumption	≤ 25 mA
Weight	
HFT 31XX-F21-0020	2.5 kg
HFT 31XX-F21-0060	4.0 kg
HFT 31XX-F21-0300	5.7 kg
HFT 31XX-F21-0600	7.0 kg

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

¹⁾ Not for measuring ranges 1.2 .. 20 l/min ²⁾ T120 °C at Ta = -40 .. +70 °C with electrical connection single leads available

Measuring Range Limits:

By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits:

Lower measuring range limit		Upper measuring range	e limit	Measuring span	
min	max	min	max	min	max
0 % FS	75 % FS	25 % FS	100 % FS	25 % FS	100 % FS

Fields of application:

	Single leads Electrical connection "9"		Jacketed cable Electrical connection "G"				
CSA		Explosionprod	of (seal not required)				
ATEX		Fla	ameproof				
IECEx	Flameproof						
_c CSA _{us}	Class I Group A, B, C, D, T6, T5 Class II Group E, F, G Class III Type 4						
ATEX	M2						
IECEx	Ex d Mb Ex d IC T6, T5 Gb Ex tb IIIC T110 120 °C Db						

Model Code:

HFT 3 1 X X - F21 - XXXX - S - X - D - 000 (2m)

Mechanical process connection

= G 1/4" = G 1/2" only for measuring range: 1.2 .. 20 l/min only for measuring range: 6.0 .. 60 l/min = G 1 1/4" only for measuring range: 15 .. 300 l/min = G 1 1/2" only for measuring range: 40 .. 600 l/min

Electrical connection

= 1/2-14 NPT Conduit male thread (single leads) = 1/2-14 NPT Conduit male thread (jacketed cable)

Output signal

F21 = 4 .. 20 mA, 2-conductor, with HART protocol (4 mA \(\triangle 0 \) l/min)

Measuring ranges

0020 = 1.2 .. 20 l/min 0060 = 6.0 .. 60 l/min 0300 = 15.0 .. 300 I/min 0600 = 40.0 .. 600 l/min

Housing material S = stainless st

= stainless steel

Housing design

= without additional hole (measuring range 0020)

= with two additional female threads G 1/4 ISO 1179-2 (measuring ranges 0060, 0300, 0600)

Approval D = CS

= CSA Explosionproof (seal not required)

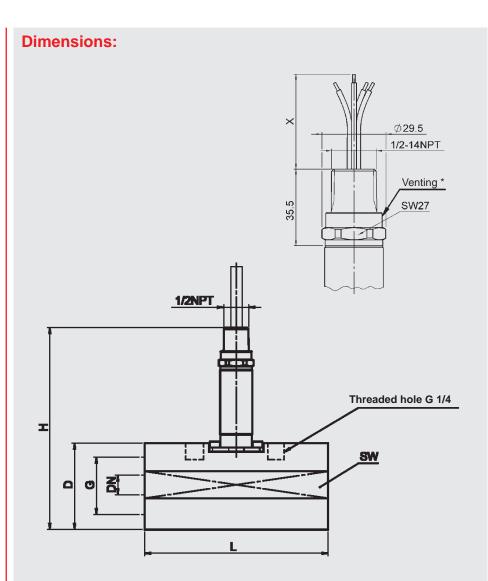
ATEX Flameproof **IECEx** Flameproof

Modification number

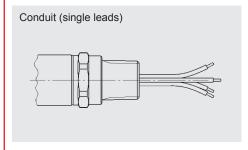
000 = standard

Cable length in m

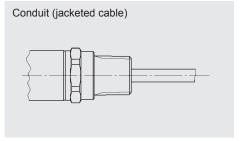
Standard = 2 m



Pin connections:



Lead	HFT 31x9
red	Signal +
black	Signal -
green-yellow	Housing



Lead	HFT 31xG	
white	Signal -	
brown	Signal +	
green	n.c.	
yellow	n.c.	

Without threaded holes for temperature and pressure sensors:

Model	Meas.	L	Н	D/SW	G	Torque	DN
	range [l/min]	[mm]	[mm]	[mm]		[Nm]	[mm]
HFT 31XX-F21-0020	1.2 20	117	158	60 / 56	G¼"	35	7

With threaded holes for temperature and pressure sensors:

With threaded holes for temperature and pressure sensors.							
Model	Meas.	L	Н	D/SW	G	Torque	DN
	range [l/min]	[mm]	[mm]	[mm]		[Nm]	[mm]
HFT 31XX-F21-0060	6 60	144	160	63 / 60	G1/2"	65	11
HFT 31XX-F21-0300	15 300	155	173	75.5 / 72	G1¼"	240	22
HFT 31XX-F21-0600	40 600	181	178	81 / 76	G1½"	290	30

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAC INTERNATIONAL



Flow Rate Transmitter HFT 3100 Ex applications

High accuracy Additional measuring connections

Intrinsically Safe, Dustproof enclosure Non-Sparking ATEX, IECEx, double approval **HART** interface



Description:

The HFT 3100 with HART interface is an intrinsically safe compact flow rate transmitter for measuring flow rates in hydraulic systems. The double approval in accordance with ATEX and IECEx enables universal, almost worldwide utilisation of the devices in potentially explosive atmospheres.

The current flow is determined acc. to the turbine principle, by means of a highly accurate and robust sensor. In addition to the analogue 4 .. 20 mA output of the measured value, digital communication is possible by means of the HART protocol.

The main fields of application are in the oil & gas industry, gas turbines. The device is also used in mining applications as well as in locations with high dust contamination.

Two additional threaded bore holes in the turbine housing provide the flow rate transmitter with additional connection options for temperature and pressure sensors.

Protection types and applications:

ATEX

I	M1	Ex ia	I	Ма
Ш	1G	Ex ia	IIC	T6,T5 Ga
Ш	1/2 G	Ex ia	IIC	T6,T5 Ga/Gb
Ш	2 G	Ex ia	IIC	T6,T5 Gb
Ш	1D	Ex ia	IIIC	T85 °C/T95 °C Da
Ш	1D	Ex ta	IIIC	T80/90/100 °C
		T ₅₀₀	90/T	500100/T ₅₀₀ 110 °C Da
Ш	2D	Ex tb	IIIC	T80/T90/T100 °C Db
Ш	3G	Ex nA	IIC	T6, T5, T4 Gc
Ш	3G			T6, T5, T4 Gc
Ш	3D	Ex tc	IIIC	T80/T90/T100 °C Dc
Ш	3D	Ex ic	IIIC	T80/T90/T100 °C Dc
ΙE	CEx			

Ex ia	I	Ма
Ex ia	IIC	T6,T5 Ga
Ex ia	IIC	T6,T5 Ga/Gb
Ex ia	IIC	T6,T5 Gb
Ex ia	IIIC	T85/T95 °C Da
Ex ta	IIIC	T80/T90/T100 °C
T ₅₀₀	90/T	₅₀₀ 100/T ₅₀₀ 110 °C Da
Ex tb		T80/T90/T100 °C Db
		T6,T5,T4 Gc
Ex ic	IIC	T6,T5,T4 Gc
Ex tc	IIIC	T80/T90/T100 °C Dc
Ex ic	IIIC	T80/T90/T100 °C Dc

Technical data:

Input data	10 00011	400 k			
Measuring range and operating pressure	1.2 20.0 l/min	420 bar			
	6.0 60.0 l/min	420 bar			
	15.0 300.0 l/min 420 bar				
	40.0 600.0 l/min	420 bar			
Additional connection options 1)	2x G 1/4 female thre sensors with relevan	ads for pressure or temperature			
Housing material	Stainless steel 1.440	- ' '			
Parts in contact with fluid		04, 1.4460, tungsten carbide			
Output data	Stalliless steel. 1:44	04, 1.4400, turigsteri carbide			
Output signal, permitted load resistance	$R_{Lmax} = (U_B - 12 V) / for HART communic$				
	HART Common Pracaltering of measuring (see table)	ctice Commands, e.g. g range limits			
Accuracy	≤ 2 % of the actual v	alue			
Environmental conditions	= 2 /0 Of the detual V				
Operating/ambient temperature range	T6, T80/T85 °C, T ₅₀₀ T5, T90/T95 °C, T ₅₀₀ T100 °C, T ₅₀₀ 110 °C T4				
Storage temperature range	-40 +100 °C				
Fluid temperature range	T6, T80, T85 °C, T ₅₀ , T5, T90, T95 °C, T ₅₀ , T100 °C, T ₅₀₀ 110 °C T4				
(€ mark	EN 61000-6-1 / 2 / 3 / 4, EN 60079-0 / 11 / 15 / 26 / 31, EN 50303				
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 10 g				
Protection class acc. to DIN EN 60529 2)	IP 67				
Relevant data for Ex applications	Ex ia, ic	Ex nA, ta, tb, tc			
Supply voltage	Ui = 12 28 V DC	12 28 V DC			
Max. input current	li = 100 mA				
Max. input power	Pi = 0.7 W	Max. power consumption ≤1W			
Connection capacitance of the sensor	Ci ≤ 22 nF				
Inductance of the sensor	Li = 0 mH				
Insulation voltage	50 V AC, with integra EN 61000-6-2	ated overvoltage protection acc. to			
Other data					
Measuring medium	Hydraulic oil, water b	pased fluid			
Viscosity range	1 100 cSt				
Calibration viscosity	30 cSt				
Residual ripple of supply voltage	Acc. to FSK Physica (HCF_SPEC_054)	l Layer Specification			
Current consumption	≤ 25 mA				
Weight	,				
HFT 311X-F21-0020	2.5 kg				
HFT 311X-F21-0060	4.0 kg				
HFT 311X-F21-0300	5.7 kg				
HFT 311X-F21-0600	7.0 kg				

Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

1) Not for measuring ranges 1.2 .. 20 I/min

Note:

2) With mounted mating connector in corresponding protection class

EN 18.100.0/02.18

Measuring Range Limits: By means of HART Common Practice Commands, you have the opportunity to adjust the following measuring range limits:

Lower measuring range limit		Upper measuring rang	e limit	Measuring span		
min	max	min	max	min	max	
0 % FS	75 % FS	25 % FS	100 % FS	25 % FS	100 % FS	

Fields of application:

Code no. for use in model code	1			9	A	С
ATEX DEKRA 13ATEX0031X DEKRA 13ATEX0032	I M1 Ex ia I Ma	II 1G Ex ia IIC T6,T5 Ga II 1/2G Ex ia IIC T6,T5 Ga/Gb II 1D Ex ia IIC T85/T95 °C Da	II 2G Ex ia IIC T6,T5 Gb	II 3G Ex nA IIC T6,T5 Gc		II 3G Ex ic IIC T6,T5 Gc II 3D Ex ic IIIC T80/T90 °C Dc
IECEX DEK 14.0011X	Ex ia I Ma	Ex ia IIC T6,T5 Ga Ex ia IIC T6,T5 Ga/Gb Ex ia IIIC T85/T95 °C Da	Ex ia IIC T6,T5 Gb	Ex nA IIC T6,T5 Gc	Ex ta IIIC T80/T90 °C T50090/T500100 °C Da Ex tb IIIC T80/T90 °C Db	Ex ic IIC T6,T5 Gc Ex ic IIIC T80/T90 °C Dc
Application fields	Mining	Gases/conductive dust	Gases	Gases	Conductive dust	Gases/conductive dust
	Protection type: intrinsically safe ia with barrier	ntrinsically safe ia intrinsically safe ia		Protection type: non-sparking nA	Protection type: dustproof enclosure	Protection type: Intrinsically safe ic with barrier

Instruments for other protection types and zones (see cover) are available upon request.

Model code:

HFT 3 1 X X - F21 - XXXX - S - X-ENX-000

Mechanical process connection

= G 1/4" only for measuring range: 1.2 .. 20 l/min only for measuring range: 0.2 .. 20 l/min only for measuring range: 6.0 .. 60 l/min only for measuring range: 15 .. 300 l/min = G 1 1/4" = G 1 1/2" only for measuring range: 40 .. 600 l/min

Electrical connection

= male M12x1, 4 pole (mating connector not supplied)

Output signal

F21 = 4 .. 20 mA, 2-conductor, with HART protocol (4 mA \(^{\text{\text{0}}}\) 1/min)

Measuring ranges

0020 = 1.2 .. 20 l/min 0060 = 6.0 .. 60 l/min

0300 = 15.0 .. 300 l/min

0600 = 40.0 .. 600 l/min

Housing material

= stainless steel

Housing design

= without additional hole (measuring range 0020)

2 = with two additional female threads G 1/4 ISO 1179-2 (measuring ranges 0060, 0300, 0600)

Approval E = AT = ATEX and IECEx

Insulation voltage
N = 50 V AC to housing

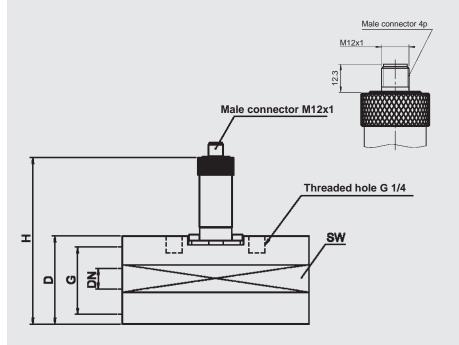
Protection types and applications (code)

	ATEX		IECEx
1 =		Exia I Ma Exia IIC T6, T5 Ga Exia IIC T6, T5 Ga/Gb Exia IIC T6, T5 Gb Exia IIIC T85/T95 °C Da	Ex ia I Ma Ex ia IIC T6, T5 Ga Ex ia IIC T6, T5 Ga/Gb Ex ia IIC T6, T5 Gb Ex ia IIC T85/T95 °C Da
9 =	II 3G	Ex nA IIC T6, T5 Gc	Ex nA IIC T6, T5 Gc
		conjunction with impact protectinensions)	ion metal safety sleeve
A =	II 1D II 2D	Ex ta IIIC T80/T90 °C Da T ₅₀₀ 90/T ₅₀₀ 100 °C Da Ex tb IIIC T80/T90 °C Db	Ex ta IIIC T80/T90 °C T ₅₀₀ 90/T ₅₀₀ 100 °C Da Ex tb IIIC T80/T90 °C Db
		conjunction with impact protectinensions)	ion metal safety sleeve
C =	II 3G II 3D	Ex ic IIC T6, T5 Gc Ex ic IIIC T80/T90 °C Dc	Ex ic IIC T6, T5 Gc Ex ic IIIC T80/T90 °C Dc

Modification number

000 = standard

Dimensions:



Without threaded holes for temperature and pressure sensors:

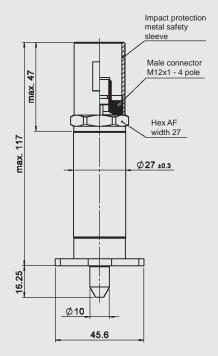
Model	Meas.		L	Н	D/SW	G	Torque	DN
	range [l/min]		[mm]	[mm]	[mm]		[Nm]	[mm]
HFT 31XX-F21-0020	1.2	20	117	158	60 / 56	G¼"	35	7

With threaded holes for temperature and pressure sensors:

Model	Meas.	L	Н	D/SW	G	Torque	DN
	range [l/min]	[mm]	[mm]	[mm]		[Nm]	[mm]
HFT 31XX-F21-0060	6 60	144	160	63 / 60	G1/2"	65	11
HFT 31XX-F21-0300	15 300	155	173	75.5 / 72	G1¼"	240	22
HFT 31XX-F21-0600	40 600	181	178	81 / 76	G1½"	290	30

With impact protection metal safety sleeve:

Protection types and applications: (code): 9, A



The impact protection metal safety sleeve is included in delivery. A straight mating connector is required for electrical connection; e.g. mating connector M12x1, 4 pole, straight, with 3 m shielded cable: ZBE 06S-03, Part no. 6098243

Pin connections:

M12x1



Pin	HFT 31x6-F21
1	Signal +
2	n.c.
3	Signal -
4	n.c.

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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EN 18.379.2/02.18





Flow Switch HFS 2100

Float Any installation position 30-600 cSt

Description:

The HYDAC flow switches of the HFS 2100 series are based on a variable area float principle.

The measuring medium deflects a springloaded float in the direction of flow, depending on the flow rate. A reed contact is fitted outside of the device, therefore separated from the fluid circuit. When the magnet inside the float reaches the pre-set position, the reed contact will switch.

To protect it from external influences, the reed contact is encapsulated in a housing designed to allow steplessly variable adjustment. The devices are designed to be capable of monitoring threshold values reliably, even when the viscosity fluctuates. The kinematic viscosity may vary between 30 and 600 cSt.

The main fields of application are:

- Central lubrication systems
- Circulation oil lubrication systems
- Transformers
- Cooling systems and circuits
- Lubrication circuits
- Hydraulic systems
- Pumps
- Welding machines and laser plants
- Chemical industry
- Research and development

For oils / viscous fluids

Technical data:

Input data Measuring ranges [I/min]	Size 1	Size 2			
weasuring ranges [minin]	0.5 1.6	0.5 1.5			
	0.8 3.0	1 4			
	2.0 7.0	2 8			
	2.0	3 10			
		5 15			
		8 24			
		10 30			
		15 45			
		20 60			
		30 90			
		35 110			
Operating pressure					
Brass version [bar]	300	250			
Stainless steel version [bar]	350	300			
Pressure drop [bar]	0.02 0.2	0.02 0.4			
Mechanical connection	see dimensions				
Parts in contact with fluid					
Brass version	St. steel 1.4571; FKM ¹⁾ ; I brass; hard ferrite	orass nickel-pl.;			
Stainless steel version	Stainless steel 1.4571; FKM 1); hard ferrite				
Housing material	Brass (nickel-plated) or s	tainless steel 1.4571			
Output data					
Switching outputs 2)	1 or 2 reed contacts normally open or change-	-over type			
Accuracy	≤ ± 10 % FS				
Repeatability	2 % FS max.				
Switching capacity					
Change-over contact 3)	max.	max.			
Male connector EN 175301-803	250 V / 1.5 A / 50 VA	250 V / 1.5 A / 50 VA			
Male connector M12x1	125 V / 1.5 A / 50 VA	250 V / 1.5 A / 50 VA			
N/O contact	max.	max.			
Male connector EN 175301-803	230 V / 3 A / 60 VA	250 V / 3 A / 100 VA			
Male connector M12x1	125 V / 3 A / 60 VA	250 V / 3 A / 100 VA			
Environmental conditions					
Operating temperature range	-20 +70 °C				
Fluid temperature range					
Male connector EN 175301-803	-20 +120 °C (optional -2	20 +160 °C)			
Male connector M12x1	-20 +85 °C				
Viscosity range	30 600 cSt				
(€ mark	Directive 2014 / 35 / EU Directive 2014 / 30 / EU				
Protection class acc. to DIN EN 60529 4)	IP 65				

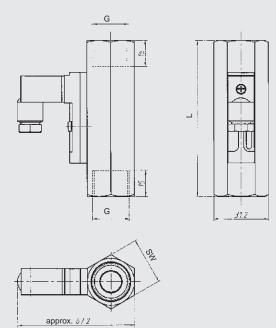
- 1) Other seal materials on request
- 2) The contact opens / switches when the flow falls below the set switch point.
- 3) Minimum load 3 VA
- 4) With mounted mating connector in corresponding protection class

Dimensions without indicator:

Oll -size 1- without indicator

OIL -Size 1- Without mulcator					
Туре		Installation dimensions			Weight (approx.)
[l/min]		[mm]	,,,,,,		[g]
	DN	SW	G	L	
	8	24	1/4"	98	400
0.5 1.6	10	24	3/8"	118.6	450
	15	27	1/2"*)	90	350
0.8 3.0	15	27	1/2"	90	350
2.0 7.0	15	21	1/2	90	330

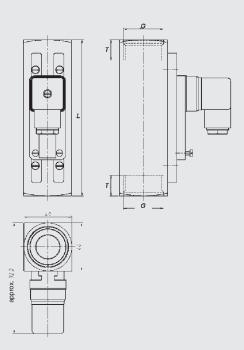
^{*)} Standard



OIL -size 2- without indicator

Type [I/min]	Installa dimens [mm]					Weight (approx.)
[,,,,,,,]	DN	SW	G	L	Т	[9]
0.5 1.5	8	34	1/4"	152	10	1500
	15	34	1/2"	152	14	1425
1 4	20	34	3/4"	152	15	1340
1	25	40	1"*)	130	17	1160
2 8	15	34	1/2"	152	14	1425
3 10	20	34	3/4"	152	15	1340
<u>5 15</u> 8 24	25	40	1"*)	130	17	1160
10 30	20	34	3/4"	152	15	1240
15 45		_	1"*)	_		1340
20 60	25	40	1")	130	17	1160
30 90	25	40	1"	130	17	1160
35 110	25	40	1	130	17	1100

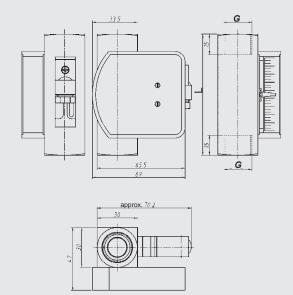
^{*)} Standard



Dimensions with indicator:

OIL -size 1- with indicator

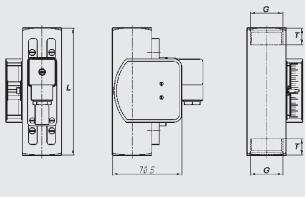
OIL -Size 1- With indicator						
Туре		Installation dimensions			Weight (approx.)	
[l/min]		[mm]			[g]	
	DN	SW	G	L		
0.5 1.6						
0.8 3.0	15	30	1/2"	90	570	
2.0 7.0						

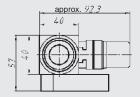


OIL -size 2- with indicator

Type [l/min]	dimensions					Weight (approx.)
	DN	SW	G	L	Т	
0.5 1.5	8	34	1/4"	152	10	1550
	15	34	1/2"	152	14	1475
1 4	20	34	3/4"	152	15	1390
	25	40	1"*)	130	17	1210
2 8	15	34	1/2"	152	14	1475
3 10 5 15	20	34	3/4"	152	15	1390
5 15		40	1"*)	130	17	1210
8 24	25	40	1 ′	130	17	1210
10 30	20	34	3/4"	152	15	1390
15 45	_	_	1"*)	_	_	
20 60	25	40	·[" <i>)</i>	130	17	1210
30 90	25	40	1"	130	17	1210
35 110		40	<u>'</u>	130	17	1210

^{*)} Standard





Model code:

HFS <u>2 1 X X - XX - XXXX-XXXX - 7 - X - X - 000</u>

Measuring principle

= variable area float

Measuring medium

= oils / viscous fluids

Mechanical connection 5) 6)

= 1/4"

= 3/8"

= 1/2" 3 = 3/4" 4

= 1"

Electrical connection

= male EN175301-803,

3 pole + PE

(mating connector supplied)

= male M12x1, 4 pole

(mating connector not supplied)

Switching contacts 7)
1S = 1 N/O contact

2S = 2 N/O contacts

1W = 1 change-over contact

2W = 2 change-over contacts

Switching ranges in I/min 6)

Oil 10 % -size 1-

00.5-01.6; 00.8-03.0; 02.0-07.0

Oil 10 % -size 2-

00.5-01.5; 0001-0004; 0002-0008; 0003-0010; 0005-0015; 0008-0024; 0010-0030; 0015-0045; 0020-0060; 0030-0090; 0035-0110

Accuracy

 $= \le \pm 10.0 \% FS$

Housing material

B = brass, nickel-plated

= stainless steel

Mechanical indicator

= without indicator

= with indicator

Modification number

000 = standard

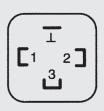
- 5) Mechanical connection options depend on housing type (see Dimensions)
- 6) Other types available on request
- 7) When the model with 2 switching contacts is selected, the second switching contact is fitted on the side of the instrument as standard.

Accessories:

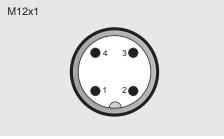
Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:

EN175301-803



Pin	HFS 21X5-XS	HFS 21X5-XW
1	Centre	Centre
2	N/O contact	N/C contact
3	n.c.	N/O contact
<u></u>	n.c.	n.c.



Pin	HFS 21X6-XS	HFS 21X6-XW
1	Centre	Centre
2	n.c.	N/C contact
3	n.c.	n.c.
4	N/O contact	N/O contact

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726

DAC INTERNATIONAL



Flow Switch HFS 2500

Float	Any installation position	Two accuracy classes
-------	---------------------------	----------------------

For water / water-based media

Description:

The HYDAC flow switches of the HFS 2500 series are based on a variable area float principle.

The measuring medium deflects a springloaded float in the direction of flow, depending on the flow rate. A reed contact is fitted outside of the device, therefore separated from the fluid circuit. When the magnet inside the float reaches the pre-set position, the reed contact will switch.

To protect it from external influences, the reed contact is encapsulated in a housing designed to allow steplessly variable adjustment.

The instruments in the HFS 2500 series are available in two versions, with 5 % accuracy and with 10 % accuracy.

Fields of application are to monitor flow rate in fluids (water / water-based) in the following areas, amongst others:

- Cooling systems and circuits
- Hydraulic systems
- Pumps
- Welding machines and laser plants
- Medical technology
- Pharmaceutical industry
- Chemical industry
- Research and development

Technical data:

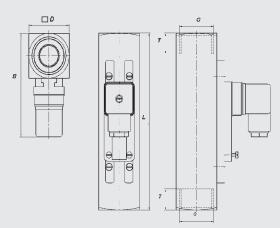
Input data					
Measuring ranges [I/min]	5 % ac	curacy	t	0 % accuracy	
			Size 1	Size 2	Size 3
	0.2 4.0	8 90	0.005 0.06	+	10 30
	0.6 5.0	5 110	0.04 0.13		15 45
	0.5 8.0	10 150	0.1 0.6	0.4 1.8	20 60
	1 14	35 220	0.2 1.2	0.8 3.2	30 90
	1 28	35 250	0.4 2.0	2 7	60 150
	2 40		0.5 3.0	3 13	
	4 55		1.0 5.0	4 20 8 30	
Operating pressure	1 70			8 30	
Brass version [bar]	20	00	300	300	250
Stainless steel version [bar]	30		350	350	300
Pressure drop [bar]	0.02		0.02 0.2	0.02 0.3	0.02 0.4
Mechanical connection	see dimensions		0.02 0.2	0.02 0.3	0.02 0.4
Parts in contact with fluid	see uniterisions	•			
Brass version Stainless steel version	Stainl. steel 1.4 Stainless steel		rass (nickel-pl.); b); hard ferrite	rass; hard ferrite)
Housing material	Brass (nickel-p	lated) or stainle	ess steel 1.4571		
Output data					
Switching outputs 2)	1 or 2 reed con Normally open		r type ²⁾		
Accuracy	$\leq \pm 5 \% \text{ or } \leq \pm 2$	10 % FS			
Repeatability	2 % FS max.				
Switching capacity				·	
Change-over contact ³⁾ Male connector EN175301-803	max - 25 - 1.5 - 50	0 V 5 A	max. - 150 V AC/DC - 1 A - 20 VA	max. - 250 V - 1.5 A - 50 VA	max. - 250 V - 1.5 A - 50 VA
Male connector M12x1	max - 25 - 1.5 - 50	0 V A	max. - 125 V AC/DC - 1 A - 20 VA	max. - 125 V - 1.5 A - 50 VA	max. - 250 V - 1.5 A - 50 VA
N/O contact Male connector EN175301-803	max - 250 - 3 A - 100	0 V	max. - 140 V AC - 0.7 A - 20 VA - 200 V DC - 1 A	max. - 230 V - 3 A - 60 VA	max. - 250 V - 3 A - 100 VA
Male connector M12x1	max - 25/ - 3 <i>A</i> - 10/	0 V	- 20 VA max. - 125 V AC - 0.7 A - 20 VA - 125 V DC - 1 A - 20 VA	max. - 125 V - 3 A - 60 VA	max. - 250 V - 3 A - 100 VA
Environmental conditions					
Operating temperature range	-20 +70 °C				
Fluid temperature range Male connector EN175301-803 Male connector M12x1	-20 +100 °C -20 +85 °C		+160 °C)		
(€ mark	Directive 2014/ Directive 2014/				
Protection class acc. to DIN EN 60529 4)	IP 65		,		
Note: FS (Full S cale) = relative to	complete measu	ring range			

- Other seal materials on request
 The contact opens / switches when the flow falls below the set switch point.
 Minimum load 3 VA
- 4) With mounted mating connector in corresponding protection class

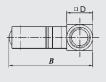
Dimensions without indicator:

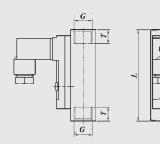
Туре	Installa							Weight (approx.)
[l/min]	[mm]							[g]
	SW	D	W	G	DN	Т	L	

Water 5 % accu	ıracy							
0.2 4.0								
0.6 5.0				1/4"	8	10		
0.5 8.0	27	30	88	3/8"	10	15	131	850
1 14				1/2"	15	14		
1 28								
2 40	27	30	88	1/2"	15	14	146	900
4 55	32	30	00	3/4"	20	15	174	900
1 70	24	40	00	0/4"	20	4.5	450	4.400
8 90	34 40	40 40	98 98	3/4" 1"	20 25	15 17	152 156	1400 1100
5 110	70	0	30	'	20	17	130	1100
10 150	50	50	108	1 1/4"	32	20	200	2750
35 220	50	50	108	1 1/4"	32	20	200	3000
35 250	60	60	116	1 1/2"	40	20	200	3800



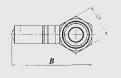
water 10 % acc	uracy	-Size i-						
0.005 0.06								
0.04 0.13								
0.1 0.6								
0.2 1.2	17	17	57	1/4"	8	10	65	140
0.4 2.0								
0.5 3.0								
1.0 5.0								

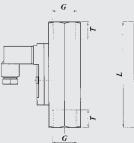


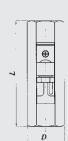


Water 10 % accuracy -size 2-

0.02 0.2								
0.2 0.6								
0.4 1.8								
0.8 3.2	27	31	67	1/2"	15	14	90	350
2.0 7.0	21	31	07	1/2	15	14	90	330
3.0 13.0								
4.0 20.0								
8.0 30.0								



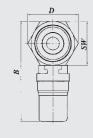


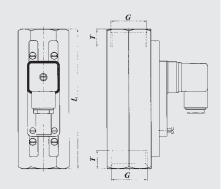


Water 10 % accuracy -size 3-

114101 10 70 400	, a. a. b	0.20						
10 30								
15 45	34	47	99	3/4"	20	15	152	1240
20 60	41	47	99	1"*)	25	17	130	1030
30 90								
60 150	41	47	99	1"	25	17	130	1030

^{*)} Standard

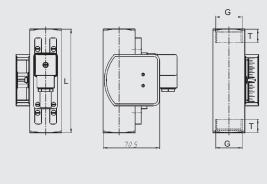


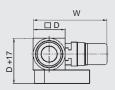


Dimensions with indicator:

Туре	Installa							Weight
[l/min]	dimens	sions						(approx.)
	SW	D	W	G	DN	T	L	

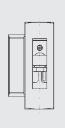
Water 5 % accu	ıracy							
0.2 4.0 0.6 5.0 0.5 8.0 1 14 1 28	27	30	88	1/4" 3/8" 1/2"	8 10 15	10 15 14	131	900
2 40 4 55	27 32	30	88	1/2" 3/4"	15 20	14 15	146 174	950
1 70 8 90 5 110	34 40	40 40	98 98	3/4" 1"	20 25	15 17	152 156	1450 1150
10 150	50	50	108	1 1/4"	32	20	200	2800
35 220	50	50	108	1 1/4"	32	20	200	3050
35 250	60	60	116	1 1/2"	40	20	200	3850

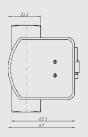


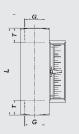


Water 10 % accuracy -size 2-

Water 10 /6 acc	uracy	-SIZE Z						
0.02 0.2								
0.2 0.6								
0.4 1.8								
0.8 3.2	30	30	70	1/2"	15	14	90	570
2.0 7.0	30	30	/0	1/2	15	14	90	570
3.0 13.0								
4.0 20.0								
8.0 30.0								





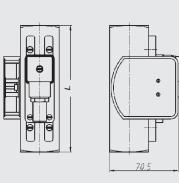


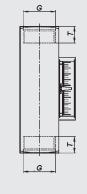


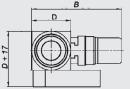
Water 10 % accuracy -size 3-

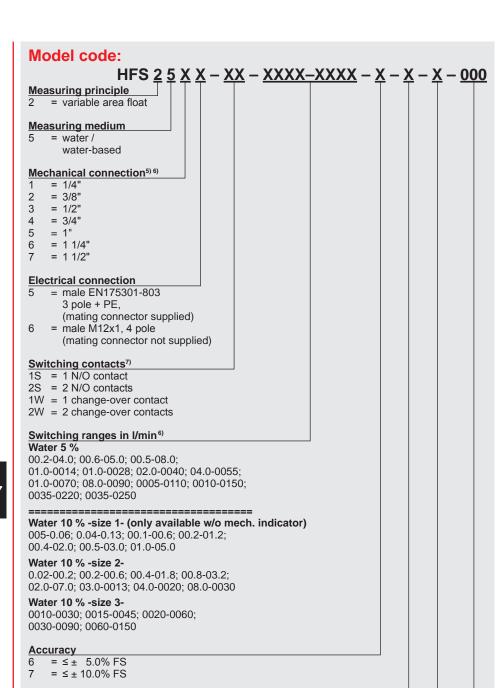
10 30								
15 45	34	40	00	3/4"	20	15	152	1340
20 60	40	40	98	1"*)	25	17	130	1160
30 90								
60 150	41	40	98	1"	25	17	130	1160

^{*)} Standard



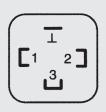




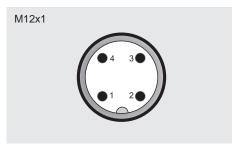


Pin connections:

EN175301-803



HFS 25X5-XS	HFS 25X5-XW
Centre	Centre
N/O contact	N/C contact
n.c.	N/O contact
n.c.	n.c.
	Centre N/O contact n.c.



Pin	HFS 25X6-XS	HFS 25X6-XW
1	Centre	Centre
2	n.c.	N/C contact
3	n.c.	n.c.
4	N/O contact	N/O contact

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726

e-mail: electronic@hydac.com Internet: www.hydac.com

Housing material

(see Dimensions)

Accessories:

6) Other types available on request

the side of the instrument as standard.

= brass, nickel-plated = stainless steel Mechanical indicator = without indicator = with indicator **Modification number** 000 = standard

5) Mechanical connection options depend on housing type

⁷⁾ When the model with 2 switching contacts is selected, the second switching contact is fitted on

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

YDAC INTERNATIONAL



Flow Switch HFS 2100 Ex applications

Any installation position 30-600 cSt

ATEX encapsulation For oils / viscous media



Description:

The HYDAC HFS 2100 series flow switch in ATEX version has been specially developed for use in potentially explosive atmospheres. Like the standard version it is based on the variable area float principle.

The measuring medium deflects a spring-loaded float in the direction of flow, depending on the flow rate. A fully encapsulated reed contact is fitted to the outside of the instrument therefore separated from the fluid circuit. When the magnet inside the float reaches the pre-set position, the reed contact will switch.

Intended fields of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

Protection types and applications:

II 2G Ex mb II T6 / T5

II 2D Ex tD A21 IP67 T80 °C / T100 °C

Certificate:

- PTB 03 ATEX 2159 X
- PTB 03 ATEX N056-4

Technical data:

Input data				
Measuring ranges [l/min]	Size 1	Size 2		
	0.5 1.6	0.5 1.5		
	0.8 3.0	1 4		
	2.0 7.0	2 8		
		3 10		
		5 15		
		8 24		
		10 30		
		15 45		
		20 60		
		30 90		
		35 110		
Operating pressure				
Brass version [bar] Stainless steel version [bar]	300 350	250 300		
Pressure drop [bar]	0.02 0.2	0.02 0.4		
Mechanical connection	see dimensions			
Parts in contact with fluid				
Brass version	St. steel 1.4571; FKM ¹); brass nickel-pl.; brass; hard ferrite			
Stainless steel version	Stainless steel 1.4571; FKM 1); hard ferrite			
Housing material	Brass (nickel-plated) or	stainless steel 1.4571		
Output data				
Switching outputs	1 or 2 reed contacts Normally open or change-over type ²⁾			
Accuracy	≤±10 % FS			
Repeatability	2 % FS max.			
Switching capacity				
Change-over contact	Back-up fuse 1 A	max. 250 V / 1 A / 30 W Back-up fuse 1 A (outside the hazardous area)		
N/O contact	max. 250 V / 2 A / 60 W Back-up fuse 2 A (outside the hazardous area)			
Environmental conditions				
Operating temperature range	T6 / T80 °C: -20 +7 T5 / T100 °C: -20 +9			
Fluid temperature range	T6 / T80 °C: -20 +7 T5 / T100 °C: -20 +9			
Max. surface temperature	T6 / T80 °C: +75 °C T5 / T100 °C: +90 °C			
Viscosity range	30 600 cSt			
(€ mark	2014/35/EU (not for electr. equipment for use in potentially explosive atmosphere)			
	2014/30/EU 2014/34/EU EN 60079-0: 2014-6; E EN 60079-31: 2014-12 EN 1127-1: 2011			
Protection class acc. to DIN EN 60529	IP 67			
Note: ES (Full Scale) - relative to complete meas	uring range			

Note: FS (Full Scale) = relative to complete measuring range

1) Other seal materials on request

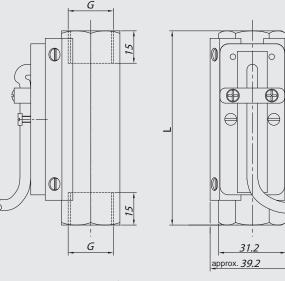
2) The contact opens / switches when the flow falls below the set switch point.

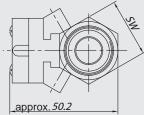
Dimensions without indicator:

OIL -size 1- without indicator

OIL SIZE I WILLIOUS INCIDATOR						
Type Installation dimensions					Weight (approx.)	
[l/min]	[mm]					
	DN	SW	G	L		
	8	24	1/4"	98	450	
0.5 1.6	10	24 27	3/8"	119	500	
	15	27	1/2"*)	90	400	
0.8 3.0	45	0.7	1/2"	00	400	
2.0 7.0	15	27	1/2	90	400	

^{*)} Standard

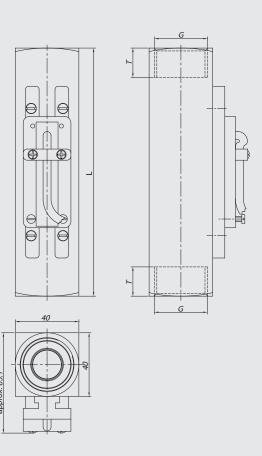




OIL -size	2- without	indicator
-----------	------------	-----------

Type	Installation dimensions				Weight (approx.)	
[l/min]					[g]	
	DN	SW	G	L		
0.5 1.5	8 15	34	1/4"	152	10	1500
	15	34	1/2"	152	14	1425
1 4	20	34	3/4"	152	15	1340
	25	40	1" *)	130	17	1160
2 8 3 10 5 15						
3 10	15	34	1/2"	152	14	1425
5 15	20	20 34 25 40	3/4" 1" *)	152 130	15 17	1340 1160
5 15	25					
8 24						
10 30	00	0.4	0/4"	450	4.5	4040
15 45	20 25	34 40	3/4" 1" *)	152 130	15 17	1340 1160
20 60	25					
30 90	25	25 40	1"	130	17	1160
35 110	25	40	ı	130	17	1100

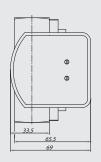
^{*)} Standard

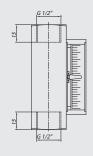


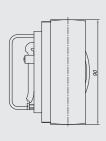
Dimensions with indicator:

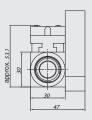
OIL -size 1- with indicator

Type [I/min]	Installation	Installation dimensions [mm]								
[]	DN	SW	G	L	191					
0.5 1.6										
0.8 3.0	15	30	1/2"	90	620					
2.0 7.0										





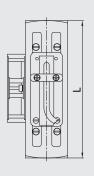


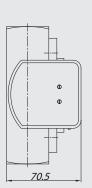


OIL -size 2- without indicator

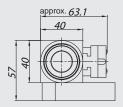
Туре	Installation	Installation dimensions										
[l/min]	[mm]			(approx.)								
	DN	SW	G	L	Т							
0.5 1.5	8	34	1/4"	152	10	1550						
1 4	15 20 25	34 34 40	1/2" 3/4" 1" *)	152 152 130	14 15 17	1475 1390 1210						
2 8												
2 8 3 10 5 15 8 24 10 30	15	34	1/2" 3/4"	152 152	14	1475						
5 15	20 25	34 40	3/4 1" *)	130	15 17	1390 1210						
8 24		.0		100		1210						
	200	24	0/4"	450	45	4200						
15 45	20 25	34 40	3/4" 1" *)	152 130	15 17	1390 1210						
20 60	25	40		130	17	1210						
30 90	25	40	1"	130	17	1210						
35 110	23	40		130	17	1210						
*) Standard												

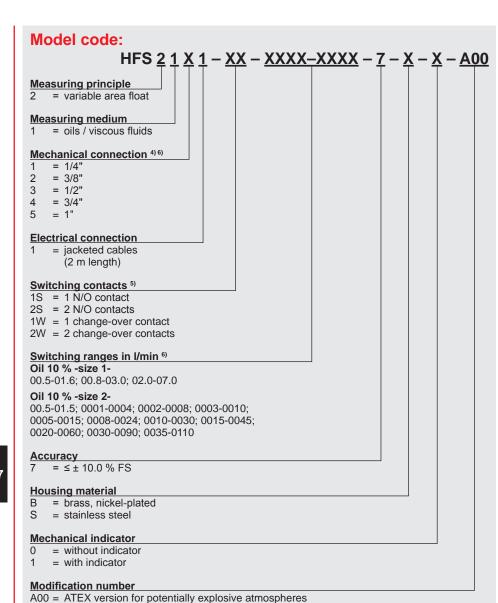












⁴⁾ Mechanical connection options depend on housing type (see Dimensions).

5) When the model with 2 switching contacts is selected, the second switching contact is fitted on the side of the instrument as standard.

6) Other types available on request

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Pin assignment:

Jacketed cable

Core	HFS 21X1-XS	HFS 21X1-XW					
1	N/O contact	Centre					
2	N/O contact	N/C contact					
3		N/O contact					

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstraße 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01

DAD INTERNATIONAL



Flow Switch HFS 2500 Ex applications

Any installation position 30-600 cSt

ATEX encapsulation For water / water-based media



Description:

The HYDAC HFS 2500 series flow switch in ATEX version has been specially developed for use in potentially explosive atmospheres. Like the standard version it is based on the variable area float principle.

The measuring medium deflects a spring-loaded float in the direction of flow, depending on the flow rate. A fully encapsulated reed contact is fitted to the outside of the instrument therefore separated from the fluid circuit. When the magnet inside the float reaches the pre-set position, the reed contact will switch.

Intended fields of application are, for example, the oil and gas industry, on gas turbines or in locations with high levels of dust contamination, e.g. in mills.

Protection types and applications:

II 2G Ex mb II T6 / T5

II 2D Ex tD A21 IP67 T80 °C / T100 °C

Certificate:

- PTB 03 ATEX 2159 X
- PTB 03 ATEX N056-4

Technical data:

Input data				
Measuring ranges [l/min]	5 % ac	curacy	10 % ac	
			Size 2	Size 3
	0.2 4.0	8 90	0.02 0.2	10 30
	0.6 5.0	5 110	0.2 0.6	15 45
	0.5 8.0	10 150	0.4 1.8	20 60
	1 14	35 220	0.8 3.2	30 90
	1 28	35 250	2 7	60 150
	2 40		3 13	
	4 55		4 20	
	1 70		8 30	
Operating pressure	-			
Brass version [bar]	20	00	300	250
Stainless steel version [bar]		00	350	300
Pressure drop [bar]		0.8	0.02 0.3	0.02 0.4
Mechanical connection	see dimension		1 0.02 0.0	0.02 0.4
Parts in contact with fluid	occ dimension	7110		
Brass version	Stainl. steel 1	I.4571; NBR ¹	; brass (nickel-	pl.); brass;
	hard ferrite		,	
Stainless steel version			M 1); hard ferrite	
Housing material	Brass (nickel	-plated) or sta	ainless steel 1.4	571
Output data				
Switching outputs 2)	1 or 2 reed co		over type 2)	
Accuracy	Normally ope ≤±5% or≤:		over type /	
Repeatability	2 % FS max.			
Switching capacity	2 70 TO Max.			
Change-over contact	max. 250 V /	1 A / 30 W/		1
Change-over contact			the hazardous	area)
N/O contact	max. 250 V /			
	Back-up fuse	2 A (outside	the hazardous	area)
Environmental conditions				
Operating temperature range	T6 / T80 °C:		-20 +75 °C	
	T5 / T100 °C		-20 +90 °C	
Fluid temperature range	T6 / T80 °C:		-20 +75 °C	
	T5 / T100 °C:		-20 +90 °C	
Max. surface temperature	T6 / T80 °C: T5 / T100 °C:		+75 °C +90 °C	
	2014/35/EU	(not for elect		
CEIIIaik	2014/33/LU	for use in pot	tentially	
		explosive atr		
	2014/30/EU	·	. ,	
	2014/34/EU	2014 6: 5N 0	0070 10: 0045	10.
			60079-18: 2015∙ N 13463-1: 2009	
	EN 1127-1: 2		¥ 10400-1. 2003	J,
Protection class acc. to DIN EN 60529	IP 67			

Note: FS (Full Scale) = relative to complete measuring range

- 1) Other seal materials on request
- ²⁾ The contact opens / switches when the flow falls below the set switch point.

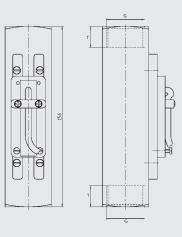
Dimensions without indicator:

Туре	Installa	Weight						
[l/min]	dimens [mm]	sions						(approx.) [g]
	SW	D	W	G	DN	Т	L	

Water 5 % accuracy

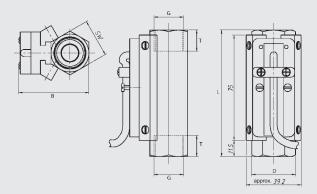
vvaler 3 /6 acct	пасу							
0.2 4.0 0.6 5.0 0.5 8.0 1 14 1 28	27	30	53	1/4" 3/8" 1/2"	8 10 15	10 15 14	131	850
2 40 4 55	27 32	30	53	1/2" 3/4"	15 20	14 15	146 174	900
1 70 8 90 5 110	34 40	40 40	63 63	3/4" 1"	20 25	15 17	152 156	1400 1100
10 150	50	50	73	1 1/4"	32	20	200	2750
35 220	50	50	73	1 1/4"	32	20	200	3000
35 250	60	60	81	1 1/2"	40	20	200	3800





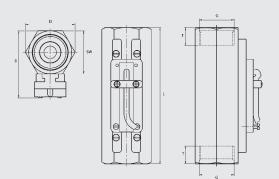
Water 10 % accuracy -size 2-

0.02 0.2								
0.2 0.6								
0.4 1.8								
0.8 3.2	27	31	50	1/2"	15	14	90	400
2.0 7.0	21	31	30	1/2	13	14	90	400
3.0 13.0								
4.0 20.0								
8.0 30.0								
5.5 50.0								



water 10 % accuracy -size 3-										
10 30										
15 45	34	47	63	3/4"	20	15	152	1240		
20 60	41	47	03	1"*)	25	17	130	1030		
30 90										
60 150	41	47	63	1"	25	17	130	1030		

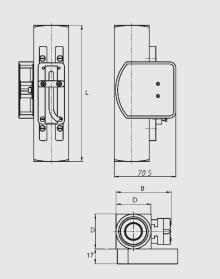
^{*)} Standard



Dimensions with indicator:

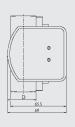
Туре	Installa	Weight (approx.)						
[l/min]	[mm]							
	SW	D	W	G	DN	Т	L	

Water 5 % acc	curacy							
0.2 4.0	-			1/4"	8	10		
0.5 8.0	27	30	53	3/8"	10	10 15	131	900
1 14				1/2"	15	14		
1 28								
2 40	27	30	53	1/2"	15	14	146	950
4 55	32			3/4"	20	15	174	
1 70		40		0/4"	20	45	450	4.450
8 90	34 40	40 40	63 63	3/4" 1"	20 25	15 17	152 156	1450 1150
5 110	10	40	00	•	2	.,	100	1100
10 150	50	50	73	1 1/4"	32	20	200	2800
35 220	50	50	73	1 1/4"	32	20	200	3050
35 250	60	60	81	1 1/2"	40	20	200	3850

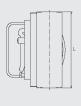


Water 10 % accuracy -size 2-

11ato: 10 /0 aoc	· · · · · · · ·							
0.02 0.2								
0.2 0.6								
0.4 1.8								
0.8 3.2	30	30	53	1/2"	15	14	90	570
2.0 7.0	30	30	55	1/2	13	14	90	370
3.0 13.0								
4.0 20.0								
8.0 30.0								





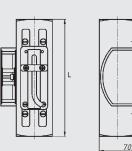


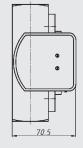


Water 10 % accuracy -size 3-

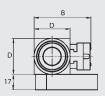
10 30								
15 45	34	40	63	3/4"	20	15	152	1390
20 60	40	40	03	1"*)	25	17	130	1210
30 90								
60 150	40	40	63	1"	25	17	130	1210

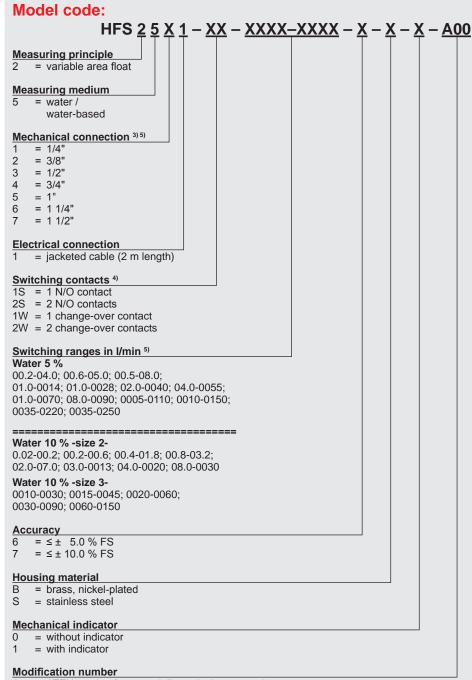
^{*)} Standard











A00 = ATEX version for potentially explosive atmospheres

- 3) Mechanical connection options depend on housing type (see Dimensions)
- 4) When the model with 2 switching contacts is selected, the second switching contact is fitted on the side of the instrument as standard.
- 5) Other types available on request.

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:

Jacketed cable

Core	HFS 25X1-XS	HFS 25X1-XW
1	N/O contact	Centre
2	N/O contact	N/C contact
3		N/O contact

Note:

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For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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SPEED SENSORS [8]	
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HSS 110	405
HSS 120	407
HSS 130	409
HSS 210	411
HSS 220	413

YDAC INTERNATIONAL



Speed Sensor HSS 110

1 channel

Flange housing

Description:

The contact-free speed sensors of the HSS 110 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

For integration into standard controls, standard output signals are available.

Due to their extremely compact design, the robust housing and protection class IP 6K9K, the devices can be used in almost any application and any mounting position.

The main fields of application are detection of speed and rotation direction on gear wheels with small module and high resolution, especially in vehicles and mobile machines with electrical and hydraulic drives.

Optional PWM

Technical data:

Input data	
Frequency range	NPN frequency output: 0,1 20,000 Hz PWM output: 0.1 12,000 Hz
Probe length Probe diameter	18.4 mm 10.2 mm
Max. pressure on sensing surface	25 bar, static
Mechanical connection	Flange, single, asymmetrical, cable outlet 90°
Tightening torque, recommended	Max. 8 Nm
Type of installation	Dependent on direction (with asymmetrical flange)
Housing material Seal	Brass FKM
Output data	
Output signal	NPN frequency output Signal level: HIGH: +U _B / LOW: ≤ 0.6 V Max. switching current: ≤ 40 mA PWM output, 4 20 mA Signal level: HIGH: 12 17 mA / LOW: 4 9 mA Max. switching current: ≤ 200 mA
Environmental conditions	
Operating temperature range	-40 +140 °C
Media resistance of housing	Salt water; various hydraulic oils; diesel oils; cleaning agent; salt spray
(€ mark	EN 61000-4-2/3/4/6/8
Vibration resistance acc. to EN 60068-2-6	0.05 g ² / Hz, 20 2,000 Hz
Shock resistance acc. to EN 60068-2-27	100 g, 6 ms, 3x in each direction
Protection class acc. to IEC 60529	IP 67; IP 6K9K
Other data	
Electrical connection	Jacketed cable, 3-core, 1 m cable length
Supply voltage	NPN frequency output: 12.5 32 V DC PWM output: 4.5 24 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	< 30 mA at 30 V DC
Life expectancy	875,000 h (MTTF) / 1,750,000 h (MTTF _d)
Weight	~ 50 g
Note: Reverse polarity protection of the supply vol	Itage and load short circuit protection

Note: Reverse polarity protection of the supply voltage and load short circuit protection (max. 50 mA) are provided.

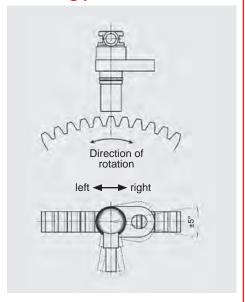
Switching/installation distance:

Module 1	0.2 0.8 mm	
Module 1.25	0.2 1.4 mm	
Module 1.5	0.2 1.8 mm	
Module 2	0.2 2.4 mm	
Module 3	0.2 2.9 mm	

Pin connections:

Lead	HSS 110-1	HSS 110-4	
red	+U _B	+U _B	
black	0 V	PWM	
blue	Frequency		

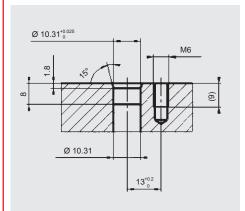
Mounting position tolerance:



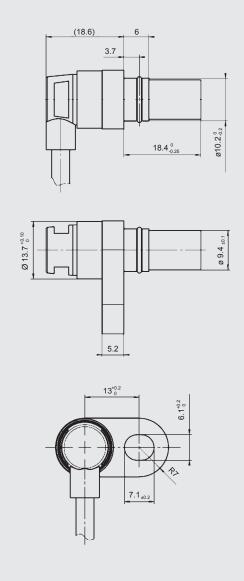
Direction of rotation (only PWM):

Flange left, gear wheel rotating clockwise, impulse duration defines PWM signal

Specification for installation cavity:



Dimensions:



Model code:

HSS 1 1 0 - \underline{X} - $\underline{018}$ - $\underline{000}$

Signal technology

= output 1: frequency

= output 1: PWM (frequency and direction of rotation)

Probe length

 $018 = 18.4 \, \text{mm}$

Modification number

000 = standard

Note:

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Subject to technical modifications.

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DAC INTERNATIONAL



Speed Sensor HSS 120

2 channel

Flange housing

Description:

The contact-free speed sensors of the HSS 120 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

The instruments are available in different immersion depths. For integration into standard controls, standard output signals are available.

Due to their extremely compact design, the robust housing and protection class IP 6K9K, the devices can be used in almost any application and any mounting position.

The main fields of application are detection of speed and rotation direction on gear wheels with a small module and high resolution, especially in vehicles and mobile machines with hydraulic drives.

Technical data:

Input data	
Frequency range	0.1 20,000 Hz
Probe length Probe diameter	30; 35; 45 mm 15 mm
Max. pressure on sensing surface	15 bar (dynamic and static)
Mechanical connection	Flange, single, asymmetrical, cable outlet 90° (30 mm) / axial (35, 45 mm)
Tightening torque, recommended	10 Nm
Type of installation	Dependent on direction (with asymmetrical flange)
Housing material Seal	Brass FKM
Output data	
Output signal	2 NPN frequency outputs Signal level: HIGH: +U _B / LOW: ≤ 0.6 V Max. switching current: ≤ 50 mA
Environmental conditions	
Operating temperature range	-40 +140 °C (-40 +160 °C for max. 500 operating hours)
Media resistance of housing	Salt water; various hydraulic oils; diesel oils; cleaning agent; salt spray
(€ mark	EN 61000-4-2/3/4/6/8
Vibration resistance acc. to EN 60068-2-6	30 g, 10 500 Hz, 100 min in each direction
Shock resistance acc. to EN 60068-2-27 / -29	50 g, 11 ms, 3x in each direction 100 g, 6 ms, 3x in each direction
Protection class acc. to IEC 60529	IP 67; IP 6K9K
Other data	
Electrical connection	Jacketed cable, 4-core, 1 m cable length
Supply voltage	7 30 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	< 30 mA at 30 V DC
Life expectancy	195,000 h (MTTF) / 390,000 h (MTTF _d)
Weight	~ 80 g

Note: Reverse polarity protection of the supply voltage and load short circuit protection (max. 50 mA) are provided.

Switching/installation distance:

Probe length:	30 mm	35 / 45 mm
Module 1	0.2 1.0 mm	0.2 1.3 mm
Module 1.25	0.2 1.5 mm	0.2 1.8 mm
Module 1.5	0.2 1.7 mm	0.2 2.0 mm
Module 2	0.2 2.2 mm	0.2 2.5 mm
Module 2.5	0.2 3.2 mm	0.2 3.5 mm

Pin connections:

Lead	HSS 120-2	
brown	+U _B	
blue	Frequency 1 (A)	
black	0 V	
white	Frequency 2 (B)	

Adjustment angle for other modules:

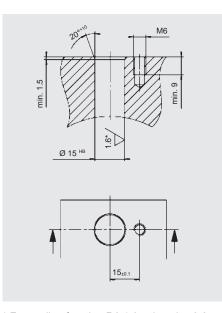
It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor accordingly.

-20°	Module 1	'
-15°	Module 1.25	
-10°	Module 1.5	
± 0°	Module 2	± 0°
	Module 2.5	+15°

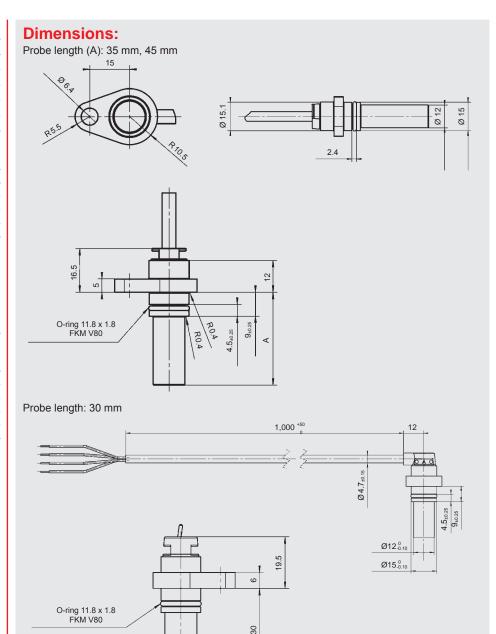
Direction of rotation:

Flange left, gear turns clockwise: channel A following; channel B leading

Specification for installation cavity:



* For sealing function RA 1.6, otherwise 3.2





Signal technology = outputs 1 and 2: frequency (90° / 270° phase shift for module "2")

Probe length

030 = 30 mm

 $035 = 35 \, \text{mm}$ $045 = 45 \, \text{mm}$

Modification number

000 = standard

Note:

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For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

HSS 120 - 2 - XXX - 000

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YDAC INTERNATIONAL



Speed Sensor HSS 130

2 channel

Flange housing

Description:

The contact-free speed sensors of the HSS 130 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

The instruments are available in different immersion depths. For integration into standard controls, standard output signals are available.

Due to their extremely compact design, the robust housing and protection class IP 6K9K, the devices can be used in almost any application and any mounting position.

These devices are mainly used for detection of speed and rotation direction on rotary sensors, even under extreme environmental conditions.

Direct detection of direction of rotation

Technical data:

Input data	
Frequency range	0.1 20,000 Hz
Probe length	16; 32 mm
Probe diameter	18 mm
Max. pressure on sensing surface	10 bar (dynamic and static)
Mechanical connection	Double flange, asymmetrical, cable outlet at 90°
Tightening torque, recommended	10 Nm
Type of installation	Dependent on direction (with asymmetrical flange)
Housing material Seal	Brass/plastic (PA6 GF30) FKM
Output data	
Output signal	2 NPN frequency outputs Signal level: HIGH: ≥ 5 V / LOW: ≤ 2 V Max. switching current: ≤ 500 mA 1 NPN frequency output + 1 NPN dir. of rotation output Signal level: HIGH: ≥ 5 V / LOW: ≤ 2 V Max. switching current: ≤ 500 mA
Environmental conditions	
Operating temperature range	-40 +125 °C
Media resistance of housing	Saltwater and various hydraulic oils
(€ mark	EN 61000-4-2/3/4/6/8
Vibration resistance acc. to EN 60068-2-36	5 57 Hz (1.5 mm p-p), sine 57 2000 Hz (10 g), sine
Shock resistance acc. to EN 60068-2-27	15 g, 11 ms, 3x in each direction 25 g, 6 ms, 3x in each direction
Protection class acc. to IEC 60529	IP 67; IP 6K9K
Other data	
Electrical connection	Jacketed cable, 4-core, 43 cm cable length
Supply voltage	8 32 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	< 33 mA at 24 V, both outputs LOW < 23 mA at 24 V, both outputs HIGH
Life expectancy	120,000 h (MTTF) / 240,000 h (MTTF _d)
Weight	~ 110 g

Note: Reverse polarity protection of the supply voltage and load short circuit protection are

Switching/installation distance:

Module 1	0.2 1.3 mm	
Module 1.25	0.2 1.8 mm	
Module 1.5	0.2 2.0 mm	
Module 2	0.2 2.5 mm	
Module 2.5	0.2 3.5 mm	

Pin connections:

Lead	HSS 130-2	HSS 130-3
brown	+U _B	+U _B
blue	0 V	0 V
black	Frequency 1	Frequency
white	Frequency 2	Direction of rotation

Adjustment angle for other modules:

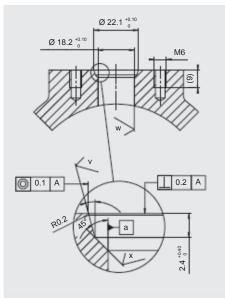
It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor accordingly.

)	
-12°	Module 1	
- 9°	Module 1.25	
- 7°	Module 1.5	
- 3°	Module 1.75	
± 0°	Module 2	± 0°
	Module 2.25	+ 4°
	Module 2.5	+ 8°
	Module 2.75	+13°
	Module 3	+17°

Direction of rotation:

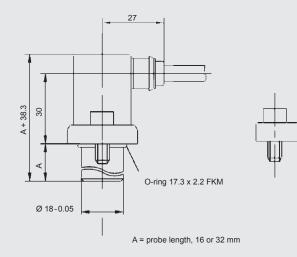
Cable outlet at 90°, gear rotation clockwise: channel A leading; channel B following or rotational direction signal (right HIGH / left LOW)

Specification for installation cavity:



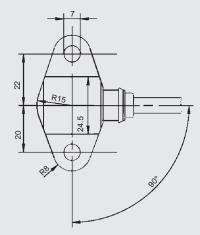
- General tolerances for chipping processes: ISO 2768-mH
- Tolerance: ISO 8015
- Surface quality: ISO 1302

Dimensions:



24.5

Cheese-head screw DIN912 Internal hexagon M6 x 16



Model code:

Signal technology = outputs 1 and 2: frequency

(90° / 270° phase shift for module "2")

= output 1: frequency output 2: direction of rotation

Probe length

 $016 = 16 \, \text{mm}$ $032 = 32 \, \text{mm}$

Modification number

000 = standard

Note:

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Subject to technical modifications.

HYDAC ELECTRONIC GMBH

HSS 1 3 0 - $\frac{X}{X}$ - $\frac{XXX}{X}$ - $\frac{000}{X}$

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DAC INTERNATIONAL



Speed Sensor HSS 210

2 channel

Life expectancy

Screw-in thread M12

Description:

The contact-free speed sensors of the HSS 210 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

For integration into standard controls, standard output signals are available.

Due to their extremely compact design, the robust housing and protection class IP 67, the instruments can be used in almost any application and any mounting position.

The main fields of application are detection of speed and rotation direction on gear wheels with a small module and high resolution, especially in vehicles and mobile machines with hydraulic drives.

Technical data:

Direct detection of direction of rotation

Input data	
Frequency range	0.1 20,000 Hz
Installation depth	0 50 mm adjustable
Max. pressure on sensing surface	10 bar (dynamic and static)
Mechanical connection	Screw-in thread M12x1
Tightening torque, recommended	Max. 13 Nm
Type of installation	Dependent on direction
Housing material	Brass
Output data	
Output signal	2 NPN frequency outputs Signal level: HIGH: ≥ +U _B / LOW: 0.5 V Max. switching current: ≤ 50 mA 1 push-pull frequency output + 1 push-pull dir. of rotation output Signal level: HIGH: ≥ +U _B -2 V / LOW: ≤ 2 V Max. switching current: ≤ 50 mA
Environmental conditions	
Operating temperature range	-40 +125 °C
Media resistance of housing	Oils: HETG; HEES, HFD; HVLP; HLP
(€ mark	EN 61000-4-2/3/4/6/8
Vibration resistance acc. to EN 60068-2-64	0.05 g²/Hz, 20 2.000 Hz
Shock resistance acc. to EN 60068-2-27	30 g, 11 ms
Protection class acc. to IEC 60529	IP 67 (when an IP 67 mating connector is used)
Other data	
Electrical connection	Male M12x1, 4 pole
Supply voltage	8 30 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	< 30 mA at 30 V DC

~ 40 g Note: Reverse polarity protection of the supply voltage and load short circuit protection are provided.

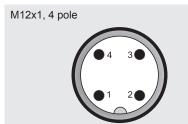
200,000 h (MTTF) / 400,000 h (MTTF_d)

EN 18.609.1/02.18

Switching/installation distance:

Module 1	0.2 1.0 mm	
Module 1.25	0.2 1.5 mm	
Module 1.5	0.2 1.7 mm	
Module 2	0.2 2.2 mm	
Module 2.5	0.2 3.2 mm	

Pin connections:



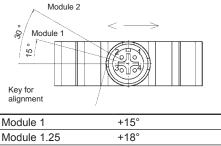
Pin	HSS 210-2	HSS 210-3
1	+U _B	+U _B
2	Frequency 1 (A)	Frequency
3	0 V	0 V
4	Frequency 2 (B)	Direction of rotation

Direction of rotation:

Marking on housing in direction of rotation, gear rotation clockwise: channel A leading; channel B following or direction of rotation signal (right HIGH / left LOW)

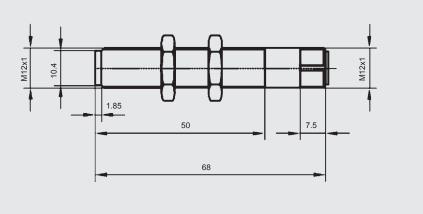
Adjustment angle for other

It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor accordingly.



Module 1	+15°
Module 1.25	+18°
Module 1.5	+23°
Module 2	+30°
Module 2.5	+38°

Dimensions:



Model code:

HSS 2 1 0 - \underline{X} - $\underline{050}$ - $\underline{000}$

Signal technology 2 = outputs 1 and

- = outputs 1 and 2: frequency (90° / 270° phase shift)
- = output 1: frequency output 2: direction of rotation

Installation depth

050 = 50 mm max.

Modification number

000 = standard

Note:

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Subject to technical modifications.

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DAC INTERNATIONAL



Speed Sensor HSS 220

2 channel

Screw-in thread M18

Description:

The contact-free speed sensors of the HSS 220 series detect the movement of ferromagnetic structures, such as gear wheels, gear rims or perforated discs, using the changes in magnetic flux.

So each sensor has two Hall elements and the differential between the two signals is detected, evaluated and then converted into an output signal suitable for processing.

For integration into standard controls, standard output signals are available.

Due to their extremely compact design, the robust housing and protection class IP 67, the instruments can be used in almost any application and any mounting position.

The main fields of application are detection of speed and rotation direction on gear wheels with a small module and high resolution, especially in rail vehicles and mobile machines.

Direct detection of direction of rotation

Technical data:

Input data	
Frequency range	0.1 20,000 Hz
Installation depth	0 48 mm adjustable
Max. pressure on sensing surface	10 bar, static
Mechanical connection	Screw-in thread M18x1
Tightening torque, recommended	Max. 12 Nm
Type of installation	Dependent on direction
Housing material	X12CrNiS18 8
Output data	
Output signal	2 NPN frequency outputs Signal level: HIGH: ≥ +U _B - 2 V / LOW: ≤ 2 V Max. switching current: ≤ 50 mA (36 V, 125 °C, 50 % duty cycle) ≤ 500 mA (24 V, 25 °C, 50 % duty cycle) 1 NPN frequency output + 1 NPN dir. of rotation output Signal level: HIGH: ≥ +U _B - 2 V / LOW: ≤ 2 V Max. switching current: ≤ 50 mA (36 V, 125 °C, 50 % duty cycle) ≤ 500 mA (24 V, 25 °C, 50 % duty cycle)
Environmental conditions	
Operating temperature range	-40 +125 °C
Media resistance of housing	Saltwater, various hydraulic oils
C € mark	EN 61000-4-2 / 3 / 4 / 6
Vibration resistance acc. to EN 60068-2-6	15 g / 3 2,000 Hz
Shock resistance acc. to EN 60068-2-27	30 g, 11 ms, 3x in each direction
Protection class acc. to IEC 60529	IP 67 (when an IP 67 mating connector is used)
Other data	
Electrical connection	Male M12x1, 4 pole
Supply voltage	8 32 V DC
Residual ripple of supply voltage	≤ 5 %
Current consumption	< 33 mA at 24 V, both outputs LOW < 23 mA at 24 V, both outputs HIGH
Life expectancy	1,100,000 h (MTTF) / 2,200,000 h (MTTF _d)
Weight	~ 80 g
Note: Reverse polarity protection of the su	upply voltage and load short circuit protection are

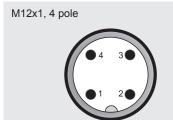
Note: Reverse polarity protection of the supply voltage and load short circuit protection are

EN 18.610.1/02.18

Switching/installation distance:

Module 1	0.2 1.3 mm	
Module 1.25	0.2 1.8 mm	
Module 1.5	0.2 2.0 mm	
Module 2	0.2 2.5 mm	
Module 2.5	0.2 3.5 mm	

Pin connections:



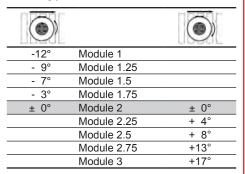
Pin	HSS 220-2	HSS 220-3
1	+U _B	+U _B
2	Frequency 2 (B)	Direction of rotation
3	0 V	0 V
4	Frequency 1 (A)	Frequency

Direction of rotation:

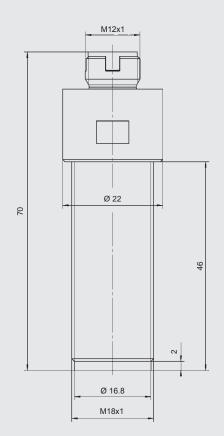
Marking on housing at 90° to rotational direction, gear rotation clockwise: channel A leading, channel B following or direction of rotation signal (right HIGH / left LOW)

Adjustment angle for other

It is possible to achieve a 90° phase shift of the two frequency signals by turning the sensor accordingly.



Dimensions:



Model code:

HSS 2 2 0 - X - 046 - 000

Signal technology 2 = outputs 1 and

- = outputs 1 and 2: frequency
- (90° / 270° phase shift for module "2") = output 1: frequency
- output 2: direction of rotation

Installation depth

046 = 46 mm max.

Modification number

000 = standard

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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HAT 1200	Functional safety	Analogue	421
HAT 1400	Functional safety	CAN	423
HAT 3800	Functional safety	CAN	425

YDAC INTERNATIONAL



Angle Sensor HAT 1400

Magnetic	Absolute	Singleturn, 14 bit

CANopen IP 6K9K (two-chamber design)



Description:

HAT 1400 is an absolute measuring singleturn angle sensor.

Thanks to its non-contact magnetic measuring method and its robust design, the HAT 1400 is ideally suited for the measurement of the rotational angle in mobile machines.

Due to its two-chamber design, the electronic unit is completely encapsulated which means it meets IP 6K9K if the electrical connection is carried out accordingly.

In the CANopen version, the measured signal is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The sensor is therefore suitable for a large variety of applications in the automobile industry and in mobile work machines.

Especially for the use in public traffic vehicles, HAT 1400 has (E^{r_3}) approval (approved for road vehicles) in accordance with ECE type approval.

Technical data:

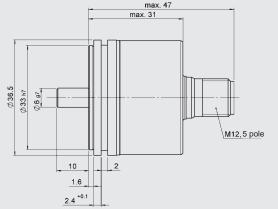
Input data	
Measuring range	0 360 °
Direction of rotation	No orientation restrictions
Max. speed	17,000 rpm
Max. axial load	60 N
Max. radial load	100 N
Housing material	Stainless steel
Shaft material	Stainless steel
Output data	
Output signal	CANopen
Resolution	14 bit
Accuracy (at room temperature)	± 0.1 ° typ. ± 0.2 ° max.
Accuracy (over the temperature range)	± 0.05 ° / 10 K typ. ± 0.1 ° / 10 K max.
Repeatability	≤ ± 0.05 °
Angle increase	cw / ccw (factory-set)
Environmental conditions	
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
(E13) mark	E13*10R00*10R05*14136*00
Vibration resistance acc. to DIN EN 60068-2-6: 2010	7.5 mm (5 Hz ≤ f < 8.2 Hz) 2 g (8.2 Hz ≤ f < 2000 Hz)
Shock resistance acc. to DIN EN 60068-2-27: 2011	20 g (11 ms in 3 axes)
Protection class acc. to DIN EN 60529 1)	IP 67, IP 6K9K (electronics)
Protocol data for CANopen	
Communication profile	CiA DS 301 V4.2.0
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s 1 Mbit/s acc. to DS305 V2.2
Transmission services	
- PDO - Transfer	Measured value as 32 bit and float synchronous, asynchronous, cyclical
Node ID / baud rate	Adjustable via LSS
Other data	Adjustable via LSS
Supply voltage	9 36 V DC
Residual ripple of supply voltage	≤ 5 %
Power consumption	< 1.4 W
Life expectancy	1.5 * 10° rotations at 3000 rpm
Weight	approx. 120 g
	approx. 120 g

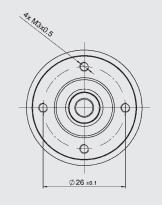
Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

1) With mounted mating connector in corresponding protection class

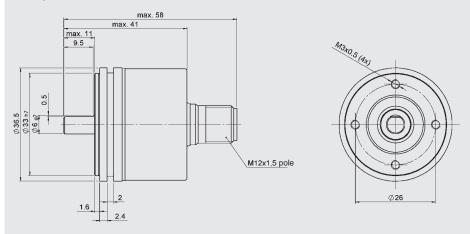


Dimensions: Solid shaft:

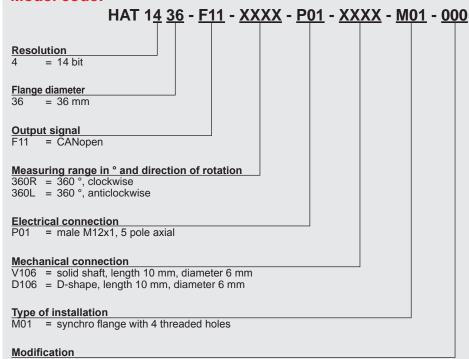




D-shape:



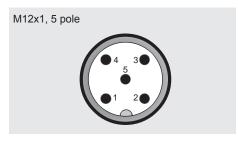
Model code:



= standard

Appropriate accessories, such as elastic couplings and mating connectors, can be found in the Accessories brochure.

Pin connections:



PIN	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	-U _B	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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YDAC INTERNATIONAL



Angle Sensor HAT 3800

Magnetic	Absolute	Singleturn, 18 bit

CANopen



Description:

HAT 3836 is a high resolution absolute measuring singleturn angle sensor.

Thanks to its non-contact magnetic measuring method and its robust design, HAT 3800 is ideally suited for rotational angle measurement in mobile machines as well as in stationary applications.

In the CANopen version, the measured signal is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The sensor is therefore ideally suited for mobile machines and stationary applications, especially wherever high-resolution data acquisition is required.

Especially for the use in public traffic vehicles, HAT 3800 has (E^{13}) approval (approved for road vehicles) in accordance with ECE type approval.

Technical data:

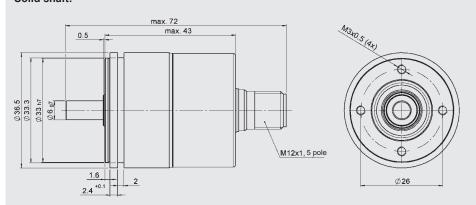
Input data	
Measuring range	0 360 °
Direction of rotation	No orientation restrictions
Max. speed	1,000 rpm
Max. axial load	60 N
Max. radial load	100 N
Housing material	Stainless steel
Shaft material	Stainless steel
Output data	
Output signal	CANopen
Resolution	18 bit
Accuracy (at room temperature)	± 0.1 ° typ. ± 0.2 ° max.
Accuracy (over the temperature range)	± 0.05 ° / 10 K typ. ± 0.1 ° / 10 K max.
Repeatability	≤ ± 0.05 °
Angle increase	cw / ccw (factory-set)
Environmental conditions	
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
(E ¹³) mark	E13*10R00*10R05*14137*00
Vibration resistance acc. to DIN EN 60068-2-6: 2010	7.5 mm (5 Hz ≤ f < 8.2 Hz) 2 g (8.2 Hz ≤ f < 2000 Hz)
Shock resistance acc. to DIN EN 60068-2-27: 2011	20 g (11 ms in 3 axes)
Protection class acc. to DIN EN 60529 1)	IP 67
Protocol data for CANopen:	
Communication profile	CiA DS 301 V4.2.0
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s 1 Mbit/s acc. to DS305 V2.2
Transmission services - PDO - Transfer	Measured value as 32 bit and float synchronous, asynchronous, cyclical
Node ID / baud rate	Adjustable via LSS
Other data	Aujustable via 200
Supply voltage	9 36 V DC
Residual ripple of supply voltage	≤ 5 %
Power consumption	< 1.4 W
Life expectancy	1.5 * 10 ⁹ rotations at 1000 rpm
Weight	approx. 180 g
	y voltage, overvoltage, override and short circuit

Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

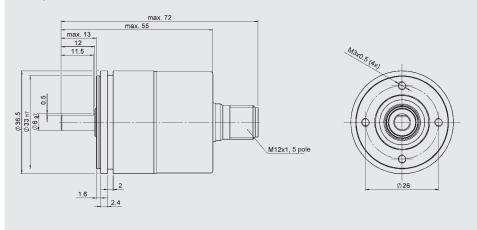
1) With mounted mating connector in corresponding protection class

Dimensions:

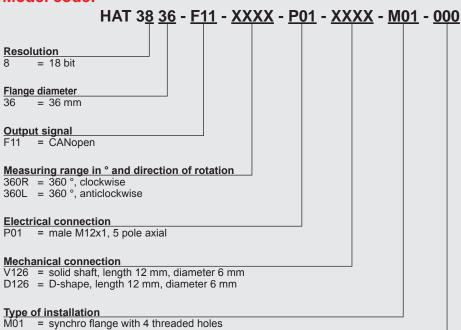
Solid shaft:



D-shape:



Model code:

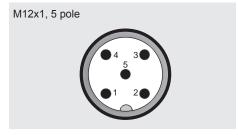


Modification = standard

Accessories:

Appropriate accessories, such as elastic couplings and mating connectors, can be found in the Accessories brochure.

Pin connections:



PIN	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	-U _B	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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YDAC INTERNATIONAL



Angle Sensor HAT 1200

Magnetic **Absolute** Singleturn, 12 bit

Analogue IP 6K9K (two-chamber design) Increased Functional Safety



Description:

HAT 1200 is an absolute measuring singleturn angle sensor.

Thanks to its non-contact magnetic measuring method and its robust design, the HAT 1200 is ideally suited for the measurement of the rotational angle in mobile machines.

Due to its two-chamber design, the electronic unit is completely encapsulated which means it meets IP 6K9K if the electrical connection is carried out accordingly.

The sensors meet the safety requirements according to SIL2 (IEC 61508) or PL d (ISO 13849), respectively.

The sensor is therefore suitable for a large variety of applications in the automobile industry and in mobile work machines, especially for applications with increased safety requirements.

Especially for the use in public traffic vehicles, HAT 1200 has $(E^{(3)})$ approval (approved for road vehicles) in accordance with ECE type approval.

Technical data:

Input data	
Measuring range	0 360 °
Direction of rotation	No orientation restrictions
Max. speed	17,000 rpm
Max. axial load	60 N
Max. radial load	100 N
Housing material	Stainless steel
Shaft material	Stainless steel
Output data	
Output signal, permitted load resistance	4 20 mA, load resist. max. 500 Ω
Resolution	12 bit
Accuracy (at room temperature)	± 0.15 ° typ. ± 0.3 ° max.
Accuracy	± 0.075 ° / 10 K typ.
(over the temperature range)	± 0.15 ° / 10 K max.
Repeatability	≤ ± 0.05 °
Characteristic curve	Linear, cw / ccw (factory-set)
Environmental conditions	
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
(E ¹³) mark	E13*10R00*10R05*14136*00
Vibration resistance acc. to DIN EN 60068-2-6: 2010	7.5 mm (5 Hz ≤ f < 8.2 Hz) 2 g (8.2 Hz ≤ f < 2000 Hz)
Shock resistance acc. to DIN EN 60068-2-27: 2011	20 g (11 ms in 3 axes)
Protection class acc. to DIN EN 60529 1)	IP 67, IP 6K9K (electronics)
Safety-related data	
Performance level	
Based on	DIN EN ISO 13849-1:2008
PL	d
Architecture	Category 2
Safety Integrity Level	
Based on	DIN EN 61508:2010
SIL	2
Other data	
Supply voltage	9 36 V DC
Residual ripple of supply voltage	≤ 5 %
Power consumption	< 1.4 W
Life expectancy	1.5 * 109 rotations at 3000 rpm
Weight	approx. 120 g
Note: Payerse polarity protection of the su	nnly voltage overvoltage override and short circuit

Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

1) With mounted mating connector in corresponding protection class

Dimensions: Solid shaft: max. 47 max. 31 Ф33 н7 Ø 6 g7 M12,5 pole 10 Ø 26 ±0. 1.6 2.4 +0.1 D-shape:

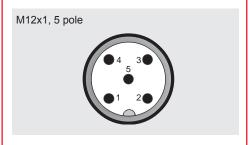
M3x0.5 (4x)

max. 58

max. 41

max. 11

Pin connections:



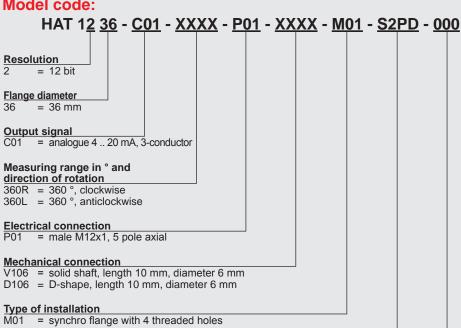
PIN	
1	+U _B
2	n.c.
3	0 V
4	Signal
5	n.c.

Model code:

1.6

0.5

Ø36.5



M12x1,5 pole

Functional safety
S2PD = SIL2 acc. to IEC 61508 and PLd – Cat 2 acc. to DIN EN 13849-1

Modification

= standard

Appropriate accessories, such as elastic couplings and mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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DAC INTERNATIONAL



Angle Sensor HAT 1400

Magnetic **Absolute** Singleturn, 14 bit

CANopen Safety IP 6K9K (two-chamber design) Increased Functional Safety



Description:

HAT 1400 is an absolute measuring singleturn angle sensor.

Thanks to its non-contact magnetic measuring method and its robust design, the HAT 1400 is ideally suited for the measurement of the rotational angle in mobile machines.

Due to its two-chamber design, the electronic unit is completely encapsulated which means it meets IP 6K9K if the electrical connection is carried out accordingly.

The sensors meet the safety requirements according to SIL2 (IEC 61508) or PL d (ISO 13849), respectively.

In the CANopen version, the measured signal is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The sensor is therefore suitable for a large variety of applications in the automobile industry and in mobile work machines, especially for applications with increased safety requirements.

Especially for the use in public traffic vehicles, HAT 1400 has (£13) approval (approved for road vehicles) in accordance with ECE type approval.

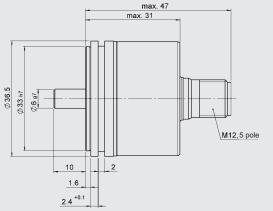
Technical data:

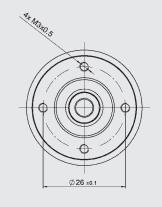
Input data	
Measuring range	0 360 °
Direction of rotation	No orientation restrictions
Max. speed	17,000 rpm
Max. axial load	60 N
Max. radial load	100 N
Housing material	Stainless steel
Shaft material	Stainless steel
Output data	
Output signal	CANopen Safety
Resolution	14 bit
Accuracy	± 0.1 ° typ.
(at room temperature)	± 0.2 ° max.
Accuracy (over the temperature range)	± 0.05 ° / 10 K typ. ± 0.1 ° / 10 K max.
Repeatability	≤ ± 0.05 °
Angle increase	cw / ccw (factory-set)
Environmental conditions	
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
(E ¹³) mark	E13*10R00*10R05*14136*00
Vibration resistance acc. to	7.5 mm (5 Hz ≤ f < 8.2 Hz)
DIN EN 60068-2-6: 2010	2 g (8.2 Hz ≤ f < 2000 Hz)
Shock resistance acc. to DIN EN 60068-2-27: 2011	20 g (11 ms in 3 axes)
Protection class acc. to DIN EN 60529 1)	IP 67, IP 6K9K (electronics)
Protocol data for CANopen Safety	
Communication profile	CiA DS 301 V4.2.0 / DS 304 V1.0.1
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s 1 Mbit/s acc. to DS305 V2.2
Transmission services	
- PDO - Transfer	Measured value as 32 bit and float
Node ID / baud rate	synchronous, asynchronous, cyclical Adjustable via LSS
	Aujustable via LSS
Safety-related data Performance level	
	DINI EN 100 42040 4:2000
Based on	DIN EN ISO 13849-1:2008
PL Analytic at the	d Cotonomia
Architecture	Category 2
Safety Integrity Level	DINI ENI 04500:0040
Based on	DIN EN 61508:2010
SIL Other data	2
Other data	0. 26 V DC
Supply voltage	9 36 V DC
Residual ripple of supply voltage	≤ 5 %
Power consumption	< 1.4 W
Life expectancy	1.5 * 109 rotations at 3000 rpm
Weight	approx. 120 g
Note: Reverse polarity protection of the supp	bly voltage, overvoltage, override and short circuit

protection are provided.

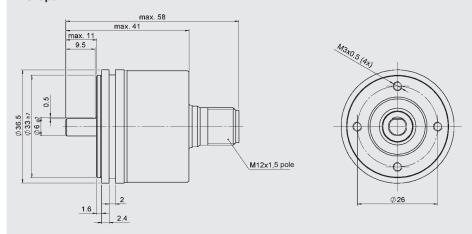
1) With mounted mating connector in corresponding protection class

Dimensions: Solid shaft: max. 47 max. 31

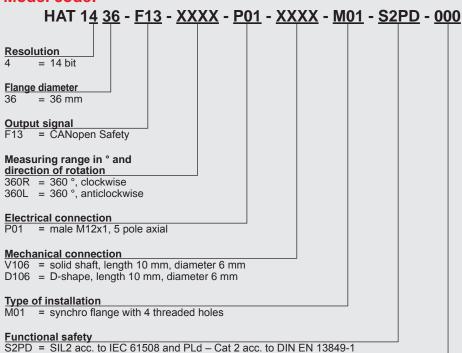




D-shape:



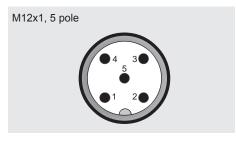
Model code:



Modification = standard

Appropriate accessories, such as elastic couplings and mating connectors, can be found in the Accessories brochure.

Pin connections:



PIN	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	-U _B	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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HYDAC INTERNATIONAL



Angle Sensor HAT 3800

Magnetic Absolute Singleturn, 18 bit

CANopen Safety Increased Functional Safety



Description:

HAT 3836 is a high resolution absolute measuring singleturn angle sensor.

Thanks to its non-contact magnetic measuring method and its robust design, HAT 3800 is ideally suited for rotational angle measurement in mobile machines as well as in stationary applications.

The sensor version designed for applications with increased functional safety meets the safety requirements according to SIL2 (IEC 61508) or PL d (ISO 13849), respectively.

In the CANopen version, the measured signal is digitised and made available to the CAN field bus system via the CANopen protocol. The instrument parameters can be viewed and configured by the user via the CANopen object directory using standard CAN software.

The sensor is therefore ideally suited for mobile machines and stationary applications, especially in applications with increased safety requirements and wherever high-resolution data acquisition is required.

Especially for the use in public traffic vehicles, HAT 3800 has (13) approval (approved for road vehicles) in accordance with ECE type approval.

Technical data:

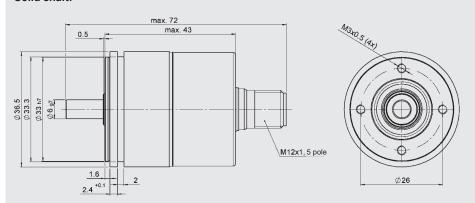
Input data	
Measuring range	0 360 °
Direction of rotation	No orientation restrictions
Max. speed	1,000 rpm
Max. axial load	60 N
Max. radial load	100 N
Housing material	Stainless steel
Shaft material	Stainless steel
Output data	
Output signal	CANopen Safety
Resolution	18 bit
Accuracy	± 0.1 ° typ.
(at room temperature)	± 0.2 ° max.
Accuracy (over the temperature range)	± 0.05 ° / 10 K typ. ± 0.1 ° / 10 K max.
Repeatability	≤ ± 0.05 °
Angle increase	cw / ccw (factory-set)
Environmental conditions	
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Es mark	E13*10R00*10R05*14137*00
Vibration resistance acc. to	7.5 mm (5 Hz ≤ f < 8.2 Hz)
DIN EN 60068-2-6: 2010	2 g (8.2 Hz ≤ f < 2000 Hz)
Shock resistance acc. to DIN EN 60068-2-27: 2011	20 g (11 ms in 3 axes)
Protection class acc. to DIN EN 60529 1)	IP 67
Protocol data for CANopen Safety	
Communication profile	CiA DS 301 V4.2.0 / DS 304 V1.0.1
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Encoder Device Profile	CiA DS 406 V3.2
Baud rates	10 kbit/s 1 Mbit/s acc. to DS305 V2.2
Transmission services	
- PDO	Measured value as 32 bit and float
- Transfer	synchronous, asynchronous, cyclical
Node ID / baud rate	Adjustable via LSS
Safety-related data	
Performance level	DIN EN 100 400 40 4 0000
Based on	DIN EN ISO 13849-1:2008
PL	d
Architecture	Category 2
Safety Integrity Level	BN/ 51/ 0/ 500 00/0
Based on	DIN EN 61508:2010
SIL	_2
Other data	
Supply voltage	9 36 V DC
Residual ripple of supply voltage	≤ 5 %
Power consumption	< 1.4 W
Life expectancy	1.5 * 109 rotations at 1000 rpm
Weight	approx. 180 g
Note: Reverse polarity protection of the supp	ly voltage, overvoltage, override and short circuit

ote: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

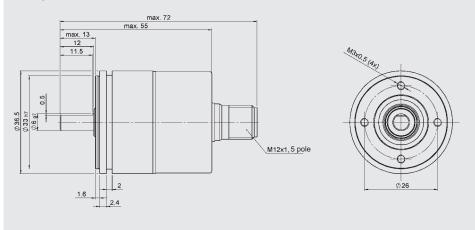
1) With mounted mating connector in corresponding protection class

Dimensions:

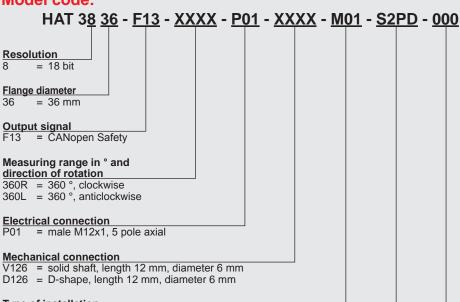
Solid shaft:



D-shape:



Model code:



Type of installation

= synchro flange with 4 threaded holes

Functional safety

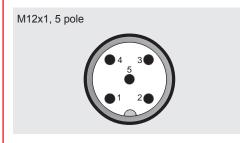
S2PD = SIL2 acc. to IEC 61508 and PLd - Cat 2 acc. to DIN EN 13849-1

Modification

= standard

Appropriate accessories, such as elastic couplings and mating connectors, can be found in the Accessories brochure.

Pin connections:



PIN	Signal	Description
1	n.c.	
2	+U _B	Supply+
3	-U _B	Supply-
4	CAN_H	Bus line dominant high
5	CAN_L	Bus line dominant low

Note:

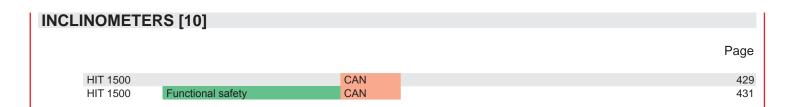
The information in this brochure relates to the operating conditions and applications

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01



DAC INTERNATIONAL



Inclinometer HIT 1500

MEMS Technology

Motion compensated

CANopen



Description:

In many applications, the measurement of the angle of inclination is required in order to ensure safe machine functions and to control processes.

HIT 1500 was developed in particular for the special use in dynamic system.

By using both an accelerometer and an additional gyroscope based on MEMS technology (Micro-Electro-Mechanical System), two measured variables which are entirely independent from one another from the physical point of view are detected by the HIT 1500 and combined.

A motion compensation is performed hence the contouring error, which occurs in damped or low-pass filtered systems, is avoided.

Thus, the HIT 1500 provides excellent dynamic characteristics and is therefore particularly suited for active orientation, stabilisation, and control of the inclination of mobile machines such as boom lifts and work platforms, cranes and mobile cranes, construction and drilling systems, agricultural, and municipal machines, etc.

Especially for the use in public traffic vehicles, HIT 1500 is approved for road vehicles according to ECE type approval.

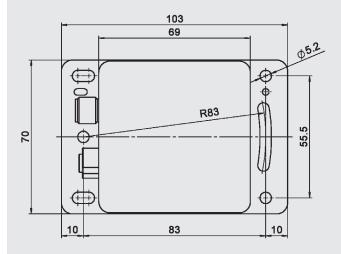
Technical data:

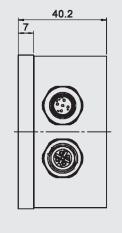
nclination	
Axes	1/ 2
Measuring range ("slope long")	±15 ° / ±60 ° / ±120 ° / ±180 °
Measuring range ("slope lateral")	±15 ° / ±60 ° / ±90 °
Resolution	0.01 °
Dynamics	30 50 Hz (-3 dB)
Update rate	200 Hz
Accuracy (static RMS)	< 0.1 ° over the entire measuring range
Temperature coefficient	Active temperature control, warm-up phase depending on ambient temperature 1)
Acceleration	
Axes	3
Measurement range	± 3 g in 3 axes
Resolution	0.01 m/s ²
Cutoff frequency	30 50 Hz
Gyro	
Axes	3
Measurement range	± 250 °/s in 3 axes
Resolution	0.2 mrad/s
Cutoff frequency	30 50 Hz
Output data	00 00 HZ
Output data Output signal	CANopen
Environmental conditions	CANOPEII
	20 160 °C
Compensated temperature range	-20 +60 °C
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +85 °C
(mark	EN 61000-6-1 / 2 / 3 / 4 (see Declaration of Conformity)
/ibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	5 g (criteria B)
Shock resistance acc. to DIN EN 60068-2-27	20 g, 11 ms half sine (criterion B) 50 g, 6 ms half sine (criterion B)
Protection class 2) acc. to DIN EN 60529 ISO 20653	IP66, IP67, IP69 IP6K9K
Protocol data for CANopen	
Communication profile	CiA DS 301 V4.2
MT-Services	CiA DSP 302 V4.1
ayer setting services and protocol	CiA DSP 305 V2.2
Device profile	CiA DS 410 V1.3
Baud rates	10 kbit 1 Mbit acc. to. CiA DS305 V2.2
ransmission services	
PDO	Measured value as 16 bit value, status
Transfer	synchronous, asynchronous, cyclical
Node Id / Baudrate	Can be set via Manufacturer Specific Profile & LSS
Default setting	250 kbps / Node ID 1
Other data	
Supply voltage	9 36 V DC
Residual ripple of supply voltage	< 5 %
Power consumption	< 5 W
lousing material	Aluminium, anodized
Tousing material	~ 400 g

1) e.g. approx. 40 s at 20 °C, < 2 min at 0 °C

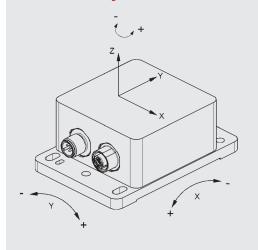
²⁾ With mounted mating connector in corresponding protection class

Dimensions:



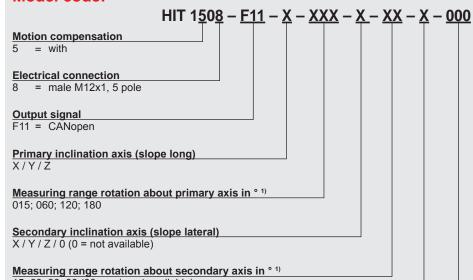


Coordinate system and direction of rotation:





Model code:



Additional CAN socket

= none

= female M12x1, 5 pole

15; 60; 90; 00 (00 = axis not available)

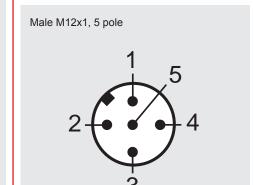
Modification number

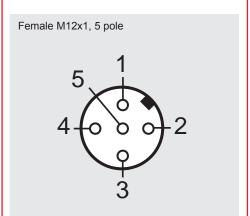
000 = standard

Note:

1) Other measuring ranges on request

Pin connections:





Pin	Signal	Description
1	CAN_SHLD	CAN shield
2	CAN_V+	CAN external positive supply
3	CAN_GND	Ground / 0 V / V-
4	CAN_H	CAN_H bus line (dominant high)
5	CAN_L	CAN_L bus line (dominant low)

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstraße 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01

EN 18.113.0/02.18

DAD INTERNATIONAL



Inclinometer HIT 1500

MEMS Technology

Motion compensated

Increased Functional Safety CANopen Safety



Description:

In many applications, the measurement of the angle of inclination is required in order to ensure safe machine functions and to control processes.

HIT 1500 was developed in particular for the special use in dynamic system.

In the version for use in applications with enhanced functional safety, the data can be transmitted via the CANopen Safety protocol.

The inclinometers are particularly suited for application in safety circuits according Functional Safety in Machines and Systems up to SIL 2 (IEC 61508) or PL d depending on the version category 2 or 3 (ISO 13849), respectively.

By using both an accelerometer and an additional gyroscope based on MEMS technology (Micro-Electro-Mechanical System), two measured variables which are entirely independent from one another from the physical point of view are detected by the HIT 1500 and combined by the device.

A motion compensation is performed hence the contouring error, which occurs in damped or low-pass filtered systems, is avoided.

Thus, the HIT 1500 provides excellent dynamic characteristics and is therefore particularly suited for the active orientation, stabilisation and control of the inclination of mobile machines such as boom lifts and work platforms, cranes and mobile cranes, construction and drilling systems, agricultural, and municipal machines, etc.

Especially for the use in public traffic vehicles, HIT 1500 is approved for road vehicles according to ECE type approval.

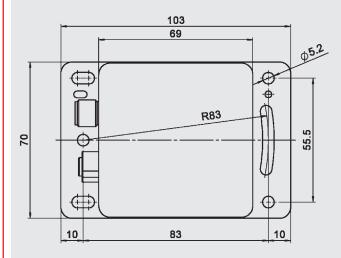
Technical data:

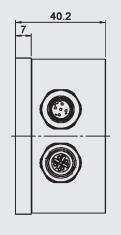
Input data	·
Inclination	
Axes	1/2
Measuring range ("slope long")	±15°/±60°/±120°/±180°
Measuring range ("slope lateral")	±15 °/±60 °/±120 °/±100
Resolution	0.01 °
Dynamics	30 50 Hz (-3 dB)
Update rate	200 Hz
Accuracy (static RMS)	< 0.1 ° over the entire measuring range
Temperature coefficient	Active temperature control, warm-up phase
	depending on ambient temperature 1)
Acceleration	
Axes	3
Measurement range	± 3 g in 3 axes
Resolution	0.01 m/s ²
Cutoff frequency	30 50 Hz
Gyro	
Axes	3
Measurement range	± 250 °/s in 3 axes
Resolution	0.2 mrad/s
Cutoff frequency	30 50 Hz
Output data	
Output signal	CANopen Safety
Environmental conditions	
Compensated temperature range	-20 +60 °C
Operating temperature range	-40 +85 °C
Storage temperature range	-40 +85 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
	(see Declaration of Conformity)
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	5 g (criteria B)
Shock resistance acc. to DIN EN 60068-2-27	20 g, 11 ms half sine (criterion B) 50 g, 6 ms half sine (criterion B)
Protection class ²⁾ acc. to DIN EN 60529 ISO 20653	IP66, IP67, IP69 IP6K9K
Protocol data for CANopen Safety	
Communication profile	CiA DS 301 V4.2
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Device profile	CiA DS 410 V1.3
CANopen Safety	CiA DS 410 V1.0
Baud rates	10 kbit 1 Mbit acc. to. CiA DS 305 V2.2
Transmission services	TO NOTE :: 1 WIDE GOO. IO. ON I DO GOO VELE
- SRDO (inclination) / PDO - Transfer	Measured value as 16 bit value, status synchronous, asynchronous, cyclical
Node ID / baud rate	Can be set via Manufacturer Specific Profile & LSS
Default setting	250 kbps / Node ID 1
Safety-relevant data	·
Performance Level	
Based on PL	DIN EN ISO 13849-1:2015
PL	PL = d
Architecture	Cat 2 or Cat 3
Safety Integrity Level	
Based on SIL	DIN EN 61508:2010
SIL	2
Architecture	1001 / 1002
Other data	
Supply voltage	9 36 V DC
Residual ripple supply voltage	< 5 %
Power consumption	< 5 W
Housing material	Aluminium, anodized
Weight	~ 400 g
	oltage and overvoltage protection are provided.
1) e.g. approx 40 s at 20 °C. < 2 min at 0 °C.	

 $^{1)}$ e.g. approx. 40 s at 20 °C, < 2 min at 0 °C

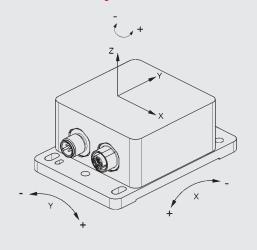
With mounted mating connector in corresponding protection class

Dimensions:



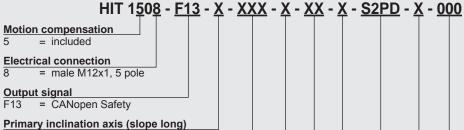


Coordinate system and direction of rotation:





Model code:



 $\overline{X/Y/Z}$

Measuring range rotation about primary axis in ° 1)

015; 060; 120; 180

Secondary inclination axis (slope lateral)

X/Y/Z/0 (0 = not available)

Measuring range rotation about secondary axis in ° 1)

15; 60; 90; 00 (00 = axis not available)

Additional CAN socket

= none

= female M12x1, 5 pole

Functional safety
S2PD = SIL2 acc. to IEC 61508 and PLd acc. to DIN EN 13849-1

Design architecture

= category 2 acc. to DIN EN 13849-1

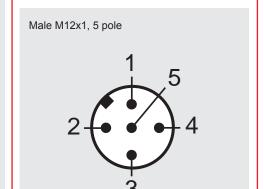
= category 3 acc. to DIN EN 13849-1

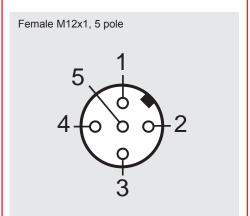
Modification number

000 = standard

1) Other measuring ranges on request

Pin connections:





Pin	Signal	Description
1	CAN_SHLD	CAN shield
2	CAN_V+	CAN external positive supply
3	CAN_GND	Ground / 0 V / V-
4	CAN_H	CAN_H bus line (dominant high)
5	CAN_L	CAN_L bus line (dominant low)
		-

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstraße 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01

HLB 1400

CONDITION MONITORING PRODUCTS [11] Page CMU 1000 CM unit 435 CSI-B-2 439 CM interface module 441 AS 1000 Display AS 3000 443 EY 1356 445

447

YDAC INTERNATIONAL

Condition Monitoring Unit CMU 1000

Programmable

8 analogue inputs

Ethernet interface

Description:

The CMU 1000 is an electronic evaluation unit designed for permanent online condition monitoring of machines and systems. In order to achieve this, the device must be supplied with relevant data which is recorded by the sensors connected to it.

This recorded data (processed or unprocessed) can be transferred by the CMU 1000 via different interfaces or as an analogue value to other devices and/or monitoring levels.

The CMU 1000 processes the application program stored in it continuously and cyclically like a PLC. The user creates this program simply and conveniently on a PC using the CM Editor developed for this purpose and then uploads it to the CMU 1000.

The CM Editor is part of the HYDAC PC software CMWIN Version V03 or higher (supplied) and it provides the various tools and functions in accordance with IEC 61131 for designing, integrating and testing the user program using "drag and drop" operations. The device is equipped with a backgroundlit LCD display as well as three differentcoloured LEDs for the status display and presentation of messages and values. The CMU 1000 is operated and data is input on site using a built-in key pad within the menu structure of the device. The CMU 1000 is designed for use in machines in both the stationary and mobile sectors. It is possible to connect easily to higher-level control, monitoring and bus systems using the built-in interfaces or in combination with an additional coupling module.



Special features:

- 8 input channels for HSI or SMART sensors
- 8 input channels for analogue sensors
- 4 input channels for digital signals
- 2 output channels for analogue signals
- 4 relay switching outputs with changeover
- USB slave interface for PC connection
- USB Master interface for storing the measured data on a commercially available USB memory stick.
- Ethernet interface
- RS 232 interface
- 2-line LCD display (2 x 16 characters) for display of measured data and status and/or error messages
- 3 freely programmable, different-coloured LEDs for status display (red, yellow, green)
- Simple operation via navigation cross
- Creation of customised application programs using the PC software CMWIN supplied

Technical data:

Supply	10.0 25.0 \(\text{DO} \)	
Input voltage	18.0 35.0 V DC	
Current consumption	max. 1.5 A	
Reverse polarity protection	-30 V	
Insulation voltage	+40 V	
Connection of sensors	Up to 8 sensors with HSI functionality or up to 8 SMART sensors 1) and in addition up to 8 analogue sensors and up to 4 digital sensors 4 x digital / 2 x digital + 2 x frequency / 3 x digital + 1 x frequency	
Analogue inputs		
Channels I and J (accuracy)	4 20 mA (≤±0.1 % FS max 0 20 mA (≤±0.1 % FS max 0.5 4.5 V (≤±0.1 % FS max 0 10 V (≤±0.1 % FS max	.)
Channels K and L (accuracy)	4 20 mA 0 20 mA 0.5 4.5 V 0 50 V -10 +10 V (≤±0.1 % FS max (≤±0.1 % FS max (≤±0.1 % FS max (≤±0.1 % FS max L only!	.)
Channels M and N (accuracy)	4 20 mA (≤±0.1 % FS max 0 20 mA (≤±0.1 % FS max 0.5 4.5 V (≤±0.1 % FS max	.)
Channels O and P (accuracy)	4 20 mA 0 20 mA 0.5 4.5 V -10 +10 V (≤±0.1 % FS max (≤±0.1 % FS max (≤±0.2 % FS max P only!	.) .)
Digital inputs		_
Quantity	4, of which 2 are for frequency measurements (channels Q and R)	
Trigger threshold	approx. 2 V	
Dynamics	30 kHz	
Measurement channels		
Quantity	32 – one measurement channel can be a value of a connected sensor (also a subchannel of a SMART sensor) or a value derived (calculated) from sensor data.	
Analogue outputs		
Quantity	2	
Туре	Individually selectable, current (4 20 mA) or voltage (0 10 V)	
Digital outputs		
Quantity	4	
Туре	Relay output, change-over contact	<u>ct</u>
Switching capacity	30 V DC / 1 A	
Calculation unit		_
Analogue value recording	12 bit A/D converter	

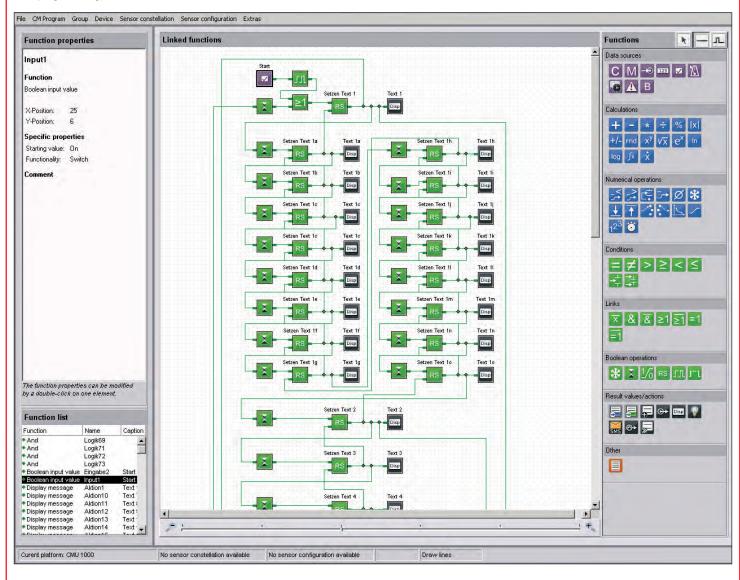
Note: 1) SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC which can provide a variety of different measured values.

Interfaces		
Keypad	4 arrow keys (up, down, right, left)	
Reypau	OK key	
	• ESC key	
Display	Two-line LCD display	
(with LED backlight)	(2 x 16 characters)	
(With LEB basinging)	Additional display of status	
	information via 3 different-coloured	
	LEDs possible	
USB mass storage device 2)	USB 1.1 / USB 2.0 full speed	
202 mass storage as not	interface for connection of a mass	
	storage device (memory stick)	
	• Female connection type "A".	
Ethernet, supported protocols	RJ 45 8/8 Ethernet interface	
	HTTP Server	
	TCP/IP	
Serial Interface 0 (UART 0)	 Implementing an RS 232 or an HSI 	
	master interface	
	 Change-over user-programmable 	
	 Connection via plug-in terminals 	
	 No handshake lines 	
HSI Master	Cascading the CMU	
USB device	USB 1.1 / USB 2.0 full speed	
	interface for connecting a PC/laptop	
	for configuration of the CMU	
	Female connection type "B".	
Cycle time		
Determined independantly at pro-		
Current cycle time can be display		
Operating and environmental of		
Operating temperature	-20 +70 °C	
Storage temperature	-30 +80 °C	
Relative humidity	0 70 %,	
	non-condensing	
Dimensions and weight		
Dimensions	approx. 212 x 106 x 36 mm	
Weight	approx. 600 g	
Technical standards		
EMC	EN 61000-6-1 / 2 / 3 / 4	
Safety	EN 61010	
Protection class	IP 40	
Note.: 2) Recorded data from the	CMU can be transferred to a memory	

Note.: ²⁾ Recorded data from the CMU can be transferred to a memory stick via this interface. The USB host supports exclusively mass storage devices.

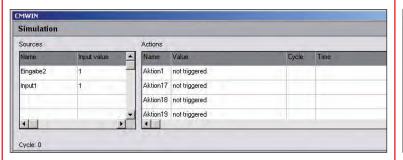
CM Editor:

The CM Editor is part of the HYDAC PC software CMWIN, Version 03 or higher, and provides a wide variety of tools and functions for designing, integrating and testing the application program. An application program consists of many individual functions which can be linked together. During subsequent operation, this user program is processed as for a PLC, cyclically. The program is created according to the IEC 61131 (the standard for PLC programming).



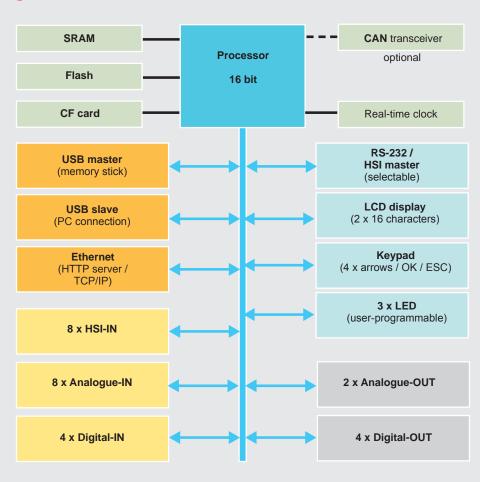


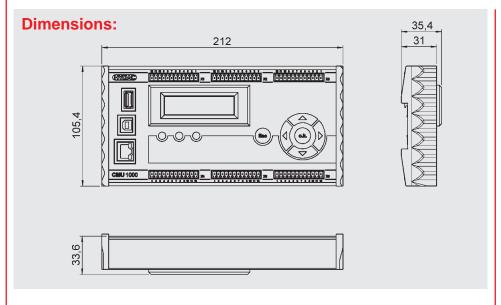




CM Program - Pr	ogramm CMU 1000-4Eng
-m.r.regium -r.r	ogramm omo roco r_rm
Eingabe2	Boolean input value(;1;"Start 2";
Input1	Boolean input value(;1;"Start";0;
Intervall1	Time sensor(1)
Pulse generation1	Pulse generation(Input1)
Flankenerkennunn?	Pulse generation/Fingahe?)

Block circuit diagram:





Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

Model code:

Modification number 000 = standard

CMU 1000 - 000 - X

User interface and documentation D = German

Е = English

F = French

Accessories:

Appropriate accessories, such as sensor lines for the electrical connection, can be found in the Accessories brochure.

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YDAC INTERNATIONAL



Condition Monitoring Interface Module CSI-B-2

RS 232 RS 485

Description:

The Condition Monitoring Interface Module CSI-B-2 is an additional segment of the HYDAC condition monitoring concept which connects the sensor level with the interpretation level.

It is a universally utilisable electronic device for the conversion of the HSI signal from HYDAC SMART sensors into a standardised PC signal.

Using the HYDAC "CMWIN" PC software, it is therefore possible to read the data and measured values of the connected SMART sensor directly.

It remains possible to read out the longterm memory and to make settings and parameterisations on the connected sensor (the setting opportunities are sensordependent).

The HSI signal can be converted into an RS 232 or an RS 485 signal. The CSI-B-2 can be connected to any PC via the RS 232 interface, and possibly an additional standard RS 232-USB adapter 1).

The RS 485 interface and appropriate additional coupling modules can also be used to connect to higher-level control and/or bus systems.

Technical data:

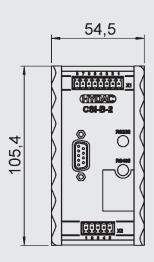
Innut data		
Input data	111/04000 111 6	
HSI interface	HYDAC Sensor Interface for digital connection of SMART sensors 2)	
	- male connector X2	
Output data	maio delinidate / /L	
Signal output	Switchable:	
oignar output	RS 485 half duplex or RS 232	
	- male connector X1 (RS 485)	
	- SUB-D 9 pole socket (RS 232)	
Environmental conditions		
Operating temperature range	-25 +85 °C	
Storage temperature range	-30 +85 °C	
Relative humidity	0 70 %, non-condensing	
(€ mark	EN 61000-6-1 / 2 / 3 / 4	
Protection class acc. to DIN EN 60529	IP 40	
Other data		
Supply voltage of the module	18 35 V DC (male X1)	
Current consumption (module + sensor)	30 mA 300 mA max.	
,	(depending on the supply voltage and the senso	
	connected)	
Sensor supply $15 \text{ V DC} \pm 5 \% / 300 \text{ mA max}.$		
	at 23 °C (male X2)	
Electrical connection		
Cross section of connection	Max. 1.5 mm ²	
X1: module supply + RS 232 / RS 485	Plug-in terminal block, 8 pole RM 3.5	
X2: sensor supply + HSI	Plug-in terminal block, 5 pole RM 3.5	
SUB-D: RS 232	O made an about with a second on a second	
Selection of conversion mode	Selection of HSI - RS 232 or HSI - RS 485	
	via jumper (bridge):	
	X1.3 - X1.4 open: HSI - RS 232 X1.3 - X1.4 closed: HSI - RS 485	
Indication of active conversion mode	Green LED: HSI - RS 232	
indication of active conversion mode	Yellow LED: HSI - RS 232 Yellow LED: HSI - RS 485	
Dimensions and weight	TOHOW LLD. HOT - NO 400	
Housing	Approx. 55 x 106 x 34 mm	
	Housing to be mounted on rails (35 mm) acc. to	
	DIN EN 60715 TH 35 (formerly DIN EN 50022)	
Weight	~ 140 g	

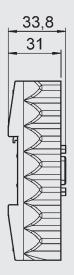
Reverse polarity protection of the supply voltage, overvoltage, override and short circuit Note: protection are provided.

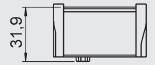
¹⁾ RS 232/USB adapter is not supplied with the device.

SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC which can provide a variety of different measured variables.

Dimensions:







Terminal assignment:

Terminal strip -X1

Pin	Signal
1	RS 485 (-)
2	RS 485 (+)
3 4	3 – 4 open: HSI to RS 232 3 – 4 closed: HSI to RS 485
5	RxD RS 232 (connected to Pin 3 SUB-D 9 pole)
6	TxD RS 232 (connected to Pin 2 SUB-D 9 pole)
7	0 V (connected to Pin 5 SUB-D 9 pole)
8	+U _B (18 35 V DC) module supply

Terminal block -X2

TOTTIMIAI BIOOK AL		
Pin	Signal	
1	+U _B (15 V DC) sensor supply	
2	0 V	
3	HSI signal	
4	0 V	
5	0 V	

Model code:

CSI - B - 2 - 000

Modification number

000 = standard

Accessories:

Appropriate accessories, such as sensor lines for the electrical connection, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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e-mail: electronic@hydac.com Internet: www.hydac.com

EN 18.321.3/02.18

DAC INTERNATIONAL



AquaSensor AS 1000

Saturation level

Temperature

Description:

The AquaSensor AS 1000 is the culmination of continued development of the successful AS 2000 series for online detection of water in oils, in particular as an OEM sensor for fluid conditioning monitoring. It measures the degree of saturation and the temperature of

In the analogue output version, the AS 1000 transmits the values for the saturation level and the temperature as a 4 .. 20 mA signal.

In the version with two switching outputs, the AS 1000 can be configured by the user via the HYDAC service units HMG 3010 and HMG 4000, the Condition Monitoring Unit CMU 1000 and the interface module CSI-B-2. The following parameters can be adjusted:

- Saturation level / temperature
- Switch points
- Switching mode of switching outputs
- Switching direction
- Switching delay times

The AS 1000 therefore enables hydraulic and lubrication oils to be monitored accurately, continuously and online. As water problems are detected early on, malfunctions and unnecessary downtime can be reliably avoided

analogue output

2 switching outputs or

Technical data:

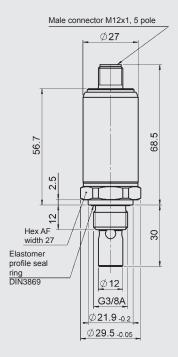
Input data		
Saturation level	0 100 %	
Temperature	-25 100 °C	
Operating pressure	-0.5 50 bar	
Pressure resistance	≤ 630 bar	
Mechanical connection	G3/8 A DIN 3852	
Tightening torque, recommended	25 Nm	
Parts in contact with fluid	Mechanical connection: stainless steel / vacuum-metallised ceramic Seal: FKM or EPDM	
Output data		
Pin 2: Saturation level		
Output signal	4 20 mA (corresponds to 0 100 %) R_{Lmax} = (U _B - 10 V) / 20 mA [kW] or switching output (configurable)	
Calibration accuracy	≤ ± 2 % FS max.	
Accuracy in media measurements	≤ ± 3 % FS typ.	
Pressure dependence	± 0.025 % FS / bar	
Pin 4: Temperature		
Output signal	4 20 mA (corresponds to -25 +100 °C) R _{Lmax} = (U _B - 10 V) / 20 mA [kW] or switching output (configurable)	
Accuracy	≤ ± 2 % FS max.	
Pin 5:	HSI (HYDAC Sensor Interface) Automatic sensor recognition	
Switching outputs		
Туре	PNP transistor outputs (configurable as N/O or N/C)	
Switching current	maximum 1 A per switching output	
Environmental conditions		
Compensated temperature range	0 +90 °C	
Operating temperature range 1)	-40 +100 °C / -25 +100 °C	
Storage temperature range	-40 +100 °C	
Fluid temperature range 1)	-40 +125 °C / -25 +125 °C	
Viscosity range		
	1 5000 cSt	
Flow velocity	1 5000 cSt < 5 m/s	
	1 5000 cSt	
Flow velocity	1 5000 cSt < 5 m/s Mineral oil based fluids, synthetic and natural	
Flow velocity Fluid compatibility 2)	1 5000 cSt < 5 m/s Mineral oil based fluids, synthetic and natural esters	
Flow velocity Fluid compatibility ²) C € mark	1 5000 cSt < 5 m/s Mineral oil based fluids, synthetic and natural esters EN 61000-6-1 / 2 / 3 / 4	
Flow velocity Fluid compatibility ²) C € mark Protection class acc. to DIN EN 60529 ³) Other data Supply voltage	1 5000 cSt < 5 m/s Mineral oil based fluids, synthetic and natural esters EN 61000-6-1 / 2 / 3 / 4 IP 67 12 32 V DC	
Flow velocity Fluid compatibility ²) C € mark Protection class acc. to DIN EN 60529 ³) Other data Supply voltage Residual ripple of supply voltage	1 5000 cSt < 5 m/s Mineral oil based fluids, synthetic and natural esters EN 61000-6-1 / 2 / 3 / 4 IP 67	
Flow velocity Fluid compatibility ²⁾ (€ mark Protection class acc. to DIN EN 60529 ³⁾ Other data Supply voltage Residual ripple of supply voltage Current consumption	1 5000 cSt < 5 m/s Mineral oil based fluids, synthetic and natural esters EN 61000-6-1 / 2 / 3 / 4 IP 67 12 32 V DC	
Flow velocity Fluid compatibility ²⁾ (€ mark Protection class acc. to DIN EN 60529 ³⁾ Other data Supply voltage Residual ripple of supply voltage	1 5000 cSt < 5 m/s Mineral oil based fluids, synthetic and natural esters EN 61000-6-1 / 2 / 3 / 4 IP 67 12 32 V DC ≤ 5 % ≤ 30 mA without outputs ~ 145 g	

Note: reverse polarity protection, short circuit protection provided.

FS (Full Scale) = relative to complete measuring range

- 1) -25 °C with FKM seal, -40 °C on request
- 2) Special fluids on request
- 2) With mounted mating connector in corresponding protection class

Dimensions:



Model code:

Fluid 1)



Mechanical connection

= G3/8 A DIN 3852

Electrical connection

= male M12x1, 5 pole

(mating connector not supplied)

= operating fluid mineral oil-based

= operating fluid phosphate ester-based

Output signal

- = output 1 pin 2 saturation level (4 .. 20 mA) output 2 pin 4 temperature (4 .. 20 mA)
- = 2 switching outputs

Modification number

000 = standard

Note:

1) Special fluids on request

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical

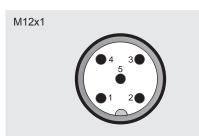
Subject to technical modifications.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01

Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com

Pin connections:



Pin	AS 1X08-C	AS 1X08-2	
1	+U _B	+U _B	
2	Saturation level 4 20 mA	SP2	
3	0 V	0 V	
4	Temperature 4 20 mA	SP1	
5	HSI*	HSI*	

* HSI = HYDAC Sensor Interface (HYDAC's own communication interface)

Display, read-out and configuration options:

HDA 5500-1-1-xC-000

Digital Display Unit with 2 programmable switching outputs, specifically designed for use with the AS 1000

HDA 5500-1-1-AC-000 Order no.: 908869 HDA 5500-1-1-DC-000 Order no.: 908870

HMG 510

Portable 2-channel measuring instrument, specially designed for use with HSI and SMART sensors

Order no.: 909889

HMG 3010 and HMG 4000

Portable data recorders with fully graphicscapable colour display for displaying, recording and processing measured values as well as for configuring of HSI and SMART sensors

CMU 1000

Electronic evaluation unit for online monitoring of measured value as well as for the configuration of HSI and SMART sensors Order no. 920718

CSI-B-2

Interface module, enables configuration of HSI and SMART sensors using HYDAC PC software **CMWIN**

Order no. 920134

Information on other read-out options can be found on our website at www.hydac.com or please contact your HYDAC representative.

department.

DAC INTERNATIONAL



Description:

The AquaSensor AS 3000 with an integrated digital display is based on the proven AS 1000 series for the online detection of water in oils, particularly as a sensor for Condition Monitoring.

The device has 2 switching outputs and one switchable analogue output signal (4 .. 20 mA or 0 .. 10 V).

The AS 3000 detects the water saturation level and temperature of the fluid and transmits the values in the form of an analogue or switching signal. The display shows the actual measured values. All settings available on the AS 3000 are combined in two easy-to-navigate menus. The following parameters can be adjusted:

- Saturation level / temperature
- Switch points
- Switching mode of switching outputs
- Switching direction
- Switching delay times

The AS 3000 therefore enables hydraulic and lubrication oils to be monitored accurately, continuously and online. As water problems are detected early on, malfunctions and unnecessary downtime can be reliably avoided.

AquaSensor AS 3000

Saturation level **Temperature** With display

2 switching outputs Analogue output

Technical data:

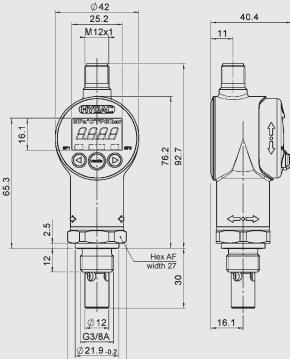
Input data		
Saturation level	0 100 %	
Temperature	ature -25 100 °C	
Operating pressure	-0.5 50 bar	
Pressure resistance	≤ 630 bar	
Mechanical connection	G3/8 A DIN 3852	
Tightening torque, recommended	25 Nm	
Parts in contact with fluid	Mechanical connection: stainless steel / vacuum- metallised ceramic Seal: FKM or EPDM	
Output data		
Calibration accuracy	≤ ± 2 % FS max.	
Accuracy in media measurements	≤ ± 3 % FS typ.	
Pressure dependence	± 0.2 % FS / bar	
Analogue output		
Signal Selectable: 4 20 mA load resist. max. 500 Ω 0 10 V load resist. min. 1 k Ω corresponds to measuring range selecte		
Switching outputs		
Туре	PNP transistor outputs (programmable as N/O or N/C)	
Assignment	Selectable: Saturation level or temperature	
Switching current	max. 1.2 A per switching output	
Switching cycles	> 100 million	
Environmental conditions		
Compensated temperature range	0 +80 °C	
Operating temperature range	-25 +80 °C	
Storage temperature range	-40 +80 °C	
Fluid temperature range 1)	-40 +100 °C / -25 +100 °C	
Viscosity range	1 5000 cSt	
Flow velocity	< 5 m/s	
Fluid compatibility ²⁾	Mineral oil based fluids, synthetic and natural esters	
(€ mark	EN 61000-6-1 / 2 / 3 / 4	
Protection class acc. to DIN EN 60529 3)	IP 67	
Other data		
Supply voltage	18 35 V DC	
Residual ripple of supply voltage	≤ 5 %	
Current consumption	≤ 50 mA without outputs	
Weight	~ 125 g	
N. () () () () () () () ()		

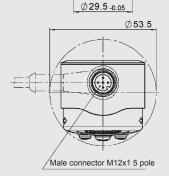
Note: reverse polarity protection, short circuit protection provided. **FS** (Full Scale) = relative to complete measuring range

- 1) -25 °C with FKM seal, -40 °C on request
- 2) Special fluids on request
- 3) With mounted mating connector in corresponding protection class

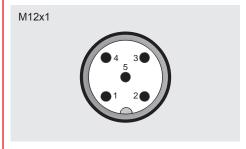
EN 18.605.1/02.18

Dimensions:





Pin connections:



Pin	AS 3X08-5	
1	+U _B	
2	Analogue	
3	0 V	
4	SP1	
5	SP2	

Model code:

AS $3 \times 0 = -5 - 000$ = operating fluid mineral oil-based = operating fluid phosphate ester-based Mechanical connection = G3/8 A DIN 3852 0 **Electrical connection** = male M12x1, 5 pole (mating connector not supplied)

Output signal = 2 switching outputs and 1 analogue output

Modification number 000 = standard

Note:

1) Special fluids on request

Accessories:

Appropriate accessories, such as mating connectors and mechanical adapters, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Internet: www.hydac.com



EN 18.602.2/02.18

YDAC INTERNATIONAL



Contamination Switch EY-1356

Description:

The contamination switch series EY-1356 works as a warning element in hydraulic systems and gearboxes and has been developed by HYDAC ELECTRONIC to meet the special requirements of our customers.

The sensor detects and attracts metallic ferromagnetic particles in oil or in other hydraulic fluids. The accumulation of particles leads to a change of the ohmic resistance which has an effect on the switching signal. The contamination sensor thus provides an early warning of possible wear. Substantial damage on bearings and gear wheels, for instance, can therefore be avoided.

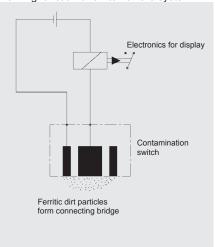
The sensor is available with different mechanical and electrical connections and can be integrated into almost any application.

Special features:

- Simple structure
- Robust construction
- Standard connection types

Functional principle / diagram:

The permanent magnet solenoid at the measuring surface of the contamination switch attracts the ferromagnetic contaminant particles from the passing oil. The increased accumulation of particles forms an electrical bridge between the permanent solenoid and the adjacent metal contact. The resulting switching signal can, for instance, activate a warning function or switch off the system.



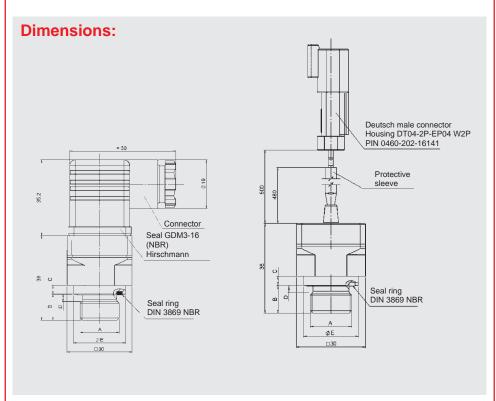
Technical data:

Maximum switching voltage	30 V DC
Maximum switching current	200 mA
Maximum oil pressure abs.	6 bar (16 bar)
Retention force of the permanent solenoid	~ 1.5 N
Ambient temperature	-25 °C to +90 °C
Protection class acc. to DIN 40050	DEUTSCH male connector DT04 2 pole IP67 Integrated connector acc. to EN175301-803/ ISO4400 IP65
Mating connector supplied	DEUTSCH male connector DT04 2 pole no Integrated connector acc. to EN175301-803/ ISO4400 yes
Max. tightening torque	M14x1.5 15 Nm M18x1.5 25 Nm M22x1.5 60 Nm M26x1.5 70 Nm M33x2 140 Nm
Installation position	We recommend an "upside-down" mounting position, i.e. connector or cable outlet pointing downwards.
The contamination switch is supplied with seal ring	I DIN 3806 NRD

The contamination switch is supplied with seal ring DIN 3896 NBR.

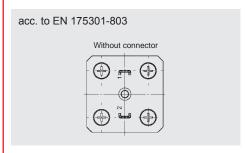
Order details:

Electrical connection	Mechanical connection	Part number
Integrated connection plug acc. to EN175301-803/ ISO4400	M14x1.5	3252533
	M18x1.5	3305023
	M22x1.5	3731848
	M26x1.5	3731849
	M33x2	3252555
Strand DEUTSCH male connector	M14x1.5	3731852
DT04 2 pole	M18x1.5	3731853
	M22x1.5	3731854
	M26x1.5	3731855
	M33x2	3731856

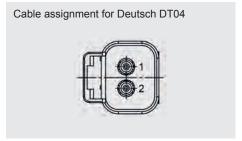


Dim.	14	18	22	26	33	
A	M14x1.5	M18x1.5	M22x1.5	M26x1.5	M33x2	Other types of
В	12	12	12	12		connection are
С	4	4	4	4	4.5	available on
D	3	3	3	3	4	request
αF	10	23.0	27	31 /	30.2	

Pin connections:

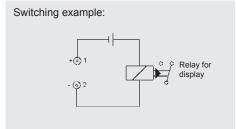


Pin		
1	+U _B	
2	-U _B	
Reverse polarity permitted		



Pin		
1	+U _B	
2	-U _B	

Reverse polarity permitted



Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH

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Internet: www.hydac.com

DAC INTERNATIONAL



Oil Condition Sensor HYDACLAB® HLB 1400

Oil condition monitoring

4 measured variables

Sequential analogue and switching output

Description:

The HYDACLAB® HLB 1400 is a multifunctional sensor for online condition monitoring of standard and biodecradable oils in stationary and mobile applications.

The user is kept informed of changes in fluid condition as they occur and can take immediate action in the case of deteriorating operating conditions.

Assertions can be made about the condition of an oil, e.g. ageing or mixing with other fluids, based upon the measured values of dielectric constant and its change, electric conductivity and its change, saturation level, and temperatur.

These measurements are available as sequential analogue signals and/or switching signals at the electrical output of the HYDACLAB® (e.g. for activating warning devices or alarms).

The measurement values can be displayed and configured on various HYDAC display and measurement devices.

Technical data:

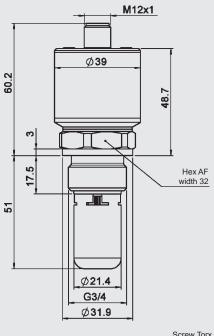
Input data

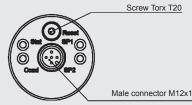
Input data	
Saturation level	0 100 % saturation
Temperature	-25 +100 °C
Dielectric constant	1 10
Change in the dielectric constant	-30 +30 %
electrical conductivity	0 100 nS/m
Change of electric conductivity	-100 200 %
Operating pressure	< 50 bar
Pressure resistance	< 600 bar
Flow velocity	< 5 m/s
Parts in contact with fluid	Stainless steel / ceramic with vacuum-metallised seal Glass with thin-film metallic coating / FKM
Output variable saturation level	
Output signal (0 100 %)	4 20 mA / 0 10 V
Calibration accuracy	≤ ± 2 % FS max.
Accuracy ¹⁾	≤ ± 3 % FS typ. 1)
Output variable temperature	
Output signal (-25 +100 °C)	4 20 mA / 0 10 V
Accuracy	≤ ± 3 % FS max.
Output variable dielectric constant	
Output signal (1 10)	4 20 mA / 0 10 V
Accuracy	≤ ± 5 % FS max.
Output variable change of dielectric constant	
Output signal (± 30 % of IV)	12 mA ± 8 mA / 5 ± 5 V
Accuracy	See below ²⁾
Output variable electric conductivity	(not for Mod 001)
Output signal (0 100 nS/m)	4 20 mA / 0 10 V
Accuracy	≤ ± 5 % FS max.
Output variable change of electric conductivity	(not for Mod 001)
Output signal (-100 200 %)	12 mA ± 8 mA / 5 ± 5 V
Accuracy	See below ²⁾
Switching output (default settings)	·
Switching output (default settings) Signal 1 (N/C)	PNP switching output 0.5 A max., switching level ≥ U _B - 4 V
	PNP switching output 0.5 A max., switching level ≥ U _B - 4 V ≥ 85 %
Signal 1 (N/C)	
Signal 1 (N/C) Default alert SP1 relative humidity	≥ 85 %
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity	≥ 85 % ≥ 80 °C
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001)
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range Storage temperature	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range Storage temperature	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range Storage temperature Fluid compatibility	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range Storage temperature Fluid compatibility (€ mark	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1/2/3/4
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range Storage temperature Fluid compatibility C mark Viscosity range	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine 10 g / sine
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range Storage temperature Fluid compatibility (mark Viscosity range Shock resistance acc. to DIN EN 60068-2-6	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range Storage temperature Fluid compatibility C mark Viscosity range Shock resistance acc. to DIN EN 60068-2-27 Vibration resistance acc. to DIN EN 60068-2-6 at 5 2000 Hz	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine 10 g / sine
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 relative notation in dielectric constant Default alert SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range Storage temperature Fluid compatibility C mark Viscosity range Shock resistance acc. to DIN EN 60068-2-27 Vibration resistance acc. to DIN EN 60068-2-6 at 5 2000 Hz Protection class acc. to DIN EN 60529 3)	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine 10 g / sine
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 relative nostant Default alert level SP1 relative nostant Default alert SP1 relative nostant Environmental conditions Nominal temperature range Storage temperature Fluid compatibility C mark Viscosity range Shock resistance acc. to DIN EN 60068-2-27 Vibration resistance acc. to DIN EN 60068-2-6 at 5 2000 Hz Protection class acc. to DIN EN 60529 3) Other data	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine 10 g / sine IP 67
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range Storage temperature Fluid compatibility C € mark Viscosity range Shock resistance acc. to DIN EN 60068-2-27 Vibration resistance acc. to DIN EN 60068-2-6 at 5 2000 Hz Protection class acc. to DIN EN 60529 ③ Other data Supply voltage U _B	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine 10 g / sine IP 67 10 36 V DC
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 relative humidity Default alert level SP1 relative humidity Default alert level SP1 relative humidity Default alert SP1 relative humidity Environmental conditions Nominal temperature range Storage temperature Fluid compatibility (mark Viscosity range Shock resistance acc. to DIN EN 60068-2-27 Vibration resistance acc. to DIN EN 60068-2-6 at 5 2000 Hz Protection class acc. to DIN EN 60529 3) Other data Supply voltage Us Residual ripple of supply voltage	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine 10 g / sine IP 67 10 36 V DC ≤ 5 %
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 relative humidity Default alert level SP1 relative humidity Default alert level SP1 relative humidity Default alert SP1 relative humidity Environmental conditions Nominal temperature range Storage temperature Fluid compatibility C	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine 10 g / sine IP 67 10 36 V DC ≤ 5 % max. 100 mA
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range Storage temperature Fluid compatibility (mark Viscosity range Shock resistance acc. to DIN EN 60068-2-27 Vibration resistance acc. to DIN EN 60068-2-6 at 5 2000 Hz Protection class acc. to DIN EN 60529 3) Other data Supply voltage Us Residual ripple of supply voltage Current consumption without outputs Mechanical connection Tightening torque, recommended	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine 10 g / sine IP 67 10 36 V DC ≤ 5 % max. 100 mA G % A ISO 1179-2 30 Nm
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 rel. change in dielectric constant Default alert SP1 rel. change in conductivity Environmental conditions Nominal temperature range Storage temperature Fluid compatibility C mark Viscosity range Shock resistance acc. to DIN EN 60068-2-27 Vibration resistance acc. to DIN EN 60068-2-6 at 5 2000 Hz Protection class acc. to DIN EN 60529 3) Other data Supply voltage U _B Residual ripple of supply voltage Current consumption without outputs Mechanical connection	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine 10 g / sine IP 67 10 36 V DC ≤ 5 % max. 100 mA G ¾ A ISO 1179-2
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 relative notations in dielectric constant Default alert SP1 relative constant Default alert SP1 relative notations Default alert SP1 relative notations Nominal temperature range Storage temperature range Storage temperature Fluid compatibility C mark Viscosity range Shock resistance acc. to DIN EN 60068-2-27 Vibration resistance acc. to DIN EN 60068-2-6 at 5 2000 Hz Protection class acc. to DIN EN 60529 3) Other data Supply voltage Us Residual ripple of supply voltage Current consumption without outputs Mechanical connection Tightening torque, recommended Electrical connection	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine 10 g / sine IP 67 10 36 V DC ≤ 5 % max. 100 mA G % A ISO 1179-2 30 Nm M12x1, 5 pole / 8 pole
Signal 1 (N/C) Default alert SP1 relative humidity Default alert level SP1 temperature Default alert level SP1 relative notations in dielectric constant Default alert SP1 relative notations Default alert SP1 relative notations Default alert SP1 relative notations Nominal temperature range Storage temperature range Storage temperature Fluid compatibility (mark Viscosity range Shock resistance acc. to DIN EN 60068-2-27 Vibration resistance acc. to DIN EN 60068-2-6 at 5 2000 Hz Protection class acc. to DIN EN 60529 3) Other data Supply voltage UB Residual ripple of supply voltage Current consumption without outputs Mechanical connection Tightening torque, recommended Electrical connection Housing	≥ 85 % ≥ 80 °C ± 15 % ± 15 % (not for Mod 001) +20 +80 °C -30 +90 °C Suited for hydraulic and lubrication oils EN 61000-6-1 / 2 / 3 / 4 1 5000 cSt 50 g / 11 ms / half sine 10 g / sine IP 67 10 36 V DC ≤ 5 % max. 100 mA G ¾ A ISO 1179-2 30 Nm M12x1, 5 pole / 8 pole Stainless steel ~ 215 g

- The max. accuracy achievable when measuring relative humidity is heavily dependent on the type of fluid or fluid additive. More precise information on this is available on request.
 The accuracies when measuring the change of dielectric constant and the electric conductivity depend on the application, the oil type and the auto-calibration of the sensor. Detailed information available on request.
 With mounted mating connector in corresponding protection class

EN 18.371.1.0/02.18

Dimensions:





Model code:

HLB 1 <u>4 J X - XXXXX - 000</u>

Measured variables

- = 4 measured variables:
 - saturation (rel. humidity)
 - temperature
 - electric conductivity (not for Mod 001)
 - dielectric constant (DC)

Mechanical connection

= G 3/4 A ISO 1179-2

Electrical connection

= male M12x1, 5 pole (mating connector not supplied)

= male M12x1, 8 pole (mating connector not supplied)

Signal technology

5 pole:

1C000 = 1 switching output / analogue output

00S12 = RS 485

CANopen (only available on request)

IO-Link (only available on request)

1CS12 = switching output / analogue output / RS 485

Modification number

000 = standard

001 = modification; replaces HLB 1308

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Pin connections:

M12x1, 5 pole



+U _Β RS485B
DC10ED
K3403D
GND
RS485A
HSI





Pin	1CS12
1	+U _B
2	SP1/AA1
3	GND
4	PE
5	HSI
6	RS 485A
7	RS 485B
8	SP2/AA2

= HYDAC Sensor Interface (HYDAC's own communication interface)

SP = Switch point

= Analogue output (sequence)

Display and read-out options:

HMG 510

Portable 2-channel measuring instrument, specially designed for use with HSI and SMART sensors.

Order no.: 909889

HMG 2500 / HMG 3010 / HMG 4000

Portable data recorders with fully graphicscapable colour display for displaying, recording and processing measured values as well as for configuring of HSI and SMART sensors.

CMU 1000

Electronic evaluation unit for online monitoring of measured values as well as for configuration of HSI and SMART sensors.

Order no.: 920718

CSI-R-2

Interface module, enables configuration of HSI and SMART sensors using HYDAC PC software CMWIN.

Order no.: 920134

Note:

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For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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MEASURING INSTRUMENTS AND DISPLAY UNITS [12]	
DISPLAY UNITS	Page
HDA 5500	451
MEASURING INSTRUMENTS (PORTABLE DATA RECORDERS)	
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HMG 510	455
HMG 2500	457
HMG 4000	461

DAC INTERNATIONAL



Digital Display Unit HDA 5500

Description:

The digital display units in the HDA 5500 series are microprocessor-controlled display and monitoring units designed for control panel installation. Different versions are available with a maximum of three analogue inputs, an analogue output (adjustable 4 .. 20 mA or 0 .. 10 V) and up to four relay

The analogue input signals are displayed according to the settings selected by the user. Each of the relay output can be assigned to one of the inputs or to the difference between input 1 and 2. A Pt100 temperature probe can be connected directly. In addition, an optional frequency measurement is possible, e.g. by using the HDS 1000 (HYDAC rpm probe) for the measurement of the rpm speed of rotary components.

Depending on the model, it is also possible to connect SMART sensors (Condition Monitoring sensors). SMART sensors are a generation of sensors from HYDAC which can provide a variety of different measured variables.

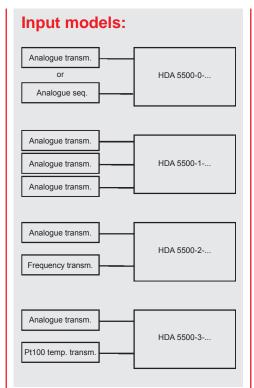
Special features:

- Digital display of analogue signals
- Clear 4-digit, 7-segment LED display
- Up to 3 analogue inputs (4 .. 20 mA, 0 .. 10 V or 0 .. 5 V)
- Accuracy ≤ ± 0.5 %
- Differential measurement possible
- Analogue output (4 .. 20 mA or 0 .. 10 V)
- Up to 4 relay switching outputs
- Supply voltage 12 .. 32 V DC or 85 .. 265 V AC 50 / 60 Hz
- Optionally with Pt100 sensor input or frequency input

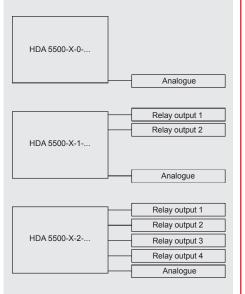
Technical data:

Display range	
Display	4-digit 7-segment LED display field, red,
	height of digits 14.2 mm
	3 LEDs for active sensor, 4 LEDs for active switching output
Display range	-999 9999 (user-adjustable)
Display units with backlight	bar, kg/cm², MPa, psi, °C, °F, mA, V, Hz, kN, m,
	mm, inch, I, I/min, gal, gal/min, rpm, %, t
Input data	
Analogue signal input(s)	
Measuring range(s)	Selectable: 4 20 mA, 0 10 V, 0 5 V or
(up to 3 analogue inputs)	4 20 mA sequential (Modification 006)
Accuracy	≤ ± 0.5 % at 25 °C
Pt100 input	05 +400 °C
Measuring range	-25 +100 °C
Accuracy	≤ ± 0.5 % at 25 °C
Frequency/counter input	0 061/-101/13 241/- 1101
Signal threshold	0 0.6 V = LOW, 3 24 V = HIGH 15 Hz to 4 kHz
Frequency range	13 HZ (0 4 KHZ
Output data Analogue output, permitted load resistance	4 20 mA load resist. ≤ 400 Ω or
Analogue output, permitted load resistance	010 V load resist. $\geq 2 k\Omega$
Accuracy	≤ ± 0.5 % at 25 °C
Rise time	70 ms
Switching outputs	
Туре	2 or 4 relays each with separate common supply
Switching voltage	0.1 250 V AC, 12 32 V DC
Switching current	10 mA 2 A
Switching capacity	500 VA, 64 W
Life expectancy of switch contacts	≥ 20 million at minimum load
	≥ 400,000 at maximum load (typical)
Reaction time	Approx. 20 ms
Catting range of quitab points	(with switching delay = 0 ms)
Setting range of the switching hystoroges	1.5 100 % of the pre-set display range
Setting range of the switching hystereses (switch-back points)	0.5 99 % of the pre-set display range
Environmental conditions	
Nominal temperature range	0 +50 °C
Operating temperature range	0 +50 °C
Storage temperature range	-40 +80 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Other data	
Housing	Control panel housing 96 x 48 x 109 mm;
-	control panel cut-out 92 (+0.8) x 45 (+0.6) mm;
	front panel thickness 1.25 15 mm;
Supply voltage	maximum installation depth 121 mm 12 32 V DC or 85 265 V AC 50 / 60 Hz
Supply voltage	,
Power consumption	15 VA at 85 230 V AC – fuse protection 1 AT
Supply for measurement transmitters Posidual ripple of supply voltage	12 V DC ± 1 %; max. 20 mA / analogue input ≤ 5 %
Residual ripple of supply voltage	
Weight	approx. 320 g
note. Reverse polarity protection of the supply	/ voltage, overvoltage, override and short circuit

protection are provided.



Output models:



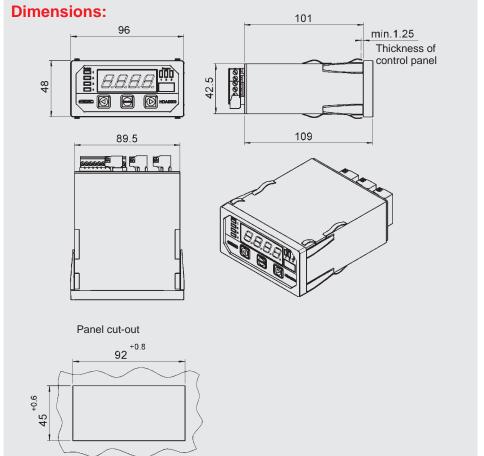
Connection terminals:

Supply voltage: Plug-in terminal block 2 pole, RM 5.08 (cross section max. 2.5 mm²)

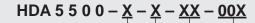
Inputs/outputs:

Plug-in terminal block 11 pole, RM 3.5 (cross section max. 1.5 mm²)

Relay switching outputs: Plug-in terminal block 5 pole, RM 5.08 (cross section max. 2.5 mm²)







<u>Inputs</u>

- = one analogue input
- = three analogue inputs
- = one analogue input + frequency 2 input/counter function 3
 - = one analogue + Pt100 input

Outputs

- = 1 analogue output
 - = 1 analogue output + 2 relay switching outputs
- = 1 analogue output + 4 relay switching outputs

Supply voltage

AC = 85 .. 265 V AC DC = 12 .. 32 V DC

Modification

000 = standard

006 = version with sequential analogue output for HLB 1400 and CS 1000 (only with input model "0" and output model "2")

Note:

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Subject to technical modifications.

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YDAC INTERNATIONAL

Portable Measuring Instrument HMG 500

Two-line LCD display Two sensors can be connected Automatic sensor recognition

Description:

The HMG 500 is a portable measuring instrument for simple measurement tasks in fluid technology such as hydraulics, pneumatics, lubrication, process, refrigeration and air conditioning.

Up to two sensors with $\mathbf{H}\mathsf{YDAC}$ Sensor Interface (HSI), for example for measuring pressure, temperature or flow rate, can be connected (exception: SMART sensors). The HMG 500 automatically recognises these sensors and takes all of the necessary basic settings from each sensor. The measurement values and the corresponding physical unit are displayed on an easy-to-read LCD display.

In addition, the HMG 500 offers a multitude of additional advantages, e.g. in comparison with pressure measurements on machines and plants using mechanical pressure gauges. The user profits from a technology-related high level of measuring accuracy and dynamics. The HMG 500 determines the measured values with a very high sampling rate and can therefore, for example, monitor and display pressure peaks in the maximum value memory or rapid pressure discharge in the minimum value memory. Furthermore, differential measurements can be carried out with using two sensors of a similar type, for example, to evaluate pressure drops or temperature

To further extend the application range, the HMG 500 has a function for setting mechanical pressure and temperature switches precisely and reliably.

Compact, simple and versatile - the HMG 500 is an invaluable tool for all those involved in maintenance, commissioning and service.



Special features:

- Hand-held 2-channel portable measuring instrument
- Simple and user-friendly key operation
- Large LCD display including battery status
- 2 sensor inputs, automatic sensor recognition

EN 18.063.3/02.18

Technical data:

Management Insured	O and all and a famous
Measurement inputs	2 analogue inputs for HYDAC measurement transmitters with HSI interface – except for SMART sensors ²⁾
Accuracy ¹⁾	≤ ± 0.1 % FS max.
Functions	 Automatic recognition of measuring range and unit of measurement Taring of the measuring channels Display of the current measured value Min/max value display Reset of min/max values Measured values differentiel channel A-B Unit display, selectable Setting device for mechanical pressure and temperature switches
Display	4-digit 7-segment LCD display with battery status indication; 2 measured values incl. unit displayed simultaneously
Measurement unit (dependent on connected sensors)	Selectable: Pressure: bar, psi, MPa Temperature: °C, K, °F Flow rate: I/min, gallon/min (1 US gallon = 3.7853 I)
Sampling rate	0.1 ms
Resolution	12 bit
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Safety	EN 61010
Protection class	IP 54
Supply voltage	9 V battery, operating life: approx. 10 h (with 2 sensors) Power supply unit 230 V AC (available as accessory)
Environmental conditions	Operating temperature: +5 +60 °C Storage temperature: -40 +70 °C Rel. humidity: 0 70 %
Weight	410 g
NI-4 1) FO (Fill O1-)	

Note: 1) **FS** (Full **S**cale) = relative to complete measuring range 2' SMART sensors (Condition Monitoring Sensors) are a generation of sensors from HYDAC which can provide a variety of different measured variables.

Dimensions: 102

Ordering Details:

HMG 500 - 000 Scope of delivery

- HMG 500
- Operating manual D/E/F
- 9 V battery

HMG 500-Set 01 Scope of delivery

- HMG 500
- Operating manual D/E/F
- 9 V battery
- HDA 4748-H-0600-000
- ZBE 30-02, sensor cable M12x1, 2 m
- Connection adapter G1/4 female to Minimess 16X2
- Case for HMG 500 / 510

HMG 500-Set 02 Scope of delivery

- Operating manual D/E/F
- 9 V battery
- 2 pcs. HDA 4748-H-0600-000
- 2 pcs. ZBE 30-02, sensor cable M12x1, 2 m
- 2 pcs. connection adapter G1/4 female to Minimess 16X2
- Case for HMG 500 / 510

Accessories:

Appropriate accessories, such as electrical and mechanical connection adapters and power supply units, can be found in the Accessories brochure.

Examples of main accessories:

Pressure transmitter

HDA 4000 with HSI interface

Pressure ranges: -1 .. 9 bar, 0 .. 16 bar, 0 .. 60 bar,

0 .. 100 bar, 0 .. 250 bar, 0 .. 400 bar, 0 .. 600 bar, 0 .. 1000 bar

Temperature transmitter

ETS 4000 with HSI interface

Measuring range: -25 .. 100 °C

Flow rate transmitter

EVS 3000 with HSI interface

Measuring ranges: 1.2 .. 20 l/min, 6 .. 60 l/min,

15 .. 300 l/min, 40 .. 600 l/min

Sensor simulator

SSH 1000, ideal for training purposes

Electrical connection adapter

UVM 3000, for mechanical pressure and temperature switches

Hydraulic adapters

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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YDAC INTERNATIONAL

Portable Measuring Instrument HMG 510

Two-line LCD display Two sensors can be connected (incl. HYDAC SMART sensors) Automatic sensor recognition

Description:

The HMG 510 is a portable instrument for simple measurement tasks on hydraulic and pneumatic systems in mobile and industrial applications.

Thanks to its compactness and ease of handling, the HMG 510 is an ideal companion for employees in maintenance, commissioning and service.

Up to two sensors with HYDAC **S**ensor Interface (HSI) can be connected. Sensors are available to measure pressure, temperature and flow rate as well as sensors for condition monitoring (also known as SMART sensors).

Some examples of SMART sensors are the HYDACLAB® Oil Condition Sensor, the AS 1000 AquaSensor and the CS 1000 Contamination Sensor.

The HMG 510 automatically recognises these sensors and takes all of the necessary basic settings from each sensor. The measurement values and the corresponding physical unit are displayed on an easy-toread LCD display.

In addition to this, the HMG 510 enables measured values which have been saved in the SMART sensors to be uploaded to a PC. With the aid of the HYDAC PC software "CMWIN", the measured data stored in the SMART sensors can be displayed on a PC screen in the form of a graph, then analysed, edited, processed and saved. The HMG has a standard integrated USB port to enable this data transfer.

To further extend the application range, the HMG 510 has a function for setting mechanical pressure and temperature switches precisely and reliably.



Special features:

- Hand-held 2-channel portable measuring instrument
- Simple and user-friendly key operation
- Large LCD display including battery status
- 2 sensor inputs, automatic sensor recognition
- Specially designed to display measured values from Condition Monitoring sensors (SMART sensors).
- USB port

Technical data:

Measurement inputs	2 analogue inputs for HYDAC measurement transmitters with HSI interface and SMART sensors
Accuracy ¹⁾	≤ ± 0.1 % FS max.
Functions	 Automatic recognition of measuring range and unit of measurement Taring of the measuring channels Display of the current measured value Min/max value display Reset of min/max values Measured values differentiel channel A-B Unit display, selectable Setting device for mechanical pressure and temperature switches Communication bridge to a connected PC
Display	4-digit 7-segment LCD display with battery status indication; 2 measured values incl. unit displayed simultaneously
Measurement unit (dependent on connected sensors)	Selectable for: Pressure: bar, psi, MPa Temperature: °C, K, °F Flow rate: I/min, gallon/min (1 US gallon = 3.7853 I) Fixed for SMART sensors
Sampling rate	0.1 ms
Resolution	12 bit
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Safety	EN 61010
Protection class	IP 54
Supply voltage	9 V battery, operating life: approx. 10 h (with 2 sensors) ²⁾ Power supply unit 230 V AC (available as accessory)
Environmental conditions	Operating temperature: +5 +60 °C Storage temperature: -40 +70 °C Rel. humidity: 0 70 %
Weight	410 g

FS (Full Scale) = relative to complete measuring range 2) Not applicable to SMART sensors, as they require an power supply.



Ordering Details:

HMG 510 - 000 Scope of delivery

- Case for HMG 500/510
- HMG 510
- Operating manual D/E/F
- 9 V battery
- USB cable
- Y-adapter blue (for HLB 1400)
- Y-adapter yellow (for CS 1000)
- ZBE 30-02, sensor cable M12x1, 2 m
- Software CD with "CMWIN"

Accessories:

Appropriate accessories, such as electrical and mechanical connection adapters and power supply units, can be found in the Accessories brochure.

Examples of main accessories:

• Pressure transmitter

HDA 4000 with HSI interface

Pressure ranges: -1 .. 9 bar, 0 .. 16 bar, 0 .. 60 bar, 0 .. 100 bar, 0 .. 250 bar, 0 .. 400 bar, 0 .. 600 bar, 0 .. 1000 bar

• Temperature transmitter

ETS 4000 with HSI interface Measuring range: -25 .. 100 °C

Flow rate transmitter

EVS 3000 with HSI interface

Measuring ranges: 1.2 .. 20 l/min, 6 .. 60 l/min, 15 .. 300 l/min, 40 .. 600 l/min

Sensor simulator

SSH 1000, ideal for training purposes

Electrical connection adapter

UVM 3000, for mechanical pressure or temperature switches

Hydraulic adapters

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Portable Data Recorder **HMG 2500**

3.5" colour display Up to 4 sensors can be connected Automatic sensor recognition

Description:

The HMG 2500 is an impressive, top performance portable measurement and data acquisition equipement.

Automated setting procedures, a simple, self-explanatory operator guide and many comprehensive functions ensure the operator is able to carry out a wide range of measurement tasks within a very short time.

This makes the HMG 2500 an ideal companion for employees in maintenance, commissioning and service.

The device is designed primarily to record pressure, temperature and flow rate values which are the standard variables in hydraulics and pneumatics.

For this purpose, special sensors are available. The HMG 2500 recognises the measured value, measuring range and the unit of these sensors and automatically carries out the basic device settings accordingly.

In addition to this, the HMG 2500 has a digital input, e.g. for frequency or speed measurement, as well as a virtual measurement channel for the measurement of difference or performance.

Due to the wide range of functions and its simple handling, the HMG 2500 is just as appropriate for users who take measurements only occasionally as it is for professionals for whom measuring and documentation are routine.

The update capability of the HMG 2500 ensures that the user can benefit from future upgrades of the device software.



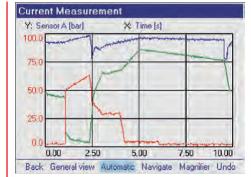
Special features:

- Simple and user-friendly operation
- Practical, robust design
- Large, full graphics colour display
- Quick and independent basic setting by use of automatic sensor recognition
- Up to 4 sensors can be connected . simultaneously
- Up to 32 measurement channels can be depicted simultaneously
- Sampling rates up to 0.1 ms
- Very large data memory for archiving measurement curves

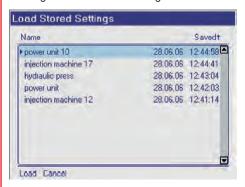
- Various measurement modes:
 - Normal measuring
 - Fast curve recording
 - Long-term measurements
- 2 independent triggers, can be linked logically
- Simple sensor connection by means of M12x1 push-pull connector
- PC connection
- USB
- RS 232
- Convenient visualisation, archiving and data processing using the HMGWIN software supplied.

Function:

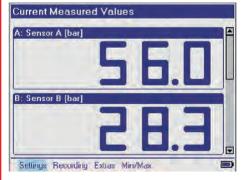
- Clear and graphical selection menus guide the operator intuitively to all the device functions available A navigation pad on the keypad ensures rapid operation.
- The HMG 2500 can record signals from up to four sensors simultaneously. For this there are 4 robust standard input sockets.
- The following sensors can be connected to 3 of these input sockets:
 - 3 analogue sensors (e.g. for pressure, temperature and flow rate) with the special digital HSI interface (HYDAC Sensor Interface); this means the basic device settings (measured variable, measuring range and unit of measurement) are undertaken automatically
 - 3 Condition Monitoring sensors 1) (SMART sensors); again, the basic device settings are carried out automatically
- Frequency measurements, counter functions or triggers for data logging can be implemented via the fourth input socket with one digital input.
- Additionally, the HMG 2500 has a virtual measuring channel. The virtual measuring channel enables a differential measurement or a performance measurement by means of the sensors connected to the measuring channels "A" and "B".
- All input channels can operate simultaneously at a sampling rate of 0.5 ms (1.0 ms for SMART sensors). For the recording of highly dynamic processes, a sampling rate of 0.1 ms can be achieved.
- The most attractive function of the HMG 2500 surely is the capability of "online" recording and graphic illustration of dynamic processes, which means as a measuring curve in real



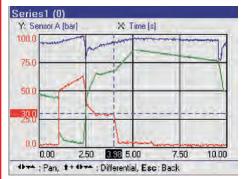
- The data memory for recording curves or logs can hold up to 500,000 measured values per recording. Over 100 of such data recordings in full length can be stored in an additional archiving memory.
- For targeted, event-driven curves or logs, the HMG 2500 has two independent triggers, which can be linked together logically.
- User-specific device settings can be stored and re-loaded at any time as required. This means that repeat measurements can be carried out on a machine again and again using the same device settings.



Measured values, curves or texts are visualised on a full graphics colour display in different selectable formats and display



 Numerous useful and easy-to-use auxiliary functions are available, e.g. zoom, ruler tool, differential value graph creation and individual scaling, which are particularly for use when analysing the recorded measurement curves.



The HMG 2500 communicates with a PC via the built-in USB interface or RS 232 interface.

1) SMART sensors (Condition Monitoring sensors) are a generation of sensors from HYDAC which can provide a variety of different measured variables.



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HMGWIN:

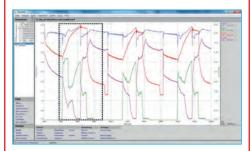
The PC software HMGWIN is also supplied with the device. This software is a convenient and simple package for analysing and archiving curves and logs which have been recorded using the HMG 2500, or for exporting the data for integration into other PC programs if required.

In addition it is possible to operate the HMG 2500 directly from the computer. Basic settings can be made, and measurements can be started online and displayed directly on the PC screen in real-time as measurement curves progress.

HMGWIN can be run on PCs with Windows Vista / XP / 2000 and Windows 7, 8.1 and 10 operating systems.

Some examples of the numerous useful additional functions:

- Transfer and archiving of measurements recorded using the HMG 2500
- Display of the measurements in graph form or as a table



Zoom function:

Using the mouse, a frame is drawn around an interesting section of a measurement curve, which is then enlarged and displayed.

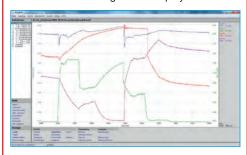
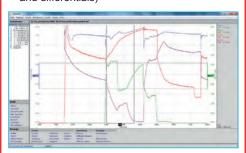
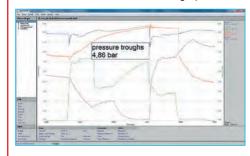


Fig.: Zoomed section of measurement curve

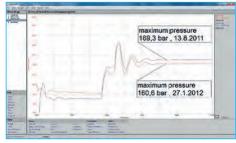
 Accurate measurement of the curves using the ruler tool (time values, amplitude values and differentials)



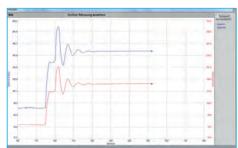
 Individual comments and measurement information can be added to the graph.



Overlay of curves, for example to document the wear of a machine (new condition/current condition)



- Using mathematical operations (calculation functions, filter functions), new curves can be added.
- Snap-shot function: Comparable to the function of a digital camera, a picture can be taken immediately of any graph and saved as a jpg file.
- A professional measurement report can be produced at the click of a mouse: HMGWIN has an automatic layout function. Starting with a table of contents, all recorded data, descriptions and graphics and/or tables are combined into a professional report and saved as a pdf file.
- Online function (HMGWIN only): Starting, recording, and online display of measurements (similar to the function of an oscilloscope)



 Change of axis assignment of the recorded measurement parameters in graph mode (e.g. to produce a p-Q graph)

Technical data:

Analogue inputs	
Input signals 3 channels M12x1 Ultra-Lock flange sockets (5 pole) channel A channel C	HYDAC HSI analogue sensors HYDAC HSI SMART sensors
Accuracy	≤ ± 0.1 % FS
Digital input	
1 channel via M12x1 Ultra-Loc flange socket (5 pole) Channel D	ckDigital status (high/low) Frequency (0.01 30,000 Hz)
Calculated channel	
Quantity	1 channel via virtual channel E
Sampling rate (dependent on number of active channels)	0.1 ms, max. 1 input channel 0.2 ms, max. 2 input channels 0.5 ms, all 3 input channels 1.0 ms, for Smart sensors
Resolution	12 bit
Memory	At least 100 measurement curves, each with 500,000 measured values
Display	3.5" colour display 7-segment display
Interfaces	1 USB, 1 serial port RS 232
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Safety	EN 61010
Protection class	IP 40
Environmental conditions	
Operating temperature	0 +50 °C
Storage temperature	-20 +60 °C
Relative humidity	0 70 %
Dimensions	approx. 244 x 173 x 58 mm (B x H x T)
Weight	approx. 1,100 g

Note: FS (Full Scale) = relative to complete measuring range

Dimensions: 0 0 173 Shown with protective cover open

Ordering details:

HMG 2500 - 000 - X

Operating manual and documentation

D = German

E = English

F = French

Scope of delivery

- HMG 2500
- Power supply unit for 90 .. 230 V AC
- Operating manual
- Data carrier with USB drivers, **HMGWIN** software
- USB connector cable

Accessories

 Additional accessories, such as electrical and mechanical connection adapters, power supply units, etc. can be found in the "Accessories Service Devices" catalogue section.

Note:

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Subject to technical modifications.

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DAC INTERNATIONAL

Portable Data Recorder **HMG 4000**

5.7" colour touchscreen Up to 38 sensors can be connected Automatic sensor recognition

Description:

The HMG 4000 is a top performance high-end portable measurement and data acquisition equipement. It was mainly developed for all measured values in relation with hydraulic systems, such as pressure, temperature, flow rate and linear position. Moreover, it provides a very high flexibility, even when it comes to evaluating other measured values. The main applications are servicing, maintenance or test rigs.

The data recorder has a very easy-tooperate user interface due to its large 5.7" touchscreen. The operator can access all of the device's functions and settings by means of clearly presented selection menus

The HMG 4000 can record the signals of up to 38 sensors at once.

For this purpose, HYDAC ELECTRONIC offer special sensors which are automatically recognised by the HMG 4000 and whose parameters such as measured values measuring ranges and measuring units can

On the one hand, there are the HYDAC **HSI** sensors (**H**YDAC **S**ensor **I**nterface) for the measurement of pressure, temperature and flow rate, for the connection of which there are 8 analogue input channels.

Furthermore, there is the option of connecting HYDAC SMART sensors to these inputs. SMART sensors can display several different measured values at a timé.

Up to 28 special HYDAC **HCSI** sensors (**H**YDAC **C**AN **S**ensor Interface) can be connected additionally via the CAN bus port, also supporting automatic sensor recognition.

The HMG 4000 can optionally be connected to an existing CAN network. This enables the recording of measured data transmitted via CAN bus (e.g. motor speed, motor pressure) in combination with the measured data from the hydraulic system.

The device also offers measurement inputs for standard sensors with current and voltage signals.

The HMG 4000 rounds off the application with two additional digital inputs (e.g. for frequency or rpm measurements).

The most impressing feature of the HMG 4000 is its ability to record the dynamic processes of a machine in the form of a measurement curve and render them as a

HYDAC software HMGWIN, which is specific to the HMG 4000, is supplied for convenient post-processing, rendering and evaluation of measurements on your computer.



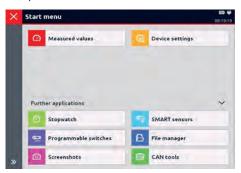
Special features:

- Large, full graphics colour display 5.7" touchscreen
- Capable of recording up to 38 sensors at once, 8 analogue, 2 digital sensors and 28 HCSI sensors via CAN bus.
- Up to 100 measurement channels can be depicted simultaneously
- High-speed sampling rate, up to 8 sensors at 0.1 ms at a time.
- Quick and automatic basic setting by use of automatic sensor recognition
- Analogue inputs 0 .. 20 mA, 4 .. 20 mA Voltage 0 .. 50 V, -10 .. 10 V
- PT 100/1000 input
- Connection to a CAN bus system (also J1939)
- Simple and user-friendly operation, intuitive menu
- Practical, robust design

- Very large data memory for archiving measurement curves, enables the storage of 500 measurements with up to 8 million measured values.
- Various measurement modes:
 - Normal measuring
- Fast curve recording
- Long-term measurements
- Recording of dynamic processes "online" in
- Event-driven measurements with several triggering options
- Programming function for HYDAC switch
- PC interface via USB
- USB Host connection for USB memory sticks
- Convenient visualisation, archiving and data processing using the HMGWIN software supplied.

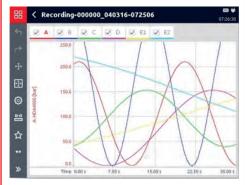
Function:

 Clear and graphical colour selection menus intuitively guide the operator to all the device functions available and ensure fast implementation.

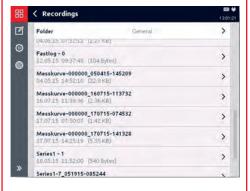


- The HMG 4000 can record the signals of up to 38 sensors simultaneously.
 11 push-pull M12x1 input sockets are available as sensor interfaces. Apart from the push-pull sensor connection cable, M12x1 standard cables can also be used.
- The following sensors can be connected to the 8 black input sockets:
 - 8 analogue sensors (e.g. for pressure, temperature, and flow rate) with the special digital HSI interface (HYDAC Sensor Interface); this means the basic device settings (measured variable, measuring range and unit of measurement) are performed automatically
 - 8 standard analogue sensors with current and voltage signals
 - 8 Condition Monitoring sensors^{*)} (SMART sensors); again, the basic device settings are carried out automatically
- The blue input socket provides 2 digital inputs, e.g. for 1 or 2 HYDAC speed sensors (2nd speed sensor connection via Y-adapter).
 Frequency measurements, counting functions or triggers can also be implemented for data recording.
- Different CAN bus functions can be implemented via the red input socket:
 - Connection of up to 28 HYDAC HCSI sensors (HYDAC CAN Sensor Interface) by setting up a CAN bus with HCSI sensors and the relevant connection accessories, also with automatic parameterisation.
 - Connecting to a CAN bus, you have the option of evaluating up to 28 CAN messages.
 - Configuration of CAN sensors; the parameterisation is performed by means of EDS files, which can be stored and administrated in the HMG.
- The yellow input socket serves as the interface for HYDAC pressure, temperature or level switches with I/O link as well as for the programming device HPG P1. These devices can be parameterised by means of the HMG 4000.

• The most attractive function of the HMG 4000 surely is the capability of "online" recording and graphic illustration of dynamic processes, which means as a measruing curve in real time. During the recording process of a measuring curve, you can zoom in the curve sections of interest using gestures on the touchscreen.



- For the purpose of recording highly dynamic processes, all 8 analogue input channels can be operated simultaneously at a sampling rate of 0.1 ms.
- The data memory for recording curves or logs can hold up to 8 million measured values.
 At least 500 of such data recordings in full length can be stored in an additional archiving memory.
- For targeted, event-driven curves or logs, the HMG 4000 has four independent triggers, which can be linked together logically. In addition, there is a "start/stop" condition, by means of which a measurement can be initiated or finished.
- User-specific device settings can be stored and re-loaded at any time as required. This means that repeat measurements can be carried out on a machine again and again using the same device settings.



 Measured values, curves or texts are visualised on the full graphics colour display in different selectable formats and display forms.



 Numerous useful and easy-to-use auxiliary functions are available, e.g. zoom, tracker, differential value graph creation and individual scaling, which are particularly for use when analysing the recorded measurement curves.



Figure: Using the magnifying gesture with two fingers, the operation is carried out – zooming in this case

• The communication between the HMG 4000 and a PC is performed via the built-in USB port. A HMG 4000 connected to your PC is recognised and depicted as a drive by the PC. You can thus move measured data to your PC conveniently. Optionally, data transfers can be carried out via a file manager by means of a USB memory stick.

HMGWIN:

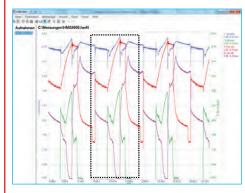
The PC software HMGWIN is also supplied with the device. This software is a convenient and simple package for analysing and archiving curves and logs which have been recorded using the HMG 4000, or for exporting the data for integration into other PC programs if required.

In addition it is possible to operate the HMG 4000 directly from the computer. Basic settings can be made, and measurements can be started online and displayed directly on the PC screen in real-time as measurement curves progress.

HMGWIN can be run on PCs with Windows 7, Windows 8.1 and Windows 10 operating systems.

Some examples of the numerous useful additional functions:

· Display of the measurements in graph form or as a table



Zoom function:

Using the mouse, a frame is drawn around an interesting section of a measurement curve, which is then enlarged and displayed.

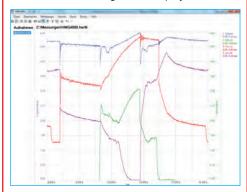
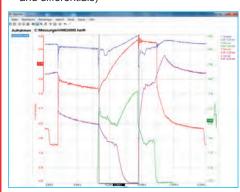
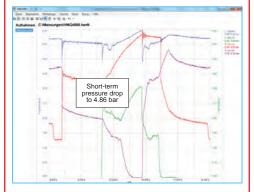


Fig.: Zoomed section of measurement curve

 Accurate measurement of the curves using the ruler tool (time values, amplitude values and differentials)



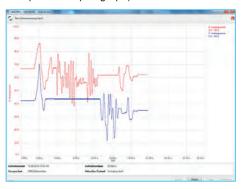
 Individual comments and measurement information can be added to the graph (function available mid-2017)



• Overlay of curves, for example to document the wear of a machine (new condition/current condition) (function available mid-2017)



- Using mathematical operations (calculation functions, filter functions), new curves can be added
- Snap-shot function: comparable to the function of a digital camera, a picture can be taken immediately of any graph and saved as a jpg file.
- A professional measurement report can be produced at the click of a mouse: HMGWIN has an automatic layout function. Starting with a table of contents, all recorded data, descriptions and graphics and/or tables are combined into a professional report and saved as a pdf file.
- Online function (HMGWIN only): Starting, recording, and online display of measurements (similar to the function of an oscilloscope)
- Change of axis assignment of the recorded measurement parameters in graph mode (e.g. to produce a p-Q graph)



*) SMART sensors (Condition Monitoring 'sensors) are a generation of sensors from HYDAC which can provide a variety of different

measurement variables.

Technical data:

recnnical data:	
Analogue inputs	
Input signals	HYDAC HSI analogue sensors
8 channels M12x1 Ultra- Lock flange sockets (5 pole)	HYDAC HSI SMART sensors Voltage signals: e.g. 0.5 4.5 V, 0 10 V etc.
channel A channel H	(input ranges for 0 50 V, 0 10 V,
	0 4.5 V, -10 10 V)
	Current signals, e.g. 4 20 mA, 0 20 mA
	(input range 0 20 mA)
Assurant dependent on the	1 x PT 100 / PT 1000 (at channel H) ≤ ± 0.1 % FS at HSI, voltage, current
Accuracy dependent on the input range	≤± 1.1 % FS at PT 100 / PT 1000
Digital inputs	= 1 1 /01 C dt 1 1 100 / 1 1 100 C
Input signals	Digital status (high/low)
2 channels M12x1 Ultra-	Frequency (0.01 30,000 Hz)
Lock flange socket (5 pole)	PWM duty cycle
channel I, J Level	Durations (e.g. period duration)
Level	Switching threshold/switch-back threshold: 2 V / 1 V Max. input voltage: 50 V
Accuracy	≤± 0.1 %
CAN	- 2 0.1 70
Input signals	HYDAC HCSI sensors, CAN, J1939,
28 channels M12x1 Ultra-Loc	kCANopen PDO, CANopen SDO
flange socket (5 pole)	
channel K1 K28	40 LEW- 4 MEW-
Baud rate	10 kbit/s 1 Mbit/s ≤ ± 0.1 %
Accuracy Calculated channels	≥ I U.1 /0
Quantity	4 channels via virtual port L (channel L1 channel L4)
Programming interface	4 Charmers via virtual port E (Charmer E1 Charmer E4)
For HYDAC I/O-Link devices	1 channel via M12x1 Ultra-Lock
	flange socket (5 pole)
Voltage supply	
Network operation	9 36 V DC via standard round plug 2.1 mm
Battery	Lithium-Nickel-Kobalt-Aluminium-Oxide
Dette a chemica time	3.6 V; 9300 mAh
Battery charging time	approx. 5 hours
Battery life	w/o sensors approx. 11 hours with 2 sensors approx. 9 hours
	with 4 sensors approx. 7 hours
	with 8 sensors approx. 4 hours
Display	
Type	TFT-LCD Touchscreen
Size	5.7"
Resolution	VGA 640 x 480 Pixel
Backlight	10 100 % adjustable
Interfaces USB Host	
Plug-in connection	USB socket, Type A, screened
USB Standard	2.0 (USB Full speed)
Transmission rate	12 Mbit/s
Supply voltage	5 V DC
Power supply	100 mA max.
Protection	Short-circuit protection to GND (0 V)
USB Slave	
Plug-in connection	USB socket, Type B, screened
USB Standard	2.0 (USB High speed)
Transmission rate	480 Mbit/s
Supply voltage	5 V DC
Power supply Protection	100 mA max. Short-circuit protection to GND (0 V)
Memory	Short-circuit protection to GND (0 V)
Measured value memory	16 GB for min. 500 measurements, each containing
weasured value memory	8 million measured values
Technical standards	
EMC	IEC 61000-4-2 / -3 / -4 / -5 / -6 / -8
Safety	EN 61010
Protection class	IP 40
Environmental conditions	
Operating temperature	0 50 °C
Storage temperature	-20 60 °C
Relative humidity	070%
Max. operating altitude	2000 m
Dimensions Weight	approx. 285 x 189 x 87 mm (B x H x T) approx. 1,850 g
Housing material	Plastic (Elastollan® R 3000 – TPU-GF)
1.0doing material	1 140110 (E1401011411 17 0000 - 11 0-01)

Order details:

HMG 4000 - 000 - X

Operating manual and documentation

D = German E = English F = French

Scope of delivery

- HMG 4000
- Power supply unit for 90 .. 230 V AC
- Tether strap
- Operating manual
- Data carrier with USB drivers and **HMGWIN** software
- USB connector cable

Accessories

- Pressure, temperature and flow rate measuring transmitter with HSI sensor detection as well as CAN pressure measuring transmitter with HCSI sensor detections – see separate data
- Additional accessories, such as the push-pull sensor connection cables, connection accessories for the HCSI CAN sensors, mechanical connection adapters, etc. can be found in the "Accessories Service Devices" catalogue section.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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Accessories Overview

The perfect accessory for any HYDAC product!

Whether for sensors or for measurement, display and service units, the extensive HYDAC accessories portfolio has a comprehensive selection of suitable accessories for almost any application.

Page

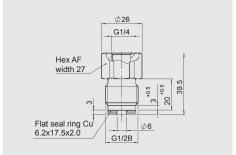
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MEASURING INSTRUMENT AND DISPLAY UNIT ACCESSORIES	
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Further accessories for HMG 500 / 510 / 2500 / 4000	
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PROGRAMMING DEVICES AND ADAPTERS	
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Accessories for sensors

Mounting and installation Adapters for pressure sensors:



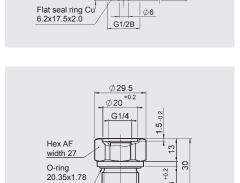


ZBM 01

Adapter female thread G1/4 male thread G1/2 B, **DIN EN 837-1**

Part no.: 257276





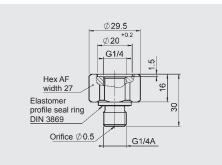
_G1/2A

-NBR

Adapter female thread G1/4 male thread G1/2 A, ISO 1179-2

Part no.: 257277

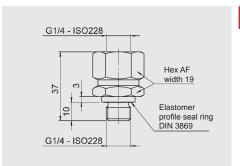




Adapter female thread G1/4 male thread G1/4 A, with orifice 0.5 mm

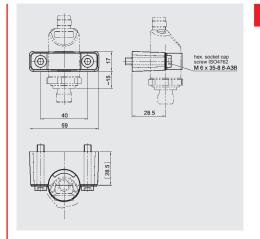
Part no.: 906968





Adapter female thread G1/4 male thread G1/4 (rotating)

Part no.: 907818

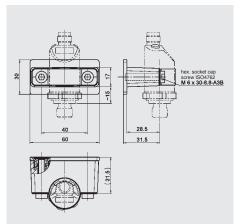


ZBM 8000

Clamp for wall-mounting - screw-type fitting -(Material of lower section: TPE Santoprene 10187; Material of top section: steel strip DIN 95381-1.4571)

Part no.: 3546755





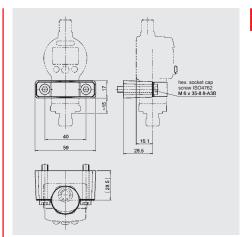
ZBM 8100

Clamp for wall-mounting - weld-type fitting -(Material of welding bridge: QSTE340TM, zinc coating EN 12329 FE/ZN8/B; Material of lower section: TPE Santoprene 10187; Material of top section: steel strip DIN 95381-1.4571)

Part no.: 3546757

Mounting accessories for EDS 3000, ETS 3000, AS 3000, ENS 3000 and HNS 3000:



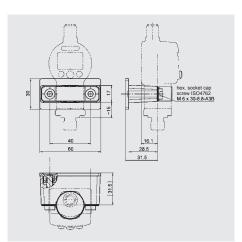


ZBM 3000

Clamp for wall-mounting screw-type fitting – (Material of lower section: TPE Santoprene 10187; Material of top section: steel strip DIN 95381-1.4571)

Part no.: 3184630



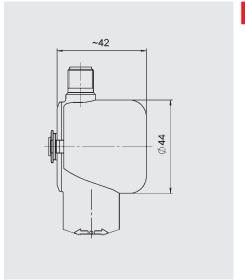


ZBM 3100

Clamp for wall-mounting - weld-type fitting -(Material of welding bridge: QSTE340TM, zinc coating EN 12329 FE/ZN8/B; Material of lower section: TPE Santoprene 10187; Material of top section: steel strip DIN 95381-1.4571)

Part no.: 3184632





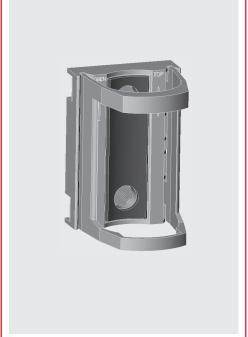
ZBM 3200

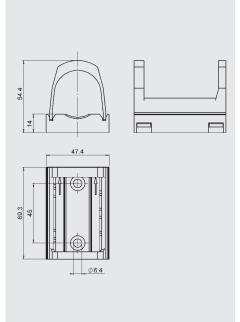
Splash guard (Material:

Elastollan S60 A15 SPF 000)

Part no.: 3201919

Mounting accessories for EDS 300 and ETS 300:

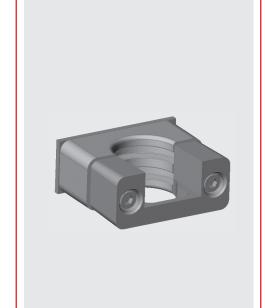


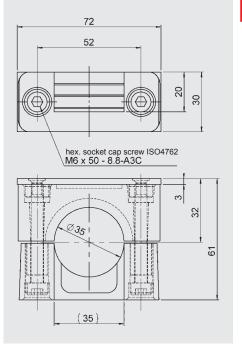


ZBM 300

Clamp for wall-mounting screw-type fitting – (Material polypropylene)

Part no.: 906385

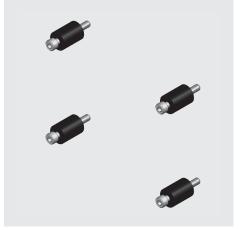


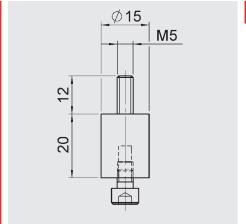


ZBM 310

Clamp for wall-mounting – weld-type fitting –

(Material polypropylene, aluminium AlSi12, steel)

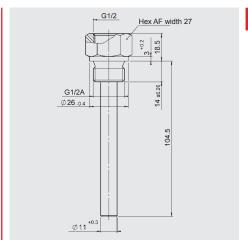




Vibration mounts Part no.: 257492

Installation accessories for ETS 3000 (100 mm):





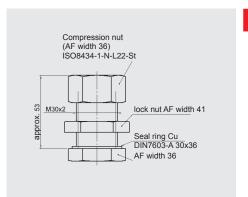
Protective sleeve for tank installation

(Material CuZn39Pb3 - DIN 1763, electro-nickel-plated)

Part no.: 909640

Connection accessories for ENS 3000:





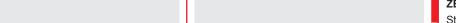
ZBM 19

Straight bulkhead connection acc. to

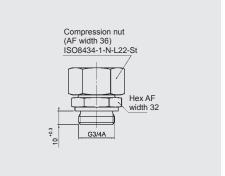
ISO 8434

Part no.: 908738 Note: Not suitable for

ENS with 250 mm rod length







ZBM 20

Straight male stud coupling acc. to

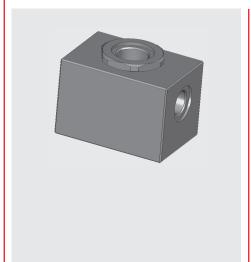
ISO 8434

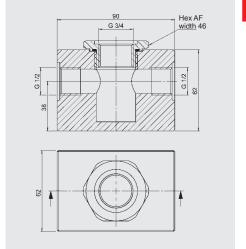
Part no.: 908739

13

EN 18.128.0/02.18

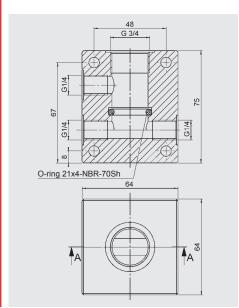
Connection accessories for HLB 1400:





ZBM 21 (Flow) Mounting block for flow rates > 2 l/min Part no.: 3244260





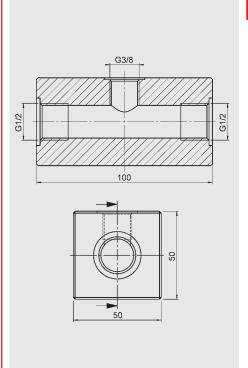
ZBM 23 (Low Flow)

Mounting block for flow rates from 0.5 .. 10 l/min

Part no.: 3299331

Connection accessories for AS 1000 and AS 3000:





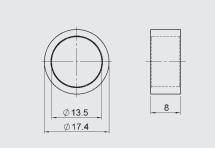
ZBM 22

Mounting block for AquaSensor

Distance and position sensor accessories Magnets for HLT 700, HLT 1000 and HLT 2000:

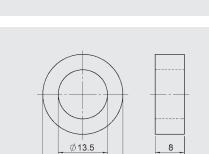
		Magnets											
	ZBL MR17.4	ZBL MR17.4 ZBL MR22 ZBL MR 25.4		ZBL MR 33	ZBL MR- HLT700	ZBL MF38-18 ZBL MU38-20		ZBL MV63	ZBL MVS35-39				
Distance sensors	0	0	0	0	0				5				
HLT 1100	✓	✓	✓	✓			✓	✓					
HLT 2100	✓	✓	✓	✓			✓	✓					
HLT 2102/3	✓	✓	✓	✓			✓	✓					
HLT 2150	✓	✓	✓	✓			✓	✓					
HLT 2500-F1						✓							
HLT 2500-L2							✓	✓	✓				
HLT 2550							✓	✓	✓				
HLT 700					✓								





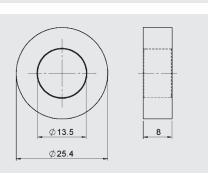






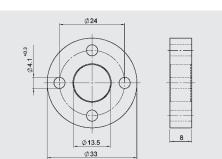
ZBL MR22 Position magnet for HLT 1x00 and HLT 21xx Part no.: 6084453





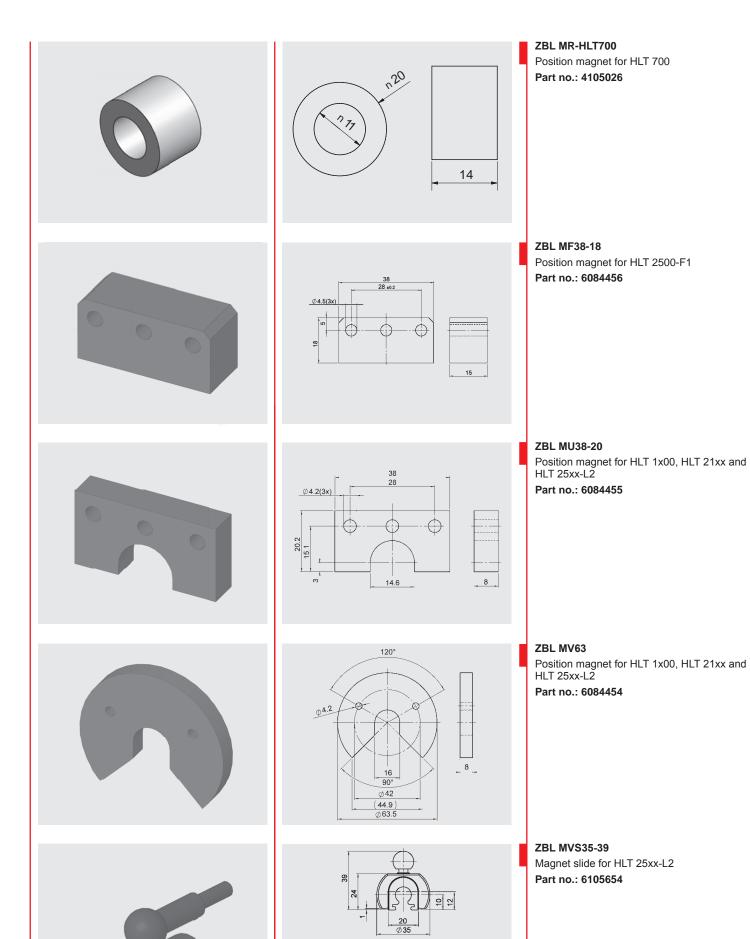
ZBL MR25.4 Position magnet for HLT 1x00 and HLT 21xx





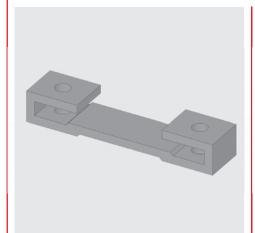
Part no.: 6141689

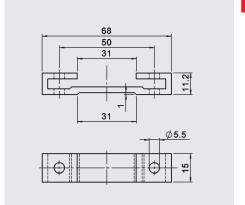
ZBL MR33 Position magnet for HLT 1x00 and HLT 21xx



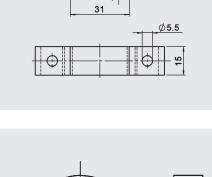


Mounting and installation accessories for HLT 2000:



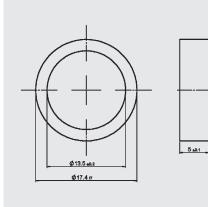


Mounting kit for HLT 25xx Part no.: 6105653



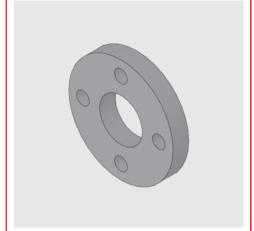
Intermediate ring AD17.4xID13.5x5 for HLT 21xx

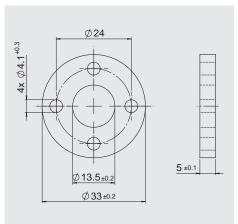
Part no.: 3903233



Intermediate ring AD33xID13.5x5

for HLT 25xx Part no.: 3887829





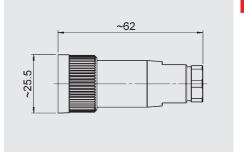
13

EN 18.128.0/02.18

Electrical connection

For electrical connection code "4" (Binder series 714 M18):



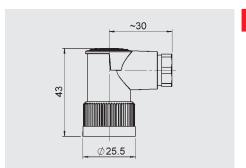


ZBE 02

Mating connector, Binder series 714 M18 4 pole, straight Cable diameter: 6.5 .. 8 mm

Part no.: 609479





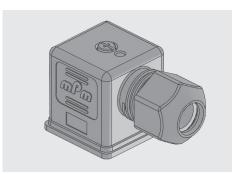
ZBE 03

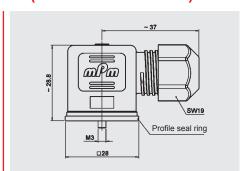
Mating connector, Binder series 714 M18

4 pole, right-angle Cable diameter: 6.5 .. 8 mm

Part no.: 609480

For electrical connection code "5" (male EN 175301-803):





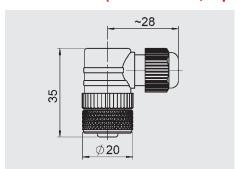
ZBE 01

Mating connector EN175301-803 3 pole + PE, right-angle Cable diameter: 4.5 .. 7 mm

Part no.: 905701

For electrical connection code "6" and "006" (male M12x1, 4 pole):



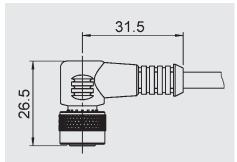


ZBE 06

Mating connector M12x1 4 pole, right-angle Cable diameter: 2.5 .. 6.5 mm

Part no.: 6006788





ZBE 06-02

Mating connector M12x1 4 pole, right-angle with 2 m cable

Part no.: 6006790

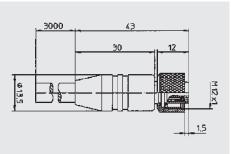
ZBE 06-05

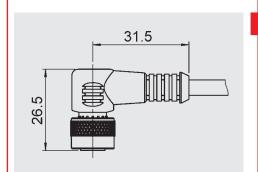
Mating connector M12x1 4 pole, right-angle with 5 m cable

	Colour code
Pin 1	brown
Pin 2	white
Pin 3	blue
Pin 4	black









ZBE 06S-03

Mating connector M12x1 4 pole, straight with 3 m cable, shielded

Part no.: 6098243

ZBE 06S-05

Mating connector M12×1 4 pole, straight with 5 m cable, shielded

Part no.: 6143284

ZBE 06S-05

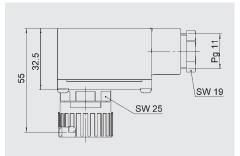
Mating connector M12x1 4 pole, right-angle with 5 m cable, shielded

Part no.: 6044891

	Colour code
Pin 1	brown
Pin 2	white
Pin 3	blue
Pin 4	black

For electrical connection code "7" (male DIN EN 175201-804):





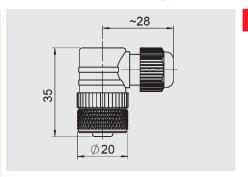
ZBE 10

Mating connector DIN EN 175201-804 6 pole + PE, right-angle Cable diameter: 7 .. 9 mm

Part no.: 654527

For electrical connection code "8", "008" and "C61" (male M12x1, 5 pole):



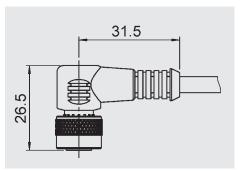


ZBE 08

Mating connector M12x1 5 pole, right-angle Cable diameter: 2.5 .. 6.5 mm

Part no.: 6006786





ZBE 08-02

Mating connector M12x1 5 pole, right-angle with 2 m cable

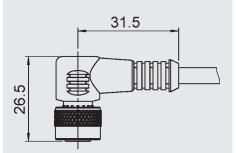
Part no.: 6006792

ZBE 08-05

Mating connector M12x1 5 pole, right-angle with 5 m cable

	Colour code	
Pin 1	brown	
Pin 2	white	
Pin 3	blue	
Pin 4	black	
Pin 5	grey	





ZBE 08S-02

Mating connector M12x1 5 pole, right-angle with 2 m cable, shielded

Part no.: 6019455

ZBE 08S-05

Mating connector M12x1 5 pole, right-angle with 5 m cable, shielded

Part no.: 6019456

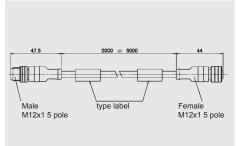
ZBE 08S-10

Mating connector M12x1 5 pole, right-angle with 10 m cable, shielded

Part no.: 6023102

	Colour code
Pin 1	brown
Pin 2	white
Pin 3	blue
Pin 4	black
Pin 5	grey





ZBE 30-02

Connection cable M12x1 male/female 5 pole, 2 m

Part no.: 6040851

ZBE 30-05

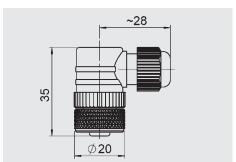
Connection cable M12x1 male/female 5 pole, 5 m

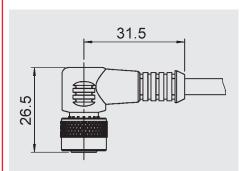
Part no.: 6040852

For electrical connection code "P" and "00P" (male M12x1, 8 pole):









ZBE 0P

Mating connector M12x1 8 pole, right-angle Cable diameter: 4 .. 8 mm

Part no.: 6055444

ZBE 0P-02

Mating connector M12x1 8 pole, right-angle with 2 m cable

Part no.: 6052697

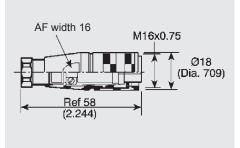
ZBE 0P-05

Mating connector M12x1 8 pole, right-angle with 5 m cable

	Colour code
Pin 1	white
Pin 2	brown
Pin 3	green
Pin 4	yellow
Pin 5	grey
Pin 6	pink
Pin 7	blue
Pin 8	red

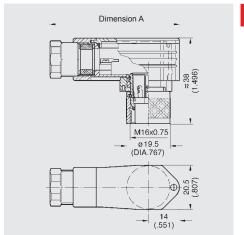
For electrical connection code "M06" (male M16, 6 pole):





Mating connector C091, 6 pole, straight Part no.: 654653

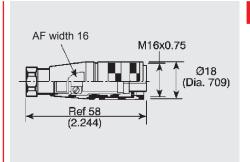




Mating connector C091, 6 pole, right angle Part no.: 6174764

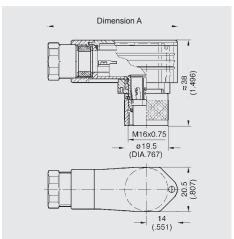
For electrical connection code "M08" (male M16, 8 pole):





Mating connector C091, 8 pole, straight Part no.: 6123255

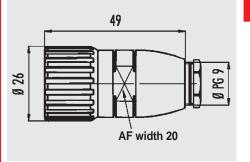




Mating connector C091, 8 pole, right angle Part no.: 6174765

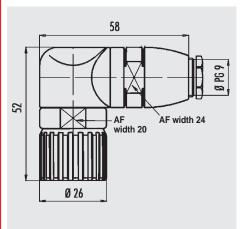
For electrical connection code "S00" (CONTACT male connector, 12 pole):





Cable connector M23, 12 pole, straight Part no.: 6120462

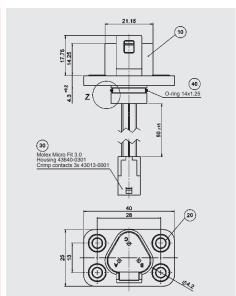




Cable connector M23, 12 pole, right-angle Part no.: 6120463

For electrical connection code "M06", "M08" and "M24" (separate male connector Molex, 3 pole) for HLT 724 and HLT 1100:





ZBE 50 Male flange connector DT04, 3 pole Molex

Pin assignment:							
DT04	Molex						
A	1						
В	2						
C	3						

Note:

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

HYDAC ELECTRONIC GMBH Hauptstr. 27, 66128 Saarbrücken

Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com

Internet: www.hydac.com



Accessories for measuring instruments, display and service units

Sensors with automatic sensor recognition

The pressure, temperature and flow rate transmitters with HSI sensor recognition have been specially developed for use in conjunction with HYDAC measuring instruments HMG 5x0, 2500 and 4000 as well as the Condition Monitoring Unit CMU 1000.

For data transmission, these sensors have an HSI interface (HYDAC Sensor Interface). This interface enables the above-mentioned HYDAC measuring instruments to automatically recognise the HSI sensor and then automatically apply all the necessary basic device settings.

To extend the number of sensors on the HMG 4000, the special HCSI sensors, based on the CAN protocol, were developed.

These HCSI sensors, easily identified with their red type label, are automatically recognised along with all their characteristics by the HMG 4000.

Up to 28 HCSI sensors can be connected to the HMG 4000 simultaneously via the Y-distributor (available as an accessory) to set up an HMG-internal bus system.

The data is transferred via a CAN-based bus protocol.

TDAC INTERNATIONAL



Pressure Transmitter HDA 4700-H

Relative pressure

Accuracy 0.25 %

Description:

The pressure transmitter HDA 4700-H with HSI sensor recognition was specially developed for use in conjunction with the HYDAC measuring instruments HMG 5X0, HMG 2500, HMG 4000 and CMU 1000.

For data transmission, the HDA 4700-H has an HSI interface (HYDAC Sensor Interface).

The HSI sensors are automatically recognised via the HSI interface by the above-mentioned HYDAC measuring instruments and all necessary basic device settings are taken from each sensor.

Like all pressure transmitters of the HDA 4700 series, the HDA 4700-H also has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane. It combines excellent technical data with a very compact design.

With HSI sensor recognition

Technical data:

Input data			-						-										
Measuring ranges ¹⁾	bar	-19	16	60	100	250	400	600	1000	1600	2000								
Overload pressures	bar	20	32	120	200	500	800	1000	1600	2400	3000								
Burst pressure	bar	100	200	300	500	1000	2000	2000	3000	3000	4000								
Mechanical connection					G1/4 A														
Tightening torque, recor	nmon	dod			G1/2 B 20 Nm) (C1/2	`										
Parts in contact with flu		ueu			Mech.														
i arts in contact with hu	Iu				Seal: F		Alon. O	talliles	3 31661										
Output data																			
Output signal					HSI (H														
A		-			Automa			ognitio	n										
Accuracy acc. to DIN 16 terminal based	086,				≤ ± 0.2 ≤ ± 0.5	5 % FS % FS :	typ. max.												
Accuracy, B.F.S.L.					≤ ± 0.1														
· ————					$\leq \pm 0.2$														
Temperature compensations Zero point	tion				≤ ± 0.00 ≤ ± 0.0														
Temperature compensa	tion				$\leq \pm 0.0$														
Span					$\leq \pm 0.0$	15 % F	S/°Ci	max.											
Non-linearity at max. se terminal based	tting a	acc. to D	IN 1608		≤±0.3 % FS max.														
Hysteresis					≤ ± 0.1 % FS max.														
Repeatability					≤ ± 0.0	5 % FS	;												
Rise time					≤ 1 ms														
Long-term drift					≤ ± 0.1 % FS typ. / year														
Environmental conditi																			
Compensated temperate					-25 +85 °C														
Operating temperature r		1)			-40 +85 °C / -25 +85 °C														
Storage temperature rar					-40 +100 °C														
Fluid temperature range	, 1)				-40 +100 °C / -25 +100 °C														
(€ mark					EN 61000-6-1 / 2 / 3 / 4														
Vibration resistance acc DIN EN 60068-2-6 at 10		0 Hz			≤ 20 g														
Shock resistance acc. to		≤ 100 g / 6 ms																	
Protection class acc. to		IP 67																	
Other data																			
Voltage supply		Via HY HMG 2	DAC m 500, H	easurir MG 400	ng instri	uments MU 100	HMG :	5X0,											
Life expectancy					> 10 million cycles (0 100 % FS)														
Weight					~ 150 g]													
Note: Reverse polarity	prote	ection of	the sun	nly yol	tage o	vervolt	200 01/	arrida s	and sho	Note: Reverse polarity protection of the supply voltage overvoltage override and short circuit									

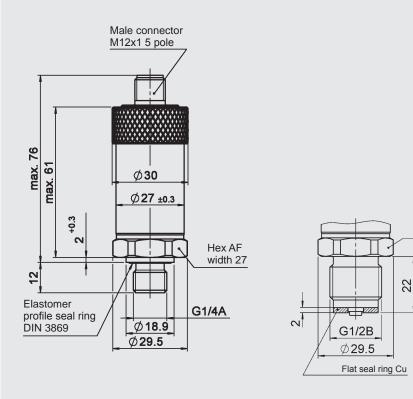
Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

1) -25 °C with FKM seal, -40 °C on request 2) With mounted mating connector in corresponding protection class

Dimensions:



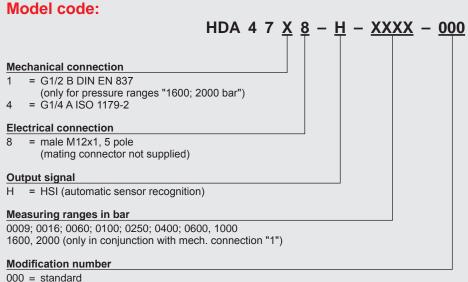
Note:

Hex AF width 27

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.



Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

HYDAC ELECTRONIC GMBH

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DAC INTERNATIONAL



Temperature Transmitter ETS 4100-H

Integrated temperature probe

Accuracy 0.4 %

Description:

The electronic temperature transmitter ETS 4100-H with HSI sensor recognition has been specially developed for use in conjunction with HYDAC measuring instruments HMG 5X0, HMG 2500, HMG 4000 and CMU 1000.

For data transmission, the ETS 4100-H has an HSI interface (HYDAC Sensor Interface).

The HSI sensors are automatically recognised via the HSI interface by the above-mentioned HYDAC measuring instruments and all necessary basic device settings are taken from each sensor.

Like all temperature transmitters of the ETS 4000 series, the ETS 4100-H features a robust design and excellent EMC properties. Based on corresponding evaluation electronics, the temperature sensor is designed to measure temperatures in the range -25 °C .. +100 °C.

With HSI sensor recognition

Technical data:

Input data	
Measuring range	-25 +100 °C
Probe length	6 mm
Probe diameter	4.5 mm
Pressure resistance	600 bar
Overload pressure	900 bar
Mechanical connection	G1/4 A ISO 1179-2
Tightening torque, recommended	20 Nm
Parts in contact with fluid 1)	Mech. connection: Stainless steel Seal: FKM
Output data	
Output signal	HSI (HYDAC Sensor Interface) Automatic sensor recognition
Accuracy (at room temperature)	≤ ± 0.4 % FS typ. ≤ ± 0.8 % FS max.
Temperature drift (environment)	≤ ± 0.01 % FS / °C
Response time acc. to DIN EN 60751	t ₅₀ : ~ 4 s
-	t ₉₀ : ~ 8 s
Environmental conditions	
Operating temperature range 2)	-40 +85 °C / -25 +85 °C
Storage temperature range	-40 +100 °C
Fluid temperature range 2)	-40 +125 °C / -25 +125 °C
	EN 61000-6-1 / 2 / 3 / 4
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g
Shock resistance acc. to DIN EN 60068-2-27	≤ 20 g
Protection class acc. to DIN EN 60529 3)	IP 67
Other data	
Voltage supply	Via HYDAC measuring instruments HMG 5X0, HMG 2500, HMG 4000 or CMU 1000
Weight	~ 150 g

Note: Reverse polarity protection of the supply voltage, overvoltage, override and short circuit

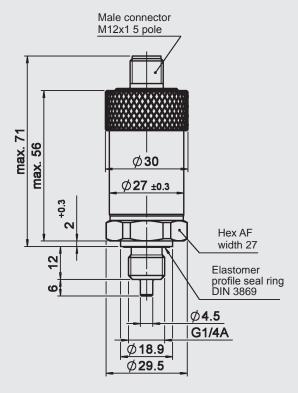
protection are provided.

FS (Full Scale) = relative to complete measuring range

1) Other seal materials on request 2) -25 °C with FKM seal, -40 °C on request

3) With mounted mating connector in corresponding protection class

Dimensions:

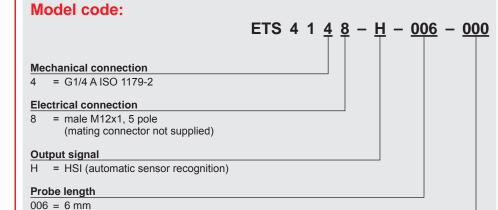


Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.



Accessories:

Modification number 000 = standard

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

HYDAC ELECTRONIC GMBH

Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com

DADINTERNATIONAL



Flow Rate Transmitter EVS 3100-H / EVS 3110-H

Turbine

Accuracy 2 %

Description:

The flow rate transmitters of the EVS 3100-H and EVS 3110-H series with HSI sensor recognition were specially developed for use in conjunction with the HYDAC measuring instruments HMG 5x0, HMG 2500, HMG 4000 and CMU 1000.

For data transmission, the EVS 31x0-H has an HSI interface (HYDAC Sensor Interface).

The HSI sensors are recognised automatically via the HSI interface by the above-mentioned HYDAC measuring instruments, and all the necessary basic settings are taken from each instrument.

As is the case with all flow rate measurement transmitters of the EVS 3100 and EVS 3110 series, the EVS 31x0-H also operates in accordance with the turbine principle. The speed of an impeller turning in the fluid flow is measured and converted into an electronic signal.

With HSI sensor recognition

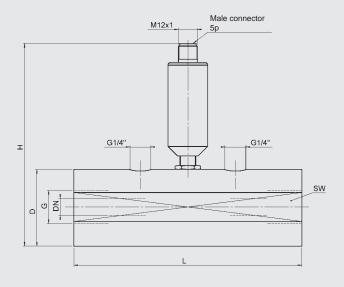
Technical data:

Input data							
Measuring ranges 1) and operating pressure							
EVS 3108-H-0020 EVS 3118-H-0020	1.2 20.0 l/min 400 bar						
EVS 3108-H-0060 EVS 3118-H-0060	6.0 60.0 l/min 400 bar						
EVS 3108-H-0300 EVS 3118-H-0300	15.0 300.0 l/min 400 bar						
EVS 3108-H-0600	40.0 600.0 l/min 315 bar						
EVS 3118-H-0600	40.0 600.0 l/min 400 bar						
Additional connection options	2 x G1/4 female threads for pressure and/or temperature sensors						
Housing material	EVS 3100-H: aluminium EVS 3110-H: stainless steel						
Output data							
Output signal	HSI (HYDAC Sensor Interface) Automatic sensor recognition						
Accuracy	≤ 2 % of the actual value						
Environmental conditions							
Compensated temperature range	-20 +70 °C						
Operating temperature range	-20 +70 °C						
Storage temperature range	-40 +100 °C						
Fluid temperature range	-20 +90 °C						
(€ mark	EN 61000-6-1 / 2 / 3 / 4						
Protection class acc. to DIN EN 60529 2)	IP 67						
Other data							
Measuring medium 3)	EVS 3100-H: hydraulic oils EVS 3110-H: water-based media						
Viscosity range	1 100 cSt						
Calibration viscosity	EVS 3100-H: 30 cSt EVS 3110-H: 5 cSt						
Supply voltage	Via HYDAC measuring instruments HMG 5x0, HMG 2500, HMG 4000 or CMU 1000						

Note:

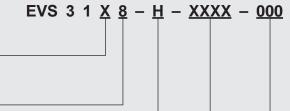
- Other measuring ranges on request
 With mounted mating connector in corresponding protection class
 Other measuring media on request

Dimensions:



Model	Meas. range	L	Н	D/SW	G	Torque value recommended	DN
	[l/min]	[mm]	[mm]	[mm]	[mm]	[Nm]	[mm]
EVS 3108-H-0020	1.2 20	117	135	47 / 46	G1/4"	60	7
EVS 3108-H-0060	6 60	144	135	48.5 / 46	G½"	130	11
EVS 3108-H-0300	15 300	155	150	63.5 / 60	G11/4"	500	22
EVS 3108-H-0600	40 600	181	150	63.5 / 60	G1½"	600	30
EVS 3118-H-0020	1.2 20	117	135	47 / 46	G1/4"	60	7
EVS 3118-H-0060	6 60	144	135	48.5 / 46	G1/2"	130	11
EVS 3118-H-0300	15 300	155	150	63.5 / 60	G11/4"	500	22
EVS 3118-H-0600	40 600	181	150	63.5 / 60	G1½"	600	30

Model code:



Housing material

= aluminium = stainless steel

Electrical connection 8

= male M12x1, 5 pole (mating connector not supplied)

Output signal

= HSI (automatic sensor recognition)

Measuring range

0020 = 1.2 .. 20 l/min 0060 = 6.0 .. 60 l/min 0300 = 15.0 .. 300 l/min 0600 = 40.0 .. 600 l/min

Modification number

000 = standard

Accessories:

Appropriate accessories, such as mating connectors, can be found in the Accessories brochure.

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.

HYDAC ELECTRONIC GMBH Hauptstr. 27, 66128 Saarbrücken Germany Telephone +49 (0)6897 509-01 Fax +49 (0)6897 509-1726 e-mail: electronic@hydac.com Internet: www.hydac.com

DADINTERNATIONAL



Pressure Transmitter HDA 4700-HC (for HMG 4000)

Relative pressure

Accuracy 0.25 %



Description:

To extend the number of sensors on the HMG 4000, the special CAN-based HCSI sensors were developed.

The HCSI sensors, easily identified by their red type label, are automatically recognised along with all their characteristics by the HMG 4000.

Up to 28 HCSI sensors can be connected to the HMG 4000 via the Y-distributor (available as an accessory) to set up an HMG-internal bus system. The data are transmitted using CAN-based bus protocol.

Like all pressure transmitters of the HDA 4700 series, the HDA 4700-HC also has a very accurate and robust sensor cell with a thin-film strain gauge on a stainless steel membrane.

Due to their outstanding temperature and EMC characteristics, together with their compact dimensions, these instruments can be used in a wide field of applications in the mobile and industrial sectors.

With HCSI sensor recognition

Technical data:

Input data														
Measuring ranges 1)	bar	-1 9	16	60	100	250	400	600	1000	1600	2000			
Overload pressures	bar	20	32	120	200	500	800	1000	1600	2400	3000			
Burst pressure	bar	100	200	300		1000	2000	2000	3000	3000	4000			
Mechanical connection					G1/4 A ISO 1179-2 G1/2 B DIN EN 837									
Tightening torque, recor	nmenc	ded			20 Nm	(G1/4);	40 Nm	(G1/2)					
Parts in contact with flu	id				Mech. Seal: F	connec KM	tion: S	tainless	s steel					
Output data														
Output signal						HYDAC atic sen				ce)				
Accuracy acc. to DIN 16 terminal based	8086,					5 % FS % FS r								
Accuracy, B.F.S.L.					≤ ± 0.2	5 % FS 5 % FS	max.							
Temperature compensations Zero point	tion				$\leq \pm 0.0$ $\leq \pm 0.0$	08 % F3 15 % F3	S / °C t S / °C r	yp. nax.						
Temperature compensar Span	tion				≤± 0.008 % FS / °C typ. ≤± 0.015 % FS / °C max.									
Non-linearity at max. set terminal based	tting a	cc. to DI	N 1608	36	≤ ± 0.3 % FS max.									
Hysteresis					≤ ± 0.1 % FS max.									
Repeatability					≤ ± 0.08 % FS									
Rise time					≤ 1 ms									
Long-term drift					≤ ± 0.1 % FS typ. / year									
Environmental conditi	ons													
Compensated temperate	ure rar	nge			-25 +85 °C									
Operating temperature r	range 1	1)			-40 +85 °C / -25 +85 °C									
Storage temperature ran	nge				-40 +100 °C									
Fluid temperature range) 1)				-40 +100 °C / -25 +100 °C									
← mark					EN 61000-6-1 / 2 / 3 / 4									
Vibration resistance acc DIN EN 60068-2-6 at 10		≤ 20 g												
Shock resistance acc. to		≤ 100 g / 6 ms												
Protection class acc. to		IP 67												
Other data														
Voltage supply	Voltage supply								ument l	HMG 4	000			
Life expectancy					> 10 million cycles (0 100 % FS)									
Weight					~ 150 <u>(</u>									

Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

B.F.S.L. = Best Fit Straight Line

1) -25 °C with FKM seal, -40 °C on request

2) With mounted mating connector in corresponding protection class

Dimensions: Male connector M12x1 5 pole max. 69 max. 56 Ø32 Ø27 ±0.3 Hex AF width 27 7 width 27 22 Elastomer G1/4A profile seal ring DIN 3869 Ø18.9 G1/2B

Ø29.5 Flange seal ring Cu

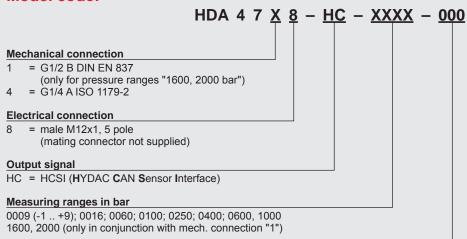
Note:

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For applications or operating conditions not described, please contact the relevant technical

Subject to technical modifications.





Accessories:

Modification number 000 = Standard

HCSI Y-distributor Part no.: 6178196 Part no.: 6178198 HCSI bus termination

Ø29.5



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DAC INTERNATIONAL



Temperature Transmitter ETS 4100-HC (for HMG 4000)

Integrated temperature probe

Accuracy 0.4 %



Description:

To extend the number of sensors on the HMG 4000, the special CAN-based HCSI sensors were developed.

The HCSI sensors, easily identified by their red type label, are automatically recognised along with all their characteristics by the HMG 4000.

Up to 28 HCSI sensors can be connected to the HMG 4000 via the Y-distributor (available as an accessory) to set up an HMG-internal bus system. The data are transmitted using CAN-based bus protocol.

Like all temperature transmitters of the ETS 4000 series, the ETS 4100-HC features a robust design and excellent EMC properties. The temperature sensor is designed to measure temperatures in the range -25 °C .. +100 °C.

Due to their compact dimensions, these instruments can be used in a wide field of applications in the mobile and industrial

With HCSI sensor recognition

Technical data:

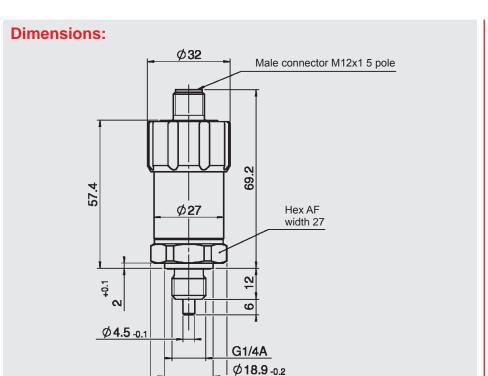
Input data		
Measuring range	-25 +100 °C	
Probe length	6 mm	
Probe diameter	4.5 mm	
Pressure resistance	600 bar	
Mechanical connection	G¼ A ISO 1179-2	
Tightening torque, recommended	20 Nm	
Parts in contact with fluid 1)	Mech. connection: Stainless steel Seal: FKM	
Output data		
Output signal	HCSI (HYDAC CAN Sensor Interface) Automatic sensor recognition	
Accuracy (at room temperature)	≤ ± 0.4 % FS typ. ≤ ± 0.8 % FS max.	
Temperature drift (environment)	≤±0.01 % FS / °C	
Response time acc. to DIN EN 60751	t ₅₀ : ~ 4 s t ₉₀ : ~ 8 s	
Environmental conditions		
Operating temperature range ²⁾	-40 +85 °C / -25 +85 °C	
Storage temperature range	-40 +100 °C	
Fluid temperature range 2)	-40 +125 °C / -25 +125 °C	
(€ mark	EN 61000-6-1 / 2 / 3 / 4	
Vibration resistance acc. to DIN EN 60068-2-6 at 10 500 Hz	≤ 20 g	
Shock resistance acc. to DIN EN 60068-2-27	≤ 20 g	
Protection class acc. to DIN EN 60529 3)	IP 67	
Other data		
Voltage supply	Via HYDAC measuring instrument HMG 4000	
Weight	~ 150 a	

Reverse polarity protection of the supply voltage, overvoltage, override and short circuit protection are provided.

FS (Full Scale) = relative to complete measuring range

1) Other seal materials on request 2) -25 °C with FKM seal, -40 °C on request

3) With mounted mating connector in corresponding protection class

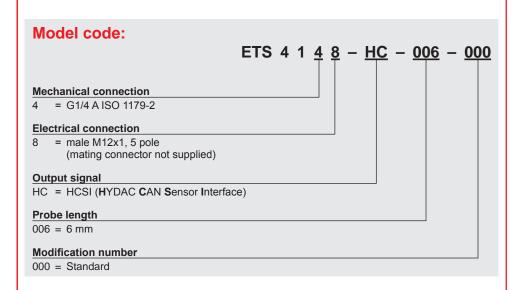


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HCSI Y-distributor

Bus termination

 $(120~\Omega)$

Sensor 2

Sensor 28

Part no.: 6178196

Ø29.5

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Accessories: HCSI Y-distributor

HCSI bus termination (120 Ω) Part no.: 6178198

EN 18.130.0/02.18

Further accessories for HMG 500 / 510 / 2500 and 4000



Case

for HMG 2500/4000 and accessories

Part no.: 6179836



ZBE I1-000

Current measurement adapter for galvanically isolated current measurement up to ±4 A for connection to HMG 5x0/2500/30x0/4000.

Part no.: 926543



Plastic case

for HMG 500/510 and accessories

Part no.: 6043006



ZBE 26

Y-adapter (blue) for connecting a HYDACLAB® HLB 1400

Part no.: 3304374



Magnetic holder

for HMG 4000 Handle can be rotated 360°, three magnets on back with approx. 80 N holding force

Part no.: 4227226



ZBE 38

Y-adapter (black) for HMG 4000 for the digital input socket

Part no.: 3224436



Bag with carrying strap

for HMG 2500/30X0 Part no.: 909795



ZBE 41

Y-adapter (yellow) for HMG 2500/30X0/4000 for connecting a ContaminationSensor CS 1000

Part no.: 910000



Power supply unit

for HMG 2500/30X0/4000

Part no.: 6054296



ZBE 46

Pin adapter for HMG 2500/30X0/4000 for 3-conductor signals and AquaSensor AS 1000

Part no.: 925725



Power supply unit

for HMG 500/510 Part no.: 6043562



ZBE 100

Connection adapter for HMG 4000 for temperature probe TFP 100

Part no.: 925726



ZBE 31

Car charger for HMG 2500/30X0/4000

Part no.: 909739



HCSI Y-distributor

Adapter for HMG 4000 for connecting HCSI sensors

Part no.: 6178196



UVM 3000

Connection adapter for HMG 30X0/4000 for connecting

third-party sensors Part no.: 909752



HCSI bus termination

Termination resistor for HCSI bus

line (120 Ω)

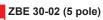






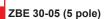






Connection cable, 2 m length, male/ female M12x1, screw connection

Part no.: 6040851



Connection cable, 5 m length, male/ female M12x1, screw connection

Part no.: 6040852



ZBE 40-02 (5 pole)

Connection cable, 2 m length, male/ female M12x1,

push-pull connection on male side, screw connection on female side

Part no.: 6177158



ZBE 40-05 (5 pole)

Connection cable, 5 m length, male/ female M12x1. push-pull connection on male side, screw connection on female side

Part no.: 6177159



ZBE 40-10 (5 pole)

Connection cable, 10 m length, male/female M12x1. push-pull connection on male side, screw connection on female side

Part no.: 6177160



HDS 1000 RPM probe

for HMG 2500/30X0/4000 including

reflective foil set Part no.: 909436

HDS 1000 reflective foil set Spare Part, Quantity: 25

Part no.: 904812



USB cable (HMG 2X/3X/4X)

Sensor simulator for HMG 2500/30X0/4000 to simulate 2 HSI sensors, ideal for training

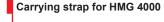
(1x plug A - 1x plug B) Part no.: 6040585

SSH 1000

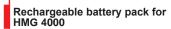
purposes Part no.: 909414

USB cable (HMG 500)

(1x plug A - Mini USB) Part no.: 6049553



Part no.: 4070365



Part no.: 3956715



For HMG, 2 pcs. each of
- Adapter hose DN 2-1620/1620
(400 mm and 1000 mm)
- Pressure gauge connection 1620/

- Bulkhead coupling 1620/1620

Part no.: 903083



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Programming Devices Programming Adapters

The programming of sensors directly at the system, quick 1:1 replacement of sensors, sensor data transmission from one device to another - these are today's fundamental requirements in order to ensure optimised processes and high machine availability.

For HYDAC's own programmable pressure switches and IO-Link sensors, HYDAC offers a variety of programming devices and programming adapters, ideally suited to satisfy the customer's requirements.

	Programming devices		Programming adapter *)
Device-specific	HPG 3000	HPG P1	ZBE P1
Device			
EDS 4000	✓		✓
EDS 4000 Ex ia, with ATEX approval	✓		✓
EDS 4000 Exd, with ATEX, CSA, IECEx approval	✓		✓
EDS 820 IO-Link		✓	✓
EDS 3000 IO-Link		✓	✓
ETS 3000 IO-Link		✓	✓
ENS 3000 IO-Link		✓	✓
HNS 3000 IO-Link		✓	✓

^{*)} in conjunction with a PC and the HYDAC software ZBE P1-WIN, which is delivered with the

Note: With the portable data recorder HMG 4000, it is also possible to parameterise the IO-Link products.

Programming device HPG 3000:

Device designed for the adaptation of the HYDAC programmable pressure switches EDS 4000 series to the relevant application, even directly at the plant.



Technical Data

Supply voltage	18 32 V DC
Current consumption	≤ 35 mA + sensor
Ambient temperature range	-25 + 80 °C
Storage temperature range	-40 80 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Power supply connection (power supply via the respective sensor supply or via HMG 4000 / ZBE P1)	Male M12x1, 4 pole
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 120 g

Order details:

HPG 3000-000 Part no.: 909422

Programming device HPG P1:

Designed for the programming of HYDAC IO-Link sensors directly at the plant.

Allows sensor settings to be copied and transmitted easily from one device to another.

If direct programming of the sensor at the plant is not necessarily required, parameter sets can also be transmitted from the HPG P1 to a HYDAC portable data recorder HMG 4000, or to a PC (via the HYDAC programming adapter ZBE P1) and imported again after processing.



Technical data:

Supply voltage	18 32 V DC
Current consumption	≤ 35 mA + sensor
Ambient temperature range	-25 + 80 °C
Storage temperature range	-40 80 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Power supply connection (power supply via the respective sensor supply or via HMG 4000 / ZBE P1)	Male M12x1, 4 pole
Display	4-digit, LED, 7 segment, red, height of digits 7 mm
Weight	~ 120 g

Order details:

HPG P1-000 Part no.: 925316

Programming adapter ZBE P1:

Designed for the programming of HYDAC ELECTRONIC programmable pressure switches and IO-Link sensors in conjunction with a PC and the HYDAC software ZBE P1-WIN which is delivered with the device.



Technical data:

External supply voltage	24 V DC
Current consumption	≤ 35 mA + sensor
Residual ripple	≤ 5 %
Current consumption at USB	Max. 500 mA (with sensor)
Storage temperature range	- 40 80 °C
(€ mark	EN 61000-6-1 / 2 / 3 / 4
Power supply connection	USB connection to PC or M12x1 for integration into the system concept or external power supply unit
Display	3 LEDs (USB status / status of supply voltage of unit to be programmed / status of communication)
Weight	~ 170 g

Order details:

ZBE P1-000 Part no.: 923695

Supplied with the instrument: one connection cable ZBE 30-02 (M12x1, 5 pole, 2 m, part no. 6040851), one USB cable (part no. 604085) and the software ZBE P1-WIN.

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