

**HYDAC**

**INTERNATIONAL**

**Components,  
systems and service  
for telescopic loaders**







HYDAC Head Office Neuweiler



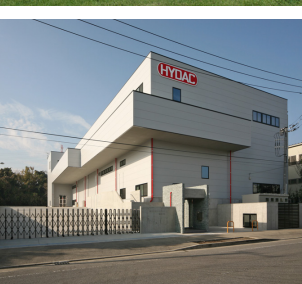
HYDAC China



HYDAC India



HYDAC USA



HYDAC Japan



HYDAC Czech Republic



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HYDAC Poland

# HYDAC

## Your partner with expertise in telescopic loaders.

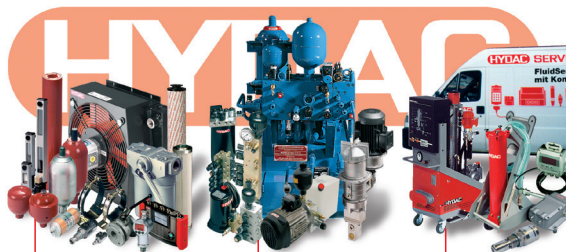
HYDAC is one of the world's leading suppliers for fluid technology, hydraulics and electronics, employing over 8,000 people. With our wide range of products and our expertise in development, manufacturing, sales and service, we find solutions for all manner of applications in the telescopic loader sector. Our quality and environmental certificates ISO 9001/2000 and ISO 14001 document our first-class quality standards and responsible use of resources.

### Global and yet local.

With 45 overseas subsidiaries, and more than 500 sales and service partners, HYDAC is your reliable partner worldwide.

### System solutions. One supplier. One contact.

Wherever you need us, we are there to help you find the most effective solution – for every application, from components to a complete system.



Components

Systems

Fluid Engineering

HYDAC



# Systems and Service – Worldwide.

Service, commissioning, analysis and diagnostics.

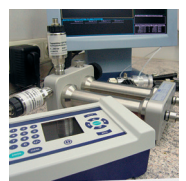


70–80% of all breakdowns in hydraulic and lubrication systems are due to excess contamination of the fluids and components used.

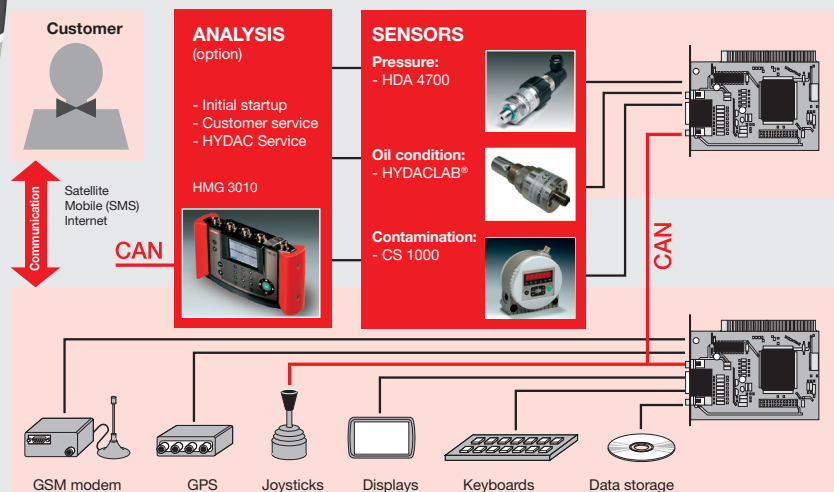
In practice, this is often not sufficiently recognised.

HYDAC offers a comprehensive range of easy-to-use measurement and analysis equipment to monitor fluid condition and technical cleanliness.

Fluid laboratory vehicles are at your service worldwide.



## Condition monitoring, teleservice



Constantly growing demands for operational availability, reduction in downtime, and detailed load and service management (economy, wear & tear, service, warranty) require innovative monitoring, service and control concepts.

A variety of sensors provides the ideal basis for the development of such integrated system solutions.

Oil condition / oil ageing through the measurement of temperature, humidity, viscosity, dielectric constant (HYDACLab®), water content (AS), temperature (ETS)

Particle contamination (CS)

Pressure (HDA)

Flow rate (EVS)

Fluid level (ENS)

When used in conjunction with the Portable Data Recorders of the HMG series, this data can be displayed and analysed, to supplement the electronics of the machine (e.g. servicing).

# The perfect telescopic loader solutions.

From component to system – for hydraulics, electronics or mechanics – our mission is to find you the perfect solution:

- Increasing convenience by reducing vibrations and noise
- Improving easy of use by optimising the layout and linkage of components
- Making operation more reliable by reducing interfaces
- Incorporating reliable electronic systems and components
- Optimising costs by using standard components and a modular structure to reduce the number of variants
- Active collaboration in close development partnerships
- Worldwide commercial and technical support thanks to a global presence

## Electro-hydraulic control technology

From component to intelligent drive solution.

HYDAC offers everything from a comprehensive range of hydraulic and electronic components to subsystems, right through to finished functional solutions that can also include the corresponding application software.

### USER LEVEL

- Displays for the most demanding visual requirements
- Peripherals, e.g., joysticks

### CONTROL LEVEL

- Controllers in various classes
- I/O expansion modules
- Standard version and versions with increased functional safety

### SENSOR LEVEL

- Pressure, temperature, and level
- Distance, position, angle, inclination and speed
- Flow and oil level
- Standard version and versions with diagnostics and increased functional safety available

### ACTUATOR LEVEL

- Pilot-operated and direct-acting valves
- Control blocks (monoblock/sandwich)
- Pilot and primary control systems
- Intelligent axles
- Cylinders and motors

## 1 Sensors, system electronics, control systems and condition monitoring

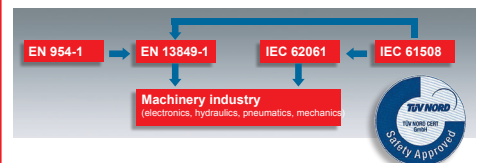
Sensors that meet the demands of specific applications:

- IP 6K9K (ISO 20653)
- Vibration-resistant thanks to encapsulated components
- All standard connections available
- Pressure and temperature
- Angle and speed
- Fluid level and flow rate
- Measuring devices to collect operating data
- Application-specific control electronics e.g. proportional amplifiers or axle level control
- For preventive fluid care and to increase operation reliability
- Signals to customer-specific software or external portable data recorders
- Oil condition
- Particle contamination and moisture

See **brochure no. 10.122** – Condition Monitoring

## Functional safety

The technical requirements with regard to functional safety are derived from the standards IEC 61508 and EN 13849.



HYDAC provides:

Controllers and I/O modules certified to  
- IEC 61508, SIL 2 (3) - EN 13849, PL d (c)

Other components for applications with increased functional safety

- Sensors - Valves  
Support provided throughout, from risk analysis to certified machine function

See **brochure no. 18.700** – Functional Safety in Mobile Machinery

## Sensors and measuring devices



Pressure transmitters/  
pressure switches



Sensors for enhanced  
safety requirements  
(e.g. PL d, SIL 2)



Linear position/distance  
sensors



Fluid level sensor



Oil condition sensor HYDACLab®



Portable Data Recorder  
HMG 500 / HMG 3010

See **Product Catalogue 18.500** – Control Technology for Mobile Machinery

## Operating elements / HMI



Electronic controls and displays

## Control devices and I/O expansion modules for general applications



Functional Safety  
PL d  
SIL 2

HY-TTC 30X-H  
HY-TTC 60  
(Extended controller)  
HY-TTC 90  
(Extended controller  
with SIL 2 PL d)

32-bit controller  
HY-TTC 500  
(Extended controller  
with SIL 2 and PL d)



## 5 Working hydraulics

When it comes to designing telescopic loader controllers, HYDAC has an extensive valve portfolio at its disposal, made up of diverse screw-in valves and OC/LS directional control valves. This makes it possible to realise controls that are simple or complex, such as the lift & telescoping controls, the outrigger, additional rear hydraulics, special blocks for front hydraulics or locking functions for the tipping cylinder, for example the safety block for telescopic arm control (conforming to DIN EN 15000)

Can be combined with any pump systems with the properties  $Q = < 200 \text{ l/min}$ ;  $p = 350 / 420 \text{ bar}$

Designed as a monoblock, monoblock with flange face (HYDAC interface) or in segment design

Cylinder position functions with or without load sensing

Main consumer connected in parallel or in series

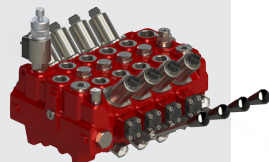
Simple integration

- of secondary functions
- of the priority valve for (OC or LS) steering
- of the priority valve for the braking system, fan controls, accumulator charging controls,
- of filtrations and sensor systems
- Outrigger and level control

See brochure no. 5.254 – Mobile Valves



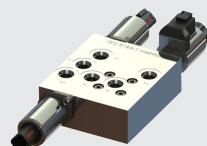
**RS 160**  
Open Center main pilot valve



**RS 220**  
Open Center main pilot valve



**LX-6**  
Load-sensing primary control valve

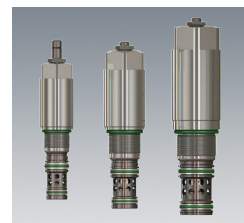


Safety block for telescopic arm control (DIN EN 15000)

## Load-holding and counterbalance valves

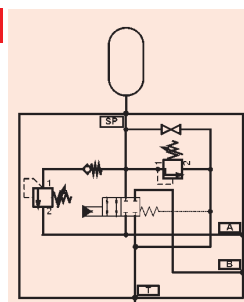
SBVE and RS valve series, available as system module elements for various flow rates and actuation conditions.

See brochure no. 5.933 – RSM  
See brochure no. 5.177 – SBVE

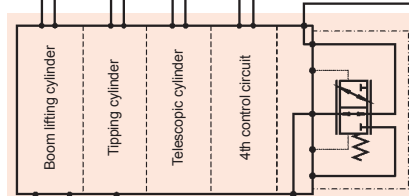


RSM load-holding valves

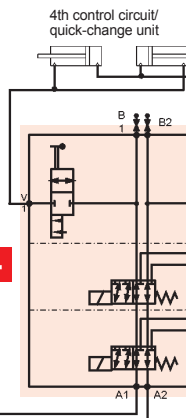
9



5



4



## 9 Suspension systems for axle, boom and cab suspension

To meet increased demands for comfort and traction stability.

Hydro-pneumatic chassis suspension, irrespective of load, with level control, axle lift, shut-off function, roll stabilisation and automatic error indication

Optimum adjustment of the chassis to the load condition (level control)

Hydropneumatic suspension system for the telescopic boom.

The manifolds is connected to the piston and the rod sides of the hoist cylinders and the suspension unit. The system provides suspension for the pitching vibrations that occur during driving operation.

High operating safety is achieved during the working process due to active pressure compensation.

Hydro-pneumatic cab suspension with adaptive damping and level control for full utilisation of the piston travel of the cab (Human response to vibration directive ISO 8041)



Intelligent axle suspension system



Level control



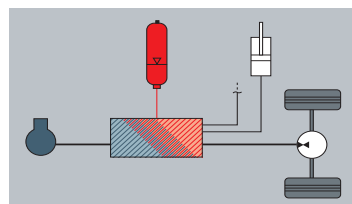
Boom suspension



Cab suspension system

See brochure no. 10.116.6 – Cab Suspension Element

See brochure no. 10.116.4 – Hydropneumatic Suspension System



## Development of hybrid concepts

We use the measurement data as a basis for compiling hybrid drive structures in conjunction with the customer, building on our wide experience in mobile hydraulics and our decades of expertise in the use of hydraulic accumulators.

See brochure 10.140 – Hydraulic accumulators – Core Components for Hydraulic Hybrid Technology

2

## Accumulator technology

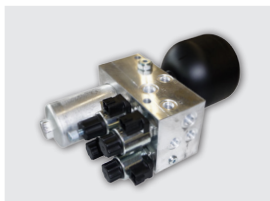

- Accumulators of all operating principles, for any application:
- Energy accumulation for braking systems
- Smoothing of pump pulsations
- Damping of pressure peaks
- Chassis suspension
- Counterbalance
- Boom suspension

See brochure no. 30.000 – Accumulator Technology



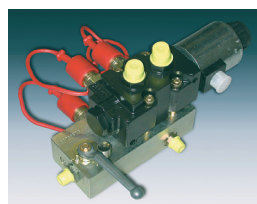
## 3

Any combination of 3/2 directional valves, pressure relief valves, flow regulators, hydraulic accumulators (emergency functions, reducing pressure spikes) and filters.



## 4

For activating different consumers with an oil supply. Function can be extended as required.



6/2 Selector Module

7

A comprehensive range of hydraulic and breather filters, equipped with elements made from high-quality materials, provide a high level of operating safety and long service life e.g.:

**Return line and suction boost filter RKM**  
Optionally with thermal-cooler bypass valve integrated into the head

## Return line filter RFM

All sizes and also available in various in-tank designs

### Supply circuit filtration with supply pressure filter LPF

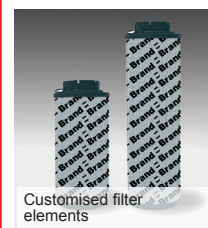
### Pressure filters MFM, HFM and DF

- All filter types and elements are available with quality protection and customer logo to secure replacement part business

- Application-specific filter elements, tested on the basis of practice-based load profiles (in the HYDAC Hydraulic Load Cycle Test)

## Tank filter solutions from a single source

Ready-to-install complete systems, optimised for component protection, system cleanliness and venting.



Customised filter elements



Stat-Free® filter elements  
to combat static charging



Plastic tank solution with patented, leak-free connection between tank-top filter and tank surface. Possible to separate the suction side from the return line side

See **brochure no. 70.000** – Fluid Filters  
See **brochure no. 7.020** – Update, Mobile Machinery  
See **brochure no. 10.777** – Filter Overview

## 6

As secure supply to the vehicle's steering or braking system needs to be guaranteed even in the event of power failure, we are able to supply the following solutions:

- DC1 emergency power unit (motor-pump group)
- Accumulator charging block (accumulator size as required)

Operating volt.: 12 / 24 V  
Pump output: 2 – 10 l/min  
Pressure range: 50 – 250 bar



DC1 emergency power unit



### Accumulator charging block

## 1

### Axial piston pumps - PPV series

- Nom. pressure / max. pressure: 320/350 bar
- Spec. displacement: 16 – 200 cm<sup>3</sup>/rev.
- Extensive range of controllers available
- Through-drive-compatibility for multiple-pump combinations
- Can be used for flame-resistant fluids  
(in line with specification)

### External gear pump - PGE series

- Nom. pressure / max. pressure: 250/300 bar
- Spec. displacement: 0.25 – 60 cm<sup>3</sup>/rev.
- Can be combined to form multiple-pump combinations up to 25 kW

### External gear motor MGE

- Nom. pressure / max. pressure: 200/220 bar
- Spec. displacement: 1.6 – 60 cm<sup>3</sup>/rev.

**See brochure no. 2.900 – Pump Specifications**



## 8 Cooling systems

### Combination cooler CMS

The following cooling circuits can be combined together in various ways in a CMS mobile cooler:

- Charge air cooling (CAC)
- Coolant cooling (RAD)
- Oil-cooling: gearbox, hydraulics, fan drive
- Fuel cooling

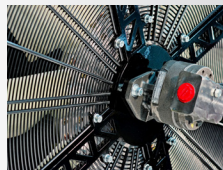
The KULI software makes it possible to observe the entire heat balance of a mobile machine. This allows calculations to be made for complex cooling systems with several different cooling circuits rapidly and precisely.

- Fan drive: direct, electric or hydraulic with speed control and option direction reversal

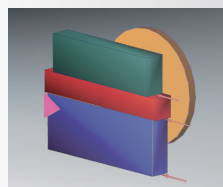
See **product catalogue 57.000** – Cooling Systems and **product catalogue 5.812** – Mobile Coolers



Combination cooler CMS



Hydraulic fan drive



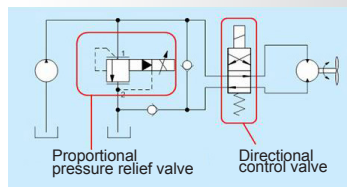
Individual arrangement of cooling elements for combination coolers

### Fan control components and control blocks

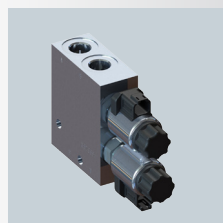
Hydraulic and electro-hydraulic controls for regulating fan motor speed with optional reversal of rotation direction for use with various types of pumps.

**Valves specially developed for the application:**

- Directional control valves
- Non-return anti-cavitation valves
- Manually adjustable pressure relief valves
- Inversely proportional pressure relief valves



Example of fan control application



See **brochure no. 5.315** – A Breath of Fresh Air in Electro-Hydraulic Cooling Control

## 11 Electro-hydraulic primary and auxiliary steering systems (EHZ)

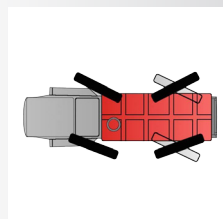
- Front axle steering
- Rear axle steering
- All-wheel steering

Electro-hydraulic primary and auxiliary steering systems allow various types of steering to be realised in telescopic loaders. The telescopic loader is capable of various special types of driving (such as all-wheel and crab steering) in addition to the normal driving varieties. In combination with the hydraulic steering systems of the front axles, electro-hydraulic superimposed steering systems and additional steering systems for the rear axles are possible.

### Modular steering valve module

The steering valve modules from the EHZ series can be used in two- or multi-axle self-propelled vehicles. By using different inlet modules, they can be connected to all types of hydraulic system. The proportional valves are specially optimised for use in steering systems. The basic version is intended to be used on a steering axle. Adding a second module makes it suitable for two-axle vehicles. Other modules can be added to disconnect, lock or centre the steering cylinders. Shock valve modules are also available to protect the steering cylinders against external factors.

See **brochure no. 10.116.9** – HY-STEER Electro-Hydraulic Steering Systems



Electro-hydraulic auxiliary steering for all-wheel & crab steering for self-propelled vehicles



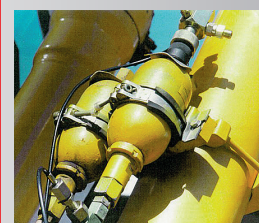
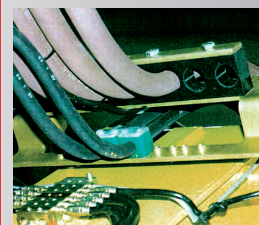
Modular steering unit Inlet, steering, and centring plate

## Accessories

**To complete hydraulic systems.**

- Standard valves (high pressure)
- Manipulation-proof inductive proximity switches (high-pressure-proof)
- Fluid level sensors
- Temperature switch TSE
- Standard clamp 3015
- Air/water supply tank fastening tapes
- Test point connections
- Quick release couplings
- Special clamps for particle filters

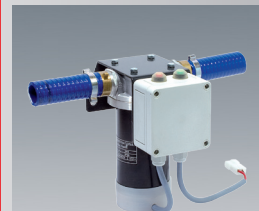
See **product catalogue 61.000** – Accessories



## Diesel refuelling pump kit

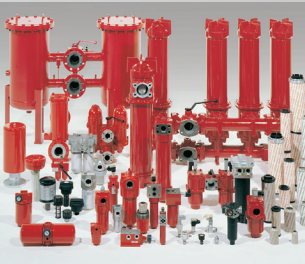
Filling the fuel tank is possible on the vehicle independent of a stationary tanking system.

- Operating voltage: 12 / 24 V DC
- Output: 5 - 50 l/min
- Integral temperature switch
- Fully leaktight check valve, no leakage





Accumulator Technology 30.000



Filter Technology 70.000



Process Technology 77.000



Filter Systems 79.000



Compact Hydraulics 53.000



Accessories 61.000



Electronics 180.000



Cooling Systems 57.000

**Global Presence.  
Local Expertise.**  
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- HYDAC Companies
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**HYDAC**

**INTERNATIONAL**

**Head Office  
HYDAC INTERNATIONAL  
GMBH**

Industriegebiet  
66280 Sulzbach/Saar  
Germany

Phone:  
+49 6897 509-01

Fax:  
+49 6897 509-577

Internet: [www.hydac.com](http://www.hydac.com)  
E-mail: [mobile@hydac.com](mailto:mobile@hydac.com)