HYDAC INTERNATIONAL

Expertise in Components and Systems for Loader Cranes



Your partner for expert system solu tions in loader cranes.



117.1.0/02.15

The professional partner for manufacturers of loader cranes.

With over 7,500 employees worldwide, HYDAC is one of the leading suppliers of fluid technology, hydraulic and electronic equipment.

Our wide range of products, combined with our expertise in development, manufacturing, sales and service enables us to tackle the most diverse challenges for crane applications worldwide.

Our quality and environment certification ISO 9001/2000 and ISO 14001 denote first class quality and responsible management of our resources.

Global and vet local.

With more than 45 overseas subsidiaries and over 500 distributors 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

find the most effective solution - for every application - from the component to the complete system.

Worldwide service

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

- Worldwide sales and service network
- Worldwide spare parts supply
- Condition Monitoring
- Worldwide specifications and approvals

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Loader cranes

Areas of application and hydraulic performance

Lightweight & small cranes, (0.8 – 10 mt); Loading of pallets, equipment, loose goods

Driver comfort, manual operation, clamshell grab, 5 / 6 working functions: 2 outriggers, lifting, slewing, telescoping

Q: up to 30 l/min; p: 250 - 350 bar

Medium cranes, (11 – 36 mt); Loading of pallets, equipment, loose goods Driver comfort, manual operation & remote control, manlifts, crane winch, 5 / 6 working functions: 2 / 4 outriggers, lifting, slewing,

telescoping Q: 45 – 80 l/min; p: 250 – 350 bar (400 bar*)

Heavy duty cranes, (37 – 150 mt); Loading of pallets, equipment, loose goods

Driver comfort, manual operation & remote control, 5 / 6 working functions: 4 outriggers, lifting, slewing, telescoping

Q: 100 + 100 l/min; p: 310 – 400 bar

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Forestry & recycling cranes Timber & waste handling (forwarders, etc.)

Operator comfort, manual operation & remote control, load limit control, 4 / 5 working functions: outriggers, lifting, slewing, telescoping, orange peel grabs, harvesting heads Q: 40 – 100 l/min; p: 180 – 400 bar

Special cranes

Marine, offshore, breakdown vehicles, etc.

Operator comfort, manual operation & remote control, winches, forks, 4 / 5 working functions: 2 outriggers, lifting, slewing, telescoping, orange peel grabs

Q: 45 + 45 l/min; p: 305 - 400 bar (building materials loader crane)

*) The trend in working hydraulics is for higher pressure ranges, i. e. up to 400 bar and beyond.

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Solutions for different types of loader cranes..

... are based on the particular requirements of the individual loader crane.

Truck loader cranes:

Vehicle cranes which are designed and built primarily for loading and unloading the transport vehicle. These include, for example, building material cranes, breakdown vehicle cranes, etc.

- Loader cranes: DIN EN 12999
- Functional safety:
- DIN EN 13849 and IEC 61508
- Manual operation and remote control
- 5 / 6 work functions
- 2 / 4 outriggers
- Optional crane winch
- Clamshell grab
- To lift, slew, telescope, extend and support



Forestry and recycling cranes:

Forestry and recycling cranes which are designed to lift tree trunks / recycling material. When goods are over a certain length/ dimension, it is not possible to lift them in the centre of gravity. Other functions such as pulling, pushing or levering must therefore be implemented safely.

- Loader cranes: DIN EN 12999
- Functional safety:
- DIN EN 13849 and IEC 61508
- Manual operation and remote control
- 6 / 8 work functions
- 2 / 4 outriggers
- To lift, slew, telescope, pull, push, lever



Driven manlifts:

Manlifts can be installed on the loader crane boom as an option, to lift personnel to carry out installation, repair and similar tasks.

- Loader cranes: DIN EN 12999
- Mobile manlifts: DIN EN 280
- Increased functional safety: DIN EN 13849 and IEC 61508
- Manual operation and remote control
- 5 / 6 work functions
- 4 outriggers
- To lift, slew, telescope, and level the man basket



...in hydraulics, electronics or mechanics, providing you with the best solution is our challenge:

Controllability: By tailoring the geometries and using more high-performance materials the natural frequency of the mechanical structures is reduced. The demands placed on the controls for operating cranes with combined functions rise sharply. This is particularly so for precise positioning of the crane slewing gear. Powerful electronics, innovative and sensitive primary control valves, low actuating forces on mechanically controlled manual valves as well as increased flow rates, open up new possibilities. Other requirements are for a minimal reaction time on the control (maximum dynamics).

- **Safety:** Steadily increasing use of sensors and powerful controllers to monitor and control the crane system (valve spool position, cylinder positions, outrigger positions, load pressures) ensures that modern loader cranes satisfy current safety requirements.
- **Efficiency:** More efficient profile design in lightweight construction, efficient truck loading (lower deadweight = higher payload), the use of high quality fine-grained structural steels (strength) as well as increased hydraulic pressures, have been important factors in boosting loader crane efficiency significantly over the course of the last few decades.

Stability: The constant improvement in combining steelwork, drive, hydraulic and electronic components to coordinate with the carrier vehicle has brought about persistent progress in stability, safe working loads and crane reach.

Comfort: Constant modification of the operating elements, optional protection from the weather through the use of covered workstations and sometimes climate controlled cabs, have significantly enhanced the level of comfort and the ergonomics experienced in the crane workstation.

From the component to the system.

HYDAC offers a variety of components and systems to meet the requirements of today's machines and to fulfil the related demands. In addition to standard components, HYDAC offers a comprehensive modular system which can be geared to different applications. HYDAC will also work with you to develop an individual solution for your machine.

HYDAC's contribution

- Fulfilling the requirements of safety and emissions directives
- Precise hydraulic control
- Integration of reliable electronic controls and components
- Increased operational safety by minimising the number of interfaces
- Meeting the demands for comfort and safety at work
- Greater serviceability through optimised designs and component combinations
- Higher level of comfort due to reduced vibration and noise
- Cost optimisation by reducing the complexity of choice through the use of standard components and modular construction
- Industry experience and machinery know-how
- Active co-operation in close development partnership
- Worldwide technical and commercial support through our global presence











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Hydraulic control

Optimal working hydraulics for fast, accurate and efficient control.

Open centre primary control valves

HYDAC's open centre primary control valves offer you a modular system with which to design robust, energy efficient and cost-effective open centre controls for mechanical, pneumatic, hydraulic and electrohydraulic controls.

Features:

- Monoblock, multi-section and sectional designs
- Key data: Q_{max} ≤ 180 l/min; p_{max} = 350/420 bar
- Energy saving Q inlet option
- Robust, high quality and maximum controllability
- Low internal leakage
- Inlet selector for safe flow distribution
- Electrical cut-off of pump flow
- Primary actuator connected in parallel, series and tandem
- · Simple integration of secondary relief
- Optional switch position monitoring of the primary control spool
- · Control of LS variable pumps also an option



- RS 160 primary control valve $\Rightarrow Q_{max} = 60 \text{ l/min; } p_{max} = 250 \text{ bar}$
- RS 220 primary control valve
- DX-6 primary control valve
- \Rightarrow Q_{max}= 80 l/min; p_{max}= 300 bar
- \Rightarrow Q_{max}= 140 l/min; p_{max}= 350 bar
- DX-6 Open centre primary control valve

RS 160

RS 220

Open centre primary control valve

Open centre primary control valve

Load-sensing primary control valves

HYDAC's load sensing primary control valves offer you a modular system with which to design load-compensated, energy efficient loadsensing controls for mechanical, pneumatic, hydraulic and electrohydraulic controls.

Features:

- Multi-section and sectional designs
- Key data: Q_{max} ≤ 180 l/min; p_{max} = 350/420 bar
- Extra long 10 mm spool stroke for maximum fine control
- Independent of the load, parallel operation possible without mutual interaction
- · Simple integration of primary / secondary relief
- Inlet selector for safe flow distribution
- Electrical cut-off of pump flow
- Optional switch position monitoring of the primary control spool
- Possible to shutdown individual sections whilst maintaining full functionality in remaining sections





Key data for load-sensing primary control valves (see photos on right):

- HX-1 load-sensing primary control valve ⇒ Q_{max} = 120/35 (prop) l/min; p_{max} = 250 bar
- LX-6 load-sensing primary control valve $\Rightarrow Q_{max} = 160 \text{ l/min}; p_{max} = 350 \text{ bar}$
- LX-6 + HX-1 Primary control valve combination solution

See Mobile Valves brochure no. 5.254

Load-holding values





RSM Load-holding valves -For venting to atmosphere or via a drain port

HYDAC's load-holding valves include the pilot-to-open check valve series and counterbalance valve series. Pilot-to-open check valves hold the load in position, counterbalance valves also enable the loads to be moved under constant control by preventing overrunning of pulling loads - also associated with cavitation which causes wear in the hydraulic system. HYDAC counterbalance valves are notable for their compact design with a high level of functionality, so the valves also restrict the load pressure to a preset value and fulfil the function of a hose-break valve.

HYDAC's load holding valves are available in various models for different cavities for flow rates up to Q = 350 l/min and pressure ranges up to p = 420 bar. All valves have a robust and durable poppet which ensures leak-free load-holding and thus prevents a load from lowering unexpectedly.

Counterbalance valves in the new RSM series are comprehensive and flexible modules for a wide range of functions and applications. The RSM series which are available in 3 sizes for 60, 120 or 240 l/min offers the following features:

- Load pressures up to 420 bar
- Different pilot ratios
- Leakage-free

See Accessories catalogue no. 61.000

Customer benefits:

- ⇒ The fine control sleeve can be used to adapt the valve function precisely to critical applications, specifically by throttling the lowering function.
- \Rightarrow In the lift function, despite its compact design, the valve achieves an optimised and therefore energy efficient pressure drop value.
- ⇒ Most importantly for mobile applications, the improved corrosion protection of 720 h means that painting is not required in most cases
- \Rightarrow Sensible size distribution at the same time as a wide range of models ensures the most appropriate valve can be selected for the application
- HYDAC

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drawing



Circuit diagram

- Fine control sleeve for optimising the cylinder movement
- Internal venting, either to atmosphere or separately to tank
- Pressure loss optimised check function
- Load pressure independent version
- Hysteresis optimised version
- Cavity to ISO 7789
- Increased corrosion protection due to ZnNi coating
- Comprehensive range of connection housings available as accessories
- contr raulic

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LX-6



Example of an electro-hydraulic control with open centre primary control valves



Example of an electro-hydraulic control with load-sensing primary control valves



Solutions for electro-hydraulic proportional controls

Smart universal control package, Consisting of two G-pro joystick control units, RS 220 open centre primary control valve and cable harness.





SmartPLUS universal control package,

Consisting of electronic joysticks, LX-6 load-sensing primary control valve, sensors, HY-TTC controller and cable harness.





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Hydraulic supply

Optimal solutions from the HYDAC technology platform.

Cooling systems





Various models of air coolers with DC motors (OK-ELD)

Oil-air coolers with DC motor (OK-ELD) are used to cool the hydraulics. They are specially developed for mobile applications which require high capacity combined with compact dimensions and simple installation.

Features

Cooling capacity up to 34 KW

- DC motor with 12 V or 24 V
- Air blade with very good anti-contamination properties

With electronic speed control ESC it is possible to control the fan speed smoothly, according to the oil temperature.

This ensures that the fan speed is precisely coordinated to the required cooling capacity and the oil temperature remains constant. As an option, these controls can also be supplied with a reversing function, to "purge" the cooler of dirt (e.g. dust and debris).

Customer benefits: ⇒ Compact design

⇒ Efficient - due to individually controlled cooling circuits ⇒ Low-noise fan

Drive technology





PPV100S and PPV101

HYDAC offers a wide range of pumps for the working hydraulics of lift-lower systems in open hydraulic circuits. The pump range includes fixed and variable displacement pumps of varying sizes from 0.25 ccm/rev to 560 ccm/rev and pressure ranges up to 400 bar.

HYDAC fixed displacement pumps for lift-lower systems:

- External gear pump PGE
- From 0.25 ccm/rev 60 ccm/rev, nominal pressure up to 250 bar and maximum pressure up to 300 bar. Also available in multiple pump combinations.
- Internal gear pump PGI

PGF100

PVF100

From 3.8 ccm/rev - 250 ccm/rev, nominal pressure up to 330 bar and maximum pressure up to 400 bar. Can be combined with speed controlled frequency converter drives to save energy. These start immediately from standstill under back pressure. Bidirectional operation possible on request. Also available in multiple pump combinations.

• Vane pump PVF

From 5.8 ccm/rev – 237 ccm/rev, nominal pressure up to 210 bar. Ideally suited to offline cooling and filtration circuits. Also available in multiple pump combinations.

HYDAC variable displacement pumps for lift-lower systems:

• Axial piston pump PPV100S

See Pump Preferences catalogue no. 2.900

- From 16 ccm/rev 180 ccm/rev, nominal pressure = 315 bar and maximum pressure = 350 bar. High speed reserves, finely graduated flows, pressure control range constantly being extended. Design standard to DIN ISO 3019-2 and to SAE. Also
- available in multiple pump combinations. • Axial piston pump PPV101
- From 45 ccm/rev 200 ccm/rev, nominal pressure = 320 bar and maximum pressure = 350 bar. High speed reserves, wide range of pressure controls. Design standard to DIN ISO 3019-2 and to SAE. Also available in multiple pump combinations.

Filter and tank systems



BF 10 / 30 / 72 Return line filter RFM



Diesel PreCare filte Inline filter MFM Stat-Free® filter elements

Filters

We offer a comprehensive range of hydraulic and breather filters. High-quality filter element materials ensure a high level of operating safety and long maintenance intervals Typical filters for loader cranes are for example:

- Return line filter RFM Tank-top or in-tank versions
- Pressure filters Inline filters HFM or MFM
- Breather filter ELF, BF Optionally with check/bypass valve to support the suction characteristics of the pump, anti-splash device and dehumidifier
- Diesel PreCare High-guality filtration and dewatering of diesel
- Stat-Free[®] Innovative element technology to prevent electrostatic discharges in the system See Fluid Filters catalogue no. 70.000

Plastic tanks

Unlike welded steel tanks, customised plastic tanks are usually used when installation space is extremely limited and a very lightweight construction is preferable.



Customer benefits:

- ⇒ High level of operating safety thanks to top class filtration
- ⇒ Protection of system components
- ⇒ Element is easy to change and filter housing is easy to install
- ⇒ Low operating costs thanks to low pressure drops across the filter and filter element
- ⇒ Improved operating safety due to filter clogging indicators
- ⇒ Brand labelling to protect spare parts business
- ⇒ Tank-filter complete systems, optimized for component protection, system cleanliness and ventina
- ⇒ Ultra-modern laboratory and test rig technology

Lightweight **DC** compact power units



Short-time duty to EN 60034-1 Flow rate Q up to 250 bar, up to 5.6 l/min

Mobile applications, loader cranes being one example, place ever greater demands on hydraulic drive units. In line with the need to reduce CO_a, the main requirements are low weight and the integration of as many functions as possible into the smallest space. HYDAC's newly developed lightweight range makes full use of plastic components. Furthermore, this generation of power units have additional advantages over the DC power units that are currently on the market.

Technical specifications:

- Flow rate Q: up to 2.5 ... 5.6 l/min
- Operating pressure: up to 200 bar
- · Peak pressure: up to 250 bar
- Motor: Pn = 1.2 kW ... 2.2 kW
- Voltages: 12 and 24 volts
- Protection class: DIN EN 60034-5 min IP 54 • Pump displacement: 0.8 cm³/rev ... 2.6 cm³/rev.
- Tank volume: 4.0 ... 7.5 l
- Useable volume: 2.2 6.3 I
- S2 (short-term operation) • Duty cycle: S3 (intermittent operation)
- Operating fluid: mineral oil to DIN 51524 Part 2
- Temperature of operating fluid: min. -20 °C to +80 °C
- Ambient temperature: min. -20 °C to +40 °C
- Viscosity range: min. 10 mm²/s to max. 380 mm²/s
- Filtration: Operating fluid to ISO 4406 Class 21/19/16 or cleaner

Customer benefits:

- ⇒ The use of specially formed plastic parts such as the tank and cover provide maximum protection against salt and spray, as well as an aesthetically pleasing exterior.
- ⇒ In addition, noise emissions are minimised by the vibration-resistant plastic casing.
- ⇒ This is the only power unit in its class that can be installed in 3 different positions without having to undergo modifications.
- ⇒ Outputs of 1.2 to 2.2 kW in 12 and 24 Volt DC, and 3 different tank sizes, are possible due to the modular design.
- ⇒ It is easy to maintain despite its compact design.

See Compact Power Units Overview brochure no. 5.311

See Cooling Systems brochure no. 5.700

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System intelligence

Performance and intelligence from the same source.

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Electro-hydraulic control technology

From the components to the intelligent drive solution.



See Control Technology for Mobile Machines - Product Catalogue no. 18.500

System development



Example of control architecture

Based on the customer's requirements, HYDAC offers across-the-board support in developing electro-hydraulic control systems for mobile machinery. The scope of development is determined together with the customer according to the task.

Services include:

- Writing customer-specific application software (according to specification)
- Integrating intelligent subsystems into the customer's machine (e.g., suspension systems, auxiliary steering systems, fan controls)
- Complete control solutions for mobile machinery (safety functions, electrical/electronic control architecture, application software)

Software development

Depending on the hardware, the following programming languages can be used to program the application software:

- CoDeSys 2.3 / 3.5 / 3.5 SIL2
- C MATLAB/SIMULINK

2--Programming languages

System development support



Seriousness of injury

- Minor, temporary injury S1 Severe, permanent injury, including death S2

Frequency / duration of exposure to the hazard

- F1 Rare or brief exposure to hazard
- F2 Frequent to continuous exposure to hazard

Possibility of avoiding the hazard or limiting the damage

- P1 Possible under certain circumstances
- P2 Practically impossible

HYDAC offers extensive consultation and support for customer projects with regard to: • Hazard and risk (H&R) analysis

- Definition and description of safety functions
- Drafting safe system architectures and user interfaces (HMI)

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USER INTERFACE

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

CONTROL INTERFACE

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

SENSOR INTERFACE

- 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 INTERFACE

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



Sensors, system electronics, control systems and Condition Monitoring

Sensors





Sensors for increased

safety

Linear position and distance



sensors

Fluid level senso



Oil condition sensor HYDACLal

pressure switches

Pressure trans

requirements (e.g. PL d, SIL 2)

Operating elements / HMI



- Electronic operating elements available with integrated or external keypad or integrated display
- Displays for visualisation solutions available in different sizes and models

• Simple to high-end controls for complex and safety-critical applications (SIL 2-3)

Electronic operating elements

Controllers for general applications





16-bit controlle HY-TTC 50 (Standard co HY-TTC 60 HY-TTC 90

ontrolle

(Extended control with SIL 2 PL d)

32-bit controlle HY-TTC 500

(Extended controller with SIL 2 and PL d)

Displays

I/O expansion modules



Radio remote controls



HY-TTC 30X

- 30 inputs and outputs with very flexible configuration
- For work functions with increased functional safety to Performance Level c HY-TTC 48XS
- 48 inputs and outputs with flexible configuration
- For work functions with increased functional safety to Performance Level d
- Complete remote control systems for proportional operation in different applications

ller PIN finition (I/O's) Machine error definition Com Parameters & Configuration ore valvos) Test & Simulation En cture & frame and Unit Tests. (Ar

Mobile Application Tool Chain

With the "MATCH" (Mobile Application Tool Chain) development environment, HYDAC offers a tool chain for system-level software development by the customer that is specially suited to the requirements of mobile machinery. "MATCH" supports development from defining the system at the vehicle level, to writing the application software, to start-up, testing, and documentation.

"MATCH" offers building blocks for:

- Defining the system at the vehicle level
- Starting up and servicing the machine
- Testing software
- Documentation

In addition, "embedded middleware" is also offered which allows the application to be programmed regardless of the hardware and which contains many basic functions. A comprehensive range of library modules (e.g. for sensor drivers and valve drivers) are also available to enable the application software to be developed efficiently.

Functional safety

"MATCH" can also write application software with increased functional safety according to the following safety standards:

- "SIL 2" to IEC 61508
- "PL d" to EN ISO 13849
- "AgPL d" to ISO 25119 or EN 16590

Software library



Selection of library modules

In order to make software development significantly easier for the customer, HYDAC offers software libraries with ready-made modules as part of its "MATCH" development environment. The library modules can be configured and parameterised as desired.

Examples of library modules include:

- Sensors
- Switches
- Proportional and switching valves
- Relays, LEDs
- Transfer functions/signal elements

Special error modules can also be used to detect system errors.

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"MATCH" development environment

MATCH Mobile Application Tool Chain

Development environment for mobile working machines



Outriggers

Component modules can be scaled to safety requirements.

Using component modules scaled to safety requirements for support systems, we can develop, in partnership with you, almost any outrigger system for your application

- If required, HYDAC offers support throughout the process of selecting the best control concept.
- PL b to PL d can be represented by modules:
- For different performance classes
- For different safety requirements
- For different control types
- Interfaces for working area restriction and load moment limitation

Mobile cranes Loader cranes Concrete pumps Drilling equipment Manlifts Telehandlers Inclined lifts Excavators etc.

Applications:

Application examples

For all mobile machinery with an outrigger or levelling system, symmetrical or asymmetrical, remote-controlled or directly operated. Can be supplied on request with interfaces to sensors, display instruments, data loggers, load safety systems and working area restrictions.



In 4 stages: Design examples* for controlling an outrigger system

The control examples* in stages 1-4 differ depending on the type of machinery and the statutory standards and directives. The functional safety in the control increases with each stage. The machine builders' product ideas and designs form the basis for designing an appropriate control. The requirements are defined by the manufacturer and our application engineers support him by advising him on the selection of suitable hardware components

Stage 1 Stage 2

The outrigger system is operated manually via a lever according to a visual assessment (using spirit level) by the operator. There is no sensory feedback from the hydraulic system or the outrigger cylinders.

Stage 4

The support and levelling of the vehicle is carried out automatically at the touch of a button using certified levelling, pressure and position detection sensors. Only certified controllers are used for the electro-hydraulic control. This includes piston position monitoring in the control block, outrigger pressure monitoring and outrigger base detection to operate the outriggers. A high resolution display for visual control can also be included as an option.

Stage 3

Support and levelling of the vehicle is carried out automatically at the touch of a button, taking into account levelling sensors and, where used, outrigger pressure monitoring. The control operates, however, without the use of certified electronic components and without implementing a redundant safety system on the vehicle.

The outrigger system is activated via remote control or a rocker

switch, the hydraulics only operating for as long as the operator

activates them. The system is operated without electronic monitoring and feedback, purely on visual assessment (sight of

spirit level or an electronic level) by the operator.

Examples* of the different control categories

According to the Safety of Machinery standard, EN ISO 13849-1, machine builders must determine the control category, i.e. the Performance Level (PL) that applies to their machine and all safety-related parts of the control must meet the requirements of the particular Performance Level.

From the range of component modules scaled to safety requirements for support systems the machine builder can, in collaboration with our application engineers, select the hardware components that will fulfil the requirements of the control category of his machine.



Design example* of component modules scaled to safety requirements



Component examples*

displacement sensor pressure

sensor



LX-6 Load-sensing primary control valve

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All from one supplier:

Input – Logic – Output – Test unit - Output test unit -Diagnostics

Input. e.g. electronic operating elements or sensors

Logic, e.g. controller

Test unit e.g. controller

Output. e.g. hydraulic control block

Output test unit, e.g. electronic pump flow cut-off

Diagnostics, e.g. position monitoring



LX-6 Load-sensing primary control valve with pump cut-off unit



RS 220 Open centre primary control valve with electronic pump cut-off unit and control spool position monitoring sensor HLS 200 built into the directional

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Additional solutions

Perfectly matched to the HYDAC Technology platform.

Accumulators

HYDAC supplies accumulators and dampers for numerous hydraulic applications in mobile machinery, whether standard accumulators or customised solutions with, for example, devices for connecting and shutting-off the accumulator to and from the hydraulic system. A coordinated portfolio of accessories, such as clamps, consoles and complete accumulator sets for secure mounting of the accumulator to the machine complete the range

Customer benefits:

Our accumulator specialists have decades of experience in the development and design of all the major types of accumulator. This enables them to select the right accumulator for each application from the extensive product range and to size it according to the operating conditions. The correct accumulator will always provide the best performance for each application and country-specific approvals mean that HYDAC accumulators can be used world-wide



Bladder, piston and diaphragm accumulators for mo applicatio

See Accumulator Technology Catalogue no. 30.000

Accessories for every sector

For the completion of hydraulic systems

- Standard fittings (high pressure)
- Tamper-proof inductive proximity switch (high pressure-resistant)
- Fluid level sensors
- Temperature switch TSE
- Standard clamp 3015 Air/water reservoir clamping bands
- Test points
- Quick release couplings

See Accessories catalogue no. 61.000

• Special clamps for particle filters

Customer benefits:

HYDAC is your expert for modifications and special solutions at all times, and especially when custom jobs are required because standard parts are unsuitable HYDAC's in-house engineering, coupled with our multidisciplinary approach and worldwide know-how, guarantee state-of-the-art technology and rapid development times.

HYDAC accessories provide the final perfect touch to your machine with a broad range of standard and special components, also available in stainless steel



Ball valves, clamps, coaxial valves, fluid level gauges, etc

Cylinder systems

Our cylinders and cylinder systems are characterised by a versatile, extremely compact design. Our lightweight tipping, horizontal and outrigger cylinders with built-in valve technology guarantee optimum stability for your system even under the highest loads. To meet the safety requirements, this function is supported by our counterbalance cylinders. Whether single-stage differential cylinders or multi-stage telescopic cylinders, our hydraulic cylinders can also be used without any problem in confined spaces. We also offer lightweight cylinders with pressure sensors or a built-in distance measuring system on request.

See Cylinders and Cylinder Systems for Mobile Hydraulics - brochure no. HS-E 10.102

Customer benefits:

We offer you comprehensive customer service via our in-house Servicecenter. We support you during the design, assembly, maintenance and start-up of the system. We collaborate closely with the customer right from the development phase. Through our know-how we can achieve the best cylinder solution for your product, for example by using special surface coatings for the piston rod. FE simulations or fatigue strength calculations also come under our engineering standard.



Tipping cylinder



Outrigger

cylinders

Horizontal cylinder, 2-stage, double-action

Fluid Conditioning Systems

To provide flexible servicing on machines there are convenient mobile units for particle filtration

- Portable filtration units
- Mobile filtration units

Customer benefits:

- ⇒ Filling and flushing is clean and efficient ⇒ Versatile design - can be used on
- variety of systems
 - ⇒ Relief for the primary filters
 - ⇒ Greater system availability ⇒ Reduction in Life Cycle Cost

See Filter Systems Catalogue no. 79.000

FluidCareCenter

We get involved in the process early on. With our clean room in the FluidCareCenter, we promise you exceptional cleanliness from the component to the system: Technical component cleanliness is becoming increasingly important in mobile hydraulics. Phrases such as "reduction and prevention of production-stage breakdowns" and the difficulty of longer warranty periods are driving up the demands for component cleanliness.

Customer benefits:

- ⇒ By understanding the relevant cleanliness data of your components, you
- ⇒ A laboratory approved and recommended by well-known automotive suppliers
- ⇒ Many years' experience in the area of technical cleanliness owing to active collaboration on VDA Volume 19 and ISO 16232
- ⇒ Analysis with the help of extraction units developed at HYDAC
- ⇒ Sophisticated analysis equipment
- ⇒ Continual advances in equipment and processes to meet the increasing requirements and needs of customers

Customer

Mobile (SMS)

See FluidCareCenter brochure no. 7.128

Condition monitoring, teleservice

Constantly growing demands for operational availability, reduction in downtime, detailed load and service management (economy, wear & tear, service, warranty) require innovative integrated monitoring, service and control concepts. A variety of sensors provides the ideal basis for the development of such integrated system solutions.

Oil condition e.g. ageing or presence of contaminating oils can be determined via saturation level, temperature, change in electrical conductivity, change in dielectric constant (HYDACLAB®) Saturation level (AS) Particle contamination (CS) Pressure (HDA) Flow rate (EVS) Fluid level (ENS, HNT)

In combination with hand-held devices (HMG series), this data can be recorded and analysed to supplement the machine electronics (service)

GSM Modern GPS



will be a step ahead of your competitors.



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Note

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

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

Subject to technical modifications.