Global Presence. Local Expertise.
www.hydac.com
HYDAC has been one of the leading suppliers of fluid technology, hydraulics, electronics and cooling equipment for more than 50 years and has over 8,000 members of staff worldwide.

With our wide range of products, and with our acknowledged expertise in development, manufacturing, sales and service we provide solutions for the wide range of requirements in the machine tool industry.

For use in various excavator applications, HYDAC offers a wide range of industry-specific components and systems from the areas of hydraulics, cooling, electronics and control technology in addition to its standard products. Intelligent integration of products also creates innovative and technologically advanced subsystems and complete systems for the increased requirements of specialist machinery.

Customer benefits:
- Cost optimisation achieved by customised system solutions which use standard components
- Reduction in number of models through standardisation and modular construction
- On hand everywhere: more than 45 foreign companies and more than 500 Sales and Service Partners
- Fluid engineering and service: Support in technical design, for commissioning, maintenance, training and in the event of claims
- Customised solutions: designs can be tailored to individual customer requirements, made-to-order solutions for your machines.
- Advice on and implementation of the safety requirements in accordance with DIN EN ISO 13849

Function overview
Main functions:
- Boom, stick and bucket cylinders
- Swing drive
- Traction drive (wheel / crawler chassis)
- Additional control circuits

Additional functions:
- Boom adjustment (mobile excavators)
- Dozer blade (mini, compact, mobile and short-swing excavators)
- Support brackets (mobile & material handling excavators)
- Track adjustment (mini & demolition excavators)
- Quick coupler
- Hammer function
- Grab & pincer function (turning, opening/closing)
- All-wheel steering (mobile & material handling excavators)
- Cab adjustment (material handling excavators)
- Articulated joint adjustment (mini & compact excavators)

Mini excavators from 0.3 to 6.0 to.
- Adjustable undercarriage
- Boom can swivel to side
- Dozer blade
- Upper carriage tilting
- Quick-coupler systems

Mid-range excavators from 12 to 60 to.
- Standard boom or adjustable boom
- QUICK-couplet systems

Large excavators from 60 to 200 to.
- Backhoe excavators
- Shovel excavator
- QUICK-couplet systems

Metal handling excavators/machines
- Wheel or crawler chassis
- Forestry (forestry equipment)

Excavators – special designs
- Road-rail vehicles
- Material handling excavators/machines
- Short-swing/zero-swing excavators
Energy efficient, safe, comfortable.

The development of modern excavators is increasingly driven by the need for energy efficiency, comfort, safety, and reliability. In addition to standard components, HYDAC offers a comprehensive modular system to meet these demands. Our technology is tailored to customer needs, reducing CO2 emissions and extending maintenance intervals by monitoring systems. HYDAC offers tested and certified software libraries that are electrically and functionally secure. The demands of modern excavators are leading to ever-increasing complexity of control systems. Modern excavators require a variety of assistance and control systems whenever simple operating concepts and a better overview and controllability of the machine functions become necessary.

**HYDAC’s contribution**

HYDAC offers a variety of components and systems that meet these requirements and fulfill your demands to extend the standard packages. HYDAC offers a comprehensive modular system for each application. HYDAC can also provide you with a comprehensive solution that is tailored to your specific needs.

**HYDAC’s key issues**

Our development team and application engineers are working continuously to further develop our products. The focus of these developments is on the following key topics:

- **Function integration**
  - Combined functional units for pump, valve, and actuator technologies
- **Reliability**
  - Certified software modules for functional safety
  - Systems for functional safety
- **Noise reduction**
  - Robust noise level control
- **Health & safety**
  - Reduced exposure to dust by cabin ventilation systems
  - Reduced exposure by optimized cabin ventilation systems
  - Reduced exposure through regulated fan speeds
- **Piping and installation**
  - Integrated tank and control systems
  - Combined functional units
- **Software development**
  - HYDAC offers everything from component to intelligent control technology. The scope of development is determined together with the customer according to the task.

**Electro-hydraulic control technology**

From component to intelligent systems, HYDAC offers everything from component to intelligent control technology. The scope of development is determined together with the customer according to the task. HYDAC offers a variety of components and systems that meet these requirements and fulfill your demands to extend the standard packages. HYDAC offers a comprehensive modular system for each application. HYDAC can also provide you with a comprehensive solution that is tailored to your specific needs.

**Your benefits**

- **Increased life**
  - Electro-hydraulic system design reduces noise and wear on the machine
- **Energy efficiency**
  - Lower hydraulic losses
- **Reduced fuel consumption**
  - Lower emission levels
- **Increased controllability**
  - Better overview and controllability of the machine functions
- **Hydraulic oil tank sizes**
  - Optimized hydraulic oil tank sizes
- **Driver’s exposure to dust**
  - Ventilation systems reduce exposure to dust
- **Driver’s exposure to dust**
  - Monitoring systems for functional safety
- **Compliance with the Emissions Directive**
  - Sustained performance in all kinds of hydraulic control technology
- **Improved working position**
  - Sensitive controls, valves, and actuators
- **Hydraulic control systems**
  - Optimal positioning in combination with sensitive actuation and control systems
- **Energy saving and recovery systems**
  - Lower hydraulic losses
- **Integrated tank and control systems**
  - Combined functional units
- **System intelligence**
  - Electro-hydraulic system solutions as the interface between actuators and sensors.

**System development**

Based on the customer’s requirements, HYDAC offers support across the spectrum with developing electro-hydraulic control technology. The scope of development is determined together with the customer according to the task. Services can include:

- Creating customer-specific application software (according to specification)
- Integrating intelligent subsystems into the customer’s machine
- Complete control solutions for mobile machinery (safety functions, electro-hydraulic control architecture, application software)

**Software development**

HYDAC offers extensive consultation and support for customer projects with regard to:

- MATLAB/SIMULINK
- C
  - Application software:
    - Depending on the hardware, the following services can be provided:
      - Software development
        - Creating customer-specific application software (according to specification)
      - Services can include:
        - System development
          - Architecture, application software)

**System development support**

HYDAC offers comprehensive monitoring and support for customer projects with regard to:

- Matlab and the (R) interface
- Definition and description of safety functions
- Hazard and risk (H&R) analysis
- HYDAC offers extensive consultation and support for customer projects with regard to:
  - Machine control
    - Full support across the spectrum with developing electro-hydraulic control technology.

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**System development support**
"MATCH" development environment

**MATCH Mobile Application Tool Chain**

Development environment for mobile working machines

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

"MATCH" offers modules for:
- Defining the system at the vehicle level
- Starting up and servicing the machine
- Testing software
- Documentation

Furthermore, an "Embedded Middle Ware" is offered which permits a hardware-independent programming of the application and which contains a multitude of basic functions. A comprehensive software library with ready-made modules as part of its "MATCH" development environment. The library modules take place via CANopen according to CiA DSP 401. It enables inputs and outputs to be configured and parameterized via the CANopen controller configuration of the available control device in a simple and uncomplicated way.

The HY-TTC 500 controller series is based on a 32-bit processor with a modern micro-controller platform. The controller is notable for its impressive 96 inputs and outputs and for its high performance capability. The new HY-TTC 500 controller series is therefore especially suitable for complex control tasks in centralized and decentralized control architectures. The controller has up to three alternative PWM shutdown groups for differentiated safety functions.

**Sensors**, **system electronics** and **control systems**. Solutions perfectly tailored to the application – all from a single source.

**Software library**

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 parameterized 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.

**Sensors**

- **Function**
  - The range of sensors includes products for measuring pressure, temperature, distance, level, flow rate, speed, inclination and angle as well as contamination and oil condition.
  - In addition to products for standard applications, the product portfolio covers special applications in potentially explosive atmospheres or applications with increased functional safety.
  - Electronic sensors and controls to complement the system electronics.
- **Features**
  - Max. load regulation
  - Electro-hydraulic load sensing
  - Working hydraulics
  - Positioning
  - Controls of special equipment
  - Switch-off devices
  - Safety systems

**Mobile Controller HY-TTC 500**

- **Function**
  - The HY-TTC 500 controller series is based on a 32-bit processor with a modern micro-controller platform. The controller is notable for its impressive 96 inputs and outputs and for its high performance capability. The new HY-TTC 500 controller series is therefore especially suitable for complex control tasks in centralized and decentralized control architectures. The controller has up to three alternative PWM shutdown groups for differentiated safety functions.
- **Features**
  - SIL 2 / PL d
  - Up to three alternative PWM shut-off groups
  - Up to 36 PWM power outputs with current measurement and outputs with internal current measurement as well as configurable analogue and digital inputs.
  - Our product range includes two additional safety-oriented versions for the implementation of distributed applications with enhanced functional safety (SIL PL c, EN ISO 13849).

**I/O Expansion Module HY-TTC 30X / 30XS**

- **Function**
  - The HY-TTC 30X series of I/O expansion modules provides an outstanding power balance combined with extremely compact design. The HY-TTC 30X series extension modules are integrated very easily. They provide a simple extension of on-board electronics.
  - The communication and integration of the extension module takes place via CANopen according to CiA DSP 401. It enables inputs and outputs to be configured and parameterized via the CANopen controller configuration of the available control device in a simple and uncomplicated way.
- **Features**
  - 30 I/Os, with up to 8 PWM outputs, configurable analogue and flexible digital inputs.
  - They provide a simple extension of on-board electronics.

**Mobile Display HY-TTC eVision**

- **Function**
  - The compact background-lit TFT colour displays with integrated high-end display controller are characterized by a very high image quality, low reflections and high colour saturation as well as optimal readability, even under the most unfavourable light conditions.
  - The displays are protected by a robust aluminium or plastic housing and can be either built directly into the instrument panel or surface-mounted in the field of vision of the driver/operator using a RAM Mount® system in the cockpit.
  - Ten programmable illuminated control keys along with the optional touchscreen feature create an easy-to-use human-machine interface.
  - Up to two external cameras can be connected to the display via the two integrated composite video ports, and controlled via software.
- **Features**
  - User-friendly, self-explanatory and time-saving graphical design and operation interface
  - Good portability via CoDeSys platform
  - High image brilliance
  - High refresh rate
  - Fast boot-up times
  - Impress display options such as 3D, picture-in-picture, overlapping effects, etc.
  - Two pictures can be displayed simultaneously
  - Up to 4 CAN, USB and Ethernet interfaces
  - Robust housing with appealing design, suited for mobile applications

Solutions perfectly tailored to the application – all from a single source.
Hydraulic systems
The optimal working hydraulics for fast, accurate and efficient control.

Open center primary control valves
HYDAC’s open center primary control valves offer a modular system with which to design robust, energy efficient and cost-effective open centre control systems. The main control is based on proportional pressure control valves, which are ideally suited to industrial applications.

Properties:
- Structural design as monoblock, multi-section and slice construction
- Key data: $Q_{\text{max}} \leq 180 \text{ l/min}; p_{\text{max}} = 350/420 \text{ bar}$
- Energy-saving O-matic option
- Robust, high-quality and maximum controllability
- Low internal leakage
- Inlet track switching for safe volume flow distribution
- Electrical pump voltage cut-off
- Mean consumer in parallel, series and tandem switching
- Simple integration of secondary safeguards
- Optional switch position monitoring of the main control spool
- Optionally also for the USL-3 series

Key data for open center primary control valves (see photos on right):
- DH-2 primary control valve: $Q_{\text{max}} = 80 \text{ l/min}; p_{\text{max}} = 250 \text{ bar}$
- HS-220 main control valve: $Q_{\text{max}} = 150 \text{ l/min}; p_{\text{max}} = 350 \text{ bar}$
- DH-4 primary control valve

Load-sensing primary control valves
HYDAC’s load-sensing primary control valves offer a modular system with which to design load-compensated, energy efficient load-sensing controls for mechanical, pneumatic, hydraulic and electro-hydraulic controls.

Properties:
- Structural design as monoblock, multi-section and slice construction
- Key data: $Q_{\text{max}} \leq 180 \text{ l/min}; p_{\text{max}} = 350/420 \text{ bar}$
- Energy-saving O-matic option
- Robust, high-quality and maximum controllability
- Low internal leakage
- Inlet track switching for safe volume flow distribution
- Electrical pump voltage cut-off
- Mean consumer in parallel, series and tandem switching
- Simple integration of secondary safeguards
- Optional switch position monitoring of the main control spool
- Optionally also for the USL-3 series

Key data for load-sensing primary control valves (see photos on right):
- LH-2 primary control valve: $Q_{\text{max}} = 80 \text{ l/min}; p_{\text{max}} = 250 \text{ bar}$
- LH-4 primary control valve: $Q_{\text{max}} \leq 180 \text{ l/min}; p_{\text{max}} = 350 \text{ bar}$
- LH-4+IL-1471 Primary control valve combination

See brochure: 1.254 – Mobile Valves
See brochure: 5.268 – 1007
Focus on energy efficiency

Hydraulic hybrid technology
In many construction machines, the fuel consumption is on the rise due to the continuous increase in the load on the engine, which reduces the efficiency of the engine. To optimise the performance and efficiency of hydraulic systems, HYDAC offers a comprehensive range of solutions for hydraulic hybrid technology. The advantages of hydraulic hybrid technology are:

- Lower fuel consumption
- Improved performance
- Reduced noise levels
- Enhanced machine comfort
- Optimal support even in the initial phase of operation
- Significant improvement in the efficiency of the machine

To ensure that the right solutions are chosen for each application, HYDAC provides a comprehensive range of products and services, including:

- Customised accumulator solutions
- Specialised control blocks
- Functional valves
- Robust sensors
- Safety devices

Applications for excavator functions
We offer you different solutions for the various primary and auxiliary functions of your excavator:

- **Pilot control blocks/PCM**
  - Used to control the pilot-completed valve. The pressure balance between the hydraulic systems is maintained. The solution is flexible and can be adapted to any machine.

- **Proportional pilot control**
  - To control the pilot valve to provide stable operation. The control block is used as a booster in the system to reduce the control pressure.

- **Support control**
  - Used to support the main valve in the system. The solution is used to control the main valve in the system.

- **RSM load-holding valves**
  - For load-holding in excavators and material handling applications. The valves are used to control the large primary valves in mobile excavators.

- **Filter/tank solutions from a single source**
  - HYDAC offers a comprehensive range of solutions for filter and tank technology, including:
    - **Filter**
      - Robust sensors
      - Extensive valve portfolio
    - **Tank**
      - Parked brake
      - Changing travel speed
      - Supplying hydraulic joystick control

The following components can be integrated:

- Pilot, line & solenoid filters
- Return line filters
- Cartridge valves
- Proportional valves
- Pressure relief valves

Advantages:

- Clear benefits can be achieved by using the solutions from HYDAC in various applications, particularly by reducing the wear and tear on the components.
- The solutions are tested in the laboratory and on the site to ensure optimal performance. The solutions are designed to meet the specific requirements of particular machines, ensuring that the most appropriate value can be selected for each application.

Comprehensive range of product solutions:

- Cartridge valves
- Proportional valves
- Pressure relief valves
- Filter solutions
- Tank solutions

The RSM series, for example, is a combination of type RSM load-holding valves and flow regulators. The solutions are available in various versions and can be integrated into the machine as needed. The RSM series is available in 3 sizes for 60, 120 or 240 models, ensuring the most appropriate valve can be selected for each machine.

In cars, electrical start/stop systems are increasingly being used. This involves the integration of a hydraulic system into the start/stop system. HYDAC offers a comprehensive range of solutions for hydraulic systems, including:

- **WSM20121W**
  - Sensible size distribution at the same time as a wide range of functionalities.
  - Advantages:
    - Comprehensive range of housings available as accessories
    - Variety of models ensures the most appropriate valve can be selected for each machine
    - Optimum cooling capacity even in cramped spaces.
Hydraulic supply
Optimal solutions from the HYDAC technology platform.
CABINAIR: Air coolers with DC motors (OK-ELD) or hydraulic motors (OK-ELK) are used to cool air for the cabin space. The cooler's effectiveness can be increased by integrating a filter system. A full metal or stainless steel filter system, in combination with a standard filter, ensures clean, filtered air for the driver. The filter system can be used as a separate unit or integrated into the cooler unit.

Additional solutions

Perfectly tailored to the HYDAC Technology Platform.

CABINAIR:

- Filter system
- Air cooling
- Filter system
- Air cooling

CABINAIR for the occasion

- Combination coolers
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