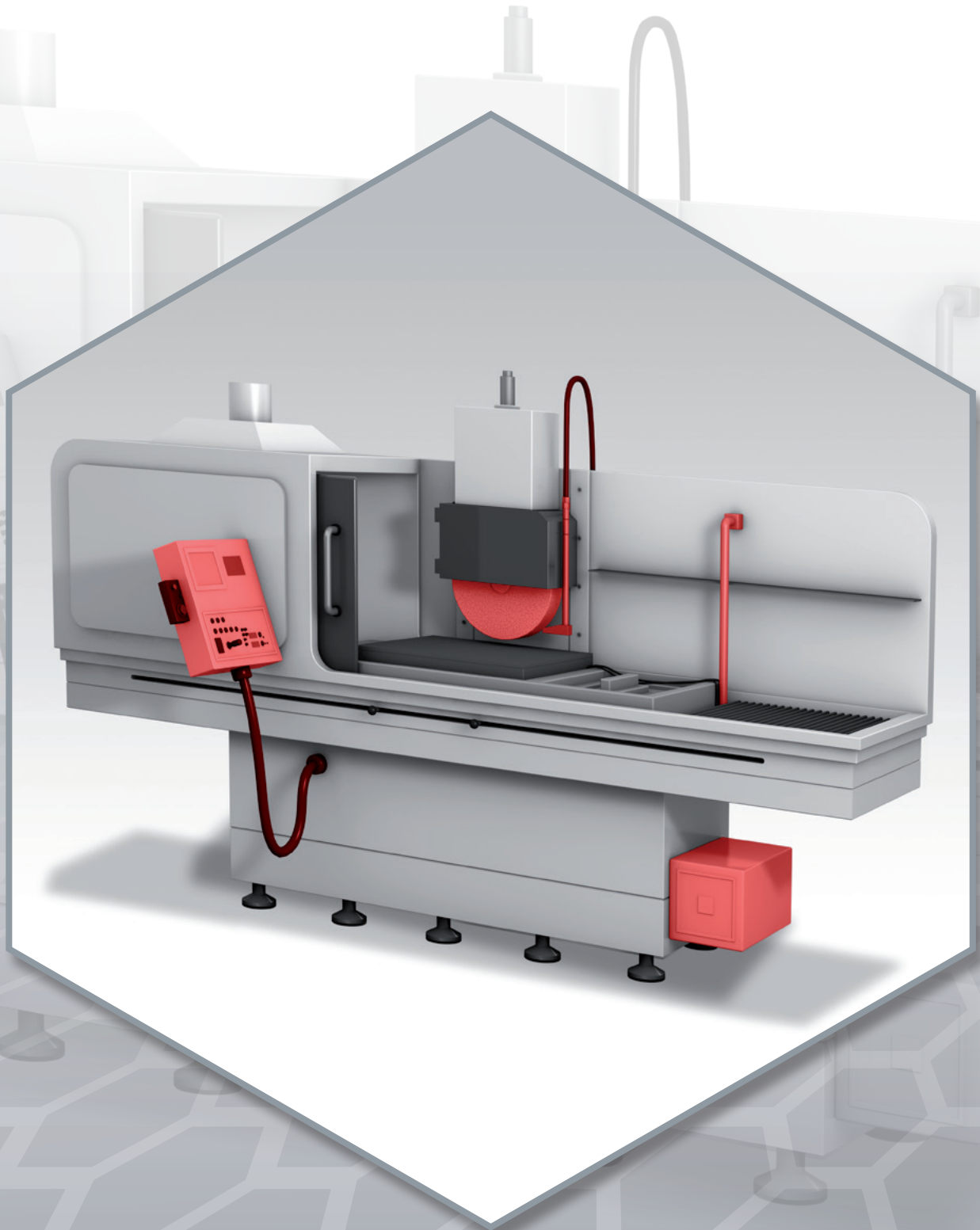


Components, Systems and Service for Grinding Machines



Innovative solutions specially designed for grinding machines ...

Your partner for expertise in grinding machines

HYDAC has been one of the leading suppliers of fluid power, hydraulics, electronics and cooling equipment for more than 60 years and has over 10,000 members of staff worldwide.

The breadth and depth of our product range, combined with our recognised expertise in development, manufacturing and service, allow us to provide solutions worldwide for the wide range of requirements in the machine tool industry.

In addition to standard products, HYDAC has a wealth of components specifically developed for use in grinding machines. These components have evolved from the fields of hydraulics, cooling, electronics and coolant management. Intelligent integration of products creates innovative and technologically advanced subsystems and complete systems for use in grinding machines.

Customer benefits

- Cost optimisation achieved by customised system solutions which use standard components
- Reduction in number of models through standardisation and modular designs
- Global yet local: More than 45 subsidiaries and over 500 sales and service partners
- Fluid engineering and service: Support in technical design, in the case of complaints, commissioning, maintenance and training
- Customised solutions: Designs can be tailored to individual customer requirements - made-to-order solutions for your grinding machine

Valve technology

- Valve stacking systems for controlling hydraulic functions
- Coaxial valves for controlling non-hydraulic media

Accessories

- Ball valves
- Fluid level gauges and fluid level sensors
- Mounting technology
- Other accessories

System solutions

- Customised, self-supporting units with all the components for fluid control
- Project-oriented solutions complex fluid control requirements including the necessary calculations

Software

Digitalisation of machine functions, states and processes:

- Visualisation, evaluation and interpretation
- Documentation, warnings and recommendations

Electronics

- Sensors (IO-Link, smart) and condition monitoring
- Measuring instruments and data recorders
- Network interface modules
- Accessories

Hydraulics

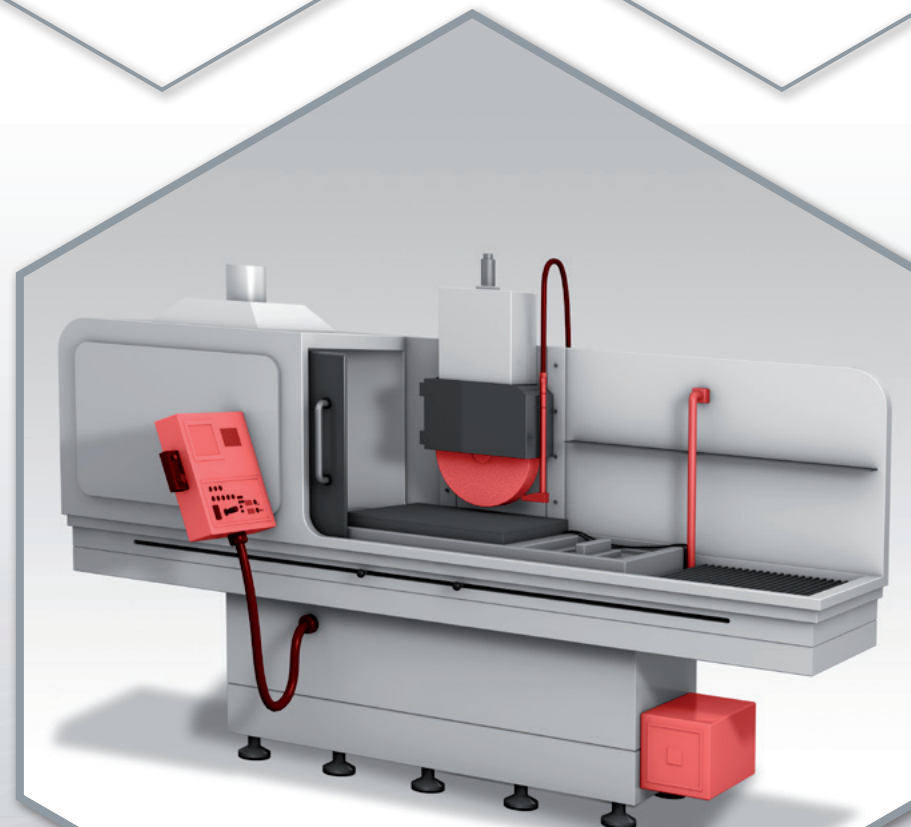
- Variable-speed drives for needs-based provision of hydraulic energy

Cooling

- Active and passive cooling systems for cooling drives, machine elements, hydraulic fluids and coolants

Filtration

- Inline filters for ultra-fine filtration to protect components
- Filter housing with optional change-over and monitoring functions
- Compact back-flushing filters with low maintenance requirements



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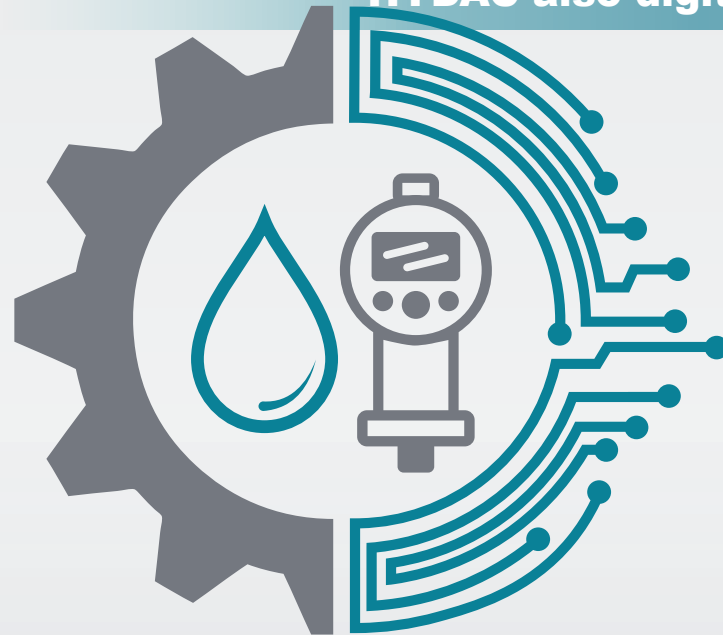
Project solutions

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Product innovations

Reduce water content in oil, smart filter sensor, Stat-X filter, online sensors for coolant applications, Smart Compact Power Unit, intelligent industrial valves, valves with position monitoring 21

HYDAC also digitalises fluid power technology



Digitalisation of the lowest field level closes an important communication gap in terms of the Internet of Things. It also increases efficiency and improves machine availability.

Using the digital IO-Link communication protocol allows the transfer of information in addition to the process data, such as value status (validity of the process data) and incidents (error messages) as well as many types of device information (ID, operating parameters, diagnosis etc.). Thanks to the bidirectional communication with the sensors and actuators on the lowest field level via IO-Link, new services are made possible such as remote diagnosis, remote service and condition-based predictive maintenance.

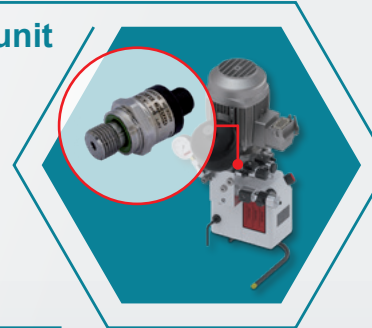
Remote or automated self-parametrisation speeds up and simplifies the initial start-up and maintenance of systems and plants.

"Plug & Play" minimises sources of errors, reduces machine downtime and leads to cost savings when configuration parameters are transferred to the new device by the controller in a fully automated process.

Thanks to these functionality enhancements, these sensors and actuators are an integral component for digitalisation and system networking in **"Smart Factory"** solutions in the age of Industry 4.0.

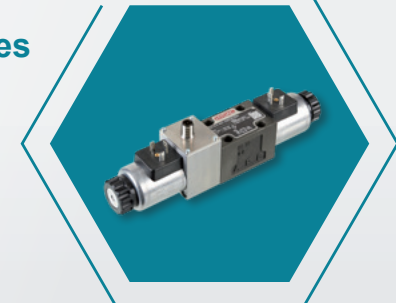
CO1S – smart compact power unit with a high power density

- Smart sensor with IO-Link interface
- Automatable p_0 assessment
- Condition monitoring and notification when operating parameters are outside of the permitted range
- Pressure peak monitoring including operating hours counter



IO-Link actuators – smart valves with position monitoring

- Condition monitoring to comply with the safety principles according to DIN EN ISO 13849-2.
- Communication via IO-Link (type A)
- Diagnostic information



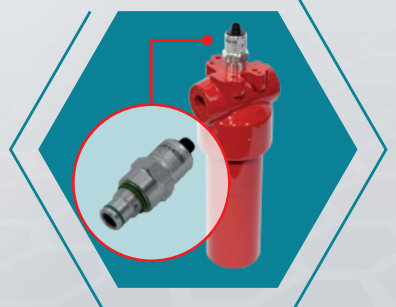
Smart pressure sensors for monitoring your fluid system

- Monitoring whether operation complies with specifications
- Recording of load profile & overload detection
- Detailed information on irregularities
- Data foundation for smart services and new business models



Smart filters thanks to the Virtual Fluid Lab (VFL)

- Filter monitoring
- Determination of remaining element service life
- Logging function for analysis
- Active system monitoring



Smart hydraulic accumulators with p_0 monitoring

- Monitoring of gas pre-charge pressure
- Simple installation on the oil side
- Retrofitting of existing systems
- Accumulator charging function
- Data analysis in the pressure sensor



Smart fluid level sensors with LoRaWAN

- End-to-end encryption
- No cabling needed
- Battery operation up to 10 years
- Can be retrofitted
- Wireless interface (LoRaWAN)
- Variable switch points



Electronics

Sensor systems and condition monitoring components contribute to increased productivity, a high level of machine safety, effective mechanical efficiency and the achievement of high quality machining.

To this end, HYDAC ELECTRONIC provides sensors for pressure, position, level, temperature, flow and oil level monitoring with analogue or digital output signals as well as communication interfaces.

In the context of increasing digitalisation, the sensors are also available as smart sensors with IO-Link interfaces and a variety of diagnostic options such as device temperature, temperature-standardised operating times and measuring range monitoring, to mention but a few.

The product range also encompasses data recorders and measuring equipment for the parameterisation and analysis of smart sensors. In addition, the HYDAC ELECTRONIC product range includes network interface modules (IO-Link Master) which enable connection to the control level and the Internet of Things.

Pressure sensors



Pressure transmitters: HPT 1000 Smart IO-Link, HDA 8000, HDA 4000 IO-Link;
Pressure switches: EDS 3000 IO-Link, EDS 824 IO-Link, HPS 2000 IO-Link

Features

- Robust wear-free measurement technology
- Long-term stability
- Simple and precise adjustment:
 - Automated, e.g. via an IO-Link interface
 - Manual, e.g. based on VDMA menu navigation
- Application-specific and customer-specific models
- Model for applications with increased functional safety
- Additional functions/diagnostics functions via smart sensors

Function

- Reliable pressure monitoring is of prime importance for the machine's function and the quality of the component. Pressure transmitters and switches are deployed to monitor:
 - Clamping pressure
 - Workpiece support
 - Coolant systems
 - Hydrostatic bearings
 - Accumulator charging pressure
 - Pneumatics
- Ensuring that machine operation meets the specification and simplifying troubleshooting in the event of errors, via overload detection for example

Advantages

- Increased machine availability
- Accuracy stability over the entire useful life
- Consistently high machining quality
- Time savings thanks to plug & play technology
- Optimised stock control
- Operating errors minimised thanks to self-parametrisation (with IO-Link)
- Simplified or optimised machine architecture / cabling
- Increased machine safety
- Smart sensors with added value:
 - Storage of diagnostic information in the sensor
 - Measurement range and device temperature monitoring
 - Automatic self-parametrisation
 - Remote diagnosis, remote maintenance
 - Condition-based, predictive maintenance

Temperature sensors



Temperature transmitters:
HTT 1000 Smart IO-Link; HTT 8000, ETS 4000 Smart IO-Link;
Temperature switch: ETS 3000 IO-Link; Temperature probe: TFP 100

Features

- Robust, wear-free measurement technology
- Long-term stability
- Simple and precise adjustment:
 - Automated, e.g. via an IO-Link interface
 - Manual, e.g. based on VDMA menu navigation
- Application-specific and customer-specific models
- Additional functions/diagnostic functions via smart sensors
- Different probe lengths or remote temperature probe (TFP 100)

Function

- A consistently high product quality can only be achieved when the machining tools are at a constant temperature
- Temperature transmitters and switches are used to monitor the temperature of cooling media and hydraulic fluids
- Ensuring that machine operation meets the specification and simplifying troubleshooting in the event of errors via overload detection

Advantages

- Increased machine availability
- Accuracy stability over the entire useful life
- Consistently high machining quality
- Time savings thanks to plug & play technology
- Optimised stock control
- Minimal operating errors
- Simplified or optimised machine architecture
- Smart sensors with added value:
 - Storage of diagnostic information in the sensor
 - Measuring range and device temperature monitoring
 - Automatic self-parametrisation
 - Remote diagnosis, remote maintenance
 - Condition-based, predictive maintenance

Level sensors



Level switches: ENS 3000 IO-Link, HNS 3000 IO-Link;
Level transmitter: HNT 1000; level switch: HNS 526

Features

- Wear-free measuring method
- Fluid level display
- Simple and precise adjustment:
 - Automated, e.g. via an IO-Link interface
 - Manual, e.g. based on VDMA menu navigation
- Analogue resolution over the whole measuring range
- Combined sensors for fluid level + temperature

Function

- Measuring and monitoring of fill levels in oil tanks or coolant tanks

Advantages

- Increased machine availability
- Time savings thanks to plug & play technology
- Accuracy stability over the entire useful life
- Consistently high machining quality
- Continuous, smooth level detection over the entire measurement range
- Active metrological suppression of short-term fill level fluctuations
- Automatic fill level detection and readjustment to central systems
- Level measurement and temperature measurement combined

Flow sensors / flow meters



Flow rate transmitters: EVS 3100, HFT 2100, HFT 2500 (structurally identical);
Flow switch: HFS 2000; Flow meter: HFS 256

Features

- For water, oils, coolants
- High level of measuring accuracy and switching accuracy
- Robust design
- Viscosity-compensated
- Low Δp
- Ensures sufficient cooling / lubrication

Function

Flow sensors are used to measure and monitor the flow rates of fluid media:

- Monitoring hydraulic oil circuits
- Monitoring the flow rates to the tool in internally cooled tools

Advantages

- Process analysis and optimisation
e.g. optimising tool use by monitoring the flow rates
- Pump dry-running protection
- Early detection of leaks
- Increased machine availability

Position sensors: Linear position, distance, angle, inclination



Linear position sensors: HLT 2500 flat housing IO-Link/profile design, HLT 1000 rod; Position switch: IES 2020; distance sensor: HLS 528; angle sensor: HAT 1400; inclination sensor: HIT 1500

Features

- Linear position/distance sensors based on various measurement methods
 - Magnetostrictive:
 - Wear-free and robust
 - High accuracy
 - Automated, e.g. via an IO-Link interface
 - Other linear position and distance sensors based on LVDT, Hall sensors, ultrasonic sensors and optical sensors
- Angle sensors
 - Detection of the angle of rotation using a non-contact, robust and magnetic measuring method
 - Various models
 - Single-turn angle sensor with absolute measurement
- Inclination sensors
 - Based on MEMS technology
 - Very robust sensor element
 - Highly dynamic
 - Good long-term stability
 - Motion-compensated

Function

Increasing demands for precision, machine availability and improved safety require reliable measuring technology which is perfectly adapted to the application.

Linear position and position sensors are used in:

- Tailstock monitoring
- Valve position monitoring
- Position detection, e.g. on locks
- Detection of traverse paths

Advantages

- Increased machine availability
- Consistently high machining quality
- Simplified and optimised machine architecture/cabling
- Increased machine safety
- For general applications and applications with increased functional safety SIL 2/PL d

Oil condition sensors



AquaSensor: AS 1000, AS 3000 IO-Link;
Oil condition sensors: HLB 1400 IO-Link

Features

- Online condition monitoring of oils
- 2 in 1 combined sensor: for the detection of water in oil
 - Saturation level
 - Temperature
- 4 in 1 combined sensor: for the detection of oil degradation or mixing with other fluids
 - Saturation level (rel. humidity)
 - Temperature
 - Dielectric constant
 - Electrical conductivity

Function

The humidity / oil condition sensors enable hydraulic oils and lubrication oils to be monitored accurately, continuously and online.

Advantages

- Early detection of water problems / oil degradation enables needs-based maintenance / fluid care
- Increased machine availability

Measurement technology



Measuring instrument / data recorder: HMG 4000;
USB IO-Link programming adapter ZBE P1

Features

- Measuring instrument / data recorder HMG 4000
 - Up to 38 sensors can be connected
 - Up to 100 measuring channels can be displayed simultaneously
 - 5.7" colour graphics touch display
 - IO-Link interface for parameterisation
- Programming adapter ZBE P1 for programming HYDAC sensors in connection with a PC

Function

The HMG 4000 measuring instrument and data recorder is designed for:

- Data collection and analysis, data storage
- Sensor parameterisation

Advantages

- Simplifies service and commissioning
- Remote diagnostics, remote maintenance and condition-based, predictive maintenance
- Measurement and analysis
- Connection to the Internet of Things

Network interface



Network interface: IO-Link Master



Features

- IO-Link Master network interface module
 - with 4 or 8 ports
 - Class A or Class B

Function

- Link between IO-Link field device and automation system/ PLC

Advantages

- Simplifies service and commissioning
- Remote diagnostics, remote maintenance, predictive maintenance
- Measurement and analysis
- Connection to the Internet of Things
- Simplified, faster and more cost-effective cabling for the entire system via IO-Link Master

Variable-speed drives

Grinding machines require large oil flow rate ranges at constant pressure ratios. To reduce downtimes and speed up processing times, the clamping cylinders must be operated as quickly and reliably as possible when clamping the workpieces. For this purpose, the variable-speed power unit facilitates the maximum flow rate possible to make the low, system-related leak flow rate of the rotating clamping cylinders available. This is just one example of the great potential of this modern drive technology offered by HYDAC KineSys.

The robust gear pump and electrical drive control work together in a symbiosis which perfectly combines the benefits of hydraulics and electronics.



CO3 – reduced to the essentials

The CO3 variable-speed hydraulic power unit is a standardised pressure supply unit. Designed to meet the needs of the most demanding grinding machines, this is the ideal machine for continuous operation with an efficient cost structure. Cooling for the oil, motor and drive controller is included, which means that the system can be integrated into the machine via plug & play.



DVA kit – for custom requirements

The DVA kit hydraulic power unit is a variable-speed pressure supply unit that can be customised to meet a wide range of grinding machine requirements.

In contrast to the CO3 unit, all degrees of freedom are available here. Output, tank volume, valve stacking systems, various pressure circuits and accumulators, cooling, etc. can be tailored exactly to machine requirements.

Advantages

- **Simple integration into the machine:**
Plug & play means needs-based, variable-speed pressure supply for immediate use. For simple controlled functions, constant pressure systems and machines in continuous operation.
- **No machine control** or programming required for simple applications, such as pressure control.
- **No control cabinet** required thanks to motor-mounted drive controller.
- **Sensors for unit condition monitoring** can be wired directly to drive controllers, evaluated and read via a fieldbus interface in the machine control system (pressure, fluid level, temperature, filter contamination).
→ No need to wire or install the unit sensors in the machine control system.
- **Simple troubleshooting:**
Error codes can be transmitted in plain text via Fieldbus.
- **No knowledge of the drive controller software required:**
All interfaces for control and condition monitoring can be transmitted via a standardised Fieldbus protocol or via analogue and digital signals.
- **Merging of interdisciplinary systems:**
Hydraulics, electrical engineering and programming are fully harmonised.
- **Standardised modular system** with standardised components.
- **Easy to configure** (configurator and guided enquiry form & design documents)



Stacking system

HL controls with flexible valve solutions

Features

- Can be used as individual modules or in stacking configurations locally in the machine
- Installed close to the particular actuator
- Can easily be extended to achieve the required range of functions
- Tried-and-tested cartridge valve technology in conjunction with Cetop valves in Δp -optimised, modular housings
- High energy saving potential due to zero-leakage poppet valves in conjunction with an accumulator charging function
- Modular design with a range of standardised valve cavities and intelligent combinations to offer a wide selection of circuits
- Vast in-house manufacturing capacity in valve production enables a high degree of flexibility in terms of customer requirements

Function

The HL stacking system is a control logic for the auxiliary functions in a grinding machine.

It consists of individually combined standard modules. These modules achieve the customer's desired function through flexible valve solutions. Each function module can be used both independently and in stacking configurations. The sequence of modules depends on the control task, as does the use of pressure, flow control, shut-off and directional control valves on the module.

The system can easily be customised as adding and exchanging components is very simple.

Advantages

- Energy efficiency
- High level of integration
- Plug & play
- Reliability

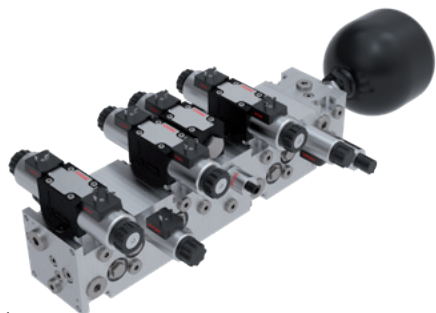


Individual modules for different applications

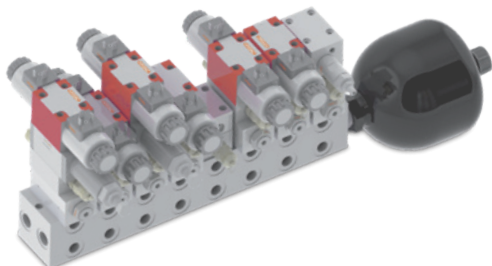
HL stacking system vs. conventional stacking systems

The compact design of the HL stacking system, which was specially developed for the numerous hydraulic applications of the grinding machine, offers considerable advantages over conventional stacking systems, e.g. in terms of installation space, weight, costs and flexibility, for example.

- Cavity: -35%
- Weight: -40%
- Costs: -10%
- High flexibility due to modular design
- Almost all hydraulic functions are possible



HL stacking system



Conventional stacking system

Filtration and coolant

Automatic back-flushing filter AutoFilt® RF9



Automatic back-flushing AutoFilt® RF9, Chemicon®-filter elements

Patented hydropneumatic back-flushing

Features

- Fine filtration of coolants and fluids with high viscosity
- Large filter area for its compact design
- Low-maintenance and easy-to-service design
- Filtration ratings from 5 to 100 µm
- Flow rates up to 1,000 m³/h

Function

The medium flows through the filter chambers from outside to inside in parallel and the contamination is retained on the outer surface of the filter elements. One cleaned filter chamber is always on stand-by.

If increasing filter element contamination causes the differential pressure to rise, back-flushing is initiated.

The stand-by chamber is made available for filtration, while in another the contaminated filter element is back-flushed with compressed air and the filtrate is removed via the back-flushing connection.

Advantages

- Efficient hydraulic cleaning
- High cleaning efficiency
- No reduction in pressure during back-flushing
- Low flow losses
- No mixing with the compressed air
- Defined back-flush volumes

Automatic back-flushing filter AutoFilt® RF4



Automatic back-flushing filter AutoFilt® RF4, conical filter elements

Tried-and-tested function principle, compact design

Features

- Separation of solid particles from low viscosity fluids
- Filtration ratings from 20 to 1,000 µm
- Flow rates up to 385 l/min
- Compact design
- Efficiency thanks to automation
- Performance enhanced by isokinetics
- Optional: AutoFilt® Control Unit ACU with open connectivity to all common interfaces (Ethernet, RS-232 C, RS 485) for self-diagnostics, system diagnostics, remote monitoring and process monitoring

Function

The medium flows through the filter elements from the inside to the outside. Contamination particles then collect on the smooth inside of the filter element surface. As the level of contamination increases, the differential pressure between the contaminated and clean sides of the filter increases. When the differential pressure reaches the pre-set trigger point, back-flushing starts automatically.

Advantages

- Fully automatic function
- Ready-to-use unit
- Maximum utilisation of the filter area
- Full filtration performance following back-flushing
- Complete cleaning of the conical filter elements
- Low maintenance
- Low operating costs

Automated coolant management FCU 5000 and FluidController 5000



FCU 5000



FluidController 5000

Features

- Continuous monitoring and control of concentration, pH value, conductivity, temperature and tank level
- The specified target concentration and fill level in the coolant tanks can be kept constant by automatically topping up the coolant concentrate and refilling the tanks with ready-mixed emulsion.
- Documentation of all measured parameters

Applications

- Fully automated fluid management for central systems
- Fully automated fluid management at up to 10 measuring points for linked, decentralised systems

Advantages

- Fully automated system solution
- Increased productivity: ROI < 1 year possible
- Safeguards key coolant parameters in chip-removal machining processes
- Direct connectivity to the cloud and control station
- Creation of digital lab reports (Employers' Liability Insurance Association-compliant in acc. with TRGS 611)
- Integrated self-monitoring for consistently reliable measurements

Inline filters LF / DF / FLND / FMND



Change-over filter FLND

Ultrafine filtration for component protection

Features (depending on the filter type)

- Separation of solid particles from hydraulic fluids and coolants
- Filtration ratings from 3 to 50 µm
- Flow rate up to 900 l/min
- Pressure up to 420 bar
- Filters to DIN 24550 available
- Change-over filters possible

Function

As the fluid passes through the filter element, the particles are retained and become embedded in the deep structure of the element. The large internal surface provides a high contamination retention capacity and long filter service life. The excellent filtration of even the smallest particles protects the downstream components, such as the rotary joint, internally cooled tools and high pressure valves, from damage.

Advantages

- Desired cleanliness class is guaranteed
- Protects downstream components
- Low pressure drops
- Compact and space-saving design
- 24 hour operation with duplex change-over filters
- Low leakage when changing element
- Available with/without bypass valve

Cooling

Fluid-air cooling systems FLKS



Fluid-air cooler FLKS 2EC

Features

- Cooling of circuits which use water glycol or mineral oil
- Compact design with plastic tank, circulation pump, cooling element and fan
- Various sizes with cooling capacities up to 4.5 kW/K and flow rates up to 300 l/min

Function

The pump conveys the cooled operating medium from the tank through the component that is to be cooled. The fluid absorbs heat from the component and then flows back to the heat exchanger, where it is returned to a cooler temperature by the air flowing from the installed fan.

Advantages

- Cost-effective and efficient cooling system
- Compact and lightweight: sizes FLKS-1 to FLKS-5 are equipped with plastic tank housings
- Energy efficient as optimised, specially designed drives are used and heat is dissipated directly to the environment
- Optional: speed-controlled systems:
The temperature of the operating medium is controlled by adjusting the fan speed to a defined differential to the ambient temperature

Fluid-water cooling systems FWKS



Fluid-water cooler FWKS-2-2

Features

- Cooling of circuits which use water glycol or mineral oil
- Compact design with plastic tank, circulation pump and plate heat exchanger
- Various sizes with cooling capacities up to 250 kW and flow rates up to 300 l/min
- Can be used as a temperature-controlled intermediate circuit; in this way, the contamination and corrosion in the coolant circuits which could arise as a result of direct cooling with poor water quality is prevented

Function

The pump conveys the cooled operating medium from the tank through the component that is to be cooled. Once there, it absorbs the heat and flows back to the plate heat exchanger where it is cooled again by the cooling water.

Advantages

- It is also possible to cool to temperatures below the ambient temperature (depending on the temperature of the available cooling water)
- Low release of heat to surroundings and low noise emission
- Thermostatically or electronically controlled proportional valve available as an option: this is how the temperature of the operating fluid can be maintained at a specific temperature value

Plate heat exchanger – gasketed or brazed



Brazed and gasketed plate heat exchangers

Function

Thanks to their compact design, highly turbulent flow and use of the countercurrent principle, plate heat exchangers can generate extremely high levels of heat recovery. Temperature harmonisations of up to 1 K can be achieved.

Gasketed plate heat exchangers

Features

- The stack of heat transfer plates and gaskets is clamped together with bolts in a frame.

Advantages

- High thermal performance thanks to CFD-optimised wave field of the heat transfer plates
- Cleaning and maintenance simplified thanks to visual seal identification and use of clip-on seals.
- Safety heat exchanger designs with double plates and a special sealing system to prevent media from mixing even in the event of plate damage

Brazed plate heat exchangers

Features

- The stainless steel transfer plates are brazed with copper as standard and can withstand pressures up to 30 bar.

Advantages

- Easy to service and easy to maintain thanks to highly efficient self-cleaning resulting from the turbulent flow in the flow gaps
- Efficient cooling capacity combined with low cold water consumption
- Wide range of applications, including aggressive media, or with double plates to prevent media from mixing

Plate heat exchanger with closed-loop control WTRE



Plate heat exchanger with closed-loop control

Features

Water cooling system, consisting of:

- A brazed plate heat exchanger
- A flow control valve
- An electronic controller
- A temperature sensor for measuring the fluid temperature or, additionally, the air temperature

Function

The WTRE is used as an intermediate circuit for cooling motor spindles, gears, hydraulic power units and cooling lubricants. It is generally used in combination with the existing cooling unit. The coolant is pumped from the cooling unit pump through the WTRE plate heat exchanger to the machine tool. If the available plant cooling water is cold enough, the compressor is not needed and remains continuously switched off.

Advantages

- Fixed value control of the fluid temperature;
As an option, the temperature of the operating fluid can also be kept at the ambient temperature (air or machine bed temperature)
- Highly accurate electronic controller
- Reduced operating costs due to energy savings
- Simple retrofitting: interference with the machine tool's electrics or PLC is not necessary

Refrigerated Fluid Cooler RFCS



Refrigerated Fluid Cooler RFCS

Features

- Fluid cooling system as separate auxiliary cooler or for integration into a machine
- Cooling capacities from 0.3 to 200 kW
- Can be used for any cooling tasks
- Stand-alone control of the system due to innovative controller design
- Condenser available as water-cooled or air-cooled version
- Several cooling circuits possible
- Precise temperature control accuracies of up to ± 0.1 K

Function

The RFCS cooling unit cools various fluids such as water, DI water, water glycol and oils. The cooling system, which consists of a chiller, pump, tank and control, independently regulates the operating medium temperature to a pre-defined setpoint. The energy-efficient, patented mixer principle rounds off this system to make it an ideal component for your machine tool.

Advantages

- Natural refrigerants (propane, CO₂) available
- Number of options
- Compact dimensions
- User-friendly control interface
- Plug & play solution
- Easy to service and user-friendly

CX valves control and regulate your media
Available as individual valves and in modular stacking configurations



When it comes to media compatibility, CX valves are a tried-and-tested means of controlling vacuum as well as gaseous, gelatinous, highly viscous, paste-like and, above all, contaminated and aggressive media. They can therefore be used in a wide range of applications. The range of models extends from simple switch valves to special application-specific valves and complete modules.

A broad range of sizes and connection types combined with seal materials and housing materials which are compatible with the medium enable our engineers to develop tailor-made solutions for an almost unlimited range of applications.

CX valves in low to high pressure ranges for use with a range of media from gaseous, highly viscous and clean media to heavily contaminated media. **HYDAC offers a well-stocked standard range – on request, from stock!**

Made in Germany

HYDAC offers more than just first-class quality. We rely on our in-house production. For us, this means a "Made in Germany" promise. The advantages for you are clear: we don't just deliver quickly, we also press ahead with custom developments in very short time frames. The direct communication channels between development, production and you as a customer combined with our exceptional engineering skills makes for the perfect mix.

Close links between development and sales

Try out new projects or make use of our extensive standard assortment. Our deliveries are always fast and straightforward, no matter what. From tried-and-tested products and minor modifications to complete custom solutions – talk to us about your project.

Advantages

Pressure balanced design

- System pressure and Δp do not have any influence on the switching forces
- Valves switch from 0 bar; no minimum differential pressure is required
- High pressures can be switched with low energy consumption

Back pressure tight

- When closed, the pressure on the outlet side can be higher without any leakage occurring
- There is no need for additional valves, such as non-return valves

Fast actuation

- The valve design enables fast switching times
- Repeatable switching behaviour in less than 40 ms
- Precise switching and high switching cycle rate

Bi-directional operation

- The valve design allows for flow in both directions
- 100 % reliability in both directions
- Their application reduces the number of other, conventional valves

Resistant to contamination

- Valve design with only one moving part, which makes it resistant to contamination
- Long service life and low maintenance effort

Compact size

- Valve drive is located around the control tube, so no bulky valve drives
- CX valves fit into the pipework
- For use in confined installation spaces

CX valves – Cartridge version



CXC DN10 & CXC DN15

Features

- Can be used up to 200 bar
- Compact design
- Control of high pressures at the same time as high flow rates
- Pilot control thanks to standardised 5/2-way Namur valves
- Detection of the valve position by magnetic field sensors

Function

Cartridge valves are also referred to as 2/2-way valves. Three screws are used to secure the valve cartridge in the valve body. Once installed in the pipe system, one advantage the system offers is that the valve cartridge can be replaced in a matter of minutes if necessary. There is no need for arduous removal of the entire valve body from the pipe using a large spanner. Only the three screws need to be loosened.

Advantages

- Cartridge valves are easy to use and don't require any special tools or specialist knowledge.
- If necessary, cartridge valves can be replaced quickly and easily without having to dismantle the entire valve.
- Cartridge valves provide a reliable seal
- Cartridge valves are available in various sizes and versions to meet the requirements of different applications.
- Maintenance work can be carried out quickly and efficiently thanks to the simple replacement of cartridge valves.
- Using cartridge valves can reduce the overall cost of installing and maintaining valve systems.

2/2-way, direct-acting	3/2-way, direct-acting	2/2 way, externally controlled	3/2-way, externally controlled
DN10 to DN50 / PN0 – 100 bar	DN10 to DN50 / PN0 – 64 bar	DN10 to DN50 / PN0 – 200 bar	DN10 to DN50 / PN0 – 100 bar
2/2-way, direct-acting Modular	3/2-way, externally controlled Modular	2/2-way, direct-acting Modular plug-in	3/2-way, externally controlled Modular plug-in
DN10 to DN50 / PN0 – 100 bar	DN10 to DN50 / PN0 – 160 bar	DN10 & DN15 / PN0 – 100 bar	DN10 & DN15 / PN0 – 120 bar
2/2-way, externally controlled Cartridge valve	2/2-way, externally controlled Compact	2/2-way, externally controlled Compact modular	2/2-way, externally controlled Modular cartridge valve
DN08 / PN0 – 40 bar	DN08 / PN0 – 40 bar	DN10 & DN15 / PN0 – 200 bar	DN10 & DN15 / PN0 – 200 bar
2/2-way, direct-acting Flanged valves	2/2-way, externally controlled Flanged valves	Pressure relief valves	Pressure-reducing valves
DN15 to DN50 / PN0 – 100 bar	DN15 to DN50 / PN0 – 160 bar	DN10 to DN20 / PN3 – 200 bar	DN12 to DN320 / PN0 – 200 bar
Position control valves	Customised solutions		
DN01 to DN20 / PN0 – 120 bar			

The valves are technically designed for specific media and applications, which may lead to deviations from the general specifications mentioned in terms of design, sealing materials and parameters.

Accessories for every sector. HYDAC's comprehensive product range can supply the right components for all your fluid power requirements, whether this involves locking, switching, control, fastening lines and components, screw-in connections, couplings or damping.

Ball valves



Manual or with pneumatic actuator

Function

Secure blocking and redirecting of your media. We supply a wide range of high-quality materials for the biggest challenges in your application. Manually operated or switched automatically, with a pilot valve and additional position monitoring on request, from analogue to bus communication or IO-Link. We supply custom solutions for almost any application. Our expertise ranges from the requirements analysis and development to the finished product. Get in touch – we will gladly assist you with your project from the outset.

Advantages

- Full-flow passage to ensure unrestricted flow of the medium
- Self-sealing due to sealing principle with floating ball
- Easy actuation, even at high pressures
- Maintenance-free, no adjustment of the seal necessary
- 100% individual testing of the ball valves

Fluid level gauges and fluid level sensors



Fluid level gauge FSA / fluid level sensor FSK

Function

Visualisation and monitoring of fluid level values. The range spans from our series product line to especially robust, break-proof and leak-proof custom solutions. A wide variety of materials and designs as well as temperature ranges of between -50 °C and +160 °C are available.

Advantages

- UV and temperature resistance
- Custom designs and models
- Large number of connectors and switching functions for FSK
- Optional temperature monitoring
- Tank stop for easy maintenance
- Specially selected materials for challenging media
- Special versions with LED and wireless remote monitoring

Mounting technology



Tank, component, pipe, cable and hose mounting

Function

For the mounting of tanks or components of different shapes and materials, along with pipes, hoses, cables, sensors, switches and/or all other parts, the HY-ROS range from HYDAC supplies solutions suitable for all kinds of applications.

Advantages

Series strips:

- Bundled, safe and optimised installation
- Simple and rapid installation
- Protection of sensitive components
- Compensation of pipe and cable tolerances
- Different diameters in one series strip

DIN 3015 and Buegu clamps:

- Damping of shocks, vibrations and noise, as well as compensation of pipe tolerances
- High strength
- Surface protection
- Safe overhead installation

Clamping bands:

- Easy installation thanks to hinged closure system
- System solution with support base and other attachment parts
- Custom shaping of the clamping bands for extra flexibility
- Various materials for any application
- Reduced vibration and noise level
- Produced in-house – custom-made or standardised

System solutions

Fluid panel



a Coolant / media control

CX valves, ball valves, piston control valves, high pressure pump, automatic back-flushing filter

b Electronics

Sensors, electrical control

c Hydraulics

Hydraulic power units, valve stacking systems, hydraulic accumulator units, mounting technology

d Pneumatics

Supply unit, valves, modules

e Lubrication systems

Lubrication units, dosing units, pressure filters

f Cooling

Air, water and/or compressor cooling systems

g Level display

FSK LED

Function

A fluid panel is a self-supporting unit which combines all the fluid control components of a machine tool. It includes the cooling, electronics, coolant, hydraulics and pneumatics.

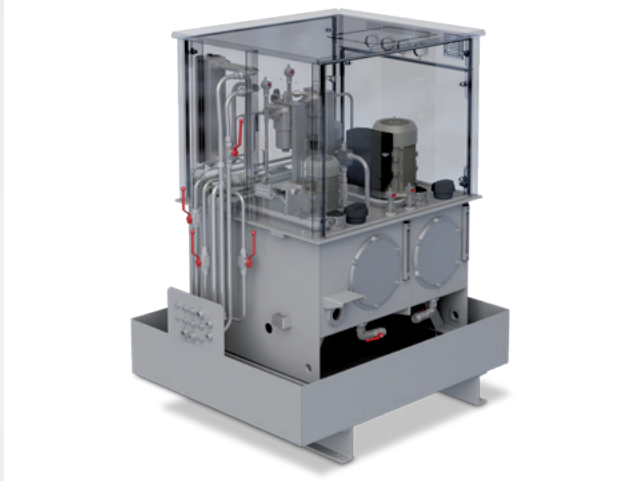
By using defined interfaces accurately coordinated with the machine tool manufacturer, it is possible to design a subsystem to concentrate all the fluid control for a machine tool in one area. From the technical calculation, through to the installation including piping and wiring, right up to function testing the unit, HYDAC is your system partner with all the expertise.

Advantages

- Simple and rapid installation thanks to defined hydraulic, pneumatic and electronic interfaces (quick-release couplings, connectors, etc.)
- Concentration of all fluid control in the machine
 - Better overview, more maintenance friendly, easier troubleshooting
- Machine tool manufacturer has one contact for cooling, electronics, coolant, hydraulics and pneumatics
- Everything from a single source – reduces the number of interfaces and minimises the number of suppliers

Project solutions

HYDAC – Your partner for efficient solutions



Custom hydrostatic unit

Grinding machines are complex, high precision machines. In addition to the “typical” hydraulic functions, such as clamping workpieces and lubricating guides, this type of machine is increasingly being used with hydrodynamic and/or hydrostatic plain bearings, as these bearing types combine precision, resilience and low wear.

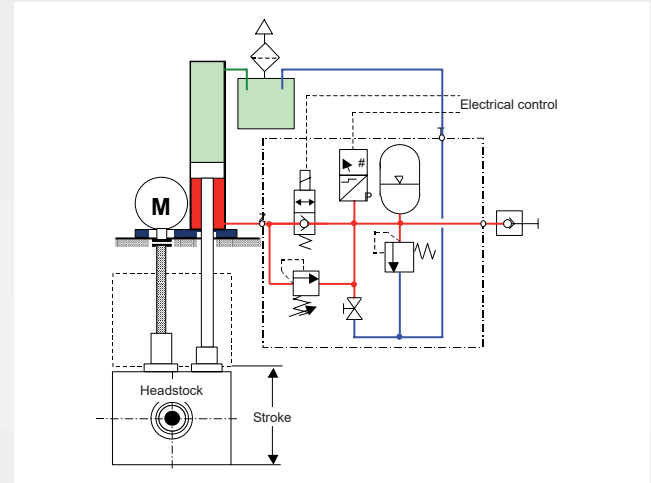
As an experienced hydraulics specialist, HYDAC offers custom solutions that meet all requirements. In specific terms, we supply the customer with a hydraulic unit that:

- supplies oil pressure to grinding spindles which have hydrodynamic bearings
- ensures lubrication of the guides with slideway oil and
- provides hydraulic energy for hydraulic actuators.

The subsystem is combined to form a compact assembly and configured and designed to meet the customer's specifications. The various functions are supplied by units that suit their specific needs, including a variable-speed drive that reacts to the machine's various requirements with low noise and resistance to contamination. The subsystem has all the necessary components, such as tanks, filters and sensors. It can be used immediately after connection to the interfaces and filling, which keeps the commissioning effort to a minimum.

Counter weight balancing

Hydraulic counter weight balancing



Counter weight balancing systems are often used in machine tools to compensate for the weight and inertia of machine elements such as vertical axes. This minimises the drive power of the moving axes and enhances the quality of the workpieces to be produced. Hydraulic systems for counter weight balancing offer key advantages:

- Very compact design
- Easily adaptable to different axis loads
- Flexible designs
- Option of integrating valves for safety functions

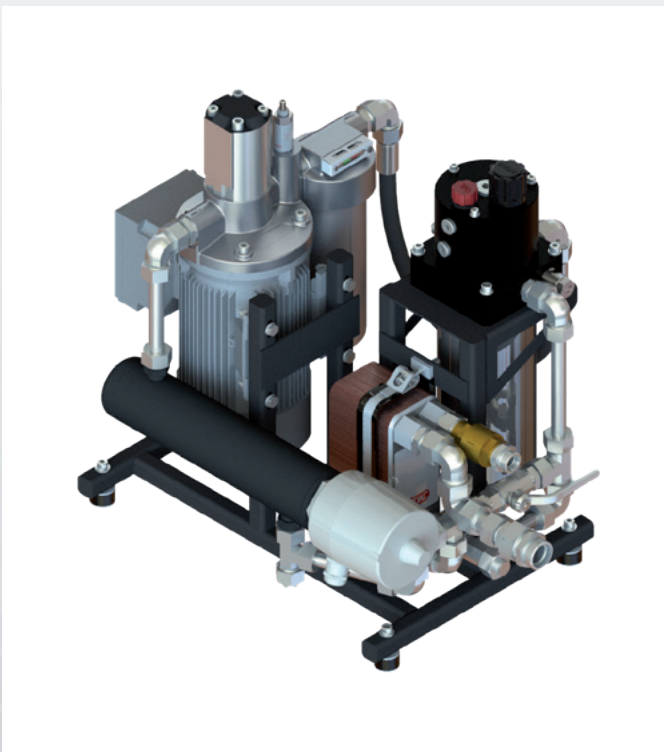
Various designs can be implemented. These differ in the scope of the available functions (e.g. integration of a hydraulic safety brake) and in the arrangement of the components. The main components of the system are always the following, however: a hydraulic cylinder to absorb the force, a hydraulic accumulator for pressure compensation and a valve block which contains the valves required to protect the accumulator. These key components can be supplemented by valves for additional safety functions, sensors for position and pressure monitoring and hydraulic pumps for filling the system. HYDAC supplies both the individual components and complete counter weight balancing systems. These are always customised and assembled to meet the customer's specific requirements.

Reduce the water content in oil



Efficient solutions for grinding machines

In the grinding process, precision is the top priority. First and foremost, this calls for powerful and clean machining fluids and lubricating fluids. In practice, water-based coolants are sometimes used. This can cause problems in the grinding process if the water-based coolant is able to bypass the seal rings and mix with the hydraulic fluid used as track lubrication. This can result in corrosion which leads to rust on the machine guides, which causes a drop in quality in the machined workpieces. The high water content also gives rise to very short oil service lives, so the oil needs to be changed frequently, with high service costs. For these reasons, machine owners are increasingly pressuring grinding machine manufacturers to come up with an efficient and cost-effective solution for keeping the water content in the hydraulic fluid consistently low.



The FAM-1 OEM dewatering solution

The FAM-1 OEM solution is a dewatering unit from the FluidAqua Mobil FAM series, designed for continuous use in small hydraulic systems. The key element of the unit is the MiniOX MOX, a hydraulically driven degassing and dewatering unit.

Based on tried-and-tested vacuum technology, it can be used to keep the water content below the saturation point. For oil temperatures below 35 °C, we recommend using an additional heater to increase the dewatering rate. A HYDAC plate heat exchanger is also used to recool the fluid flow. The FAM-1 OEM therefore enables automatic dewatering without filtration aids. This type of dewatering works in parallel with the machining process. The unit can also be equipped with an optional heating system to increase the dewatering capacity. As there is no need for integration in the machine's PLC, subsequent integration in existing machines is also possible without major investment in the electronics.

Product innovations

Smart sensors for filter monitoring



Features

The HYDAC Virtual Fluid Lab (VFL) is a smart concept that not only determines the remaining service life of filter elements but also contributes to predictive maintenance. A reduction in life cycle costs and therefore an increase in machine availability are key advantages. Using sensors for measuring differential pressure or for measuring back pressure, the concept can be used regardless of the filter type and size. The Virtual Fluid Lab is available with either CAN bus or IO-Link as a communication system.

Function

The Virtual Fluid Lab is a smart sensor for filter monitoring. The pressure loss as flow passes through a filter element is used to determine the element's load condition and to estimate its remaining service life. The following process data is output:

- Remaining service life of the filter element in hours
- Operating hours of the filter element
- Pressure value
- Filter load

Advantages

- Maximum utilisation of the element service life
- Conservation of resources
- Optimised planning of service work
- No unscheduled downtime or failures
- Reduced life cycle costs
- Improved machine availability
- Integration in internal, digital processes

Stat-X® filter element technology



Filter elements to combat electrostatic charging in systems

Features

Over the past few years, the trend towards ash-free hydraulic fluids, more compact systems and finer filtration has led to increasing problems of electrostatic charging and discharging in hydraulic and lubrication oil systems.

Using the pioneering Stat-X® element technology allows you to demonstrably reduce electrostatic discharge and high oil charges even in extremely critical systems with excellent ultra-fine filtration.

Advantages

- Maximum safety for the employees and system thanks to a proven reduction in spark discharges
- Reduction in oil degradation products (varnish) and longer oil change intervals
- Safe operation in potentially explosive atmospheres
- Reduction in unscheduled downtimes
- Reduced maintenance costs and longer maintenance intervals

PCS2000



Features

The HYDAC PCS2000 fluid management system is used to automate fluid management tasks on individually filled machine tools. The focus here is on measuring and controlling concentration and tank fill levels. Thanks to cloud connectivity, all measured and controlled variables are recorded and visualised for all process participants via a dashboard.

Function

The PCS2000 sensor determines the key fluid parameters on each machine. Such parameters include concentration, temperature, pH value and tank fill level. The optional mixing unit can then be used to set individual concentrations for each tank and the tank fill levels. All measured variables are stored on the PCS2000 or can be transferred directly to a cloud.

Advantages

- Automatic measurement and control of concentration and tank fill level
- Fluid management 4.0
- Plug and play thanks to integrated pump
- Installation in under 5 minutes
- Cloud connectivity

Smart Compact Power Unit CO1S



CO1S goes smart

Features

The CO1...MCF21 Smart machine tool unit with pressure filtration for clamping and tensioning functions. The smart sensors are used to diagnose the condition of the power unit, filter and hydraulic accumulator. Hydraulic accumulators with safety devices and valves are combined to form a compact unit located right inside the power unit flange.

Advantages

- Continuous condition monitoring with messages when the set operating parameters are exceeded prevents hydraulic failures and increases system availability
- Servicing can be planned more easily
- Filter element integrated in the flange and remaining service life indicator
- Flange can be extended as required using the HYDAC ML stacking system
- Very compact design as the accumulator, pressure gauge and pressure switch etc. are integrated into the flange

Intelligent industrial valves



Features

HYDAC pressure control valves from the P3DRSERE 6 series are direct-acting, proportional pressure control valves in a leak-proof design with intelligent control and integrated electronics. The leak-proof design ensures that no leakage occurs when the pressure is set and therefore lowers energy consumption. The on-board electronics set the required pressure precisely. Here, the consumer pressure is measured by an internal sensor and compared with the setpoint by the on-board electronics. This comparison of target and actual values constitutes a closed-loop control system. This means that the P3DRSERE not only allows clamping pressures to be set with precision, but also allows them to be retained over time without loss. In the event of a fault, e.g. failure of the supply voltage or a cable break, the workpiece remains securely clamped.

Advantages

- Low power consumption with regulated pressure → No leakage occurs when the pressure is set outside of normal operation
- Easy to use thanks to a plug-and-play design or specific adjustment to suit more complex applications
- Operating parameters of the on-board electronics can be adjusted via the OBE Service Tool software
- Low hysteresis
- Interface according to ISO 4401-03; DIN 24340 Form A6

Valves with position monitoring



Features

Valves with position monitoring are used for condition monitoring in a system to comply with the safety principles in accordance with DIN EN ISO 13849-2. In concrete terms, this can increase the diagnostic coverage. HYDAC offers a wide range of valve products including poppet valves, spool valves and check valves in various nominal sizes and flow rates.

- Valves with switching position sensors for monitoring movement
- Various nominal sizes and cavities available for flange-on and cartridge valves
- Optional IO-Link version available

Advantages

- Can be used to increase diagnostic coverage
- Perfectly suited to safety-related circuits
- Can be used to detect valve functioning

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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.