

*Quality products for
demanding applications*



WANDFLUH INDUSTRIAL

“ We want to inspire our customers around the world with high-quality products and get engaged as a valuable partner in the development of technically demanding hydraulic systems. ”

————— Hansruedi Wandfluh and Matthias Wandfluh —————

WANDFLUH INDUSTRIAL

Applications in industrial machinery have always been geared towards precision, efficiency and reliability. With Industry 4.0, these requirements have become even more relevant. Although other techniques and procedures are being implemented to some extent, hydraulics remain a key component in fast and powerful motion sequences and clamping devices on processing machines. Stable performance coupled with a high level of repeatability are an indispensable part of this.

FOCUS

Industrial production is undergoing transformation. Industry 4.0 is changing the production environment and thus also the demands on hydraulic systems developed for the industrial sector. The requirements for valve and electronic components are increasing significantly. These requirements range from redundant switching position monitoring to customer-specific constructions.

One of the primary objectives in the industrial sector is to develop hydraulic systems with sensitive control characteristics that can be precisely adapted to the machine. Thanks to intelligent electronics and intuitive software, dynamic motion sequences in industrial production plants can be coordinated precisely and easily.

APPLICATION EXAMPLES

- Axes positioning in machine tools
- Industrial robots
- Cutting feed control with positioning
- Variable workpiece clamping
- Controlled force transmission in cutting installations
- Plain bearings
- Tension control of coiling machines
- Actuation and control of presses and bending machines

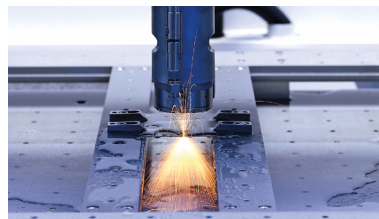
...designed to ensure reproducibility and precision



INDUSTRIAL

FEATURES

- Precisely adaptable hydraulics by means of intelligent electronics and intuitively operated software
- Valve technology with switching position monitoring
- High power density (up to 450 bar / 1600 l/min)
- Compact constructions (NG3-MINI, NG4-MINI)
- High precision
- Good repeatability
- Sensitive control characteristics
- Ease of maintenance
- Individual customer-specific adaptations
- Worldwide customer service



APPLICATION **BENDING MACHINE**

Hydraulic systems in ultra-modern bending machines are nowadays implemented using proportional valves and intelligent electronics to flexibly parameterise the various bending processes. In addition to exact cylinder positioning, safety-relevant requirements, that are monitored and ensured in redundant systems with sensors, must also be taken into account.

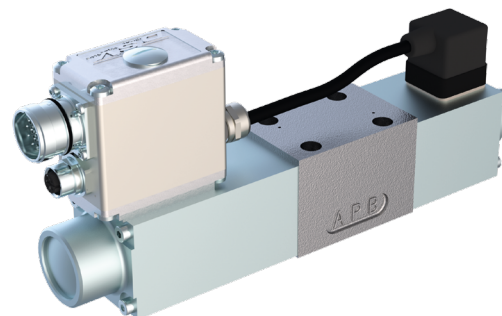
FUNCTION

On large bending machines, two hydraulic cylinders that move the beam with the bending punch vertically are mounted on each side. Fast and monitored proportional spool valves are used for the exact positioning of the bending punch. The signal of the integrated spool position control (LVDT) is used for fast and precise adjustment of the valve spool and for monitoring its position in the valve. To guarantee exact movement during bending, the two cylinders and thus also the proportional valves must run synchronously. The superordinated electronics regulate and control the motion sequences. Thanks to the on-board DSV electronics, the valve is already set at the factory, making commissioning easy.



COMPONENTS

Proportional control valves are the main element in the application. The WDRFA06 has an on-board DSV electronics with an integrated spool position control system (LVDT). Smaller axes can be implemented with the smaller valve version, the compact NG4-MINI control valve. The parameter sets are optimally tuned to the application and are pre-set and tested at the factory. To ensure that the two cylinders move at a controlled speed and position the bending punch quickly and accurately, a superordinated electronic controller card is required.



SPECIALITIES

- Customer-specific adaptations to valve and electronics
- Defined parameter sets factory set
- Various valve executions including fieldbus connection
- Control via superordinated PLC possible

APPLICATION **CLAMPING SYSTEMS**

Stable clamping force when fixing a workpiece enables precise and safe machining. High pressure accuracy enables a uniform clamping and prevents vibrations and displacements in the vice. In the event of a power failure, the existing pressure protection system maintains the clamping force, thus preventing possible accidents.

FUNCTION

For clamping systems in machine tools, proportional pressure reducing valves are typically used to adapt the clamping pressure to the material to be machined. The pressure can be relayed to the control system via the machine programming and can be continuously adjusted on the clamping system. The amplifier electronics can either be integrated directly on the valve or with the machine control. By using low-leakage valves, an energy-efficient and stable clamping force with a high power density is achieved. In addition, the repeatability leads to high process reliability, significantly improving the quality of the machine tool.



COMPONENTS

Proportional pressure reducing valves of various sizes and power ranges controlled by amplifier electronics form the basis for the adjustment of the clamping pressure. The pressure reducing valve of type MDPPM16 is used for rather short strokes, while the valve with type designation MPPPM22 is used for longer strokes or where short positioning times are required. As an amplifier, either the compact PD2 electronics or a DSV with its multitude of functions and features can be used. The holding function is ideally implemented using a combination of poppet valves and pressure reducing valves. The additional poppet valve is responsible for maintaining the holding function in the case of a sudden loss of power and thus contributes to the operational safety of a machine tool.



SPECIALITIES

- Valves for special fluids
- Customer-specific valves and system solutions
- Valves with integrated and parameterised electronics
- Very low leakage values for pressure control valves, < 50 ml/min

APPLICATION **TEXTILE MACHINE**

Hydraulic components for textile machines are expected to function perfectly over the entire service life of the installation. They manage the controlled starting and braking of the heavy yarn winding machine and continuously monitor the thread tension. These tasks are critical, because if one of the strands breaks, the entire machine and thus part of the production process comes to a standstill.

FUNCTION

To keep the thread tension constant, hydraulic pressures are controlled in the tenths of a bar. To accomplish this, pulsed PWM poppet valves are sometimes used. With the aid of amplifier electronics, they take over the pressure control with low energy loss. For other applications, fast proportional pressure reducing valves with low hydraulic power loss are used. Since such hydraulic systems often run in accumulator unloading operation, low-leakage valves are of great importance. The electronics as a stand-alone or on-board version provides an optimal addition to the unit to ensure 24/7 operation.



COMPONENTS

Proportional pressure reducing valves of size M16 are usually used to control small volume flows. These relatively small valves are characterised by their sensitive behaviour and low leakage. For the actuation of the larger control cylinders, the directly controlled proportional pressure control cartridge with the type designation MPPPM22 can be used, for example, whereas small, slightly modified NG3 poppet valves are used for a pulsed PWM solution.



SPECIALITIES

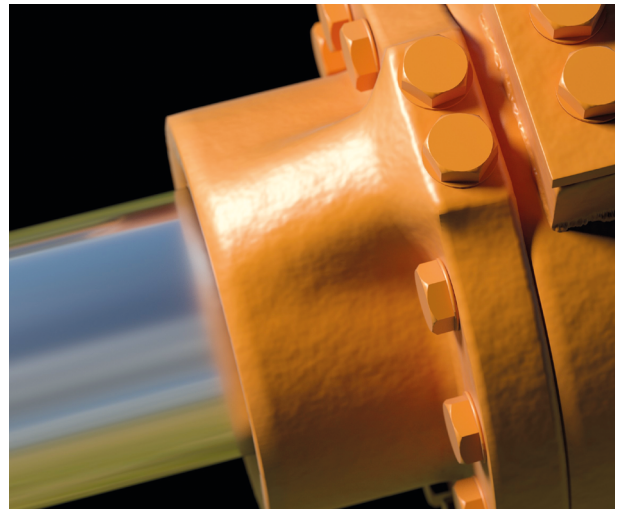
- Valves for special fluids
- Customer-specific valves and system solutions
- Valves with integrated and parameterised electronics
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APPLICATION PRESS CONSTRUCTION

High working pressures and large oil volume flows are among the main requirements in press construction. Such machines are expensive and differ not least in their performance and efficiency. Important factors here are fast pressing cycles, high process reliability and energy-efficient hydraulic components. The same applies to the die-casting sector, where nearly identical valve technology is used.

FUNCTION

In hydraulics, high loads (large cylinders) and fast motion sequences require large oil volume flows of hundreds, if not several thousand litres per minute. In addition, more and more hydraulic components today allow higher working pressures, leading to an increased power density within the control block. To achieve good energy efficiency, it is therefore extremely important to avoid large pressure drops within the control block. This can be accomplished by using 2/2-way slip-in cartridge valves. They are integrated into a control block as pure logic elements, whereby their function is determined by the pilot valve used. These slip-in cartridge valves are designed for pressures up to 630 bar and have a very low pressure drop (Δp).



COMPONENTS

2/2-way slip-in cartridge valves are performance-optimised logic modules that are available in the nominal sizes from NG16 to NG50. During development, great importance was placed on a small Δp in order to achieve an optimum flow rate, resulting in low losses.

Size	C_xx (350 bar)	C_ENxx (630 bar)
NG16	180 l/min	270 l/min
NG25	335 l/min	600 l/min
NG32	675 l/min	980 l/min
NG40	1160 l/min	1620 l/min
NG50	n/a	2360 l/min

Volume flow indications at Δp of 5 bar



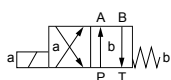
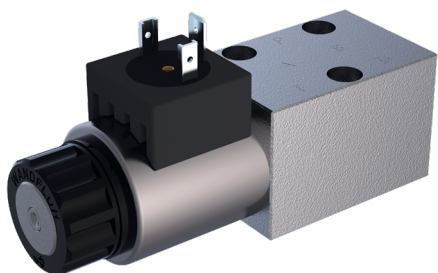
SPECIALITIES

- Valves with special seals
- Customer-specific adaptations of the valves
- Combination with pilot valves and electronics
- Solutions for special fluids

TYPICAL VALVES

Valves adapted to the various applications ensure that the different requirements such as small leakage, freely adjustable volume flows or pressures as well as seat tight closing of control lines can be easily realised. The valve is mainly operated manually or electrically. If the hydraulic performance is to be adjusted continuously and remotely, proportional hydraulics is used. The valve is controlled with electronics.

SPOOL VALVES, FLANGE WDMF



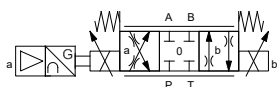
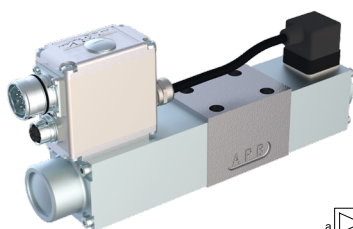
CHARACTERISTICS

Controls the oil flow and can thus, for example, determine the direction of movement of a cylinder. The valve is screwed as a flange onto a standardised mounting interface.

FEATURES

- Solenoid valve remotely controlled via intelligent electronics
- Direct or pilot operated
- Optionally detented, for safety in the case of power failure
- Small losses due to low leakage
- Soft switching for reduction of shocks
- Switching position monitoring
- Pressure max. 350 bar
- Flow max. 160 l/min
- Nominal sizes NG3, NG4, NG6, NG10

SPOOL VALVES WITH INTEGRATED ELECTRONICS WDRFA06



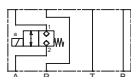
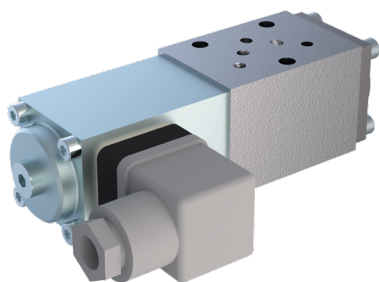
CHARACTERISTICS

The volume flow is controlled proportionally to the command value signal. The valve is factory set.

FEATURES

- Linear characteristics
- High dynamics (35Hz)
- Precise reproducibility and very small hysteresis
- Direct operated
- Integrated amplifier electronics with spool position control
- Optional with controller function
- Pressure max. 350 bar
- Flow max. 40 l/min
- Nominal sizes NG4, NG6

POPPET VALVES SANDWICH Z_2204



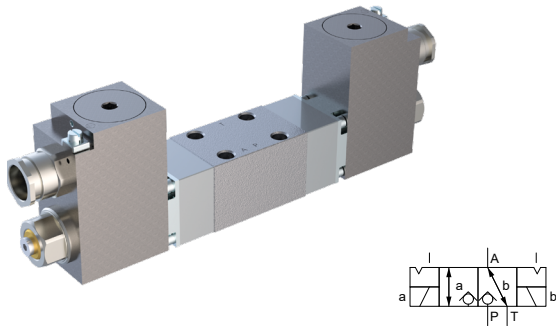
CHARACTERISTICS

For leakage-free closing functions such as safe holding of loads, clamping and gripping of workpieces or for pilot control of larger valves.

FEATURES

- Metallically sealing seat, resulting in an excellent and long-lasting tight seal
- Direct or pilot operated
- 2/2- and 3/2-way executions
- Seal tight in all directions of flow
- Sandwich, flange and cartridge construction types

POPPET VALVES WITH DETENT FUNCTION AEXD3206RR



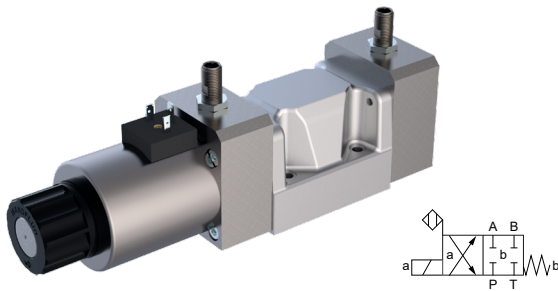
CHARACTERISTICS

The practically leakage-free poppet valve spool can be opened or closed against the applied spring pressure and mechanically detented in the desired position by an electrical impulse.

FEATURES

- 3-way function
- Electrical actuation with standard or Ex d solenoids
- Combination of an electrical actuation with a mechanical actuation possible
- Spool position monitored with position sensor
- Pressure max. 350 bar
- Flow max. 40 l/min

VALVES WITH SWITCHING POSITION MONITORING WDMFA_Z



CHARACTERISTICS

Electronic sensors detect the switching position of the valve spool. The evaluation of the command/feedback signals considerably increases the safety of an installation.

FEATURES

- For various spool and poppet valves
- In combination with standard and Ex d solenoids
- Inductive switching sensor
- Pressure max. 350 bar
- Flow max. 160 l/min
- Nominal sizes NG6, NG10

FLOW CONTROL VALVES QNPP, QDPP



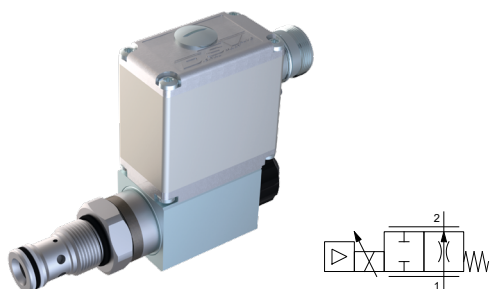
CHARACTERISTICS

Controls the volume flow proportionally to the adjusted solenoid current. Changes in load are continuously compensated.

FEATURES

- Linear characteristic and good repeatability
- 2- or 3-way execution
- Pressure max. 350 bar
- Flow max. 200 l/min
- Nominal sizes M18, M22, M33, M42, U16

THROTTLE VALVES DNPP, DOPP



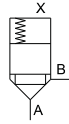
CHARACTERISTICS

Throttling of the volume flow according to the set solenoid current.

FEATURES

- Linear characteristic and good repeatability
- Normally open or normally closed
- Pressure max. 350 bar
- Flow max. 65 l/min
- Nominal sizes M18, M22, M33

2-WAY SLIP-IN CARTRIDGE VALVES C_ENXX



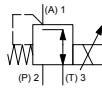
CHARACTERISTICS

With a 2-way slip-in cartridge valve, very high flow rates with low ΔP can be controlled. Control takes place via a pilot valve in the control cover.

FEATURES

- Seat tight closure
- Way and pressure functions can be implemented
- Pressures also available as proportional function
- Pressure max. 630 bar
- Flow max. 2500 l/min
- Nominal sizes NG16, NG25, NG32, NG40, NG50

PRESSURE REDUCING VALVES MDPP, MVPP



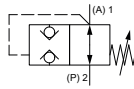
CHARACTERISTICS

Reduces the input pressure to the desired output pressure. The pressure in A is continuously adjusted via the solenoid current.

FEATURES

- Linear characteristics and precise reproducibility
- Direct or pilot operated
- Pressure max. 350 bar
- Flow max. 250 l/min
- Nominal sizes M16, M18, M22, M33, M42, U10

SEAT TIGHT PRESSURE CONTROLLERS MSDPM22



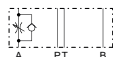
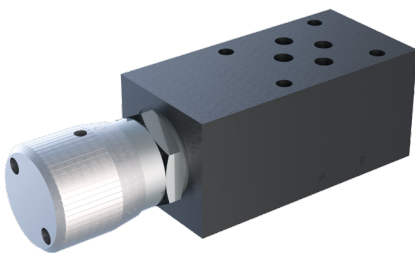
CHARACTERISTICS

Controls the set output pressure independently of the volume flow and closes seat tight. This leads to a significant reduction of losses in a hydraulic system.

FEATURES

- Manual adjustment of the output pressure
- Good pressure control in case of volume flow fluctuations
- Seat tight
- Pressure max. 350 bar
- Flow max. 20 l/min
- Cartridge with cavity M22x1,5

THROTTLE NON-RETURN VALVES AURDA



CHARACTERISTICS

Allows continuous adjustment of a cylinder speed in one direction while allowing free flow through the valve in the opposite direction.

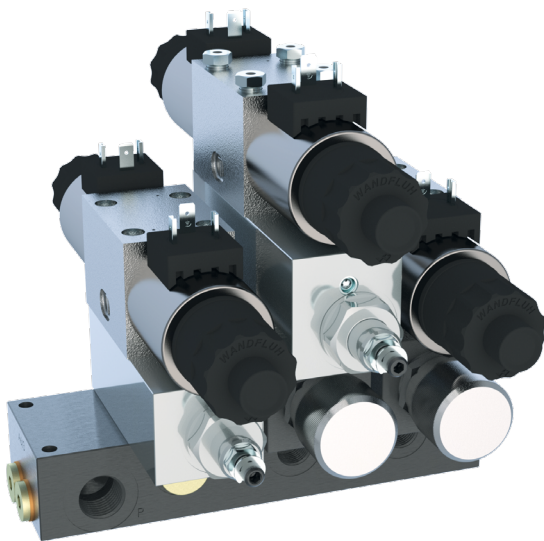
FEATURES

- Manual adjustment of the volume flow
- Non-return valve for one-sided bypass of the throttle
- Special notch for finest resolution in the lower flow range
- Pressure max. 350 bar
- Flow max. 100 l/min
- Nominal sizes NG3, NG4, NG6, NG10

MODULAR TECHNOLOGY

The modular construction of system solutions makes it possible to implement solutions for several consumers by the simple stringing together of valve stations. For this purpose, existing valve functions are stacked on top of each other in a vertical chain. For each consumer, all required functions such as pressure relief, protection and actuation by means of switching or proportional valves can be combined according to the individual requirements. This allows for the construction of very compact control systems.

MULTI-STATION SUBPLATE WITH SANDWICH CONSTRUCTION



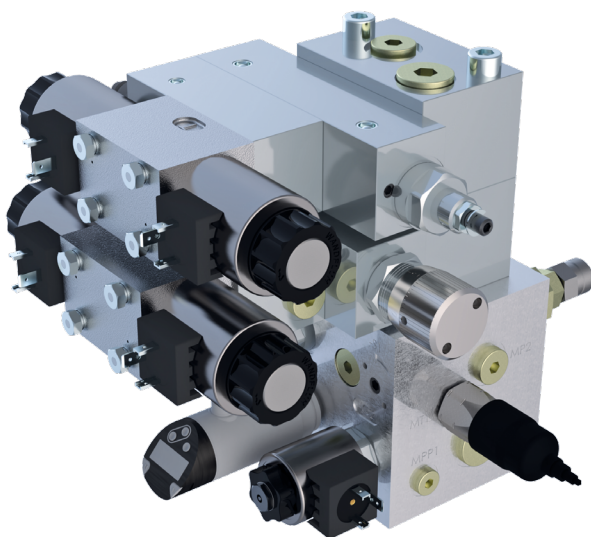
CHARACTERISTICS

The multi-station subplate serves as a basic element for ready-to-connect controls in a vertical stacking construction. It supplies up to eight valve stations. Only one connection for the pressure supply and one tank connection is required. Each station has two outputs for the connection of a consumer.

FEATURES

- Compact hydraulic controls
- Individual valve functions with vertical stacking
- Modular solutions
- Flange and intermediate plates for switching and proportional valves
- One common tank and pump line
- Separate consumer connections per station
- Easy mounting
- Nominal sizes NG3, NG4, NG6, NG10

HORIZONTAL MOUNTING SYSTEM



CHARACTERISTICS

Enables a simple modular construction of valve controls for any number of consumers. Particularly in power unit construction, the system can be very easily built up on a basic block and expanded with a variety of valve functions.

FEATURES

- Compact hydraulic controls
- Individual valve functions with vertical stacking
- Modular construction and combinable with customer-specific modules
- Parallel and series circuits can be flexibly combined
- Flange and intermediate plates for switching and proportional valves
- One common tank and pump line
- Separate consumer connections per station
- Easy to expand later on
- Nominal sizes NG3, NG4, NG6, NG10

CONTROL ELECTRONICS

For the control of proportional valves, electronic control devices are required. They control the solenoid current on the valve and thus guarantee a highly sensitive, low-hysteresis valve control by means of Pulse Width Modulation and a superimposed dither signal. The control devices are equipped with a microprocessor and can be adjusted using the intuitive parameterisation software PASO. This extends the functionality and allows for flexible utilisation in a control system.

AMPLIFIER ELECTRONICS SD7



CHARACTERISTICS

Digital amplifier module for controlling one or two solenoids.

FEATURES

- Control of one 4/3-way spool valve or two 1-solenoid valves
- Control via solenoid current with dither signal
- Command values as voltage or current
- Up to 7 digital inputs and up to 4 outputs
- Optional with fieldbus (CANopen, Profibus DP, HART)
- Housing for top-hat rail mounting

CONTROLLER ELECTRONICS SD7



CHARACTERISTICS

Digital controller module for controlling position, pressure or volume flow including integrated amplifier.

FEATURES

- Controller modes selectable: pressure, position, speed
- Control via solenoid current with dither signal
- Command and feedback values as voltage or current
- Up to 7 digital inputs and up to 4 outputs
- Optional with fieldbus (CANopen, Profibus DP, HART)
- Housing for top-hat rail mounting
- SSI interface
- Analogue output

MINIATURE AMPLIFIER PD3



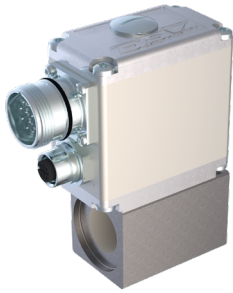
CHARACTERISTICS

Digital amplifier module for controlling a proportional valve. PD3 is an electronics unit with cable connection. In the MPS version, it is firmly mounted on a solenoid.

FEATURES

- Housing of protection class IP67
- Command value as voltage or current
- IO-Link interface
- Bluetooth interface
- Parameterisable by App, PASO Software or IO-Link
- Optional with fieldbus (CANopen or J1939)
- Housing with cable connections or mounted on the solenoid

VALVE ELECTRONICS DSV



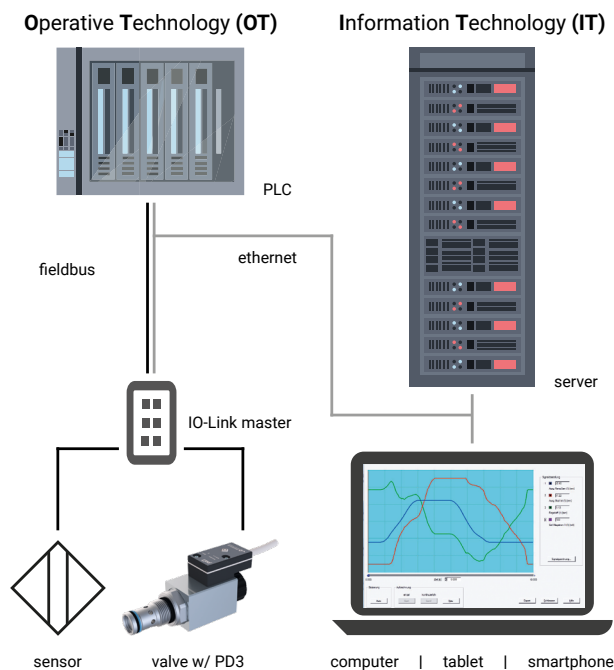
CHARACTERISTICS

Digital amplifier electronics DSV (Digital Smart Valve) directly integrated in the valve for controlling a proportional valve.

FEATURES

- Type amplifier or controller
- Controller modes selectable: pressure, position, speed
- Valve factory set
- Control via solenoid current with dither signal
- Command values as voltage or current
- 2 digital inputs and 1 output
- Parameterisable by means of PASO software
- Optional with fieldbus (CANopen, Profibus DP)
- Protection class IP67

THE IO-LINK DATA CONNECTION



CHARACTERISTICS

The Industrial Internet of Things (IIoT) connects the components used to form an intelligent overall system in order to optimise operational efficiency in terms of rationalisation, automation and maintenance. This requires intelligent components with corresponding interfaces from all branches, including hydraulics. As a digital interface, the IO-Link system is used. It guarantees a simple, standardised connection to intelligent master devices that on their part can transmit the data directly from the valve to the IT world. Alongside this, the actual control of the valve takes place via the classic channel to the PLC.

The simple and fast parameterisation of the IO-Link master via a corresponding tool as well as the central data storage enable fast programming and commissioning, helping considerably in the creation of clear plant documentation.

FEATURES

- Command value setting via IO-Link
- Transmission of device status data
- Parameterisation via IO-Link directly from IO-Link master
- After replacing a device in the system, it is automatically parameterised correctly

FIELDBUS INTERFACE



CHARACTERISTICS

Simple communication interface for industrial electronic controls.

FEATURES

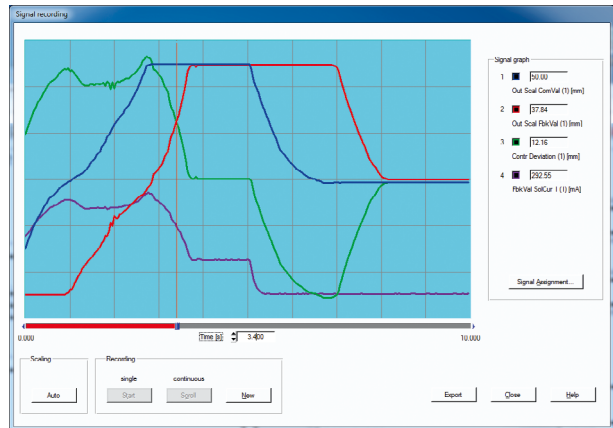
- Protocol for bidirectional data transmission
- Protocols: CANopen or Profibus DP
- Enables to query status and diagnostics of the module
- Parameterisation via fieldbus
- Electronic Device Description (EDD) available

PARAMETERISATION SOFTWARE PASO

With the PASO software, all configuration and parameterisation can be carried out via the intuitive user interface with a laptop. In addition, as all important signals can be recorded or analysed on the screen in real time, the software also provides the possibility of troubleshooting.

FUNCTIONALITIES

Despite the multitude of application possibilities, PASO is very user-friendly and easy to operate. The functional process is displayed on the screen as a block diagram. By clicking on one of the block diagram symbols, a menu window opens in which the parameters associated with the process can be set. In addition to the connecting lines between the blocks, the feedback value being passed onto the following block is also displayed in real time. In this way, it is possible to monitor the effects of a parameter change on the entire system on the computer, allowing fine tuning to be performed quickly and precisely. The set values can then be saved in a parameter file and can also be loaded directly into a new electronic module.

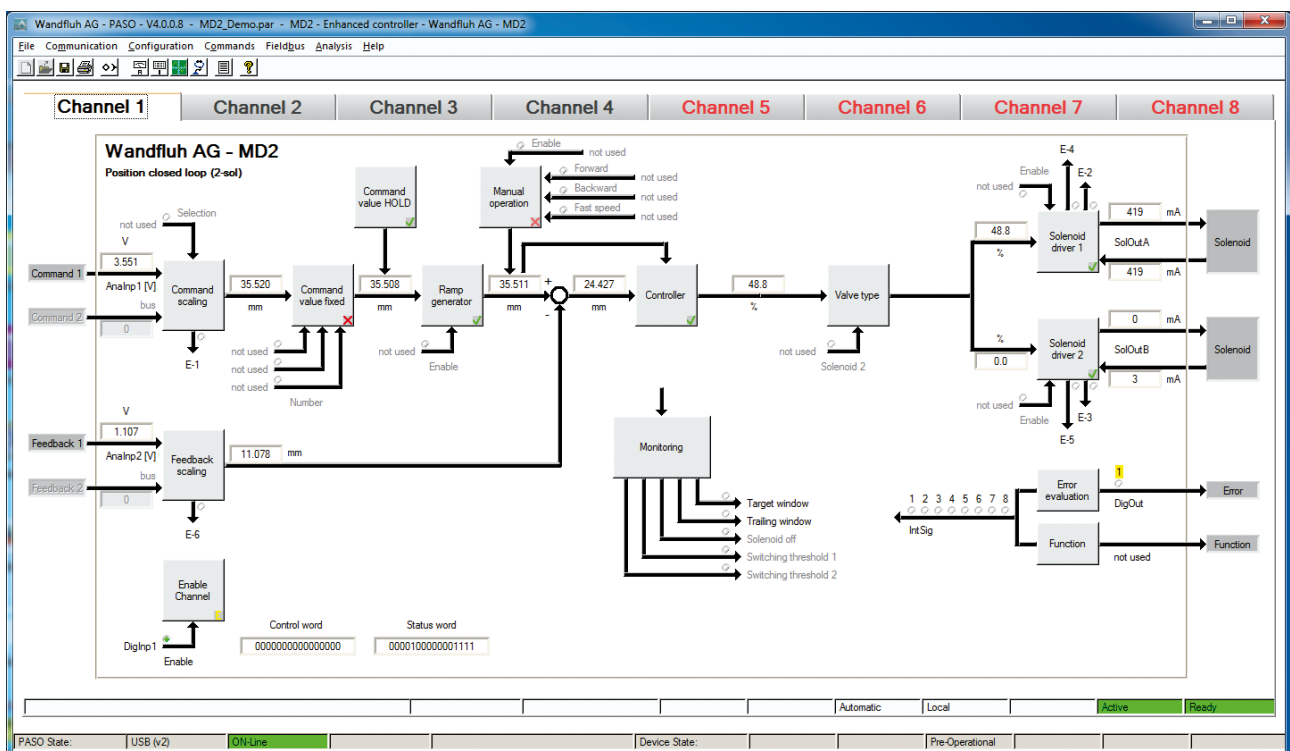


PARAMETERISATION AND PROGRAMMING

- PC software PASO (freely available)
- Individual process data monitoring
- Integrated oscilloscope
- Remote control functions
- Fieldbus Interface

ADDITIONAL EXECUTIONS

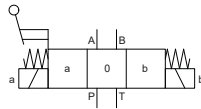
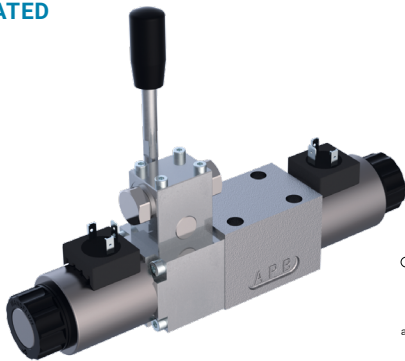
- Customer-specific software expansions
- Hardware expansion for additional functions
- Software for application-optimised solutions
- Flexible interface definition
- Electronics integrated in the valve



INDIVIDUAL SOLUTIONS

Wandfluh valves are constructed in a modular way and are thus very flexible in their composition. This allows different standard functional components to be combined with one another to easily create individual solutions. Together with the customer, requirements are defined and then further developed into an optimised product. The extensive experience of the engineers and flexibility in production help to find and implement optimal solutions for special customer requirements.

SPOOL VALVES SOLENOID AND MECHANICALLY ACTUATED



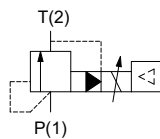
CHARACTERISTICS

The valve can be remotely controlled by appropriate electronics or manually operated on site.

FEATURES

- Completes the electrical actuation with a hand lever actuation for 3-way valves
- For switching and proportional valves
- In combination with standard and Ex d / Ex i solenoids

PROPORTIONAL VALVES WITH ELECTRONICS



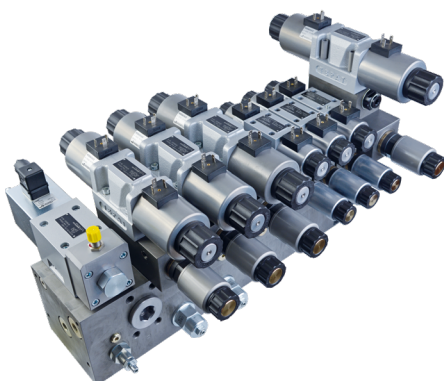
CHARACTERISTICS

Each proportional valve is available with the option of integrated electronics. Thereby the valve turns into a Digital Smart Valve (DSV) and is factory set. The user thus has the advantage that the valve is immediately ready for use without any adjustment.

FEATURES

- Factory setting and adjustment
- Customer-specific factory settings possible
- Easy change in case spare parts are needed
- Plug & Play
- Valve characteristics individually adjustable

CONTROL UNITS NG10



CHARACTERISTICS

Compact control units for industrial machines and machine tools. Combined solutions with an individual basic block and built-on standard modules allow an exact adaptation to customer requirements.

FEATURES

- Modularly constructed and individualised solutions
- Customer-specific solutions integrated in the block
- Complex functional units

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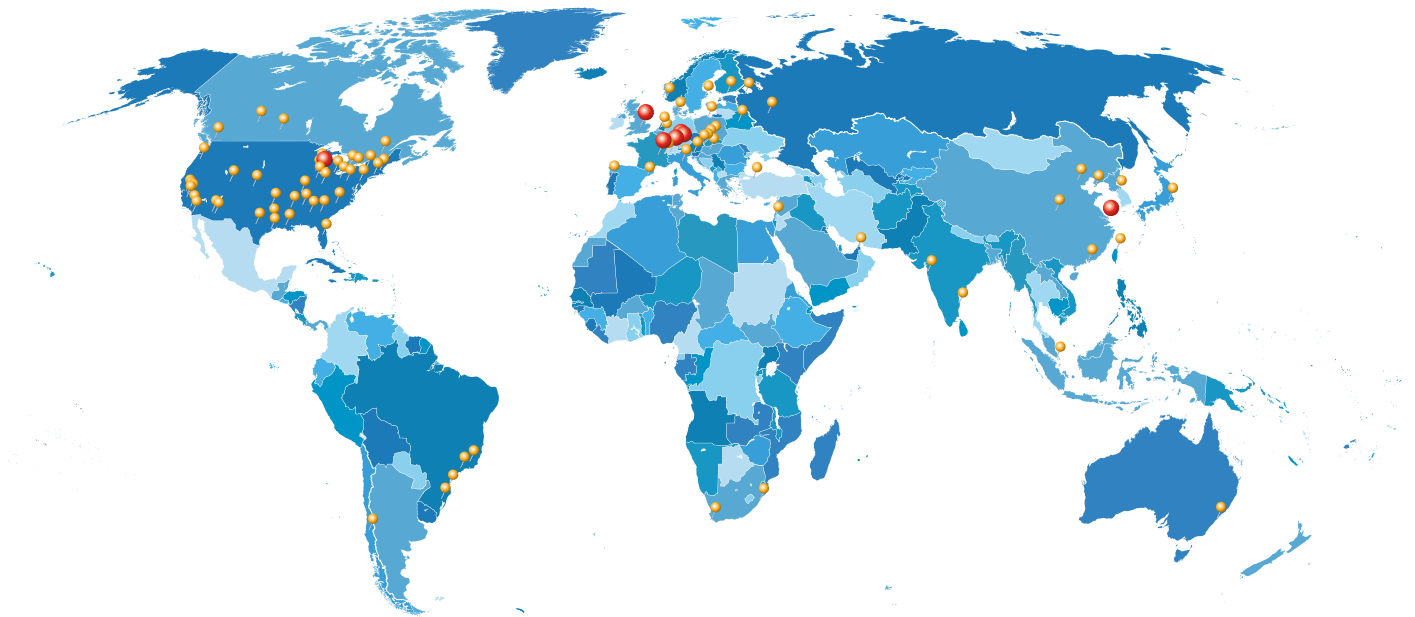
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