

*Quality products for
demanding use*



PROPORTIONAL TECHNOLOGY

PROPORTIONAL **HYDRAULICS**

Proportional technology is an interaction between the most up-to-date electronics and continuously, sensitively adjustable proportional valves. With the use of sensors and controller electronics, external influences on the hydraulic system can be compensated. The combination with a fieldbus connection enables bidirectional communication with a superordinate main control.

REMOTE CONTROL CAPABILITY



Proportional technology enables signal transmission over any distance. This characteristic offers the following important benefits:

- No mechanical transmission elements such as gears, couplings, chains, pulleys, etc.
- Less piping cost
- Optimal device arrangement, e.g. directly at the consumer
- Possible in vehicles or in process controls of stationary installations

PROGRAMMABILITY



It allows:

- Optimal adaptation of the proportional system to the operating procedure
- Quick conversion to another mode of operation
- Product-related procedures in NC or process controls
- Most rational working methods for machine tools, robotic systems and mobile installations

INCREASED OPERATING COMFORT



The continuous valve adjustment enables very clean and controllable processes:

- Smooth acceleration and deceleration of hydraulic motors and cylinders
- Decompression without any pressure peaks. Increased service life of machines and installations as a result
- Better environmental conditions and increased operating comfort in all types of applications

FEWER CONSTRUCTION ELEMENTS IN THE SYSTEM



The proportional valve can reduce the number of valves per installation by its adjustability:

- Reduction of several conventional spool valves, pressure valves or flow valves to a single proportional valve
- Weight-saving and smaller construction volume
- Fewer leakage points and thus lowering the maintenance costs
- Reduction of engineering and assembly costs

BETTER EFFICIENCY



Proportional technology allows precise adaptation to the various operating states. This means that pressure and volume flows can be precisely adjusted to the respective operating conditions:

- Less energy consumption, reduced operating costs
- Low oil heating, small oil tanks
- Better efficiency of the whole installation

FIELDS OF APPLICATION

Proportional valves are used wherever controllable or adjustable motion sequences are required. Optimal alignment of the electronics used with the hydraulic valve allows the motion sequences to be adjusted and optimised. This leads to a sensitive and secure characteristic of the hydraulic system, particularly in the case of sometimes high forces.

MACHINE TOOLS

- Continuous clamping or tightening
- Position controlling of axes
- Force regulation

LIFTING AND CONVEYOR TECHNOLOGY

- Joystick-operated motion control
- Load-independent lifting and lowering

WIND TURBINES

- Regulated angle adjustment of the rotor blades

ROBOTICS

- External pressure compensated proportional valves (ROV)
- Precise and sensitive movements
- Remote-control

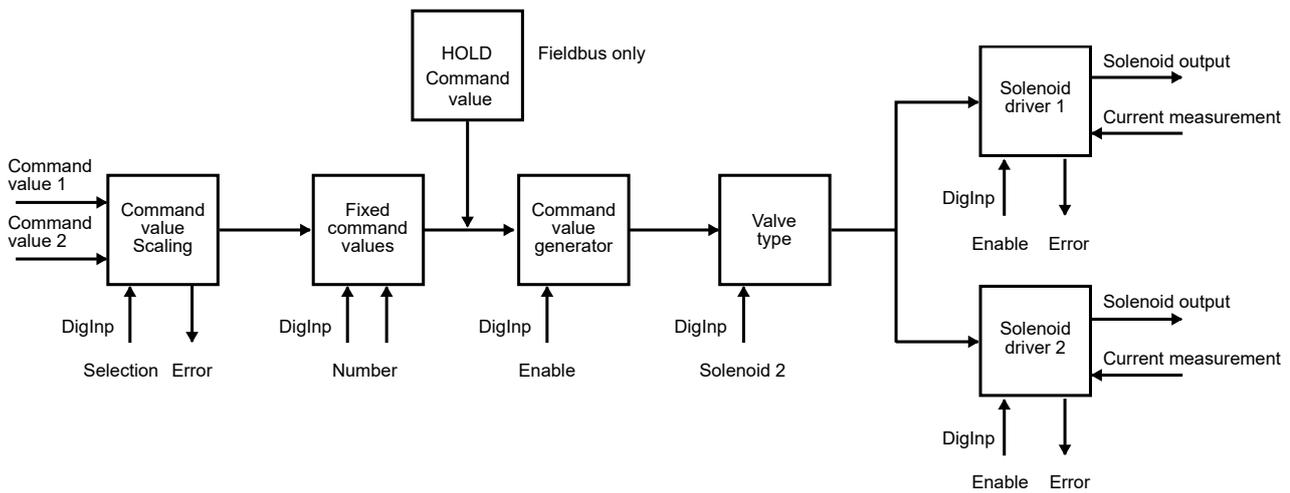
BRAKE SYSTEMS

- Rapid and precise pressure specification
- Secure function
- Energy-efficient with minimal leakage oil loss



OPEN CONTROL SYSTEMS

Proportional valves are continuously controlled by a specially developed proportional solenoid. Control electronics energise the solenoid depending on the command value signal, thus creating a force that responds proportionally to the solenoid current.



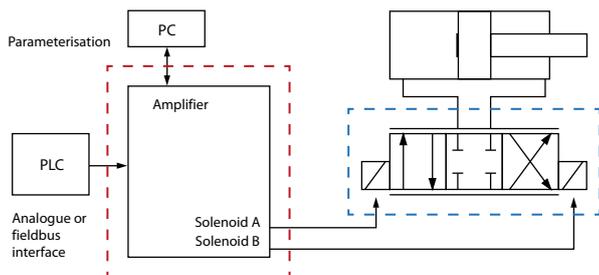
FUNCTIONS OF THE CONTROL ELECTRONICS

Optimal co-ordination between electronics, solenoid and valve is vital for a precise motion sequence. Thus, for example, temperature changes of the solenoid are compensated by the electronics, and a dither signal superimposed on the PWM control signal leads to a very low hysteresis of the valve. With the control electronics (amplifier), various func-

tions such as fixed command values, ramps, characteristic curve corrections and much more can be realised. The electronics allow adjustment and alignment of the various signals such as the command value range or solenoid currents. The above diagram shows the signal flow with the adjustable functions.

THE HIGHLY FLEXIBLE STANDARD SOLUTION

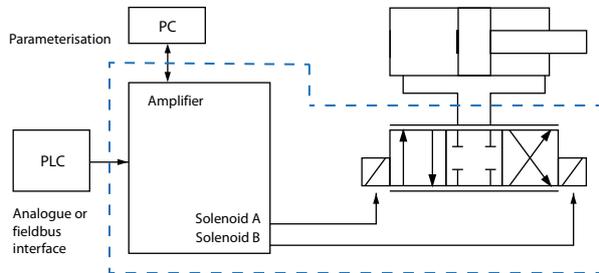
The proportional valve and amplifier electronics are assembled separately.



Configuration example: SD7 with WDPFA06-ACB

THE "ALL-IN-ONE" SOLUTION FOR SIMPLE USE

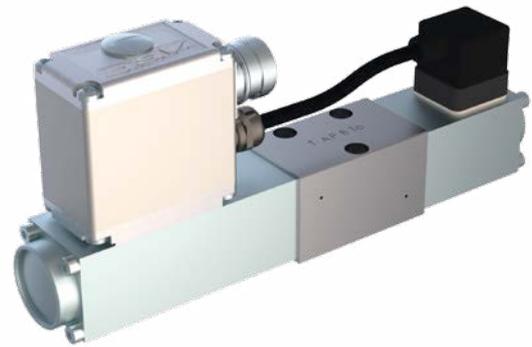
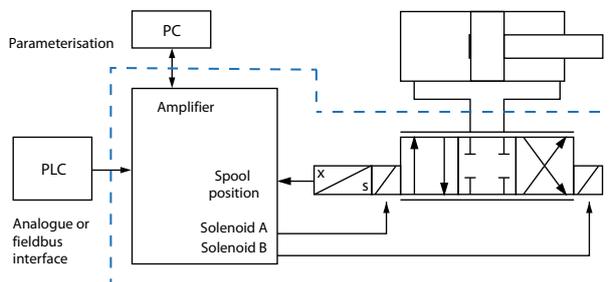
The intelligent proportional valve with integrated amplifier electronics for Plug & Play. Valve alignment is made ex works.



WDPFA06-ACB.../ME with DSV Electronics

THE SOLUTION FOR HIGHER REQUIREMENTS FOR SPEED AND REPEATABILITY

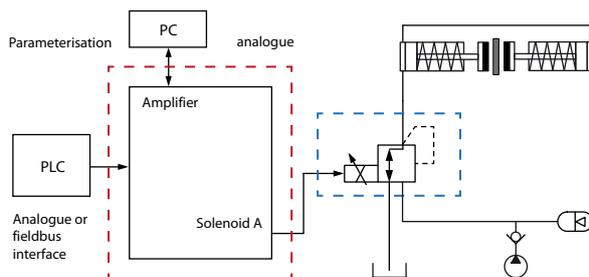
The intelligent proportional valve with integrated electronics and valve spool position control for increased dynamics and precision.



BRWS4D41 with DSV Electronics

THE SIMPLE SOLUTION FOR A BRAKE SYSTEM

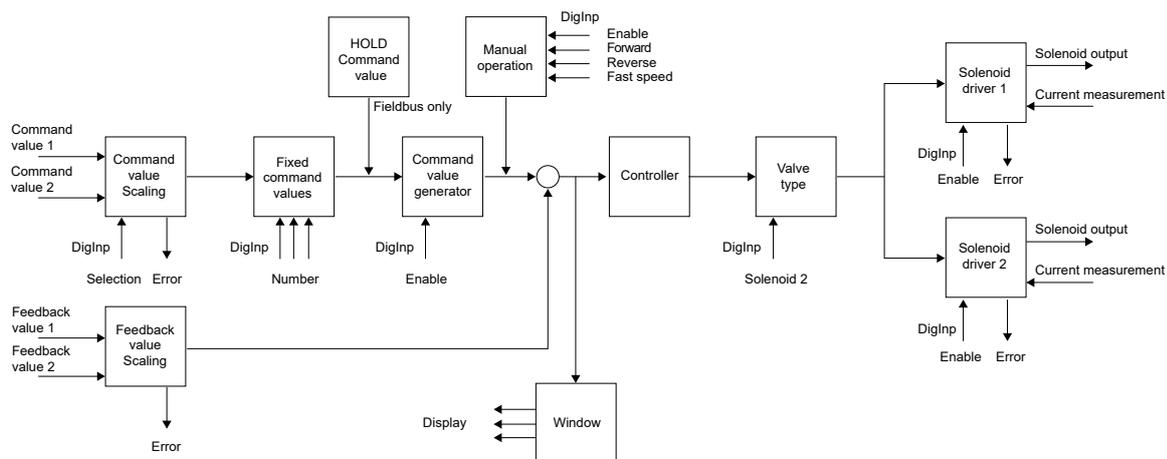
A proportional pressure reducing valve with cost-optimized control electronics.



Configuration example: MPPPU10 with PD2 Electronics

CONTROLLER PRESSURE / VOLUME FLOW

A regulated system is used where a pressure or a speed must be maintained exactly. In contrast to pure amplifier electronics, controller electronics reads the pressure signal as a feedback value, then calculates the discrepancy to the command value and gives a corresponding correction signal to the valve.



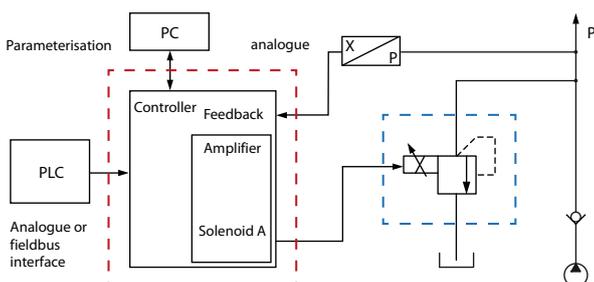
FUNCTIONS OF THE CONTROL ELECTRONICS

Using the control electronics, the specified command values are maintained exactly independent of external influences on the system. External pressures acting on a hydraulic installation from the outside, backpressures, accelerations and decelerations, etc. can be rapidly and precisely registered by the sensors, calculated by the electronics and compensated

with a correction signal directly on the valve. In every controller module, amplifier electronics are therefore integrated. The signal flow diagram above shows the additional feedback value to the amplifier with the difference generator and the downstream controller.

PRESSURE CONTROL WITH A PRESSURE VALVE

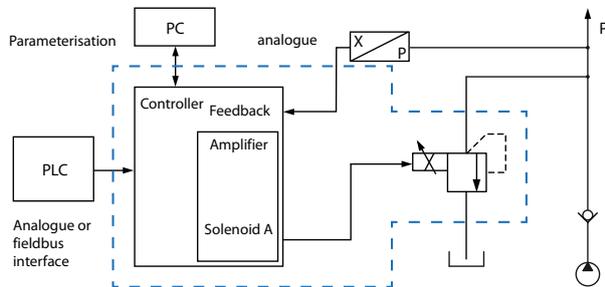
Control of a pressure reducing or pressure relief valve in a closed control circuit. The pressure is measured by the pressure sensor and transmitted to the electronics as a feedback value. The ideal solution if the electronics should be mounted in a control cubicle.



Configuration example: SD7 with BDPPM22

PRESSURE CONTROL WITH A PRESSURE VALVE

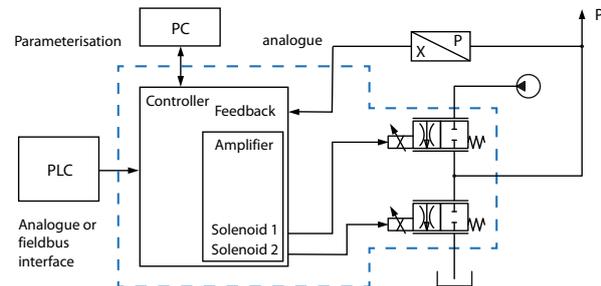
The control electronics including the amplifier is integrated in the valve. Pressure signal connection through a separate plug.



BVPPM33.../ME with DSV Electronics

PRESSURE CONTROL WITH THROTTLE VALVES

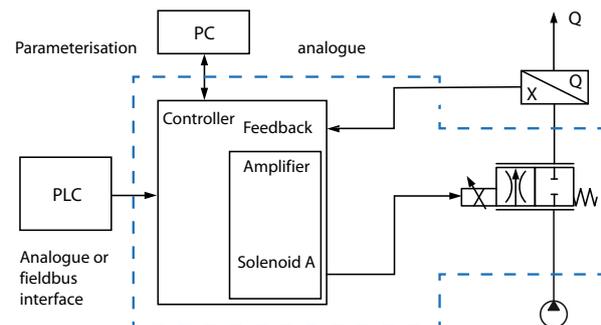
Control of two 1-solenoid throttle valves in the closed control circuit as pressure control. Here one throttle valve serves as pressure loading valve, the other as a pressure unloading valve.



1x DNPPM22.../ME with 1x DNPPM22

VOLUME FLOW CONTROL WITH A THROTTLE VALVE

Control of a 1-solenoid throttle valve or flow control valve in a closed control circuit. The flow is measured by the sensor and transmitted to the electronics as feedback value. Simple control with just one valve.



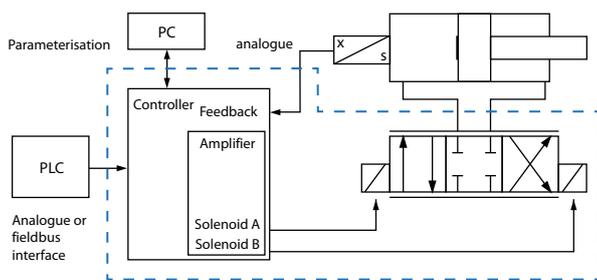
DNPPM22.../ME with DSV Electronics

CONTROLLER POSITION

The position controller allows an exact and reproducible movement to a position with one cylinder or motor. For this, the position of the actuator is read in and compared with the specification position. The electronic controller immediately balances out any deviations through the control valve. Various controller types are available and have to be selected according to the control tasks.

THE "ALL-IN-ONE" SOLUTION FOR SIMPLE CONTROL TASK

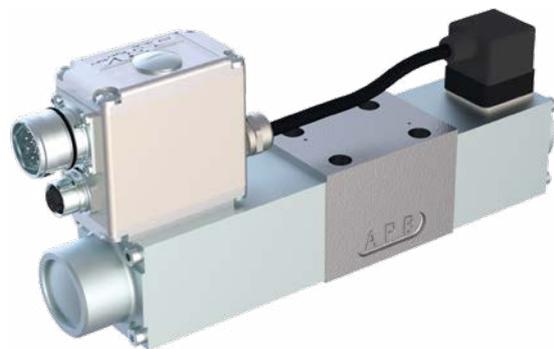
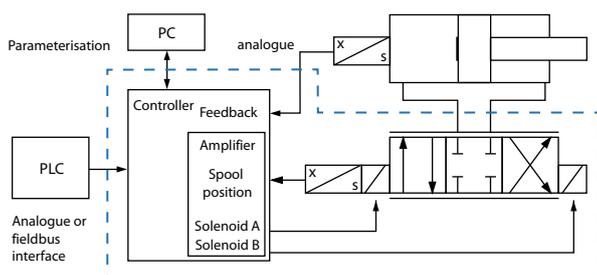
The control electronics with amplifier is integrated in the valve. All that is required is to connect the position sensor signal to the valve.



WDPFA04-ACB.../MEA2R with DSV Electronics

THE DYNAMIC AND PRECISE "ALL-IN-ONE" CONTROLLER SOLUTION

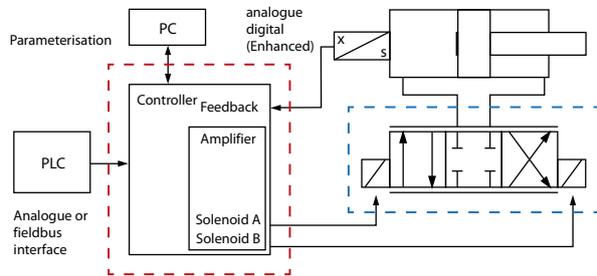
The control electronics with amplifier is integrated in the valve. The valve also has a control circuit for the valve spool position. This increases the dynamics and thus the precision of the position control.



WDRFA06-ACB...24A2R2 with DSV Electronics

**THE STANDARD CONTROLLER SOLUTION,
FLEXIBLY ADAPTABLE TO THE REQUIREMENTS OF
THE APPLICATION**

The control electronics with integrated amplifier is installed as an electronic module in the control cubicle. The valve and position sensor are connected by a cable.



WDPFA06-ACB



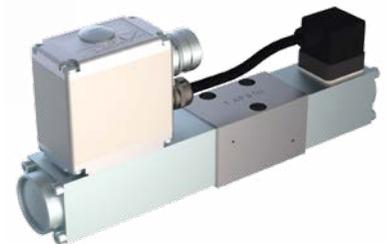
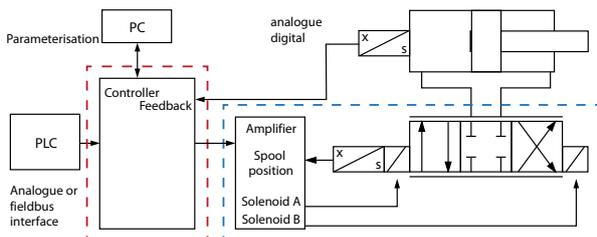
SD733 with SD736



WDPFU10-ACB

**THE SOLUTION FOR HIGH DEMANDS ON
POSITIONING ACCURACY, SIGNAL RESOLUTION AND
FLEXIBILITY**

The control electronics with amplifier is installed as an electronic module in the control cubicle. Through an additional interface for digital position signals (e.g. SSI), positions with a resolution of up to 0.001mm can be recorded. The valve has a control circuit for the spool position. This increases the dynamics and thus the precision of the position control.



Configuration example: SD736 and BRWS4D41 with DSV Electronics

CONTROL DEVICES

For controlling proportional valves, electronic control devices are required.

They control the solenoid current on the valve and thus ensure a very sensitive actuation of the valve. Control devices are available in a wide range of executions, in order to fulfil the requirements of varied tasks in varied fields of application.

ANALOGUE

The electronic device is of purely analogue construction and can thus only process analogue signals.

DIGITAL

The electronic device is controlled by a microprocessor. The functionality of the device is predetermined by corresponding programming. This enables many additional functions to be installed relatively simply. The device can also read and process analogue signals. Most of our devices are digital.

FIELDBUS

Digital electronics open up the possibility of communicating with a superimposed control via a serial interface - a fieldbus. This permits the exchange of commands and large amounts of process data in both directions.

PARAMETERISATION

Digital electronics require software for comfortably setting the parameters. Additionally, with this software diagnosis and commissioning aids are offered. A function for signal recording helps to visualise details in the signal sequence. The PASO software contains all these functions.

CONSTRUCTION

- As a control cubicle version on DIN rails
- As a robust and sealed housing for mobile working devices
- Directly integrated in the valve. Allows factory adjustments and alignment of the valve, in order to guarantee the smallest valve-to-valve reproducibility (Plug & Play)

AMPLIFIER

Reads a command value and controls the valve accordingly with a pulse width modulated signal (PWM). The resulting current is regulated, in order to compensate for temperature and voltage influences. Various parameters such as currents, dither, ramps and characteristic diagrams are adjustable.

CONTROLLER

Besides the command value also reads the feedback value and thus adjusts the deviation between the two values. As feedback value generators, sensors with voltage or current outputs or also with a digital signal can be directly connected. The available controller structures are optimised for use with hydraulic drives.

PD2 AMPLIFIER ELECTRONICS



Features

Digital amplifier module for controlling a proportional valve. PD2 electronics have a cable connection, with the MPS version, it is mounted fixed on a solenoid.

Characteristics

- IP67 housing
- Solenoid current regulated
- Command value as voltage or current
- Digital input
- Parameterisable by means of PASO software or display and buttons on the device
- Optionally with fieldbus (CANopen or J1939)
- Housing with cable connections or mounted on the solenoid

AMPLIFIER ELECTRONICS SD7



Features

Digital amplifier module for controlling one or two solenoids.

Characteristics

- Controlling one 4/3-way spool valve or two 1-solenoid valves
- Solenoid current regulated, with superimposed dither
- 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 dome rail mounting

CONTROLLER ELECTRONICS SD7



Features

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

Characteristics

- Control modes selectable (pressure, position, speed)
- Solenoid current regulated, with superimposed dither
- 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 dome rail mounting
- SSI interface
- Analogue output

AMPLIFIER ELECTRONICS DSV



Features

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

Characteristics

- Valve adjusted ex works (Plug & Play)
- Solenoid current regulated, with superimposed dither
- 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

CONTROLLER ELECTRONICS DSV



Features

Digital controller electronics DSV directly integrated in the valve for position, pressure or volume flow controlling.

Characteristics

- Valve adjusted ex works (Plug & Play)
- Control modes selectable (pressure, position, speed)
- Solenoid current regulated, with superimposed dither
- Command and feedback values as voltage or current
- 2 digital inputs and 1 output
- Optional with fieldbus (CANopen, Profibus DP)
- Protection class IP67

MOBILE ELECTRONICS MD2



Features

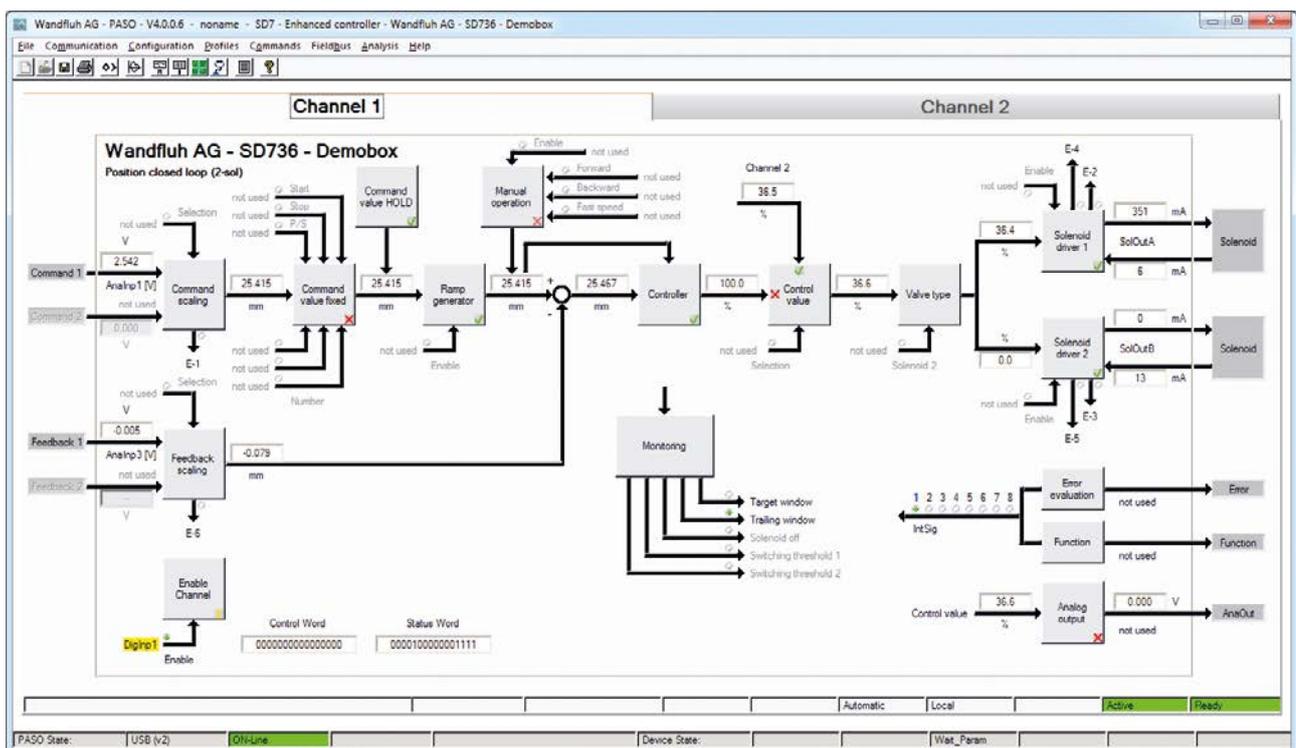
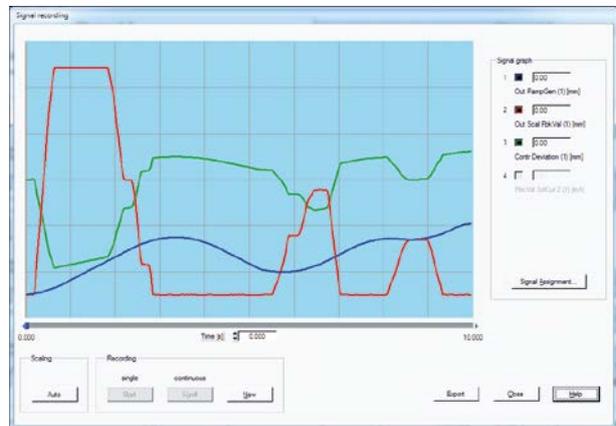
Digital amplifier and controller module for use in harsh environments. With the device, there are up to 8 solenoid outputs available for control tasks of all types.

Characteristics

- Robust and compact construction
- Protection class IP67
- Solenoid outputs can be used as proportional or switching solenoid output
- Command values in the form of voltage, current, frequency, PWM
- Up to 4 analogue and 4 digital inputs
- Up to 10 digital outputs
- Optional with CANopen-Feldbus
- Screw fixing of the housing

PARAMETERISATION SOFTWARE PASO

With the PASO software, all configuration and parameter adjustment for the electronic devices are made. Besides this, PASO can also be utilised for error detection by means of data recording and signal analysis. All the important system data are displayed on the monitor in real time. In spite of the wide variety of application possibilities, PASO is clearly designed and simple to operate. During the conception of the software, the functions and adjustment options were combined in a block diagram and shown as a process. By clicking on one of the symbols in the diagram, a menu window opens with the respective adjustment and operating options. The adjustments are stored in a parameter file and can be directly loaded into the device.



FIELDBUS INTERFACE

As the level of automation of a system increases, the amount of cabling for the parallel wiring increases rapidly due to the large number of inputs and outputs. The fieldbus replaces the parallel cable bundles by a single bus cable, over which the control signals are divided into data blocks, addressed to the respective components and sent.



Application Features

Vehicle construction
up to 1Mbit/s



Application Features

Vehicle construction
250kbit/s



Application Features

Machine industry
up to 12Mbit/s



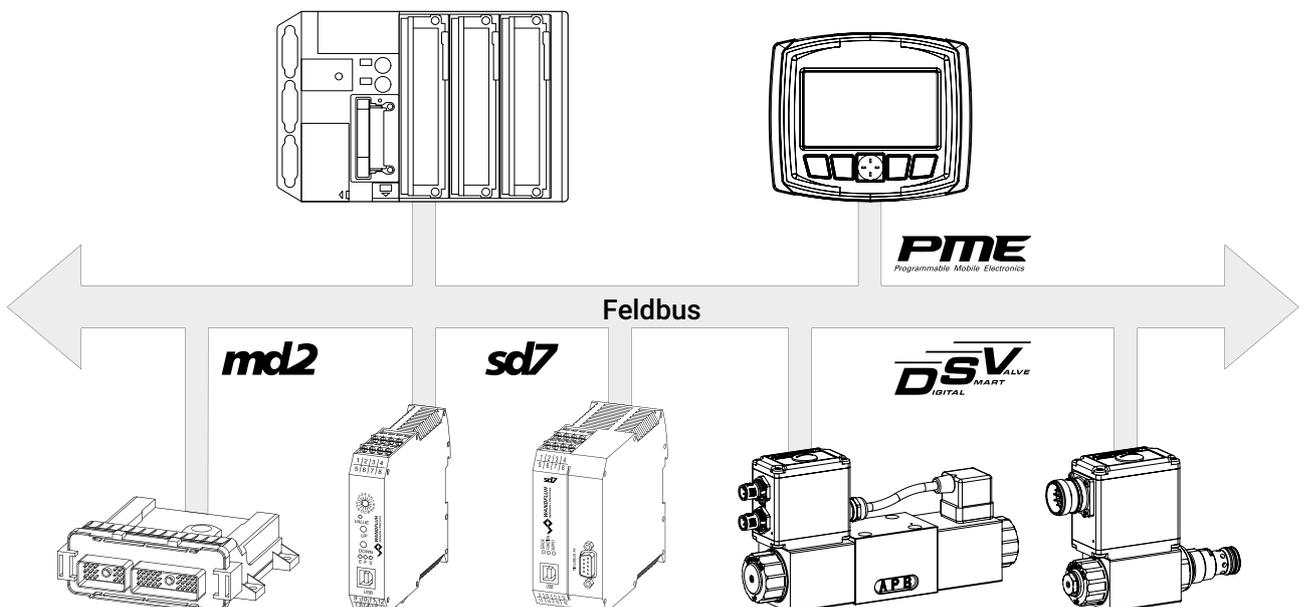
Application Features

Machine industry
Diverse communication protocols: Profinet, EtherNet/IP, EtherCAT, Powerlink, etc.



Application Features

Process industry
Signal transmission via 4-20mA analogue signal (point to point)

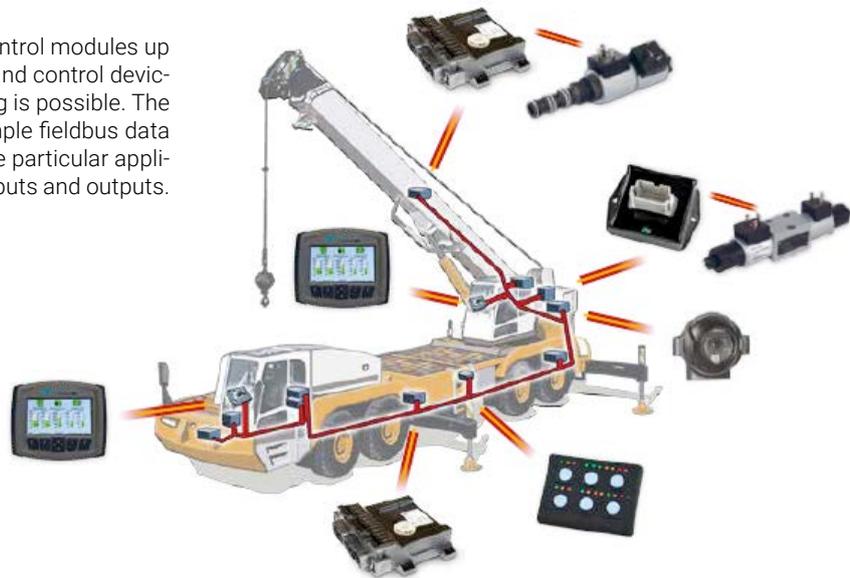


PROGRAMMABLE ELECTRONICS

In the course of digitalisation, increasingly free programmable electronic controls are being used also in hydraulics. They are available as electronic cards, modules or displays and are generally characterised by their flexibility and intuitive operability.

GENERAL INFORMATION

From small applications with one or two control modules up to complex requirements with many input and control devices distributed over one machine - everything is possible. The modules are connected together over a simple fieldbus data line the specially developed software for the particular application assumes the signal control on the inputs and outputs.



THE PROGRAMMABLE MOBILE ELECTRONICS PME INCREASES THE OVERALL PERFORMANCE AND THE VALUE OF THE SYSTEM

- Increases the productivity and controllability of a vehicle
- Expands the vehicle functionality
- Supplement with automated functions
- Maximises efficiency by coordinating the various vehicle systems
- Simplifies diagnosis, error detection and error processing
- Increases the vehicle availability by reducing the error sources
- Reduces the overall costs of the vehicle
- Makes important data available for the fleet management

THE SYSTEM SOLUTION INCLUDES ALL NECESSARY PRODUCTS FOR REALISATION

- Programming
- Visualising
- Scalable number of inputs and outputs
- Flexible use of the inputs and outputs
- Input devices
- Data recording
- Telemetry
- Remote access to the system

PROGRAMMING TOOLS

- Simple program generation with graphical logical elements (Orchestra) or in a C programming environment (CodeWarrior)
- For the commissioning of the system, a diagnosis and analysis tool is available
- Maximum freedom when creating the graphical user interface

DISPLAY AND CONTROL DEVICE CL-7



Features

Micro-controller-based control with display and operating buttons including multifunctional inputs/outputs.

Characteristics

- Functions freely programmable
- Display graphics freely configurable
- Video signal input
- High resolution display
- Monitor sizes 4, 3" and 7"
- Robust housing with IP67 protection

KEYPAD AND CONTROL DEVICE CL-6



Features

Intelligent keypad for interaction with the machine operator. With integrated display and controller functions.

Characteristics

- Wear-free keys with LED displays
- Digital inputs and outputs
- Direct control of valves
- Functions freely programmable
- Robust housing with protection class IP67
- Optional customer-specific key labelling

CONTROL SYSTEMS CL-3, CL-4



Features

Freely programmable control.

Characteristics

- Digital inputs and outputs (up to 69 I/O)
- Direct control of valves (up to 33 power outputs)
- Analogue inputs
- Functions freely programmable
- Robust housing with IP67 protection

CL-T COMMUNICATION MODULE



Features

The module allows wireless data transmission over various communication channels.

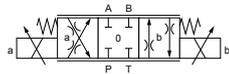
Characteristics

- Remote diagnosis of the machine
- Tracking
- Remote control of machine functions
- Data recording of any signal
- Functions programmable
- GPS receiver for position recognition
- Communication via GSM and WiFi
- Robust housing with IP67 protection

SPOOL VALVES FLANGE

A spool valve can regulate the oil flow in both directions and it can thus be used for the controlled extension and retraction of a hydraulic cylinder. By the special construction of the control edges and the continuous deflection of the spool, the oil flow and thus the speed of the cylinder are sensitively regulated between 0-100 %.

SPOOL VALVES WDPFA



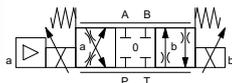
Features

The volume flow is controlled proportionally to the solenoid current.

Characteristics

- Progressive characteristic
- Good repeatability
- Direct or pilot operated
- Pressure max. 350 bar
- Flow up to 200 l/min
- Nominal sizes NG3, NG4, NG6, NG10

SPOOL VALVES WITH INTEGRATED ELECTRONICS WDPFA.../ME



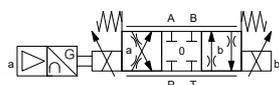
Features

The volume flow is controlled proportionally to the command value signal. Valve adjusted ex works (Plug & Play).

Characteristics

- Progressive characteristic (electronically linearisable)
- Good repeatability
- Direct or pilot operated
- Integrated amplifier electronics
- Optional with controller function
- Compact construction
- Plug & Play
- Pressure max. 350 bar
- Flow up to 200 l/min
- Nominal sizes NG4, NG6, NG10

SPOOL VALVES WITH INTEGRATED ELECTRONICS WDRFA06



Features

The volume flow is controlled proportionally to the command value signal. Valve adjusted ex works (Plug & Play).

Characteristics

- Linear characteristics
- High dynamics (35Hz)
- Very good repeatability and very low hysteresis
- Direct operated
- Integrated amplifier electronics with spool position control
- Optional with controller function
- Pressure max. 350 bar
- Flow up to 40 l/min
- Nominal sizes NG4 and NG6

SPOOL VALVES CARTRIDGES

For the compact block construction, the cartridge construction can be a space-saving alternative to the flange valve. The pilot operated execution allows a high volume flow to be controlled in tight space conditions.

SPOOL VALVES WDPPU



Features

The volume flow is controlled proportionally to the solenoid current.

Characteristics

- Progressive characteristic
- Good repeatability
- Direct operated
- Pull/push armature tube
- Compact construction through short solenoids
- Pressure max. 350 bar
- Flow adjustable 0...28 l/min
- Nominal sizes U08 and U10

SPOOL VALVES PILOT OPERATED WVPPM



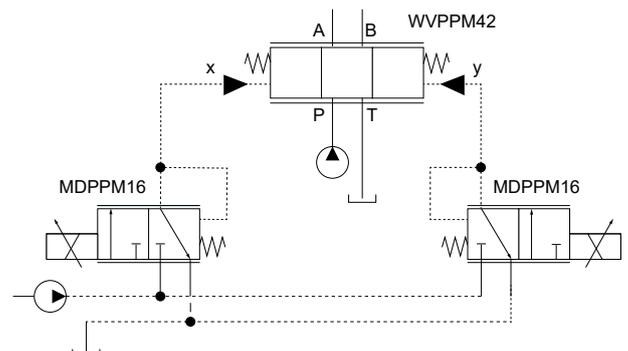
Features

The main spool of the valve, and thus the volume flow, are controlled with a pilot pressure. By the proportional pilot valve, this pressure is given.

Characteristics

- Progressive characteristic
- Good repeatability
- Direct operated
- Optional pilot valve with integrated amplifier and controller electronics
- Pressure max. 350 bar
- Flow up to 250 l/min
- Nominal sizes M33 and M42

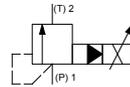
PILOT VALVES MDPPM



PRESSURE AND FLOW VALVES

The proportional pressure valve controls the pressure according to the adjusted solenoid current. This makes it possible to precisely control forces in a system. The proportional flow valve controls or regulates the volume flow according to the adjusted solenoid current. This makes it possible to control speeds of an actuator independent of the load.

PRESSURE RELIEF VALVES BDPP, BVPP



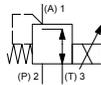
Features

Limits the pressure in port P to the value adjusted by means of the solenoid current.

Characteristics

- Linear characteristic and good repeatability
- Direct or pilot operated, inverse function optional
- Pressure max. 350 bar
- Flow up to 400 l/min
- Nominal sizes M18, M22, M33 and M42

PRESSURE REDUCING VALVES MDPP, MVPP



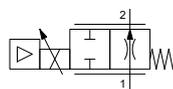
Features

The pressure in A is continuously adjusted via the solenoid current.

Characteristics

- Linear characteristic and good repeatability
- Direct or pilot operated
- Pressure max. 350 bar
- Flow up to 250 l/min
- Nominal sizes M16, M18, M22, M33, M42 and U10

THROTTLE VALVES WITH INTEGRATED ELECTRONICS DNPP.../ME, DOPP.../ME



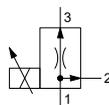
Features

Throttles the volume flow according to the adjusted solenoid current.

Characteristics

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

FLOW CONTROL VALVES QNPP, QDPP



Features

Regulates the volume flow proportionally to the adjusted solenoid current. Any change of the load is compensated.

Characteristics

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

INDIVIDUAL SOLUTIONS

Wandfluh offers a variety of individual solutions based on existing components. With the customer, the requirements are defined and then further developed to an optimised product. The extensive experience of our engineers and the flexibility of our production help us to find the optimum solution for your needs.

PROCESS VALVE CONTROL



The process industry handles a wide range of media that are controlled with process valves (such as butterfly or ball valves). The flow dosage on the process valve is made hydraulically.

- Process valve control with proportional spool valve
- Additional control of the valve opening with position controller
- Additional functions for emergency shutdown
- Integration in the process control via HART

EFFICIENT AND SECURE BRAKING



The brake system has to ensure a secure, rapid and controlled braking. For a sensitive braking response, the hydraulics must act constantly and with low hysteresis on the brake system.

- Short valve reaction time for rapid response of the brakes
- Durable and low maintenance
- Due to high power density very compact construction
- High efficiency due to low leakage losses with pressure reducing

SYNCHRONISATION AND POSITIONING CONTROL



Loading and unloading freight containers must take place quickly and precisely. The requirements for positioning the container when setting it down onto the transportation device are accordingly high.

- Controlling cylinder axis positions individually or in synchronisation
- For exact positioning of the container on the cable crane, it must be possible to make turning and tilt movements.

MOBILE CONTROL



By using small and simple PME controls (Programmable Mobile Electronics), performance and costs can be tuned exactly to the needs, and additional flexibility can be gained for extensions.

- Reduction of the cabling complexity
- The system allows extensions or optimal vehicle configurations to be added simply
- Additional functionality can be programmed quickly through the software
- Highly simplified maintenance and error detection

SWITZERLAND

Wandfluh AG **Hydraulik + Elektronik**

Helkenstrasse 13
3714 Frutigen
Tel. +41 33 672 72 52
Fax +41 33 672 72 87
sales-ch@wandfluh.com
www.wandfluh.com

SWITZERLAND

Wandfluh Produktions AG

Parallelstrasse 42
3714 Frutigen
Tel. +41 33 672 73 73
Fax +41 33 672 73 93
wapro@wandfluh.com
www.wapro.ch

GERMANY

Wandfluh GmbH

Friedrich-Wöhler-Strasse 12
78576 Emmingen
Tel. +49 74 65 92 74 0
Fax +49 74 65 92 74 20
info@wandfluh.de
www.wandfluh.de

AUSTRIA

Wandfluh GmbH

Färbergasse 15
6850 Dornbirn
Tel. +43 55 72 38 62 72 0
office-at@wandfluh.com
www.wandfluh.at

FRANCE

Wandfluh SARL

Parc Technologique
Immeuble le Pôle
333, Cours du Troisième Millénaire
69791 Saint-Priest Cedex
Tel. +33 4 72 79 01 19
Fax +33 4 13 57 02 41
contact@wandfluh.fr
www.wandfluh.fr

UNITED KINGDOM

Wandfluh UK Ltd.

Northfield Road
Southam CV47 0FG
Tel. +44 1 926 81 00 81
Fax +44 1 926 81 00 66
sales@wandfluh.co.uk
www.wandfluh.co.uk



CHINA

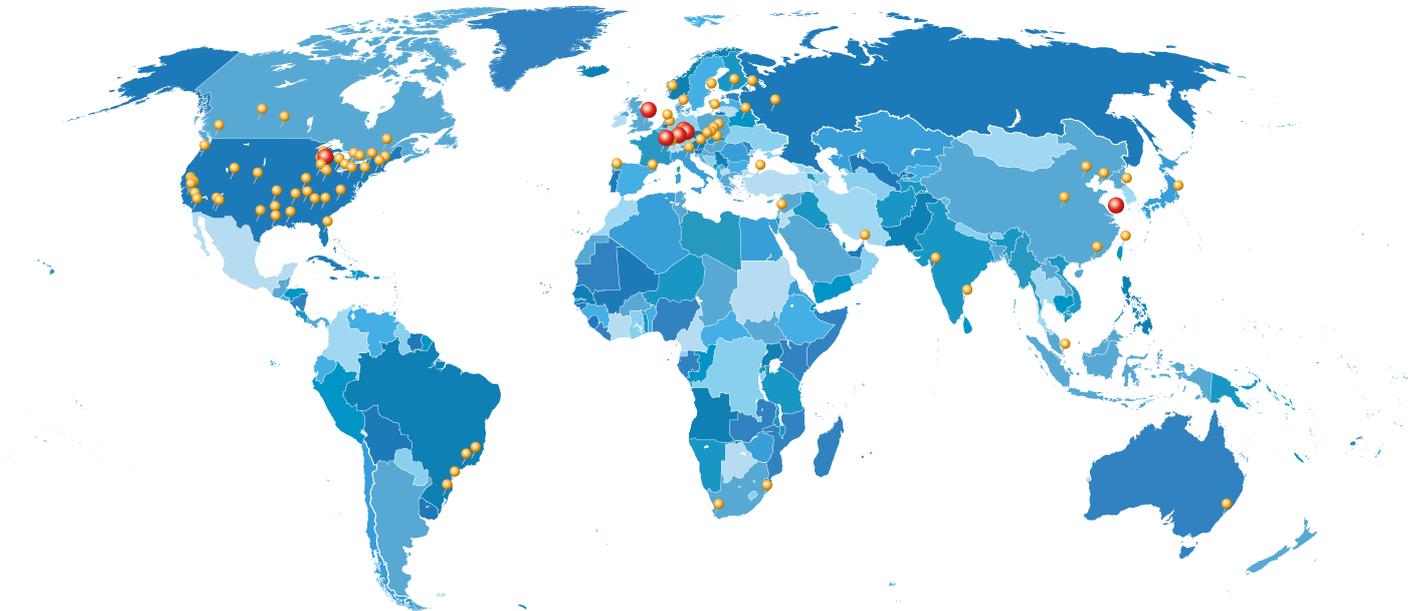
Wandfluh (Shanghai) **Hydraulic System Co. Ltd.**

No. 450 Beihengshahe Road
Minhang District
Shanghai 201 108
Tel. +86 21 67 68 12 16
Fax +86 21 67 86 12 18
sales@wandfluh.com.cn
www.wandfluh.com.cn

AMERICA

Wandfluh of America, Inc.

909 High Street
Mundelein, IL 60060, USA
Tel. +1 847 566 57 00
Fax +1 847 566 57 33
sales@wandfluh-us.com
www.wandfluh-us.com



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