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Control Systems GmbH

We give
impulses >>>

ELECTROHYDRAULIC CONTROL SYSTEM

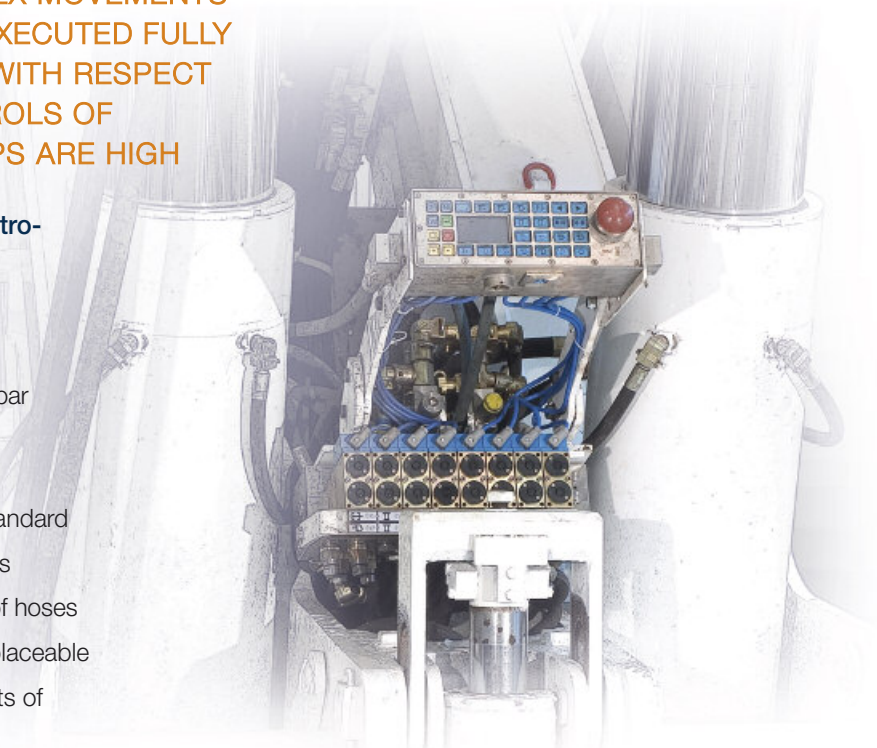
FOR THE CONTROL OF THE HYDRAULIC CYLINDERS
AND PROPS IN SHIELD SUPPORT UNITS UNDERGROUND

ELECTRO-HYDRAULIC CONTROL SYSTEM BY TIEFENBACH CONTROL SYSTEMS...

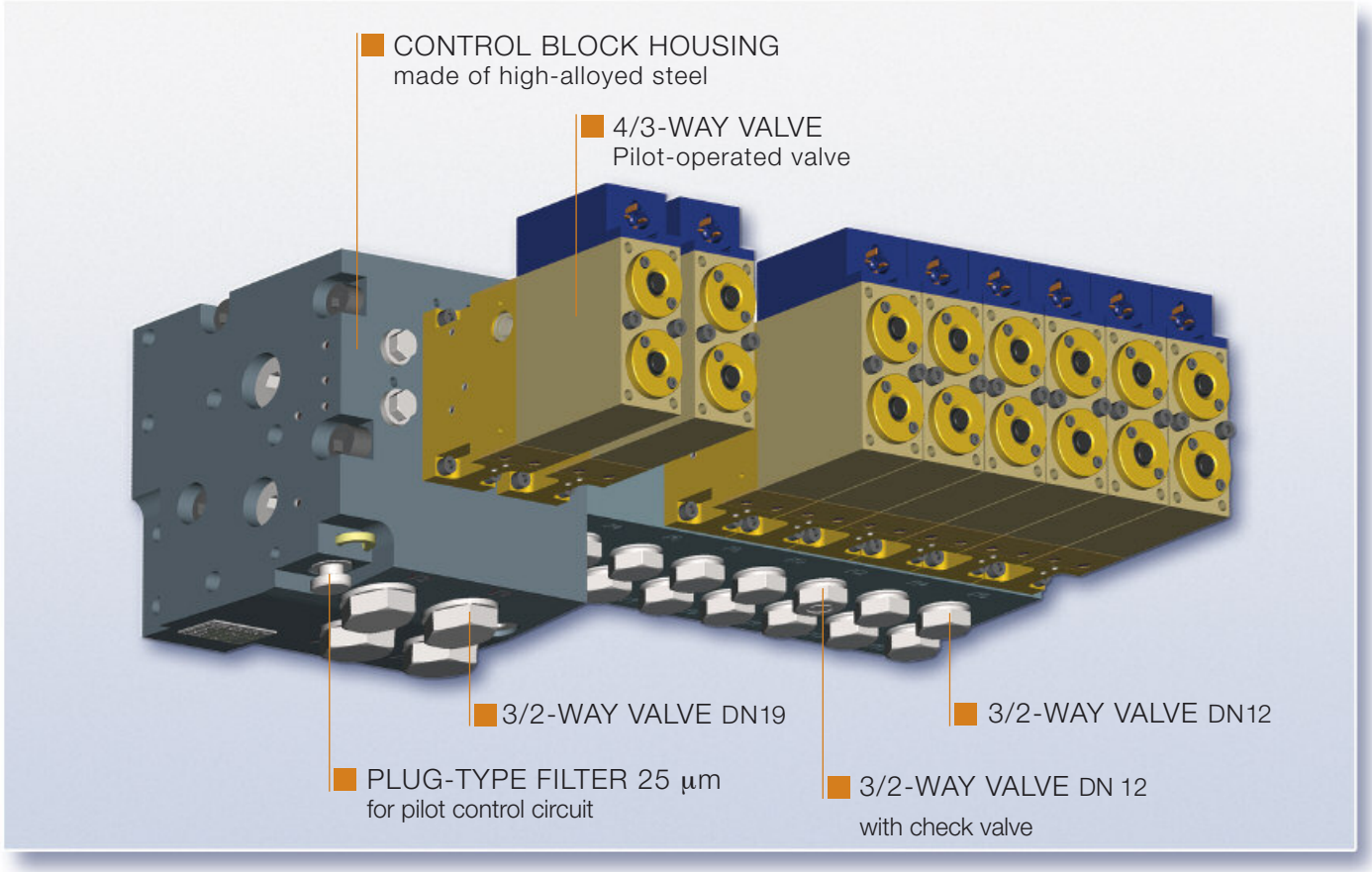
IN ORDER TO PERMIT THE COMPLEX MOVEMENTS OF THE SHIELD SUPPORT TO BE EXECUTED FULLY AUTOMATICALLY REQUIREMENTS WITH RESPECT TO THE PRECISION OF THE CONTROLS OF HYDRAULIC CYLINDERS AND PROPS ARE HIGH

This extensive task is performed by the electro-hydraulic control system together with the electronic shield control unit of type ASG

- Largely unaffected by external influences
- Fully operable up to a pressure of up to 420 bar
- Use of corrosion-resistant materials for all components
- Additional facility for manual operation as standard
- Available in 2-function to 22-function variants
- Simple Steck-O-system for the connection of hoses
- Wear parts easily accessible and quickly replaceable
- Explosion protection acc. to the requirements of DIN EN1804-3
- 3/2-way valves with different flow rates in cartridge construction
- Can be triggered electrically via the shield control unit



>>> 2-LEG SHIELD CONTROLLED BY E-H CONTROL SYSTEM AND SHIELD CONTROL UNIT ASG5



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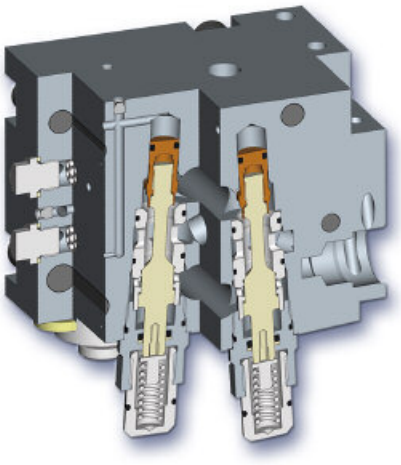
APPLICATION

- The electro-hydraulic control system is suitable for all applications where where hydraulic cylinders have to be moved in a harsh environment
- The E-H control systems are optimized for the control of …
  - tensioning frames
  - plow shields
  - shearer shields
  - sublevel caving operations

FUNCTION AND DESIGN

- The electro-hydraulic control units used worldwide are of rugged design and have been especially developed for underground mining operations. However, they can also be used in almost every other area such as e.g. in rolling mills or as motor control units.
- In order to be able to fulfil the most varied requirements of powered roof supports and meet the demands specified by the individual customers in the best possible way the electro-hydraulic control units can be combined choosing from a wide variety of individual components. In addition to the number of functions and the manifold port sizes for the hose lines valve capsules with different flow rates are available. The pilot control valves flanged to the control block which are used for operating the 3/2-way valve capsules are also available in different variants to suit the specifications of the different countries.
- For certain functions of the shield support, as for example for controlling the flipper cylinder, valve capsules can be designed as blocking valves. The respective valve capsules have a check valve integrated between the working port and the return thus which prevents that the flipper cylinder can retract all by itself.
- The valve inserts are designed in cartridge form for easy replacement of the wear parts and can, same as the 25µm filter integrated in the control, be exchanged quickly.
- In addition to the variants of the standard version a large number of further options are available.
- Tiefenbach Control Systems GmbH also offers electrohydraulic control units with high-pressure adding system.
- Here, the props are initially set with 320 bar and reset afterwards with 420 bar. Furthermore, water spraying functions, the simultaneous switching of several valve capsules or an additional low pressure port for incremental plowing can be implemented.

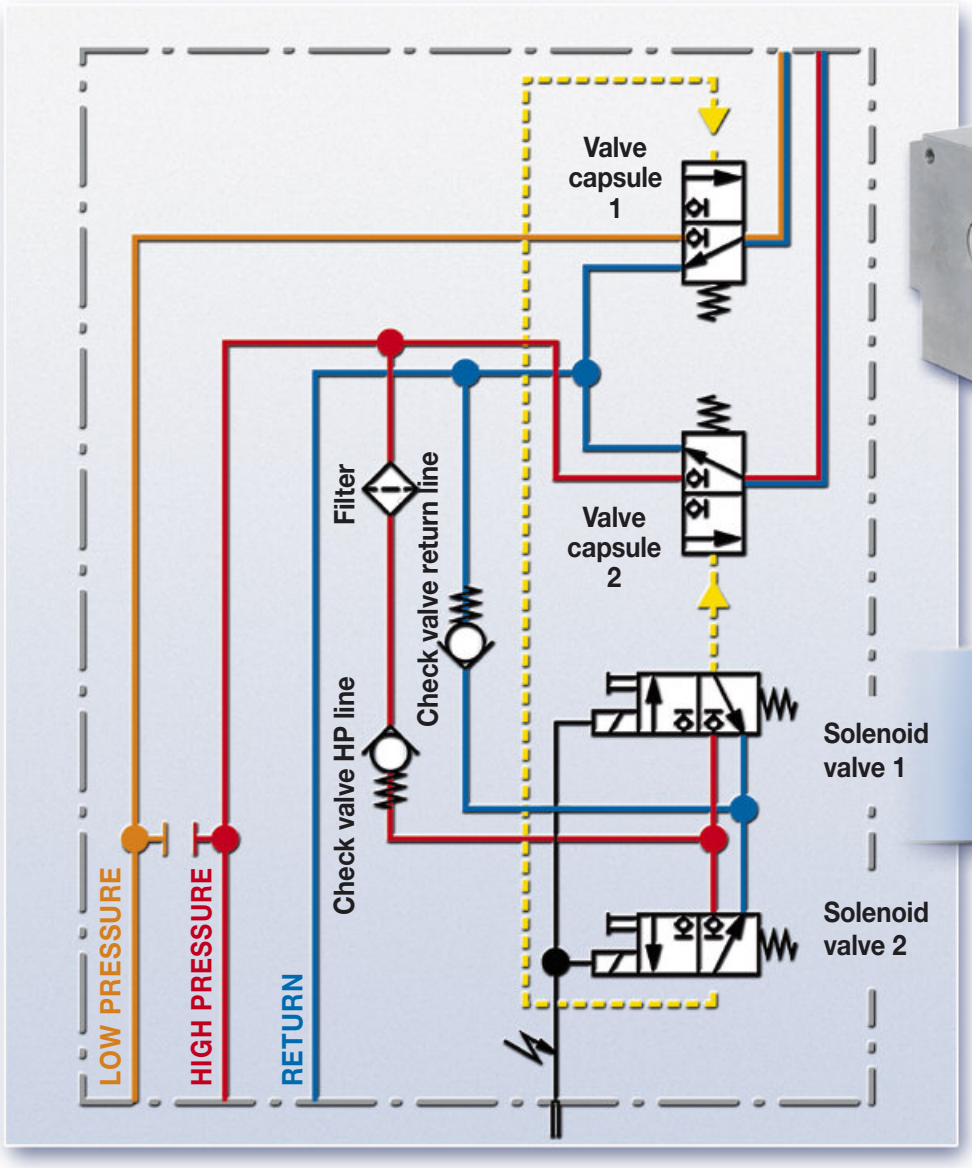


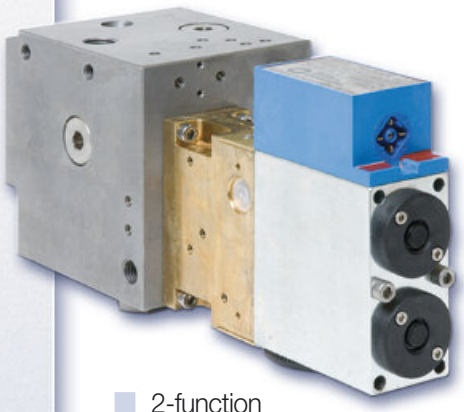
- **Highly dirt tolerant due to self-cleaning valve seat**

ELECTRO-HYDRAULIC CONTROL SYSTEM BY TIEFENBACH CONTROL SYSTEMS...

DIFFERENT STECK-O PORTS FOR OPTIMIZED PROCESSES

>>> HYDRAULIC DIAGRAM FOR 2-FUNCTION E-H CONTROL SYSTEM





2-function control

Expandable to **22** functions

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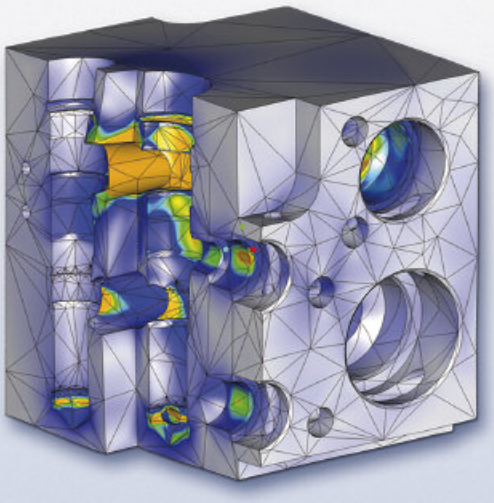
>>> THE CONTROL BLOCK HOUSING

is made of stainless steel and, based on our many years of experience, has been adapted by us to suit the harsh conditions underground. The control block in its standard version is designed for a pressure of 350 bar.

In order to ensure optimum safety against high-pressure hazards each control block housing is checked for weak points by the Finite Element Method (FEM) as early as in the design process and optimized accordingly.

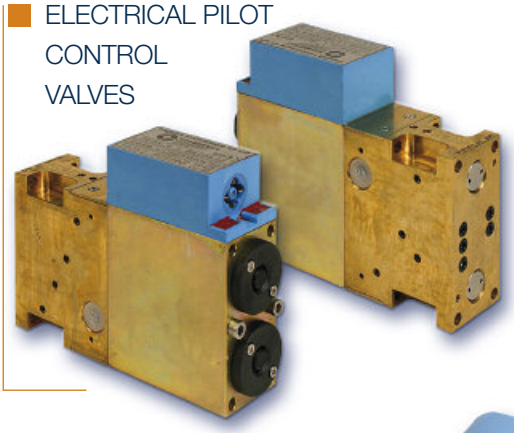
The control block housing interiors vary in their design to meet the individual hydraulic control requirements of the roof support. For example, the housings are equipped with additional high-pressure or low-pressure ports or provided with a directional control valve control deviating from the standard.

The steck-o-ports are also designed to fulfil individual customer requests so that the support can be controlled with optimum volume flows.



STRESS ANALYSIS AT A CONTROL BLOCK HOUSING BY MEANS OF THE FINITE ELEMENT METHOD

ELECTRICAL PILOT CONTROL VALVES



Intrinsically safe Hirschmann connectors with traditional plug and screw connection

Intrinsically safe TCS connectors with O-ring retention ensure secure connections without the use of tools

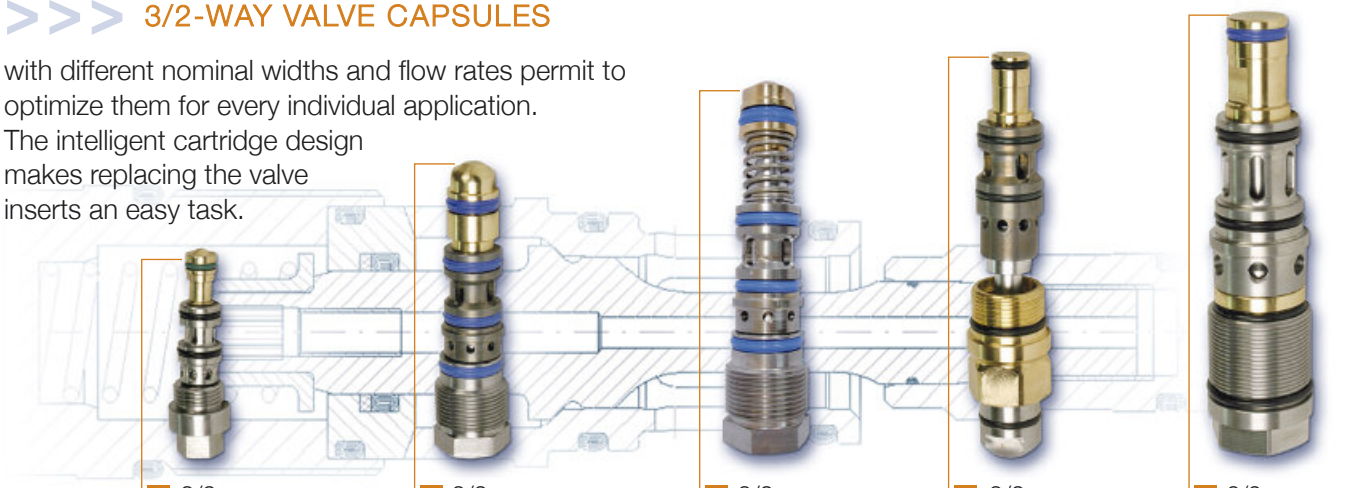
>>> THE PILOT CONTROL VALVES

control the 3/2-way valve capsules hydraulically. Each pilot valve is responsible for the activation of two directional control valve capsules. Both the pilot valves and the 3/2-way valve capsules are operated with the same medium. The pilot control valves are activated from the support control unit via intrinsically-safe cables.

Depending on the requirements to be met by the control process several different types of pilot valves may be necessary. To optimize functionality the pilot control valves are used with a different intrinsically-safe electrical connection option and rotated through 180°.

>>> 3/2-WAY VALVE CAPSULES

with different nominal widths and flow rates permit to optimize them for every individual application. The intelligent cartridge design makes replacing the valve inserts an easy task.



3/2-way valve capsule **DN5**

3/2-way valve capsule **DN12**

3/2-way valve capsule **DN12 RV**

3/2-way valve capsule **DN15**

3/2-way valve capsule **DN20**

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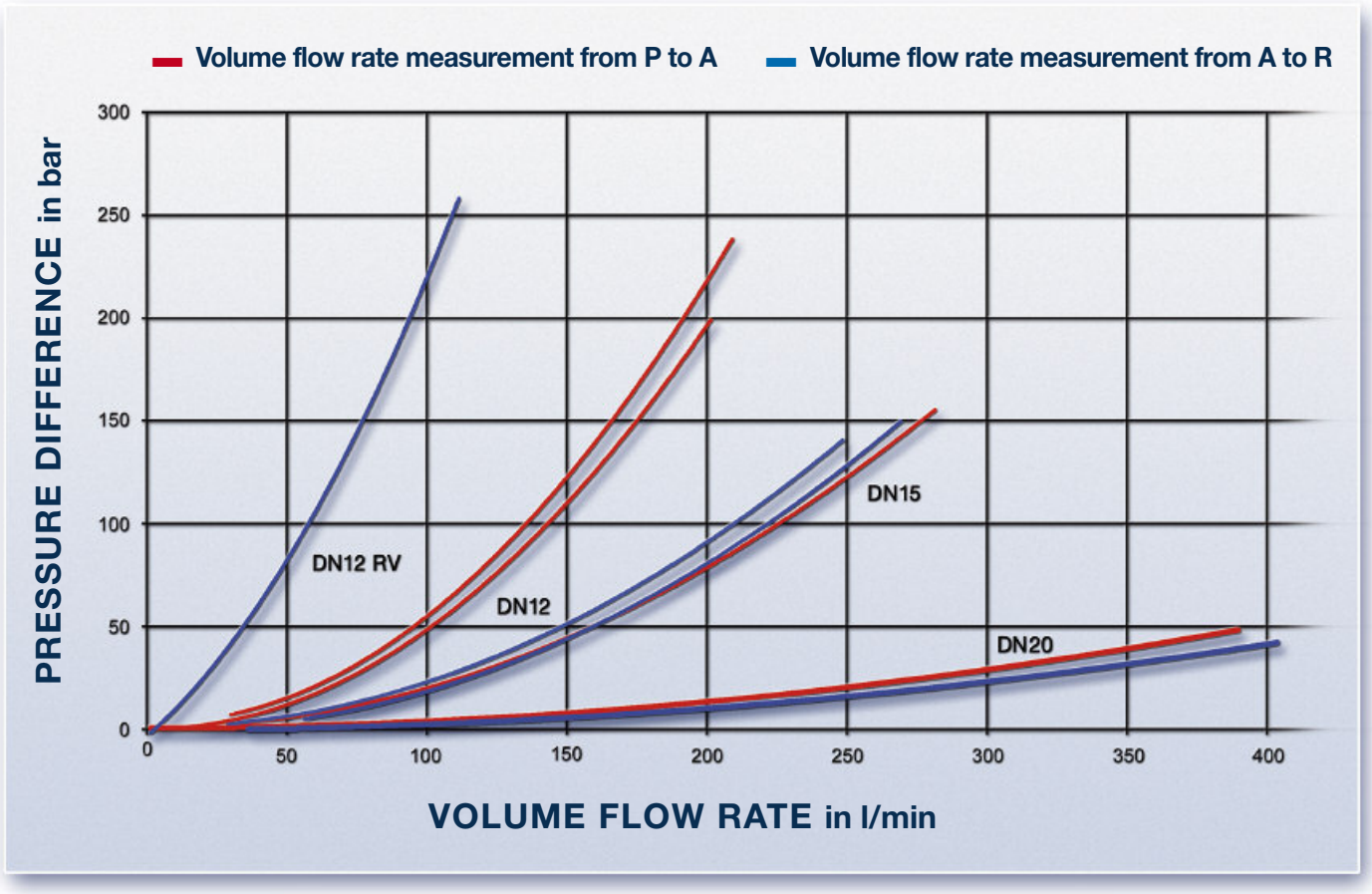
>>> VOLUME FLOW RATE MEASUREMENTS



>>> All control units leaving our factory are tested 100% and the results are recorded. This is what we owe to our customers

>>> To be on the safe side, all functions of the control unit are tested several times automatically using special company-own software

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TECHNICAL DATA

Type of pilot control valve:	Ball seat valve nominal size DN2
Type of main control valve:	Plug-type connection acc. to DIN 20043 in nominal sizes DN12 / DN15 or DN20
Ports:	Plug-type connection acc. to DIN 20043 in nominal sizes DN10 / DN12 / DN16 / DN19 / DN25 / DN31
Fitting position:	any
Pressure range:	350 bar to 420 bar
Flow rate:	from 150 l/min to 800 l/min (depending on the variant chosen)
Temperature range:	+5°C to +45°C
Pressure medium:	HFA
Viscosity range:	0 to 36 cSt
Pilot control valve filters:	Mesh size 25 µm
Operation:	- electronically controlled, hydraulically operated - mechanically operated (repair mode)
Power supply:	intrinsically safe direct voltage
Electrical connection parameters:	V_{nom} = 12VDC, V_{max} = 13.5VDC, I_{nom} = 50mA each solenoid
Current consumption:	65mA to 165mA (depending on the indiv. application)
Electrical connection:	Hirschmann connector system G4W1F
Type of protection:	IP54 acc. to EN 60529/IEC529
Ex-approval:	I M2 EEX ia I

We have plenty more control systems with special and additional functions in our program. We look forward to receiving your inquiry.

- The information given in this leaflet is for guidance only.
- Obligations and commitments or claims of any kind cannot be derived therefrom.

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