3-WAY-FLOW CONTROL VALVE

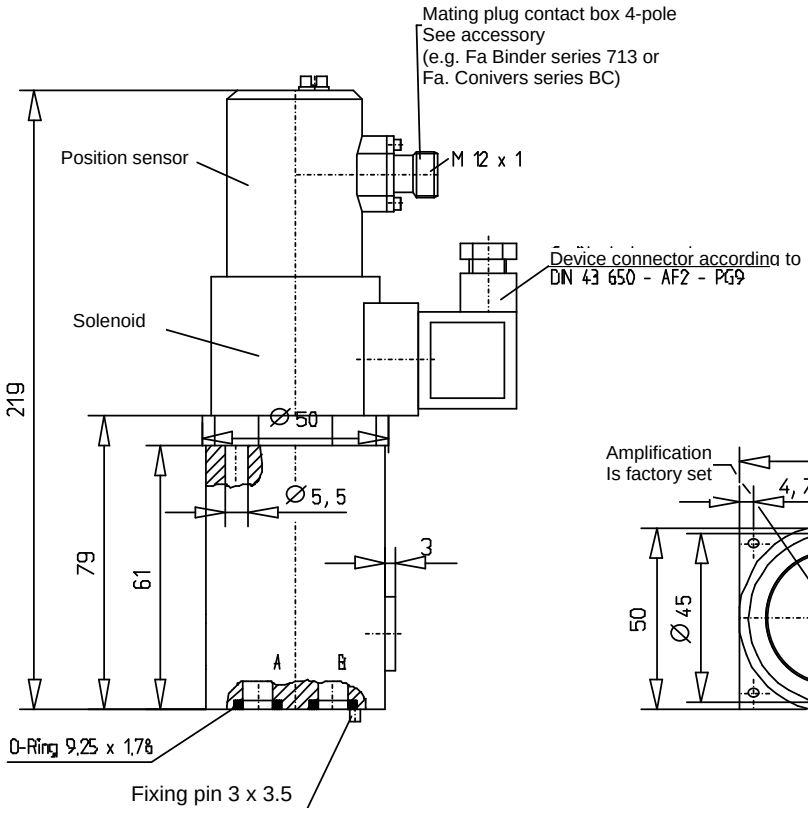
Valve regulation with proportional control solenoid
Subplate mounting NG 6 – mounting surface according to DIN 24 340–G6–
210 bar – up to 30 l/min

Type
38 CR

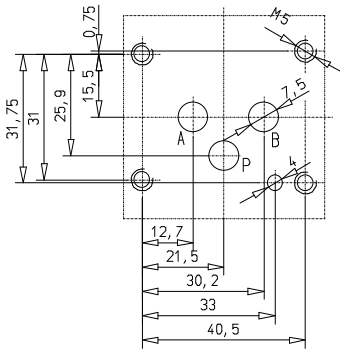
3-Way-Control Valves are flow control valves with - in parallel connection- inserted pressure balance. The valves regulate an adjustable flow rate independently of pressure changes in the work or the drain line automatically constantly.

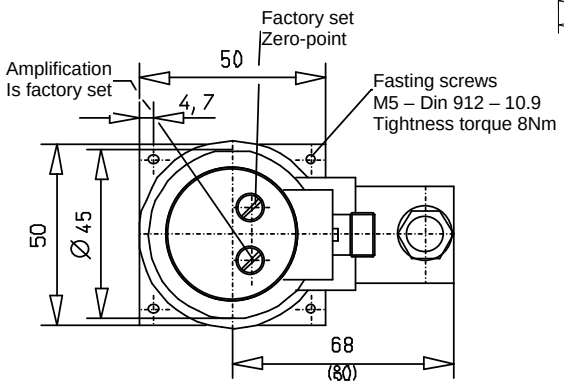
FEATURES

- Solenoid system: path-controlled, pressure resistance.
  Coil exchangeable without opening the system
- Path measuring system: pressure resistant, inductive with integrated carrier frequency measure amplifier in an enclosed metal housing
- EMV – the regulations by law concerning electro-magnetic compatibility of devices (EMVG) are fulfilling in case of proper installation
- remote controllable, programmable
- valve neutral position: closed
- Acting time 70 msec.
- Volume flow signal function: linear
- Assembly on connection plates with pipe joints or control block
- Standard sealing material Buna N / NBR



Mounting surface
DIN 24 340 – G6





ORDER INFORMATION

The scope of delivery of the flow control valve includes the o-rings for sealing the connecting, four fixing screws M 5 x 70 - DIN 912 - 10.9 and the solenoid connection plug.

Name	3-way-flow control valve	38	C	R	30	M..

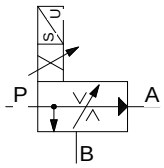
Type series
Series code letter
Valve operating mode **R** = proportional-control solenoid
Rated adjustment volume flow: 1,0; 3,0; 9,0; 20; 30 l/min
Supplementary data for special models
e.g. special Viton sealings (FKM)= **M15**

ACCESSORY

Control amplifier type StRA 03 - ES - 4 see dimension sheet 9-74-003-0026
Mating connector position sensor Suitable for an installation according to the EMVG regulations Order No.:
angle junction box 44-028-00536 (dimension sheet 9-74-028-0009)
Connecting plates see dimension sheet 9-74-030-2002

CHARACTERISTICS

1. General

Symbol	
Design	Adjustment throttle: hollow piston with rectangular opening Differential pressure valve: switched in downstream with the adjustment throttle
Weight	2.1 kg
Mounting position	any, preferably vertical
Direction of volume flow	P to A controlled; P to B unthrottled residual current
Ambient temperature	-10℃ to +50℃

2. Hydraulic characteristics

Rated pressure / max. pressure	210 bar for all connections
Hydraulic fluid	Hydraulik oil according to DIN 51 524 (1,2)
Hydraulic fluid temperature range	-20℃ to +70℃
Viscosity range	5 - 350 mm^2/sec.
Rated volume flow range	1.0; 3.0; 9.0; 20; 30 l/min
Min. adjustable and controllable volume flow	approx. 10 - 20 cm^3/min, recommended control range 1 : 100 referred to the rated variable flow
max. permitted volume flow	35 l/min
Contamination level / filtering	General permittable class 18/15 according to ISO 4406 or 9 according NAS 1638(recommended filter: min. retaining rate $\beta_{10-15} \geq 75$)

3. Type of actuation

electrical – proportional solenoid with position sensor

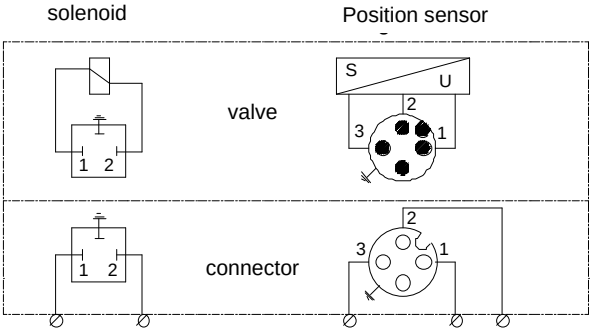
3.1 Solenoid

Design	Single solenoid - pressing, pressure resistant
Type of voltage	DC
Rated voltage	12 V
Rated current	1.6 A
Max. current	1.9 A
min. current	approx. 400 mA
Rated resistance	R_{20} = 5,7 Ohm
Coil inductively	
Nominal output	14.6 W
Pulse duty factor	100%
Type of connection	socket connection according to DIN 43 650 - AF 2
Type of protection	IP 54 according to DIN 40 050 (with installed mating connector)

3.2 Position sensor

Design	pressure-tight
Measuring system	inductive; Principle – differential transformer
Supply voltage	24 V DC +/- 20%, polarized
Permissible ripple	$U_{SS} \leq$ 5%
Power consumption	$\leq$ 40 mA
Output voltage	approx. 7,5 - 11 V; ripple $\leq$ 20 mV_{SS}, valve specific compensation
Max. output voltage loaded	> 10 K Ohm
Sensitivity, adjustable	1,5 V/mm +/- 15%
Zero shift, electrically	+/- 1mm
Type of connection	Device plug and socked connection M 12 x 1 - 4 pole
Type of protection	IP 54 according to DIN 40 050 (with installed mating connector)

Terminal assignment



Terminal assignment Position sensor	
PIN	
1	Output voltage
2	Supply voltage
3	0 V

4. Response characteristics (definition according to DIN 24 311)

Sensitivity	< 1%	from nominal signal
Repeatability	< 1%	
Range of inversion	< 1%	
Hysteresis	< 1%	on Δ p 50 bar
Temperature drift (position sensor; Without viscosity influence	<0,1% Δ Q/℃	
Volume flow signal function	see Fig. 3 and Fig. 4	
Time response	see Fig. 2.	

CHARACTERISTICS

Time response
Fig.1 shows the transient function and/or the step response for a signal input from 10% to 90% and vice versa.

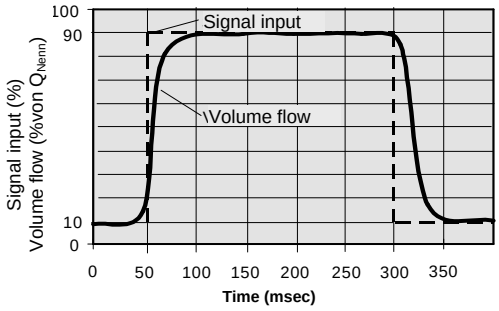


Fig. 1

Volume flow signal function characteristics Q = f (u, p = const.)
Fig. 2 and 3 shows the dependence of the nominal volume flow ranges on the electrical input signal.

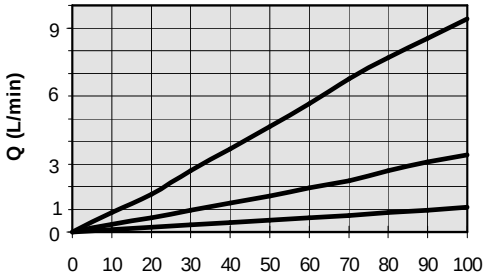


Fig. 3

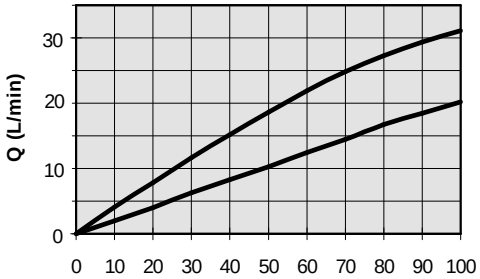


Fig. 4

Q- Δ p-characteristics; Q = f (P_A; u = constant)
Fig. 5 shows the behaviour of the valve for the volume flow direction P to A fort he various rated flow volume range as well as the minimum pressure difference required of the function P_P - P_A
Supply current 20% > Rated volume flow range.

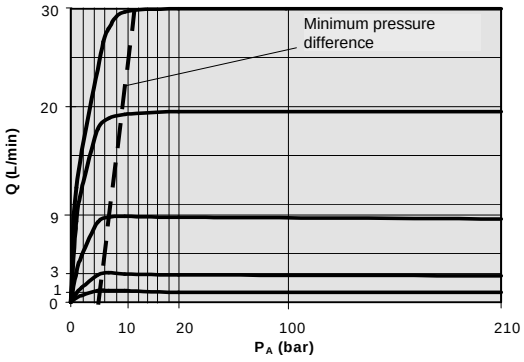


Fig. 5

Δ p-Q- characteristics; Δ p (P_P) = f (Q; P_A and P_B = 0 bar)
Fig. 6 shows the pressure loss of the valve for the volume flow direction P to B through the differential pressure valve with the setting closed, Connection A and B pressure loss.

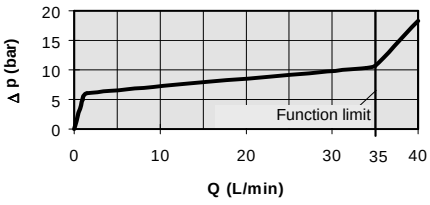
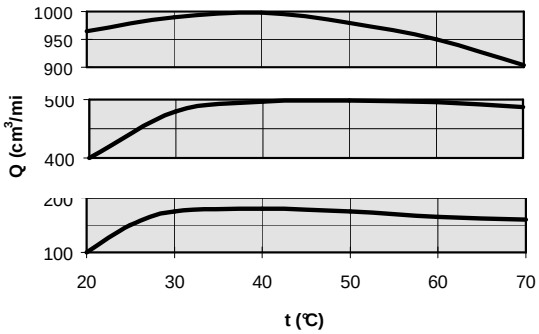


Fig. 6

Q-t- characteristics; Q = f (t, p = constant)
Fig. 7 shows the volume flow change depending on the oil temperature at a constant pressure difference of 100 bar for 3 different setting values. Measured using hydraulic oil HLP 46 (ISO-VG 46) = 46mm²/sec. at 40℃. For longer volume flows, the temperature influence becomes smaller. For smaller flow, low viscosity oils result in smaller volume flow deviations.



Description of the valve

1. Valve

The valves regulate an adjustable flow rate independently of pressure changes in the inline, work or the drain line automatically constantly.
Due to the differential pressure valve ((pressure balance) the volume flow is independent and it provides for a constant difference of pressure at the adjusting throttle. Due to the extremely compact design, extremely short control times a few msec. obtained in case of pressure variations. The volume flow is controlled in direction P to A only.
The difference to the 2-way-flow control valve consists essentially of the fact that the differential pressure valve is arranged parallels to the adjusting throttle and conveys hydraulic fluid of the pump, which is oversupply flow off the 3. connection (B). The differential pressure valve is closed in neutral position. The inlet stream to the valve must be ever larger than removed in the consumer connection A.
The pump must work at this valve type about the load on connection about connection A, this guaranteed a proper effectiveness. The installation is in the supply pipe or the inline possibly. Parallel connection of several valves is not possible. The remainder flow rate at the port B can be used to further consumers and may up to the height of the consumer pressure at the port A minus approx.
10 - 15 bar to be loaded.
The pressure adjustment is continuously variable due the proportional solenoid, which is controlled by an electronic control amplifier. The proportional solenoid is an electric-mechanical transducer. Its output quantity force is proportional to the current. The magnetic force acts against a counter check spring with the orifice opening. The solenoid is linked to the valve via a central thread.

To increase the setting accuracy and to reduce the influence of disturbances, the proportional solenoid is coupled to a path measuring system. In this way, the solenoid of the piston can be switched with the orifice opening in accordance with the given nominal value via the electronic control system in the position circuit and therefore be positioned precisely. This measure for instance eliminates large hysteresis errors among others. As the orifice section increases linearly of the solenoid stroke and as the path sensor supplies a linear output signal there is also a linear relation between nominal value and volume flow. Path sensor and solenoid together form an inseparable and rigid unit. Solenoid and sensor coil can be replaced without opening the hydraulic system. The coils can be rotated by 360°s o that the plug connection can be brought into virtually any position. The path sensor converts the solenoid stroke in a proportional electrical output voltage. The operating principle is based on the principle of a differential transformer consisting of a primary and two secondary coils. The digital control amplifier is mounted in the electronic box at the path sensor. Zero point and amplification can be adjusted via the potentiometer on the sensor.
The sensor design complies with the regulations by law concerning the electromagnetic compatibility of devices (EMVG) (see installation regulation 9-84-028-0049).
Attention!
The valve must not long be driven by the control range, valve damages cannot be excluded. By using the proportional amplifier StRA03, this shout be switched off by the Stop input by the mechanical control.

2. Materials

The valve components are made of structural steel, the externals components are bronzed. All wear parts are hardened. The actuator housing is made of aluminium, black-burnished. The other parts of the actuator are of various materials and they are corrosion protected.

For applications in excess of the given specification, please contact Schiedrum.

All specified parameters are partially based on long user's experience and partly on measurements made in laboratories. The data are typical of the valve and can deviate in series. All measurements were carried out on a test stand with an oil viscosity of 36mm²/sec and a filter mesh of < 10 µm. All data given here should be used as description of the product only and they are not to understand as warranty in the sense of law.