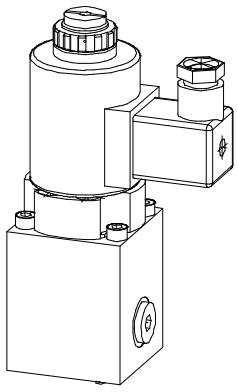
3-WAY-FLOW CONTROL VALVE

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

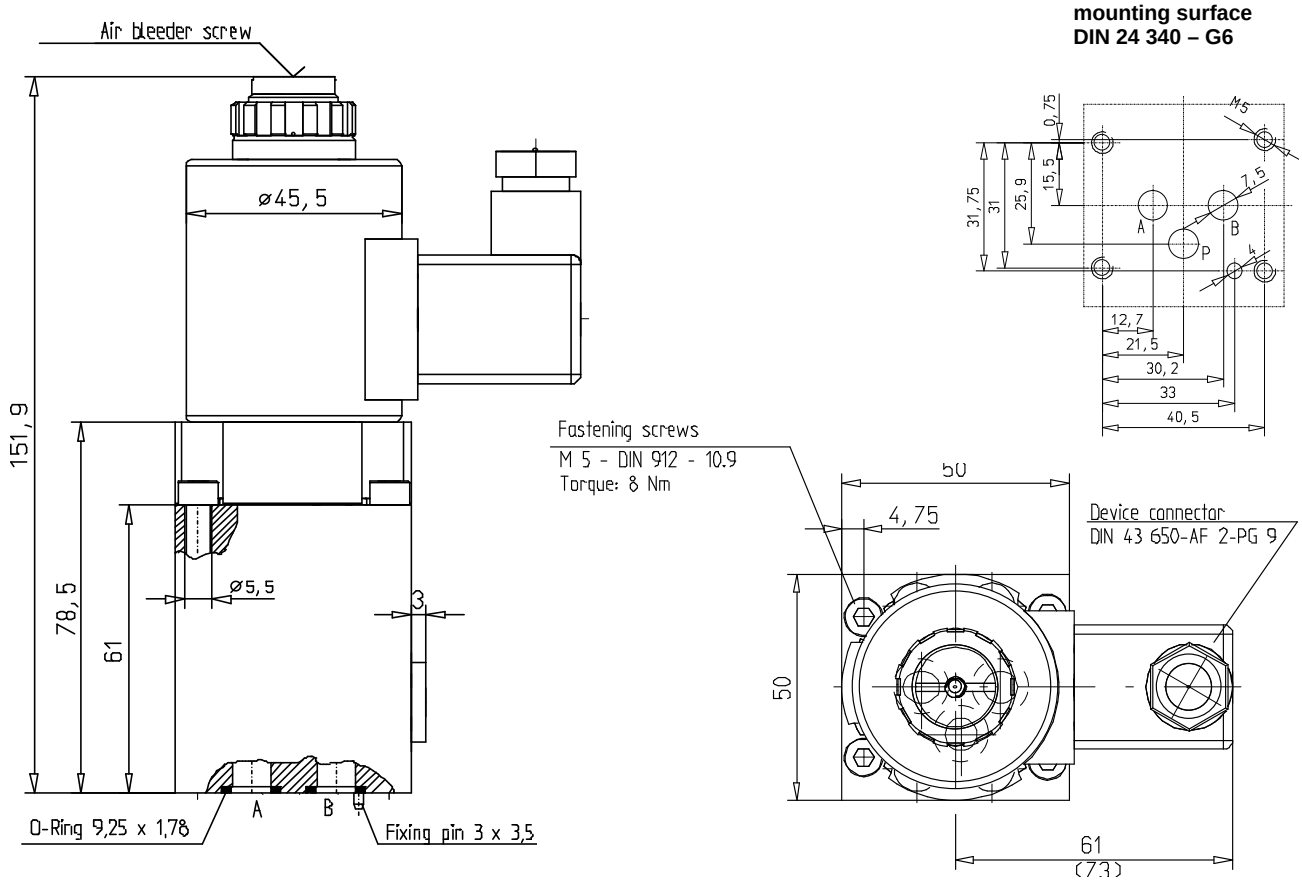
Type
38 DP

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



FEATURES

- Magnet system: power-controlled, pressure-resistant
  Coil exchangeable without opening the system
- remote control, programmable
- valve neutral position: closed
- Acting time approx. 70 msec
- Volume flow signal function: linear
- Assembly on connection plates with pipe joints or control block
- Standard sealing material Buna N (NBR)



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 connection plug.

Name

3-Way flow control valve	38	D	P	30	M15

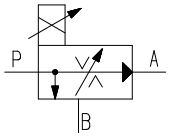
Type series
Series code letter
Valve operating mode **P** = proportional solenoid
Nominal adjustment volume flow: 1.0; 3.0; 9.0; 20; 30 l/min
Supplementary data for special models
e.g. special Viton sealings (FKM)= **M15**

ACCESSORY

Control amplifier type StA 03 - ES	see dimension sheet 9-74-003-0026
Connecting plates	see dimension sheet 9-74-030-2002

CHARACTERISTICS

1. General

Symbol	
Design	Adjustment throttle: trunk piston with rectangular opening Differential pressure valve: switched in downstream with the adjustment throttle
Weight	1,8 kg
Mounting position	any, preferably vertical
Direction of volume flow	P to A controlled; P to B uncontrolled residual flow
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: 25 referred to the nominal 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

3.1 Solenoid

Design	Simple solenoid – pressure-tight, 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} = 5.9 Ohm
Coil inductively	
Nominal output	15,1 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)

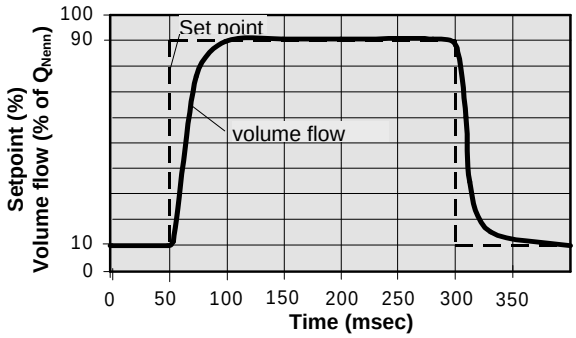
4.0 Response characteristics

(definition according to DIN 24 311)

Sensitivity	approx. 1%	from nominal signal on Δ p 50 bar
Repeatability	approx. 1%	
Range of inversion	approx. 1%	
Hysteresis	approx. 4%	
Volume flow signal function	see Fig. 2 and 3	
Time response	see Fig. 1	

CHARACTERISTICS

time response
Fig. 1 shows the frequency response or step response in case of a setpoint step change from 10% to 90% and inversely.



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.

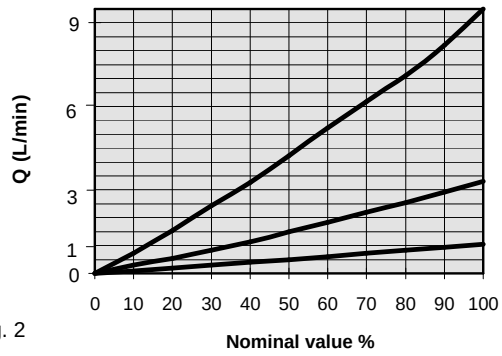


Fig. 2

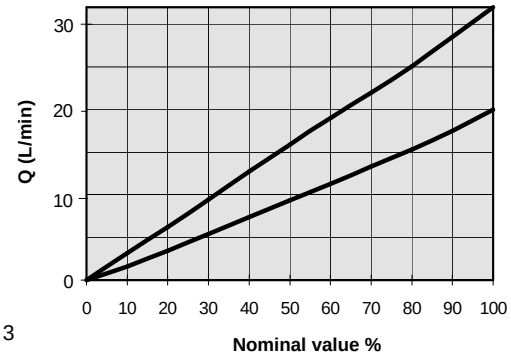


Fig. 3

Q- Δ p-characteristics; Q = f (P_A; u = constant)
Fig. 4 shows the behaviour of the valve for the volume flow direction P to A for the various rated flow volume range as well as the minimum pressure difference required of the function P_P - P_A .
Supply flow 20% > nominal volume flow range.

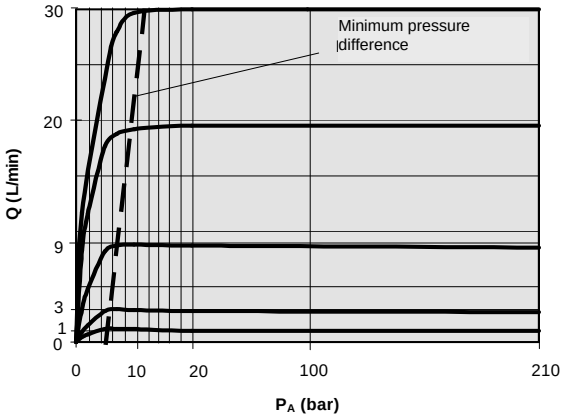


Fig. 4

Δ p-Q- characteristics; Δ p (P_P) = f (Q; P_A and P_B = 0 bar)
Fig. 5 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.

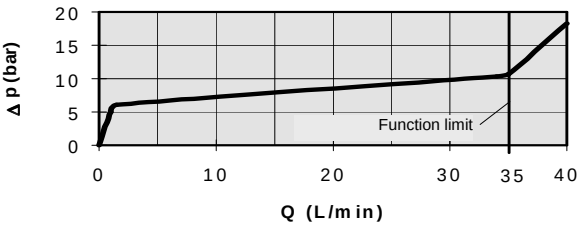
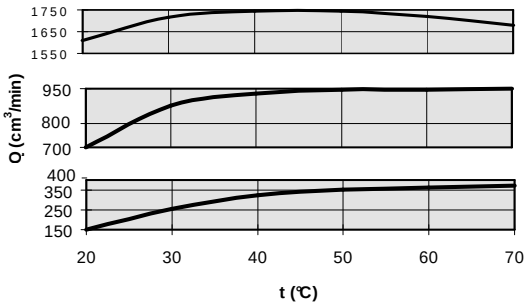


Fig. 5

Q-t- characteristics; Q = f (t, p = constant)
Fig. 6 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 f lows, 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, the 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 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 in the supply pipe is possibly only. A 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. Ist 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. The slide valve operates proportionally to the force, depending, in addition, on the throttle opening and the flow. The solenoid is exchangeable without opening the hydraulic system. The coil can be rotated by 360° so that the plug connections can be brought to any position.
Attention! We recommend to air bleed the valve before starting operation. The air bleed screw you will find on the front side of the solenoid (shown on the drawing).

2. Materials

The valve parts are made from steel. All wear parts are hardened. The outer pieces of the valve are burnished, the solenoid coil is covered in plastic housing.

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.