

2-WAY FLOW CONTROL VALVE

Valve pinning with proportional control solenoid
 Plate configuration in NG 6 - mounting surface according ISO 6263
 210 bar - up to 25 l/min

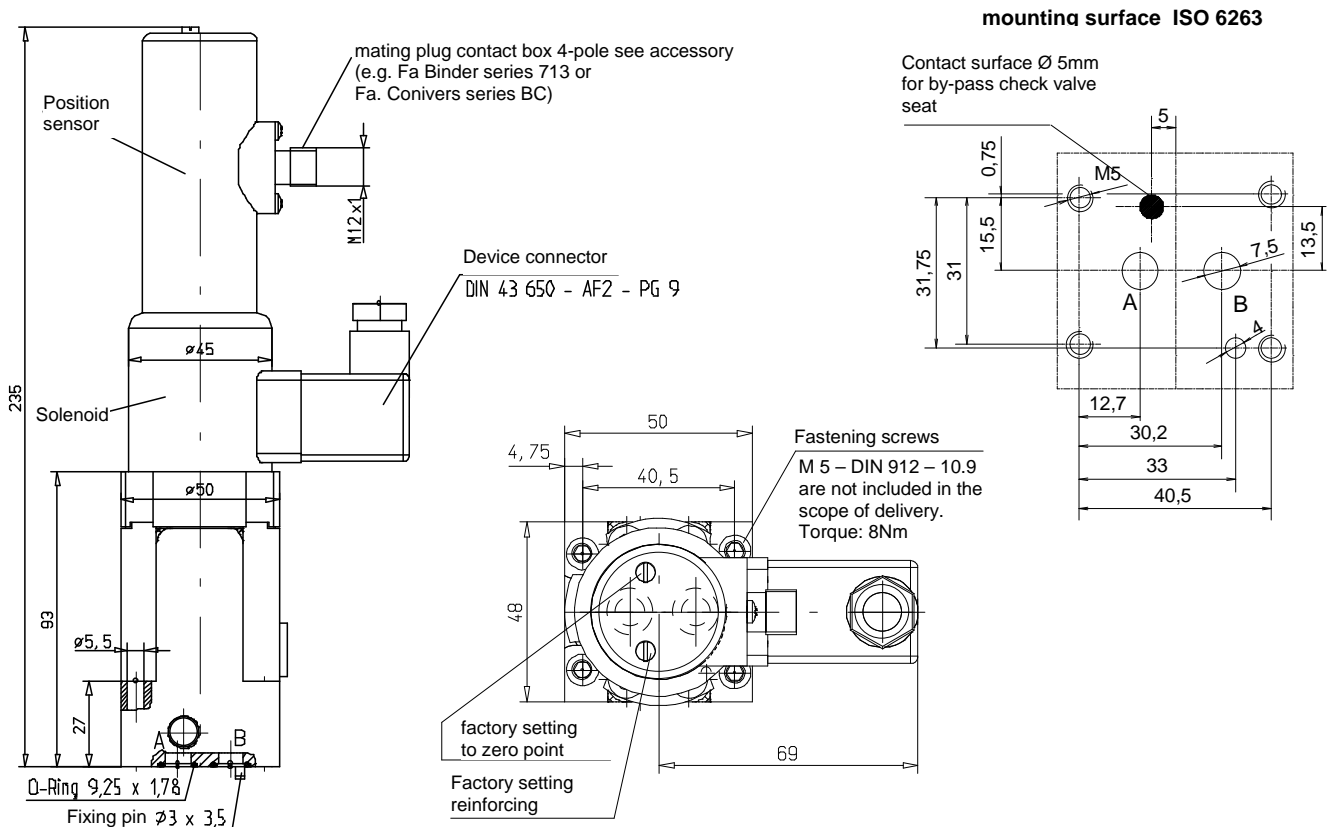
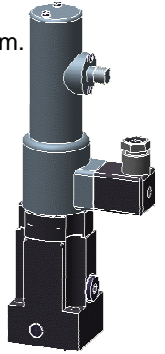
Type

28 LR

2-way flow control valves are flow valves (throttle valves) with integrated pressure balance. The valves automatically control an adjustable volume flow independently of pressure variations in the supply or discharge line to make it constant.

FEATURES

- Solenoid system: Path-controlled, pressure resistant. Coil can be replaced without opening the hydraulic system.
- Path measuring system: pressure resistant, inductive with integrated carrier frequency instrument amplifier in the 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
- Floating time 70 msec
- Volume flow signal function: linear
- Assembly on connection plates with pipe joints or control block
- With by-pass check valve
- Standard sealing material Buna N (NBR)



ORDER DATA

The scope of delivery of the flow control valve includes the o-rings for sealing of the connecting holes and the connecting plugs.

Name **2-way-flow-control valve 28 L R 25 M15**

Type series

Series code letter

Valve operating mode R = proportional control solenoid

Rated adjustment volume flow: 1,0; 2,5; 6,3; 10; 16; 25 l/min

Supplementary data for special models

e.g. special sealings from Viton (FKM) = M 15

ACCESSORY

Control amplifier type StRA 03 - ES - 1 see dimension sheet 9-74-003-0026

mating plug displacement sensor

Suitable for an installation according to the EMVG regulations.

Order-No.: angle box 44-028-00536

(dimension sheet 9-74-028-0009)

Order-No.: 44-020-00928

(4 pcs. Cylinder-screws M6 x 35 DIN 912-10.9)

see dimension sheet 9-74-030-2002

see dimension sheet 71 CZ (9-74-071-0016)

Connection plates:

Flow rectifier plates:

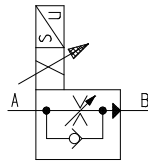
Valve fixing screw set for the combination with flow rectifier plates types 71 CZ:

Order-No.: 44-020-000921 (4 pcs. Cylinder-screws M5 x 75 DIN 912 - 10.9)

CHARACTERISTICS

1. General

Symbol



Design

Adjustment throttle: trunk piston with rectangular opening
Differential pressure valve: switched in downstream with the adjustment throttle

Return valve: spring-loaded ball-valve

2,1 kg

Weight

Mounting Position

Any, preferably vertical

Direction of volume flow

A to B controlled; B to A unthrottled return flow

Ambient temperature

-10°C to +50°C

2. Hydraulic characteristics

Rated pressure / max. pressure

210 bar for all connections

Hydraulic fluid

Hydraulic oil according to DIN 51 524 (1,2)

Hydraulic fluid temperature range

-20°C to +70°C

Viscosity range

5 - 350 mm²/s

Rated volume flow range

1,0; 2,5; 4,0 6,3; 10; 16; 25 l/min

Min. adjustable and controllable volume flow

approx. 10 - 20 cm³/min, recommended control range 1 : 100 referred to the rated variable volume flow

Max. permissible volume flow via the check valve

40 l/min

Contamination level / filtering

Class 16/13 according to ISO 4406 or 7 according to NAS 1638 (recommended filter: minimum retaining rate $\beta_{5-10} \geq 75$)

3. Type of actuation

electrical – proportional solenoid

3.1 Solenoid

Design

Single solenoid – pressure-tight, pressure-resistant

Voltage

direct current

Rated Voltage

12 V

Rated current

1,6 A

Max. current

1,9 A

Min. current (basic current)

approx. 400 mA

Nominal resistance

$R_{20} = 5,7 \text{ Ohm}$

Coil inductively

Nominal output

14,6 W

pulse duty factor

100%

Type of connection

Device plug and socket connecting according to DIN 43 650 – AF 2

Type of protection

IP 65 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

$\leq 40 \text{ mA}$

Output voltage

approx. 7,5 - 11 V; ripple $\leq 20 \text{ mV}_{ss}$, valve-specific compensation

Max. output voltage load

$> 10 \text{ K Ohm}$

Sensitivity, adjustable

1,5 V/mm +/- 15%

setting to zero point, electrical

+/- 1mm

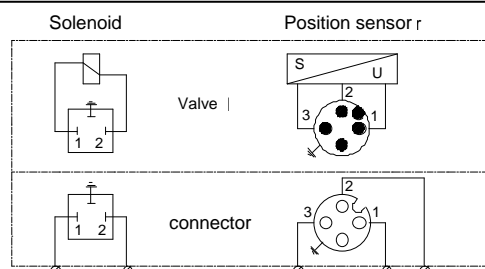
Type of connection

Device plug: M 12 x 1 – 4 pole

Type of protection

IP 65 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

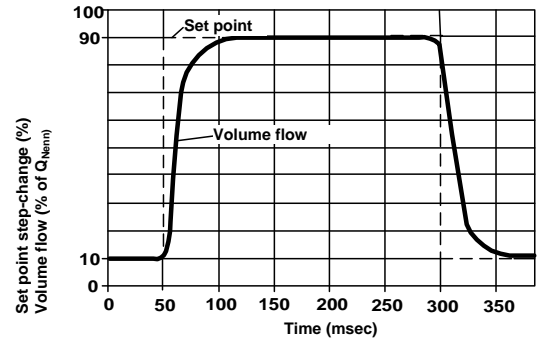
(definition according to DIN 24 311)

responsiveness	<1%	}	In rated variable volume flow at Δp 50 bar
repeat accuracy	<1%		
Reversal error	<1%		
Hysteresis	<1%		
Temperature drift (position sensor; Without viscosity influence)	<0,1% $\Delta Q/^\circ C$	}	
Volume flow signal function	} see diagrams		
Time response			

CHARACTERISTIC

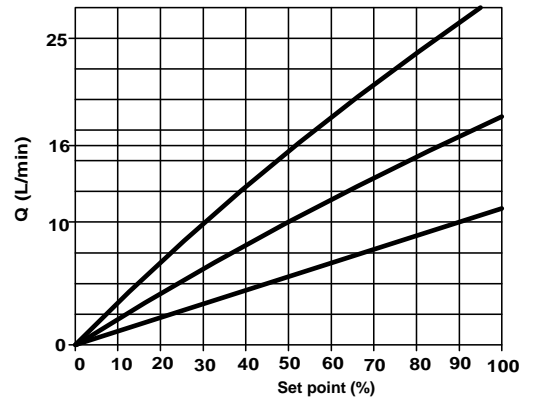
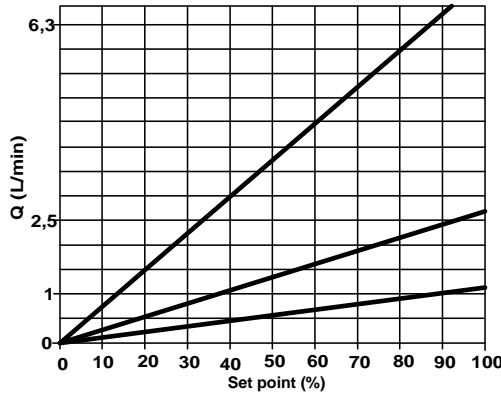
Time response

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



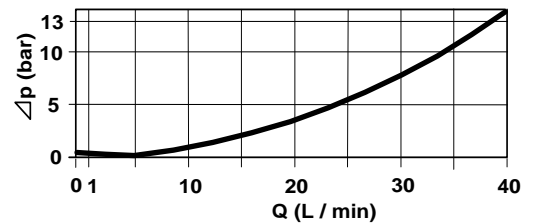
Volume flow signal function characteristics

shows the dependency of the nominal volume flow ranges on the electrical input signal.



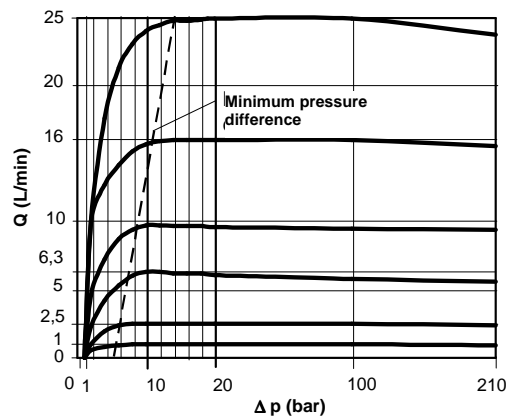
Δp -Q-characteristic line; $\Delta p = f(Q)$

The pressure loss of the valve for the volume flow direction B to A through the bypass return with the setting screen closed.



Q- Δp -characteristic line; $Q = f(\Delta p)$

The control behaviour of the valve for the volume flow direction A to B for the various rated flow volume ranges as well as the minimum pressure difference required of the function.

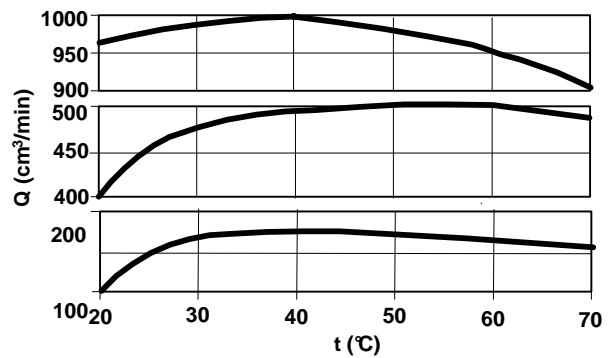


Q-t-characteristic line; $Q = f(t, p = \text{constant})$

The volume flow change depending on the oil temperature at a constant pressure difference of 100 bar for three different setting values.

The measurement is carried out with hydraulic oil HLP 46 (ISO – VG 46) = 46 mm²/sec at 40°C.

For higher volume flows, the temperature influence becomes smaller. In case of smaller flow, low viscosity oil result in smaller volume flow deviations.



Valve description

1. Valve

The valves automatically control an adjustable recharging flow constant within the function limits independently of pressure variations in this supply or discharge line. They may be integrated at the supply or discharge side of the consumer. The volume flow adjustment is infinitely variable through 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 pressure 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 supply 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° so that the plug connections 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.

2. Materials

The housing and the other parts are made of steel. All wear parts are hardened. The external valve parts are black-finished, the solenoid and sensor coils are galvanized and chromized. The solenoid components in contact with the pressure medium are of steel, iron and brass.

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.

The electronic wiring is integrated into the sensor. Zero point and amplification can be adjusted via the potentiometer on the sensor. The pressure independence of the volume flow is obtained by means of the differential pressure valve (pressure regulator). It guarantees a constant pressure difference at the setting orifice and is switched in series with the latter (secondary controller). Due to the extremely compact design, extremely short control times of few msec obtained in case of pressure variations. The pressure regulator is open in its neutral position. This may lead to a starting jump when switching on the valve. The valves can be delivered optionally with a modified control port via which the pressure regulator can be closed in its neutral position (see additional information 9-74-020-0026). The volume flow is controlled in one flow direction only. The control direction can be gathered from the name plate. In reverse flow direction, a by-passed check valve is integrated which allows for an unrestricted return flow at low pressure loss. It is designed as spring-loaded ball seat valve.

Attention!

The valve must not be driven by the electronic, when the hydraulic is shut down. Internal valve damages cannot be excluded. For this case the proportional amplifier StRA03-ES enable signal (connector Pin Z6) or the supply voltage should be disabled.