3-way flow control valve

Type 3FRM

RE 28862
Edition 2015-11
Replaces: 08.08

H5552

- Sizes 10 and 16
- Component series 2X
- Maximum operating pressure 315 bar
- Maximum flow 160 l/min

Features

- For subplate mounting
- Mechanical actuation
- Pressure relief valve (overload protection), optional
- Start-up jump reduction
- Bleed port for free circulation, optional

Contents

Ordering codes

01	02	03		04		05	06	07	08	09
3FR	**M**		**–**	**2X**	**/**					*****

01	3-way flow control valve	**3FR**
02	Mechanical actuation	**M**
03	Size 10	**10**
	Size 16	**16**
04	Component series 20 ... 29 (20 ... 29: unchanged installation and connection dimensions)	**2X**

Flow range A to B, linear

05	**– Size 10**	
	Up to 10 l/min	**10L**
	Up to 16 l/min	**16L**
	Up to 25 l/min	**25L**
	Up to 50 l/min	**50L**
	– Size 16	
	Up to 60 l/min	**60L**
	Up to 100 l/min	**100L**
	Up to 160 l/min	**160L**
06	**Without** pressure relief valve	**no code**
	With pressure relief valve	**D**
07	**Without** bleed port	**no code**
	With bleed port	**X**

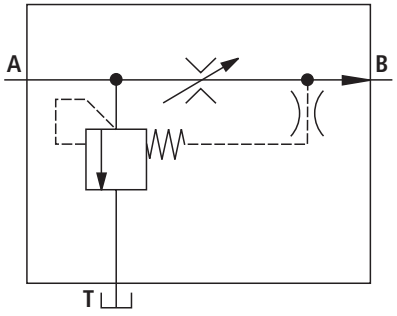
Seal material

08	NBR seals	**no code**
	FKM seals	**V**
	Observe compatibility of seals with hydraulic fluid used! (Other seals upon request)	
09	Further details in the plain text	*****

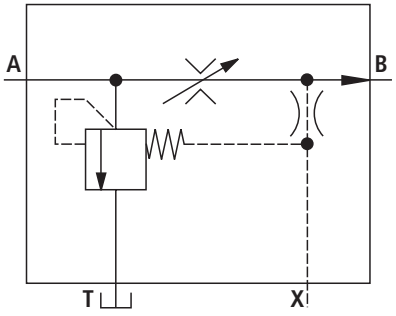
☞ **Notice:** Preferred types and standard units are contained in the EPS (standard price list).

Symbols

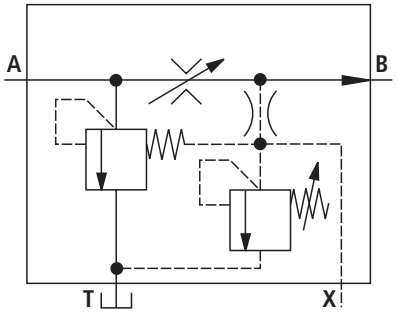
Type 3FRM ...



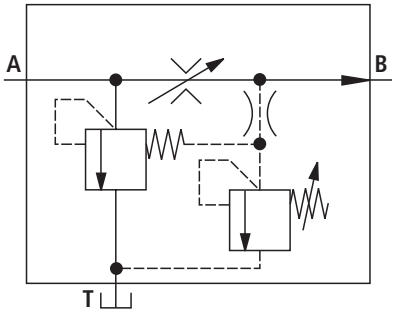
Type 3FRM ...X...



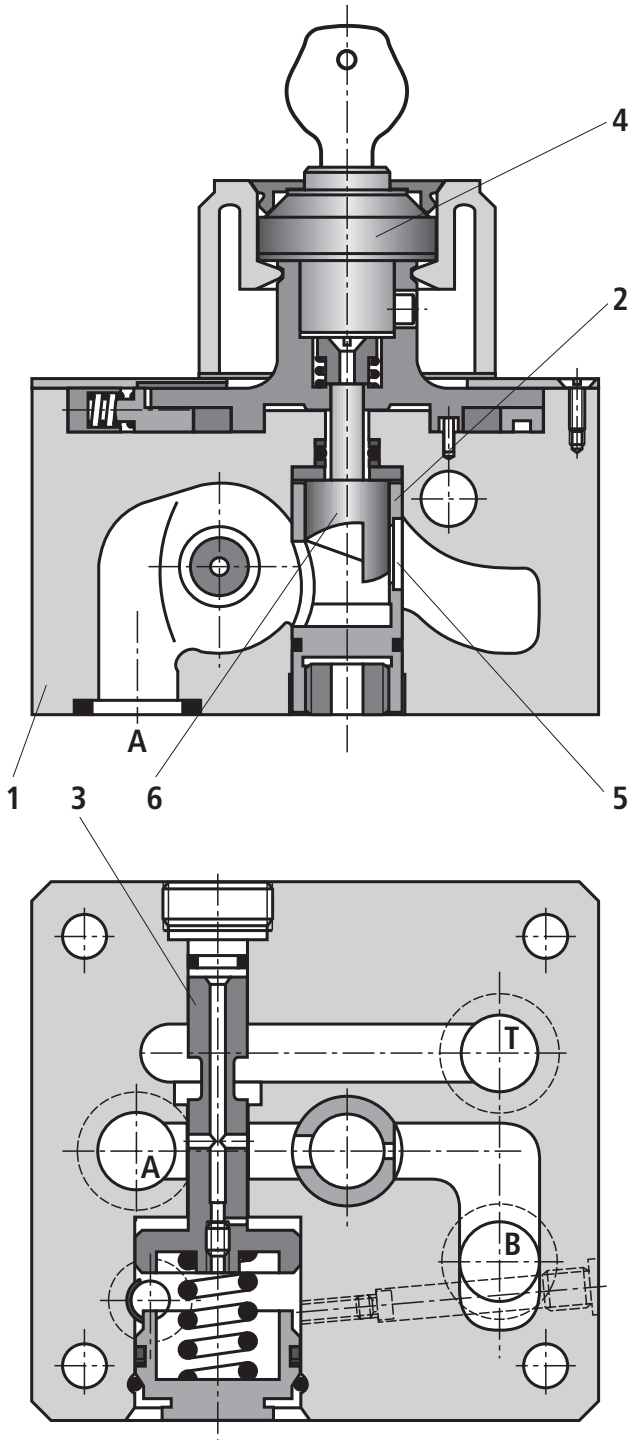
Type 3FRM ...DX...



Type 3FRM ...D...



Function, section



The flow control valve type 3FRM is a 3-way flow control valve. It is used for maintaining a set constant flow, independent of changes in pressure and temperature.
The valve basically consists of a housing (1), an orifice bush (2), a pressure compensator (3) and an adjustment type (4).
The flow from channel A to B is throttled at the throttling point (5). The throttle cross-section is set by mechanically turning the curved bolt (6) over the adjustment type (4).
An upstream pressure compensator (3) is included to keep the flow at the throttling point (5) constant independent of temperature and pressure.
The pressure compensator limits excessive flow via an additional line to the reservoir. Consequently, these valves may be used on the supply line only!
In the case of 3-way flow control valves (as opposed to 2-way flow control valves), the measurement and control orifices are not connected in series, but in parallel. Temperature independence is achieved thanks to the orifice design of the throttling point.
The differential between working pressure and operating pressure is limited to the pressure drop of the metering orifice, whereas for 2-way flow control valves, the hydraulic pump always has to produce the pressure set on the pressure relief valve. For this reason, the power loss of a 3-way flow control valve is smaller, resulting in better plant efficiency and less heat generation.
The flow control valves can be realized optionally with or without bleed port (for free circulation) and with or without pressure relief valve (overload protection).

Technical data
(For applications outside these parameters, please consult us!)

General								
Size			Size 10				Size 16	
Weight		kg	3.3				7.0	
Installation position			Any					
Ambient temperature range		°C	–30 ... +80 (NBR seals) –20 ... +80 (FKM seals)					

Hydraulic									
Maximum operating pressure		bar	315						
Minimum pressure differential		bar	3 ... 7				5 ... 12		
Maximum flow		l/min	10	16	25	50	60	100	160
Flow control	▶ Thermally stable (–20 ... +80 °C)	%	±2 ($q_{V\,max}$)				±2 ($q_{V\,max}$)		
	▶ Pressure stable (up to Δp = 315 bar)	%	±2 ($q_{V\,max}$)				< ±2 ($q_{V\,max}$)		
Hydraulic fluid			See table below						
Hydraulic fluid temperature range		°C	–30 ... +80 (NBR seals) –20 ... +80 (FKM seals)						
Viscosity range		mm²/s	2.8 ... 380 (30 ... 46 recommended)						
Maximum admissible degree of contamination of the hydraulic fluid cleanliness class according to ISO 4406 (c)			Class 20/18/15 [1]						

Hydraulic fluid		**Classification**	**Suitable sealing materials**	**Standards**	**Data sheet**
Mineral oils		HL, HLP	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ insoluble in water	HETG	NBR, FKM	ISO 15380	90221
		HEES	FKM		
	▶ soluble in water	HEPG	FKM	ISO 15380	
Flame-resistant	▶ water-free	HFDU	FKM	ISO 12922	90222
	▶ containing water	HFC (Fuchs Hydrotherm 46M, Petrofer Ultra Safe 620)	NBR	ISO 12922	90223

☞ **Important information on hydraulic fluids:**
- ▶ For more information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- ▶ There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- ▶ The flash point of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- ▶ **Flame-resistant – containing water**:
  - – Maximum pressure differential 210 bar, otherwise increased cavitation
  - – Life cycle as compared to operation with mineral oil HL, HLP 30 to 100 %; maximum hydraulic fluid temperature 60 °C
- ▶ **Bio-degradable and flame-resistant:** When using hydraulic fluids that are simultaneously zinc-solving, up to 195 mg of zinc may accumulate.

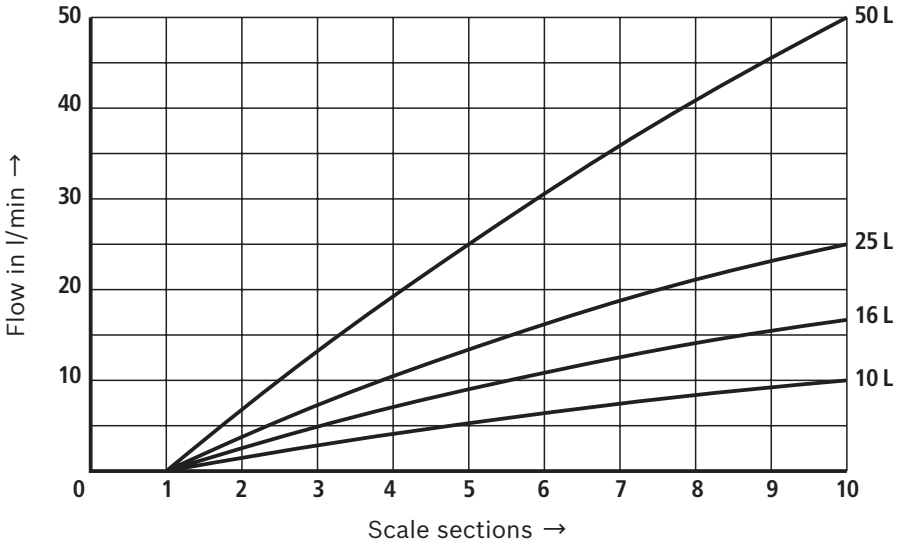
[1] The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components. Available filters can be found at www.boschrexroth.com/filter.

Characteristic curves

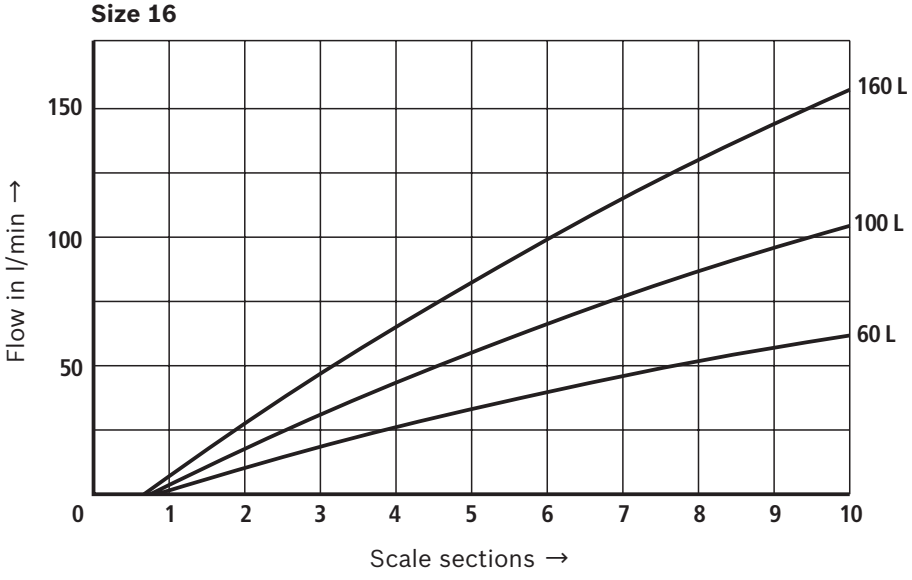
(measured with HLP46, ϑ_{Oil} = 40 ± 5 °C)

Flow control (A → B)

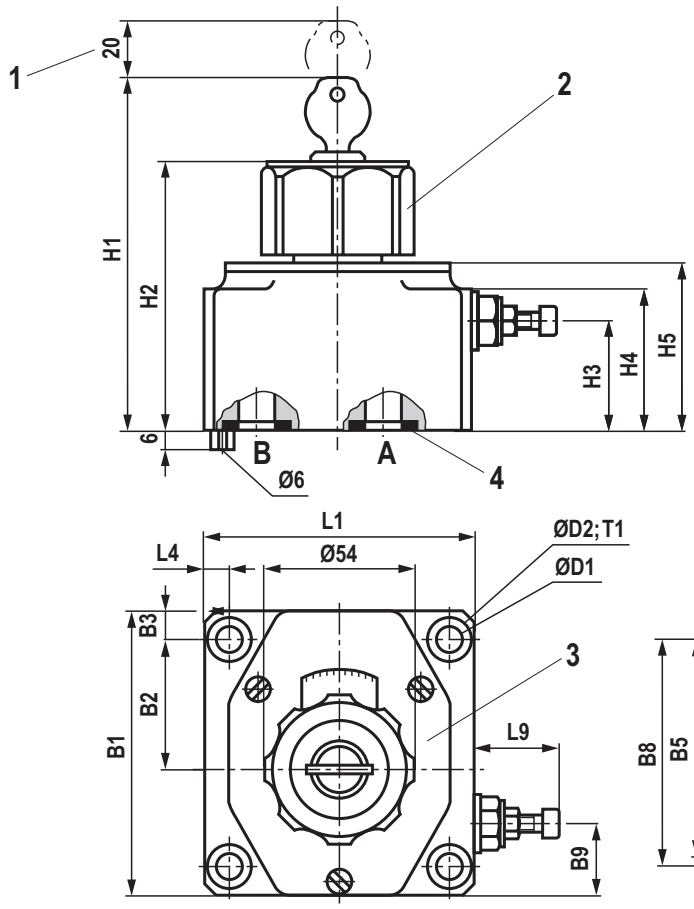
Size 10

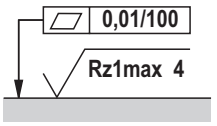


Size 16

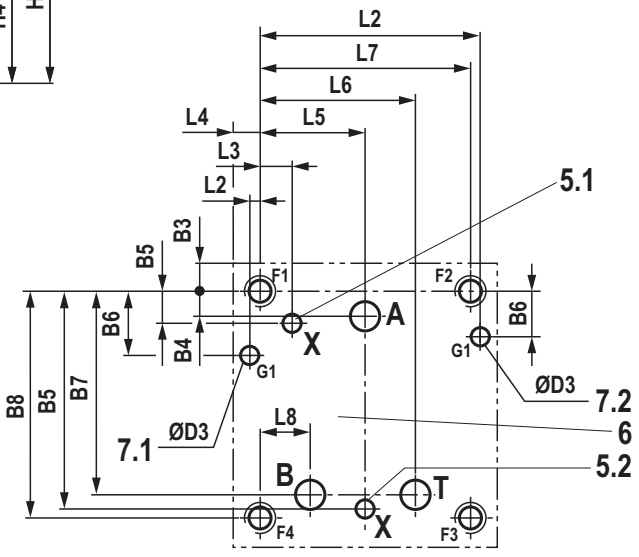


Dimensions
(dimensions in mm)





Required surface quality of the valve contact surface



1 Space required to remove the key

2 Adjustment type, rotary knob security lock (all positions can be locked), rotation range 300 ° = 10 scale sections, $M_d \approx 0.7$ Nm

3 Name plate

4 Identical seal rings for ports A and B

5.1 Bleed port X (Size 10)

5.2 Bleed port X (Size 16)

6 Porting pattern (similar to ISO 6263)

7.1 Bore for locating pin (Size 10)

7.2 Bore for locating pin (Size 16)

Subplates (upon request)

- Size 10: G 337/01 (G1/2)
  G 343/01 (G1/2)
- Size 16: G 340/01 (G1)
  G 346/01 (G1)

Valve mounting screws (separate order)

- Size 10
  4 x ISO 4762 - M8 x 50 - 10.9flZn-240h-L
  with friction coefficient μ_{total} = 0.09 ... 0.14,
  tightening torque M_A = 30 Nm ± 10 %,
  material no. **R913000543**
- Size 16
  4 x ISO 4762 - M10 x 80 - 10.9flZn-240h-L
  with friction coefficient μ_{total} = 0.09 ... 0.14,
  tightening torque M_A = 60 Nm ± 10 %,
  material no. **R913000496**

Size	B1	B2	B3	B4	B5	B6	B7	B8	B9	ØD1	ØD2	ØD3	Port X	Port A, B, T
10	101.5	47	9.5	9.5	11.9	23.8	74.6	82.5	27	9	15	7.5	6.3 [1]	14.7 [1]
16	123.5	60	11	12.5	95.1	28.6	88.8	101.5	76	11	18	7.5	7.9 [1]	17.5 [1]

Size	H1	H2	H3	H4	H5	L1	L2	L3	L4	L5	L6	L7	L8	L9 min	L9 max	T1
10	123	95	39.5	51	60	95	3.2	11.9	9.5	38	57.2	76	18.8	21.3	29.5	13
16	145	117	58	72	82	123.5	102.3	–	11	50.75	77.8	101.5	23.8			12

[1] Maximum dimension

Additional information

▶ Hydraulic fluid on mineral oil basis	Data sheet 90220
▶ Environmentally compatible hydraulic fluids	Data sheet 90221
▶ Flame-resistant, water-free hydraulic fluids	Data sheet 90222
▶ Hydraulic valves for industrial applications	Data sheet 07600-B
▶ General product information on hydraulic products	Data sheet 07008
▶ Assembly, commissioning and maintenance of industrial valves	Data sheet 07300
▶ Selection of filters	www.boschrexroth.com/filter
▶ Information on available spare parts	www.boschrexroth.com/spc

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52 / 18-0
documentation@boschrexroth.de
www.boschrexroth.de