



2FRM...Type Two Ways Flow Control valve

2FRM5,10,16...type



Sizes 5, 10, 16
Max. Working Pressure: 315 bar
Max. Flow: 160 L/min

Contents

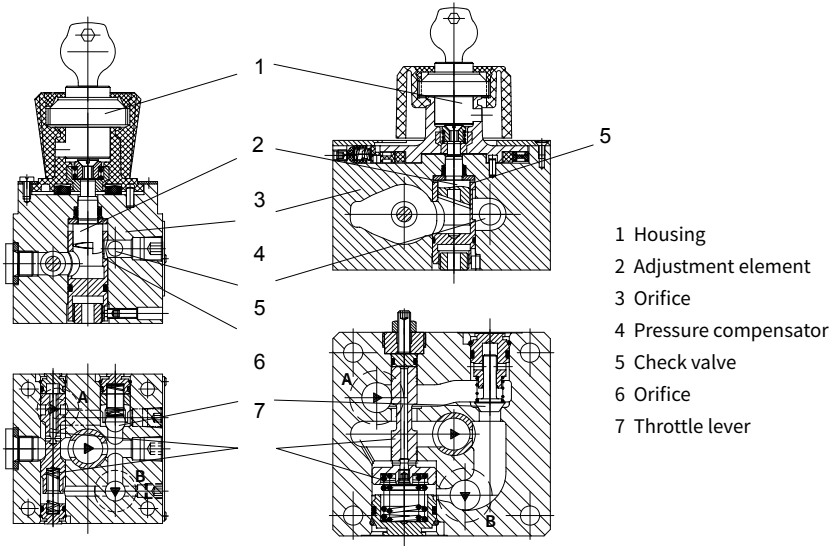
Function and configuration	02
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Features

- For subplates see catalogue
- External closing of the pressure compensator, optional
- Rotary knob with scale, optional lockable

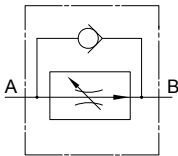
Function and configurations

2FRM type flow valve is a two-way flow control valve, consisting of pressure compensator and throttle valve in series. When fluid flows into the valve, it is reduced of pressure by the pressure compensator first and then throttled by the throttle valve. The flow in the flow control valve is able to maintain stable independent of any impact from the changing load because of pressure compensation function. Meanwhile the orifice is designed into the shape of a blade, making flow little influenced by variance of temperature. When the flow control valve is connected with a check valve in parallel, fluid can flow back in the opposite direction.



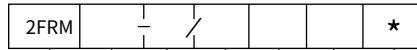
Flow control valve section,
type 2FRM5-30

Flow control valve section,
type 2FRM10-20 and 2FRM16-20



Symbol of flow control valve,
type 2FRM

Specifications



Two ways flow valve

Further details in clear text

Nominal size 5 = 5
 Nominal size 10 = 10
 Nominal size 16 = 16

No code = NBR seals
 V = FKM seals

30J Series(Nominal size 5) =30J
 21J Series(Nominal size 10 and 16) =21J

No code = Pressure compensator,
 without stroke regulator
 B = Pressure compensator,
 with stroke regulator

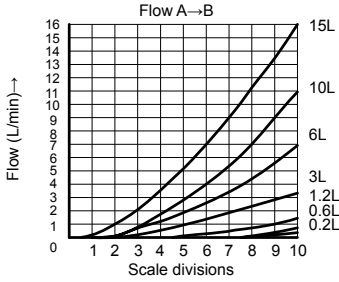
Flow adjustment range (A → B) Size=5		
	Size=10	Size=16
0.2L/min=0.2L	10L/min=10L	60L/min=60L
0.6L/min=0.6L	16L/min=16L	100L/min=100L
1.2L/min=1.2L	25L/min=25L	160L/min=160L
3L/min=3L	50L/min=50L	
6L/min=6L		
10L/min=10L		
15L/min=15L		

Technical data

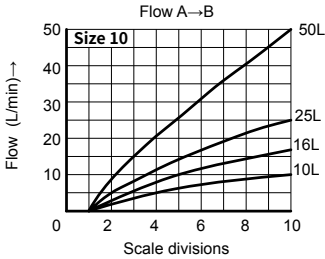
Fluid	Mineral oil ;Phosphate ester															
Fluid temperature range	°C	-20~+80														
Viscosity range	mm ² /s	10~800														
Degree of contamination	Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406															
Item	Size	5						10				16				
Max. flow-rate	L/min	0.2	0.6	1.2	3	6	10	15	10	16	25	50	60	100	160	
Pressure differential when backward flow B to A	bar	0.5	0.5	0.6	0.9	1.8	3.6	6.7	2	2.5	3.5	6	2.8	4.3	7.3	
Flow stability range (-20°C ~+80 °C)%Qmax		±5	±3	±2				±2								
		±2(P= 210bar)						±2(P= 315bar)								
Working pressure	bar	210						315								
Min. pressure differential	bar	3~5			6~8			3~7			5~12					
Weight	kg	1.6						3.4				7.4				

Characteristic curves

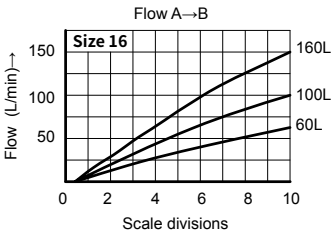
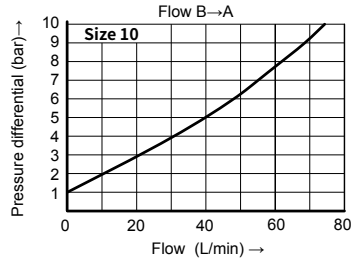
(Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)



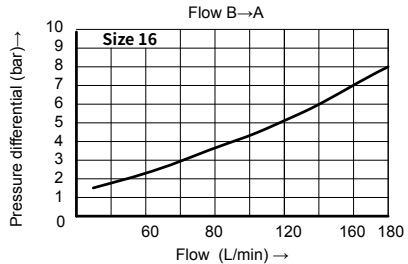
◀ Characteristic curve of flow control valve type 2FRM5



▲ Curve of flow control valve type 2FRM10



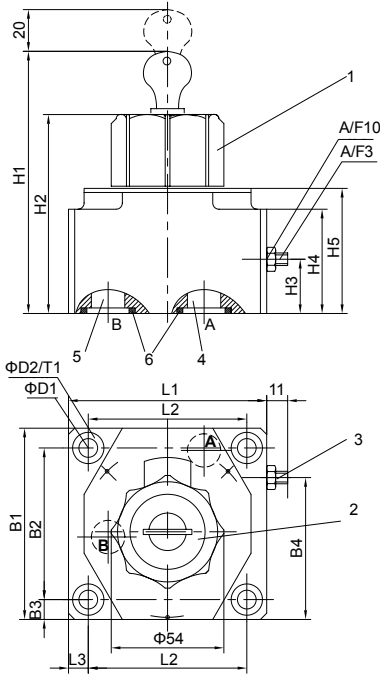
▲ Curve of flow control valve type 2FRM16



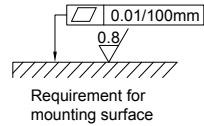
Unit dimensions:

(Dimensions in mm)

• Outline dimension of flow control valve type 2FRM10 and 2FRM16

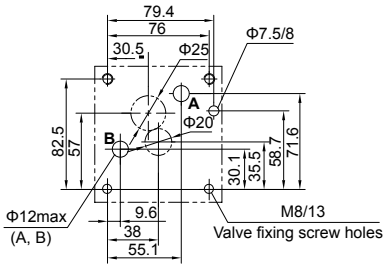


- 1 Lockable rotary knob
 - 2 Name plate
 - 3 Stroke regulator of pressure compensator
 - 4 Inlet 'A'
 - 5 Outlet 'B'
 - 6 O-ring
- (Size 10:18.66×3.53 , Size 16:26.58×3.53)

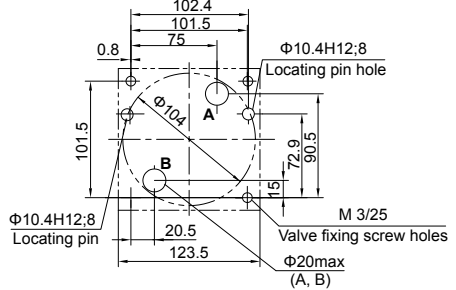


Szie	B1	B2	B3	B4	D1	D2	H1	H2	H3	H4	H5	L1	L2	L3	T1
10	101.5	82.5	9.5	68	9	15	125	95	26	51	60	95	76	9.5	13
16	123.5	101.5	11	81.5	11	18	147	117	34	72	82	123.5	101.5	11	12

•Type 2FRM10 dimensions of mounting surface



•Type 2FRM16 dimensions of mounting surface





2FRM6...type Two Ways Flow Control Valve



2FRM6...type

Size 6

Max. Working Pressure: 315 bar

Max. Flow: 32 L/min

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Features

- For subplates see catalogue
- External closing of the pressure compensator, optional
- Check valve, optional
- Rotary knob with scale, optional lockable

Function and configurations

2FRM type flow valve is a two-way flow control valve, it is used to maintain a constant flow and is independent of pressure and temperature. It consists of valve housing(1), knob rotary(2), orifice(3), pressure compensator(4), optional check valve(9).

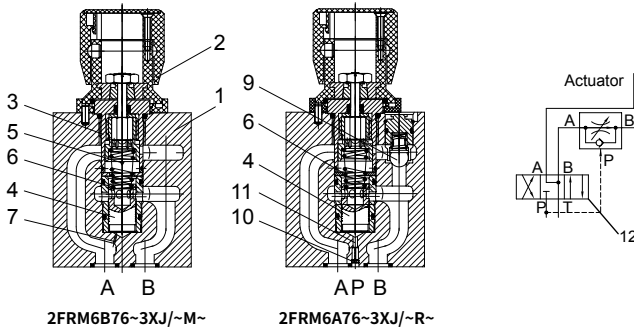
2FRM6B-3XJ/~M

Flow from A to B is throttled at throttle channel(5). Throttle cross-section is varied by turning the knob rotary(2). To avoid effects of pressure at port B on constant flow, a compensator(4) is fitted. Spring(6) separately compresses the compensator(4) and orifice(3) tightly.

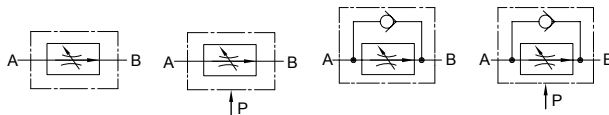
Spring(6) compresses the compensator(4) tightly to maintain it open when no fluid flows through the valve. Once the fluid flows across the valve, the pressure in port A applies a force to pressure compensator(4) via the orifice(7). The pressure compensator(4) moves into the compensating position until the force is balanced. If the pressure in port A rises, the compensator(4) moves to its closing direction until force is balanced again. Due to the compensator(4) continuous action, a constant flow is obtained.

2FRM6A-3XJ/~R

The function of this valve is basically the same as that of valve type 2FRM6B-3XJ/~R. However, pressure compensator (4) of this type of valve is connected with port P(11) so that pressure compensator(4) can be closed by external pressure. Any pressure in port P through the orifice (10) can make the compensator (4) closed against the force of compression spring (6). When the directional valve (12) acts, fluid flows from P to B, control is achieved as type 2FRM6B. This flow controls the valve with the external pressure compensator which can be closed. It only works by controlling the inlet flow.



Symbols



Type 2FRM6B ..3XJ/~.M

Type 2FRM6A ..3XJ/~.M

Type 2FRM6B ..3XJ/~.R

Type 2FRM6A ..3XJ/~.R

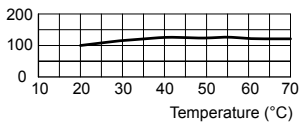
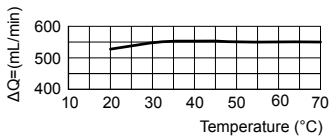
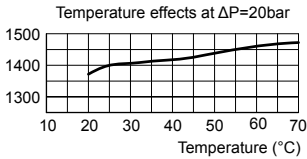
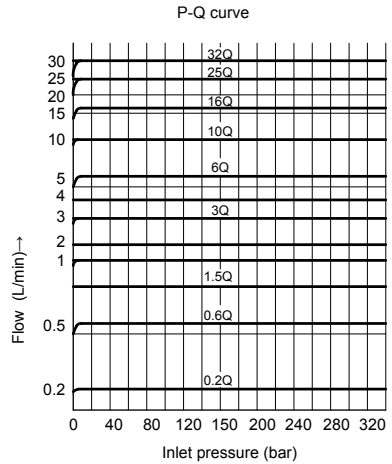
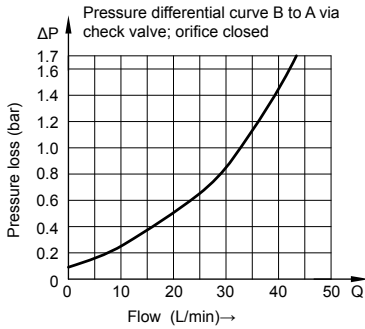
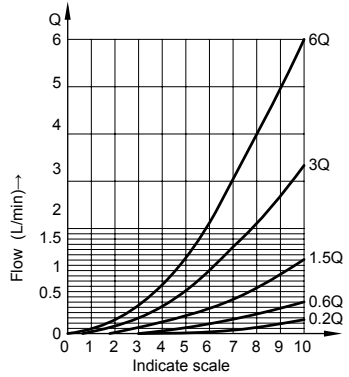
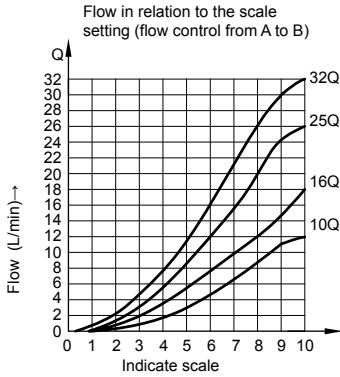
Specification

	2FRM	6			6	-	2XJ	/			*
Two ways flow valve											
Nominal size 6	=6										
With pressure compensator external close (Restraining starting impact, can not work with Z4S6)	=A										
Without pressure compensator external close (Standard type)	=B										
Without pressure compensator external close (for meter plate mounting)	=SB										
Regulating element:											
Lockable rotary knob with scale	= 3										
Rotary knob with scale	= 7										
Zero position of the markings at port P											
20J to 29J Series (20J to 29J: unchanged installation and connection dimensions)	=2XJ										
	<p>Further details in clear text</p> <p>No code= NBR seals V = FKM seals</p> <p>R= With check valve M= Without check valve</p> <p>Flow (A → B)</p> <p>0.2Q= up to 0.2L/min 0.6Q= up to 0.6L/min 1.5Q= up to 1.5L/min 3Q= up to 3.0L/min 6Q= up to 6.0L/min 10Q= up to 10.0L/min 16Q= up to 16.0L/min 25Q= up to 25.0L/min 32Q= up to 32.0L/min</p>										

Technical data

Max. operating pressure at port A		bar	315									
Pressure differential ΔP for free return flow B to A			See characteristic curves									
Minimum pressure differential		bar	6 to 14									
Pressure stability up to P= 315 bar		%	$\pm 2(Q_{max})$									
Flow -rate	Qmax	L/min	0.2	0.6	1.5	3	6	10	16	25	32	
	Qmin to 100bar	mL/min	15	15	15	15	25	50	70	100	250	
	Qmin to 315bar		25	25	25	25	25	50	70	100	250	
Fluid			Mineral oil suit, Phosphoric acid ester									
Fluid temperature range		°C	- 20 to + 80									
Viscosity range		mm ² /s	10 to 800									
Degree of contamination			Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406									
Installation position			Optional									
Circumstances temperature range		°C	-20 to +50									
Weight	2FRM6A...2FRM6B...	kg	Approx.1.3									
	2FRM6SB...	kg	Approx.1.5									

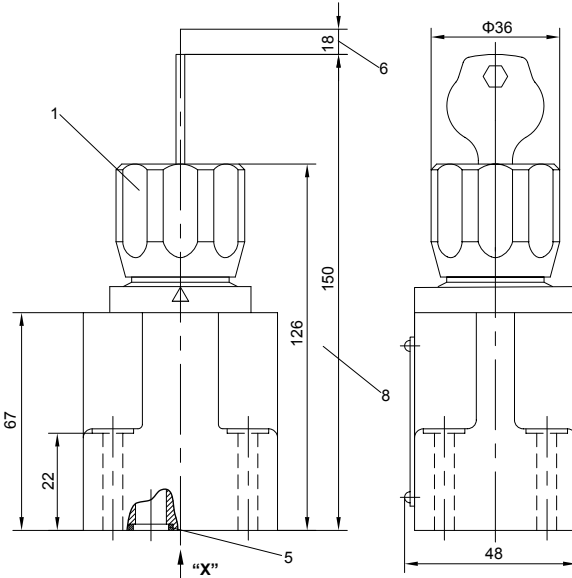
Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)



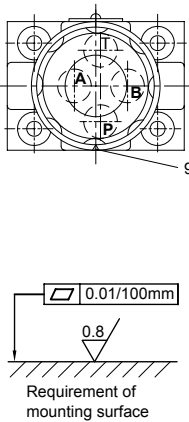
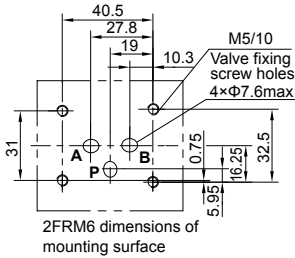
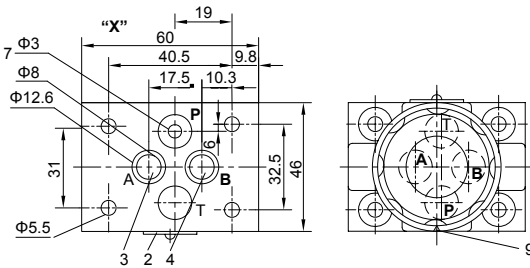
Unit dimensions

(Dimensions in mm)

Type 2FRM6A...and 2FRM6B



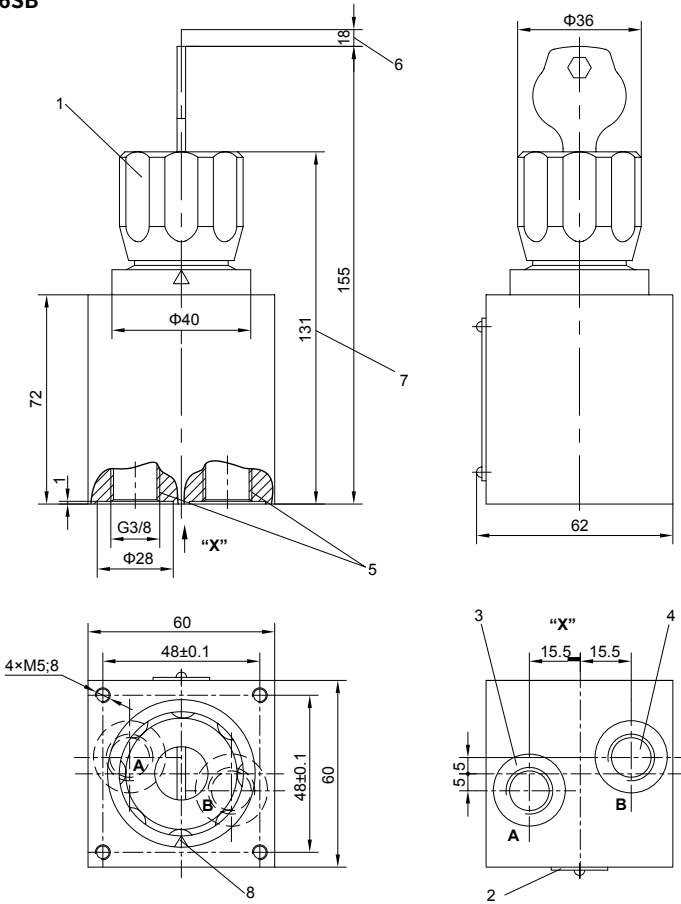
- 1 Lockable rotary knob with scale (adjustment element "3")
- 2 Name plate
- 3 Inlet "A"
- 4 Outlet "B"
- 5 O-rings 9.25×1.78 for ports A, B, P and T
- 6 Space required to remove key
- 7 Hole $\varnothing 3$ for version 2FRM6B is not drilled. (without external connection)
- 8 Rotary knob with scale (adjustment element "7")
- 9 Position of marking at port P, A, T or B



Unit dimensions

(Dimensions in mm)

Type 2FRM6SB



1 Lockable rotary knob with scale (adjustment element "3")

2 Name plate

3 Inlet a

4 Outlet "B"

5 Connection thread G 3/8 to ISO 228/1

6 Space required to remove key

7 Rotary knob with scale (adjustment element "7")

8 Position of marking opposite to the nameplate



3DREP6(E)...type 3-Way Direct Proportional Operated Reducing Valve



3DREP6 and 3DREP6E...type

Size 6
Max. Working Pressure: 100 bar
Max. Flow: 15 L/min

Contents

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Features

- Directly controlled proportional valves for the control of the pressure and direction of a flow
- 3-Way design and standard ISO 4401-03 mounting
- Operated via proportional solenoids with central thread and removable coil
- Spring centred control spool
- Hand override, optional

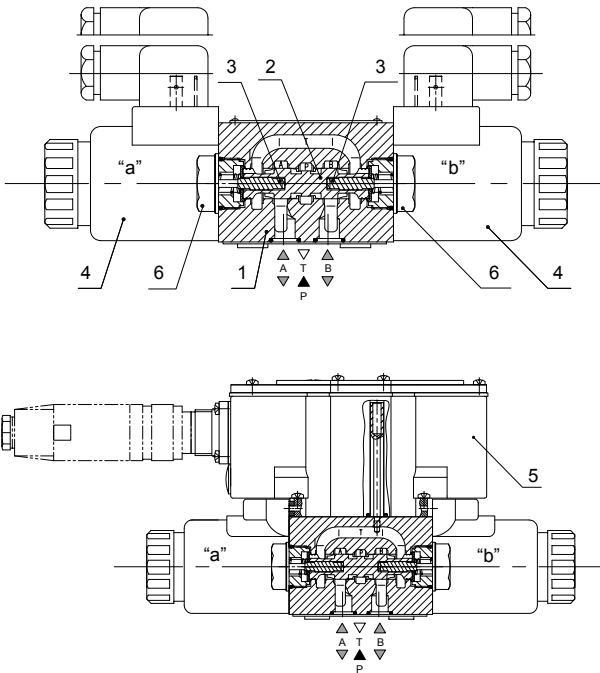
Function and configuration

3DREP/3DREPE type 3-way direct reducing valve is directly actuated by proportional solenoids. They convert an electrical input signal into a proportional pressure output signal.

The valve comprises of valve Housing (1) with mounting surface, Control spool (2) with pressure measuring spools (3), Solenoids (4) with control thread and Optional integrated valve electronics (5).

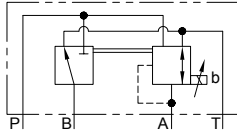
With the solenoids (4) de-energized the control spool (2) is held in its center position by compression springs. The control spool (2) is directly actuated when one of the solenoids is energised. The pressure measuring spool (3) and control spool (2) move to the right in proportion to the electrical input signal. The connection from P to B and A to T is via orifice form cross-sections with progressive flow Characteristics – De-energization of the solenoid (4). The control spool (2) is returned to its centre position by the compression springs. In the middle position the connections A and B to T are open, thus the pressure fluid can freely flow to tank.

Type 3DREP6...-2XJ/...

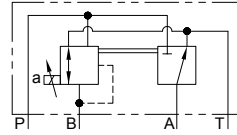


Symbols

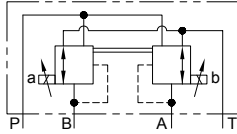
Type 3DREP6... A -2XJ/...



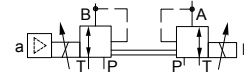
Type 3DREP6... B -2XJ/...



Type 3DREP6... C -2XJ/...



Type 3DREPE6...C 2XJ/...



Ordering code

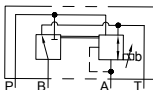
3DREP	6	-2XJ /	E	G24	/		*
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Without integrated = No code

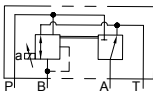
With integrate = E

Nominal size 6 = 6

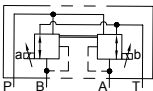
Spool symbols



=A



=B



=C

Series 20J~29J =2XJ
(20J to 29J, unchanged installation and connection dimensions)

Further information
in plain text

V = FKM seals

No code = NBR seals

3DREP: No code

Interface A1 or F1 for 3DREPE:

A1= Command value input $\pm 10V$

F1= Command value input 4 to 20mA

3DREP: Z4= With plug-in connector

K4= Without plug-in connector

3DREPE: K31= Without plug-in connector

Z31= With plug-in connector

No code = Without hand override

N9 = With protected hand override

Supply voltage for the control electronics

G24= Power supply voltage 24VDC

E = Proportional solenoid with removable coil

16=

Pressure stage 16 bar

25=

Pressure stage 25 bar

45=

Pressure stage 45 bar

Technical data

Hydraulic			
Valve type		3DREP6...2XJ	3DREPE6...2XJ
Installation		optional, preferably horizontal	
Weight	KG	2.0	2.2
Ambient temperature range		°C	-20 to +70
Max. flow		L/min	15 ($\Delta p = 50$ bar)
Hysteresis		%	≤ 5
Repeatability accuracy		%	≤ 1
Response sensitivity		%	≤ 0.5
Operating pressure range	Port P	bar	20 to 100 for pressure stage 16
	Port T		30 to 100 for pressure stage 25 50 to 100 for pressure stage 45 0 to 3
Pressure fluid		Mineral oil (HL, HLP) to DIN 51524 other pressure fluids on request	
Pressure fluid temperature range		°C	-20 to +80
Viscosity range		mm ² /s	20 to 380 (preferably 30 to 46)
Degree of contamination		Maximum permissible degree of contamination of the pressure fluid is to NAS 1638 class 9 or 20/18/15, ISO4406	

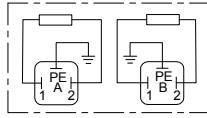
Electrical			
solenoid			
Valve type		3DREP6...2XJ	3DREPE6...2XJ
Voltage type		DC	
Command value signal		Voltage input "A1"	-
Max. current per solenoid		A	1.5
Solenoid coil resistance	Cold value at 20 °C	Ω	4.8
	Max. warm value		2
Duty		%	ED100%
Coil temperature		°C	up to 150
Valve protection to EN 60529		IP 65 with mounted and fixed plug-in connector	
Amplifier		VT-VSPA2-...-2XJ	integrated
Supply voltage	Nominal voltage	VDC	24
	Lower limiting value	V	19
	Upper limiting value	V	35
Amplifier current consumption	I _{max}	A	1.8
	Impulse current	A	4

Electrical connections, plug-in connectors

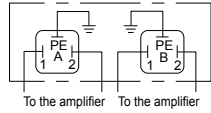
• For type 3DREP6...2XJ (without integrated electronics)

Connections on the component plug

Plug-in connector to DIN EN 175301-803 or ISO 4400



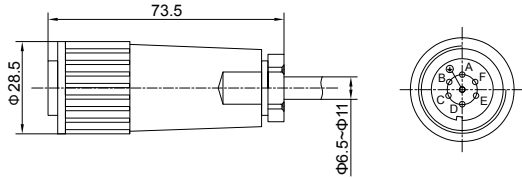
Connections on the plug-in connector



• For type 3DREPE6...2XJ (with integrated electronics (OBE))

For pin allocation also see block circuit diagram.

Plug-in connector to DIN EN 175201-804



• Integrated control electronics for type 3DREPE6

Component plug allocation

	Contact	Interface A1 signal	Interface F1 signal
Supply voltage	A	24 VDC (U(t)=19V to 35V)	
	B	GND	
	C	n.c. ¹⁾	
Differential amplifier input	D	$\pm 10V$, $R_e > 50K\Omega$	4 to 20mA, $R_e > 100\Omega$
	E	reference potential command value	
	F	n.c. ¹⁾	

¹⁾Contacts C and F must not be connected!

Connection cable:

Recommended:

- up to 25 m cable length type LiYCY 7 × 0.75 mm²;
- up to 50 m cable length type LiYCY 7 × 1.0 mm².

For outside diameter see plug-in connector sketch. Only connect screen to PE on the supply line.

Command value:

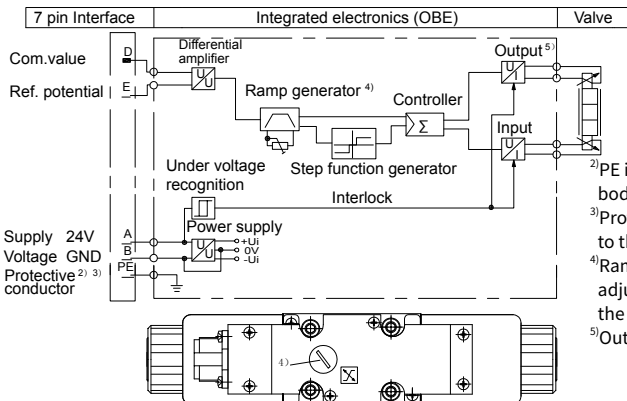
Reference potential at E and positive command value (0 to +10V or 12 to 20mA) at D result in pressure in A.

Reference potential at E and positive command value (0 to -10V or 12 to 4mA) at D result in pressure in B.

With valves with 1 solenoid on side b (design A): Reference potential at E and positive command value at D result in pressure in A.

With valves with 1 solenoid on side b (design B): Reference potential at E and positive command value at D result in pressure in B.

• Integrated electronics (OBE) for type 3DREPE6



²⁾PE is connected to the cooling body and the valve housing!

³⁾Protective conductor screwed to the valve housing and cover.

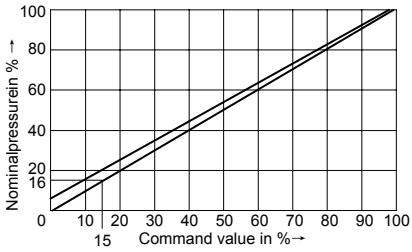
⁴⁾Ramp can be externally adjusted from 0 to 5s, the same applies for T_{up} and T_{down} .

⁵⁾Output stages current regulated.

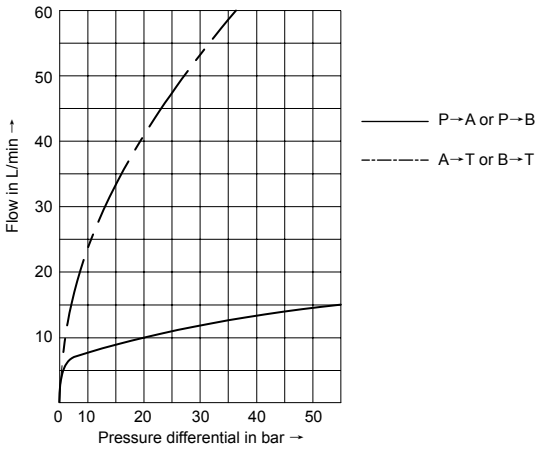
Characteristic curves

(measured with HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

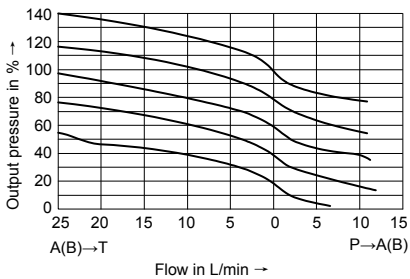
Pressure stages 16, 25 and 45 bar



Pressure stages 16, 25 and 45 bar



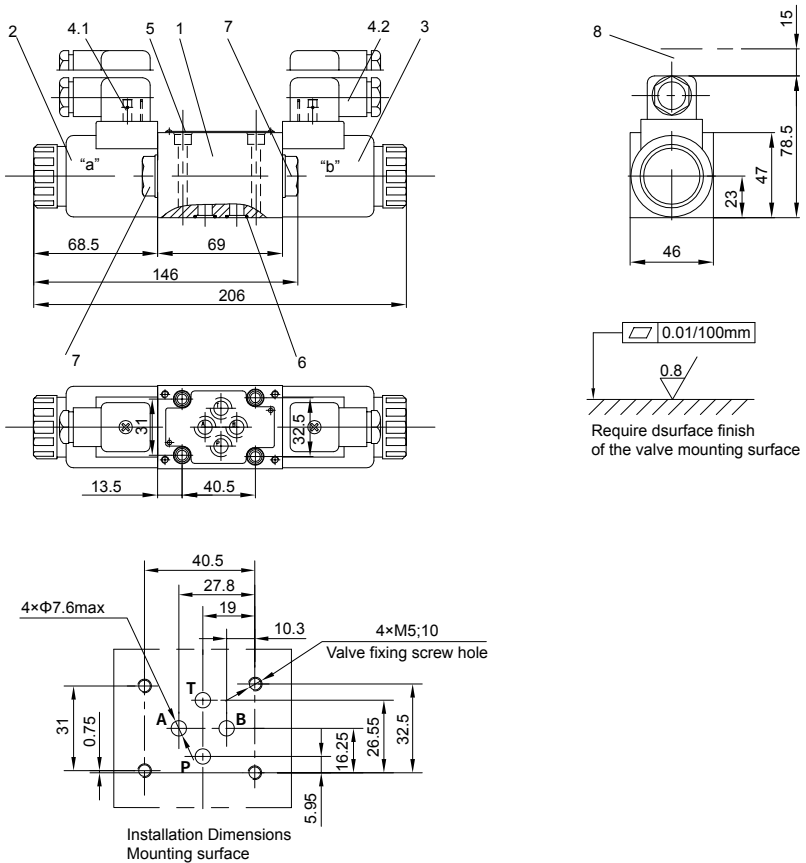
Pressure-flow relationship



Unit dimensions

(nominal dimensions in mm)

Type 3DREP6...2XJ

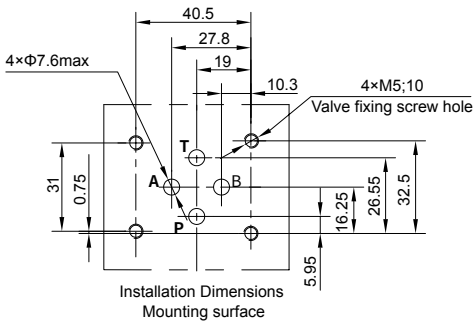
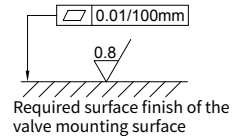
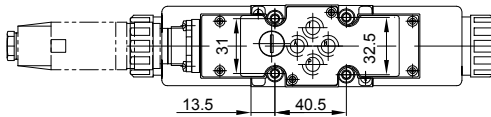
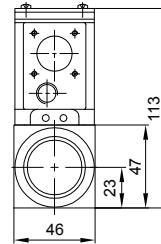
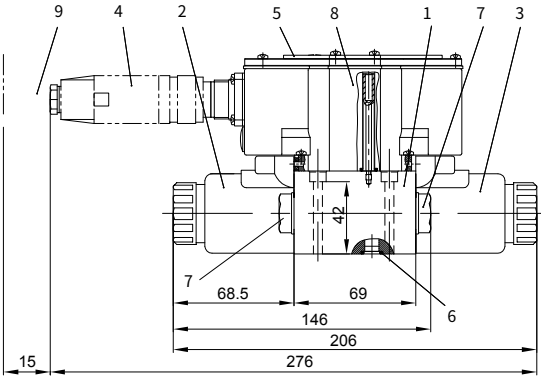


- | | |
|---|---|
| <ul style="list-style-type: none"> 1 Valve housing 2 Proportional solenoid "a" 3 Proportional solenoid "b" 4.1 Plug-in connector "A" 4.2 Plug-in connector "B" 5 Name plate | <ul style="list-style-type: none"> 6 Identical seal rings for ports A, B, P and T (R-ring 9.81×1.5×1.78 or O-ring 9.25×1.78) 7 Plug for valves with one solenoid (2 switching positions, versions A or B) 8 Space required to remove the plug-in connector |
|---|---|

Unit dimensions

(Nominal dimensions in mm)

Type 3DREPE6...2XJ



- | | |
|--|---|
| <ul style="list-style-type: none"> 1 Valve housing 2 Proportional solenoid "a" 3 Proportional solenoid "b" 4 Plug-in connector 5 Name plate | <ul style="list-style-type: none"> 6 Identical seal rings for ports A, B, P and T
(R-ring 9.81×1.5×1.78 or O-ring 9.25×1.78) 7 Plug for valves with one solenoid
(2 switching positions, versions A or B) 8 Integrated electronics (OBE) 9 Space required to remove the plug-in connector |
|--|---|



4WRA(E)...type Proportional Directional Valve



4WRA and 4WRAE...type

Size 6, 10
Max. Working Pressure: 315 bar
Max. Flow: 42 L/min (size 6)
75 L/min (size 10)

Contents

Function and configuration	02
Symbols	03
Ordering code	03
Technical data	04
Electrical connections, plug-in connectors	05
Characteristic curves	06-08
Unit dimensions	09-12

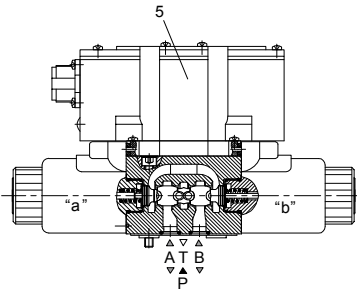
Features

- Direct operated proportional directional valve to control the direction and magnitude of a flow
- For subplate mounting: Porting pattern conforms to ISO4401
- Actuation by means of proportional solenoids with central thread and removable coil
- Spring centred control spool
- Control electronics 4WRAE...2XJ: integrated electronics (OBE) with voltage input or current input (A1 resp. F1)
- 4WRA...2XJ: available module amplifier

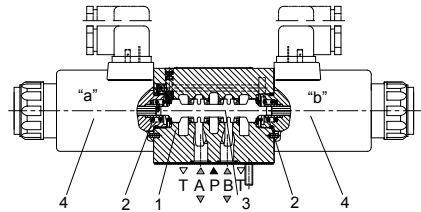
Function and configurations

4WEA(E) type proportional valve in 4/2-way and 4/3-way is designed as a direct operated components for subplate mounting. It is actuated by proportional solenoids with central thread and removable coil. The solenoids are controlled either by external control electronics (type 4WRA...2XJ) or by integrated control electronics (type 4WRAE...2XJ).

The valve consists of Housing (1) with mounting surface, Control spool (3) with compression springs(2), Solenoids (4) with central thread, Optional integrated electronics (5) With the solenoids (4), de-energised, the control spool (3) is held in the central position by the compression springs (2). Direct operation of the control spool (3) by energising one of the proportional solenoids(4) e.g. control of solenoid right, then movement of the control spool (3) to the left in proportion to the electrical input signal, and connection from P to A and B to T via orifice-like crosssections with progressive flow characteristics.

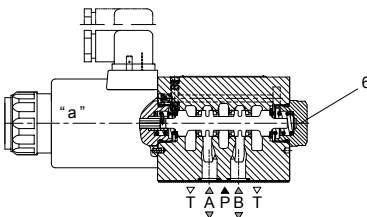


Type 4WRAE 6...-2XJ/...

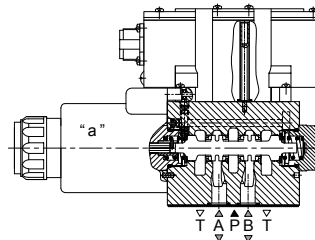


Type 4WRA 10...-2XJ/...

4WRA(E)...A-2XJ the 2 switched position valves are however only fitted with solenoid "a". A plug (6) is fitted in place on the "b" proportional solenoid.



Type 4WRA 10...A-2XJ/...



Type 4WRAE 10...A-2XJ/...

Technical data

1. Hydraulic					
Installation			Optional, preferably horizontal		
Nominal size			6	10	
Weight	4WRA...2XJ	Kg	2.0	6.6	
	4WRAE...2XJ		2.2	6.8	
Nominal flow Q_{nom} at $\Delta p = 10$ bar			L/min	7,15,26	30,60
Hysteresis			%	≤ 5	
Reversal span			%	≤ 1	
Response sensitivity			%	≤ 0.5	
Max.operating pressure	Ports A, B, P	bar	315		
	Port T	bar	210		
Pressure fluid			Mineral oil (HL, HLP) to DIN 51524 Other pressure fluids on request!		
Ambient air temperature range	4WRA...2XJ	°C	-20°C to 70°C (-4° F to 158° F)		
	4WRAE...2XJ	°C	-20°C to 50°C (-4° F to 122° F)		
Viscosity range			mm ² /s	20 to 380 (preferably 30 to 46)	
Fluid Cleanliness Class			NAS1638 class9 or ISO 4406 class 20/18/15		

2. Electrical					
1) Solenoid data					
Voltage type			DC		
Command value signal for 4WRAE			± 10V or 4 ~ 20mA		
Max.current per solenoid		A	2.5	1.5	0.8
Solenoid coil resistance	Cold value at 20°C	Ω	2	4.8	19.5
	Max.warm value		3	7.2	28.8
Duty		%	ED100%		
Max.coil temperature		°C	150		
Valve protection to EN 60529			IP 65		
2) Control electronics					
Amplifier	4WRA...2XJ	VT-VSPA2-...-2XJ			
	4WRAE...2XJ	Integrated in the valve(OBE)			
Supply voltage	Nominal voltage	VDC	24		
	Lower limiting value	V	21/22(4WRA), 19(4WRAE)		
	Upper limiting value	V	35		
Amplifier power consumption	I_{max}	A	<1.8		
	Impulse current	A	3		

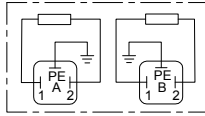
Electrical connections, plug-in connectors

nominal dimensions in mm

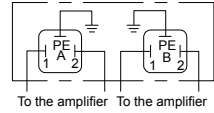
For type 4WRE...2XJ (without integrated electronics)

Connections on the component plug

Plug-in connector to DIN EN 175301-803 or ISO 4400



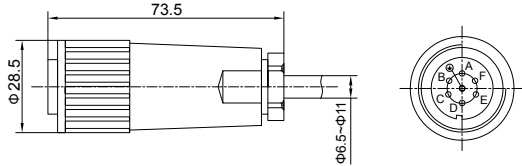
Connections on the plug-in connector



For type 4WRAE...2XJ (with integrated electronics (OBE))

For pin allocation also see block circuit diagram.

Plug-in connector to DIN EN 175201-804



Integrated control electronics for type 4WRAE

Component plug allocation

	Contact	Interface A1 signal	Interface F1 signal
Supply voltage	A	24 VDC (U(t)=19V to 35V)	
	B	GND	
	C	n.c. ¹⁾	
Differential amplifier input	D	±10V, Re>50KΩ	4 to 20mA, Re>100Ω
	E	reference potential command value	
	F	n.c. ¹⁾	

Connection cable:

Recommended:
 - up to 25 m cable length type LiYCY 7x0.75 mm²;
 - up to 50 m cable length type LiYCY 7x1.0 mm².
 For outside diameter see plug-in connector sketch.
 Only connect screen to PE on the supply line.

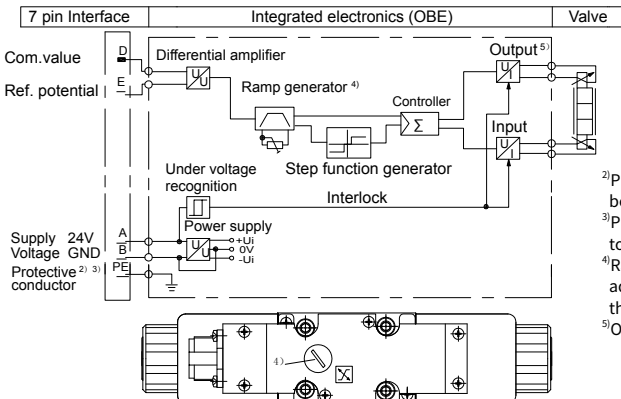
¹⁾Contacts C and F must not be connected!

Command value:

A positive command value 0 to +10 V (or 12 to 20 mA) at D and the reference potential at E results in a flow from P to A and B to T. A negative command value 0 to -10 V (or 12 to 4 mA) at D and the reference potential at E results in a flow from P to B and A to T.

For a valve with 1 solenoid on side (e.g. spool variants EA and WA) a positive command value at D and the reference potential at E results in a flow from P to B and A to T.

Integrated electronics (OBE) for type 4WRAE...2XJ



²⁾PE is connected to the cooling body and the valve housing!

³⁾Protective conductor screwed to the valve housing and cover.

⁴⁾Ramp can be externally adjusted from 0 to 2.5s, the same applies for T_{up} and T_{down}.

⁵⁾Output stages current regulated.

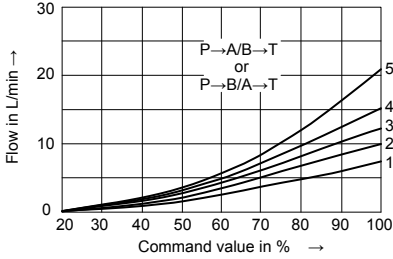
Characteristic curves

(measured with HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

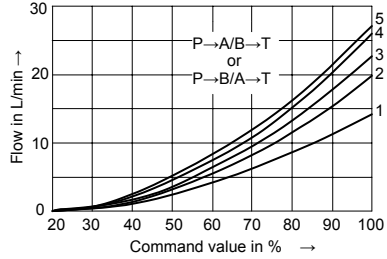
· Type 4WRAE (NG 6 and 10)

NG 6

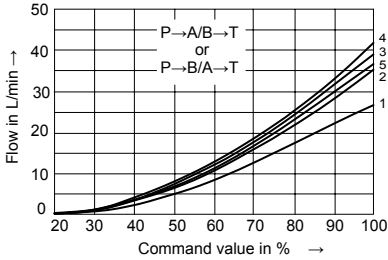
7 L/min nominal flow at a 10 bar valve pressure differential



15 L/min nominal flow at a 10 bar valve pressure differential



30 L/min nominal flow at a 10 bar valve pressure differential

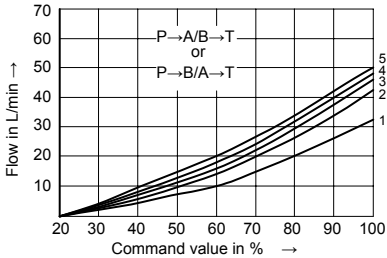


- 1 $\Delta p=10\text{bar}$ constant
- 2 $\Delta p=20\text{bar}$ constant
- 3 $\Delta p=30\text{bar}$ constant
- 4 $\Delta p=50\text{bar}$ constant
- 5 $\Delta p=100\text{bar}$ constant

Δp =Valve pressure differential
(inlet pressure p_p minus load pressure p_L minus return pressure p_r)

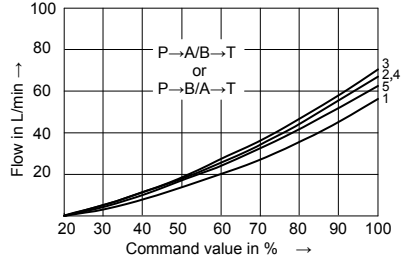
NG 10

30 L/min nominal flow at a 10 bar valve pressure differential



- 1 $\Delta p=10\text{bar}$ constant
- 2 $\Delta p=20\text{bar}$ constant
- 3 $\Delta p=30\text{bar}$ constant
- 4 $\Delta p=50\text{bar}$ constant
- 5 $\Delta p=100\text{bar}$ constant

60 L/min nominal flow at a 10 bar valve pressure differential



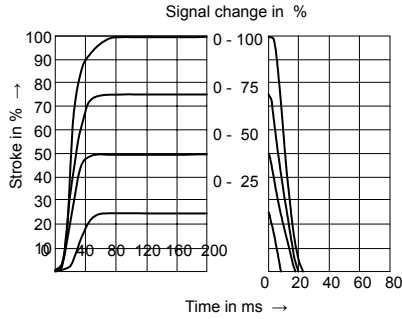
Δp =Valve pressure differential
(inlet pressure p_p minus load pressure p_L minus return pressure p_r)

Characteristic curves

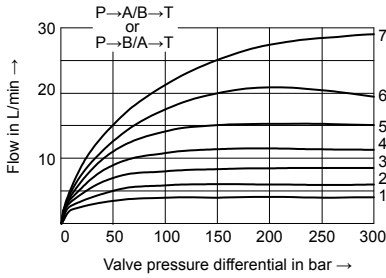
(measured with HLP46, $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

NG 6

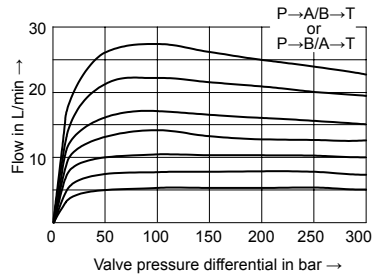
Transient function with a stepped form of electrical input sign



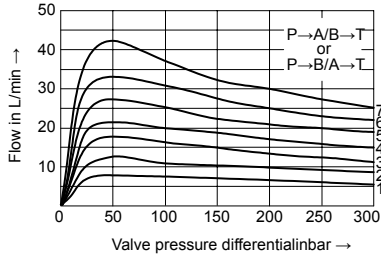
Performance limit, nominal flow 7 l/min



Performance limit, nominal flow 15 l/min



Performance limit, nominal flow 30 l/min



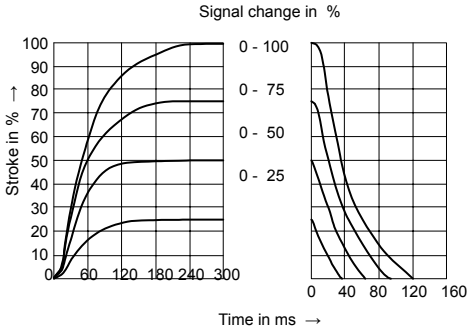
1. Com. value = 40 %
2. Com. value = 50 %
3. Com. value = 60 %
4. Com. value = 70 %
5. Com. value = 80 %
6. Com. value = 90 %
7. Com. value = 100 %

Characteristic curves

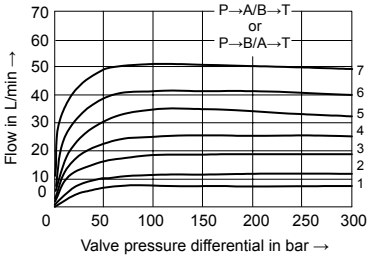
(measured with HLP46, $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

NG 10

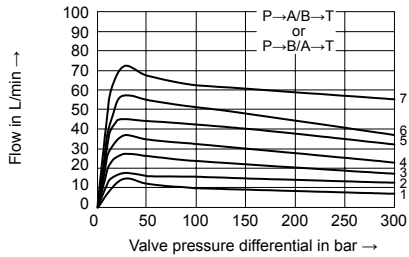
Transient function with a stepped form of electrical input sign



Performance limit, nominal flow 30l/min



Performance limit, nominal flow 60 l/min

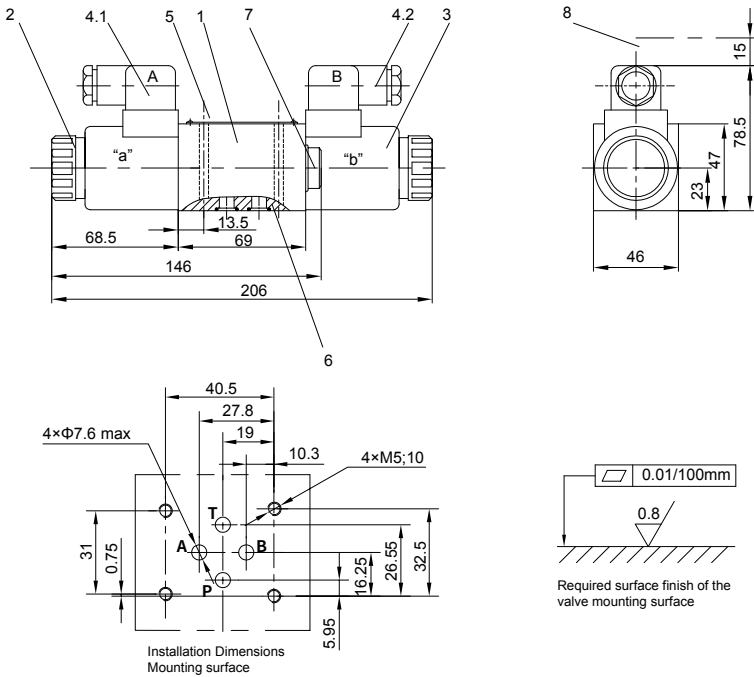


- 1.Com. value = 40 %
- 2.Com. value = 50 %
- 3.Com. value = 60 %
- 4.Com. value = 70 %
- 5.Com. value = 80 %
- 6.Com. value = 90 %
- 7.Com. value = 100 %

Unit dimensions

(nominal dimensions in mm)

Type 4WRA6...2XJ

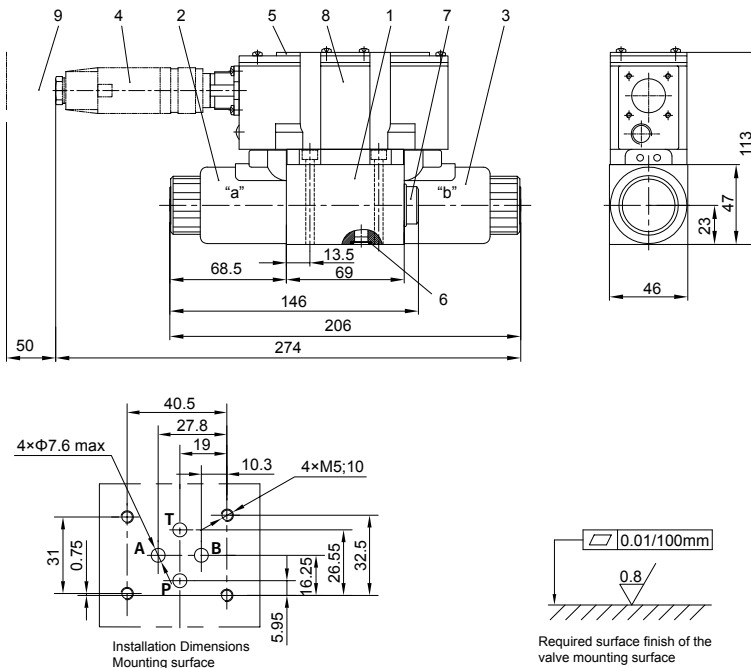


- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Plug-in connector "A"
- 4.2 Plug-in connector "B"
- 5 Name plate
- 6 Identical seal rings for ports A, B, P and T
(R-ring $9.81 \times 1.5 \times 1.78$ or O-ring 9.25×1.78)
- 7 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 8 Space required to remove the plug-in connector

Unit dimensions

(nominal dimensions in mm)

Type 4WRAE6...2XJ

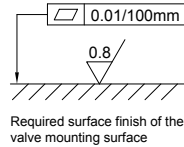
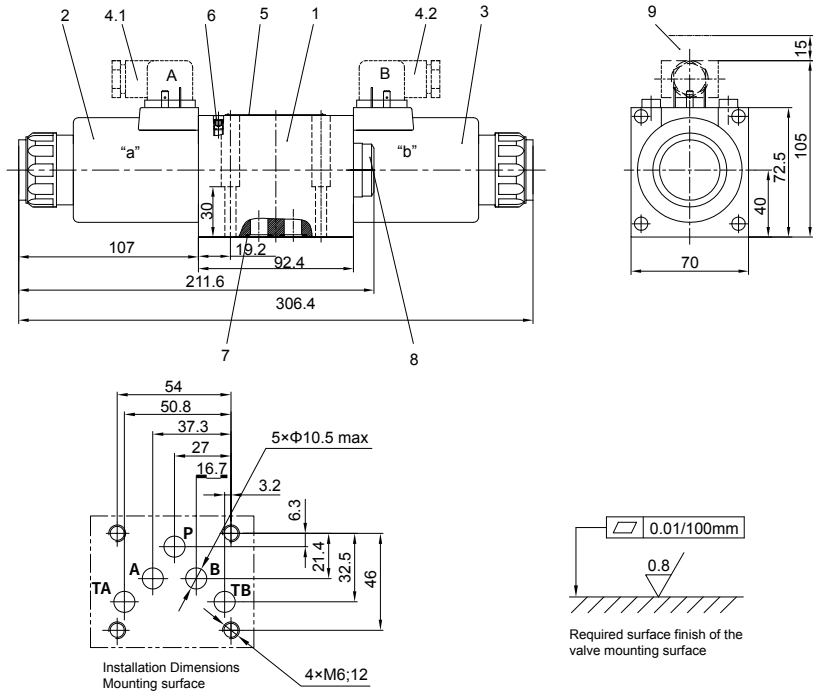


- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4 Plug-in connector
- 5 Name plate
- 6 Identical seal rings for ports A, B, P and T
(R-ring 9.81×1.5×1.78 or O-ring 9.25×1.78)
- 7 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 8 Integrated electronics (OBE)
- 9 Space required to remove
the plug-in connector

Unit dimensions

(nominal dimensions in mm)

Type 4WRA10...2XJ

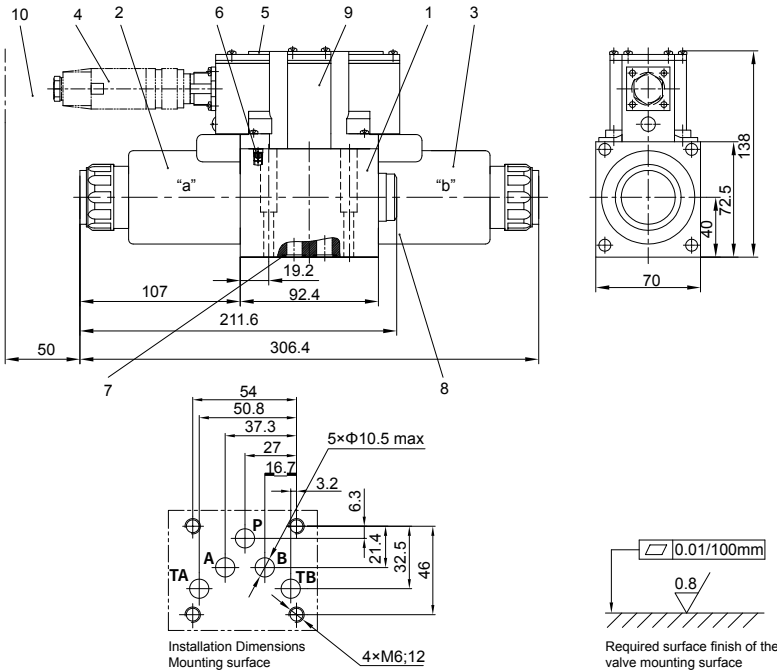


- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Plug-in connector "A"
- 4.2 Plug-in connector "B"
- 5 Name plate
- 6 Valve bleed screw
- 7 Identical seal rings for ports A, B, P and T
(R-ring 13×1.6×2 or O-ring 12×2)
- 8 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 9 Space required to remove the plug-in connector

Unit dimensions

(nominal dimensions in mm)

Type 4WRAE10...2XJ



- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4 Plug-in connector
- 5 Name plate
- 6 Valve bleed screw
- 7 Identical seal rings for ports A, B, P and T
(R-ring 13×1.6×2 or O-ring 12×2)
- 8 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 9 Integrated electronics (OBE)
- 10 Space required to remove the plug-in connector



4WRE(E)...type Proportional Directional Valve



4WRE and 4WREE...type

Size 6, 10

Max. Working Pressure: 315 bar

Max. Flow: 80 L/min (size 6)

180 L/min (size 10)

Contents

Function and configuration	02
Symbols	03
Ordering code	03
Technical data	04
Electrical connections, plug-in connectors	05
Integrated electronics	06-07
Characteristic curves	07-10
Unit dimensions	11-14

Features

- Direct operated proportional directional valve with electrical position feedback
- Closed loop control of the direction and size of a flow
- Operation is by proportional solenoids with a central thread and removable coil
- For subplate mounting: Porting pattern conforms to ISO 4401
- Spring centred control spool
- Integrated electronics (OBE) with voltage input or current input (A1 resp. F1)
- 4WRE separate order:
analogue module amplifier

Function and configurations

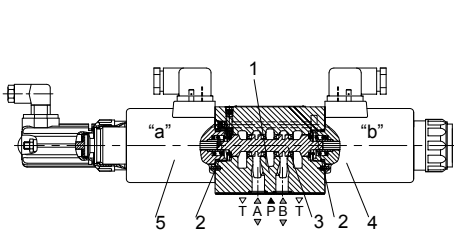
4WRE(E) type proportional valve is designed as direct operated devices in plate design. Operation is effected by proportional solenoids with central thread and detachable coil. The solenoids are optionally controlled by either external electronics (type 4WRE) or by the integrated electronics (type 4WREE).

The valve consists of Housing (1), Compression springs (2), Control spool (3), and Solenoid (4 and 5) with central thread, Solenoid(5) with position transducer and optional integrated control electronics (6).

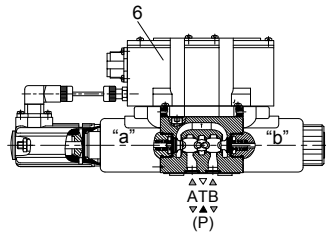
In the de-energised condition the spool (3) is held in a mechanical centre position by the solenoid return springs (2).

– With the solenoids (4), de-energised, the control spool (3) is held in the central position by the compression springs (2).

– Direct operation of the control spool (3) by energising one of the proportional solenoids (4, 5) e.g. control of solenoid right, then movement of the control spool (3) to the left in proportion to the electrical input signal, and connection from P to A and B to T via orifice-like crosssections with progressive flow characteristics.



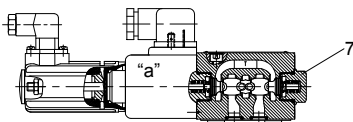
Type 4WRE 10...-2XJ/...



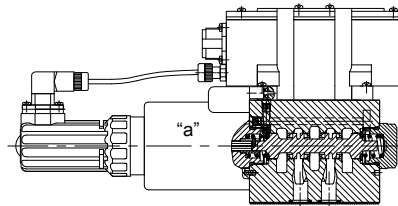
Type 4WREE 6...-2XJ/...

4WRE(E)...A-2XJ the 2 switched position valves are however only fitted with solenoid "a".

A plug (7) is fitted in place on the "b" proportional solenoid.



Type 4WRE 6...A-2XJ/...

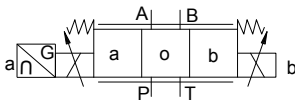


Type 4WREE 10...A-2XJ/...

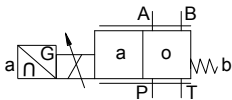
Symbols

Without integrated electronics

Type 4WRE...-2XJ/...

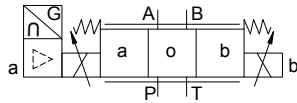


Type 4WRE...A-2XJ/...

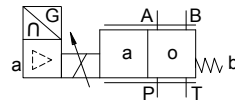


With integrated electronics

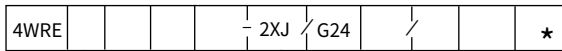
Type 4WREE...-2XJ/...



Type 4WREE...A-2XJ/...

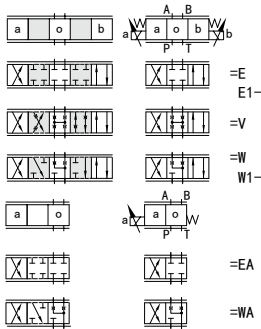


Ordering code



Without integrated = No code
 With integrate = E
 Nominal size 6 =6
 Nominal size 10 =10

Spool symbols



Transitional symbols
 With symbols E1- and W1-: P → A:
 $Q_{v,max}$ B → T: $q_v/2$
 P → B: $q_v/2$ A → T: $q_{v,max}$

Further information in plain text

V = FKM
 No code = NBR

No code = For 4WRE:
 Interface A1 or F1 for 4WREE:
 A1= Command value input ±10V
 F1= Command value input 4 to 20mA

4WRE: Z4= With plug-in connector
 K4= Without plug-in connector
 4WREE: K31= Without plug-in connector
 Z31= With plug-in connector

Power supply voltage of electric control device:
 G24= Power supply voltage 24VDC

2XJ= Series 20J~29J
 (20J to 29J unchanged installation and connection dimensions)

Nominal flow at a valve pressure differential	$\Delta P=10\text{bar}$
NG 6: 08=	8L/min
16=	16L/min
32=	32L/min
NG 10: 25=	25L/min
50=	50L/min
75=	75L/min

Technical data

1. Hydraulic			
Installation			Optional, preferably horizontal
Nominal size			6 10
Weight	4WRE...2XJ	Kg	2.2
	4WREE...2XJ		6.3
Nominal flow q_{nom} at $\Delta p = 10$ bar			L/min 8, 16, 32 25, 50, 75
Hysteresis			% ≤ 0.1
Reversal span			% ≤ 0.05
Response sensitivity			% ≤ 0.05
Max.operating pressure	Ports A, B, P	bar	315
	Port T	bar	210
Pressure fluid			Mineral oil (HL, HLP) to DIN 51524 Other pressure fluids on request!
Ambient air temperature range	4WRA...2XJ	°C	-20°C to 70°C (-4° F to 158° F)
	4WRAE...2XJ	°C	-20°C to 50°C (-4° F to 122° F)
Viscosity range			mm ² /s 20 to 380 (preferably 30 to 46)
Fluid Cleanliness Class			NAS1638 class9 or ISO 4406 class 20/18/15

2. Electrical			
1) Solenoid data			
Nominal size			6 10
Voltage type			DC
Command value signal for 4WREE			$\pm 10V$ or 4 ~ 20mA
Max.current per solenoid			A 2.5
Solenoid coil resistance	Cold value	Ω	2.7
	Max.warm value		3.7
Duty			% ED100%
Max.coil temperature			°C 150
Valve protection to EN 60529			IP 65
2) Control electronics			
Amplifier	4WRE...2XJ	VT-VSPA2-...-2XJ	
	4WREE...2XJ	integrated in the valve(OBE)	
Supply voltage	Nominal voltage	VDC	24
	Lower limiting value	V	19.4
	Upper limiting value	V	35
Amplifier power consumption	I _{max}	A	< 2
	Impulse current	A	3

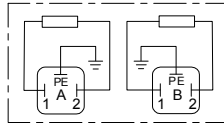
Electrical connections, plug-in connectors

nominal dimensions in mm

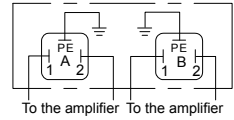
• For type 4WRE...2XJ (without integrated electronics)

Connections on the component plug

Plug-in connector to DIN EN 175301-803 or ISO 4400



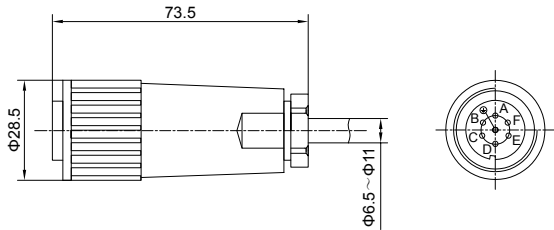
Connections on the plug-in connector



• For type 4WREE...2XJ (with integrated electronics (OBE))

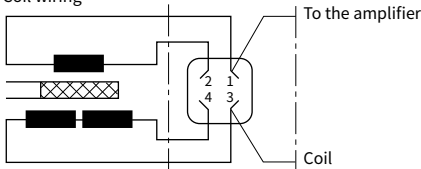
For pin allocation also see block circuit diagram.

Plug-in connector to DIN EN 175201-804

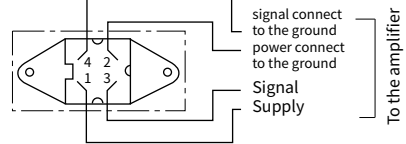


• Inductive position sensor

Coil wiring



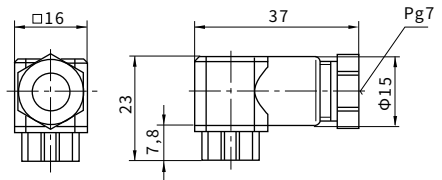
connect to the plug



Plug connector 4 pin Pg7-G4W1F

Connecting cables:

Recommend: For cables up to 50 m in length, Please use a cable of type LiYCY 4×0.25 mm² Connect the shield to the PE only on the supply side.



Integrated control electronics for type 4WREE

Component plug allocation

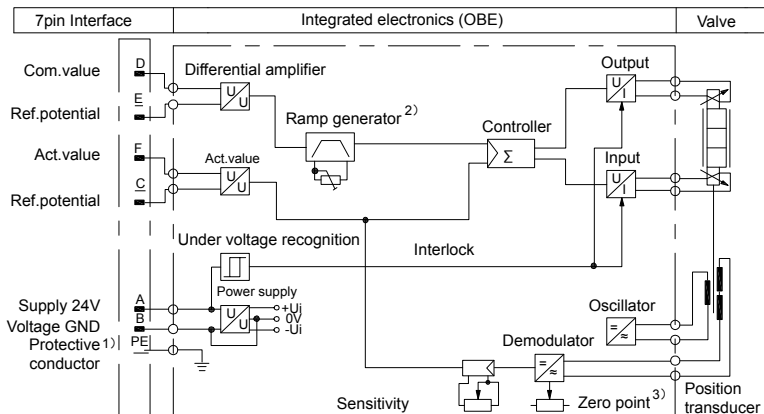
	Contact	Interface A1 signal	Interface F1 signal
Supply voltage	A	24 VDC(U(t)=19.4V to 35V), I _{max} =2A	
	B	0V	
Reference potential (actual value)	C	ref.contact F, Re>50KΩ	ref.contact F, Re<10Ω
Differential amplifier input	D	±10V, Re>50KΩ	4 to 20mA, Re>100Ω
	E	Reference potential command value	
Measurement output (actual value)	F	±10 V actual value (limiting load 5 mA)	4 to 20 mA actual value, load resistance max.300Ω
	PE	Connected with cooling body and valve housing	

Command value: A positive command value 0 to +10V (or 12 to 20 mA) at D and the reference potential at E results in a flow from P to A and B to T.
 A negative command value 0 to -10V (or 12 to 4 mA) at D and the reference potential at E results in a flow from P to B and A to T.
 For a valve with 1 solenoid on side a (e.g. spool variants EA and WA) a positive command value at D and the referencepotential at E results in a flow from P to B and A to T.

Actual value: A positive actual value 0 to +10V (or 12 to 20mA) at F and the reference potential at C results in flow from P to A and B to T,
 A negative actual value 0 to -10V (or 4 to 12mA) at F and the reference potential at C results in flow from P to B and A to T.
 With valves with 1 solenoid, a positive actual valueat F and referencepotential at C results in flow from P to B and A to T.

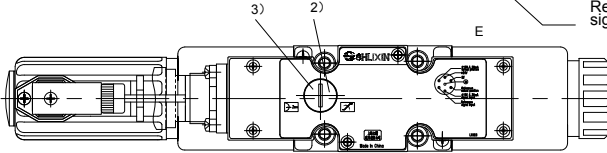
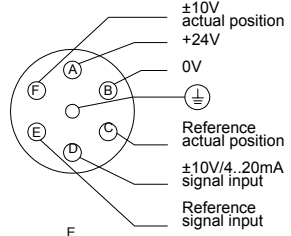
Connection cable: Recommended: - up to 25 m cable length type LiYCY 7×0.75 mm²
 - up to 50 m cable length type LiYCY 7×1.0 mm²
 For outside diameter see plug-in connector sketch
 Only connect screen to PE on the supply line.

Integrated electronics (OBE) for type 4WREE...2XJ



Integrated control electronics for type 4WREE

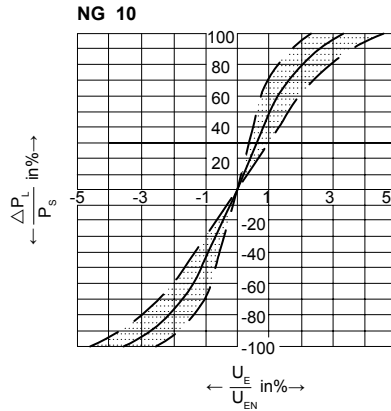
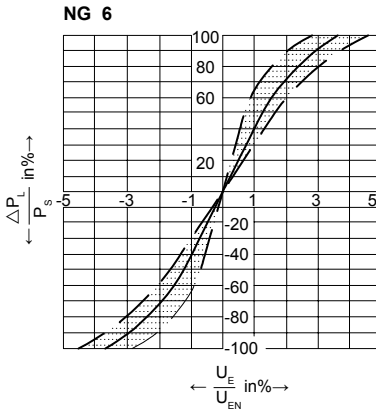
- 1) The protective conductor (PE) is connected to the cooling body and the valve housing!
- 2) The ramp is externally adjustable from 0 to 2.5 s, the same applies for T_{up} and T_{down} .
- 3) Zero point is externally adjustable.



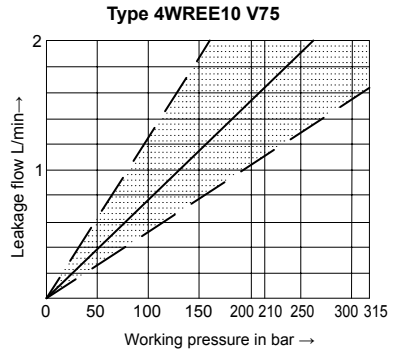
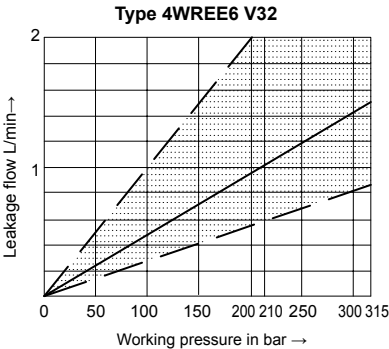
Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40^\circ\text{C} \pm 5^\circ\text{C}$)

• Type 4WREE (NG 6 and 10)

Pressure-signal-characteristic curves (V spool, $P_s = 100 \text{ bar}$)



Leakage flow with the spool in the central position

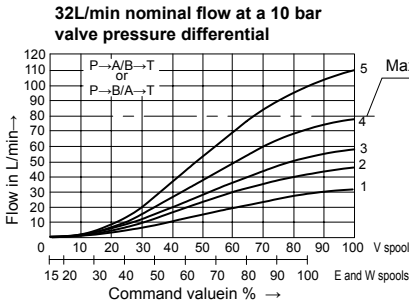
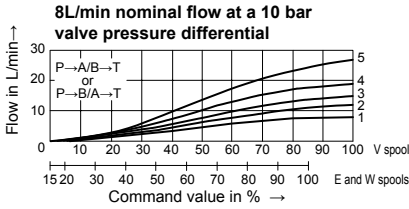


Characteristic curves

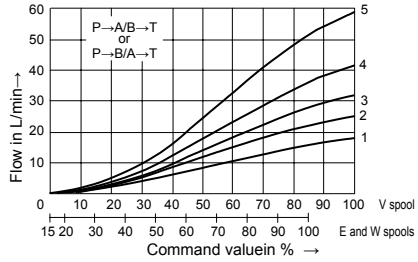
(measured with HLP46, $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, $P = 100\text{bar}$)

• Type 4WREE (NG 6 and 10)

NG 6



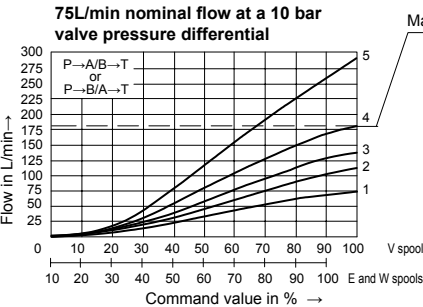
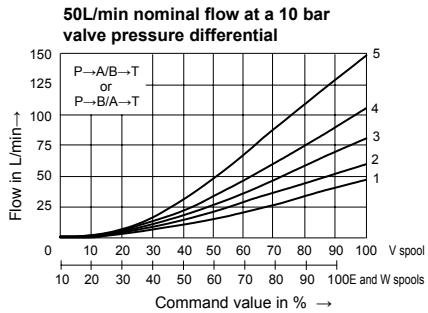
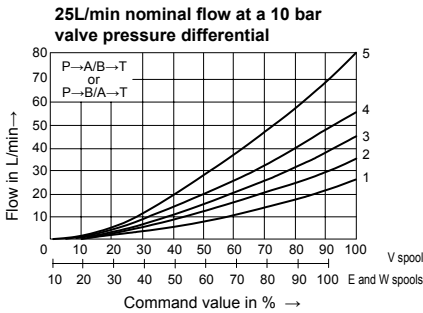
16L/min nominal flow at a 10 bar valve pressure differential



- 1 $\Delta p = 10\text{bar}$ constant
- 2 $\Delta p = 20\text{bar}$ constant
- 3 $\Delta p = 30\text{bar}$ constant
- 4 $\Delta p = 50\text{bar}$ constant
- 5 $\Delta p = 100\text{bar}$ constant

$\Delta p =$ Valve pressure differential
(inlet pressure p_p minus load pressure p_L minus return pressure p_T)

NG 10



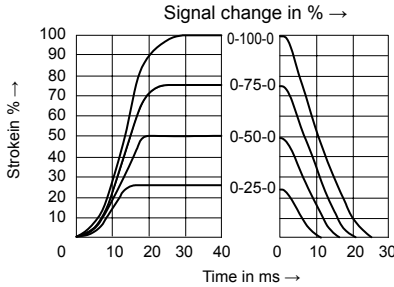
- 1 $\Delta p = 10\text{bar}$ constant
- 2 $\Delta p = 20\text{bar}$ constant
- 3 $\Delta p = 30\text{bar}$ constant
- 4 $\Delta p = 50\text{bar}$ constant
- 5 $\Delta p = 100\text{bar}$ constant

$\Delta p =$ Valve pressure differential
(inlet pressure p_p minus load pressure p_L minus return pressure p_T)

Characteristic curves

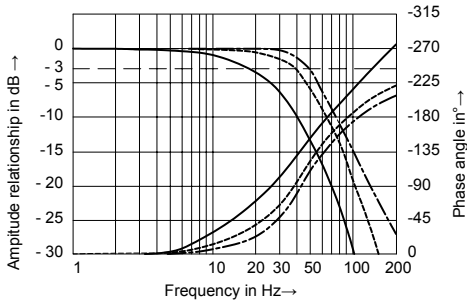
(measured with HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, $P=100\text{bar}$)

• Type 4WREE (NG 6)



Transient function with a stepped form of electrical input signal

4/3 valve version,
Spool symbol "E"



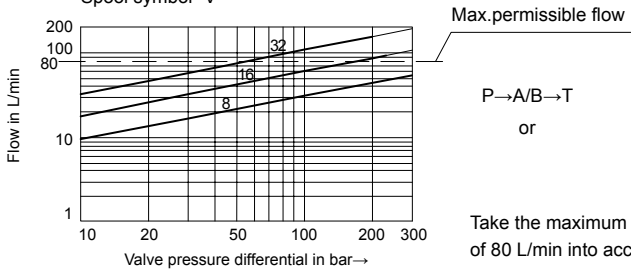
Frequency response characteristic curves

4/3 valve version,
Spool symbol "V"

- Signal $\pm 10\%$
- Signal $\pm 25\%$
- Signal $\pm 100\%$

Flow-pressure differential curve

Load function with maximum valve opening.
Nominal flows 8, 16 and 32 L/min.
Spool symbol "V"



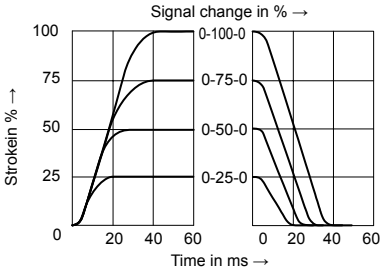
P → A/B → T
or

Take the maximum permissible flow
of 80 L/min into account!

Characteristic curves

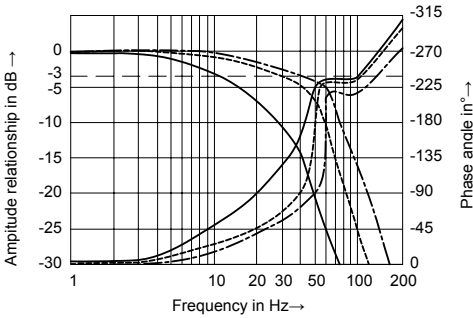
(measured with HLP46, $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, $P=100\text{bar}$)

• Type 4WREE (NG 10)



Transient function with a stepped form of electrical input signal

4/3 valve version,
Spool symbol "E"

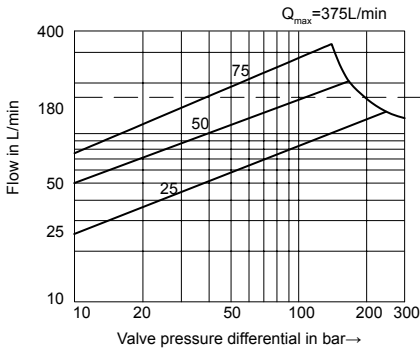


Frequency response characteristic curves

4/3 valve version,
Spool symbol "V"

Flow-pressure differential curve

Load function with maximum valve opening.
Nominal flows 25, 50 and 75 L/min.
Spool symbol "V"



Max. permissible flow

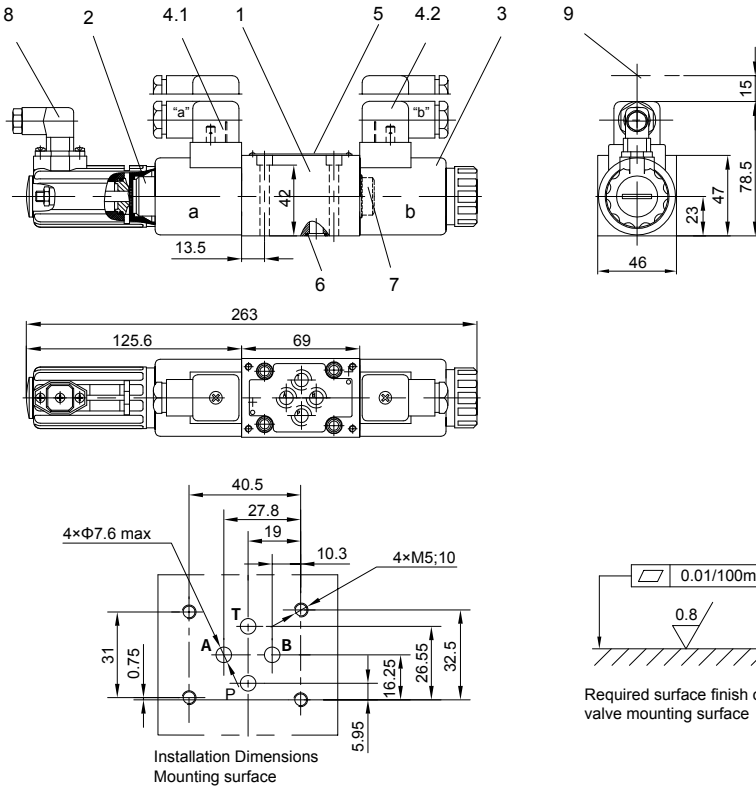
P → A/B → T
or
P → B/A → T

Take the maximum permissible flow
of 180 L/min into account!

Unit dimensions

(nominal dimensions in mm)

Type 4WRE6...2XJ

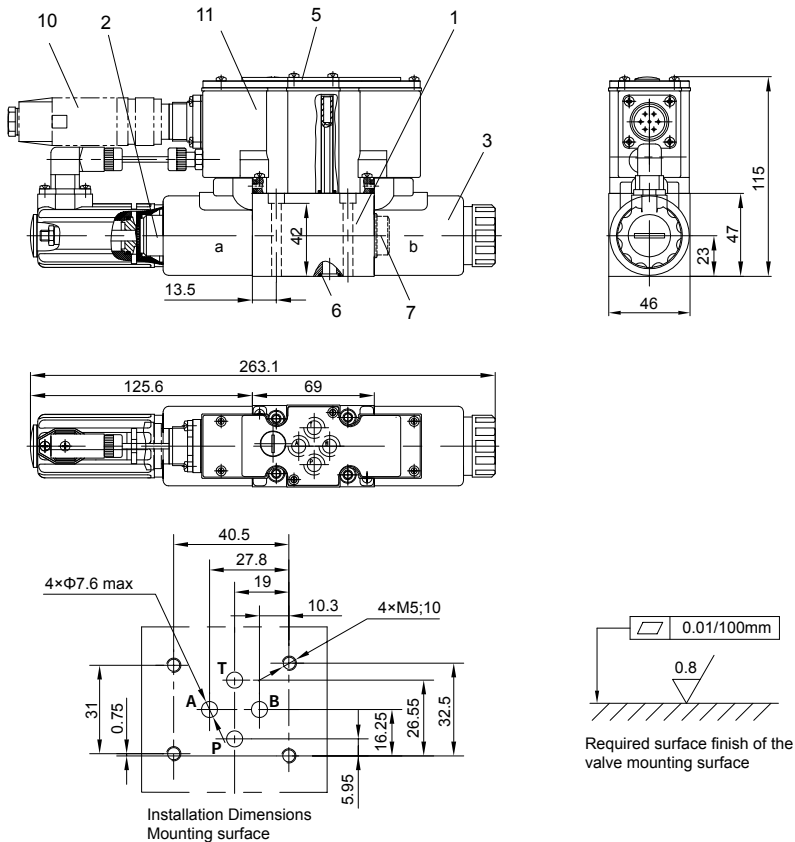


- | | |
|---|---|
| <ul style="list-style-type: none"> 1 Valve housing 2 Proportional solenoid "a" with inductive position transducer 3 Proportional solenoid "b" 4.1 Plug-in connector "A" 4.2 Plug-in connector "B" 5 Name plate 6 Identical seal rings for ports A, B, P and T (R-ring 9.81×1.5×1.78 or O-ring 9.25×1.78) | <ul style="list-style-type: none"> 7 Plug for valves with one solenoid (2 switching positions, versions EA or WA) 8 Plug-in connector for inductive position transducer 9 Space required to remove the plug-in connector |
|---|---|

Unit dimensions

(nominal dimensions in mm)

Type 4WREE6...2XJ

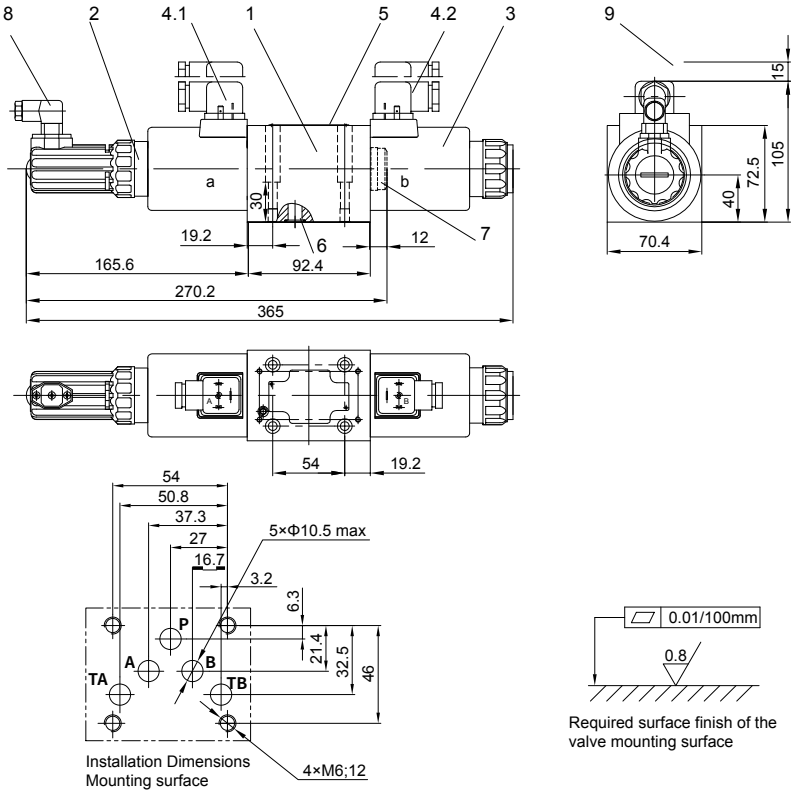


- 1 Valve housing
- 2 Proportional solenoid "a" with inductive position transducer
- 3 Proportional solenoid "b"
- 5 Name plate
- 6 Identical seal rings for ports A, B, P and T
(R-ring $9.81 \times 1.5 \times 1.78$ or O-ring 9.25×1.78)
- 7 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 10 Plug-in connector
- 11 Integrated electronics (OBE)

Unit dimensions

(nominal dimensions in mm)

Type 4WRE10...2XJ

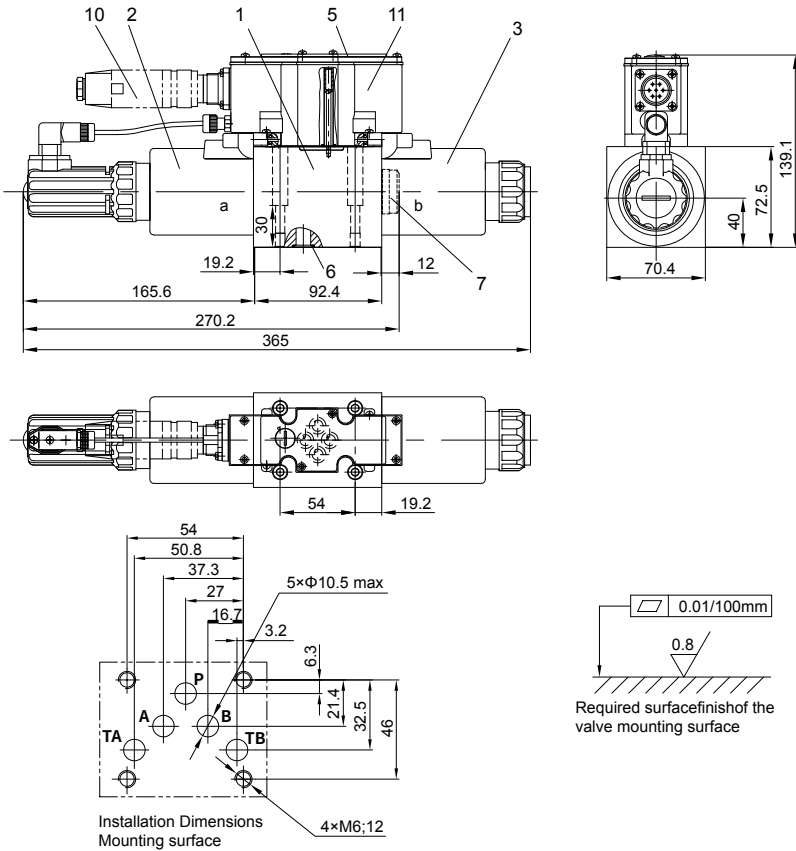


- 1 Valve housing
- 2 Proportional solenoid "a" with inductive position transducer
- 3 Proportional solenoid "b"
- 4.1 Plug-in connector "A"
- 4.2 Plug-in connector "B"
- 5 Name plate
- 6 Identical seal rings for ports A, B, P and T
(R-ring 13×1.6×2 or O-ring 12×2)
- 7 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 8 Plug-in connector for inductive position transducer
- 9 Space required to remove the plug-in connector

Unit dimensions

(nominal dimensions in mm)

Type 4WREE10...2XJ



- 1 Valve housing
- 2 Proportional solenoid "a" with inductive position transducer
- 3 Proportional solenoid "b"
- 4 Name plate
- 5 Identical seal rings for ports A, B, P and T (R-ring 13×1.6×2 or O-ring 12×2)
- 6 Plug for valves with one solenoid (2 switching positions, versions EA or WA)
- 7 Plug-in connector
- 8 Integrated electronics (OBE)



4WRKE...type Electro-Hydraulic Proportional Directional Valve



4WRKE...3XJ type

Size 10, 16, 25, 32
Max. Working Pressure: 315 bar
Max. Flow: 1600 L/min

Contents

Function and configuration	02
Symbols	03
Ordering code	03
Technical data	04
Electrical connections	05
Characteristic curves	06-08
Unit dimensions	09-12

Features

- Pilot operated 2-stage proportional directional valve
- Valve for the control of the size and direction of a flow
- For subplate mounting, porting pattern to DIN 24 340 form A
- Spring centred main spool
- Integrated control electronics

Function and configuration

Proportional directional valve type 4WRKE...3XJ...

4WRKE type valve is a 2-stage proportional directional control valves. They control the size and direction of a flow. The main stage is closed loop position controlled so that the spool position is also independent of flow forces at larger flows.

The valve consists of the pilot control valve(1), housing (8), main spool (7), covers (5 and 6), centering spring (4), inductive position transducer (9) and the pressure reducing valve (3).

If no input signal is being applied then the main spool (7) is held in the center position by the centering spring (4). The two control chambers in the covers (5 and 6) are connected via the valve spool (2) to tank. The main spool (7) is connected to suitable control electronics via the inductive position transducer(9). The positional change of the main spool (7) as well as the alteration of the command value at the summation point of the amplifier produces a differential voltage.

With the command actual value comparison a possible control deviation is recognised via the electronics and an electrical current is applied to the proportional solenoid of the pilot valve (1).

The current induces, within the solenoid, a force which is passed on to the solenoid pin which in turn actuates the control spool. The flow which is provided via the control cross sections causes the main spool to move.

Pilot control valve type 4WRAP 6 W7...-3XJ/G24...

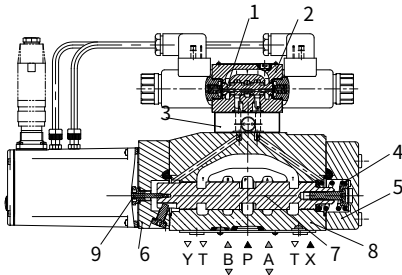
The pilot control valve is a direct operated proportional valve. The control edge geometrics were designed and optimised for the use as a pilot control valve for the proportional directional valves type 4WRKE.

The proportional solenoids are pressure tight, oil-immersed DC solenoids with removable coil. They convert an electrical current proportionally into a mechanical force. An increase in the current strength causes an appropriately higher solenoid force.

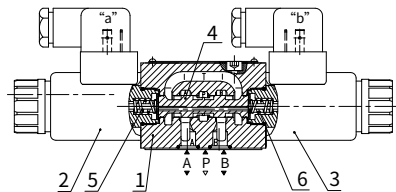
The valve consists of housing(1), proportional solenoids(2 and 3), spool(4) and springs(5 and 6).

In the de-energised condition both actuator ports are connected to tank. If one of the two solenoids (2 or 3) is energised, then the solenoid force moves the valve spool (4) against the spring (6 or 5).

Once the overlap area is overcome, the connection to tank of one of the two actuator ports is blocked and the connection to the pressure chamber is established. There is flow from P to the control chamber of the main stage.



Type 4WRKE 16 ...-3XJ...



Type 4WRAP 6 W7...-3XJ/G24...

Technical data

General					
Nominal size		10	16	25	32
Installation and commissioning guidelines	Optional, preferably horizontal				
Storage temperature range	°C	- 20 to + 80			
Ambient temperature range	°C	- 20 to + 50			
Weight	kg	8.7	11.2	16.8	31.5

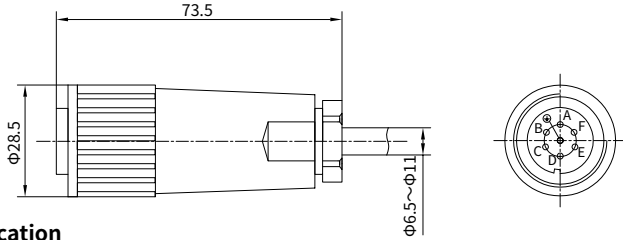
Hydraulic (measured at p=100bar, with HLP46 at $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)						
Operating pressure	-Pilot control valve	Pilot oil supply	bar	25 to 315		
	-Main valve	Ports P, A, B	bar	Up to 315	Up to 350	Up to 350
Return pressure	Port T (Pilot oil drain)	Internal	bar	Static < 10		
		External	bar	Up to 315	Up to 250	Up to 250
	Port Y		bar	Static < 10		
Nominal flow $q_{vnom} \pm 10\%$ at $\Delta p=10\text{bar}$ (Δp = valve pressure differential)		L/min	25	-	-	-
			50	125	220	440
			100	180	350	600
Flow of main valve (max. permissible)		L/min	170	460	870	1600
Pilot oil flow at port X or Y with a step form of input signal from 0 to 100 % (315 bar)		L/min	4.1	8.5	11.7	13
Pressure fluid	Mineral oil (HL, HLP) to DIN 51 524 Phosphate ester (HFD-R)					
Pressure fluid temperature range	°C	10 to 80, preferably 40 to 50				
Viscosity range	mm ² /s	20 to 380, preferably 30 to 45				
Degree of contamination		Maximum permissible degree of contamination of the pressure fluid is to NAS 1638.		A filter with a minimum retention rate of $\beta_x = 75$ is recommended		
	Pilot control valve	Class 7		x = 5		
	Main valve	Class 9		x = 7		
Hysteresis	%	≤ 1				
Response sensitivity	%	≤ 0.5				

Electrical	
Voltage type	DC
Electrical connection	Plug-in connector to DIN EN175 201-804
Power, max.	W 72 (average = 24W)
Control electronics	Integrated into the valve

Electrical connections, plug-in connector

For pin allocation also see block circuit diagram.

Plug-in connector to DIN EN 175201-804



Component plug allocation

	Contact	Signal
Supply voltage	A	24 VDC (18 to 35 VDC); $I_{max} = 1, 5 \text{ A}$; impulse load $\leq 3 \text{ A}$
	B	0V
Ref. (actual value)	C	Ref. potential for actual value (contact F)
Differential amplifier input (command value)	D	$\pm 10\text{V}$ or 4 – 20mA
	E	0V ref. potential
Measurement output (act. value)	F	$\pm 10\text{V}$ or 4 – 20 mA
	PE	Connected with cooling body and valve housing

Command value:

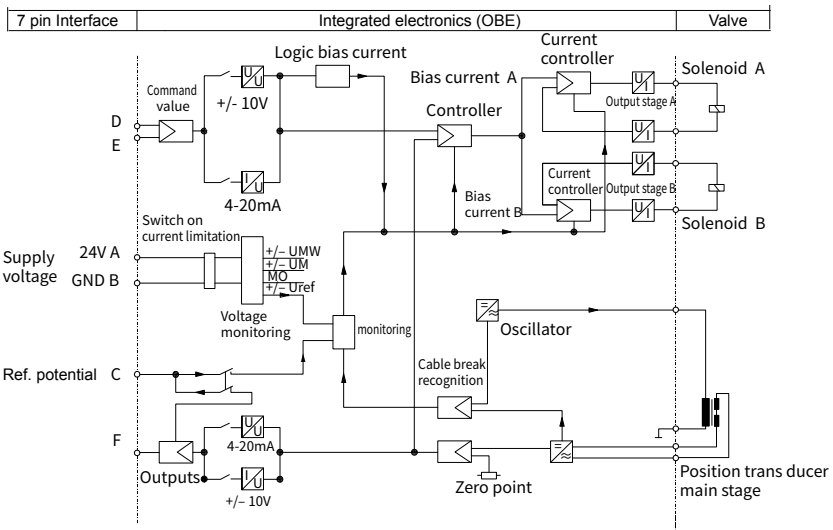
Reference potential at E and a positive command value at D results in a flow from P to A and B to T. Reference potential at E and a negative command value at D results in a flow from P to B and A to T.

Connection cable:

- Recommendation: – Up to 25m cable length type LiYCY 7×0.75 mm²
- Up to 50m cable length type LiYCY 7×1.0 mm External diameter: – 6.5 to 11mm (plastic plug-in connection)
- 8 to 12mm (metal plug-in connector)
- Connect screen to ⊥ only on supply side.

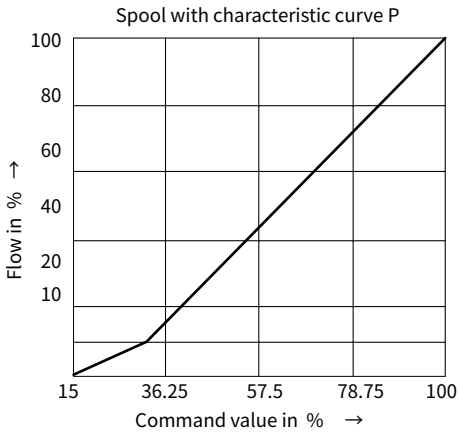
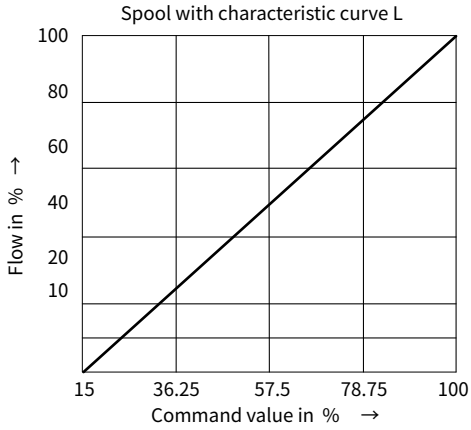
06

Block circuit diagram / connection allocation of the integrated control electronics for type 4WRKE



Characteristic curves (measured with HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

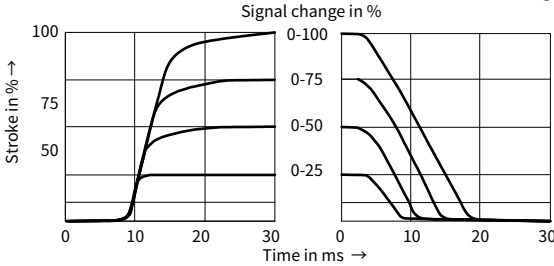
Flow - command value curve



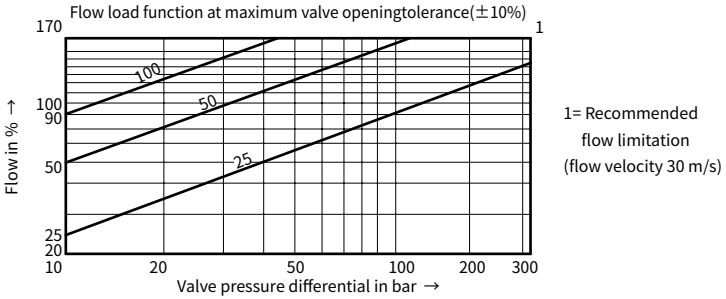
Characteristic curves (measured at p = 100bar, with HLP46, $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

NG 10

Transient function with a step form of electrical input signal

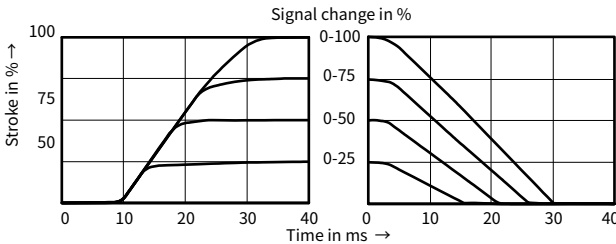


Flow-pressure differential curve

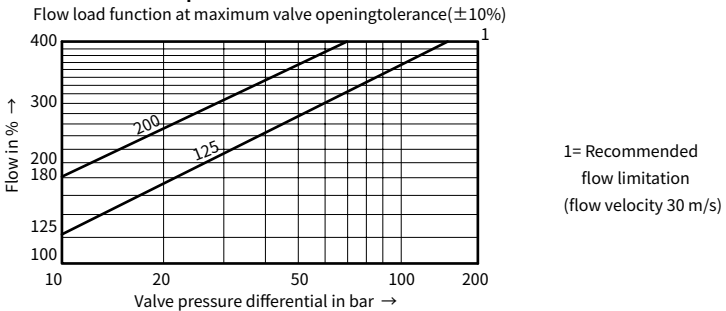


NG 16

Transient function with a step form of electrical input signal



Flow-pressure differential curve

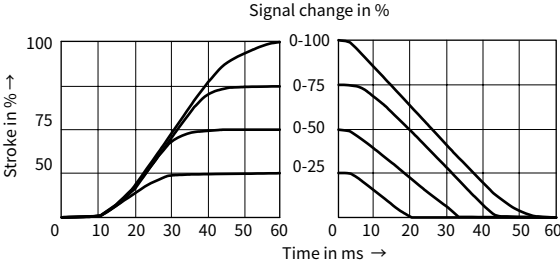


06

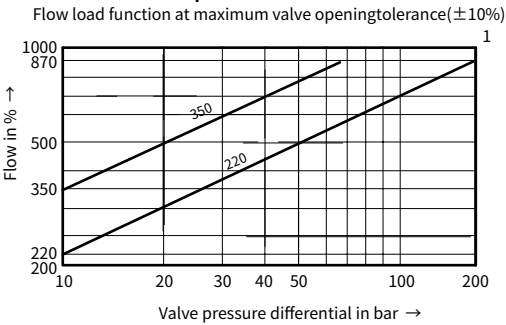
Characteristic curves (measured at p=100bar, with HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

NG 25

Transient function with a step form of electrical input signal



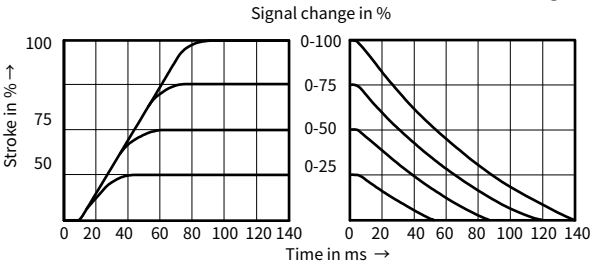
Flow-pressure differential curve



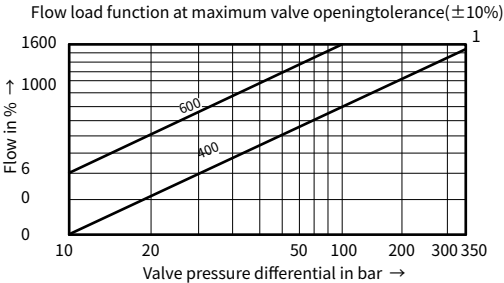
1= Recommended flow limitation (flow velocity 30 m/s)

NG 32

Transient function with a step form of electrical input signal



Flow-pressure differential curve

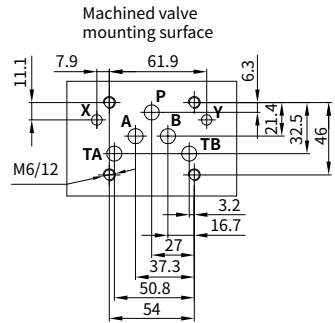
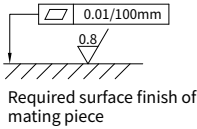
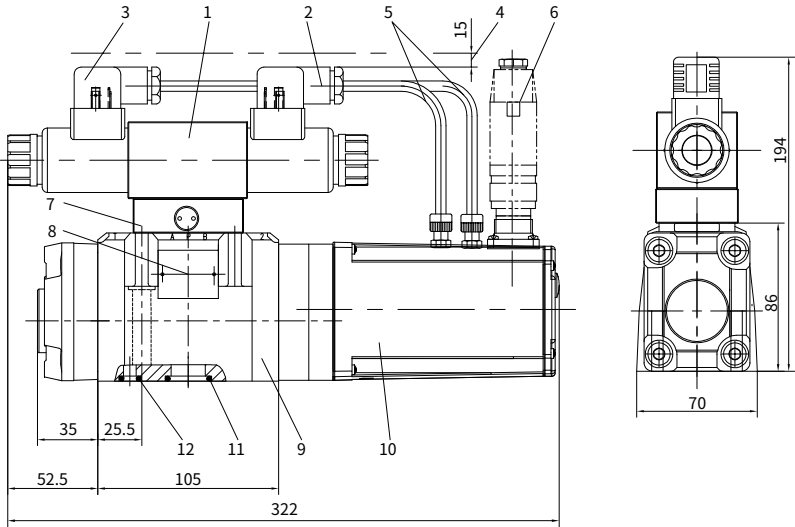


1= Recommended flow limitation (flow velocity 30 m/s)

Unit dimensions

(Dimensions in mm)

NG 10

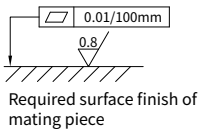
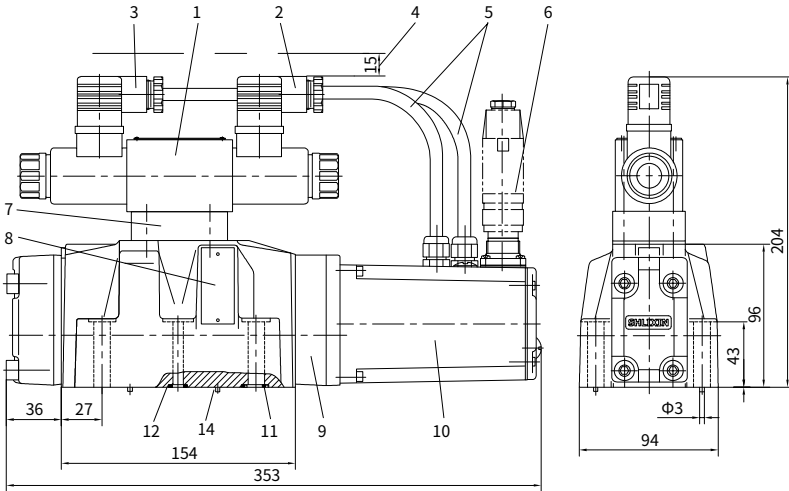


- 1 Pilot control valve
- 2 Plug-in connector "A"
- 3 Plug-in connector "B"
- 4 Space required to remove the plug-in connector
- 5 Cable
- 6 Plug-in connector
- 7 Pressure reducing valve
- 8 Name plate
- 9 Main valve
- 10 Integrated control electronics
- 11 R-ring 13×1.6×2, ports A, B, P, T
- 12 R-ring 11.18×1.6 ×1.78, ports X and Y

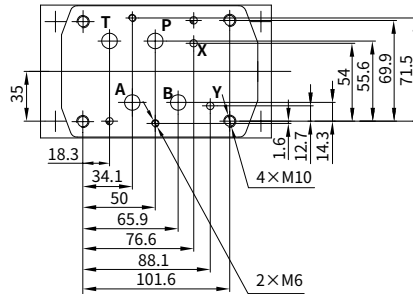
Unit dimensions

(Dimensions in mm)

NG 16



Machined valve mounting surface

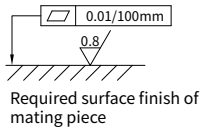
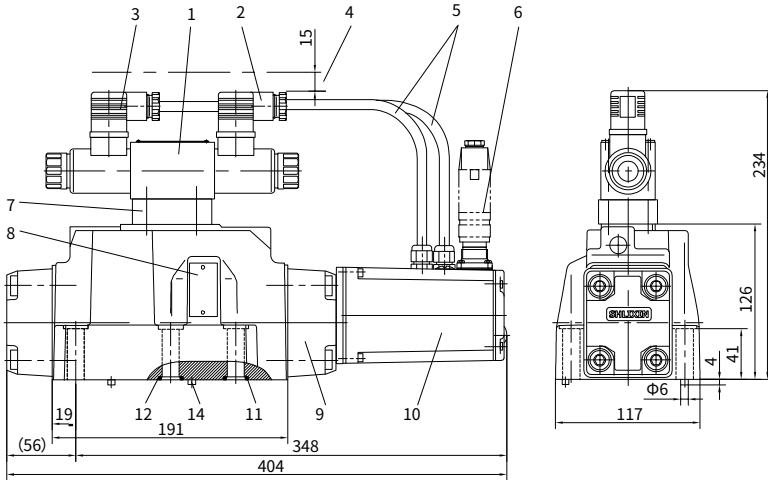


- 1 Pilot control valve
- 2 Plug-in connector "A"
- 3 Plug-in connector "B"
- 4 Space required to remove the plug-in connector
- 5 Cable
- 6 Plug-in connector
- 7 Pressure reducing valve
- 8 Name plate
- 9 Main valve
- 10 Integrated control electronics
- 11 R-ring 22.53×2.3×2.62, ports A, B, P, T
- 12 R-ring 10×2×2, ports X and Y
- 14 Locating pin

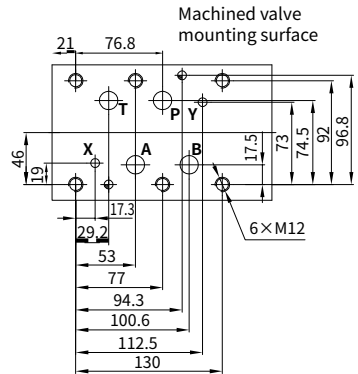
Unit dimensions

(Dimensions in mm)

NG 25



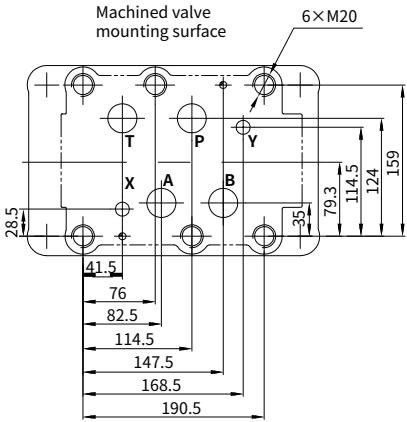
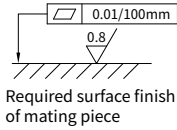
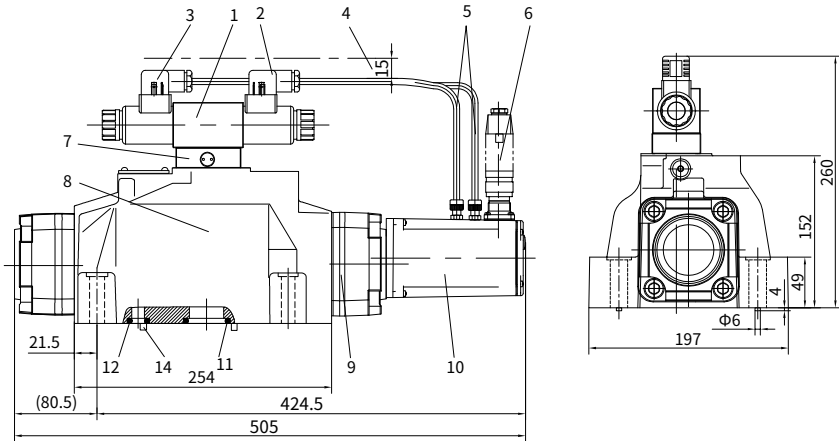
- 1 Pilot control valve
- 2 Plug-in connector "A"
- 3 Plug-in connector "B"
- 4 Space required to remove the plug-in connector
- 5 Cable
- 6 Plug-in connector
- 7 Pressure reducing valve
- 8 Name plate
- 9 Main valve
- 10 Integrated control electronics
- 11 R-ring 27.8×2.6×3, ports A, B, P, T
- 12 R-ring 19×3×3, ports X and Y
- 13 Locating pin



Unit dimensions

(Dimensions in mm)

NG 32



- 1 Pilot control valve
- 2 Plug-in connector "A"
- 3 Plug-in connector "B"
- 4 Space required to remove the plug-in connector
- 5 Cable
- 6 Plug-in connector
- 7 Pressure reducing valve
- 8 Name plate
- 9 Main valve
- 10 Integrated control electronics
- 11 R-ring 42.5×3×3, ports A, B, P, T
- 12 R-ring 19×3×3, ports X and Y
- 13 Locating pin



4WRPEH6...type Servo Valve



4WRPEH6...2XJ...type

Size 6
Max. Working Pressure: 315 bar
Max. Flow: 40 L/min

Contents

Function and configuration	02
Ordering code	03
Symbols	03
Technical data	04
Electrical connection	05
Technical data for the cable	05
Integrated electronics (OBE)	06-07
Characteristic curves	08-09
Unit dimensions	10

Features

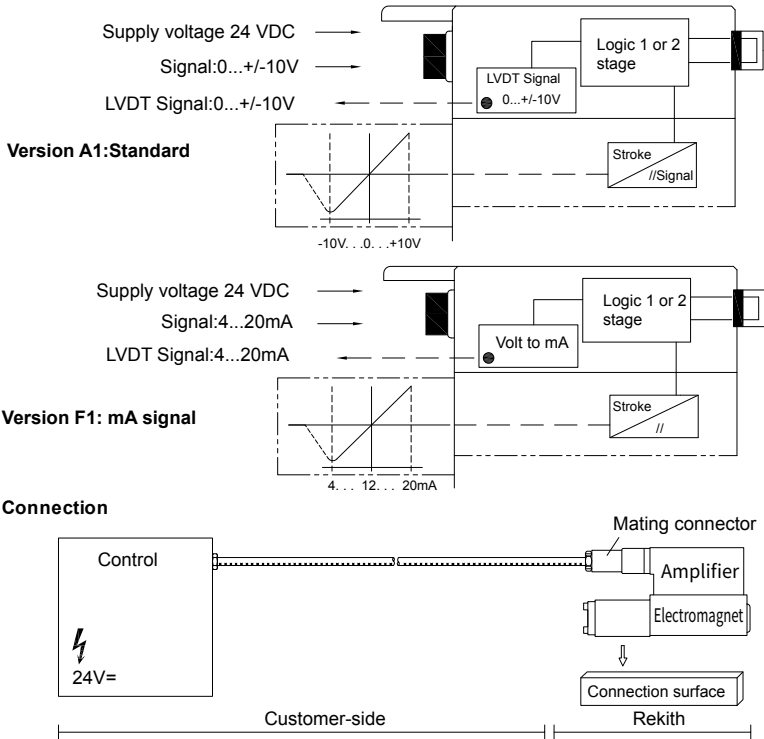
- With control spool and sleeve in servo quality
- Operated on one side, 4/4-fail-safe position in switched off state
- Electric position feedback and integrated electronics(OBE), calibrated in the factory
- Electrical connection 6P+PE signal input differential amplifier with interface "A1": $\pm 10V$ or interface "F1": 4...20mA ($R_{sh} = 200\Omega$)
- Subplate mounting, porting pattern to ISO 4401-03-02

Technical data

General							
Design		Spool valve, direct operated, with steel sleeve					
Actuation		Proportional solenoid with position control, OBE					
Connection type		Subplate mounting, porting pattern according to ISO 4401-03-02-0-05					
Installation position		Any					
Ambient temperature range		°C	-20~+50				
Weight		Kg	~2.75				
Maximum vibration resistance (test condition)		Max. 25 g, space vibration test in all directions (24h)					
Hydraulic (measured at p=100bar, with HLP46 at $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)							
pressure fluid		Mineral oil (HL, HLP)to DIN 51 524					
Viscosity range	Recommended	mm ² /s	20...100				
	Maximum admissible	mm ² /s	10...800				
Hydraulic fluid temperature range		°C	-20 to +70				
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)		Class 18/16/13					
Rated flow ($\Delta p = 35$ bar per edge)		L/min	2	4	12	24	40
Maximum operating pressure		bar	Port A, B, P: 315				
Maximum operating pressure		bar	Port T: 250				
Leakage flow at 100 bar	Linear	cm ³ /min	< 150	< 180	< 300	< 500	< 900
	Nonlinear	cm ³ /min	—	—	—	< 300	< 450
Static/Dynamic							
Hysteresis		%	≤ 0.2				
Actuating time for signal step 0 ... 100%		ms	10				
Temperature drift		Zero shift < 1% at $\Delta T = 40^{\circ}\text{C}$					
Zero compensation		Ex factory $\pm 1\%$					

Electric, control electronics integrated in the valve						
Relative duty cycle		%	100ED			
Protection class according to EN 60529		IP 65.				
Connection		Plug-in connector 6P+PE, DIN 43563				
Supply voltage		24VDC _{nom}				
Terminal A		min. 21VDC / max. 40VDC				
Terminal B		0V (ripple max. 2)				
Fuse protection, external		A _F	2.5			
Input, version "A1"		Differential amplifier, Ri = 100 kΩ				
Terminal D (U _d)		0... ± 10V				
Terminal E		0V				
Input, version "F1"		Load, R _{sh} = 200 Ω				
Terminal D (I _{D,E})		4...12...20mA				
Terminal E (I _{D,E})		Current loop I _{D,E} return				
Test signal, version "A1"		LVDT				
Terminal F (U _{Test})		0... ± 10V				
Terminal C		Reference 0 V				
Test signal, version "F1"		LVDT signal 4 ... (12) ... 20 mA on external load				
Terminal F (I _{F,C})		200 ... 500 Ω maximum				
Terminal C (I _{F,C})		4 ... (12) ... 20mA (output)				
		Current loop I _{F,C} return				
Adjustment		calibrated before delivery, see characteristic curves				

Electrical connection



Technical data for the cable

- Version:
- Multi-core wire
 - Litz wire structure, extra fine wire according to VDE 0295, class 6
 - Protective earthing conductor, green-yellow
 - Cu shielding braid

- Number of wires:
- Determined by the valve type, connector type and signal configuration

- Line Ø:
- 0.75 mm² to 20 m of length
 - 1.0 mm² to 40 m of length
- Outer Ø:
- 9.4...11.8 mm
 - 12.7...13.5 mm

Note:
 Supply voltage 24 V DC_{nom}

if the value falls below 18V = an internal fast switch-off is effected which can be compared with "Release OFF".

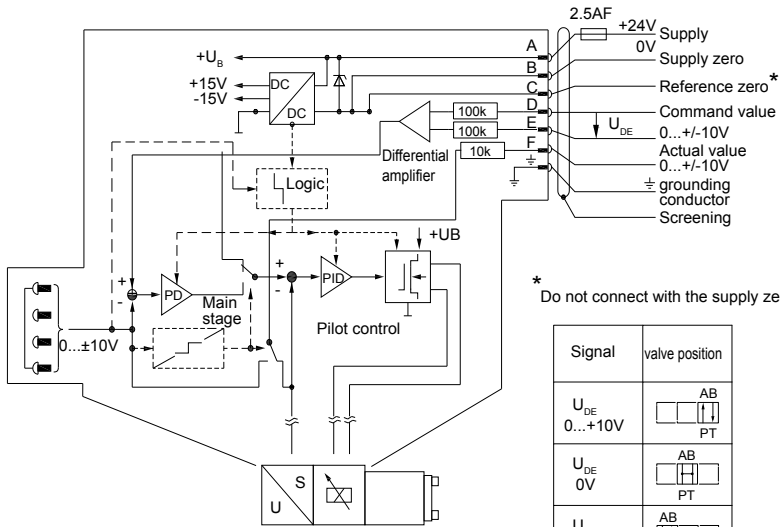
Additionally for version F1:
 $I_{D,E} \geq 3\text{mA}$ - valve is active
 $I_{D,E} \leq 2\text{mA}$ - valve is deactivated.

Electric signals taken out via control electronics may not be used for the switch-off of safety-relevant machine functions!

Integrated electronics (OBE)

Block diagram/pin assignment

A1: $U_{D,E}$ $0 \dots \pm 10V$

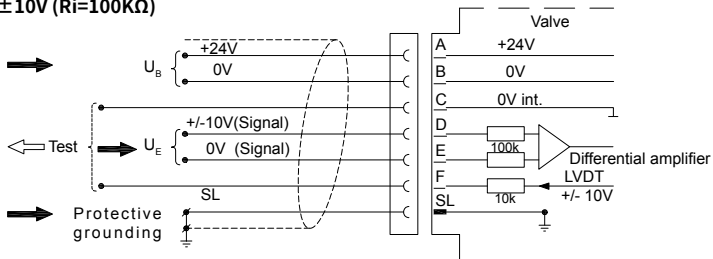


* Do not connect with the supply zero!

Signal	valve position
U_{DE} $0 \dots +10V$	
U_{DE} $0V$	
U_{DE} $0 \dots -10V$	

In assignment 6P+PE

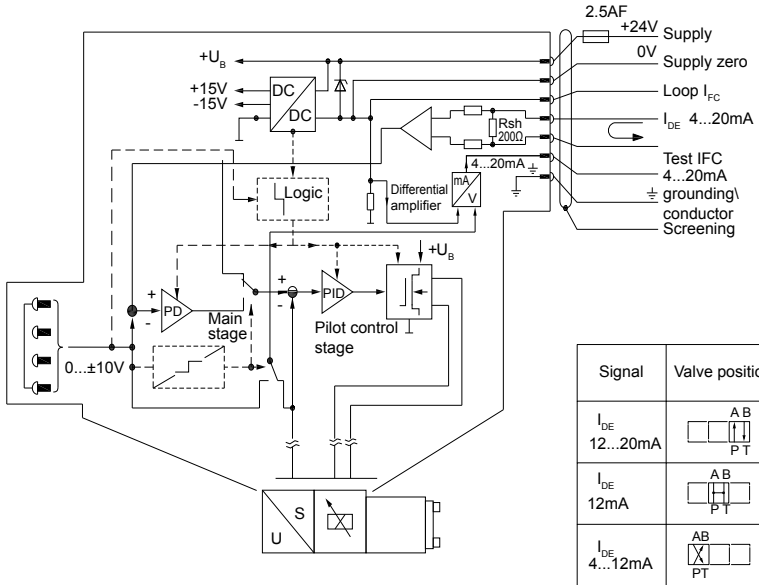
A1: $U_{D,E}$ $\pm 10V$ ($R_i=100K\Omega$)



Integrated electronics (OBE)

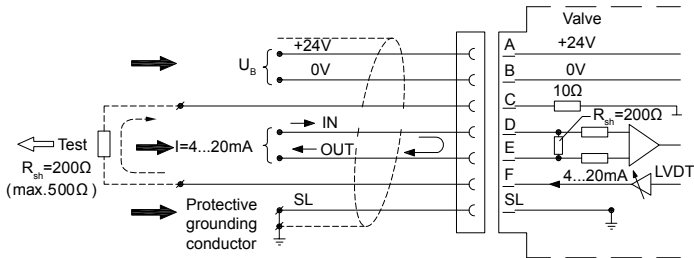
Block diagram/pin assignment

F1: $I_{D,E}$ 4...20mA



In assignment 6P+PE

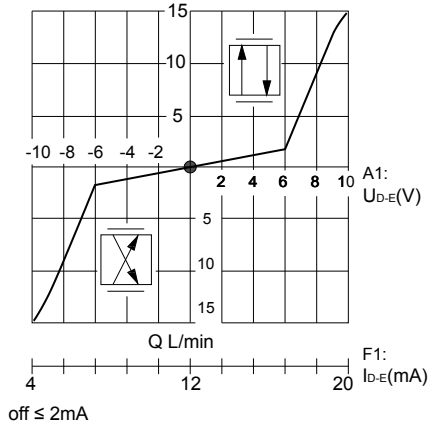
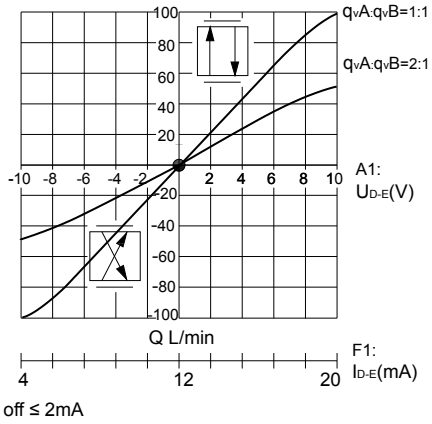
F1: $I_{D,E}$ 4...20mA ($R_{sh} = 200\Omega$)



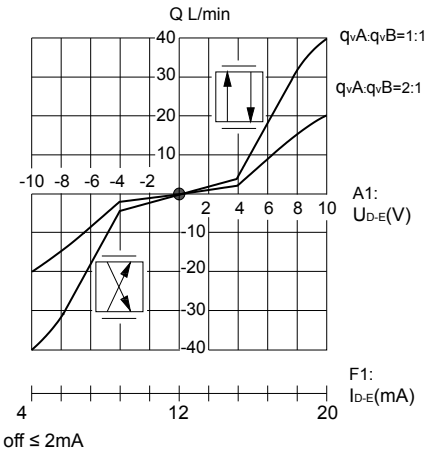
Characteristic curves (measured at p=100bar, with HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

Flow-signal function $q_v=f(U_{D-E}), q_v=f(I_{D-E})$

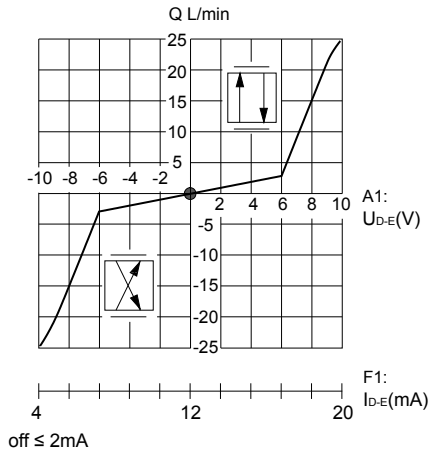
Linear characteristic curve (version "L")



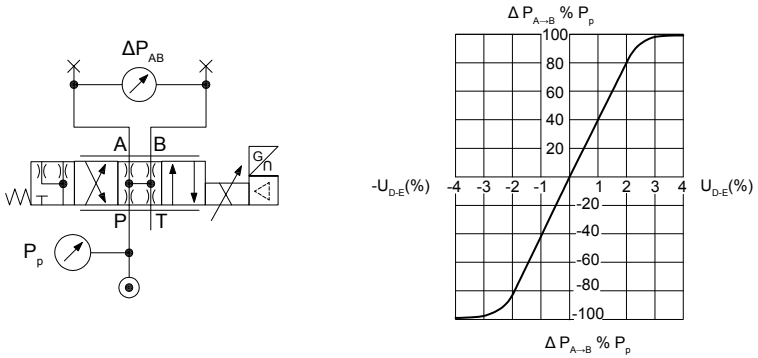
Inflected characteristic curve "P", inflection at 40%



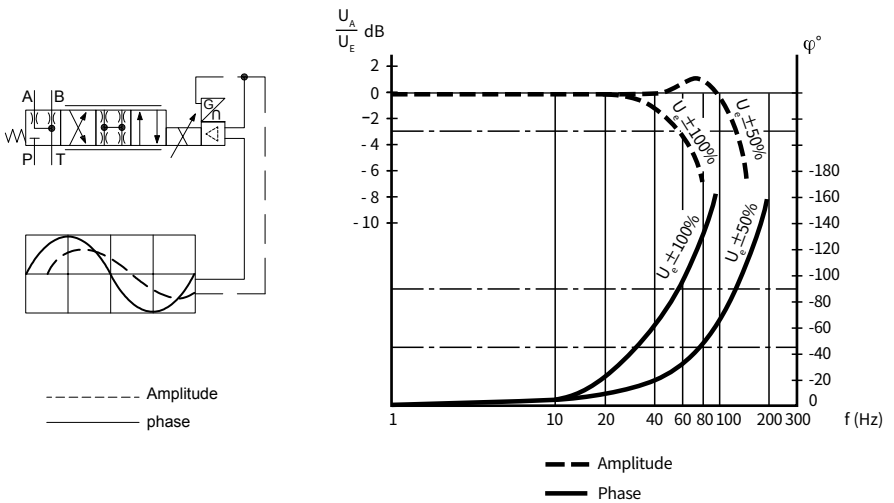
Inflected characteristic curve "P", inflection at 60%



Characteristic curves: Pressure amplification (measured at $p=100\text{bar}$, with HLP46, $\vartheta_{\text{oil}}=40^\circ\text{C} \pm 5^\circ\text{C}$)



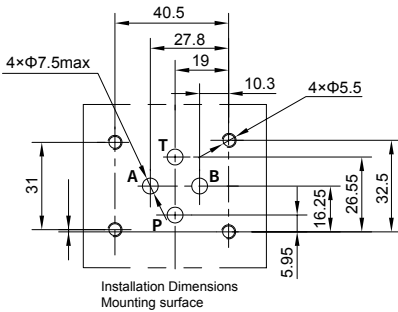
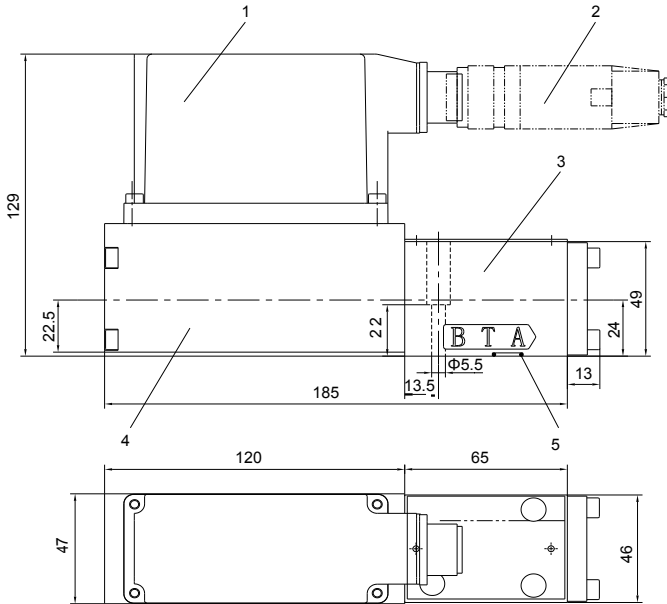
Characteristic curves: Bode diagram (measured at $p=100\text{bar}$, with HLP46, $\vartheta_{\text{oil}}=40^\circ\text{C} \pm 5^\circ\text{C}$)



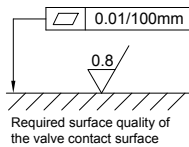
06

Unit dimensions

(Dimensions in mm)



- 1 Integrated electronics (OBE)
- 2 Mating connectors
- 3 Valve housing
- 4 Control solenoid with position transducer
- 5 O-ring 9.25×1.78 (for ports P, A, B, T)





4WRPEH10...type Servo Valve



4WRPEH10...2XJ...type

Size 10
Max. Working Pressure: 315 bar
Max. Flow: 100 L/min

Contents

Function and configuration	02
Ordering code	03
Symbols	03
Technical data	04
Electrical connection	05
Technical data for the cable	05
Integrated electronics	06-07
Characteristic curves	08-09
Unit dimensions	10

Features

- Directly actuated controlled directional valve, with control spool and sleeve in servo quality
- Single-side operated, 4/4 fail-safe position in deactivated state
- Electric position feedback and integrated electronics (OBE), calibrated in the factory
- Electric port 6P+PE Signal input of differential amplifier with interface A1: ± 10 V or interface F1: 4...20mA (Rsh=200 Ω)
- Subplate mounting, porting pattern to ISO 4401-05-04

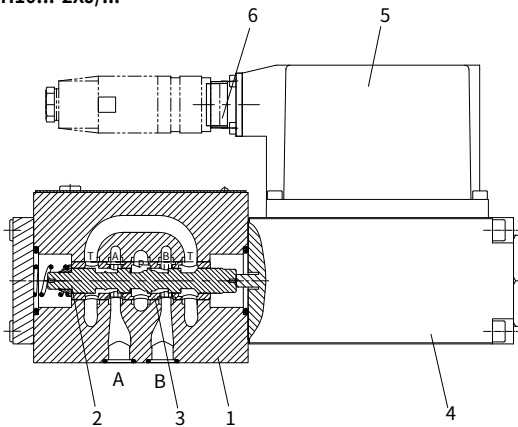
Function and configuration

4WRPEH type high-response valve is a pilot-operated directional control valve with electrical position feedback and integrated electronics (OBE). The valve consists of the housing (1), spool (2), sleeve (3), control solenoid with position transducer (4) and so on.

The specified command value is compared with the actual position value in the integrated electronics (OBE). In the event of a control deviation, the stroke solenoid is activated, which adjusts the control spool against the spring due to the change in the magnetic force.

Lifting/control cross-section is proportionally regulated to the command value. In case of a command value presetting of 0 V, the electronics adjusts the control spool against the spring to central position. In deactivated condition, the spring is untensioned to a maximum and the valve is in fail-safe position. With the electronics switched off, the valve moves immediately into the relevant safe basic position (fail-safe). The switch position P-B/A-T is passed through during this process, which can result in movements on the controlled component. It must be taken into account in system designs.

Type 4WRPEH10...-2XJ/...



Ordering code

4WRP	E	H	10	B	-2XJ/G24	/	V	*
------	---	---	----	---	----------	---	---	---

Directional control valve
direct operated

With integrated electronics =E

Control spool/sleeve =H

NG 10 =10

Spool symbols

AB
a o b
PT

	=C3,C5
	=C4,C1
	=C

Transitional symbols

With symbols C5 and C1:
P→A: qv B→T: qv/2
P→B: qv/2 A→T: qv

Installation side of the inductive
position transducer

AB
a o b
PT

=B (standard)

Further information
in plain text

V = FKM Seals
No code = NBR Seals

Interface of the
control electronics
A1= Command/
actual value ±10 V
F1 = Command/
actual value 4 to 20 mA

K31= Without plug-in connector
Z31= With plug-in connector

Supply voltage of the control electronics
G24 = +24V direct current

2XJ= Component series 20J to 29J

Flow characteristics
L= Linear
P= Inflected characteristic curve

Rated flow at 70 bar valve pressure difference

50=	50L/min
100=	100L/min

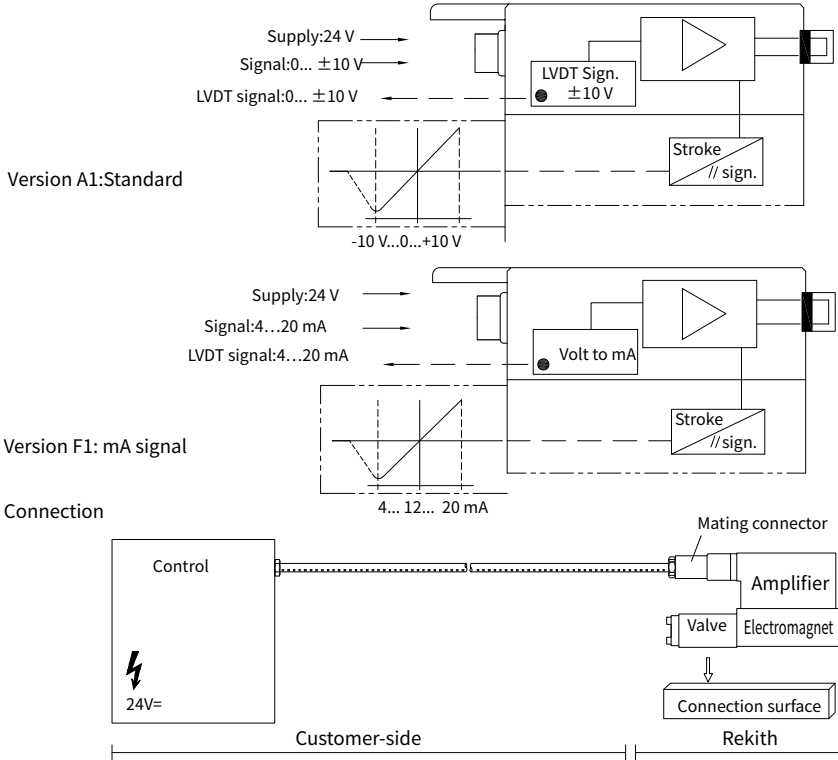
Symbols

	L: Linear	P: Inflection 40%						
<table style="border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px;"></td> <td style="padding: 2px;">C4,C1</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;"></td> <td style="padding: 2px;">C3,C5</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;"></td> <td style="padding: 2px;">C</td> </tr> </table>		C4,C1		C3,C5		C		
	C4,C1							
	C3,C5							
	C							

Technical data

General			
Design		Spool valve, directly operated, with steel sleeve	
Actuation		Proportional solenoid with position control, OBE	
Connection type		Plate port, porting pattern (ISO 4401-05-04-0-05)	
Installation position		Any	
Ambient temperature range		°C	-20...+50
Weight		Kg	7.1
Maximum vibration resistance (test condition)		Max. 25 g, space vibration test in all directions (24h)	
Hydraulic (measured with HLP 46, $\theta_{\text{oil}}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)			
Hydraulic fluid		Hydraulic oil according to DIN 51524...535	
Viscosity range	Recommended	mm ² /s	20...100
	Max. admissible	mm ² /s	10...800
Hydraulic fluid temperature range		°C	-20 to +70
Max. admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)		Class 18/16/13	
Rated flow ($\Delta p = 35$ bar per edge)		L/min	50 100
Maximum operating pressure		bar	Port P, A, B: 315
Maximum operating pressure		bar	Port T: 250
Leakage flow at 100 bar	Linear	cm ³ /min	<1200 <1500
	Nonlinear	cm ³ /min	<600 <600
Static/Dynamic			
Hysteresis		%	≤ 0.2
Actuating time for signal step 0 ... 100%		ms	25
Temperature drift		Zero shift < 1% at $\Delta T=40^{\circ}\text{C}$	
Zero compensation		Ex factory $\pm 1\%$	
Electric, control electronics integrated in the valve			
Relative duty cycle		%	100ED
Protection class		IP 65 (with mating connector mounted and locked)	
Connection		Mating connector 6P+PE, DIN 43563	
Supply voltage		24VDC _{nom}	
Terminal A		min. 21VDC / max. 40VDC	
Terminal B: 0V		Ripple max. 2 VDC	
Fuse protection, external		A _F	2.5
Input, version "A1"		Differential amplifier, R _i = 100 kΩ	
Terminal D (U _d)		0... ± 10V	
Terminal E		0V	
Input, version "F1"		Load, R _{sh} = 200 Ω	
Terminal D (I _{D,E})		4...12...20mA	
Terminal E (I _{D,E})		Current loop I _{D,E} return	
Test signal, version "A1"		LVDT	
Terminal F (U _{Test})		0... ± 10V	
Terminal C		Reference 0 V	
Test signal, version "F1"		LVDT	
Terminal F (I _{F,C})		4...20 mA output	
Terminal C (I _{F,C})		Current loop I _{F,C} feedback	

Electrical connection



Technical data for the cable

- Version:**
- Multi-core wire
 - Litz wire structure, extra fine wire according to VDE 0295, class 6
 - Protective earthing conductor, green-yellow
 - Cu shielding braid
- Number of wires:** - Determined by the valve type, connector type and signal configuration
- Line Ø:**
- 0.75 mm² to 20 m of length
 - 1.0 mm² to 40 m of length Outer Ø: - 9.4...11.8 mm
 - 12.7...13.5 mm

Note:
Supply voltage 24 V DC_{nom}

if the value falls below 18V DC= an internal fast switch-off is effected which can be compared with "Release OFF".

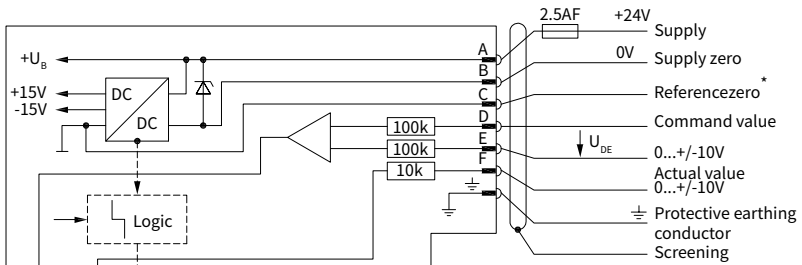
Additionally for version F1:
I_{D,E} ≥ 3mA - valve is active
I_{D,E} ≤ 2mA - valve is deactivated.

Electric signals taken out via control electronics may not be used for the switch-off of safety-relevant machine functions!

Integrated electronics

Block diagram/pin assignment

Version A1: $U_{D-E} 0... \pm 10V$

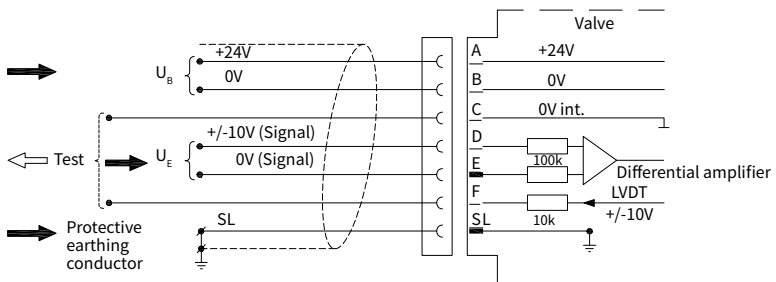


* Do not connect with supply zero !

Signal	4/4 controlled directional valve
U_{DE} 0...+10V	
U_{DE} 0V	
U_{DE} 0...-10V	

Pin assignment 6P+PE

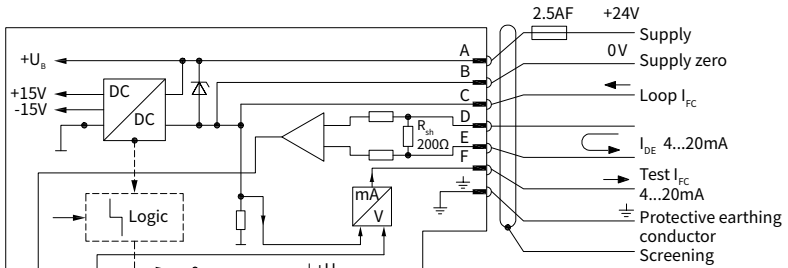
Version A1: $U_{D-E} 0... \pm 10V$



Integrated electronics

Block diagram/Pinout

Version F1: I_{D-E} 4...20mA

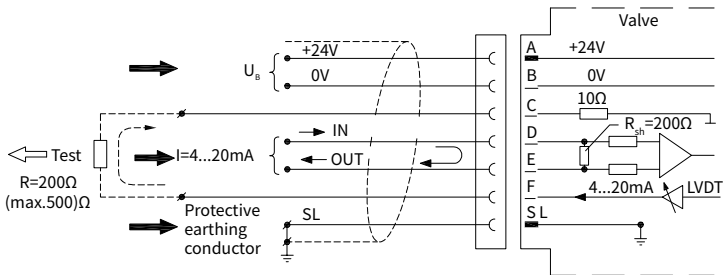


Signal	4/4 controlled directional valve
I_{D-E} 12...20mA	
I_{D-E} 12mA	
I_{D-E} 4...12mA	

$I_{D-E} \leq 2\text{mA}$, Valve inactive

Pin assignment 6P+PE

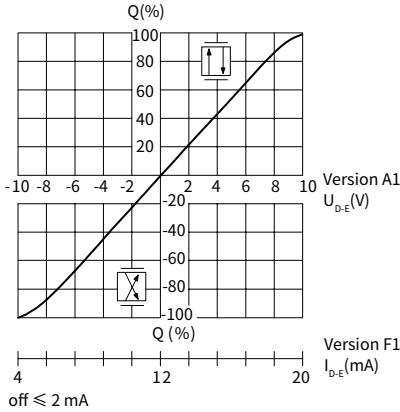
Version F1: I_{D-E} 4...20mA



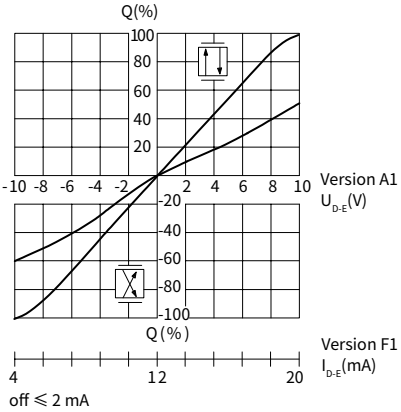
Characteristic curves (measured with HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

Flow-signal function $Q=f(U_{D-E}), Q=f(I_{D-E})$

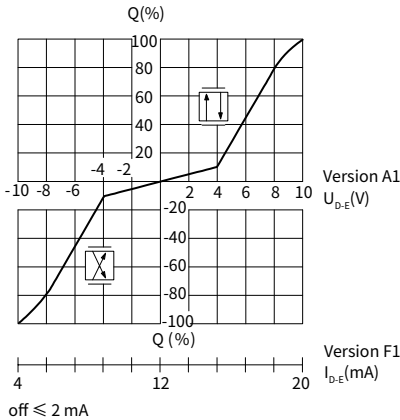
Linear characteristic curve (version "L", 1 : 1)



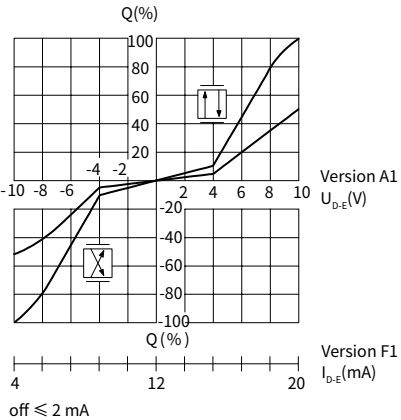
Linear characteristic curve (version "L", 2 : 1)



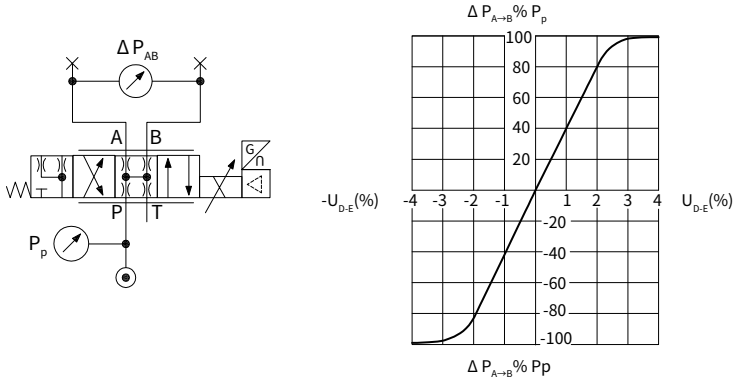
Inflected characteristic curve "P",
inflection at 40% , 1 : 1



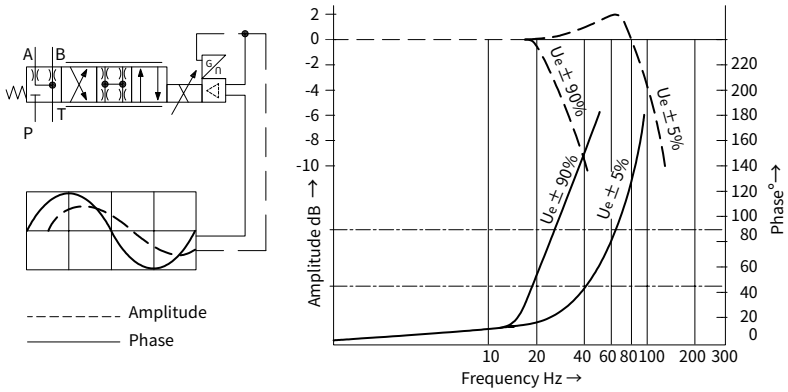
Inflected characteristic curve "P",
inflection at 40% , 2 : 1



Characteristic curves: Pressure amplification (measured with HLP46, $\vartheta_{oil} = 40^\circ\text{C} \pm 5^\circ\text{C}$)



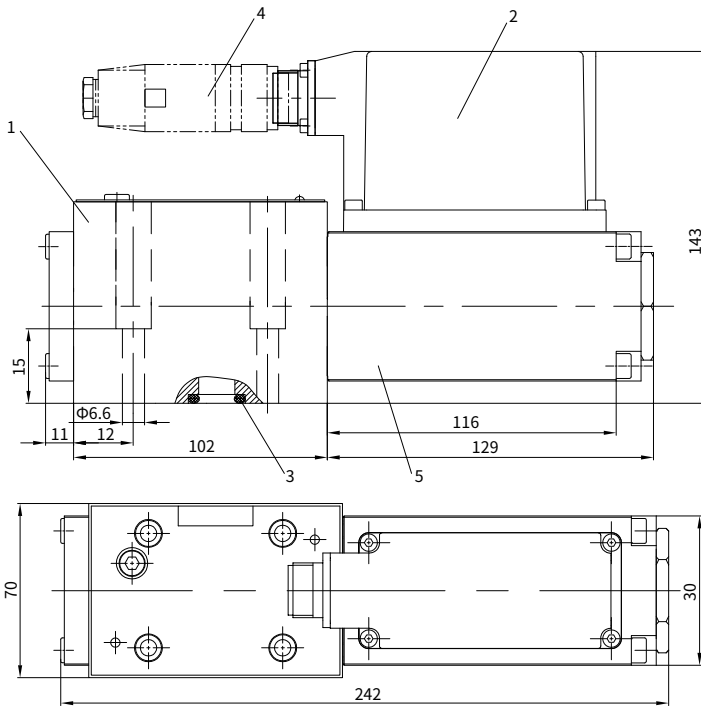
Characteristic curves: Bode diagram



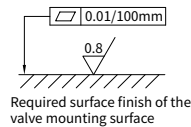
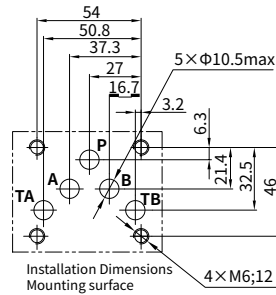
06

Unit dimensions

(nominal dimensions in mm)



- 1 Valve housing
- 2 Integrated electronics
- 3 Identical seal rings for ports A, B, P and T (O-ring 12×2)
- 4 Plug-in connector
- 5 Proportional solenoid with inductive position transducer





4WRZ(E)...type Electro-Hydraulic Proportional Directional Valve



4WRZ(E) and 4WRH...type

Size 10, 16, 25, 32

Max. Working Pressure: 315 bar

Max. Flow: 1600 L/min

Contents

Function and configuration	02-03
Ordering code	04
Symbols	05
Technical data	06
Electrical connections, plug-in connectors	07
Integrated electronics	07
Characteristic curves	08-11
Unit dimensions	12-15

Features

- Pilot operated proportional directional valve to control the direction and magnitude of a flow
- Operation is by proportional solenoids with central thread and detachable coil
- For subplate mounting:
 - Porting pattern to ISO 4401 and DIN 2430
- Spring centered control spool
- 4WRZE: Integrated electronics (OBE) with voltage input or current input (A1 resp. F1)
- 4WRZ: associated control electronics

Function and configuration

Pilot valve type 3DREP 6...

The pilot valve is a proportional solenoid operated 3-way pressure reducing valve. It is used to convert an electrical input signal into a proportional pressure output signal and is used on all 4WRZ...valves.

The proportional solenoids are controllable DC wet pin solenoid with central thread and detachable coil. The Solenoid is optionally controlled by external electronics (type WRZ...) or integrated electronics (type WRZE...).

The valve consists of valve housing(1), control spool(2) with pressure measuring spools(3 and 4), solenoids(5 and 6) with central thread, optionally with integrated electronics(8).

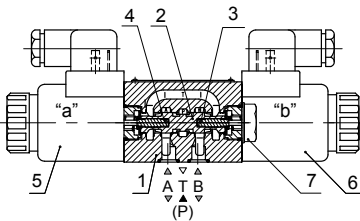
When the solenoids (5 and 6) are in the deenergized condition, the control spool (2) is held by compression springs in the central position.

Direct operation of the control spool (2) by energizing a proportional solenoid. Pressure measuring spool (3) and control spool (2) are shifted to the left in proportion to the electrical input signal; Connection from P to B and A to T through the orifice-like cross sections with progressive flow characteristics; De-energization of the solenoid (5), control spool (2) is returned to the central position by the compression spring, In the central position, ports A and B are open to T, i.e. the hydraulic fluid can flow to the tank without any restrictions.

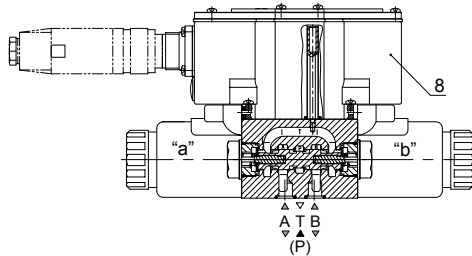
An optional manual override can be used to move the control spool (2) without solenoid energization.

Pilot valve with two spool positions type 3DREP 6...B...

In principle, the function of this valve version corresponds to that of the valve with three spool positions. However, this 2-position valve is provided with solenoid "a" (5) only. Instead of the 2nd proportional solenoid, a plug screw (7) is fitted.



Type 3DREP6...



Type 3DREPE6...

Function and configuration

Pilot operated proportional directional valves Type 4WRZ...

4WRZ type valve is a pilot operated 4-way directional valves with operation by proportional solenoids. They control the direction and magnitude of a flow.

The valve consists of pilot valve (9) with proportional solenoids (5 and 6), control spool (2) and orifice plugs (15), main valve (10) with main spool (11) and centering spring (12).

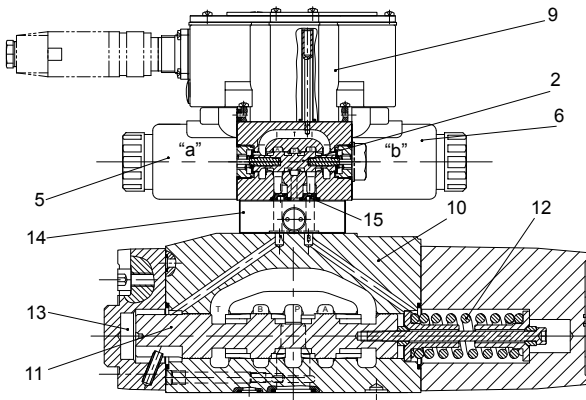
When the solenoids (5 and 6) are de-energised, the main spool (11) is held by centering springs (12) in the central position.

Operation of the main spool (11) through the pilot valve(9), the main spool is moved proportionally, depending on the spool position, flow from P to A and B to T(R) or P to B and A to T(R). e.g. by energising solenoid "b" (6), the control spool (2) is shifted to the right, pilot oil is fed through the pilot valve (9) into the pressure chamber (13) and moves the main spool (11) in proportion to the electrical input signal; Connection from P to A and B to T through orifice-like cross-sections with progressive flow characteristics.

De-energization of the solenoid (6), the control spool (2) and main spool (11) are returned to the central position.

Pilot oil supply to the pilot valve internally via port P or externally via port X.

With the help of an optional manual override the control spool (2) can be moved without requiring the energization of the solenoid.

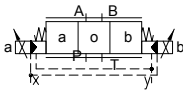


Type 4WRZE...

Symbols(simplified)

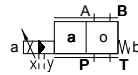
With electro-hydraulic operation and for external electronics

Type 4WRZ...-7XJ/...

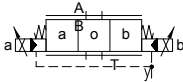


X=external
Y=external

Type 4WRZ...A-7XJ/...

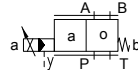


Type 4WRZ...-7XJ/...E...

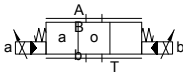


X=external
Y=external

Type 4WRZ...A-7XJ/...E...

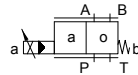


Type 4WRZ...-7XJ/...ET...

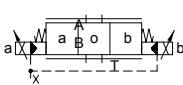


X=external
Y=external

Type 4WRZ...A-7XJ/...ET...

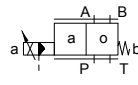


Type 4WRZ...-7XJ/...T...



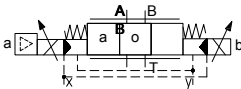
X=external
Y=external

Type 4WRZ...A-7XJ/...T...



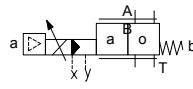
With electro-hydraulic operation and for integrated electronics

Type 4WRZE...-7XJ/...

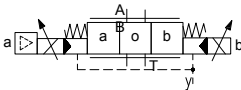


X=external
Y=external

Type 4WRZE...A-7XJ/...

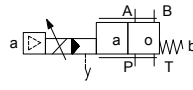


Type 4WRZE...-7XJ/...E...

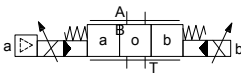


X=external
Y=external

Type 4WRZE...A-7XJ/...E...

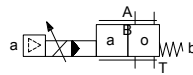


Type 4WRZE...-7XJ/...ET

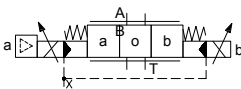


X=external
Y=external

Type 4WRZE...A-7XJ/...ET...

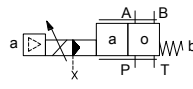


Type 4WRZE...-7XJ/...T...



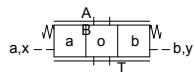
X=external
Y=external

Type 4WRZE...A-7XJ/...T...



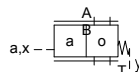
With hydraulic operation

Type 4WRH...-7XJ/...



X=external
Y=external

Type 4WRH...A-7XJ/...



Technical data

General				
Valve type		WRZ		WRZE
Installation		optional, preferably horizontal		
Storage temperature range		°C	-20 to +80	
Ambient temperature range		°C	-20 to +70	-20 to +50
Weight	NG10	kg	7.8	8.0
	NG16	kg	13.4	13.6
	NG25	kg	18.2	18.4
	NG32	kg	42.2	42.4

Hydraulic (measured with HLPAG.p=100bar : 40 °C ± 5 °C)							
Nominal size				10	16	25	32
Operating pressure	-Pilot valve	External pilot oil supply	bar	30 to 100 bar			
		Internal pilot oil supply	bar	100 to 350 with "D3" only			
	-Main valve		bar	up to 315	up to 350	up to 350	up to 350
Return flow pressure	-Port T (port R) (external pilot oil drain)		bar	up to 315	up to 250	up to 250	up to 150
	-Port T (internal pilot oil drain)		bar	up to 30	up to 30	up to 30	up to 30
	-Port Y		bar	up to 30	up to 30	up to 30	up to 30
Pilot oil volume input signal 0- 100 %			cm ³	1.7	4.6	10	26.5
Pilot oil flow in port X and Y with a stepped input signal 0- 100 %			L/min	3.5	5.5	7	15.9
Flow of the main valve			L/min	up to 170	up to 460	up to 870	up to 1600
Hydraulic fluid				Mineral oil (HL, HLP) to DIN 51524 Further fluids on enquiry!			
Hydraulic fluid temperature range			°C	-20 to +80 (preferably +40 to +50)			
Viscosity range			mm ² /s	20 to 380 (preferably 30 to 46)			
Degree of contamination	Maximum permissible degree of contamination of the pressure fluid is to NAS 1638 or ISO 4406(c)			A filter with a minimum retention rate of $\beta_x \geq 75$ is recommended			
	- Pilot valve	NAS 1638 class 7		x=5			
	- Main valve	NAS 1638 class 9		x=15			
Hysteresis			%	≤ 6			

Electrical				
Valve type		WRZ		WRZE
Type of protection of the valve to EN 60529		IP65 with cable socket mounted and locked		
Voltage type		DC		
Command value overlap		%	15	
Max. current		A	1.5	2.5
Solenoid coil resistance	Cold value at 20°C	Ω	4.8	2
	Max. warm value	Ω	7.2	3
Duty		%	100	
Coil temperature		°C	up to 150	
Valve protection to EN 60529		IP65 with mounted and fixed plug-in connector		

Control electronics				
External amplifier for type WRZ		VT-VSPA2-1-2XJ/...		
Command value signal	-Voltage input "A1"	V	± 10	
	-Current input "F1"	mA	4 to 20	

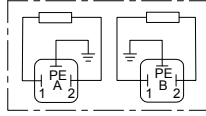
Electrical connections, plug-in connectors

nominal dimensions in mm

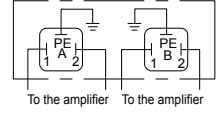
• For type 4WRZ...7XJ (without integrated electronics)

Connections on the component plug

Plug-in connector to DIN EN 175301-803 or ISO 4400



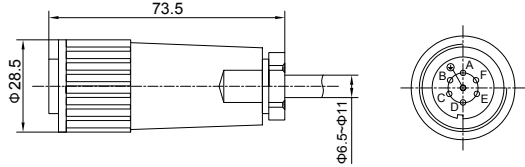
Connections on the plug-in connector



• For type 4WRZE ...7XJ (with integrated electronics (OBE))

For pin allocation also see block circuit diagram.

Plug-in connector to DIN EN 175201-804



• Integrated control electronics for type 4WRZE ...7XJ

Component plug allocation

	Contact	Interface A1 signal	Interface F1 signal
Supply voltage	A	24 VDC (U(t)=19V to 35V)	
	B	GND	
	C	n.c. ¹⁾	
Differential amplifier input	D	$\pm 10V$, $R_e > 50K\Omega$	4 to 20mA, $R_e > 100\Omega$
	E	reference potential command value	
	F	n.c. ¹⁾	

Connection cable:

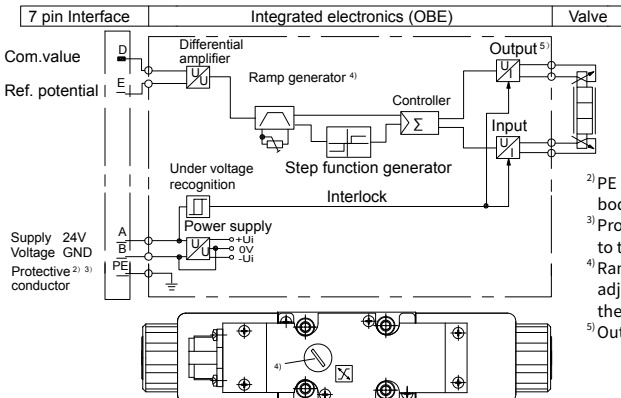
Recommended:
 – up to 25 m cable length type LiYCY 5 × 0.75 mm²;
 – up to 50 m cable length type LiYCY 5 × 1.0 mm².
 For outside diameter see plug-in connector sketch.
 Only connect screen to PE on the supply line.

¹⁾ Contacts C and F must not be connected!

Command value:

A positive command value 0 to +10V (or 12 to 20 mA) at D and the reference potential at E results in a flow from P to A and B to T. A negative command value 0 to -10V (or 12 to 4 mA) at D and the reference potential at E results in a flow from P to B and A to T. For a valve with 1 solenoid on side a (e.g. spool variants EA and WA) a positive command value at D and the reference potential at E results in a flow from P to B and A to T.

• Integrated electronics (OBE) for type 4WRZE...7XJ



²⁾ PE is connected to the cooling body and the valve housing!

³⁾ Protective conductor screwed to the valve housing and cover.

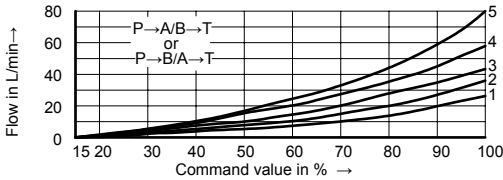
⁴⁾ Ramp can be externally adjusted from 0 to 2.5s, the same applies for T_{up} and T_{down}.

⁵⁾ Output stages current regulated.

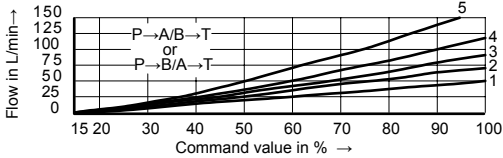
Characteristic curves (measured with spools "E, W6-, EA, W6A" and HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, $P=100\text{bar}$)

NG 10

25L/min nominal flow at a 10 bar valve pressure differential



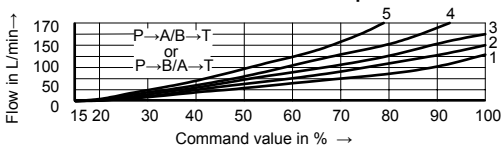
50L/min nominal flow at a 10 bar valve pressure differential



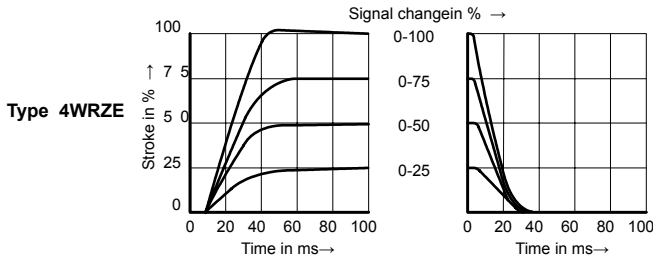
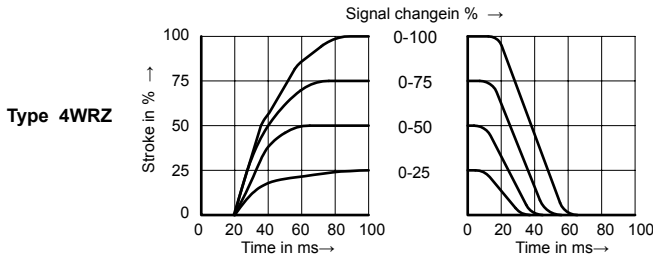
- 1 $\Delta p=10\text{bar}$ constant
- 2 $\Delta p=20\text{bar}$ constant
- 3 $\Delta p=30\text{bar}$ constant
- 4 $\Delta p=50\text{bar}$ constant
- 5 $\Delta p=100\text{bar}$ constant

Δp =Valve pressure differential
(inlet pressure p_p minus load pressure p_l minus return pressure p_r)

85L/min nominal flow at a 10 bar valve pressure differential



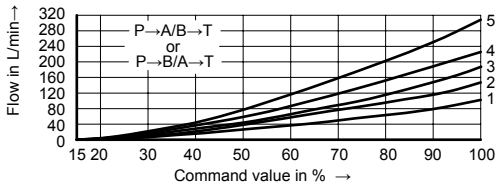
Transient function with a stepped form of electrical input signal $P_{st} = 50\text{bar}$



Characteristic curves (measured with spools "E, W6-, EA, W6A" and HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, $P=100\text{bar}$)

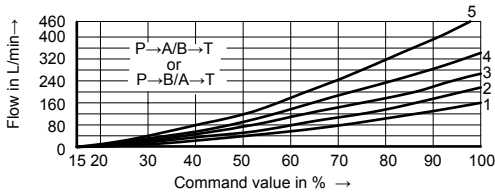
NG 16

100L/min nominal flow at a 10 bar valve pressure differential



- 1 $\Delta p=10\text{bar}$ constant
- 2 $\Delta p=20\text{bar}$ constant
- 3 $\Delta p=30\text{bar}$ constant
- 4 $\Delta p=50\text{bar}$ constant
- 5 $\Delta p=100\text{bar}$ constant

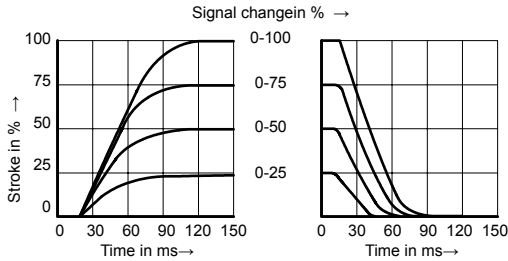
150L/min nominal flow at a 10 bar valve pressure differential



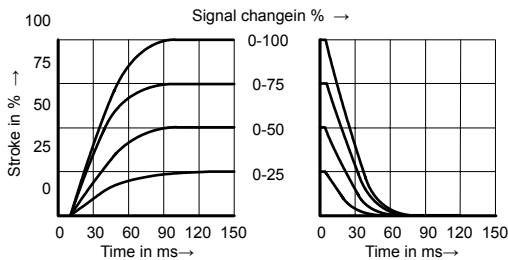
Δp =Valve pressure differential
(inlet pressure p_p minus load pressure p_L minus return pressure p_r)

Transient function with a stepped form of electrical input signal $P_{st}=50\text{bar}$

Type 4WRZ



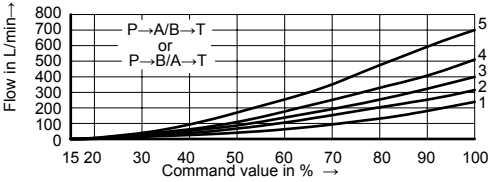
Type 4WRZE



Characteristic curves (measured with spools "E, W6-, EA, W6A" and HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, $P=100\text{bar}$)

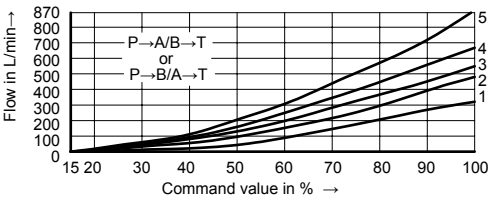
NG 25

220L/min nominal flow at a 10 bar valve pressure differential



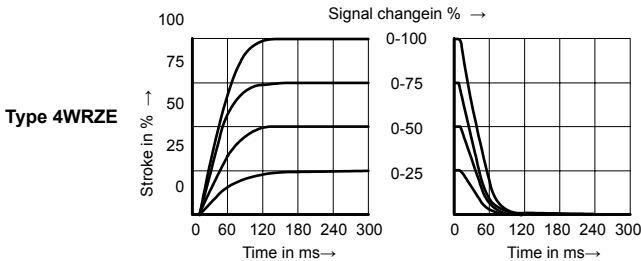
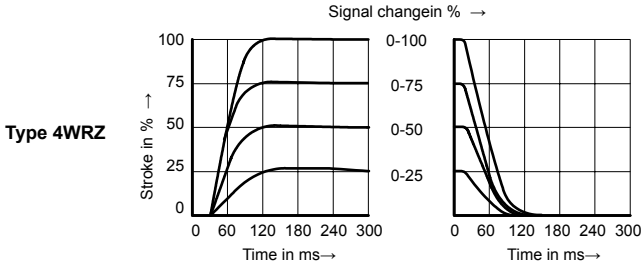
- 1 $\Delta p=10\text{bar}$ constant
- 2 $\Delta p=20\text{bar}$ constant
- 3 $\Delta p=30\text{bar}$ constant
- 4 $\Delta p=50\text{bar}$ constant
- 5 $\Delta p=100\text{bar}$ constant

325L/min nominal flow at a 10 bar valve pressure differential



Δp =Valve pressure differential
(inlet pressure p_p minus load pressure p_l minus return pressure p_r)

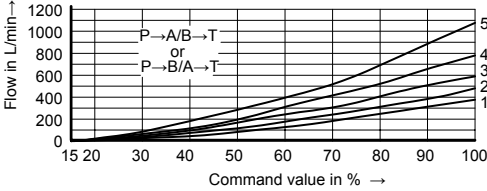
Transient function with a stepped form of electrical input signal $P_{st} = 50\text{bar}$



Characteristic curves (measured with spools "E, W6-, EA, W6A" and HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, $P=100\text{bar}$)

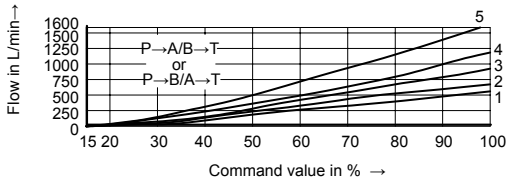
NG 32

360L/min nominal flow at a 10 bar valve pressure differential



- 1 $\Delta p=10\text{bar}$ constant
- 2 $\Delta p=20\text{bar}$ constant
- 3 $\Delta p=30\text{bar}$ constant
- 4 $\Delta p=50\text{bar}$ constant
- 5 $\Delta p=100\text{bar}$ constant

520L/min nominal flow at a 10 bar valve pressure differential

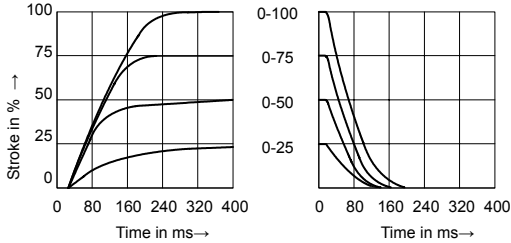


Δp =Valve pressure differential (inlet pressure p_p minus load pressure p_L minus return pressure p_r)

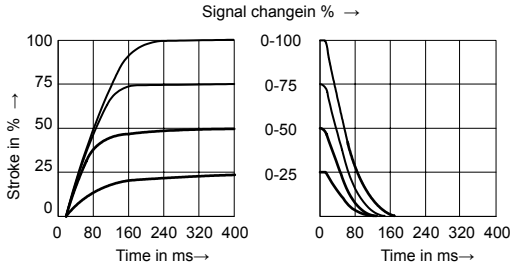
Transient function with a stepped form of electrical input signal $P_{st} = 50\text{bar}$

Signal changein % \rightarrow

Type 4WRZ



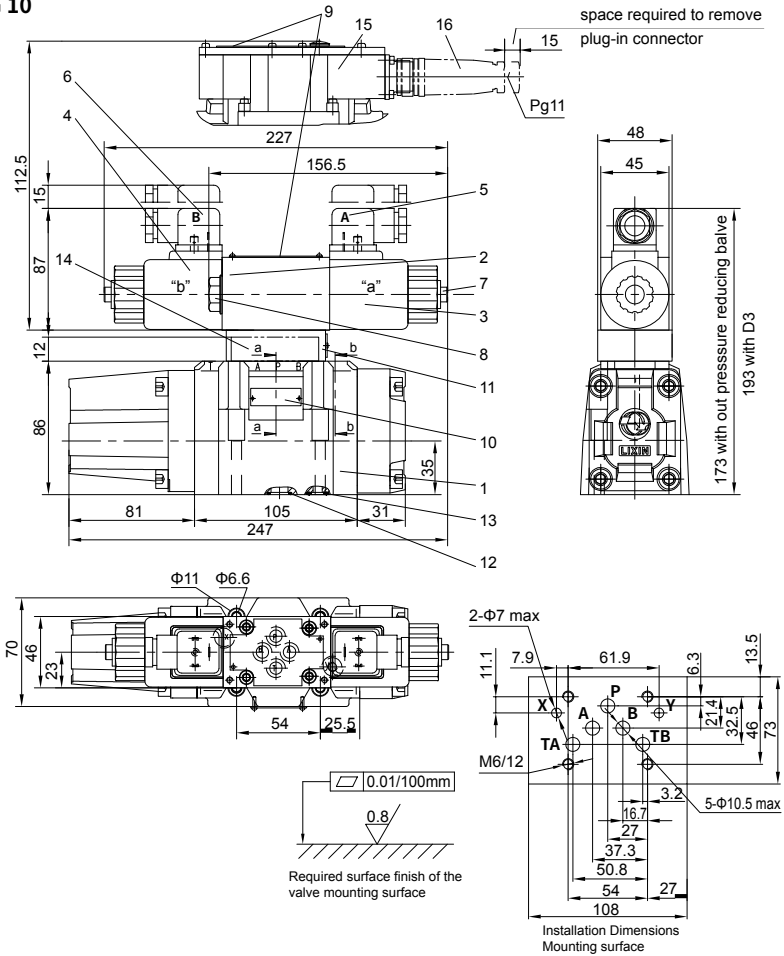
Type 4WRZE



Unit dimensions

(Dimensions in mm)

NG 10

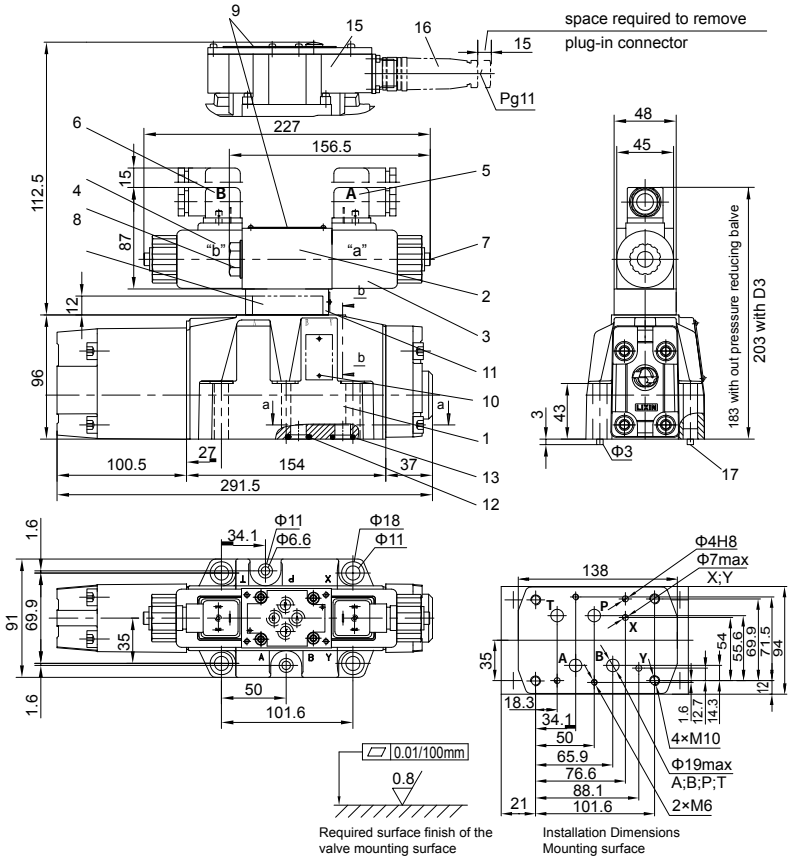


- | | |
|---|--|
| <ul style="list-style-type: none"> 1 Main valve 2 Pilot valve 3 Proportional solenoid "a" 4 Proportional solenoid "b" 5 Cable socket "A" 6 Cable socket "B" 7 Concealed manual override "N" 8 Cover for valves with one solenoid 9 Nameplate for pilot valve 10 Name plate for main valve | <ul style="list-style-type: none"> 11 Pressure reducing valve "D3" 12 Identical seal rings for ports A, B, P and T)
(R-ring $13 \times 1.6 \times 2$ or O-ring 12×2) 13 Identical seal rings for ports X and Y)
(R-ring $11.18 \times 1.6 \times 1.78$ or O-ring 10.82×1.78) 14 Interconnection plate (type 4WRH...) 15 Integrated electronics (OBE) 16 Plug-in connector to DIN EN 175201-804 |
|---|--|

Unit dimensions

(Dimensions in mm)

NG 16



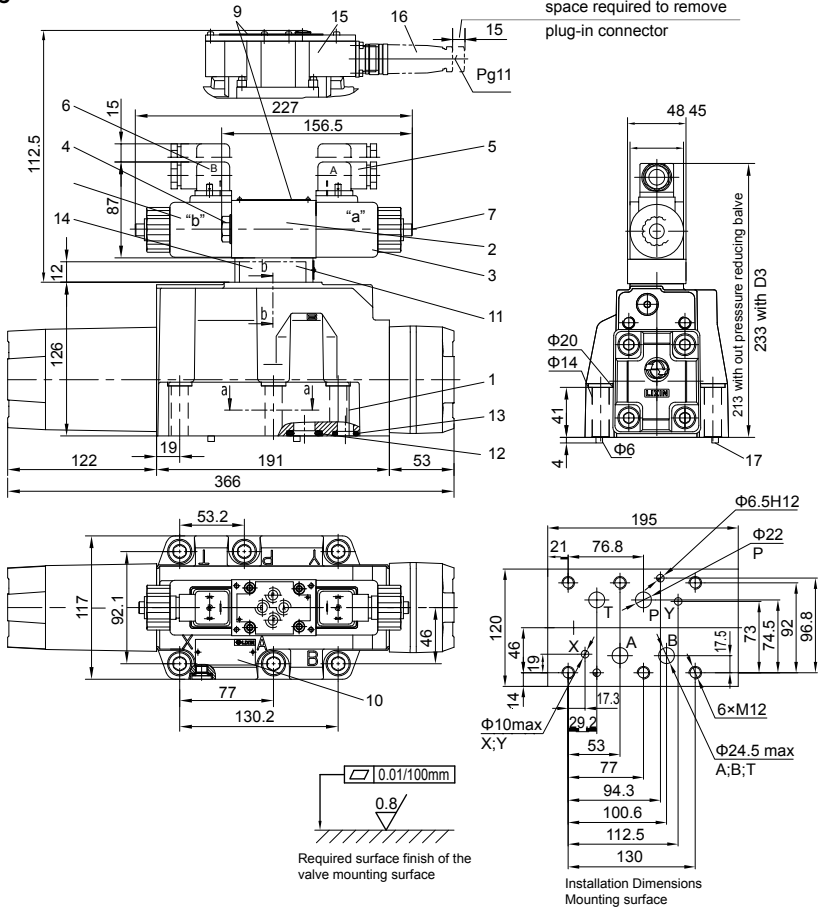
- 1 Main valve
- 2 Pilot valve
- 3 Proportional solenoid "a"
- 4 Proportional solenoid "b"
- 5 Cable socket "A"
- 6 Cable socket "B"
- 7 Concealed manual override "N"
- 8 Cover for valves with one solenoid
- 9 Nameplate for pilot valve
- 10 Nameplate for main valve

- 11 Pressure reducing valve "D3"
- 12 Identical seal rings for ports A, B, P and T)
(R-ring 22.53×2.3×2.62 or O-ring 22×2.5)
- 13 Identical seal rings for ports X and Y)
(R-ring 12×2×2 or O-ring 10×2)
- 14 Interconnection plate (type 4WRH...)
- 15 Integrated electronics (OBE)
- 16 Plug-in connector to DIN EN 175201-804
- 17 Locating pin

Unit dimensions

(Dimensions in mm)

NG 25

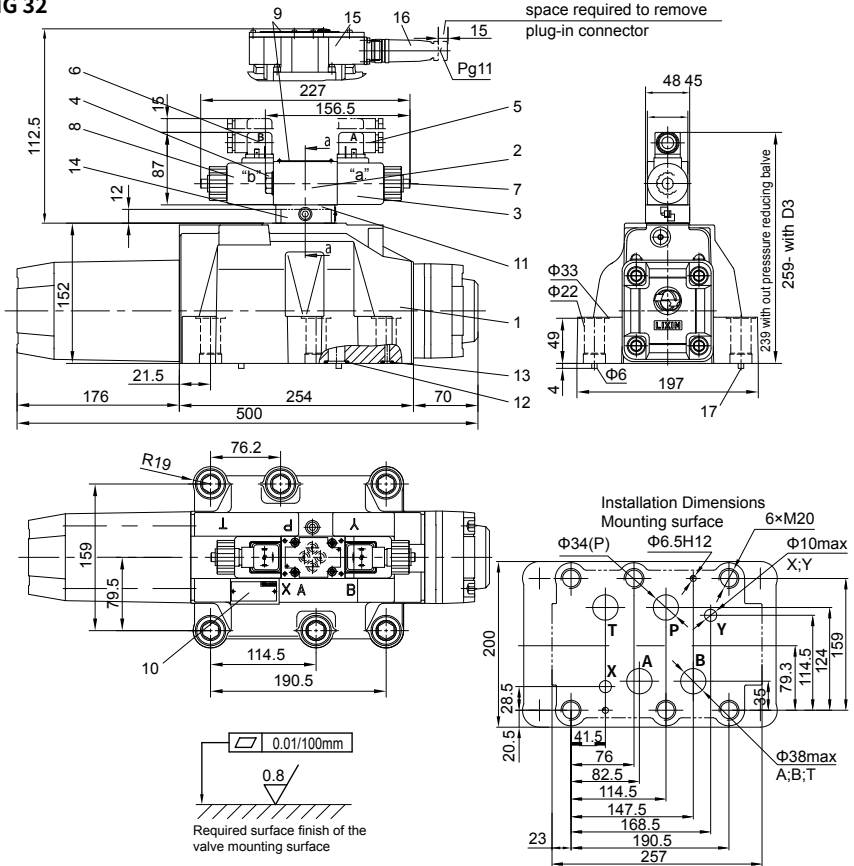


- | | |
|--|---|
| <ul style="list-style-type: none"> 1 Main valve 2 Pilot valve 3 Proportional solenoid "a" 4 Proportional solenoid "b" 5 Cable socket "A" 6 Cable socket "B" 7 Concealed manual override "N" 8 Cover for valves with one solenoid 9 Nameplate for pilot valve 10 Nameplate for main valve | <ul style="list-style-type: none"> 11 Pressure reducing valve "D3" 12 Identical seal rings for ports A, B, P and T (R-ring 27.8×2.6×3 or O-ring 27×3) 13 Identical seal rings for ports X and Y (R-ring 19×3×3 or O-ring 19×3) 14 Interconnection plate (type 4WRH...) 15 Integrated electronics (OBE) 16 Plug-in connector to DIN EN 175201-804 17 Locating pin |
|--|---|

Unit dimensions

(Dimensions in mm)

NG 32



- 1 Main valve
- 2 Pilot valve
- 3 Proportional solenoid "a"
- 4 Proportional solenoid "b"
- 5 Cable socket "A"
- 6 Cable socket "B"
- 7 Concealed manual override "N"
- 8 Cover for valves with one solenoid
- 9 Nameplate for pilot valve
- 10 Nameplate for main valve

- 11 Pressure reducing valve "D3"
- 12 Identical seal rings for ports A, B, P and T
(R-ring 42.5×3×3 or O-ring 42×3)
- 13 Identical seal rings for ports X and Y
(R-ring 19×3×3 or O-ring 19×3)
- 14 Interconnection plate (type 4WRH...)
- 15 Integrated electronics (OBE)
- 16 Plug-in connector to DIN EN 175201-804
- 17 Locating pin



DA/DAW...type Pilot Operated Unloading Relief Valve



DA/DAW...5XJ...type

Sizes 10, 25, 32
Max. Working Pressure: 315 bar
Max. Flow: 240 L/min

Contents

Function and configuration	02
Symbols	03
Sample circuit	03
Specification	04
Technical data	05
Characteristic curves	06
Unit dimensions	07-09
Sub-plate	10

Features

- Sub-plate mounting
- Porting pattern conforms to DIN 24 340, form D, and ISO 5781
- Manifold plate mounting
- 4 pressure ratings
- 4 adjustment elements:
 - Rotary knob
 - Adjustable bolt with protective cap
 - Lockable rotary knob with scale
 - Rotary knob with scale
- Solenoid unloading valve

Function and configuration

DA/DAW type valve is a pilot operated pressure shut-off valves. It is used to charge fluid to accumulator in system, or to unload the low pressure pump in high/low pressure pump system.

Pressure shut-off valves basically consist of the main valve (1) with the spool assembly (3), pilot valve (2) with pressure adjustment element and check valve (4). In valves size 10, the check valve (4.1) is built into the main valve (1). In valve sizes 25 and 32, the check valve (4.2) is built into a separate plate installed under the main valve (1).

Pressure shut-off valve type DA

· Diverting pump flow from P to A to P to T.

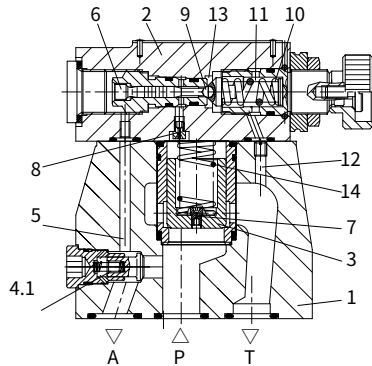
The pump delivers flow via check valve (4) into the hydraulic system (P to A). Pressure in port A acts on the pilot control spool (6) via pilot line (5). At the same time, pressure in port P passes to the spring loaded side of the main spool (3) and ball (9) in the pilot valve (2) via orifices (7) and (8). As soon as the setting pressure in the hydraulic system is reached, the ball (9) lifts off against spring (10). Pressure fluid now flows via orifices (7) and (8) into spring chamber (11). The fluid returns to tank either internally via control line (12) in valve type DA..5XJ/... or externally via control line (13) in valve type DA..5XJ/... Due to orifices (7) and (8), pressure drop is now presented at the main spool (3). The main spool (3) now lifts off its seat and opens the connection from P to T. The check valve (4) closes the connection from A to P. The ball valve (9) is kept opening by the system pressure via pilot spool (6).

· Diverting pump flow from P to T to P to A.

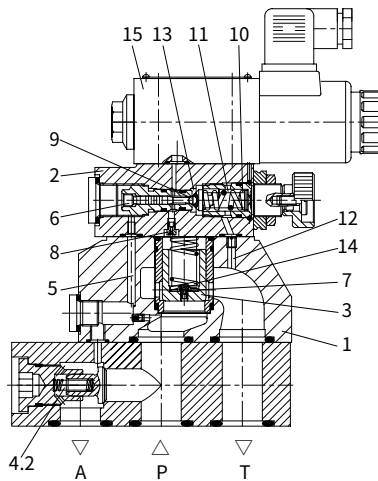
The area of the pilot spool (6) is 10 % or optionally 17 % greater than the effective area of the ball (9). The effective force on the pilot spool (6) is, therefore, 10 or 17 % greater than the effective force on the ball (9). When the actuator pressure falls to the cut-off pressure which corresponds to the switching pressure differential, spring (10) pushes ball (9) on to its seat. Pressure is then built up on the spring loaded side of the main spool (3). In conjunction with spring (14), the main spool (3) is closed the connection from P to T is isolated. The pump flow passes again via the check valve (4) into the hydraulic system (P to A).

Pressure shut-off valve type DAW

The function of this valve is basically the same as the DA valve. A solenoid directional valve (15) can, however switch the setting cut-off pressure of the pilot valve either from P to A or from P to T.



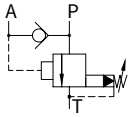
Type:DA10-1-5XJ/...



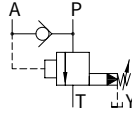
Type:DAW20-1-5XJ/...

Symbols

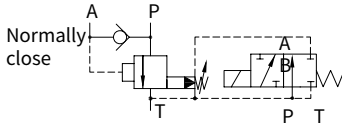
Type:DA...-5XJ/...-



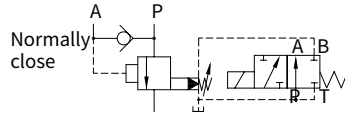
Type:DA...-5XJ/...-.Y..



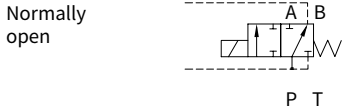
Type:DAW...A...-5XJ/...



Type:DAW...A...-5XJ/...Y..



Type:DAW...B...-5XJ/...

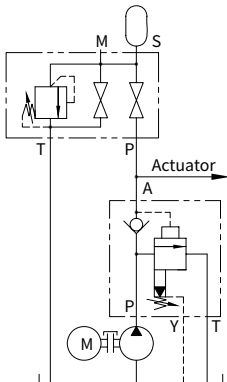


Type:DAW...B...-5XJ/...Y..

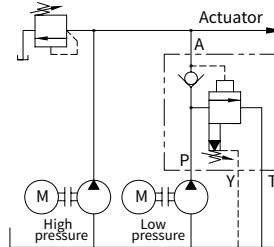


Sample circuit

Hydraulic system with accumulator



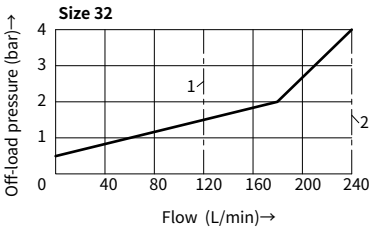
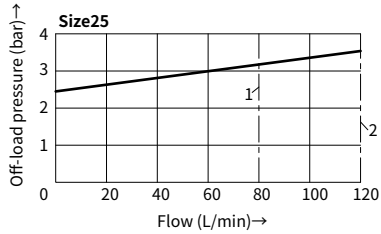
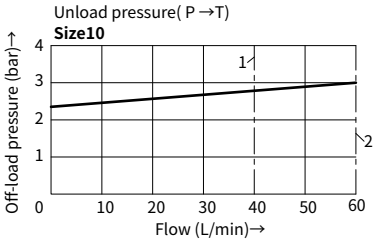
Hydraulic system with high and low pressure pumps



Technical data

Fluid		Mineral oil suitable for NBR and FKM seal			
		Phosphate ester for FKM seal			
Fluid temperature range		°C	-30 to +80 (NBR seal)		
			-20 to +80 (FKM seal)		
Viscosity range		mm ² /s	10 to 800		
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406			
Max. operating pressure	Port A	bar	315		
Max. setting pressure		bar	50, 100, 200, 315		
Size			10	25	32
Max. flow-rate	version 10%	L/min	40	80	120
	version 17%		60	120	240
Solenoid technical data		Refer to version WE6, normally close chooses 3WE6A9, normally open choose 3WE6B9			
Installation		Optional			
Size			10	25	32
weight	DA	kg	Approx.3.8	Approx.7.9	Approx.12.3
	DAW	kg	Approx.5.3	Approx.9.4	Approx.13.8
	DAC	kg	Approx.1.2 (If version DAWC, add 1.5 kg)		
	DAC30	kg	Approx.1.5 (If version DAWC30, add 1.5 kg)		

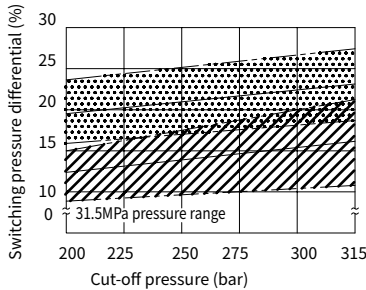
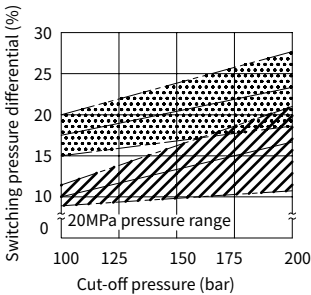
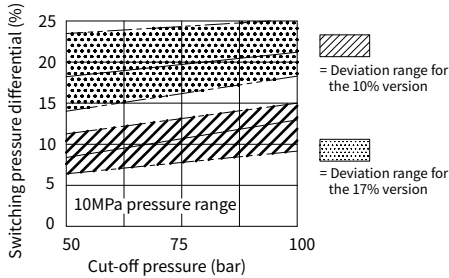
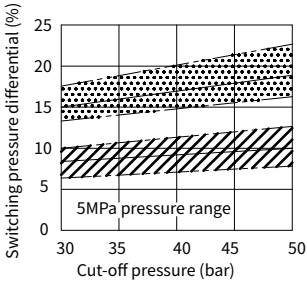
Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)



- 1 Used for 10% switching pressure differential
- 2 Used for 17% switching pressure differential

These curves are valid for an outlet pressure (T) = zero over the full flow range.

Switching pressure differential based on setting value (P → A)

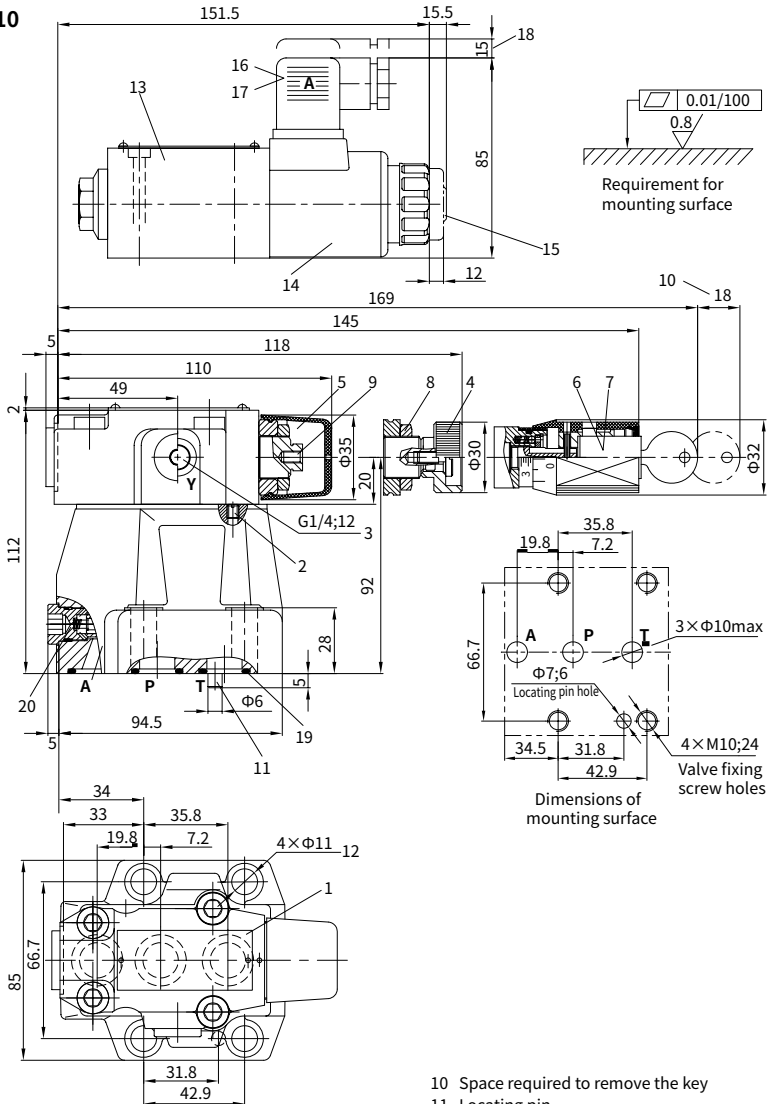


= Deviation range for the 10% version
 = Deviation range for the 17% version

Unit dimensions

(Dimensions in mm)

Size 10



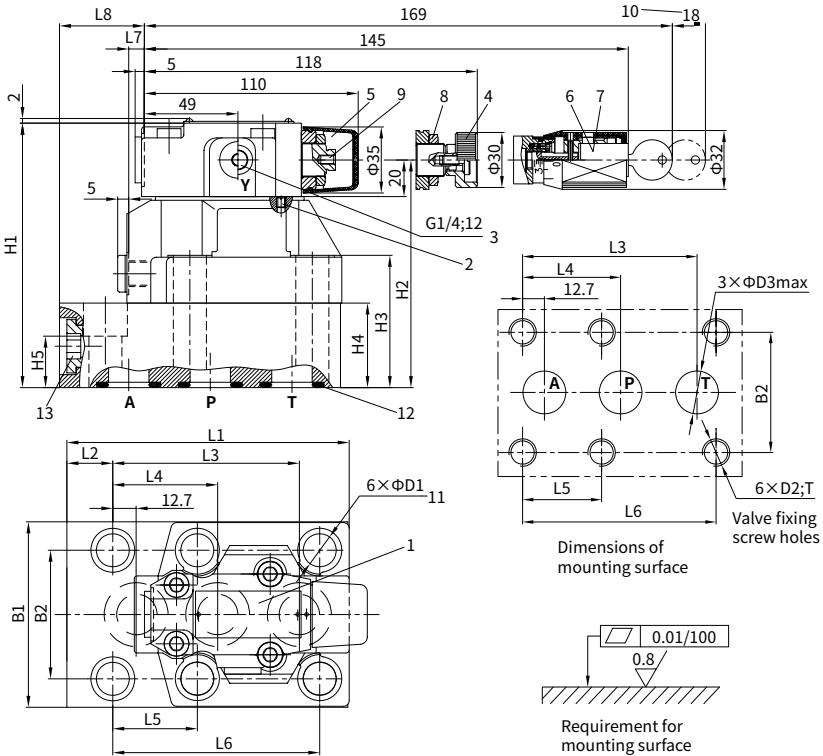
- 1 Nameplate
- 2 Without control oil internal returning
- 3 Port Y used for control oil external returning
- 4 Adjustment element "1"
- 5 Adjustment element "2"
- 6 Adjustment element "3"
- 7 Adjustment element "7"
- 8 Lockable Nut S=24
- 9 Internal hexagon screw S=10

- 10 Space required to remove the key
- 11 Locating pin
- 12 Valve fixing hole
- 13 Directional valve, size 6
- 14 Solenoid "a"
- 15 Manual override "N" button
- 16 Plug-in connector "Z4" without lamp
- 17 Plug-in connector "Z5L" with lamp
- 18 Space required to remove plug-in connector
- 19 O-ring 17.12 x 2.62 (Port A, P and T)
- 20 Integrated check valve

Unit dimensions

(Dimensions in mm)

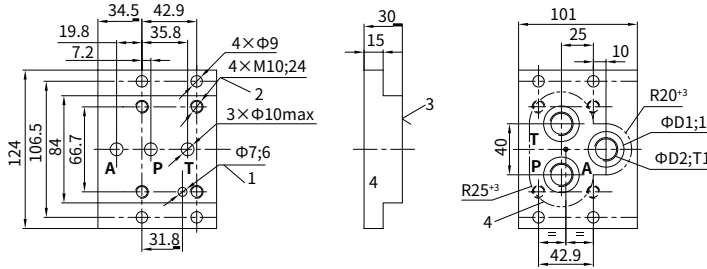
Sizes 25 and 32



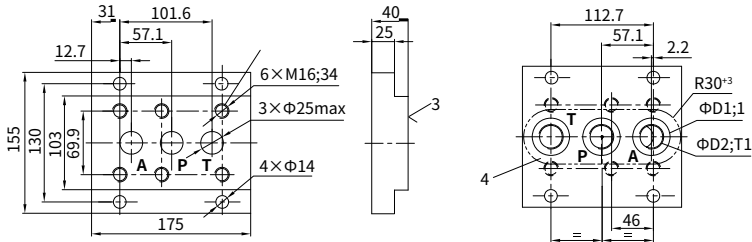
- | | |
|--|--|
| <ul style="list-style-type: none"> 1 Nameplate 2 Without control oil internal returning 3 Port Y used for control oil external returning 4 Adjustment element "1" 5 Adjustment element "2" 6 Adjustment element "3" 7 Adjustment element "7" 8 Lockable Nut S=24 | <ul style="list-style-type: none"> 9 Internal hexagon bolt S=10 10 Space required to remove the key 11 Valve fixing hole 12 Size 25: O-ring 28.17×3.53
Size 32: O-ring 34.52×3.53 13 Integrated check valve
Built-on directional valve's size,
refer to Page 07/10. |
|--|--|

Size	L1	L2	L3	L4	L5	L6	L7	L8	H1	H2	H3	H4	H5	B1	B2	D1	D2	T	D3
25	153	25	101.6	57.1	46	112.7	10.5	48.2	144	124	72	46	28	100	70	18	M16	34	22
32	198	41	127	63.5	50.8	139.7	21	69.8	165	145	93	67	45	115	82.5	20	M18	37	30

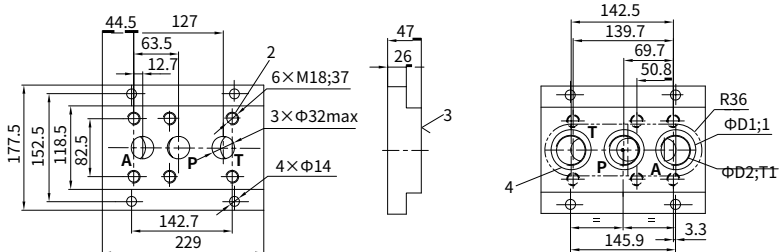
Sub-plate



Size	Type	D1	D2	T1	Valve fixing screw	Torque	Weight
10	G467/01	28	G3/8	12	Accessory: 4pcs M10×50 (GB/T70.1-10.9)	75Nm	2.0kg
	G467/02		M18×1.5				
	G468/01	34	G1/2	14			
	G468/02		M22×1.5				



Size	Type	D1	D2	T1	Valve fixing screw	Torque	Weight
25(20)	G469/01	42	G3/4	16	Accessory: 4pcs M16×100 (GB/T70.1-10.9)	310Nm	6.4kg
	G469/02		M27×2				
	G470/01	47	G1	18			
	G470/02		M33×2				



Size	Type	D1	D2	T1	Valve fixing screw	Torque	Weight
32	G471/01	56	G11/4	20	Accessory: 4pcs M18×120 (GB/T70.1-10.9)	430Nm	10.6kg
	G471/02		M42×2				
	G472/01	61	G11/2	22			
	G472/02		M48×2				

1 Locating pin hole 2 Valve fixing holes 3 Valve mounting surface 4 Valve panel cut-out



DB...K...type Cartridge Pilot Relief Valve



DB...K...4XJ...type

Sizes 6, 10
Max. Working Pressure: 315 bar
Max. Flow: 60 L/min (size6)
100 L/min (size10)

Contents

Function and configuration	02
Specification	02
Technical data	03
Characteristic curves	03
Unit dimensions	04-05

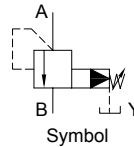
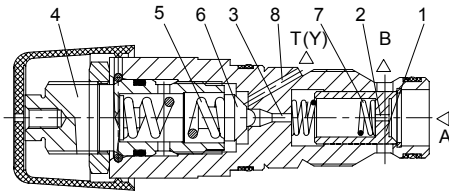
Features

- Cartridge valve
- 4 pressure ratings
- 4 adjustment elements:
 - Rotary knob
 - Adjustable bolt with protective cap
 - Lockable rotary knob with scale
 - Rotary knob with scale

Function and configuration

DB..K.. type valve is a pilot operated pressure relief valves for installation in manifolds. It is used to limit the pressure in a hydraulic system. The system pressure is set via adjustment element (4). At static position, the valves are closed. Pressure in port A acts on the spool (1). Pressure fluid flows through orifice (2) to the spring loaded side of the spool (1) and through orifice (3) to the pilot poppet (6). If the pressure in port A rises beyond the value setting at spring (5), the pilot poppet (6) opens. Fluid can flow from the spring loaded side of spool (1), orifice (3), and channel (8) into port T(Y). The pressure drop moves spool (1) to open the connection from A to B, while the setting pressure at spring (5) is maintained. Pilot oil returns from the two spring chambers via port T(Y) externally.

Type DB10K2-4XJ/Y..



Specification

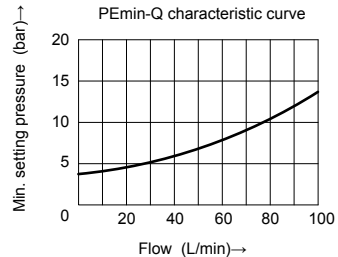
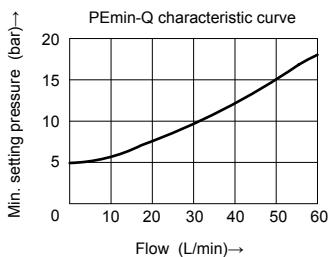
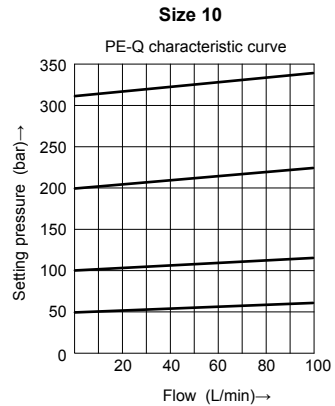
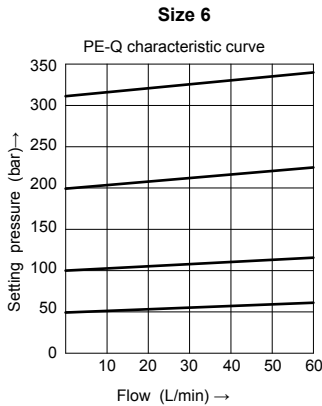
	DB	K	- 4XJ /	Y	*
Pressure relief valve	=DB				Further details in clear text
Nominal size 6	= 6				No code = NBR seals
Nominal size 10	=10				V = FKM seals
Cartridge	=K				Y = Pilot oil supply internal and drain external
Rotary knob		=1			50= Pressure adjustable up to 50bar
Sleeve with hexagon and protective cap		=2			100= Pressure adjustable up to 100bar
Lockable rotary knob with scale		=3			200= Pressure adjustable up to 200bar
Rotary knob with scale		=7			315= Pressure adjustable up to 315bar
			4XJ		= Series 40J to 49J (40J to 49J: unchanged installation and connection dimensions)

Technical data

Size		6	10
Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal	
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)	
Viscosity range	mm ² /s	10 to 800	
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	
Max. operating pressure	bar	315	
Max. setting pressure	bar	50; 100; 200; 315	
Max. flow-rate	L/min	to 60	to 100
Weight	kg	Approx. 0.22	Approx. 0.3

03

Characteristic curves (Measured at t=40°C ±5°C , using HLP46)

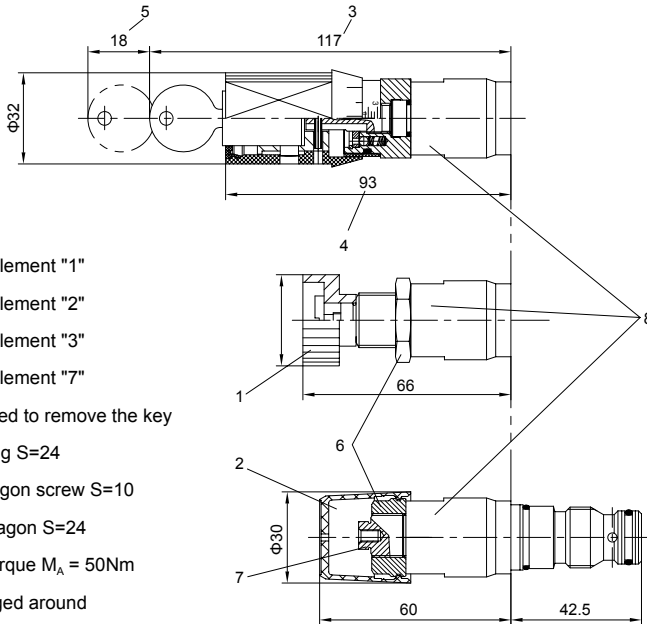


The curves are measured at zero back pressure.

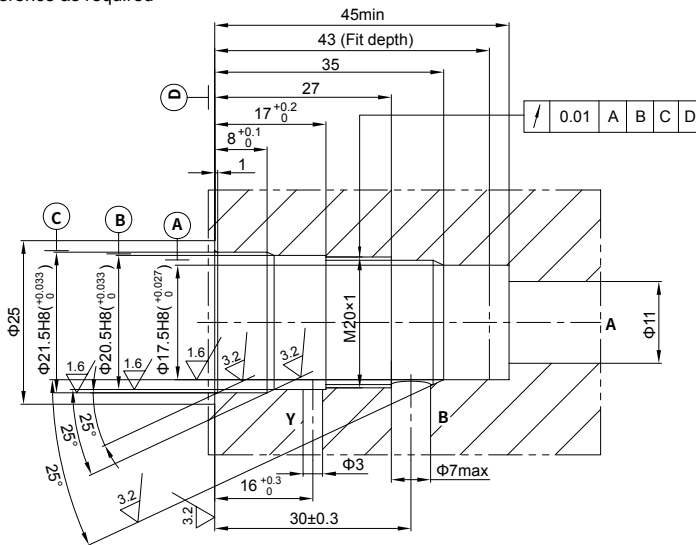
Unit dimensions

(Dimensions in mm)

• Type DB6K...-4XJ/...



- 1 Adjustment element "1"
 - 2 Adjustment element "2"
 - 3 Adjustment element "3"
 - 4 Adjustment element "7"
 - 5 Space required to remove the key
 - 6 Nut for locking S=24
 - 7 Internal hexagon S=10
 - 8 External hexagon S=24
- Tightening torque $M_A = 50\text{Nm}$
- 9 Port B arranged around circumference as required





DBK...type Cartridge Pilot Relief Valve



DB20K...1XJ...type

Size 20
Max. Working Pressure: 315 bar
Max. Flow: 300 L/min

Contents

Function and configuration	02
Specification	02
Technical data	03
Characteristic curves	03
Unit dimensions	04

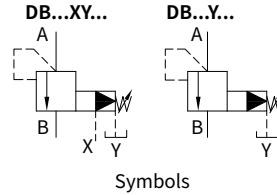
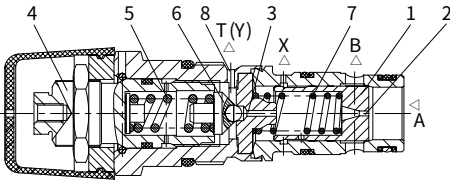
Features

- Cartridge valve
- 4 pressure ratings
- 4 adjustment elements:
 - Rotary knob
 - Adjustable bolt with protective cap
 - Lockable rotary knob with scale
 - Rotary knob with scale

Function and configuration

DB...K...type pressure valve is pilot operated pressure relief valves for installation in manifolds. It is used to limit the pressure in a hydraulic system. The system pressure is set via adjustment element (4). At static position, the valves are closed. Pressure in port A acts on the spool (1). Pressure fluid is passed through orifice (2) to the spring loaded side of the spool (1) and through orifice (3) to the pilot poppet (6). If the pressure in port A rises beyond the value setting at spring (5), then the pilot poppet (6) opens. Fluid can flow from the spring loaded side of spool (1), through the orifice (3) and channel (8) into port T(Y). The pressure drop moves spool (1) to open the connection from A to B, while the setting pressure at spring (5) is maintained. Pilot oil returns from the two spring chambers via port T(Y) externally.

DB20K2-1XJ/...XY



Specification

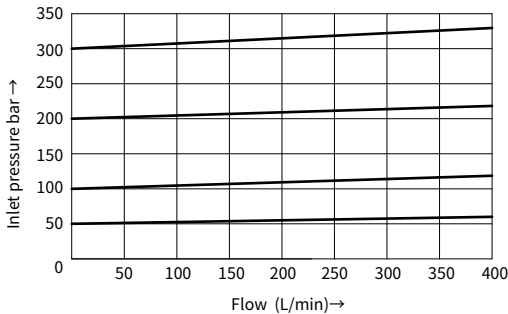
	DB	20	K	1XJ			*
Pressure relief valve =DB	Further details in clear text						
Nominal size 20 =20	No code = NBR seals V = FKM seals						
Cartridge =K	Y = Pilot oil supply internal and drain external XY = Pilot oil supply and drain external						
Rotary knob =1	50 = Pressure adjustable up to 50bar 100 = Pressure adjustable up to 100bar 200 = Pressure adjustable up to 200bar 315 = Pressure adjustable up to 315bar						
Adjustable bolt with protective cap =2							
Lockable rotary knob with scale =3							
Rotary knob with scale =7							
Series 10J to 19J (10J to 19J : unchanged installation and connection dimensions) =1XJ							

Technical data

Fluid	Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal		
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)	
Viscosity range	mm ² /s	10 to 800	
Degree of contamination	Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406		
Max. operating pressure	bar	315	
Max. back pressure	Port Y	bar	250
Max. adjustable pressure	bar		50;100;200;315
Max. flow-rate	L/min		To 400
Weight	kg		Approx.0.35

Characteristic curves (Measured at t=40°C ±5°C , using HLP46)

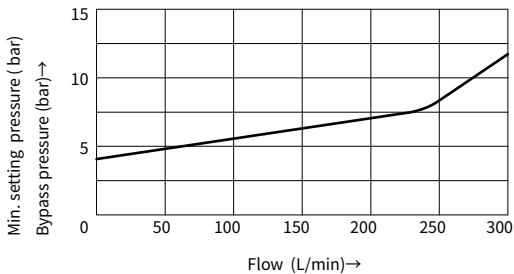
Inlet pressure in relation to the flow-rate



The curves are measured with external pilot oil drain at zero pressure.

With internal pilot oil drain the inlet pressure will increase with pressure at port B.

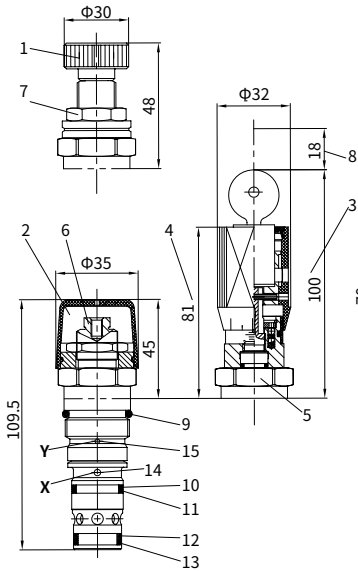
Min. setting pressure and bypass pressure in relation to the flow-rate



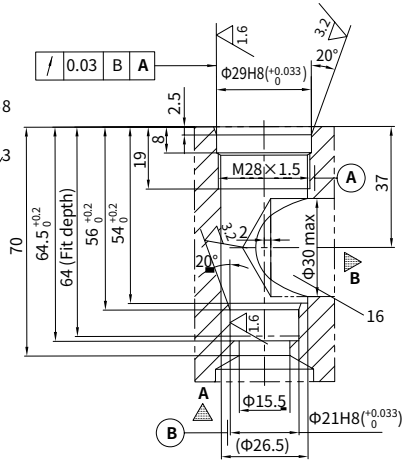
The curves are valid for outlet pressure PB=0

Unit dimensions

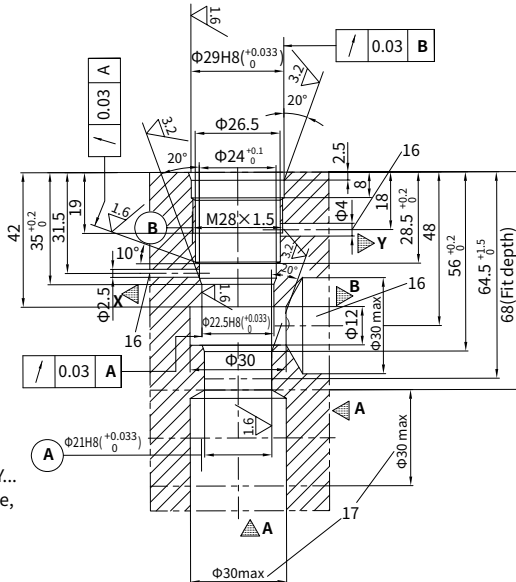
(Dimensions in mm)



Fixing holes for cartridge Y
(pilot oil supply internal and drain external)



Fixing holes for cartridge XY
(pilot oil supply external and drain external)



- 1 Adjustment element "1"
- 2 Adjustment element "2"
- 3 Adjustment element "3"
- 4 Adjustment element "7"
- 5 Nut for locking S=22
- 6 Internal hexagon screw S=10
- 7 External hexagon S=30
Tightening torque $M_A = 50\text{Nm}$
- 8 Space required to remove the key
- 9 O-ring 25 x 2.65
- 10 O-ring 17 x 1.8
- 11 Back-ring 22.5 x 19.7 x 1.1
- 12 2 Back-ring 21 x 16.2 x 1.1
- 13 O-ring 18 x 1.8
- 14 Port X used only for
DB20K...1XJ/XY...
- 15 Port Y used for
DB20K...1XJ/XY...and
DB20K...1XJ/Y...
- 16 Port X, T and B arranged around
circumference used for DB20K...1XJ/XY...
Port B arranged around circumference,
used for DB20K...1XJ/Y...
- 17 Hole A, optional



DBD... type Direct Operated Relief Valve



DBD...10J...type

Sizes 6, 8, 10, 15, 20, 25, 30
Max. Working Pressure: 630 bar
Max. Flow: 330 L/min

Contents

Function and configuration	02
Specification	03
Technical data	03
Characteristic curves	04
Unit dimensions	05-07

Features

- 3 connected versions
- Inserted cartridge
- Threaded connection
- Sub-plate mounting
- 7 pressure ratings
- 25, 50, 100, 200, 315, 400 and 630 bar
- 3 adjustment versions
- Adjusting bolt with protective cap
- Regulating handle
- Lockable regulating handle

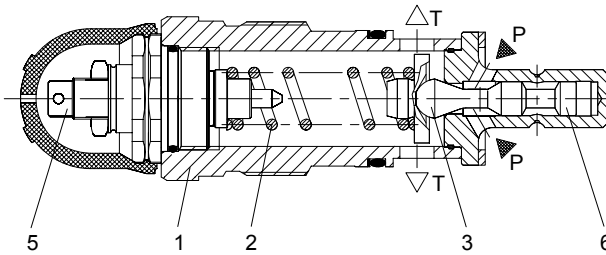
Function and configuration

DBD type pressure relief valve is direct operated, it used for limiting a system pressure. The valve comprises the sleeve (1), spring (2), poppet spool with damping (3) (pressure stages 25 to 400 bar) or ball spool (4) (pressure stage 630 bar) and pressure adjustment element (5). The system pressure may be set infinitely by the adjustment element. The spring (2) presses poppet spool (3) onto the valve seat. The channel P is connected to the system and the system pressure affect on the area of poppet (or ball) spool.

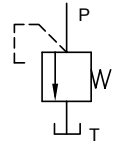
If the pressure in channel P exceeds the value set at the spring (2), the poppet spool (3) or ball spool (4) will opens against the spring (2), the oil flows from channel P to channel T. The stroke of the spool is limited by embossing (6). To gain accurate setting value within the whole pressure range, the pressure scope is divided into 7 pressure ratings, and every rating has a corresponding spring which may be set maximum pressure.

Type DBDS...K. 10J/...

pressure stages 25 to 400bar

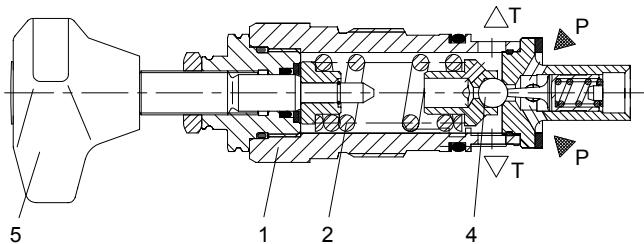


Symbol



Type DBDH10K. 10J/...

pressure rating 630bar (ball valve, only size 10)



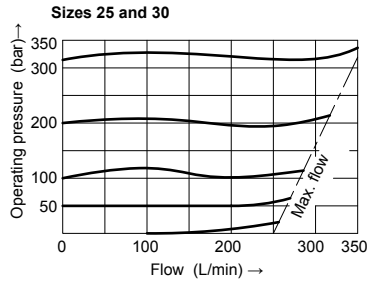
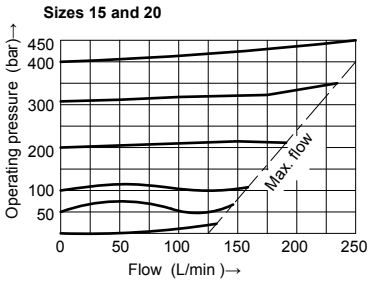
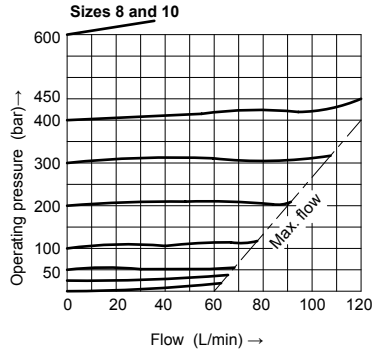
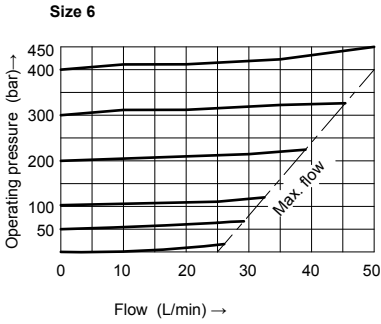
Specification

DBD					10	/		*	
Direct operated relief valve									Further details in clear text
Adjusting bolt with protective cap =S									No code = NBR seals
Regulating handle =H									V = FKM seals
Lockable regulating handle (up to size 10) =A									For threaded connection valve
									No code= Inch
									2= Metric
Connection		G	K	P					
Nominal size	6=	6	6	6					
	8=	8	-	-					
	10=	10	10	10					
	15=	15	-	-					
	20=	20	20	20					
	25=	25	-	-					
30=	30	30	30						
Connection version									
Inserted cartridge =K									
Threaded connection =G									
Sub-plate mounting =P									
						10J=	10J series		
Size		10	6,8,15 and 20	25 and 30					
Pressure ratings (up to...)	25 =	25bar	25 =	25bar	25 =	25bar			
	50 =	50bar	50 =	50bar	50 =	50bar			
	100 =	100bar	100 =	100bar	100 =	100bar			
	200 =	200bar	200 =	200bar	200 =	200bar			
	315 =	315bar	315 =	315bar	315 =	315bar			
	400 =	400bar	400 =	400bar	400 =	400bar			
	630 =	630bar	630 =	630bar	630 =	630bar			

Technical data

Fluid		Mineral oil suitable for NBR and FKM seal				
		Phosphate ester for FKM seal				
Fluid temperature range °C		-30 to +80 (NBR seal)				
		-20 to +80 (FKM seal)				
Viscosity range mm ² /s		10 to 800				
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406				
Nominal size		6 and 8	10	15 and 20	25 and 30	
Operating pressure range	Inlet bar	Up to 400	up to 630	up to 400	up to 315	
	Outlet bar	315				
Max. flow-rate L/min		See the Characteristic curve				

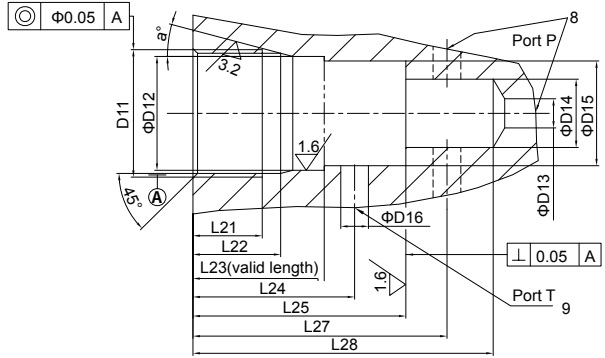
Performance curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)



Unit dimensions

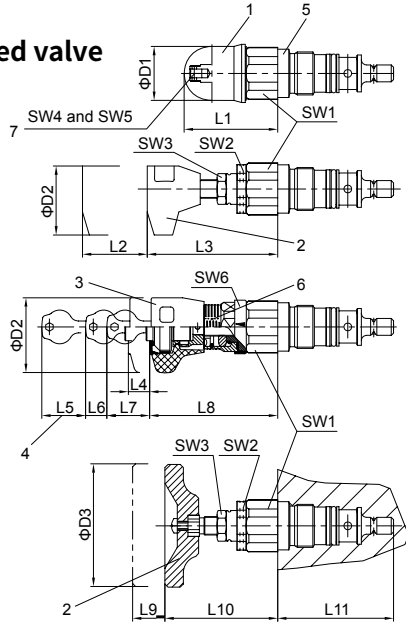
(Dimensions in mm)

• Cartridge cavity



- 1 Adjustment element "S"
- 2 Adjustment element "H"
(use pressure adjustment handwheel for sizes 25 and 30)
- 3 Adjustment element "A"
- 4 Space required to remove the key
- 5 Steel seal (type, size)
- 6 Ring with mark
(after setting the pressure, aim the arrow at the zero position and then lock up the nut)
- 7 Internal hexagon screw S=6 for under size 20(SW4) and external hexagon S=13 for above size 25 (Sw5)
- 8 Port P arranged optionally around periphery or bottom
- 9 Port T arranged optionally around periphery

• Inserted valve

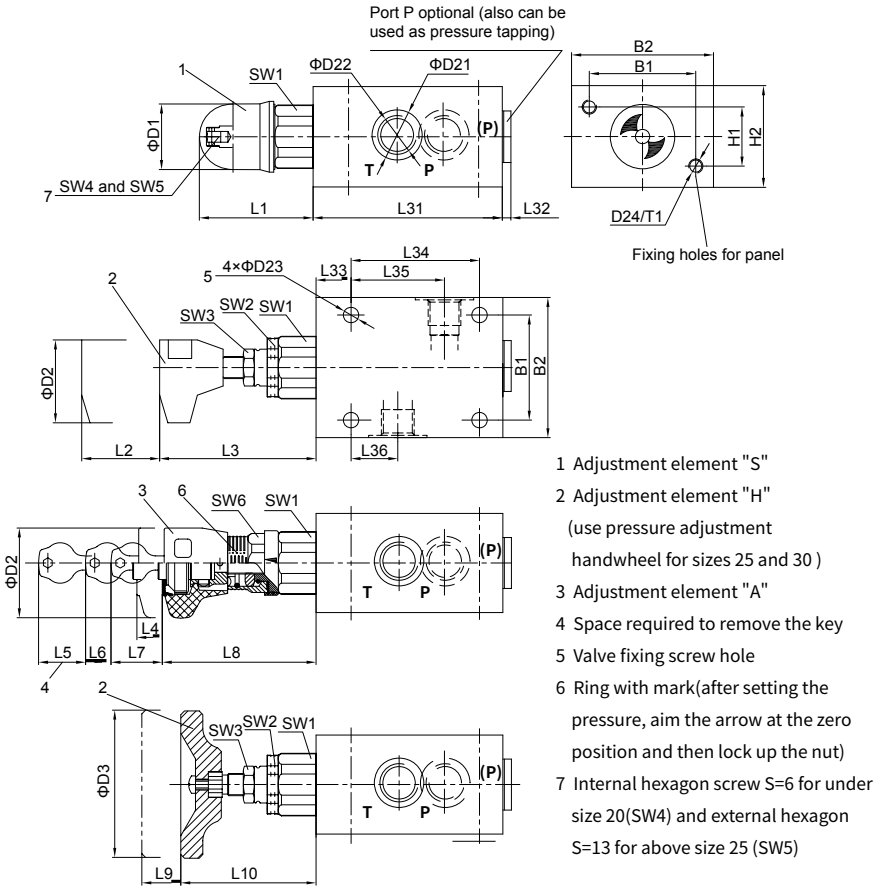


Size	Weight(kg)	D1	D2	D3	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	SW1	Torque(Nm)	SW2	SW3	SW4	SW5	SW6
6	Approx.0.4	34	60	-	72		88	11	20	11	30	83	-	-	64	32	80	30				
10	Approx.0.5	38		68	11		79					79			75	36	150	30	19	6	-	30
20	Approx.1	48		65			77					77			106	46	250	36				
30	Approx.2.3	63	-	80	83	-	-	-	-	-	-	-	11	56	131	60	450	46				13
Size	D11	D12	D13	D14	D15	D16	L21	L22	L23	L24	L25	L27					L28	α				
6	M28×1.5	25H9	6	15	24.9	6	15	19	39	35	45	56.5±5.5					65	15				
10	M35×1.5	32H9	10	18.5	31.9	10	18	23	35	41	52	67.5±7.5					80					
20	M45×1.5	40H9	20	24	39.9	20	21	27		54	70	91.5±8.5					110	20				
30	M60×2	55H9	30	38.75	54.9	30	23	29	45	60	84	113.5±11.5					140					

Unit dimensions

(Dimensions in mm)

• Threaded connection valve

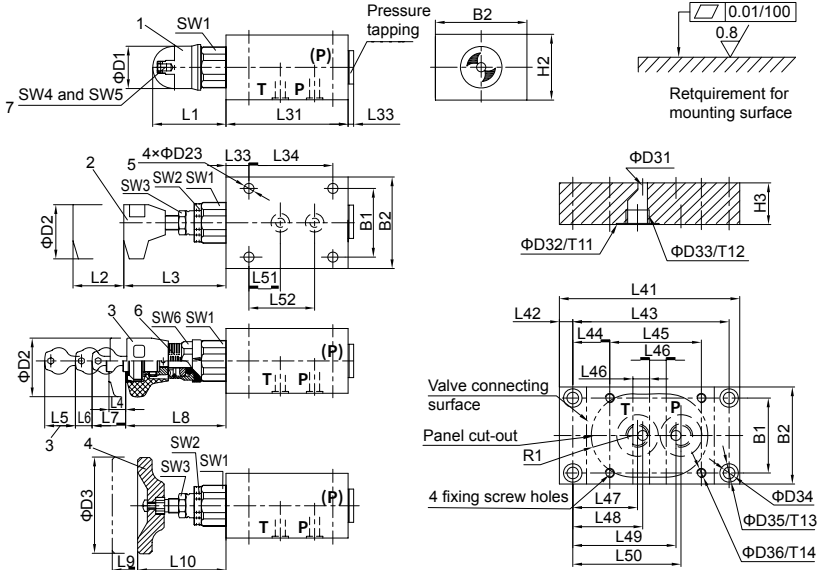


Size	Weight(kg)	B1	B2	D1	D2	D3	D21	D22		D23	D24	L1	L2	L3	L4						
6	Approx.1.6	45	60	34			25	G1/4; M14×1.5		6.6	M6	72		83							
(8)+10	Approx.3.7	60	80	38	60	-	(28)34	G3/8 M18×1.5; G1/2 M22×1.5		9	M8	68	11	79							
(15)+20	Approx.6.9	70	100	48			(42)47	G3/4 M27×2; G1 M33×2				65		77							
(25)+30	Approx.15.2	100	130	63	-	80	(56)61	G1 1/4 M42×2; G1 1/2 48×2		11	M10	83	-	-							
Size	L5	L6	L7	L8	L9	L10	L31	L32	L33	L34	L35	L36	SW1	SW2	SW3	SW4	SW5	SW6	H1	H2	T1
6	20	11	30	83			80	2	15	55	40	20	32		19	6		30	25	40	10
(8)+10				79			100	(2)3	20	70	49	21	36	30							
(15)+20							135	(3)4		100	65	34	46	36					50	70	20
(25)+30					11	56	180	4	25	130	85	35	60	46		-	13	-	60	90	25

Unit dimensions

(Dimensions in mm)

• Sub-plate mounting valve



- 1 Adjustment element "S"
- 2 Adjustment element "H" (Sizes 25 and 30 use pressure adjustment handwheel)

- 3 Adjustment element "A"
- 4 Space required to remove the key
- 5 Valve fixing screw hole
- 6 Ring with mark (after setting the pressure, aim the arrow at the zero position and then lock up the nut)
- 7 Internal hexagon screw S=6 for under size 20 (SW4) and external hexagon S=13 for above size 25 (SW5)

Size	O-ring (P and T)	Dimension of pressure tapping	Valve fixing hole (GB/T70.1-10.9)	Torque(Nm)
6	8.75×1.8	G1/4	M6×50	Approx.10
10	12.3×2.4	G1/2	M8×70	Approx.25
20	22×3	M27×2	M8×90	
30	34×3	M42×2	M10×110	Approx.50

Size	Weight(kg)	B1	B2	D1	D2	D3	D23	H2	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L31	L32	L33	L34			
6	Approx. 1.6	45	60	34			6.6	40	72		83					83			80	2	15	55			
10	Approx. 3.7	60	80	38	60	-		60	68	11	79					79	-	-	100	3		70			
20	Approx. 7.1	70	100	48			9	70	65		77								135	4	20	100			
30	Approx. 15.7	100	130	63	-	80	11	90	83	-	-	-	-	-	-		11	56	180	4	25	130			
SW1	SW2	SW3	SW4	SW5	SW6	Size	Sub-plate type		Weight(kg)	D31	D32	D33		D34	D35	H3	L41								
36	30	19	6	-	30	6	G300/1		Approx. 1.5	6	25	G1/4			7	11	25	110							
32						10	(G301/1)G302/1		Approx. 2	10	(28)34	(G3/8) G								135					
46	36					20	(G303/1)G304/1		Approx. 5.5	(15)20	(42)47	(G3/4) G1									170				
60	46								30	(G305/1)G306/1		Approx.8	30	(56)61	(G1 1/4) G11/2						190				
D36	L42	L43	L44	L45	L46	L47	L48	L49	L50	L51	L52	T11	T12	T13	T14	R1									
M6	8	94	22	55	10	39	42	62	65	20	40			15											
M8	10	115	27.5	70	12.5	40.5	48.5	72.5	80.5	21	45	1	(15)16	9	15	25+2									
	15	140	20	100	20	(45)42	54	85	(94)97	34	65						20	13	(12)22	40+3					
M10	12.5	165	17.5	130	22.5	42	52.5	102.5	(113)117	35	85			24	11.5	22	55+4								



DBE(E)/DBEM(E)...type Proportional Relief Valve



DBE(E)/DBEM(E)...7XJ...type

Sizes 10, 25, 32
Max. Working Pressure: 315 bar
Max. Flow: 700 L/min

Contents

Function and configuration	02
Ordering code	03
Symbols	03
Technical data	04
Electrical data	04
Characteristic curves	05-06
Unit dimensions	07-09

Features

- Sub-plate mounting:
- Porting pattern to DIN 24 340 form E and ISO 6264
- For installation in manifolds
- 4 pressure ratings
- Max. pressure limitation , optional
- Amplifier type VT-2000

Function and configuration

DBE valve is a pilot operated pressure relief valve. It is used to continuously set the pressure in hydraulic systems by electrical signal.

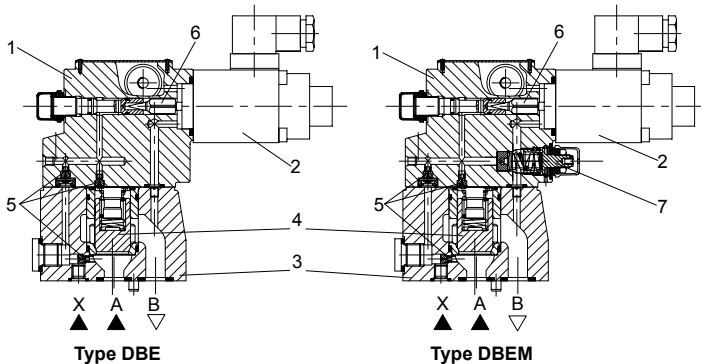
The valve consists of a pilot valve (1) with proportional solenoid (2) and the main valve (3) with main spool insert (4).

Type DBE...

The pressure limit is in relation to the electrical current value and set by the proportional solenoid (2). The system pressure is applied to the main spool (4). At the same time the pressure is applied to the spring loaded side of the main spool (4) and the pilot poppet (6) via orifice (5) at the pilot valve (1). If the hydraulic force exceeds the solenoid force, the pilot poppet (6) opens. Pilot fluid can flow back to tank and pressure drop caused by the orifices effects the main spool (4). Then main spool (4) opens the channel from pump to tank.

Type DBEM...

Optionally the valve can be supplied with an additional spring loaded pilot control valve (7) for maximum pressure safety (redundant pressure safety).



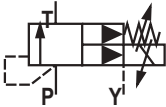
Ordering code

DBE				-7XJ /		G24		/ /		*	
Without maximum pressure safety =No code										Further information in plain text	
With maximum pressure safety =M										V= FKM seals No code=NBR seals	
Pilot operated =No code										Pilot oil drain port Y No code= Inch threaded 2= Metric threaded	
Pilot operated valve with main spool (enter nom. size 30) =C										For type DBE(M)E: A1= Command/ actual value 0-10V	
Pilot operated valve without main spool (do not enter nom. size) =C										F1= Command/ actual value 4 to 20 mA	
Pilot operated valve for remote controlling =T										For type DBE(M)E: K31 = With component plug, Without plug-in connector Z31 = With component plug and plug-in connector	
For external control electronics =No code										For type DBE(M)E, Supply voltage: G24= +24VDC	
With integrated electronics (OBE) =E										Y= Pilot oil supply internal and drain external Not for DBE(M)(E)C and DBE(M)(E)T without main spool XY= Pilot oil supply external and drain external (only for with the pilot valve and main spool)	
Nominal size 10 = 10											
Nominal size 25 = 20											
Nominal size 32 = 30											
Series 70J to 79J = 7XJ											
Max. pressure 50 bar = 50											
Max. pressure 100 bar = 100											
Max. pressure 200 bar = 200											
Max. pressure 315 bar = 315											

Symbols

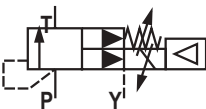
For external control electronics:

Type DBEM...-7XJ/...Y...

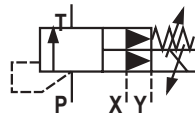


With integrated electronics:

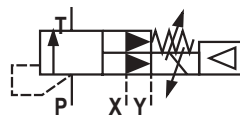
Type DBEME...-7XJ/...Y...



Type DBEM...-7XJ/...XY...



Type DBEM...-7XJ/...XY...



Technical data

Fluid	Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal			
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)		
Viscosity range	mm ² /s	2.8 to 380		
Degree of contamination	Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406			
Max. operating pressure Port A, B, X	bar	315		
Max. setting pressure	bar	50; 100; 200; 315		
Min. setting pressure	In relation to Flow (Q), see characteristic curves			
Pressure at zero command value	= min. setting pressure			
Return oil pressure port Y	bar	Separate and at zero pressure to tank		
Max. pressure safety (infinitely adjustable)	setting pressure	Pressure range under Max. safety pressure		
	50 bar	10-60 ⁺²⁰ bar		
	100 bar	10-120 ⁺²⁰ bar		
	200 bar	10-220 ⁺²⁰ bar		
	315 bar	10-340 ⁺²⁰ bar		
Max. pressure safety setting condition	When rated pressure is 50 bar, between 60 bar and 80 bar			
	When rated pressure is 100 bar, between 120 bar and 140 bar			
	When rated pressure is 200 bar, between 220 bar and 240 bar			
	When rated pressure is 315 bar, between 340 bar and 360 bar			
Nominal size		10	25	32
Max. flow-rate	L/min	200	400	600
Pilot oil (for pilot valve)	L/min	0.7 to 2		
Linearity	±3.5%			
Repeatability	<±2%			
Hysteresis	with shimmy		without shimmy	
	±1.5% P max (200Hz, amplitude 200mAssl)		±4.5% P max	
Shifting time	30~150ms (independent with the system)			

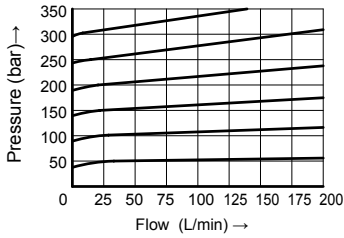
Electrical data

Power source	DC	
Min. solenoid current	mA	100
Max. solenoid current	mA	800
Coil resistance	19.5Ω at 20°C, Max. warm value: 28.8Ω	
Working status	Continuous	
Max. working environmental temperature	+50°C	
Electrical connection	Plug-in connector to DIN EN 175301-803/ISO 4400	
Insulation to DIN 40 050	IP 65	
Ampilfier	VT2000	

Characteristic curves

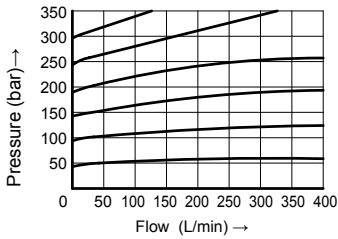
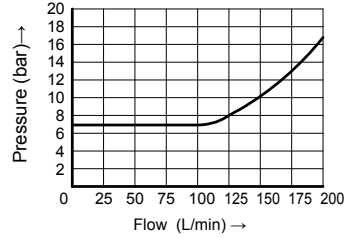
(Measured at $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

Operating pressure in relation to the flow

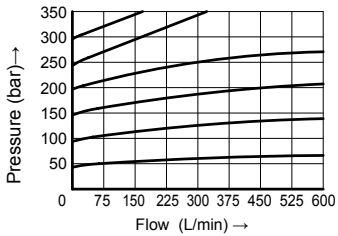
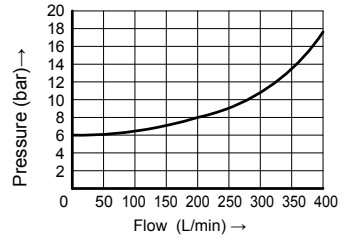


DBE10

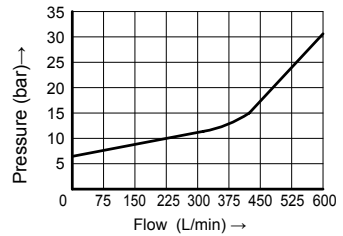
Min. setting pressure in relation to the flow



DBE20



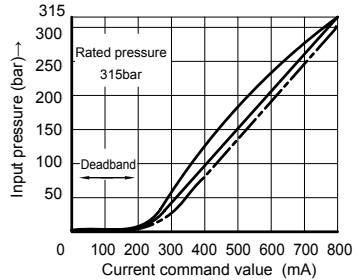
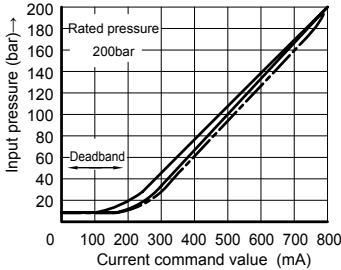
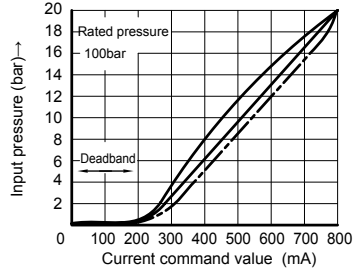
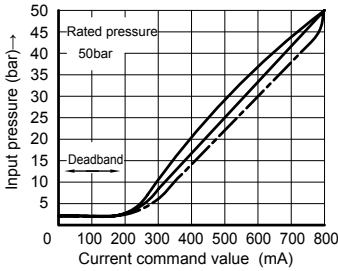
DBE30



Characteristic curves

(Measured at $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

Inputting pressure/current demand curve type DBE10, 20 and 30/DBET



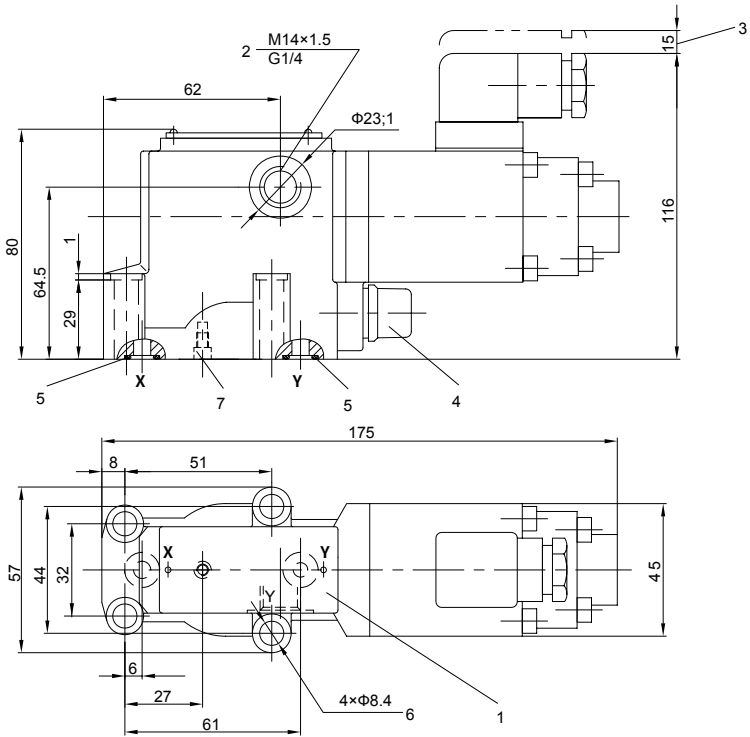
Measured under flow 27L/min of type DBE10, 20 and 30.
Measured under flow 0.8L/min of type DBET.

————— With shimmy
- - - - - Without shimmy

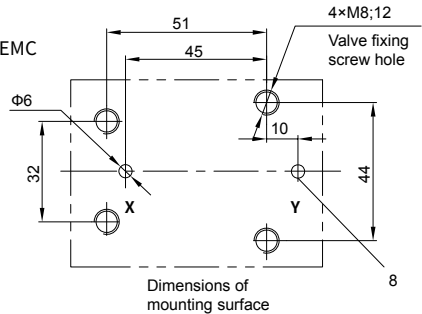
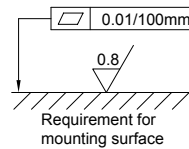
Unit dimensions

(Dimensions in mm)

Pressure relief valve as remote controller of valve type DBET/DBEMT Pilot valve without main spool assembly of valve type DBEC/DBEMC



- 1 Name plate
- 2 Pilot oil drain port, optional
- 3 Space required to remove plug-in connector
- 4 Max. pressure limitation
- 5 O-ring 9.25×1.78 (port X and Y)
- 6 Fixing screw hole
- 7 Blocked up in valve type DBET/DBEMT
Fixed with throttle hole in valve type DBEC/DBEMC
- 8 Pilot oil drain port, optional





DR5DP...type Direct Operated Reducing Valve



DR5DP...10J...type

Size 5
Max. Working Pressure: 315 bar
Max. Flow: 15 L/min

Contents

Function and configuration	02
Symbols	02
Specification	03
Technical data	03
Characteristic curves	04
Unit dimensions	05

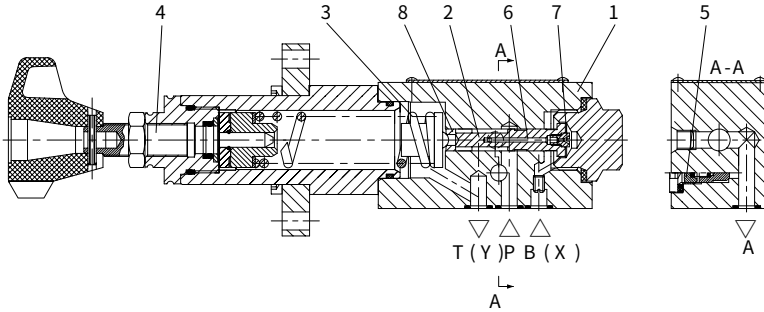
Features

- Direct operated structure
- Porting pattern to DIN 24 340 form A and ISO4401
- 5 pressure ratings
- 3 adjustment elements:
 - Rotary knob
 - Adjustable bolt with protective cap,
 - Lockable adjustable handle
- Check valve, optional

Function and configuration

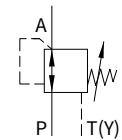
DR5DP type valve is a 3-way direct operated pressure reducing valve with a pressure relief function on the secondary side. It is used to reduce the system pressure. The secondary pressure is set by the pressure adjustment element (4).

In initial position, the valve is normally open and the pressure fluid flows unhindered from port P to port A. The pressure in port A acts at the spool area opposite to the compression spring (3) via the control line (6) and the spray nozzle (7). When the pressure in port A gets the value setting at compression spring (3), the control spool (2) moves into the control position and keeps the setting pressure in port A constant. The internal control oil is taken from port A, or from external by port X. If the pressure in port A still increases due to external forces on the actuator, the control spool (2) moves still further towards the compression spring (3). This causes a flow path to be opened via control land (8) on the control spool (2). Sufficient fluid then flows back to tank to prevent any further pressure rise. Fluid in spring chamber always drained to tank externally via port Y. For free return flow from port A to port P an optional check valve (5) can be fitted.

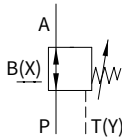


Symbols

Without check valve

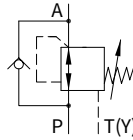


Version YM
Pilot oil supply
internal and
drain external

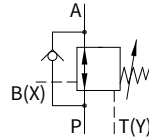


Version XYM
Pilot oil supply
external and
drain external

With check valve



Version Y
Pilot oil supply
internal and
drain external



Version XY
Pilot oil supply
external and
drain external

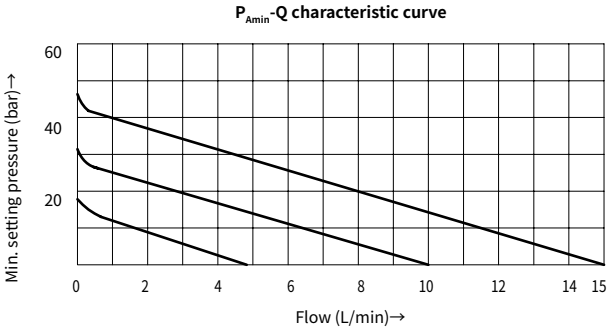
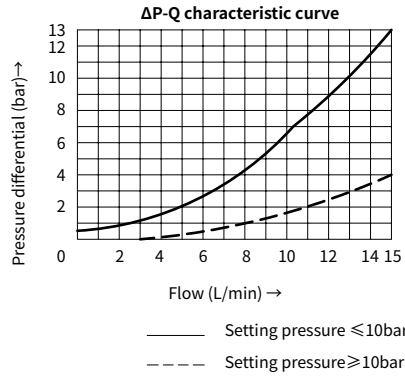
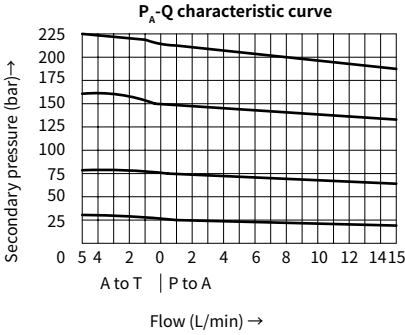
Specification

	DR5DP	10J				*	Further details in clear text
Without plate fixing flange (Standard version)=No code							No code = NBR seals
With plate fixing flange =F							V = FKM seals
Direct operated pressure reducing valve nominal size 5							No code = With check valve
							M = Without check valve
Rotary knob		=1					Y = Pilot oil supply internal
Adjustable bolt with protective cap		=2					Oil drain external
Lockable adjustable handle		=3					XY = Pilot oil supply external
							Oil drain external
Series 10J		= 10J					25 = Max. secondary pressure 25 bar
							75 = Max. secondary pressure 75 bar
							150 = Max. secondary pressure 150 bar
							210 = Max. secondary pressure 210 bar
							315 = Max. secondary pressure 315 bar

Technical data

Fluid			Mineral oil suitable for NBR and FKM seal
			Phosphate ester for FKM seal
Fluid temperature range		°C	-30 to +80 (NBR seal)
			-20 to +80 (FKM seal)
Viscosity range		mm ² /s	10 to 800
Degree of contamination			Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406
Max.operating pressure	Port P	bar	315
Max.secondary pressure	Port A	bar	25; 75; 150; 210; 315(without check valve)
Max.backing pressure	PortT(Y)	bar	60
Max. flow-rate		L/min	15
Weight		kg	Approx.1.4

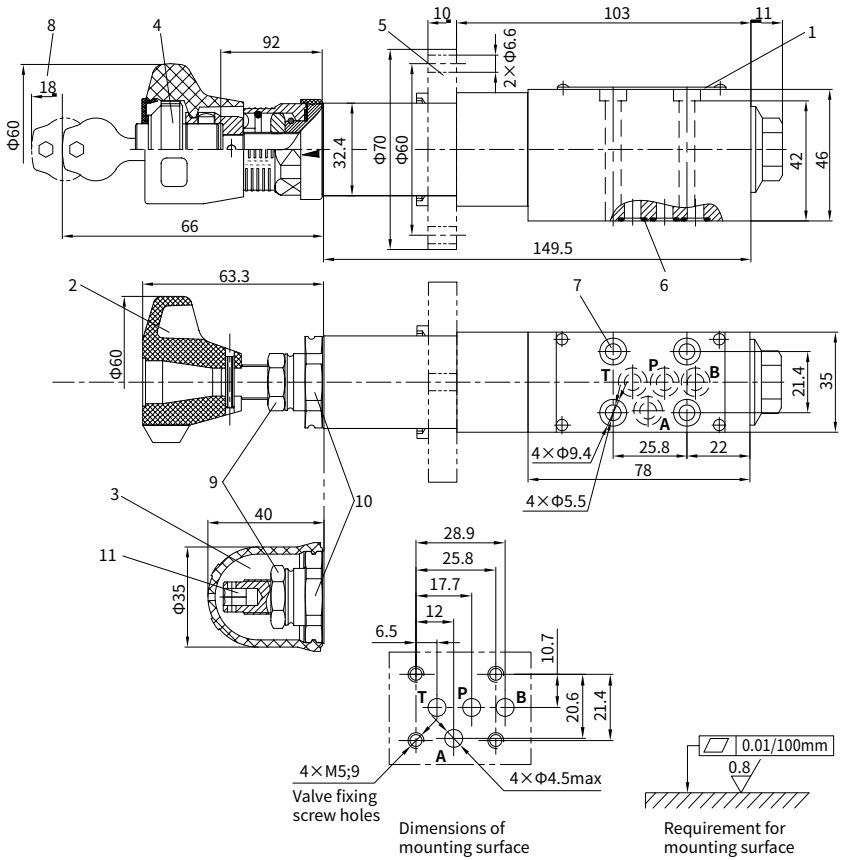
Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)



P_{Amin} -Q Characteristic curve shows the flow-rate in relation to the adjustable min. pressure rating from P to A.

Unit dimensions

(Dimensions in mm)



- | | |
|-------------------------------|------------------------------------|
| 1 Nameplate | 7 Valve fixing holes |
| 2 Adjustment element "1" | 8 Space required to remove the key |
| 3 Adjustment element "2" | 9 Lockable nut S=19 |
| 4 Adjustment element "3" | 10 External hexagon screw S=30 |
| 5 Plate fixing flange | 11 Internal hexagon screw S=6 |
| 6 O-ring 7 x 1.5 (P, T, A, B) | |



DR6DP...type Direct Operated Reducing Valve



DR6DP...5XJ...type

Size 6

Max. Working Pressure: 210 bar

Max. Flow: 60 L/min

Contents

Function and configuration	02
Symbols	02
Specification	03
Technical data	03
Characteristic curves	04
Unit dimensions	05

Features

- Direct operated structure
- Porting pattern to DIN 24 340 form A, ISO4401
- 5 pressure ratings
- 2 adjustment elements:
 - Rotary knob
 - Adjustable bolt with protective cap
- With pressure gauge connection
- Check valve, optional

Function and configuration

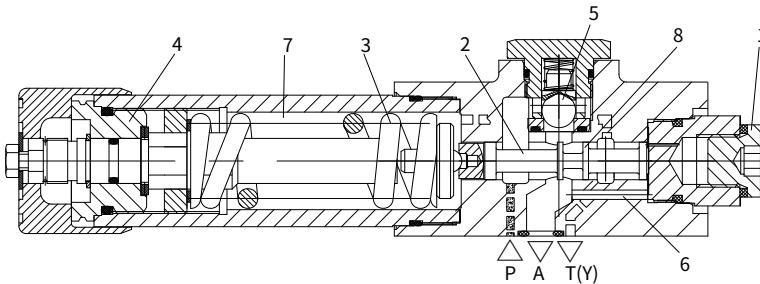
DR6DP type valve is a direct operated pressure reducing valve with 3-way design, with a pressure limitation of the secondary side, to insure the secondary pressure steady. It is used to reduce the system pressure. The secondary pressure is set by the pressure adjustment element (4).

In the zero position, the valve is normally open and the pressure fluid flows unhindered from port P to port A. The pressure in port A acts at the spool (2) area opposite to the compression spring (3) via the control line (6). When the pressure in port A get the value setting at compression spring (3), the control spool (2) moves into the control position and keeps the setting pressure in port A constant. The internal control oil is taken from port A via the control line (6). If the pressure in port A still increases due to external forces on the actuator, the control spool (2) moves still further towards the compression spring (3). This causes a flow path to be opened via control land (8) on the control spool (2). Sufficient fluid then flows back to tank to prevent any further pressure rise.

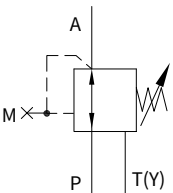
Fluid in spring chamber always drained to tank externally via port T(Y). For free return flow from port A to port P an optional check valve (5) can be fitted. One pressure gauge connection (1) used for monitoring the secondary pressure at the valve.

03

Type DR6DP1-5XJ/...Y



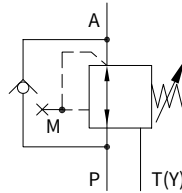
Symbols



Version "YM"

Pilot oil supply internal
oil drain external

Without check valve



Version "Y"

Pilot oil supply internal
oil drain external

With check valve

Specification

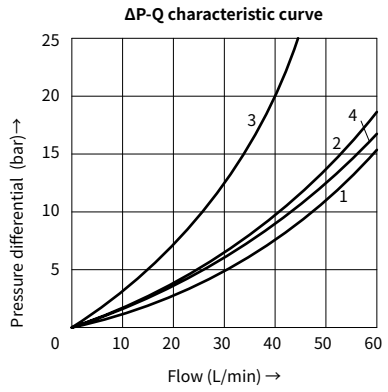
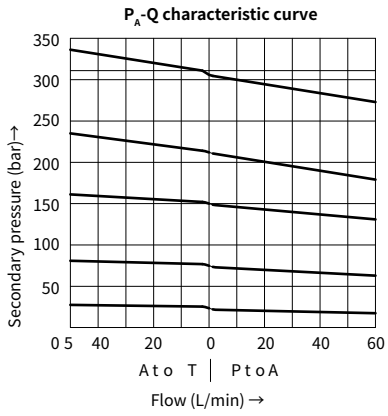
	DR6DP	-	5XJ	/	Y	/		*	Further details in clear text
Direct operated pressure reducing valve nominal size 6									
Rotary knob	=1							No code =	NBR seals
Adjustable bolt with protective cap	=2							V =	FKM seals
Lockable rotary knob with scale	=3								Pressure tapping thread
Rotary knob with scale	=7							No code =	Inch G1/4
Series 50J to 59J	=5XJ							2 =	Metric M14×1.5
(50J to 59J: unchanged installation and connection dimensions)								No code =	With check valve
Max. secondary pressure 25 bar	=	25						M =	Without check valve
Max. secondary pressure 75 bar	=	75						Y =	Pilot oil supply internal
Max. secondary pressure 150 bar	=	150							Oil drain external
Max. secondary pressure 210 bar	=	210							

Technical data

Fluid		Mineral oil suitable for NBR and FKM seal
		Phosphate ester for FKM seal
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)
Viscosity range	mm ² /s	10 to 800
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15 , ISO4406
Max.operating pressure	Port P	315
Max.secondary pressure	Port A bar	25; 75; 150; 210; 315(without check valve)
Max.backing pressure	PortT(Y)	16
Max. flow-rate	L/min	60
Weight	kg	Approx.1.6

Characteristic curves

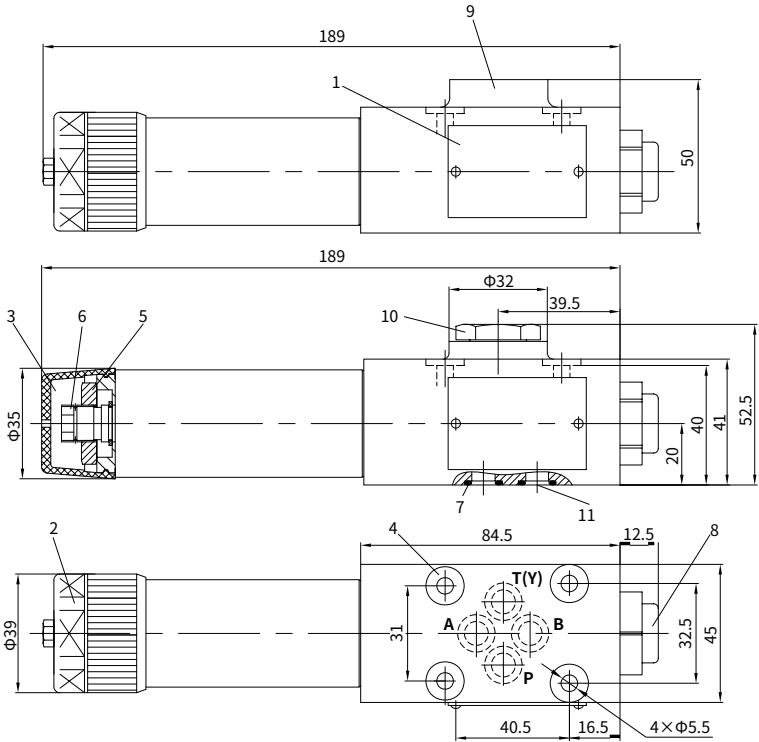
(Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)



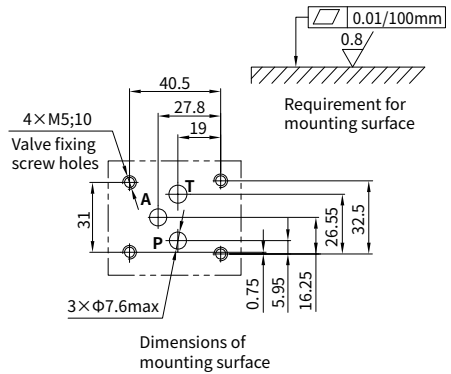
03

Unit dimensions

(Dimensions in mm)



- 1 Nameplate
- 2 Adjustment element "1"
- 3 Adjustment element "2"
- 4 Valve fixing holes
- 5 Lockable nut S=24
- 6 Internal hexagon screw S=10
- 7 O-ring 9.25×1.78 (A, B, P, T)
- 8 Pressure gauge connection:
G1/4 or M14×1.5; 12 deep
Hex wrench S=6
- 9 Without check valve
- 10 With check valve
- 11 Port B blocked, has no function





DR10DP...type Direct Operated Reducing Valve



DR10DP...4XJ...type

Size 10
Max. Working Pressure: 210 bar
Max. Flow: 80 L/min

Contents

Function and configuration	02
Symbols	02
Specification	03
Technical data	03
Characteristic curves	04
Unit dimensions	05

Features

- Direct operated structure
- Porting pattern conforms to DIN 24 340 form D and ISO5781
- 4 pressure ratings
- 2 adjustment elements:
 - Rotary knob
 - Adjustable bolt with protective cap
- With pressure gauge connection
- Check valve, optional

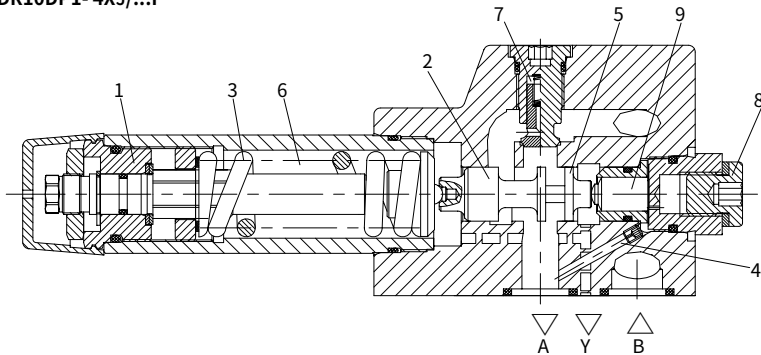
Function and configurations

DR10DP type valve is a 3-way direct operated pressure reducing valve with a pressure relief function on the secondary side. It is used to reduce the system pressure. The secondary pressure is set by the pressure adjustment element (1).

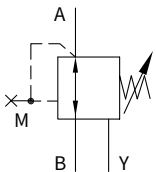
In zero position, the valve is normally open and the pressure fluid flows unhindered from port B to port A. The pressure in port A acts at the small spool(9) area opposite to the compression spring (3) via the control line (4). When the pressure in port A get the value setting at the compression spring (3), the small spool(9) pushes the control spool (2) into the control position and keeps the setting pressure in port A constant. The internal control oil is taken from port A via the control line (4). If the pressure in port A still increases due to external forces on the actuator, a flow path is to be opened via control land(5) on the control spool (2) . Port Y is open and sufficient fluid then flows back to tank to prevent any further pressure rise.

Fluid in spring chamber (6) always drained to tank externally via port Y. For free return flow from port A to port B an optional check valve(7) can be fitted. One pressure gauge connection (8) used for monitoring the secondary pressure at the valve.

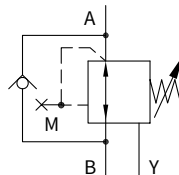
Type DR10DP1- 4XJ/...Y



Symbols



Version "YM"
Pilot oil supply internal
oil drain external
Without check valve



Version "Y"
Pilot oil supply internal
oil drain external
With check valve

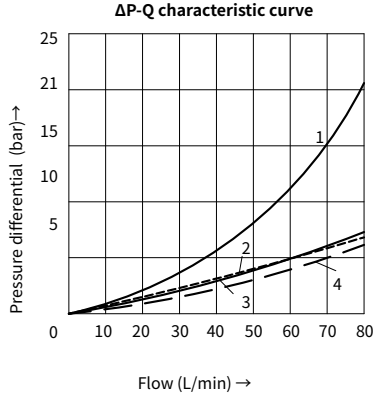
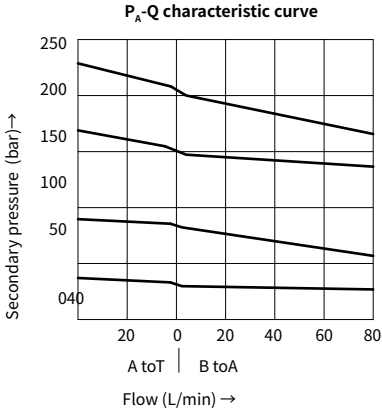
Specifications

DR10DP		-4XJ		Y		*		Further details in clear text
Direct operated pressure reducing valve nominal size 10								
Rotary knob	=1							No code = NBR seals
Adjustable bolt with protective cap	=2							V = FKM seals
Lockable rotary knob with scale	=3							Pressure tapping thread
Rotary knob with scale	=7							No code = Inch G1/4
								2 = Metric M14×1.5
Series 40J to 49J	=4XJ							No code = With check valve
(40J to 49J series: unchanged installation and connection dimensions)								M = Without check valve
Max. secondary pressure 25bar	=25							Y = Pilot oil supply internal
Max. secondary pressure 75bar	=75							Oil drain external
Max. secondary pressure 150bar	=150							
Max. secondary pressure 210bar	=210							

Technical data

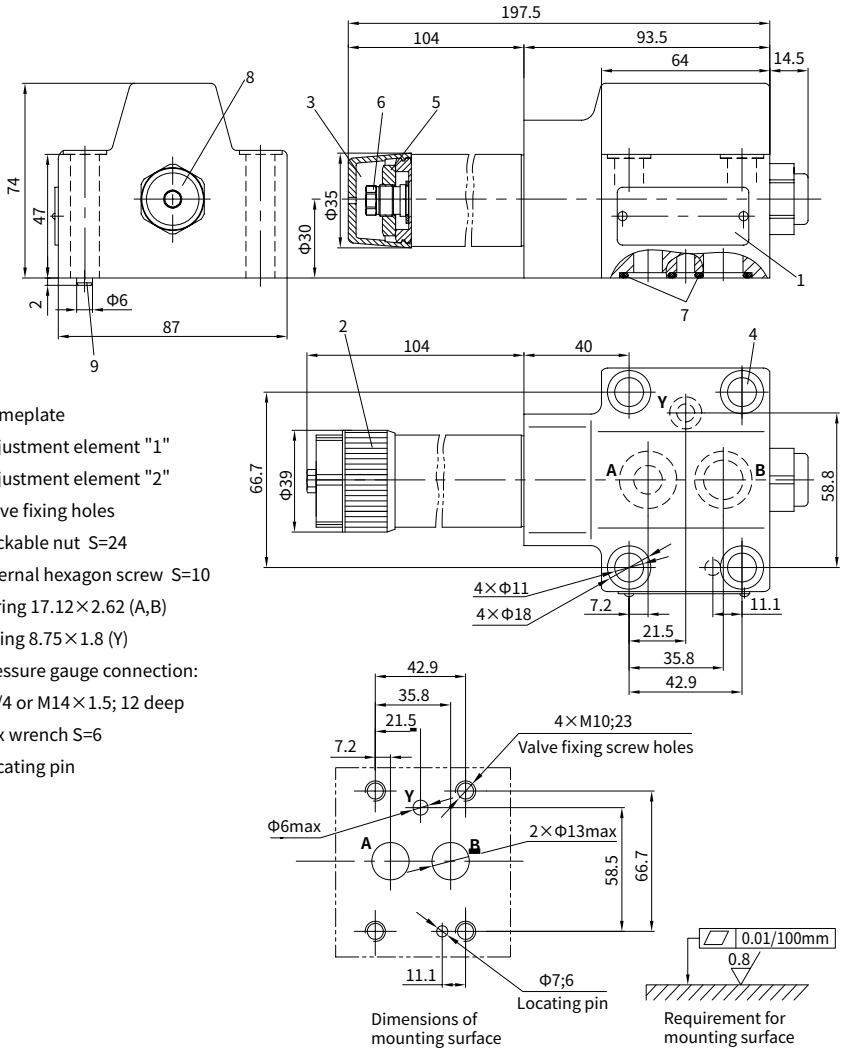
Fluid		Mineral oil suitable for NBR and FKM seal	
		Phosphate ester for FKM seal	
Fluid temperature range		°C	-30 to +80 (NBR seal)
			-20 to +80 (FKM seal)
Viscosity range		mm ² /s	10 to 800
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15 , ISO4406	
Max.operating pressure	Port P		315
Max.secondary pressure	Port A	bar	25; 75; 150; 210
Max.backing pressure	Port Y		16
Max. flow-rate		L/min	80
Weight		kg	Approx.3.3

Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)



Unit dimensions

(Dimensions in mm)





DRE(E)/DREM(E)...type Proportional Pilot Operated Reducing Valve



DRE(E)/ DREM(E)...6X...type

Sizes 10, 25
Max. Working Pressure: 315 bar
Max. Flow: 300 L/min

Contents

Function and configuration	02
Symbols	03
Ordering code	03
Technical data	04
Electrical data	04
Characteristic curves	05
Unit dimensions	06-07

Features

- For sub-plate mounting:
- Porting pattern to DIN 24 340 form D and ISO 5781
- For installation in manifolds
- 4 pressure ratings
- Maximum pressure limitation, optional
- Digital amplifier type VT-2000 of modular design

Function and configuration

DRE/DREM type valve is a pilot operated pressure reducing valve. It is used for pressure reduction. The valve consists of pilot valve(1) with proportional solenoid (2), main valve (3) with main spool assembly (4), as well as an optional check valve (5).

Type DRE10...

The setting of the pressure in port A is dependent on the voltage present at the proportional solenoids (2). At static, proportional solenoids (2) breakaway, the connection from B to A opens and fluid can flow freely from Port B to port A via main spool (4).

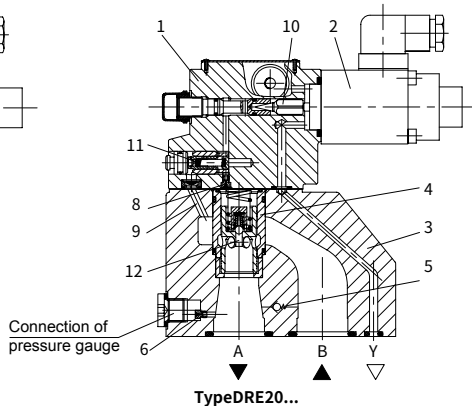
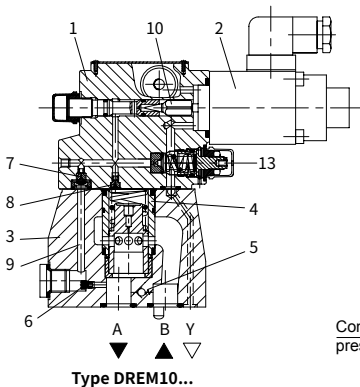
When valve works, pressure fluid from port A acts on the spring load side of the main spool (4) via pilot valve with throttle (6), (7) and (8), and at the same time acts on spool (10) effected by electromagnetic force. If pressure at port A exceeds the preset value of the corresponding proportional solenoid (2), then the spool (10) opens. Signal and pilot fluid is from port A, and fluid flows to tank through spool (10) and port Y. There is pressure differential on main spool (4) which makes itself into controller position and keeps flow constant pressure in port A as same as the setting value of the proportional solenoids (2). If the pressure in the port A increases and the main spool (4) is closed, little fluid will flow to tank via hole (9) and port Y. In order to allow free-flow from port A to B a check valve (5) can be fitted.

Type DRE20...

Same principle with DRE10 in function and pilot oil drains out from channel (9) and port B. There is a flow control valve (11) fixed in the pilot valve (1) to relief the pilot oil. And the overload protector (12) in the port A can prevent the pressure from abnormally high when flow $Q=0$.

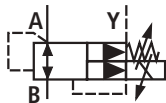
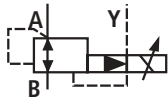
Type DREM...

A spring loaded pressure relief valve (13) can be optionally installed to prevent higher pressure in port A caused by abnormal peak voltage of proportional solenoids.

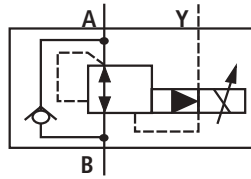


Symbols

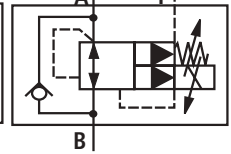
DRE -6XJ/...YM... DREM -6XJ/...YM...



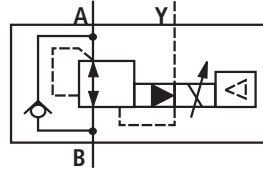
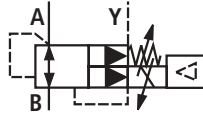
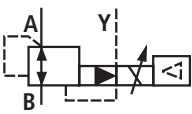
DRE -6XJ/...Y...



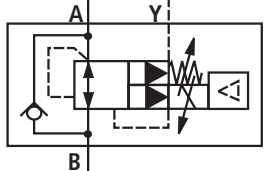
DREM -6XJ/...Y...



DREE -6XJ/...YM... DREME -6XJ/...YM... DREE -6XJ/...Y...



DREME -6XJ/...Y...



Ordering code

DRE				6XJ/				G24	/	/	*
Without maximum pressure safety = No code											
With maximum pressure safety = M											
Pilot operated = No code											
Pilot operated valve for size 10 (do not enter nom. size) = CN											
Pilot operated valve for size 20 and 30 = CH (do not enter nom. size)											
Pilot operated valve with main spool assembly for size 10 (enter nom. size 10) = CN											
Pilot operated valve with main spool assembly for size 30 (enter nom. size 30) = CH											
For external control electronics = No code											
With integrated electronics (OBE) = E											
Nominal size 10 = 10											
Nominal size 25 = 20											
Series 60J to 69J = 6XJ											
Max. pressure 50 bar = 50											
Max. pressure 100 bar = 100											
Max. pressure 200 bar = 200											
Max. pressure 315 bar = 315											
										Further information in plain text	
										V = FKM seals No code = NBR seals	
										Pilot oil drain port Y No code = Inch threaded 2 = Metric threaded	
										For type DBE(M)E: A1= Command/actual value 0-10V F1= Command/actual value 4 to 20 mA	
										For type DBE(M)E: K31 = With component plug, Without plug-in connector Z31 = With component plug and plug-in connector	
										For type DBE(M)E, Supply voltage G24= + 24V DC	
										No code = Without check valve M = With check valve	
										Y= Pilot oil drain always external, separate and zero pressure to the tank	

Technical data

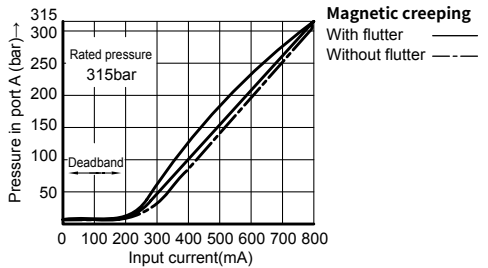
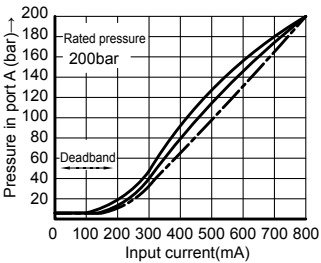
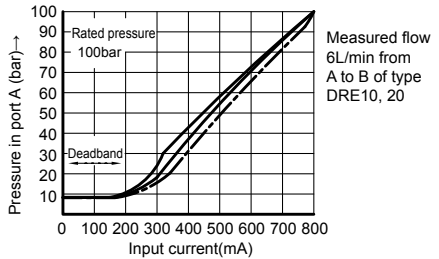
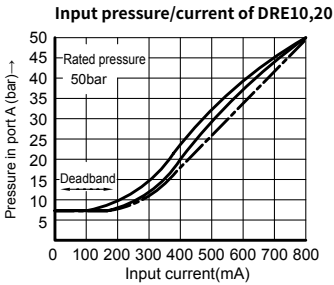
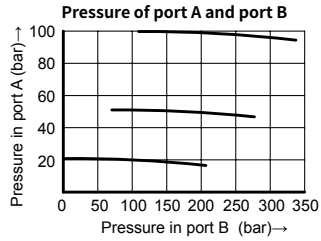
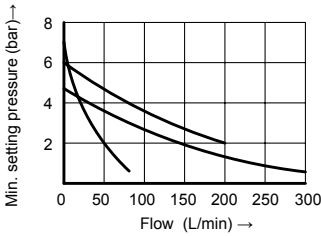
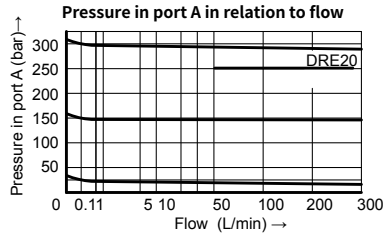
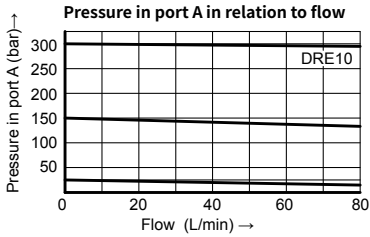
Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal		
Fluid temperature range		°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)	
Viscosity range		mm ² /s	2.8 to 380	
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406		
Max. operating pressure	Port A, B	bar	315	
	Port Y		Back to tank with zero pressure	
Max. setting pressure	Port A	bar	50; 100; 200; 315	
Min. setting pressure	Port A		Dependent with Q, see characteristic curves	
Pressure at current value 0 in port A		=Min. settable pressure (see characteristic curves)		
Max. pressure limitation (stepless)	Setting pressure		setting range under max. pressure limitation	
	50 bar		10-60 ⁺²⁰ bar	
	100 bar		10-120 ⁺²⁰ bar	
	200 bar		10-220 ⁺²⁰ bar	
	315 bar		10-340 ⁺²⁰ bar	
Max. pressure limitation setting range	When rated pressure=50 bar, between 60~80 bar			
	When rated pressure=100 bar, between 120~140 bar			
	When rated pressure=200 bar, between 220~240 bar			
	When rated pressure=315 bar, between 340~360 bar			
Nominal size		10	25	32
Max. flow-rate	L/min	80	200	300
Pilot flow-rate (for pilot valve)	L/min	0.7 to 2		
Linearity	±3.5%			
Repeatability	<±2%			
Magnetic creeping	with shimmy		without shimmy	
	±2.5% P max (200Hz, amplitude 200mAss)		±4.5% P max	
Shifting time	100 to 300ms (dependent with the system)			

Electrical data

Supply voltage	DC
Min. solenoid current	mA 100
Max. solenoid current	mA 800
Coil resistance	19.5Ω at 20°C, Max. warm value :28.8Ω
Working status	Continuous
Max. working environmental temperature	+50°C
Electrical connection	Plug-in connector to DIN EN 175301-803/ISO 4400
Valve protection to DIN 40 050	IP 65
Amplifier	VT2000

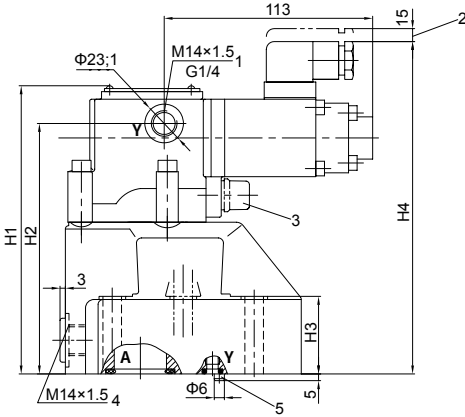
Characteristic curves

(Measured at $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

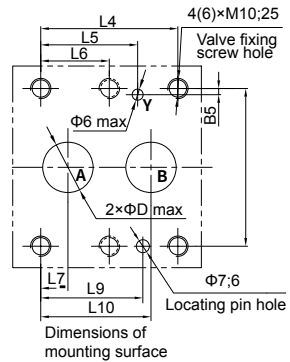
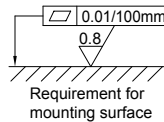
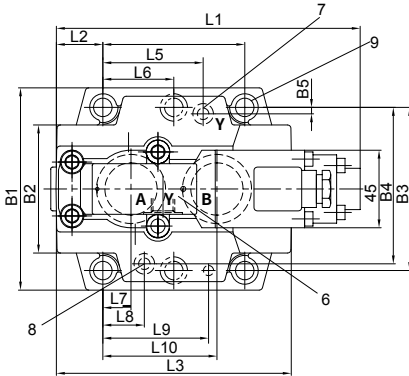


Unit dimensions

(Dimensions in mm)



- 1 As supplied, this port is plugged.
After removal of this plug this port can also be used as an external pilot oil drain.
- 2 Space required to remove plug-in connector.
- 3 Max. pressure limitation
(its application see hereinbefore "note")
- 4 Port X used for remote controlling the DRE10 and pressure gauge connection on DRE20
- 5 Locating pin
- 6 Name plate
- 7 Pilot oil drain always external and separate to tank at zero pressure.
- 8 Dead hole
- 9 Valve fixing screw holes



Size	B1	B2	B3	B4	B5	O-ring (port A and B)	O-ring (port X and Y)	D	H4					
10	85	50	66.7	58.8	7.9	17.12×2.62	9.25×1.78	13	188					
25	102	59.5	79.4	73	6.4	28.17×3.53	9.25×1.78	22	198					
32	120	76	96.8	92.8	3.8	34.52×3.53	9.25×1.78	30	206					
Size	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	H1	H2	H3	Weight
10	181	35.5	96	42.9	21.5	-	7.2	21.5	31.8	35.8	152	136.5	28	5.2kg
25	177	33.5	112	60.3	39.7	-	11.1	20.6	44.5	49.2	162	146.5	38	6.3kg
32	176.5	28	140	84.2	59.5	42.1	16.7	24.6	62.7	67.5	170	154.5	46	8.6kg



DR...type Pilot Operated Reducing Valve

DR...5XJ...type

Sizes 10, 16, 20,25, 32
Max. Working Pressure: 315 bar
Max. Flow: 400 L/min



Contents

Function and configurations	02
Symbols	02
Specifications	03
Technical data	04
Characteristic curves	05
Unit dimensions	06-08

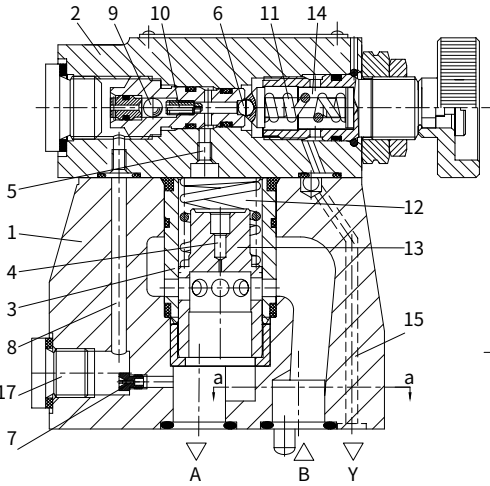
Features

- Sub-plate mounting
- Porting pattern conforms to DIN 24 340, form D and ISO 5781
- Threaded connections
- Installation in manifolds
- 5 pressure ratings
- 4 adjustment elements
 - Rotary knob
 - Adjustable bolt with protective cap
 - Lockable rotary knob with scale
 - Rotary knob with scale
- Check valve ,optional
(only for sub-plate mounting)

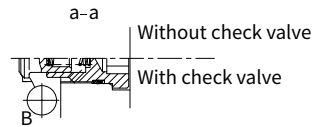
Function and configurations

DR type valve is a pilot operated pressure reducing valves. It is used to control secondary circuit in a system. It consists of the main valve (1) with main spool assembly(3) and pilot valve(2) with pressure adjustment element.

In rest position, the valves are open, fluid flows free from port B to port A via the main spool (3). Pressure at port A acts on the underside of main spool(3) and its spring-loaded side via throttle orifice(4). Fluid also acts on the ball valve(6) of the pilot valve(2) via the channel (5). At the same time, pressure fluid flows via throttle orifice (7), control line (8),check valve (9) and throttle orifice (10) to the ball valve(6). Based on the setting value of the spring (11), control piston(13) keeps open, then fluid can flow free from port B to port A, until pressure at port A exceed the setting value of spring(11), and then ball valve (6) is opened. Control piston (13) moves to close position. When pressure at port A is balanced with setting value at spring, pressure reducing is achieved as expected. Control oil returns from spring chamber(14) to tank via channel (15). A check valve(16) can be fitted optionally to give free return flow from line A to B. Pressure gauge connection(17) used for monitoring the reduced pressure at port A.

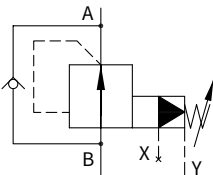


Type DR...-4-5XJ/...Y

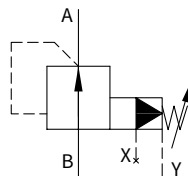


Symbols

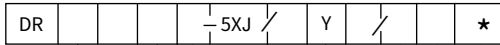
DR...5XJ/...Y



DR...5XJ/...YM



Specifications



Pressure reducing valve, pilot operated =No code
 Pilot operated valve Without main spool assembly (No mark for size) =C
 Pilot operated valve With main spool assembly (Marked with size 30) =C

Size	Connection	
	sub-plate mounting	threaded connection
10	=10	=10
16		=15
20	=20	=20
25		=25
32	=30	=30

Sub-plate mounting = -
 Threaded connection =G

Regulating element:
 Rotary knob =4
 Adjustable bolt with protective cap =5
 Lockable rotary knob with scale =6
 Rotary knob with scale =7

Further details in clear text

No code = NBR seals
 V = FKM seals

Only for Port X1 and Y1 of threaded connection valves and sub-plate mounting valves

No code = Inch thread
 2 = Metric thread

No code = With check valve (only for sub-plate mounting)
 M = Without check valve

Y = Pilot oil drain external

50 = Max. secondary pressure 50bar
 100 = Max. secondary pressure 100bar
 200 = Max. secondary pressure 200bar
 315 = Max. secondary pressure 315bar

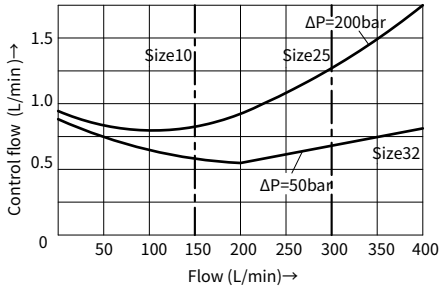
5XJ= Series 50J to 59J
 (50J to 59J series: unchanged installation and connection dimensions)

Technical data

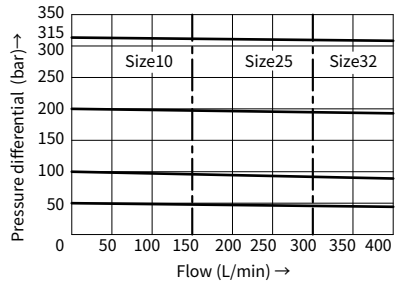
Fluid			Mineral oil suitable for NBR and FKM seal					
			Phosphate ester for FKM seal					
Fluid temperature range		°C	-30 to +80 (NBR seal)					
			-20 to +80 (FKM seal)					
Viscosity range		mm ² /s	10 to 800					
Degree of contamination			Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406					
Max.operating pressure	Port B	bar	350					
Operating pressure range	Port A	bar	10 to 350					
Max.backing pressure	Port Y	bar	350(only for without check valve); 315(with check valve)					
Adjustable pressure	Max.	bar	50;100;200;315;350					
	Min.	bar	Related with flow-rate (refer to the curves)					
Size			DR10	DR15	DR20	DR25	DR30	
Max. flow-rate	Sub-plate mounting	L/min	150	-	300	-	400	
	Threaded connection	L/min	150	300	300	400	400	
Fixing position			Optional					
Size			DR10	DR15	DR20	DR25	DR30	
Weight	Sub-plate mounting	DR	kg	Approx.3.6	-	Approx.5.3	-	Approx.8.2
		DR...G	kg	Approx.5.3	Approx.5.5	Approx.5.1	Approx.5.0	Approx.5.0
	Threaded connection	DRC	kg	Approx.1.2				
		DRC30	kg	Approx.1.5				

Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

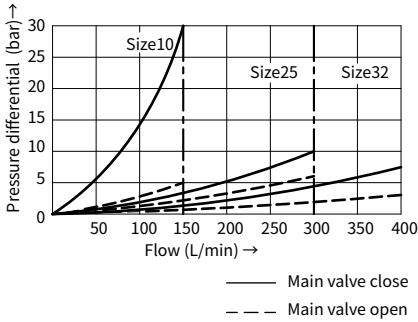
Control oil flow related with flow (B → A) and pressure differential



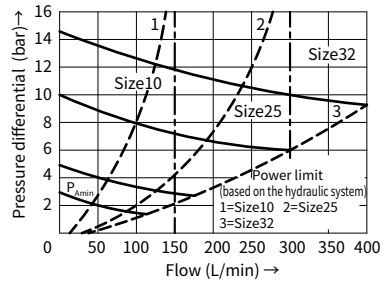
Outlet pressure PA and in relation to (B → A)



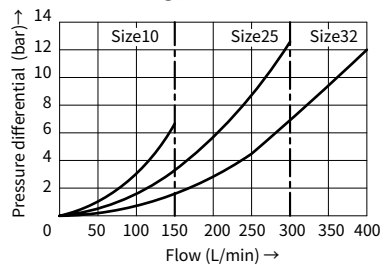
ΔP -Q curve, via check valve (A → B)



Min. setting pressure PA min in relation to flow (B → A)



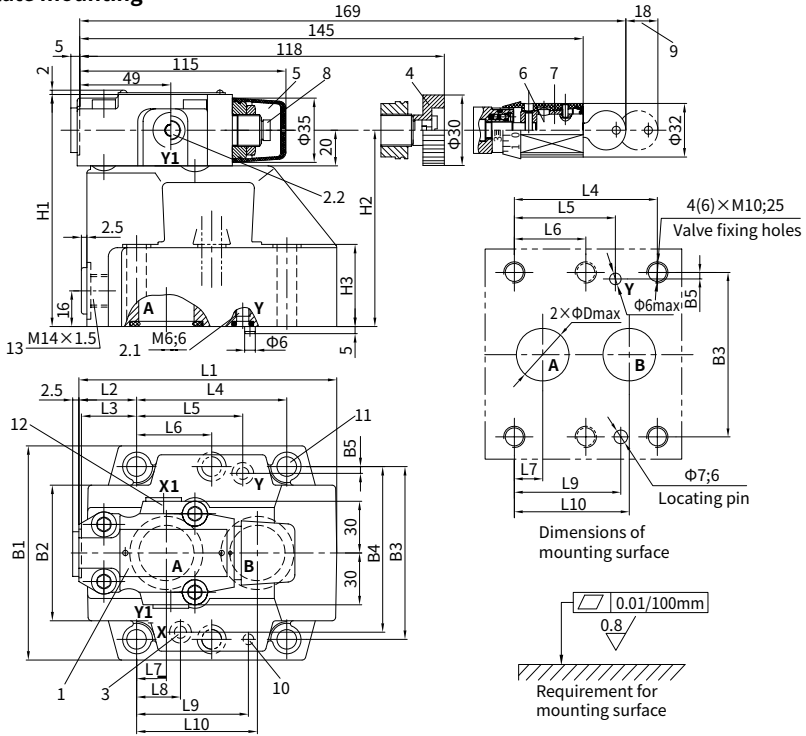
P-Q curve(B → A) (Min. setting pressure differential)



Unit dimensions

(Dimensions in mm)

Sub-plate mounting



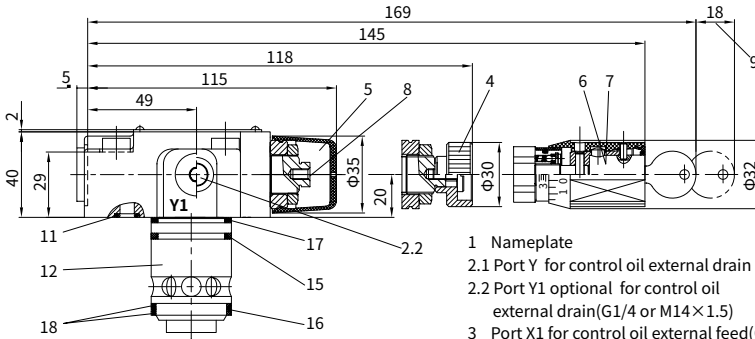
- 1 Nameplate
- 2.1 Port Y used for control oil external drain
- 2.2 Port Y1 optional for control oil external drain (G1/4 or M14×1.5)
- 3 Port X no function
- 4 Adjustment element "4"
- 5 Adjustment element "5"
- 6 Adjustment element "6"
- 7 Adjustment element "7"
- 8 Internal hexagon screw S=10
- 9 Space required to remove the key
- 10 Locating pin
- 11 Valve fixing holes 4pcs(DR10,DR20) , 6pcs(DR30)
- 12 Port X1 for control external(G1/4or M14×1.5)
- 13 Pressure gauge connection

Type	B1	B2	B3	B4	B5	O-ring (PortA,B)					O-ring (PortX,Y)		D
DR10	85	50	66.7	58.8	7.9	17.12×2.62					9.25×1.78		13
DR20	102	59.5	79.4	73	6.4	28.17×3.53					9.25×1.78		22
DR30	120	76	96.8	92.8	3.8	34.52×3.53					9.25×1.78		30
Type	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	H1	H2	H3
DR10	96	35.5	33	42.9	21.5	-	7.2	21.5	31.8	35.8	112	92	28
DR20	116	37.5	35.4	60.3	39.7	-	11.1	20.6	44.5	49.2	122	102	38
DR30	145	33	29.8	84.2	59.5	42.1	16.7	24.6	62.7	67.5	130	110	46

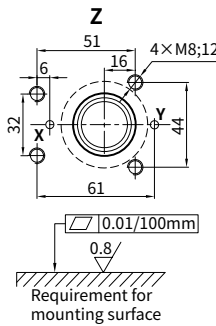
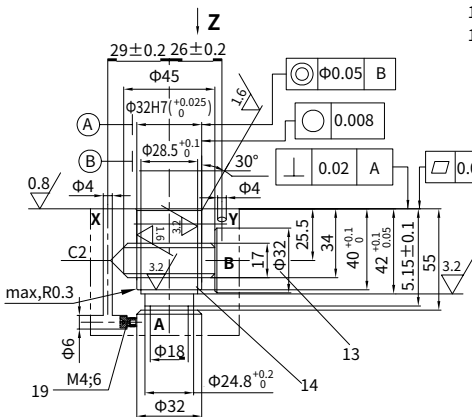
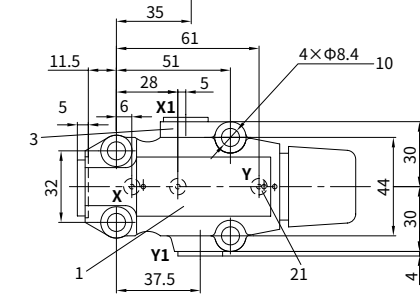
Unit dimensions

(Dimensions in mm)

(DRC30) pilot valve with or (DRC30) without main spool assembly



- 1 Nameplate
- 2.1 Port Y for control oil external drain
- 2.2 Port Y1 optional for control oil external drain(G1/4 or M14×1.5)
- 3 Port X1 for control oil external feed(G1/4 or M14×1.5)
- 4 Adjustment element "4"
- 5 Adjustment element "5"
- 6 Adjustment element "6"
- 7 Adjustment element "7"
- 8 Internal hexagon screw S=10
- 9 Space required to remove the key
- 10 Valve fixing holes(Valve fixing screw GB/T70.1-M8×40-10.9 M_A×37Nm)
- 11 O-ring 8.75×1.8(X,Y)
- 12 Main spool
- 13 Ø32 and Ø45 holes can meet each other at any position, but it can't damage the port X and the fixing holes
- 14 It must fix the O-ring and back-up ring into this hole before assembling the main spool
- 15 O-ring 28×1.8
- 16 O-ring 27.3×2.4
- 17 O-ring 28×2.65
- 18 O-ring 28.4×32×0.6
- 19 Flow controller(must be ordered separately)





DV(P)/DRV(P)...type (Check) Restrictor Valve



DV(P)/DRV(P)...10J... type

Sizes 6, 8, 10, 12, 16, 20, 25, 30
Max. Working Pressure: 350 bar
Max. Flow: 375 L/min

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Function and configuration	02
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Features

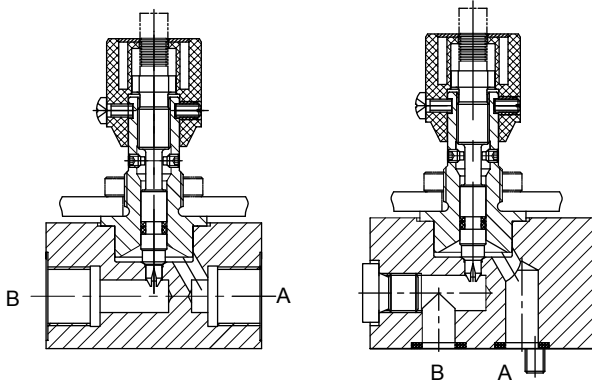
- For direct in-pipe mounting
- For control panel mounting
- Threaded connection
- Good repeatability of set values due to color scale
- Variant, optional:

Function and configuration

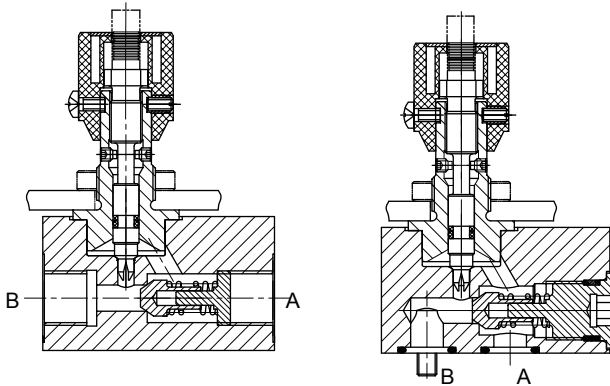
DV(P)/DRV(P) type valve is a flow control valve to adjust movement speed of actuators simply and exactly. The valve can also be used as shut-off valve when completely shut.

The scale of triangle shows how large the flow is (The larger the triangle is and the greater the flow is). Meanwhile, for resetting again, it can be restored to the preset position.

Type DV, DVP



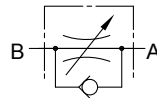
Type DRV, DRVP



Symbols



Type DV, DVP



Type DRV, DRVP

Specification

			1	10J		*	
Restrictor valve	=DV						Further details in clear text
Check restrictor valve	=DRV						No code = NBR seals V = FKM seals
Threaded connection	=No code						Threaded connection
Sub-plate mounting	= P						Inch thread Metric thread
Nominal size 6	=6						No code= 2 =
Nominal size 8	=8						10J= 10J Series
Nominal size 10	=10						1= Steel valve body
Nominal size 12	=12						
Nominal size 16	=16						
Nominal size 20	=20						
Nominal size 25	=25						
Nominal size 30	=30						

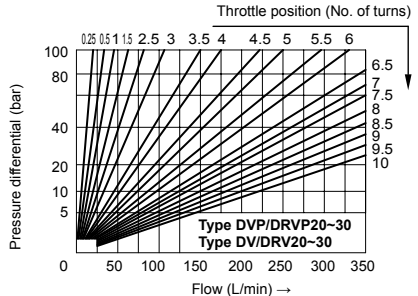
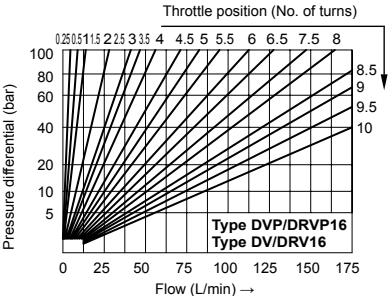
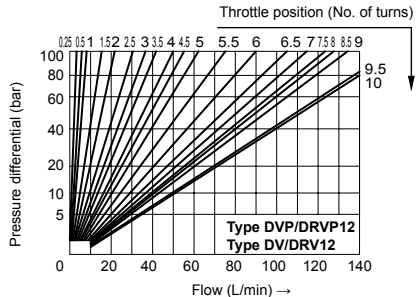
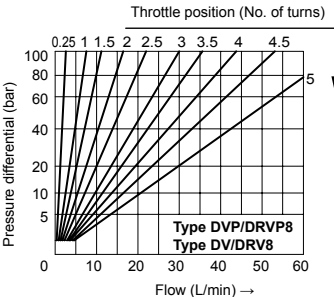
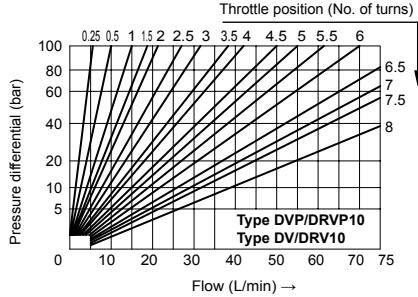
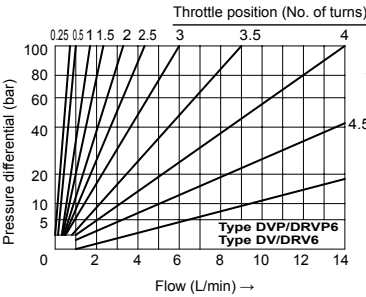
04

Technical data

Size		6	8	10	12	16	20	25	30	
Max.Operating pressure	bar	350								
Check valve cracking pressure	bar	5								
Weight	Type DV	kg	0.12	0.53	0.7	0.9	1.5	2.5	3.3	3.8
	Type DVP		0.25	0.7	1.0	1.3	2.6	4.3	8.3	11.2
	Type DRV		0.13	0.6	0.7	0.9	1.5	3.1	4.1	5.3
	Type DRVP		0.26	0.7	1.0	1.4	2.7	4.7	8.8	12.2
Fluid		Mineral oil; phosphate ester								
Fluid temperature range	°C	-20 to +80								
Viscosity	mm ² /s	2.8~500								
Installation position		Optional								
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406								

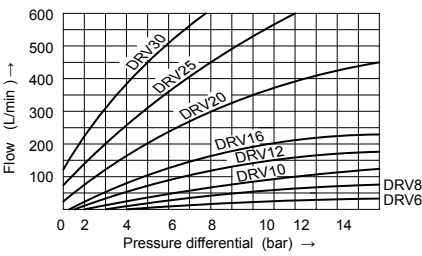
Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

Flow direction: A to B relation of differential pressure ΔP to flow Q in constant throttle position



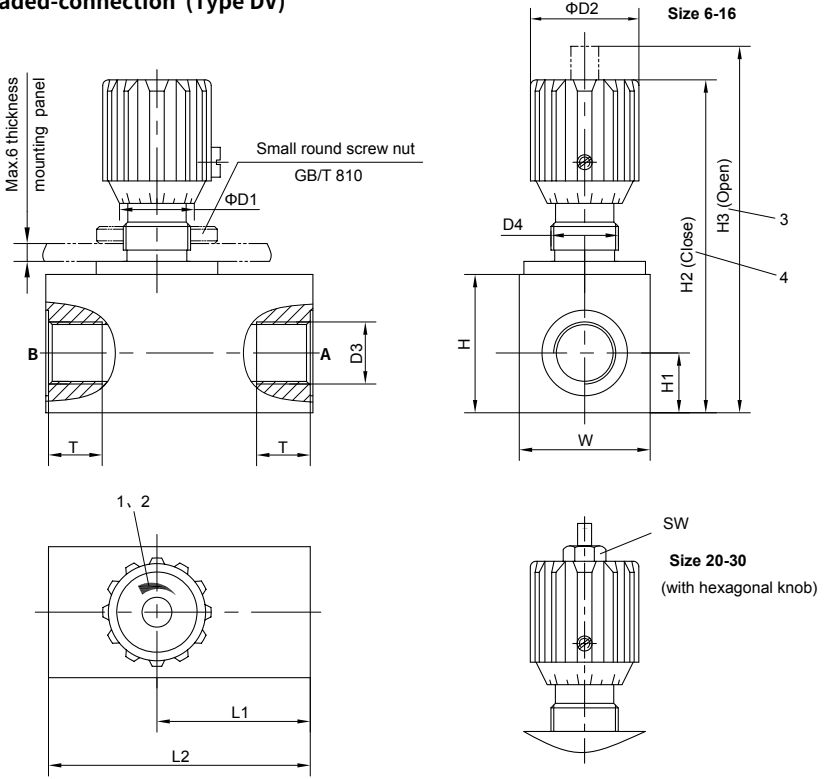
Type DRV

Flow direction: B to A P-Q curve of Free flow via open check valve



Unit dimensions

• Threaded-connection (Type DV)



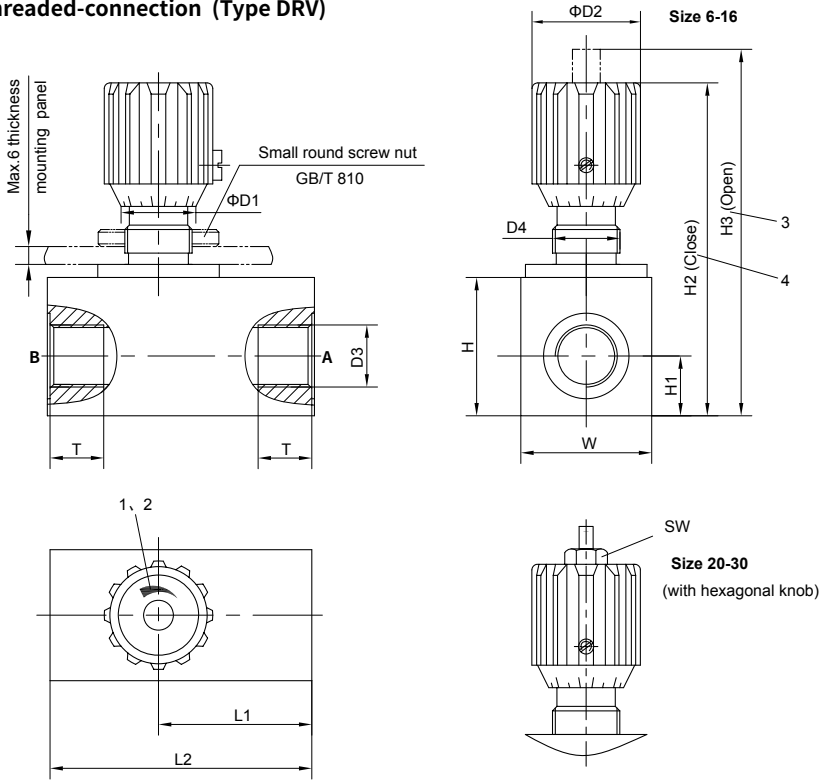
1 Flow increases with anti-clockwise rotation
 2 Flow reduces with clockwise rotation

3 Throttle fully opens
 4 Throttle closes

Size	W×H	ΦD1	ΦD2	D3		D4	H1	H2	H3	L1	L2	SW	T
6	20×20	15	24	G1/8	M10×1	M12×1.25	10	64	68	19.5	39		9
8	34×30.5	20	29	G1/4	M14×1.5	M18×1.5	12.5	83	90	32.5	63.5		12
10	36.5×38.5	20	29	G3/8	M18×1.5	M18×1.5	16	95	103	33	66		12
12	37×38	26	37.5	G1/2	M22×1.5	M22×1.5	17.5	101.5	109.5	44.5	80		14
16	45×52	26	37.5	G3/4	M27×2	M22×1.5	22.5	124	134.5	44.5			16
20	57×56.5	38	50	G1	M33×2	M36×1.5	26	162.5	178.5	49.5	99	19	18
25	63×66	38	50	G1 1/4	M42×2	M36×1.5	30	167	186	54.5	109	19	20
30	73×76	38	50	G1 1/2	M48×2	M36×1.5	35	177.5	196	54.5	109	19	22

Unit dimensions

• Threaded-connection (Type DRV)



Size	W×H	ΦD1	ΦD2	D3		D4	H1	H2	H3	L1	L2	SW	T
6	20×21	15	24	G1/8	M10×1	M12×1.25	10	65	70	28	46		9
8	34×35	20	29	G1/4	M14×1.5	M18×1.5	15	87	94	38	64.5		12
10	36.5×41	20	29	G3/8	M18×1.5	M18×1.5	16	98	105	45.5	71		12
12	37×42	26	37.5	G1/2	M22×1.5	M22×1.5	17.5	105	113	48	81		14
16	45×54	26	37.5	G3/4	M27×2	M22×1.5	22.5	124	134.5	56.5	89		16
20	57×59	38	50	G1	M33×2	M36×1.5	26	162.5	178.5	80	128	19	18
25	63×70	38	50	G1 1/4	M42×2	M36×1.5	30	170	186.5	98	144	19	20
30	73×80	38	50	G1 1/2	M48×2	M36×1.5	35	180	195.5	105	145	19	22

1 Flow increases with anti-clockwise rotation

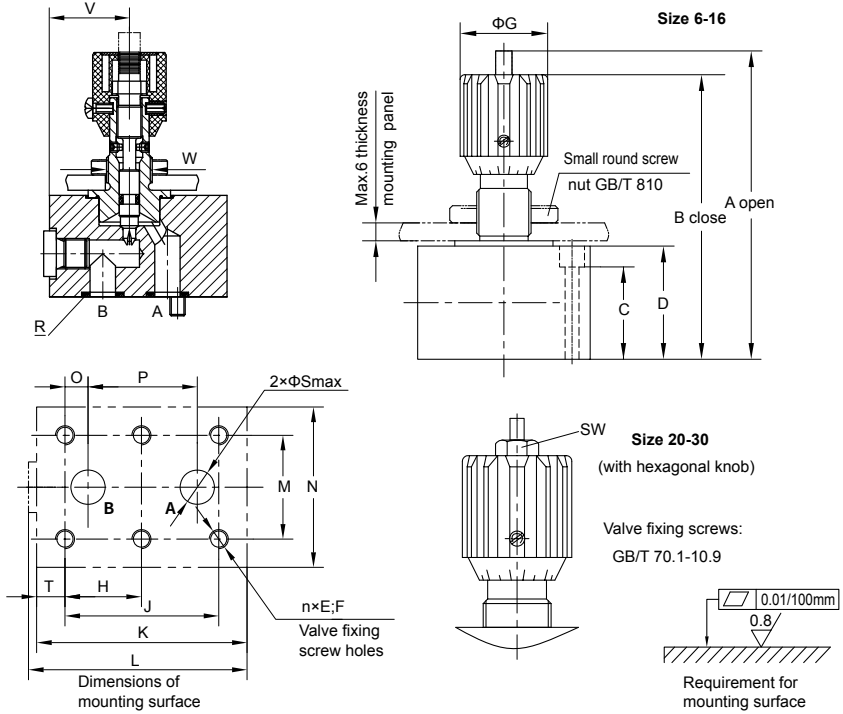
2 Flow reduces with clockwise rotation

3 Throttle fully opens

4 Throttle closes

Unit dimensions

• Sub-plate mounting (Type DVP)

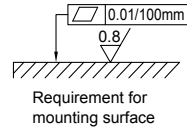
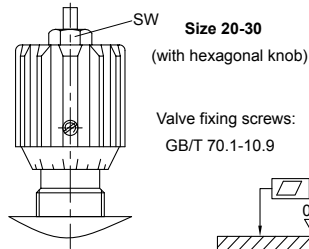
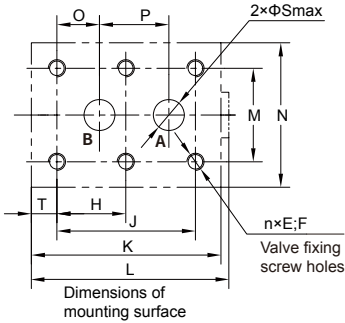
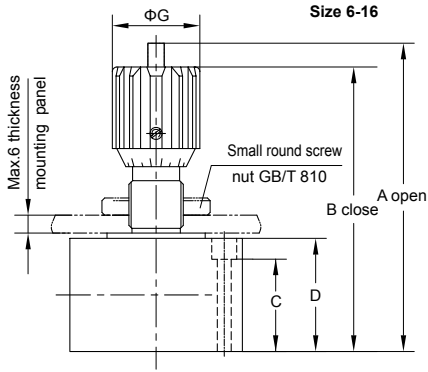
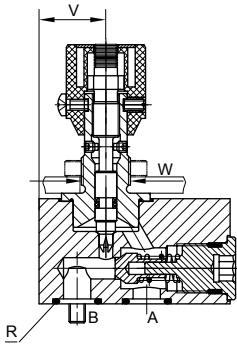


Size	A	B	C	D	n	E	F	G	H	J	K	L	M	N
6	66	61.5	10	18	4	M6	12	24	-	19	38	41	28.5	41.5
8	89.6	82.7	21	30.5	4	M6	12	29	-	35	63.5	67	33.5	46
10	104	96	29.5	40	4	M6	12	29	-	33.5	70	72.3	38	51
12	109	100.5	29	38	4	M6	12	37.5	-	38	80	82	44.5	57.5
16	133	122.3	41	52	6	M8	16	37.5	38	76	104	107	54	70
20	177	161	49	61	6	M8	16	50	47.5	95	127	129	60	76.5
25	185	170	55	68.5	6	M10	20	50	60	120	165	168	76	100
30	195	179	63	79	6	M12	24	50	71.5	143	186	186	92	115

Size	O	P	R	S	T	V	W	SW	Vale fixing screw
6	1.6	16	O-ring 7×1.5	5	9.5	18.5	M12×1.25	-	M6×20
8	4.5	25.5	O-ring 12.3×2.4	8	14.3	31	M18×1.5	-	M6×30
10	4	25.5	O-ring 12.3×2.4	10	17	31.5	M18×1.5	-	M6×40
12	4	30	O-ring 15×2.65	12	21	36.5	M22×1.5	-	M6×40
16	11.4	54	O-ring 19×3	15	14	49	M22×1.5	-	M8×55
20	19	57	O-ring 30×3	20	17	47	M36×1.5	19	M8×60
25	20.6	79.5	O-ring 32×3	25	15	77	M36×1.5	19	M10×70
30	23.8	95	O-ring 34.52×3.53	30	15	85	M36×1.5	19	M12×80

Unit dimensions

· Sub-plate mounting (Type DRVP)



Size	A	B	C	D	n	E	F	G	H	J	K	L	M	N
6	67	62.5	9	19	4	M6	12	24	-	19	41.5	43	28.5	41.5
8	90	83	19	31	4	M6	12	29	-	35	63	67	33.5	46
10	103	95	30	38.5	4	M6	12	29	-	33.5	70	72	38	51
12	112	103.5	29	41	4	M6	12	37.5	-	38	80	84	44.5	57.5
16	132	122	41	51	6	M8	16	37.5	38	76	104	107	54	70
20	176	161	48	60	6	M8	16	50	47.5	95	127	131	60	76.5
25	186	171	55	70	6	M10	20	50	60	120	165	169	76	100
30	195	180	63	79	6	M12	24	50	71.5	143	186	190	92	115

Size	O	P	R	S	T	V	W	SW	Vale fixing screw
6	1.6	16	O-ring 7×1.5	5	6.4	10	M12×1.25	-	M6×20
8	4.5	25.5	O-ring 12.3×2.4	8	9.3	25.8	M18×1.5	-	M6×30
10	4	25.5	O-ring 13.2×2.4	10	10	24.5	M18×1.5	-	M6×40
12	4	30	O-ring 15×2.65	12	21	31.5	M22×1.5	-	M6×40
16	11.4	54	O-ring 19×3	15	14	41	M22×1.5	-	M8×55
20	19	57	O-ring 30×3	20	17	44	M36×1.5	19	M8×60
25	20.6	79.5	O-ring 32×3	25	15	62	M36×1.5	19	M10×70
30	23.8	95	O-ring 34.52×3.53	30	15	72	M36×1.5	19	M12×80



DV(P)/DRV(P)...type (Check) Restrictor Valve



DV(P)/DRV(P)...10J... type

Sizes 6, 8, 10, 12, 16, 20, 25, 30
Max. Working Pressure: 350 bar
Max. Flow: 375 L/min

Contents

Function and configuration	02
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Characteristic curves	04
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Features

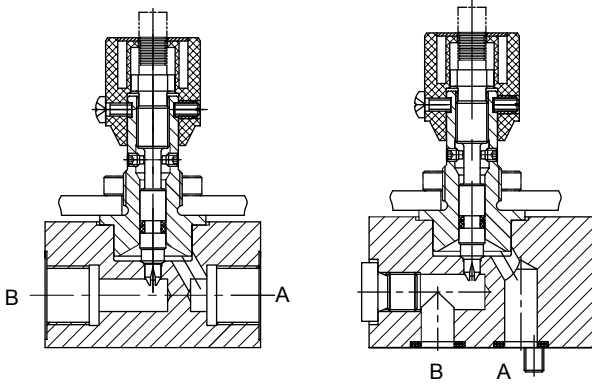
- For direct in-pipe mounting
- For control panel mounting
- Threaded connection
- Good repeatability of set values due to color scale
- Variant, optional:

Function and configuration

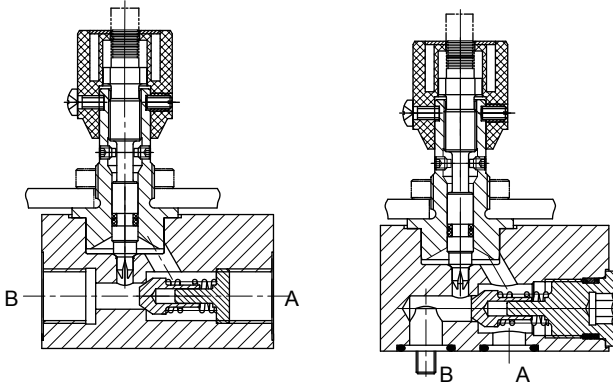
DV(P)/DRV(P) type valve is a flow control valve to adjust movement speed of actuators simply and exactly. The valve can also be used as shut-off valve when completely shut.

The scale of triangle shows how large the flow is (The larger the triangle is and the greater the flow is). Meanwhile, for resetting again, it can be restored to the preset position.

Type DV, DVP



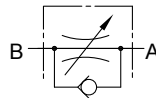
Type DRV, DRVP



Symbols

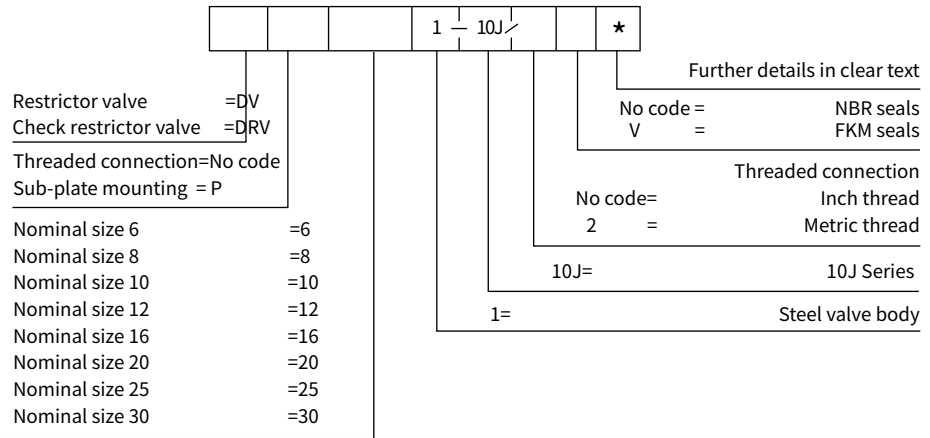


Type DV, DVP



Type DRV, DRVP

Specification



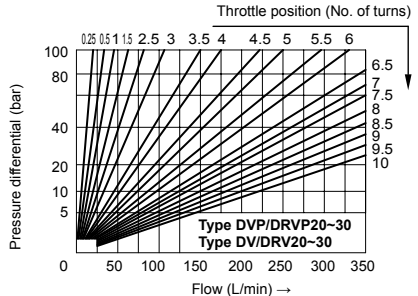
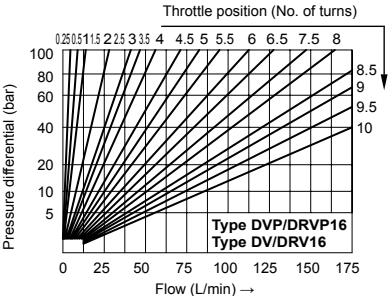
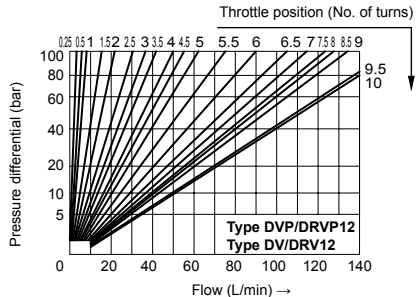
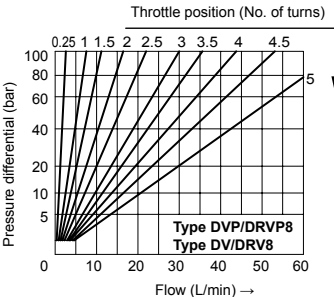
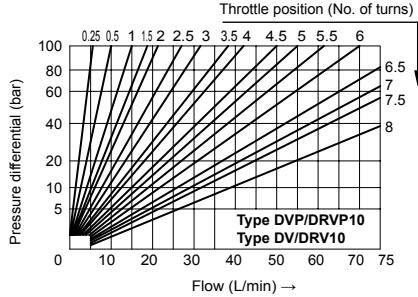
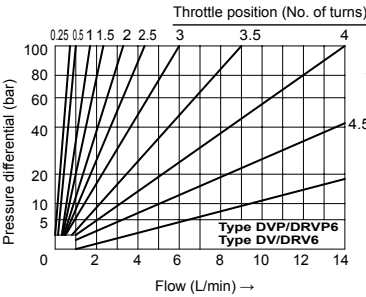
04

Technical data

Size		6	8	10	12	16	20	25	30	
Max. Operating pressure	bar	350								
Check valve cracking pressure	bar	5								
Weight	Type DV	kg	0.12	0.53	0.7	0.9	1.5	2.5	3.3	3.8
	Type DVP		0.25	0.7	1.0	1.3	2.6	4.3	8.3	11.2
	Type DRV		0.13	0.6	0.7	0.9	1.5	3.1	4.1	5.3
	Type DRVP		0.26	0.7	1.0	1.4	2.7	4.7	8.8	12.2
Fluid		Mineral oil; phosphate ester								
Fluid temperature range	°C	-20 to +80								
Viscosity	mm ² /s	2.8~500								
Installation position		Optional								
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406								

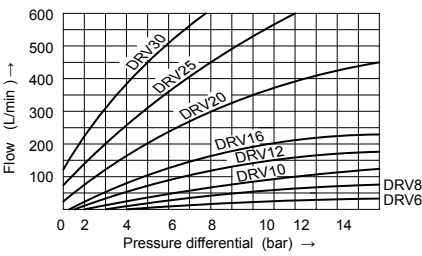
Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

Flow direction: A to B relation of differential pressure ΔP to flow Q in constant throttle position



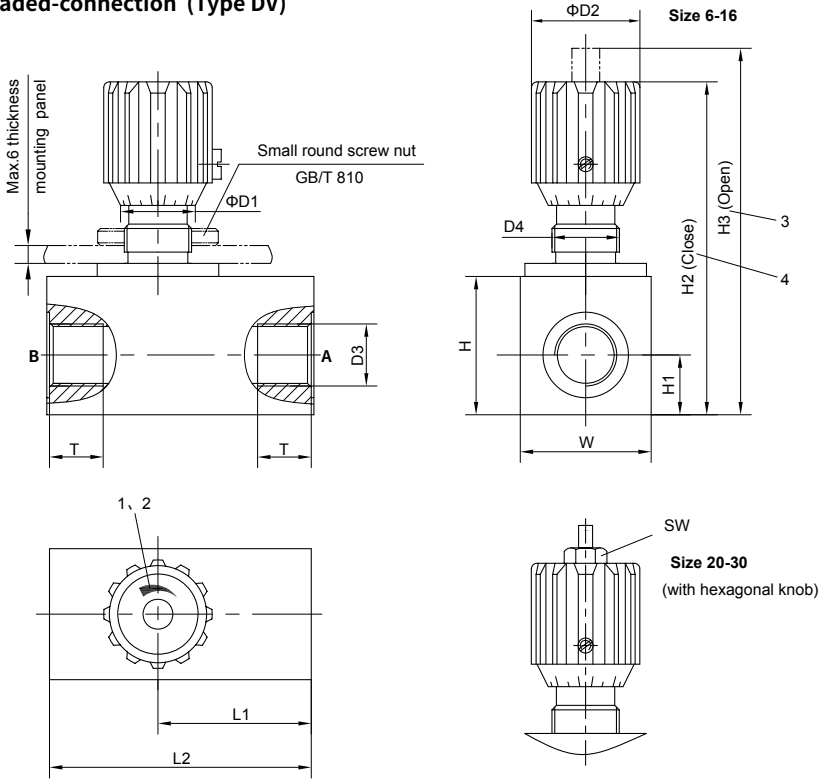
Type DRV

Flow direction: B to A P-Q curve of Free flow via open check valve



Unit dimensions

• Threaded-connection (Type DV)



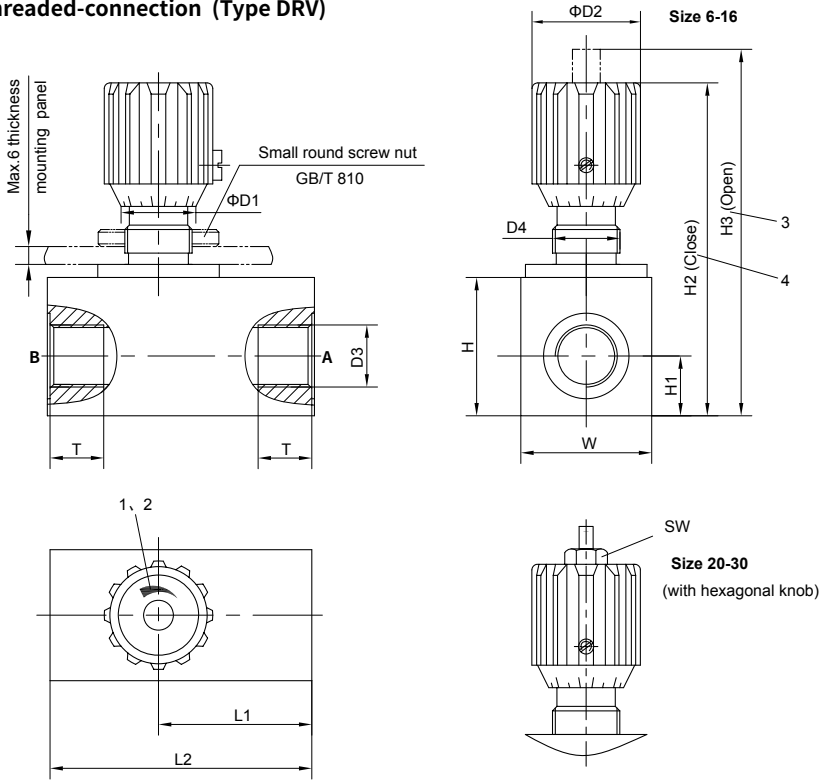
1 Flow increases with anti-clockwise rotation
 2 Flow reduces with clockwise rotation

3 Throttle fully opens
 4 Throttle closes

Size	W×H	$\Phi D1$	$\Phi D2$	D3		D4	H1	H2	H3	L1	L2	SW	T
6	20×20	15	24	G1/8	M10×1	M12×1.25	10	64	68	19.5	39		9
8	34×30.5	20	29	G1/4	M14×1.5	M18×1.5	12.5	83	90	32.5	63.5		12
10	36.5×38.5	20	29	G3/8	M18×1.5	M18×1.5	16	95	103	33	66		12
12	37×38	26	37.5	G1/2	M22×1.5	M22×1.5	17.5	101.5	109.5	44.5	80		14
16	45×52	26	37.5	G3/4	M27×2	M22×1.5	22.5	124	134.5	44.5			16
20	57×56.5	38	50	G1	M33×2	M36×1.5	26	162.5	178.5	49.5	99	19	18
25	63×66	38	50	G1 1/4	M42×2	M36×1.5	30	167	186	54.5	109	19	20
30	73×76	38	50	G1 1/2	M48×2	M36×1.5	35	177.5	196	54.5	109	19	22

Unit dimensions

• Threaded-connection (Type DRV)



Size	W×H	ΦD1	ΦD2	D3		D4	H1	H2	H3	L1	L2	SW	T
6	20×21	15	24	G1/8	M10×1	M12×1.25	10	65	70	28	46		9
8	34×35	20	29	G1/4	M14×1.5	M18×1.5	15	87	94	38	64.5		12
10	36.5×41	20	29	G3/8	M18×1.5	M18×1.5	16	98	105	45.5	71		12
12	37×42	26	37.5	G1/2	M22×1.5	M22×1.5	17.5	105	113	48	81		14
16	45×54	26	37.5	G3/4	M27×2	M22×1.5	22.5	124	134.5	56.5	89		16
20	57×59	38	50	G1	M33×2	M36×1.5	26	162.5	178.5	80	128	19	18
25	63×70	38	50	G1 1/4	M42×2	M36×1.5	30	170	186.5	98	144	19	20
30	73×80	38	50	G1 1/2	M48×2	M36×1.5	35	180	195.5	105	145	19	22

1 Flow increases with anti-clockwise rotation

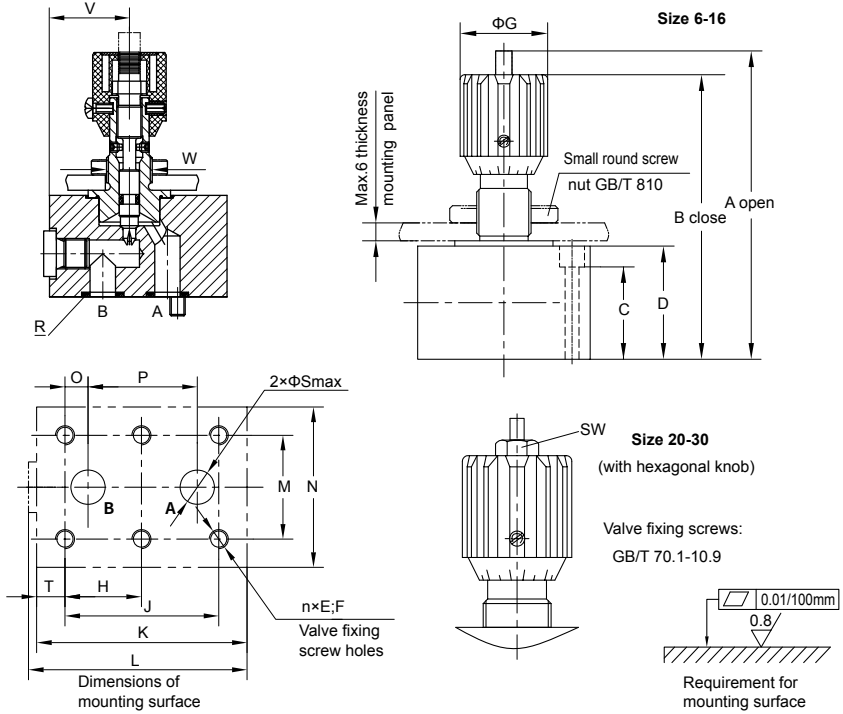
2 Flow reduces with clockwise rotation

3 Throttle fully opens

4 Throttle closes

Unit dimensions

• Sub-plate mounting (Type DVP)

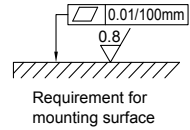
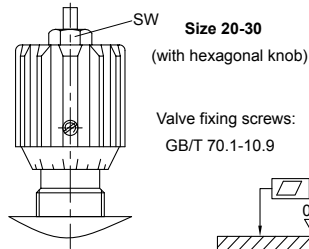
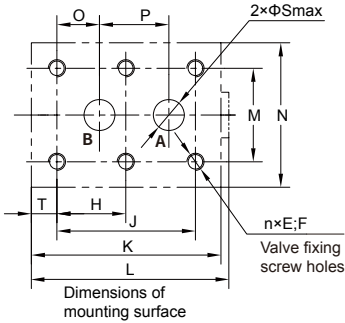
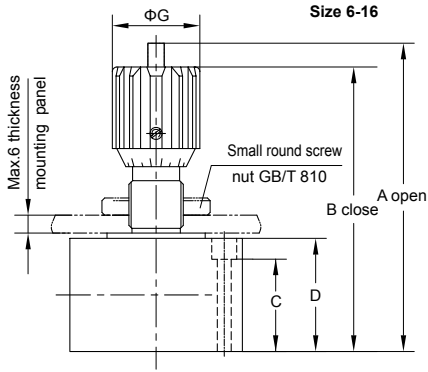
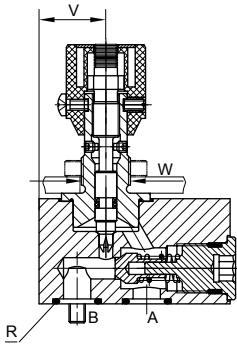


Size	A	B	C	D	n	E	F	G	H	J	K	L	M	N
6	66	61.5	10	18	4	M6	12	24	-	19	38	41	28.5	41.5
8	89.6	82.7	21	30.5	4	M6	12	29	-	35	63.5	67	33.5	46
10	104	96	29.5	40	4	M6	12	29	-	33.5	70	72.3	38	51
12	109	100.5	29	38	4	M6	12	37.5	-	38	80	82	44.5	57.5
16	133	122.3	41	52	6	M8	16	37.5	38	76	104	107	54	70
20	177	161	49	61	6	M8	16	50	47.5	95	127	129	60	76.5
25	185	170	55	68.5	6	M10	20	50	60	120	165	168	76	100
30	195	179	63	79	6	M12	24	50	71.5	143	186	186	92	115

Size	O	P	R	S	T	V	W	SW	Vale fixing screw
6	1.6	16	O-ring 7×1.5	5	9.5	18.5	M12×1.25	-	M6×20
8	4.5	25.5	O-ring 12.3×2.4	8	14.3	31	M18×1.5	-	M6×30
10	4	25.5	O-ring 12.3×2.4	10	17	31.5	M18×1.5	-	M6×40
12	4	30	O-ring 15×2.65	12	21	36.5	M22×1.5	-	M6×40
16	11.4	54	O-ring 19×3	15	14	49	M22×1.5	-	M8×55
20	19	57	O-ring 30×3	20	17	47	M36×1.5	19	M8×60
25	20.6	79.5	O-ring 32×3	25	15	77	M36×1.5	19	M10×70
30	23.8	95	O-ring 34.52×3.53	30	15	85	M36×1.5	19	M12×80

Unit dimensions

· Sub-plate mounting (Type DRVP)



Size	A	B	C	D	n	E	F	G	H	J	K	L	M	N
6	67	62.5	9	19	4	M6	12	24	-	19	41.5	43	28.5	41.5
8	90	83	19	31	4	M6	12	29	-	35	63	67	33.5	46
10	103	95	30	38.5	4	M6	12	29	-	33.5	70	72	38	51
12	112	103.5	29	41	4	M6	12	37.5	-	38	80	84	44.5	57.5
16	132	122	41	51	6	M8	16	37.5	38	76	104	107	54	70
20	176	161	48	60	6	M8	16	50	47.5	95	127	131	60	76.5
25	186	171	55	70	6	M10	20	50	60	120	165	169	76	100
30	195	180	63	79	6	M12	24	50	71.5	143	186	190	92	115

Size	O	P	R	S	T	V	W	SW	Vale fixing screw
6	1.6	16	O-ring 7×1.5	5	6.4	10	M12×1.25	-	M6×20
8	4.5	25.5	O-ring 12.3×2.4	8	9.3	25.8	M18×1.5	-	M6×30
10	4	25.5	O-ring 13.2×2.4	10	10	24.5	M18×1.5	-	M6×40
12	4	30	O-ring 15×2.65	12	21	31.5	M22×1.5	-	M6×40
16	11.4	54	O-ring 19×3	15	14	41	M22×1.5	-	M8×55
20	19	57	O-ring 30×3	20	17	44	M36×1.5	19	M8×60
25	20.6	79.5	O-ring 32×3	25	15	62	M36×1.5	19	M10×70
30	23.8	95	O-ring 34.52×3.53	30	15	72	M36×1.5	19	M12×80



DZ...type Pilot Operated Sequence Valve



DZ...5XJ...type

Sizes 10, 25, 32
Max. Working Pressure: 315 bar
Max. Flow: 600 L/min

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Features

- Sub-plate mounting
- Conforms to DIN 24 340, form D, and ISO 5781
- Manifold plate mounting
- 4 pressure ratings
- 4 adjustment elements:
 - Rotary knob
 - Adjustable bolt with protective cap
 - Lockable rotary knob with scale
 - Rotary knob with scale
- Check valve, optional

Function and configuration

DZ type valve is a pilot operated pressure sequence valves. It is used for pressure dependent sequence switching of a secondary circuit.

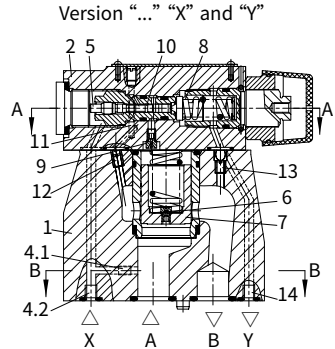
The valve consists of main valve (1) with main spool insert (7), pilot valve (2) with pressure adjustment element and optional check valve (3).

According to the Pilot Oil supply and return, the function you distinguish between:

• Type DZ...-5XJ/.....

(Control lines 4.1, 12 and 13 open;

control lines 4.2, 14 and 15 plugged) The pressure in port A acts on the pilot spool (5) of the pilot valve (2) via the control line (4.1). At the same time it acts on the spring loaded side of the main spool (7) via orifice(6). When the pressure exceeds the setting value of spring (8), the pilot spool (5) is moved against the spring (8). The fluid on the spring loaded side of the main spool (7) flows to port B via orifice (9), control land (10) and control lines (11) and (12). There is now a pressure drop at main spool (7), the connection from port A to port B opens to maintain the pressure set by spring (8). The leakage oil at pilot spool (5) is led to port B internally via control line(13). An optional check valve (3) can be fitted for free flow from port B to A.



• Sequence valve Type DZ...-5XJ/...X..

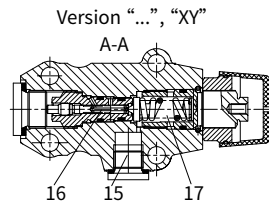
(Control lines 4.2, 12 and 13 open;

control lines 4.1, 14 and 15 plugged) The function of this valve is principally the same as valve DZ...-5XJ/....However, on pressure sequence valve type DZ...-5XJ/...X.. the signal is achieved externally by means of control line (4.2).

• Sequence valve Type DZ...-5XJ/...Y..

(Control lines 4.1, 12 and 14 or 15 open;

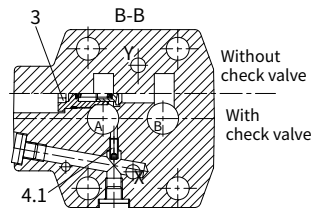
control lines 4.2, and 13 plugged) The function of this valve is principally the same as valve type DZ...-5XJ/....However, for type DZ...-5XJ/...Y.. leakage at pilot spool(5) must be drained to tank without pressure via line (14) or(15). Pilot oil is fed to port B via line(12).



• Bypass valve Type DZ...-5XJ/...XY..

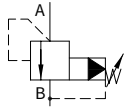
(Control lines 4.2 14 or 15 open;

control lines 4.1, 12 and 13 plugged) Pressure in port X acts on the pilot spool (5) in the pilot valve (2) via control line (4.2). At the same time pressure in port A acts on the spring loaded side of the main spool (7) via orifice (6). When the pressure in port X exceeds the setting value of the spring (8), the pilot spool(5) is moved against the spring (8), fluid can flow from the spring loaded side of the main spool (7) into the spring chamber (17) of the pilot valve (2) via orifice (9) and line (16) and pressure decreases on the spring loaded side of the main spool (7).The fluid can, therefore, flow from port A to B with minimum pressure loss. The pilot oil in spring chamber (17) should be drained to tank without pressure via line (14) or (15). An optional check valve (3) can be fitted for free flow from port B to A.

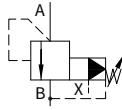


Symbols

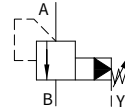
DZ...5XJ/...M...
DZC...5XJ/...M...



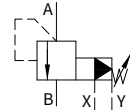
DZ...5XJ/...XM...



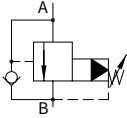
DZ...5XJ/...YM...



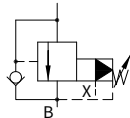
DZ...5XJ/...XYM...
DZC...5XJ/...XYM...



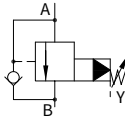
DZ...5XJ/...



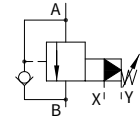
DZ...5XJ/...X...



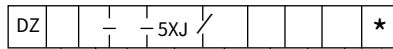
DZ...5XJ/...Y...



DZ...5XJ/...XY...



Specification



Pressure sequence valve, pilot operated	=No code
Pilot operated valve Without main spool assembly (No mark for size)	= C
Pilot operated valve With main spool assembly (Marked with size 30)	= C
Nominal size 10	=10
Nominal size 25	=20
Nominal size 32	=30
Rotary knob	=1
Adjustable bolt with protective cap	=2
Lockable rotary knob with scale	=3
Rotary knob with scale	=7
Series 50 to 59J (50J to 59J series: unchanged installation and connection dimensions)	=5XJ

Further details in clear text	
No code =	NBR seals
V =	FKM seals
No code =	With check valve
M =	Without check valve

No code= Pilot oil supply and drain internal
 X= Pilot oil supply external and drain internal
 Y= Pilot oil supply internal and drain external
 XY= Pilot oil supply and drain external

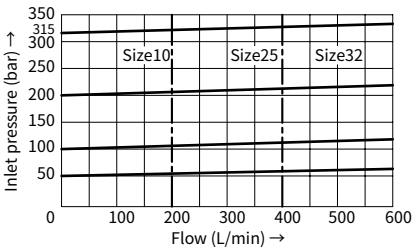
50 =	Max. secondary pressure 50 bar
100 =	Max. secondary pressure 100 bar
200 =	Max. secondary pressure 200 bar
315 =	Max. secondary pressure 315 bar

Technical data

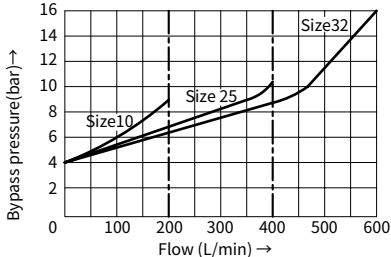
Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal			
Fluid temperature range		°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)		
Viscosity range		mm ² /s	10 to 800		
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406			
Max. operating pressure	Port A, B, X	bar	315		
	Port Y	bar	315		
Adjustable pressure	Max.	bar	50;100;200;315		
	Min.	bar	Interrelated to the flow (refer to the characteristic curve)		
Size			DZ10	DZ20	DZ30
Max. flow-rate		L/min	200	400	600
Fixing position		Optional			
Size			DZ10	DZ20	DZ30
Weight	sub-plate mounting DZ	kg	Approx.3.6	Approx.5.5	Approx.8.2
	DZC	kg	Approx.1.2		
	DZC30	kg	Approx.1.5		

Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

Inlet pressure in relation to flow (A → B)

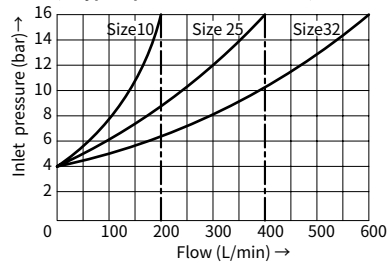


**Bypass pressure in relation to flow (A → B)
(only for version "...XY...")**



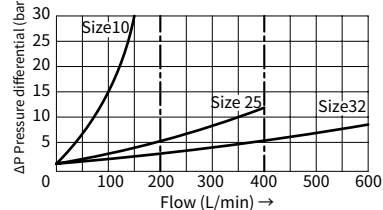
The curves are valid for outlet pressure $P_B=0$ for the complete flow range

**Minimum inlet pressure in relation to flow (A → B)
(= bypass pressure model "...X...")**



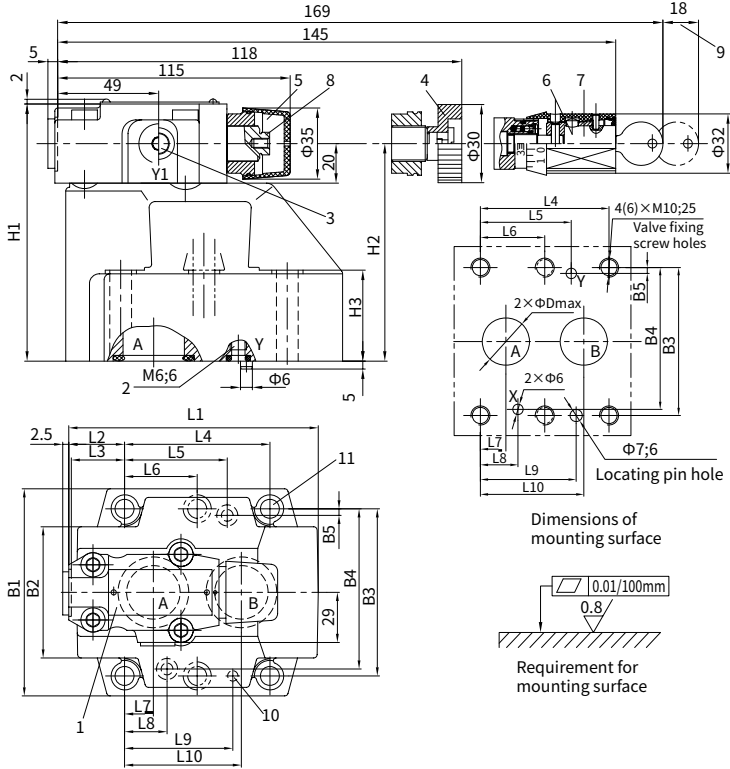
The curves are valid for outlet pressure $P_B=0$ for the complete flow range

**ΔP -Q Characteristic curves
via check valve (B → A)**



Unit dimensions

(Dimensions in mm)



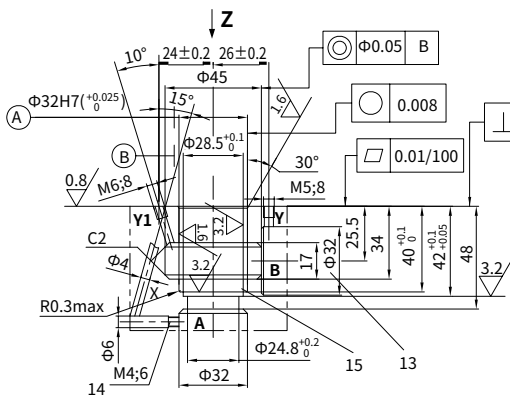
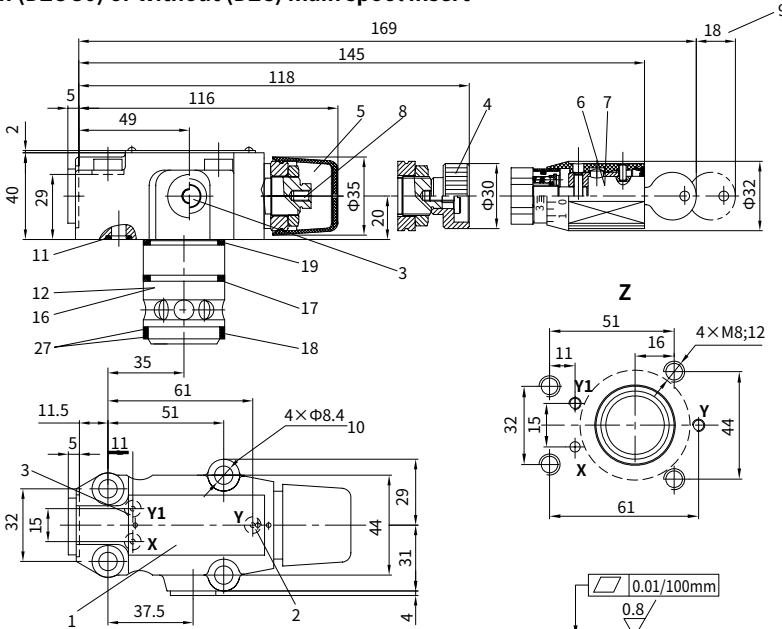
- 1 Nameplate
- 2 Port Y used for control oil drain external for use as bypass valve
- 3 Port Y1(G1/4;12) for control external drain when used as bypass valve, for unloading of spring chamber when used as sequence valve
- 4 Adjustment element "1"
- 5 Adjustment element "2"
- 6 Adjustment element "3"
- 7 Adjustment element "7"
- 8 Internal hexagon screw S=10
- 9 Space required to remove the key
- 10 Locating pin
- 11 Valve fixing holes 4pcs (DZ10, DZ20); 6pcs(DZ30)

Type	B1	B2	B3	B4	B5	O-ring(PortA,B)				O-ring(PortX,Y)				D
DZ10	85	50	66.7	58.8	7.9	17.12×2.62				9.25×1.78				13
DZ20	102	59.5	79.4	73	6.4	28.17×3.53				9.25×1.78				22
DZ30	120	76	96.8	92.8	3.8	34.52×3.53				9.25×1.78				30
Type	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	H1	H2	H3	
DZ10	96	35.5	33	42.9	21.5	-	7.2	21.5	31.8	35.8	112	92	28	
DZ20	116	37.5	35.4	60.3	39.7	-	11.1	20.6	44.5	49.2	122	102	38	
DZ30	145	33	29.8	84.2	59.5	42.1	16.7	24.6	62.7	67.5	130	110	46	

Unit dimensions

(Dimensions in mm)

With (DZC 30) or without (DZC) main spool insert



- 1 Nameplate
- 2 Port Y for control oil external drain when used as bypass valve, for unloading of spring chamber when used as sequence valve
- 3 Port Y1 (G1/4; 12) used for control oil drain external when used as pressure control or sequence valve
- 4 Adjustment element "1"
- 5 Adjustment element "2"
- 6 Adjustment element "3"
- 7 Adjustment element "7"

- 8 Internal hexagon bolt S=10
- 9 Space required to remove the key
- 10 Locating pin
- 11 O-ring 9.25×1.78
- 12 Main spool insert
- 13 Hole Ø 32 can meet hole Ø 45 at any location. It must care that connection hole X and the fixing hole are not damaged.
- 14 This drilling is not required when used as bypass valve
- 15 Back-up ring and O-ring to be inserted into this hole before fitting the main spool
- 16 Cartridge assembly includes main spool insert with throttle
- 17 O-ring 28×1.8
- 18 O-ring 27.3×2.4
- 19 O-ring 28×2.65
- 20 Back-up ring 28.4×32×0.8



DZ6DP...type Direct Operated Sequence Valve



DZ6DP...5XJ...type

Size 6
Max. Working Pressure: 315 bar
Max. Flow: 60 L/min

Contents

Function and configuration	02
Symbols	02
Specification	03
Technical data	03
Characteristic curves	03
Unit dimensions	04

Features

- Direct operated
- Porting pattern to DIN 24 340, form A and ISO 4401
- 5 pressure ratings
- 2 adjustment elements:
 - Rotary knob
 - Adjustable bolt with protective cap
- Pressure gauge connection
- Check valve, optional

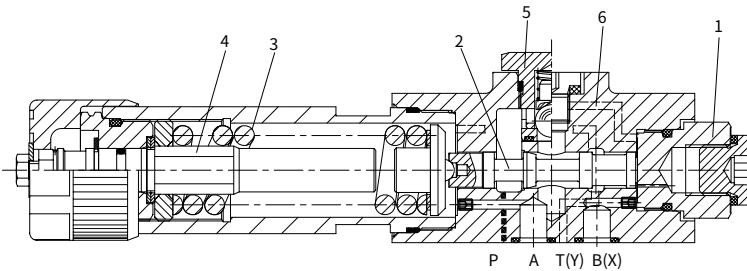
Function and configuration

DZ6DP type valve is a direct operated pressure sequence valve. It is used for the pressure dependent connection of a secondary system. The sequence pressure is setting via the adjusting element(4).

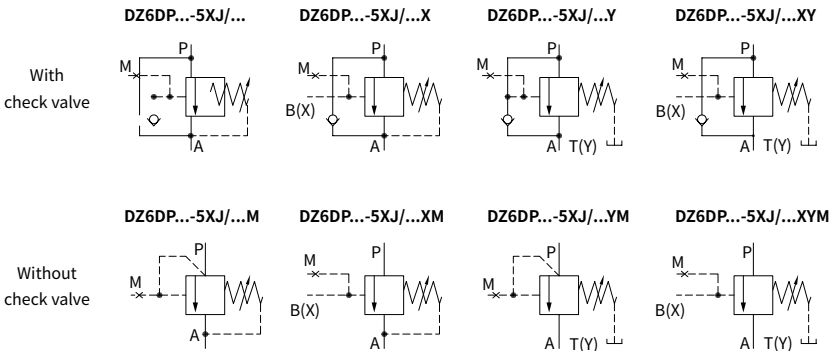
The spring (3) holds the control spool (2) in the neutral position, the valve is blocked. The pressure in channel P is acting at the end surface of the control spool (2) opposite the spring (3) via the control line (6). If the pressure in channel P reaches the setting value of the spring(3), the control spool (2) is moved to the left and the connection P to A is opened. In this case, fluid flows from channel P to A without pressure drop in channel P.

The control signal is adopted internally by the control line (6) from channel P or externally via port B (X). Depending on the use of the valve the leakage oil drain is externally via port T (Y) or internally via A.

Type DZ6DP1-5XJ/...



Symbols



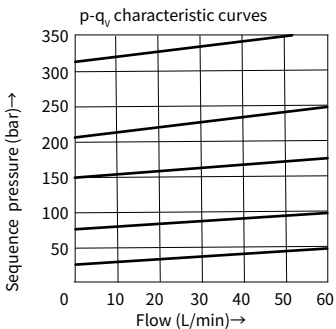
Specification

<table border="1"> <tr> <td>DZ6DP</td> <td>-</td> <td>5XJ</td> <td>/</td> <td></td> <td>/</td> <td></td> <td>*</td> </tr> </table>		DZ6DP	-	5XJ	/		/		*	Further details in clear text
DZ6DP	-	5XJ	/		/		*			
Direct operated pressure sequence valve nominal size 6								No code = NBR seals V = FKM seals		
Rotary knob =1								Pressure tapping thread		
Adjustable bolt with protective cap =2								No code = Incha thread 2 = Metric thread		
Lockable rotary knob with scale =3								No code = With check valve M = Without check valve		
Rotary knob with scale =7								No code = Pilot oil supply internal, oil drain internal X = Pilot oil supply external, oil drain internal Y = Pilot oil supply internal, oil drain external XY = Pilot oil supply external, oil drain external		
Series 50J to 59J (50J to 59J series: unchanged installation and connection dimensions) = 5XJ										
Max. secondary pressure 25 bar =25										
Max. secondary pressure 75 bar =75										
Max. secondary pressure 150 bar =150										
Max. secondary pressure 210 bar =210										
Max. secondary pressure 315 bar =315										

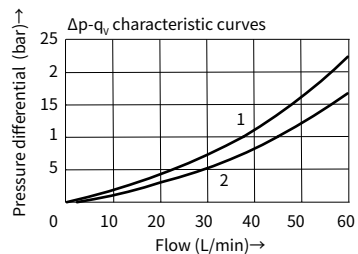
Technical data

Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)
Viscosity range	mm ² /s	10 to 800
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406
Max. operating pressure	Port P,A,B(X) bar	315
	Port T(Y) bar	160
Max. adjustable sequence pressure	bar	25; 75; 150; 210; 315
Max. flow-rate	L/min	60
Weight	kg	Approx. 1.6

Characteristic curves (Measured at t=40°C ±5°C , using HLP46)



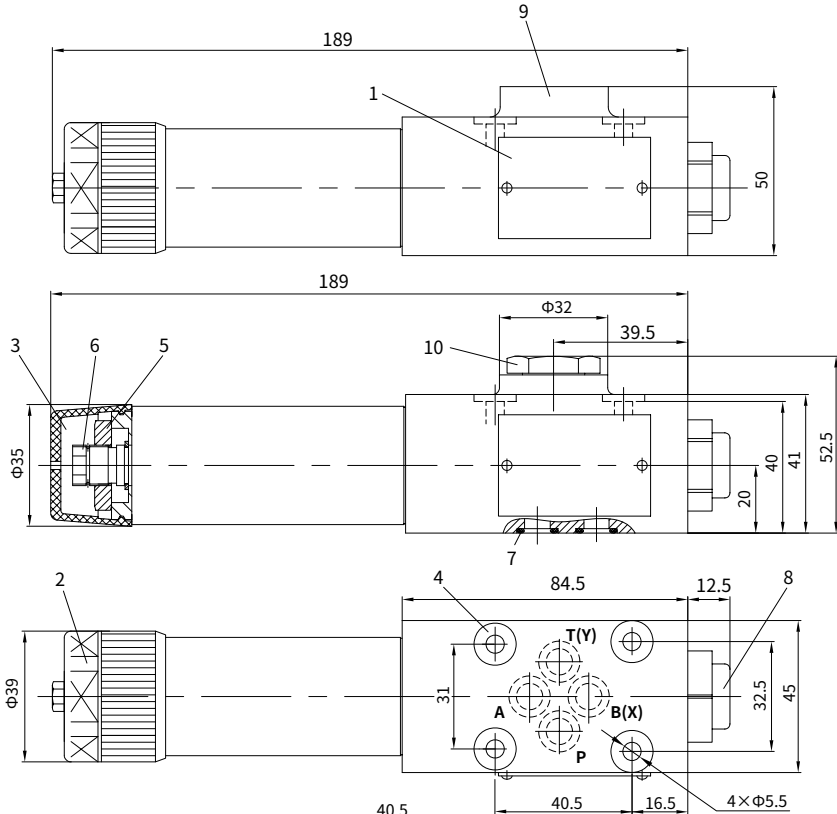
1. Δp-q_v characteristic curves A to P via check valve
2. Δp-q_v characteristic curves P to A



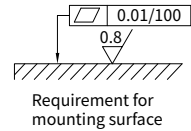
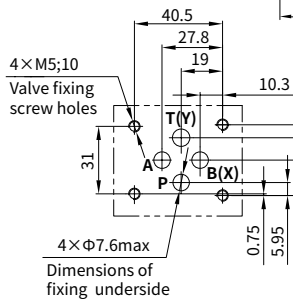
The characteristic curves are valid for output pressure = zero in the complete flow range.

Unit dimensions

(Dimensions in mm)



- 1 Name plate
- 2 Adjustment element "1"
- 3 Adjustment element "2"
- 4 Valve mounting holes
- 5 Lockable screw S=24
- 6 Internal hexagon bolt S=10
- 7 O-rings 9.25×1.78
(Ports A, B, P, T)
- 8 Pressure gauge connection
G1/4 or M14×1.5, 12 deep
Hexagon wrench S=6
- 9 Without check valve
- 10 With check valve





DZ10DP...type Direct Operated Sequence Valve



DZ10DP...4XJ...type

Size 10
Max. Working Pressure: 210 bar
Max. Flow: 80 L/min

Contents

Function and configuration	02
Symbols	02
Specification	03
Technical data	03
Characteristic curves	03
Unit dimensions	04

Features

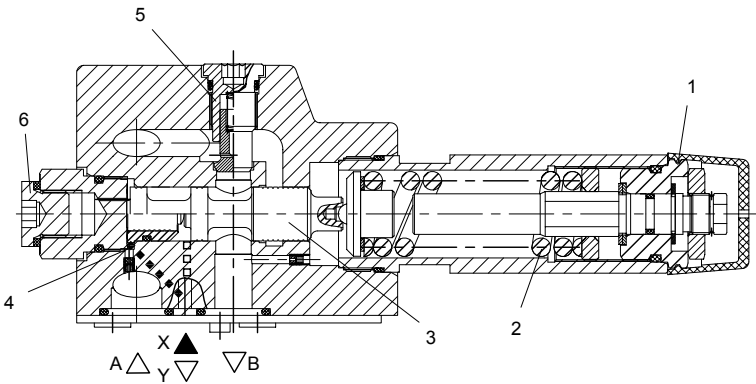
- Direct-acting structure
- Mounting face meeting requirements for DIN24340 A and ISO4401
- 4 pressure ranges
- 2 adjustment forms Knob
 - Knob
 - Adjusting screw with protective cover
- Connector with pressure gauge
- Selectable one-way valve

Function and configuration

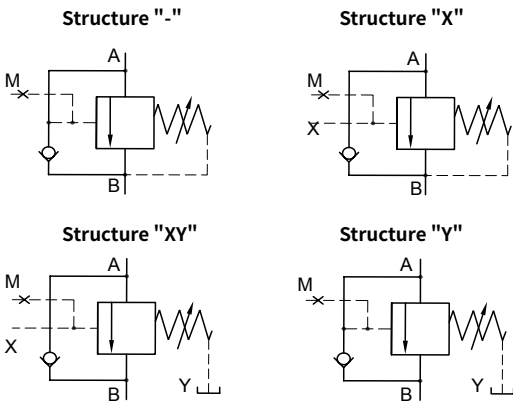
DZ10DP type valve is a direct operated pressure sequence valve. It is used for the pressure-dependent sequencing of a second system. The sequencing pressure is set by the adjusting elements (1). Compression spring (2) holds valve element (3) in initial position and the valve is closed. Pressure of Port A enters the valve element end through control route (4), of which the produced force acting on the valve element (3) on the opposite side of spring (2).

When the pressure reaches the set valve of spring (2), valve element (3) is pushed to connect port A and B; systems connected with oil port B is connected in sequence while the pressure of port A will not drop; control signal is acquired from port A via control route (4) or acquired from the outside via port X. According to the valve purpose, leaked oil can return from the outside of port Y or the inside of port B.

Type: DR10DP1-4XJ/...Y



Symbols



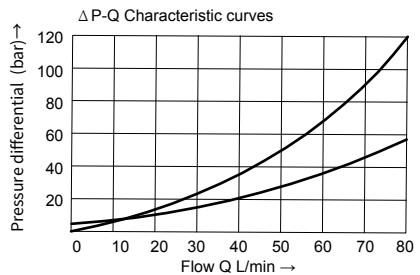
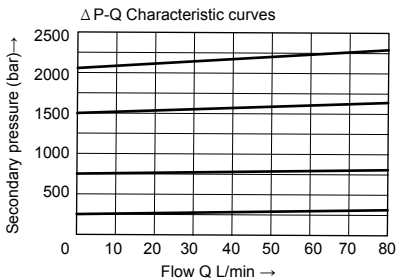
Specification

Direct-acting relief valve diameter 10	DZ10DP	- 4XJ	/	/	/	*	Further details in clear text
Knob	=1						No code = NBR seals V = FKM seals
Hex bolt with protective cover	=2						Pressure measurement port thread
Graduated knob with lock	=3						No mark = Inch thread G1/4 2 = Metric thread M14×1.5
Graduated knob without lock	=7						No mark = With one-way valve M = Without one-way valve
Series 40J to 49J (40J to 49J: unchanged installation and connection dimensions)	=4XJ						No mark= Control oil supplied from inside and drained to the outside
Max. secondary pressure 25 bar	=25						X= Control oil supplied from outside and drained to the inside
Max. secondary pressure 75 bar	=75						Y= Control oil supplied from inside and drained to the outside
Max. secondary pressure 150 bar	=150						XY=Control oil supplied from outside and drained to the outside
Max. secondary pressure 210 bar	=210						

Technical data

Fluid	Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal		
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)	
Viscosity range	mm ² /S	10 to 800	
Degree of contamination	Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406		
Max operation pressure	oil port P, A, B(X)	bar	210
	Oil port T(Y)	bar	160
Max sequence pressure set (adjustable) with port B		bar	25; 75; 150; 210
Max flow		L/min	80
Weight		kg	About 3

Characteristic curves (Measured at t=40°C ±5°C , using HLP46)

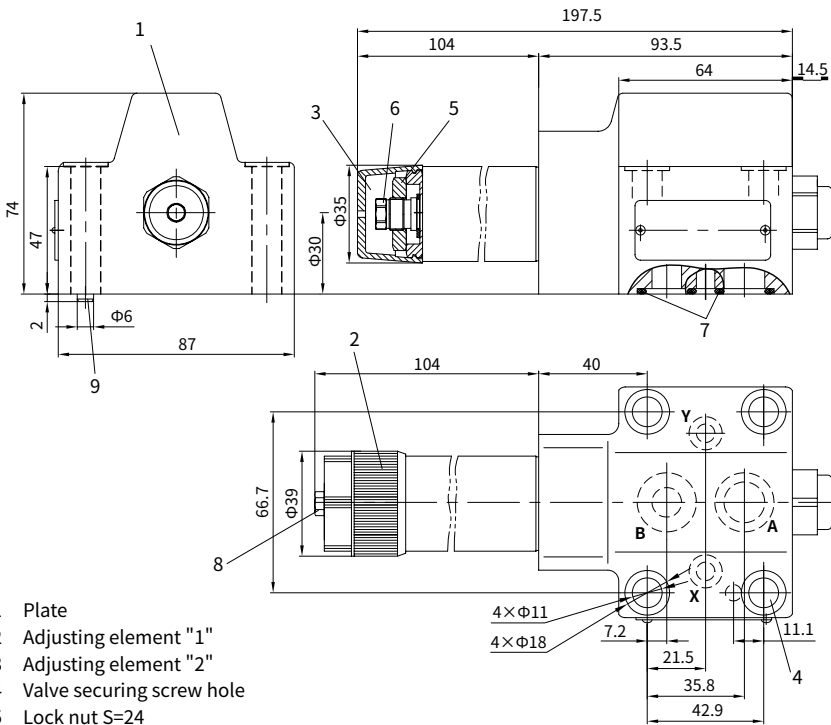


ΔP-Q- characteristic curve, flowing via one-way valve B to A.

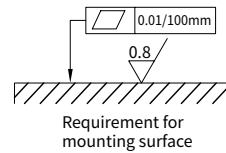
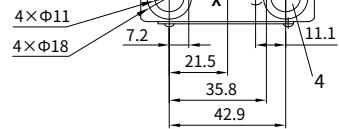
ΔP-Q characteristic curve, A to B

Unit dimensions

(Dimensions in mm)



- 1 Plate
- 2 Adjusting element "1"
- 3 Adjusting element "2"
- 4 Valve securing screw hole
- 5 Lock nut S=24
- 6 Inner hex adjusting screw S=10
- 7 O-ring 17.12×2.62(A, B)
O-ring 8.75×1.8 (X, Y)
- 8 Pressure gauge interface
G1/4 or M14×1.5; in depth 12
Hex wrench S=6
9. Positioning pin





FD...type Balanced Valve



FD...2XJ....type

Sizes 12, 16, 25, 32
Max. Working Pressure: 315 bar
Max. Flow: 560 L/min

Contents

Function and configuration	02
Curcuit examples	03
Symbols	04
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Characteristic curves	05
Unit dimensions	06-11

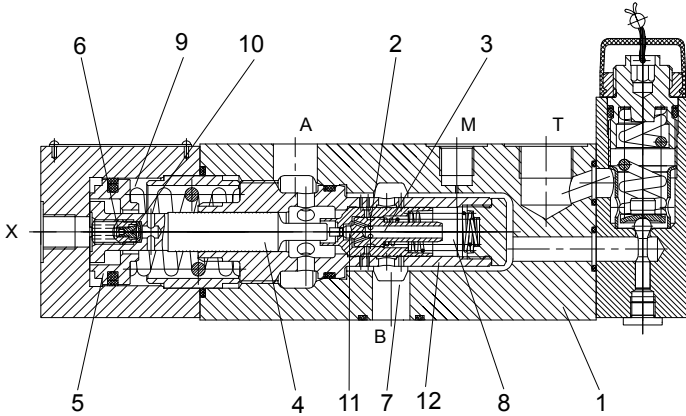
Features

- Installation in manifolds (cartridge valve)
- With SAE flange ports
- Sub-plate connection or block, porting pattern to DIN 24340 form D, ISO 5781 and CETOP-RP121 H
- Check valve pilot operated (leakage-free)
- The check-Q-meter controls the returning flow QV2 in relation to the flow Qv1 in the inlet port of actuator. For the application in cylinders system, the area ratio ($QV2 = QV1 \Phi$) has to be taken into account
- Bypass valve, free flow in opposite direction
- Safety valve, optional

Function and configuration

FD type valve is used to prevent runaway of hydraulic cylinder and motor in hydraulic system. It can also prevent pipe bursting.

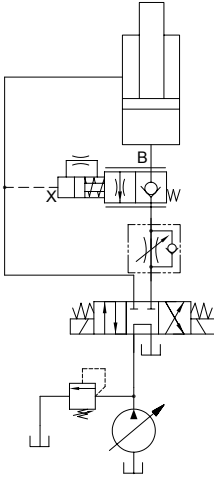
The valve consists of the housing (1), main poppet (2), pilot part (3), steel ball (11), pilot spool (4), spring seat (5) and damping (6). When load is lifted, fluid flows from A to B, the main spool (2) is opened. If pipe is cracked caused by the system, main spool (2) closes immediately as chamber (8) is connected with load pressure.



Curcuit examples

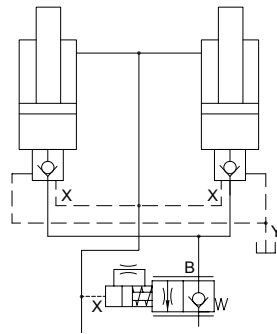
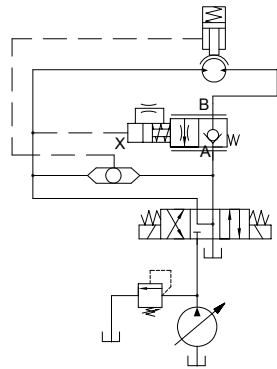
• Cylinder with single rod

On safety grounds, a closed in-between position directional valve should always be used!



• Hydraulic motor

To make sure that brake can be operated, both of the directional valve ports have to be connected to the tank in the in-between position. If the brake is externally unloaded then it is possible to use a closed in-between position directional valve.



Symbols

Without safety valve		With safety valve
Type of valve: FD12KA-2XJ/B03... FD16KA-2XJ/B03... FD25KA-2XJ/B04... FD32KA-2XJ/B06...	Type of valve: FD12PA-2XJ/B03... FD12FA-2XJ/B03... FD16PA-2XJ/B03... FD16FA-2XJ/B03... FD25PA-2XJ/B04... FD25FA-2XJ/B04... FD32PA-2XJ/B06... FD32FA-2XJ/B06...	Type of valve: FD12FB-2XJ/B03... FD12PB-2XJ/B03... FD16FB-2XJ/B03... FD16PB-2XJ/B03... FD25FB-2XJ/B04... FD32FB-2XJ/B06...

Specification

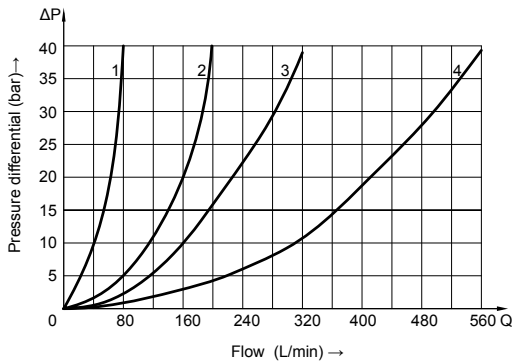
	FD	10J	*	
Balanced valve				Further details in clear text
Nominal size 12	= 12			No code = NBR seals
Nominal size 16	= 16			V = FKM seals
Nominal size 25	= 25			External connection threaded connection (X, M, T)
Nominal size 32	= 32			No code = Inch thread
Cartridge valve	= KA			2 = Metric thread
Sub-plate mounting	= PA			B00 = Without orifice
Flange connections without safety valve	= FA			B03 = Orifice Ø 0.3 mm (sizes 12 and 16)
Flange connections with safety valve	= FB			B04 = Orifice Ø 0.4 mm (size 25)
Sub-plate with safety valve (only nominal size 12 and 16)	=PB			B06 = Orifice Ø 0.6 mm (size 32) (other orifice diameters on request)
Series 10J to 19J	=10J			
(10J to 19J: unchanged installation and connection dimensions)				
Pressure setting range of safety valve				
Pressure setting up to 200 bar	=20			
Pressure setting up to 300 bar	=30			
Pressure setting up to 400 bar	=40			

Technical data

Operating pressure, ports A, X	bar	to 350
Operating pressure, port B	bar	to 420
Pilot pressure, port X (flow control range)	bar	min.20~60, max.350
Cracking pressure, A to B	bar	2
Setting pressure for secondary pressure relief valve	bar	to 400
Flow -rate	L/min	80(size 12),200(size 16),320(size 25),560(size 32)
Area ratio of the pre-opening		$\frac{\text{poppet seat area}}{\text{area of pilot spool}} = 1/20$
Fluid		Mineral oil, phosphate ester
Fluid temperature range	°C	-20 to +80
Viscosity range	mm ² /s	10 to 800
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406

Characteristic curves (Measured at t=40°C ±5°C , using HLP46)

04

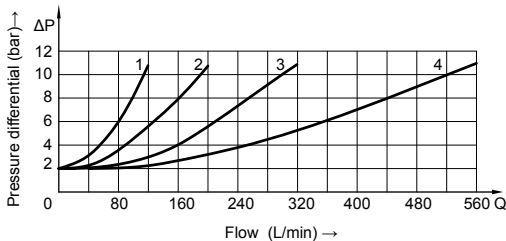


Pressure differential
Pin relation to flow Q,
measured at throttle position:

Throttle fully open (Px=60bar)

B to A

- 1 = size 12
- 2 = size 16
- 3 = size 25
- 4 = size 32



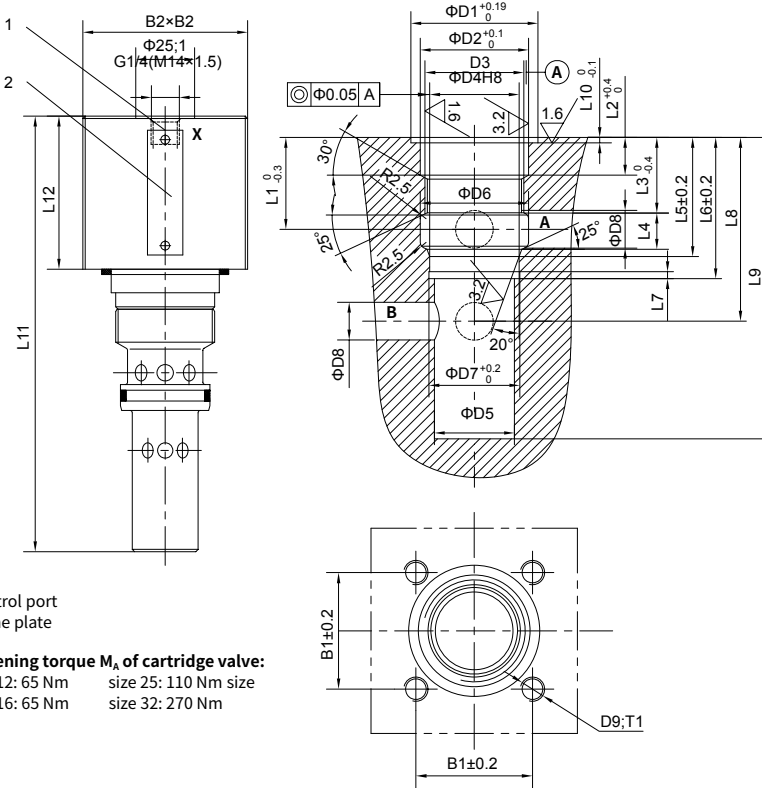
Pressure differential Pin
in relation to flow Q,
measured over the
check valve.

A to B

Unit dimensions

(Dimensions in mm)

• Installation in manifolds (cartridge valve)



- 1 Control port
- 2 Name plate

Tightening torque M_A of cartridge valve:

size 12: 65 Nm size 25: 110 Nm size
 16: 65 Nm size 32: 270 Nm

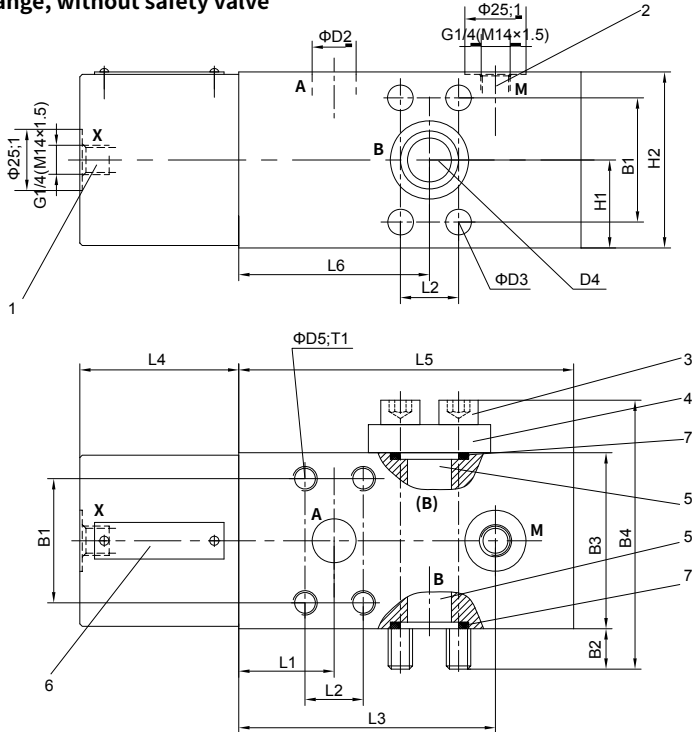
Type	B1	B2	D1	D2	D3	D4	D5	D6	D7	D8	D9	T1	L1	L2	L3	L4	L5
FD12KA	48	70	54	46	M42×2	38	34	46	38.6	16	M10	16	39	16	32	15.5	50.5
FD16KA	48	70	54	46	M42×2	38	34	46	38.6	16	M10	16	39	16	32	15.5	50.6
FD25KA	56	80	60	54	M52×2	48	40	60	48.6	25	M12	19	50	19	39	22	65
FD32KA	66	95	72	65	M64×2	58	52	74	58.6	30	M16	23	52	19	40	25	71

Type	L6	L7	L8	L9	L10	L11	L12	valve fixing screws/Tighting torque	M_A (Nm)	Weight
FD12KA	60	3	78	128	2.3	191	65	4 pcs M10×70 GB/T70.1-10.9	69	3.5kg
FD16KA	60	3	78	128	2.3	191	65	4 pcs M10×70 GB/T70.1-10.9	69	3.5kg
FD25KA	80	4	105	182	2.3	253	75	4 pcs M12×80 GB/T70.1-10.9	120	5.6kg
FD32KA	85	4	115	198	2.3	289	94	4 pcs M16×100 GB/T70.1-10.9	295	8.0kg

Unit dimensions

(Dimensions in mm)

• SAE flange, without safety valve



SAE flange connection:

Operating pressure 420bar Flange mounting screws and blanking flange are included within the scope of supply.

- | | | | |
|------------------|------------------------|-------------------|----------|
| 1 Control port | 3 Flange fixing screws | 5 Optional port B | 7 O-ring |
| 2 Measuring port | 4 Cover | 6 Name plate | |

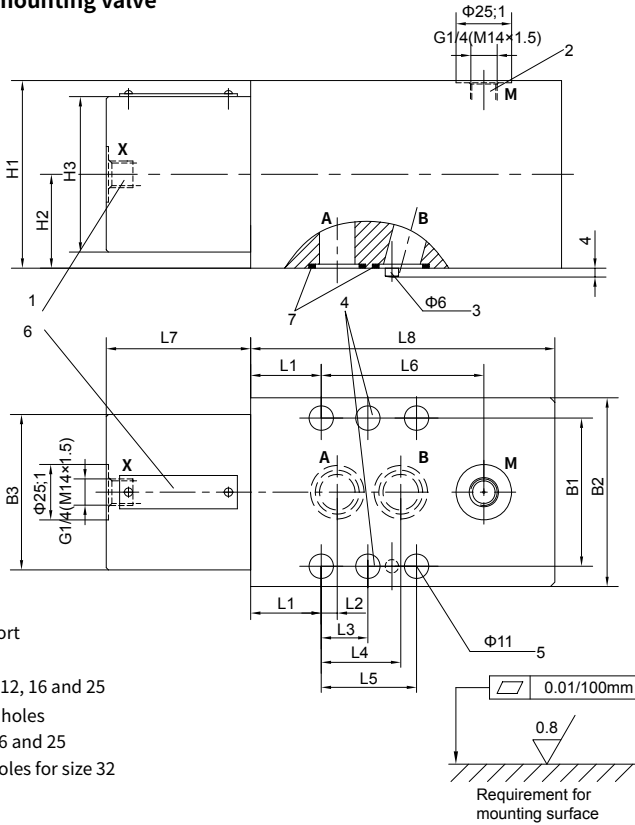
Type	B1	B2	B3	B4	D1	D2	D3	D4	D5	H1	H2	L1	L2	L3	L4
FD12FA	50.8	16.5	72	110	43	18	10.5	18	M10	36	72	39	23.8	105	65
FD16FA	50.8	16.5	72	110	43	18	10.5	18	M10	36	72	39	23.8	105	65
FD25FA	57.2	14.5	90	132	50	25	13.5	25	M12	45	90	50	27.8	148	75
FD32FA	66.7	20	105	154	56	30	15	30	M14	50	105	52	31.8	155	94

Type	L5	L6	T1	Weight	O-ring(7)	Valve fixing screws
FD12FA	140	78	15	7.2kg	25×3.5	4 pcs M10×100 GB/T70.1-10.9
FD16FA	140	78	15	7.2kg	25×3.5	4 pcs M10×100 GB/T70.1-10.9
FD25FA	200	105	18	16kg	32.92×3.53	4 pcs M12×120 GB/T70.1-10.9
FD32FA	215	115	21	23kg	37.7×3.53	4 pcs M14×140 GB/T70.1-10.9

Unit dimensions

(Dimensions in mm)

• Sub-plate mounting valve



- 1 Control port
- 2 Measuring port
- 3 Locating pin
- 4 Not for sizes 12, 16 and 25
- 4 valve fixing holes
for sizes 12, 16 and 25
- 6 valve fixing holes for size 32
- 7 Name plate

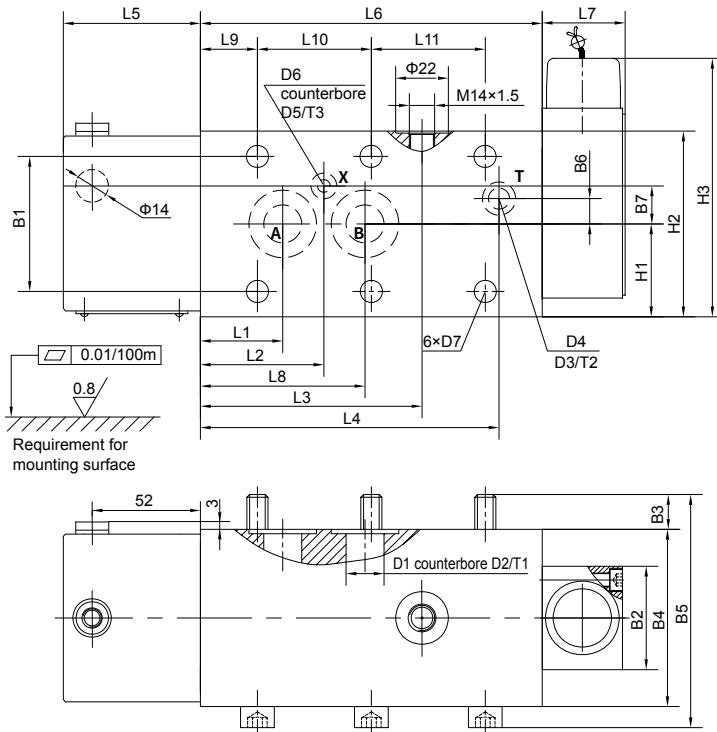
Type	B1	B2	B3	H1	H2	H3	L1	L2	L3	L4	L5	L6
FD12PA	66.7	85	70	85	42.5	70	31.8	7.2	-	35.8	42.9	73.2
FD16PA	66.7	85	70	85	42.5	70	31.8	7.2	-	35.8	42.9	73.2
FD25PA	79.4	100	80	100	50	80	38.9	11.1	-	49.2	60.3	109.1
FD32PA	96.8	120	95	120	60	95	35.3	16.7	42.1	67.5	84.2	119.7

Type	L7	L8	Valve fixing screws/tighting torque	M _a (Nm)	Weight	O-ring(7)
FD12PA	65	140	4 pcs M10×100 GB/T70.1-10.9	75	9.3kg	21.3×2.4
FD16PA	65	140	4 pcs M10×100 GB/T70.1-10.9	75	9.3kg	21.3×2.4
FD25PA	75	200	4 pcs M10×120 GB/T70.1-10.9	75	18kg	29.82×2.62
FD32PA	94	215	6 pcs M10×140 GB/T70.1-10.9	75	28kg	38×3

Unit dimensions

(Dimensions in mm)

· Special sub-plate amounting balanced valve



Dimension of balanced valve type FD12PB

Dimension of balanced valve type FD16PB

Type	B1	B2	B3	B4	B5	B6	B7	D1	D2	D3	D4	D5	D6	D7
FD12PB	64	49	16	84	11	12.5	18	18	32	15.7	10	12.2	6	10.5
FD16PB	64	49	16	84	11	12.5	18	18	32	15.7	10	12.2	6	10.5

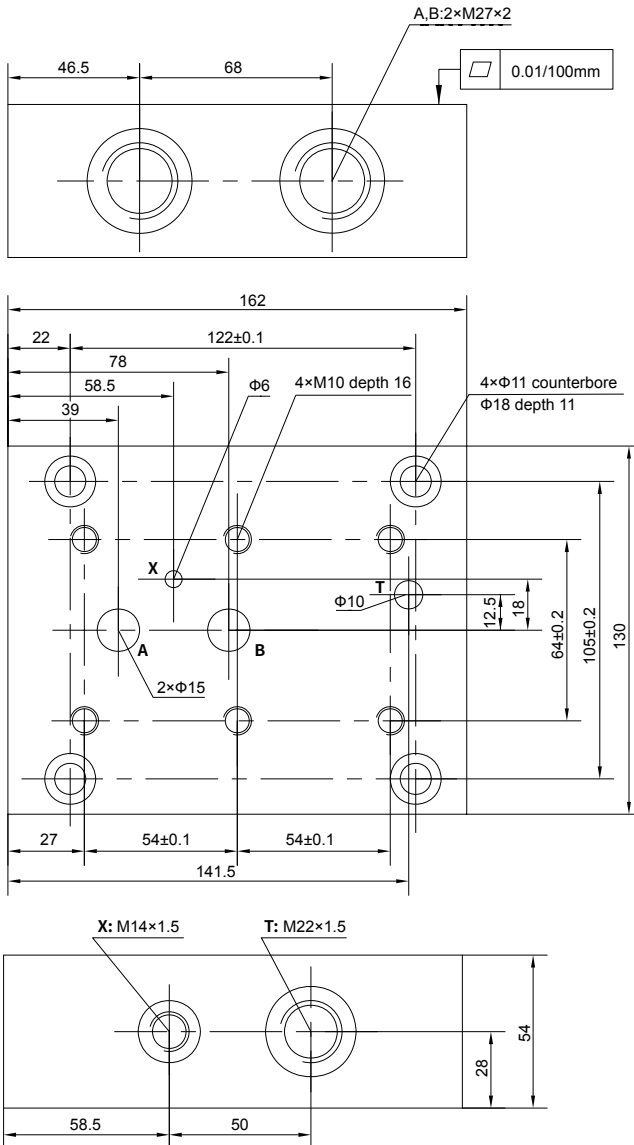
Type	H1	H2	H3	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11
FD12PB	44	88	126	39	58.5	105	141.5	65	162	38	78	27	54	54
FD16PB	44	88	126	39	58.5	105	141.5	65	162	38	78	27	54	54

Type	T1	T2	T3	Weight	Fixing screws	O-ring(7)		
FD12PB	2.7	1.9	1.4	10kg	4pcs M10×100 GB/T70.1-10.9	25×3.53	12×2	9.25×1.78
FD16PB	2.7	1.9	1.4	10kg		25×3.53	12×2	9.25×1.78

Unit dimensions

(Dimensions in mm)

• Sub-plate for balanced valve



Sub-plate dimension of balanced valve type FD12PB

Sub-plate dimension of balanced valve type FD16PB



HED4...type Pressure Relay



HED4... 1XJ...type

Max. Working Pressure: 350bar

Contents

Function and configuration	02
Terminal allocation	02
Circuit example	02
Specifications	03
Technical data	03
Characteristic curves	04
Unit dimensions	05-07
Installation guidelines	08

Features

- For sub-plate mounting
- For pipe installation
- Vertical stacking piece in the horizontal assembled valves

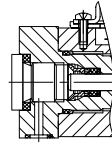
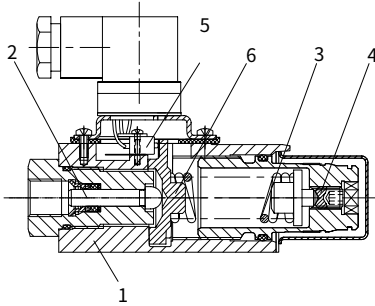
Function and configuration

HED4 type relay is a piston pressure relay . It consists of the housing(1), cartridge with spool (2),compression spring (3), adjustment element (4) and switch(5).

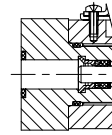
The pressure fluid is applied to the piston (2) , then the piston (2) supports itself on the spring seat (6) and acts against the infinitely adjustable force of the compression spring (3).

The spring seat (6) transfers the movement of the piston (2) to the switch (5). The switch (5) acts on-off as the designing requirement.

Type HED 4 OA 1XJ/...

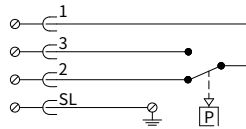
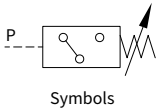


Type HED 4 OP 1XJ/...



Type HED 4 OH 1XJ/...

Terminal allocation



Terminal connection-Z14 small-scale plug

Specification

HED4		-1XJ/		Z14/		*	
Pressure relay							Further details in clear text
Sub-plate mounting	=OP					No code =	NBR seals
Pipe installation	=OA					V =	FKM seals
Vertical stacking systems	=OH						Connection thread:
Series 10J to 19J	=1XJ					No code=	Inch threaded (G1/4)
						2 =	Metric threaded (M14×1.5)
max. adjustable pressure	50bar = 5					Z14 =	small-scale plug-in
max. adjustable pressure	100bar = 10						
max. adjustable pressure	350bar = 35						

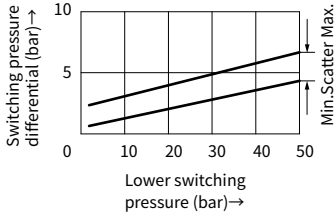
Technical data

Fluid		Mineral oil suitable for NBR and FKM seal Phosphate suitable for FKM seal			
Fluid temperature		°C	- 20 ~ + 80 (for FKM seal)		
		°C	- 30 ~ + 80 (for NBR seal)		
Viscosity range		mm ² /s	2.8~500		
Degree of contamination:		Maximum permissible degree of fluid contamination: NAS 1638 class 9. and ISO4406 20/18/15			
Switching accuracy (repeatability)		%	<±1% of setting range		
Permissible switching frequency		times/min	120		
Electrical connection		Plug-in connector to DIN 43 650 form A, 3...pin +PE			
Rated pressure(bar)	Max. setting pressure (bar)	Offset pressure (bar)		Act pressure (bar)	
		min	max	min	max
50	50	2	46	4	50
100	100	3	89	8	100
350	350		322	20	350
Max. connection cross sectional area		mm ²	1.5		
Protection degree to DIN 43650		IP 65			
(With DC inductive loading, a spark suppressor must be provided in order to increase the service life.)					
Contact load:	AC	250V/5A;			
	DC	50V/1A, 250V/0.2A			
Weight	pressure switch	0.6			
	stacking plate	0.8 (size 6) 1.9 (size 10)			

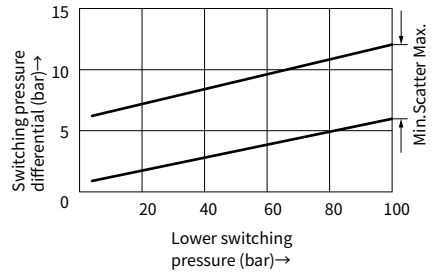
Characteristic curves

(Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

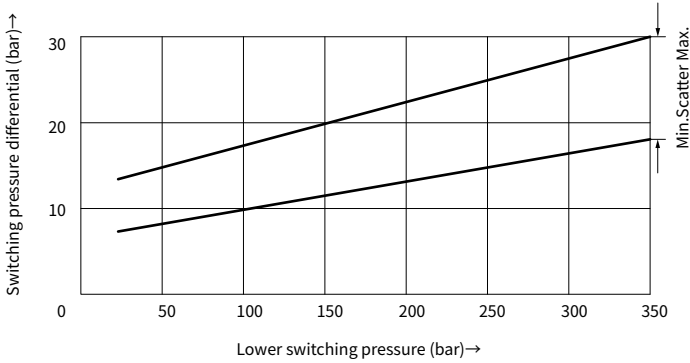
Rated pressure 50bar



Rated pressure 100bar



Rated pressure 350bar



Unit dimensions

(Dimensions in mm)

• Pressure relay

Type HED4 OH...

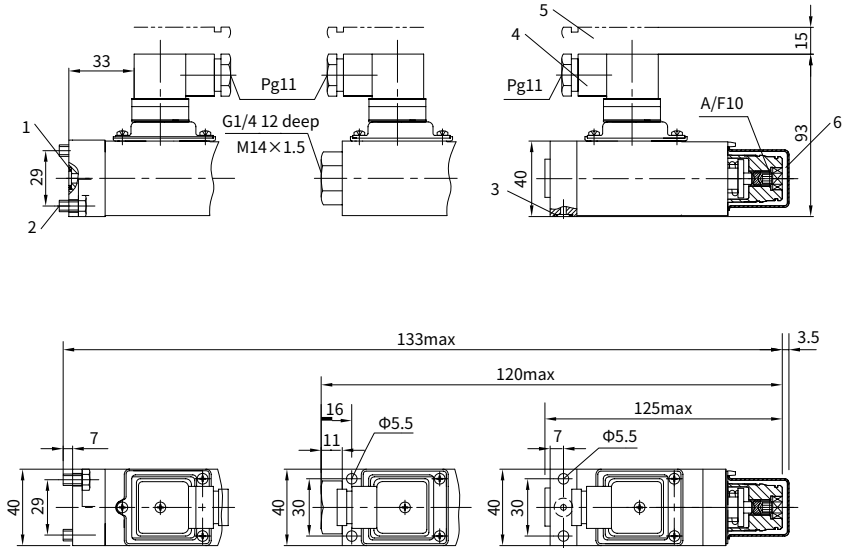
Vertical stacking systems

Type HED4 OA...

Pipe installation

Type HED4 OP...

sub-plate mounting

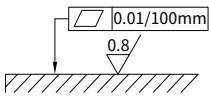
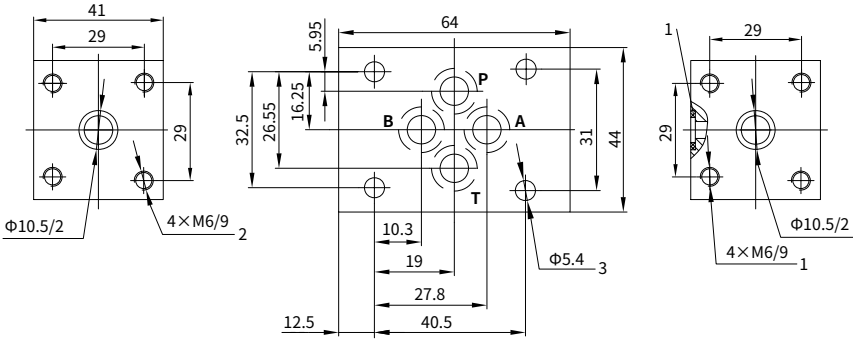


- 1 O-ring 13×2
- 2 Valve fixing screw O-ring 2 pcs M6×12
- 3 O-ring 7×1.5
- 4 Plug 90° rotary
- 5 Space required to remove the plug
- 6 Protected cap

Unit dimensions

(Dimensions in mm)

• Stacking plate size 6 (for HED4 OH...vertical stacking)



Requirement for mounting surface

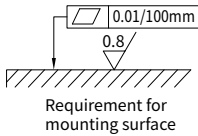
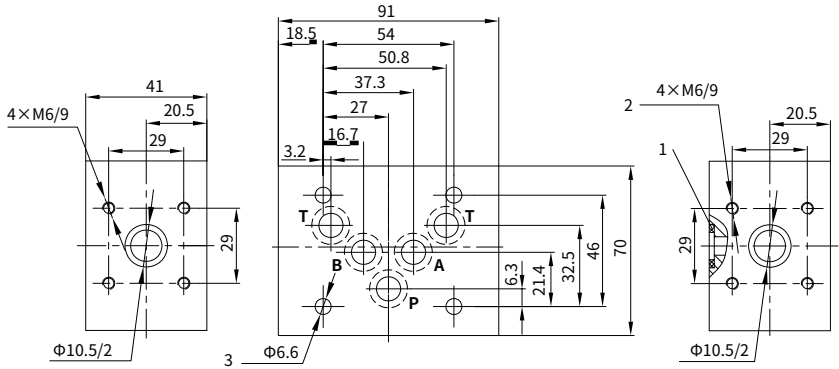
- 1 O-ring 9.25 × 1.78
- 2 Fixing screw holes of pressure switch
- 3 Fixing screw holes of stacking plate size 6

Pipeline for pressure switch						
Type	NBR	308400	308401	308402	308403	308404
	FKM	308436	308437	308438	308439	308440
Pipeline for pressure switch						
Type	NBR	308405	308406	308407	308408	317606
	FKM	308441	308442	308443	308444	317607

Unit dimensions

(Dimensions in mm)

• Stacking plate size 10 (for HED4 OH...vertical stacking)



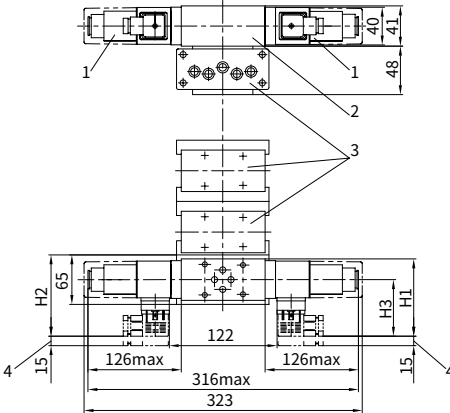
- 1 O-ring 12×2
- 2 Fixing screw holes of pressure switch
- 3 Fixing screw holes of stacking plate size 10

Pipeline for pressure switch						
Type	NBR	308409	308410	308411	308412	308413
	FKM	308445	308446	308447	308448	308449
Pipeline for pressure switch						
Type	NBR	308414	308415	308416	308417	317608
	FKM	308450	308451	308452	308453	317609

Installation guideline

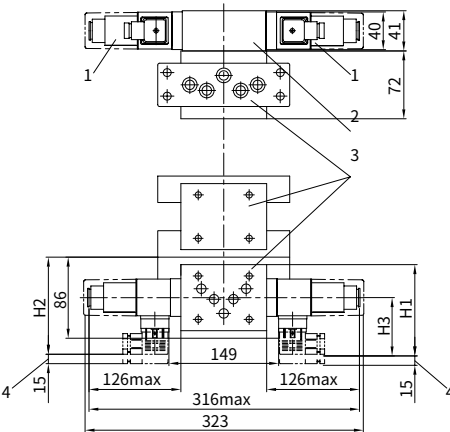
(Dimensions in mm)

· For applying the pressure relay HED4 OH...in stacking assemblies size 6



- 1 Pressure switch HED4OH...for use in stacking assemblies(can be rotated $4 \times 90^\circ$ for mounting).
The mounting possibilities of the pressure switch depends on the design of the adjacent stacking plates.
- 2 Stacking plate size 6 used.
for mounting stacking pressure switch.
- 3 Horizontal assembling module.
- 4 Space required to remove the plug-in connector.

· For applying the pressure relay HED4 OH...in stacking assemblies size 10



- 1 Pressure switch HED4OH...for use in stacking assemblies(can be rotated $4 \times 90^\circ$ for mounting).
The mounting possibilities of the pressure switch depends on the design of the adjacent stacking plates.
- 2 Stacking plate size 10 used.
for mounting stacking pressure switch.
- 3 Horizontal assembling module.
- 4 Space required to remove the plug-in connector.

Size	H1	H2	H3
6	95	98	74
10	108	116	74



HED8...type Pressure Relay



HED8...1XJ...type

Max. Working Pressure: 350bar

Contents

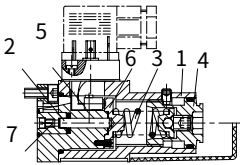
Function and configuration	02
Specifications	03
Characteristic curves	03
Technical data	04
Unit dimensions	05
Installation guidelines	06
For the pressure switch type HED 8...as a sandwich (350bar)	07-08
Transition plate when pressure switch type HED8 OH substitutes HED4 OH	09
Terminal allocation	09

Function and configuration

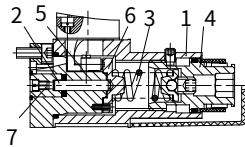
HED8 type relay is a piston pressure switch. It consists of the housing (1), cartridge with spool (2), compression spring (3), adjustment element (4) and micro-switch (5).

If the pressure to be monitored is below the set value then the micro-switch (5) is actuated. The pressure fluid is applied to the piston (2) via orifice (7). The piston (2) supports itself on the spring seat (6) and acts against the infinitely adjustable force of the compression spring (3). The spring seat (6) transfers the movement of the piston (2) to the micro-switch (5). The micro-switch (5) is released when fluid setting pressure is reached.

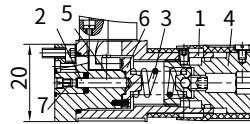
The electrical circuit is either switched on or off according to the circuit design. The mechanical stop of the spring seat (6) protects the micro-switch (5), in the case of sudden pressure loss, from mechanical destruction and prevents the compression spring (3) from damaging if an overpressure occurs.



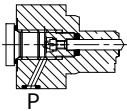
Type HED 8 OH-1XJ/...K14 "S..."



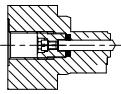
Type HED 8 OH-1XJ/...K14 A AS...



Type HED 8 OH-1XJ/...K14 KW

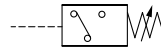


Type HED 8 OP-1XJ...



Type HED 8 OA-1XJ...

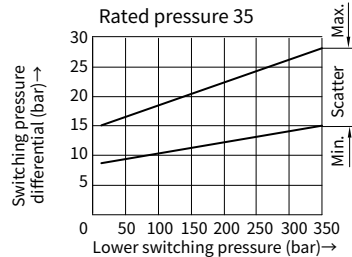
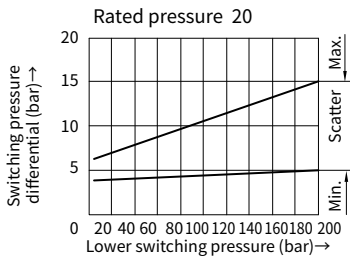
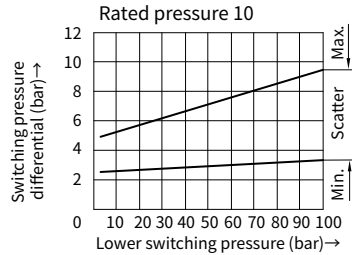
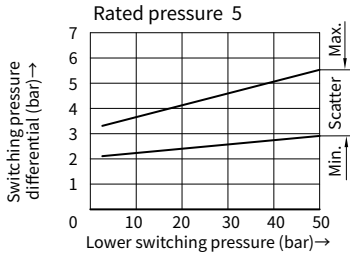
Symbols



Specifications

HED8		-1XJ	/	/	*
Pressurerelay	Further details in clear text				
Vertical stacking systems	= OH				
Sub-plate mounting	= OP				
Pipe installation	= OA				
Series 10J to 19J	= 1XJ				
(10J to 19J: unchanged installation and connection dimensions)					
Max. setting pressure 50bar	= 5				
Max. setting pressure 100bar	= 10				
Max. setting pressure 200bar	= 20				
Max. setting pressure 350bar	= 35				
Electrical connection type					
Plug-in	= Z14				
Plug-in with light (DC24V)	= L24				
		No code =		NBR seals	
		V =		FKM seals	
		Connection thread:			
		No code =		Inch threaded (G1/4)	
		2 =		Metric threaded (M14×1.5)	
		No code =		Spindle (without scale)	
		S =		Spindle (without scale)with protective cap	
		A =		Spindle with scale	
		AS =		Spindle with scale and protective cap	
		KW =		Rotary knob with scale	

Characteristic curves (Measured at t=40°C ±5°C, using HLP46)

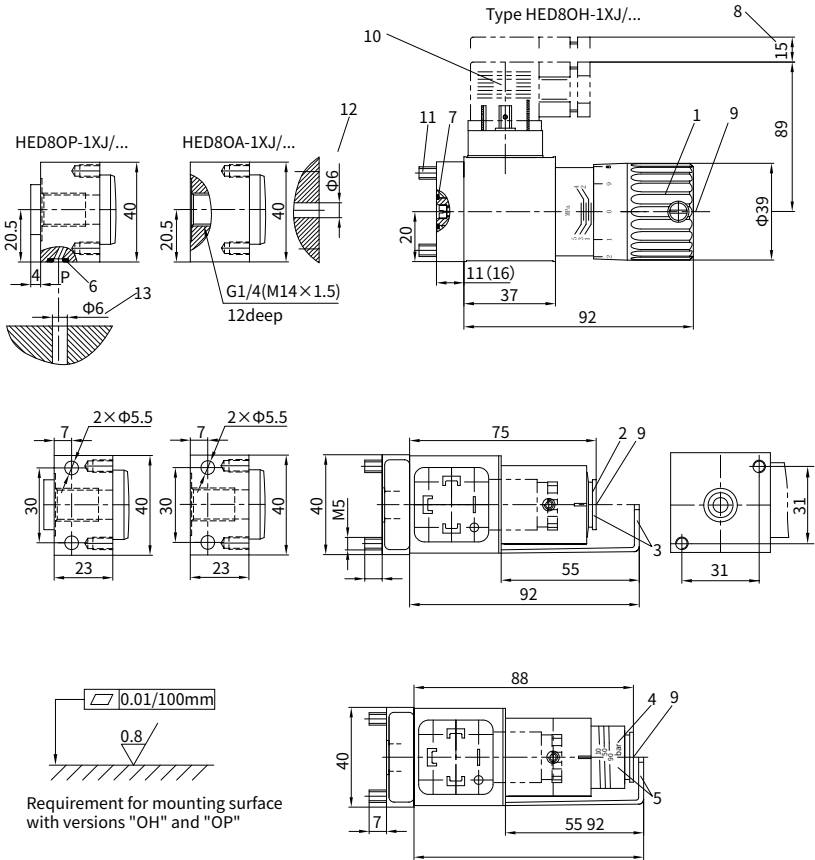


Technical data

Weight	- Pressure switch	kg	0.8
	- Sandwich plate for vertical stacking assemblies	kg	0.8 (NS 6, plate height 40.5 mm)
			3 (NS 6, plate height 120 mm) 2 (NS 10)
Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal	
Fluid temperature range		°C	- 20 to + 80 (for FKM seals) - 30 to + 80 (for NBR seals)
Viscosity range		mm ² /s	2.8 to 500
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	
Switching accuracy (repeatability)		< ± 1 % of setting range	
Permissible switching frequency		times/min.	80
Pressure setting range			
Pressure rating (Max. setting pressure) (bar)		Max. operating pressure (bar)	Pressure setting range (bar)
50		350	2 to 50
100		350	4 to 100
200		350	5 to 200
350		500	8 to 350
Electrical connection		plug-in connector to DIN 43 650, form A, 3-pin + PE	
Max. connection cross sectional area		mm ²	0.5
Max. contact load	-AC	250V/5A	
	-DC	50V/1A;125V/0.03A;250V/0.02A	
Protection to DIN 40 050		IP65	
With DC inductive loading, a spark suppressor must be provided in order to increase the service life.			

Unit dimensions

(Dimensions in mm)



- 1 Adjustment element "KW"
- 2 Adjustment element "-"
- 3 Adjustment element "S"
- 4 Adjustment element "A"
- 5 Adjustment element "AS"
- 6 O-ring 5.3×1.8
- 7 O-ring 10.82×1.78
- 8 Space required to remove the plug-in
- 9 Internal hexagon nut A/F 10
- 10 Plug-in connector without cable to DIN 43 650

- 11 Valve fixing screws:
2- M5×12 GB/T 70.1-10.9,
tightening torque $M_A=8.9\text{Nm}$

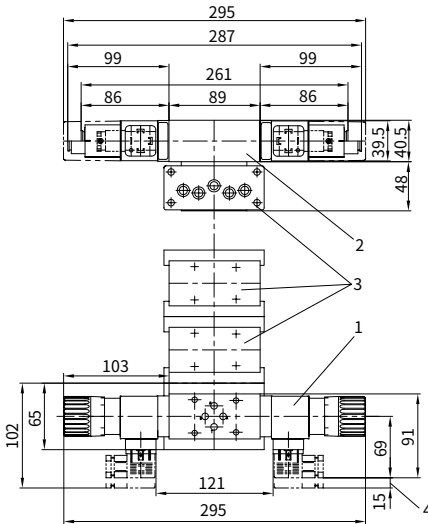
- 12 Maximum diameter of the mounting surface of the matting piece (type HED8 OH 1XJ/...)

- 13 Maximum diameter of the mounting surface of the matting piece (type HED8 OP 1XJ/...)

Installation guideline

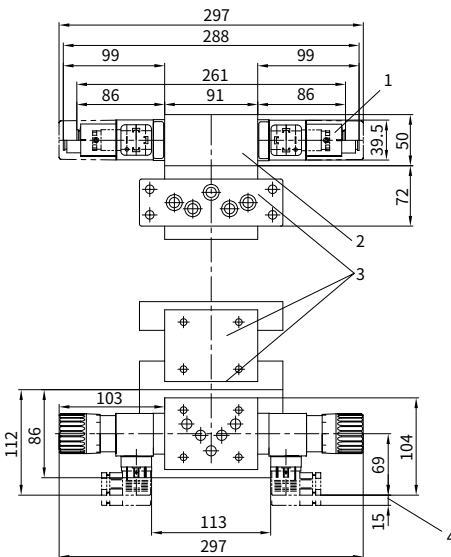
(Dimensions in mm)

• For applying the pressure relay HED4OH...in stacking assemblies size 6



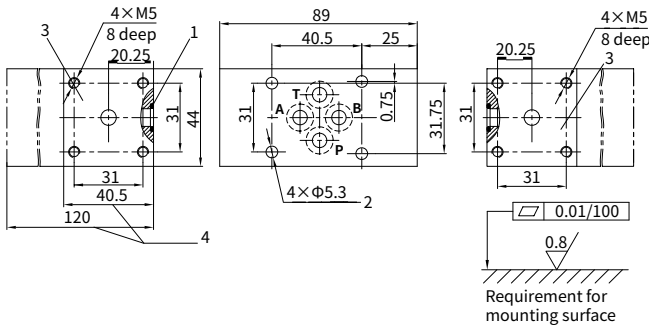
- 1 Pressure switch HED8 OH... for use in stacking assemblies (can be rotated $4 \times 90^\circ$ for mounting). The mounting possibilities of the pressure switch depends on the design of the adjacent stacking plates
- 2 Sandwich plate type HSZ 06 for mounting the pressure switch as a stacking element.
- 3 Stacking elements.
- 4 Space required to remove the plug-in.

• For applying the pressure relay ED4OH...in stacking assemblies size 10



- 1 Pressure switch HED8 OH... for use in stacking assemblies (can be rotated $4 \times 90^\circ$ for mounting). The mounting possibilities of the pressure switch depends on the design of the adjacent stacking plates
- 2 Sandwich plate type HSZ 10 for mounting the pressure switch as a stacking element.
- 3 Stacking elements.
- 4 Space required to remove the plug-in.

For the pressure relay type HED 8...as a sandwich (350bar) (Dimensions in mm)



- 1 O-ring 9.25×1.78
- 2 Through holes for valve fixing
- 3 Mounting surface for pressure switch
- 4 Plate height 40.5 mm or 120 mm, optional.

Specification

	HSZ	06	A	-	3XJ	/	00	*	
Sandwich plate									Further details in clear text
Nominal size 6	= 06								No code = NBR seals
Porting pattern to DIN 24 340, form A=A									V = FKM seals
Version no. (see below)	= 6..								3XJ = Series 30J to 39J (30J to 39J: unchanged installation and connection dimensions)

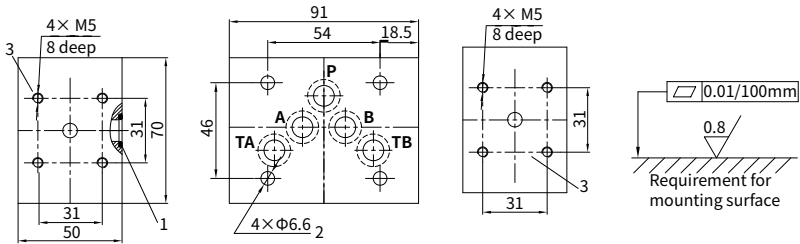
Sandwich plate NS 6: symbols, version no.(version no. in () for 120 mm plate height)

(① =valve side; ② =sub-plate side)

Pressure switc effective in channel...			
Version no.	608(627)	609(628)	601(620)
Pressure switc effective in channel...			
Version no.	602(621)	603(622)	604(625)
Pressure switc effective in channel...			
Version no.	605(624)	606(625)	607(626)
Pressure switc effective in channel...			
Version no.	610(629)	611(630)	612(631)

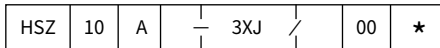
For the pressure relay HED 8...as a sandwich (350bar)

(Dimensions in mm)



- 1 O-ring 12×2
- 2 Through holes for valve fixing
- 3 Mounting surface for pressure switch

Specification



Sandwich plate

Nominal size 10 = 10

Porting pattern to DIN 24 340, form A=A

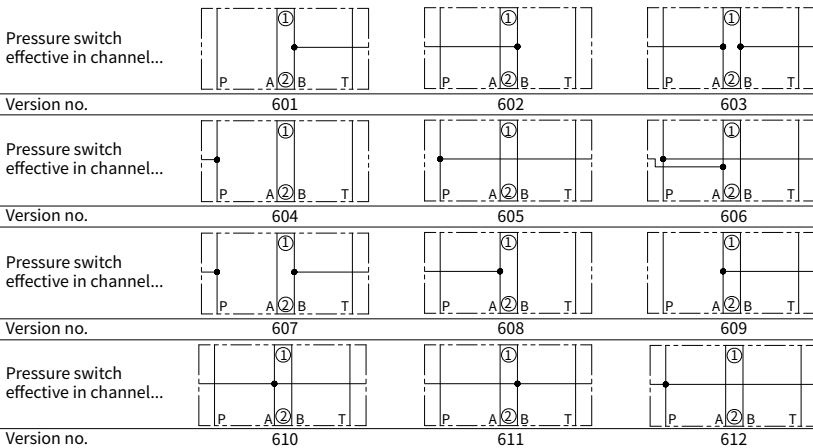
Version no. (see below) = 6..

Further details in clear text

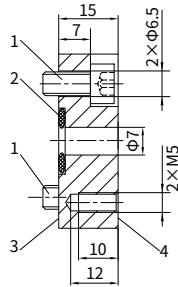
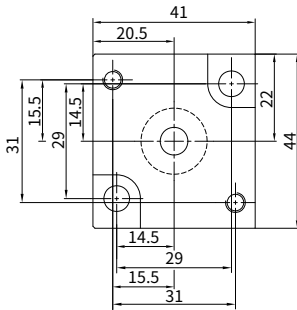
No code = NBR seals
V = FKM seals

3XJ = Series 30J to 39J
(30J to 39J: unchanged installation and connection dimensions)

Sandwich plate NS 6: symbols, version no. (① =valve side; ② =sub-plate side)



Transition plate when pressure relay type HED80H substitutes HED40H



- 1 Fixing screws: 2- M6×16
GB/T 70.1-10.9,
tightening torque $M_A=8.9\text{Nm}$
- 2 O-ring 13×2
- 3 Mounting surface for
pressure switch type HED4
- 4 Mounting surface for pressure
switch type HED80H

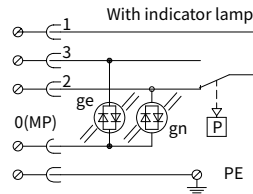
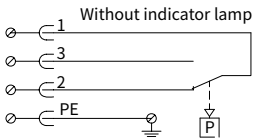
Specification

GD-HED8-4H

Transition plates

NBR seals = No code
FKM seals = V

Terminal allocation





MG/MK...type Restrictive (Check) Valve



MG/MK...type

Sizes 6, 8, 10, 15, 20, 25, 30
Max. Working Pressure: 315 bar
Max. Flow: 400 L/min

04

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Characteristic curves	03
Unit dimensions	04

Features

- Suitable for direct in-line mounting
- Pressure and viscosity dependent

Function and configuration

MG and Mk type valve is a pressure-dependent and viscosity-dependent throttle and throttle check valve.

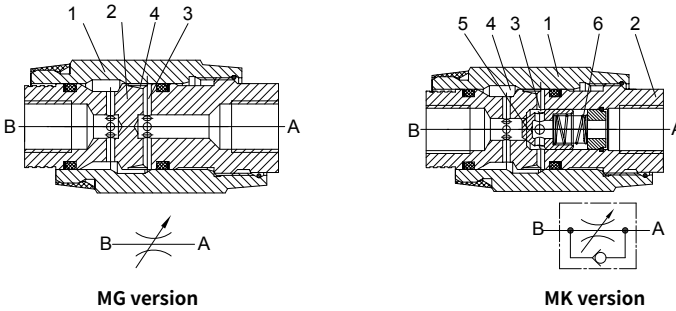
·Type MG (throttle valve)

This valve throttles in both flow directions. Fluid flows through side hole (3) to the throttling orifice (4) formed between the valve body (2) and the adjustable sleeve (1). The cross-section of throttling orifice (4) may be steplessly varied by rotating the sleeve (1).

·Type MK (throttle check valve)

In throttling direction, the spring (6) and the fluid presses the poppet (5) onto its seat, check valve is blocked. Fluid flows via the side hole (3) to the throttling orifice (4), formed between the valve body (2) and the adjustable sleeve (1).

In the opposite direction, fluid pressure acts on the face of the poppet (5), check valve is opened and fluid flows freely. At the same time, part of the fluid flowing through the annular groove gets self-clearance as the desired effect.



MG version

MK version

Specification

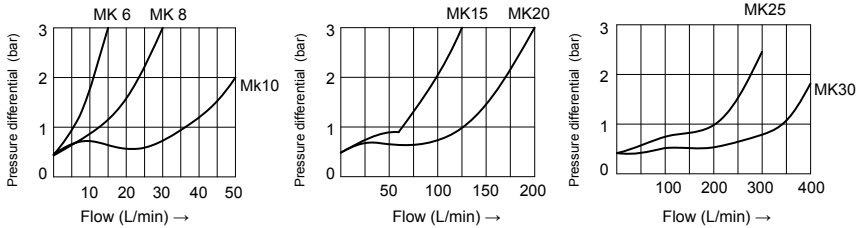
		G	1.2J	/		*
Restrictive valve	=MG					Further details in clear text
Restrictive check valve	=MK					No code = NBR seals V = FKM seals
Nominal size 6	=6					Threaded connection
Nominal size 8	=8					G thread
Nominal size 10	=10					Metric thread
Nominal size 15	=15					
Nominal size 20	=20					
Nominal size 25	=25					
Nominal size 30	=30					
		G =	1.2J =			1.2Jseries
						Threaded connection

Technical data

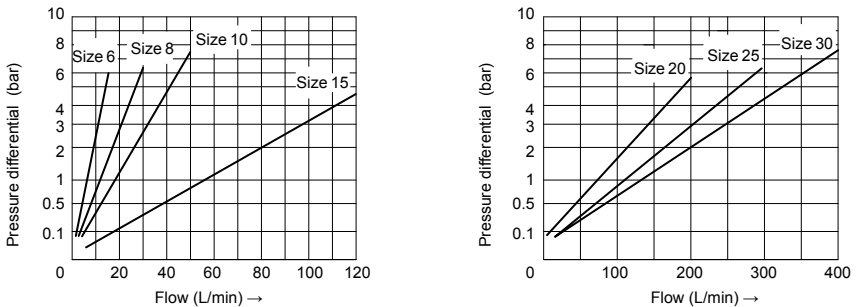
Size		6	8	10	15	20	25	30
Weight	kg	0.3	0.4	0.7	1.3	2.2	3.6	4.5
Max.operating pressure	bar	315bar, 210bar (NPTF1 1/4, NPTF1 1/2)						
Cracking pressure for type MK	bar	0.5						
Max.flow-rate	L/min	400						
Viscosity range	mm ² /s	10 to 800						
Fluid temperature range	°C	-30 °C to +80 °C						
Fluid		Mineral oil; Phosphate ester						
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406						

Characteristic curves (Measured at t=40°C ±5°C, using HLP46)

ΔP-Q curves via check valve, with closed throttle (type MK)

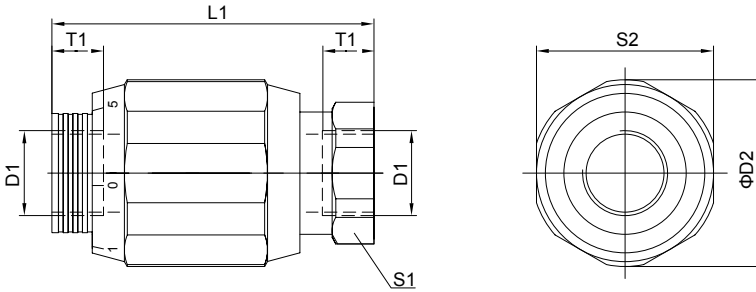


ΔP-Q curves via open throttle (type MG and MK)



Unit dimensions (MK and MG are the same)

(Dimensions in mm)



Size	D1				D2	L1	S1	S2	T1
	G	Metric	NPTF	SAE					
6	G1/4	M14×1.5	NPTF 1/4	6SAE (9/16-18)	34	65 (SAE=75)	22	32	12 (SAE=14)
8	G3/8	M18×1.5	NPTF 3/8	8SAE (3/4-16)	38 (SAE=48)	65 (SAE=77)	24 (SAE=30)	36 (SAE=45)	12 (SAE=17)
10	G1/2	M22×1.5	NPTF 1/2	10SAE (7/8-14)	48	80 (SAE=93)	30	46	14 (SAE=20)
15	G3/4	M27×2	—	12SAE (1 1/16-12)	58	100 (SAE=113)	41	55	16 (SAE=22)
20	G1	M33×2	—	16SAE (1 5/16-12)	72	110 (SAE=120)	46	70	18 (SAE=22)
25	G1 1/4	M42×2	NPTF 1 1/4	20SAE (1 5/8-12)	87	130 (SAE=140)	55	85	20 (SAE=22)
30	G1 1/2	M48×2	NPTF 1 1/2	24SAE (1 7/8-12)	93	150 (SAE=160)	60	90	22 (SAE=24)

04



M-SED 6...type Solenoid Ball Valve



M-SED6...1XJ...type

Size 6

Max. Working Pressure: 315 bar

Max. Flow: 25 L/min

Contents

Function and configuration	02
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Electrical data	04
Characteristic curves	05
Unit dimensions	06-07

Features

- Direct operated directional ball valve with solenoid actuation
- Mounting face as per DIN24 340 A ISO 4401 and CETOP-RP 121H
- Closed port is leak-free isolated
- Keep switch flexibility under high pressure
- Pressure-tight chamber does not need to be opened when changing of the coil
- Solenoid coil can be rotated through 90°
- With optional concealed manual override

Function and configuration

M-4SEW6 3/2 directional seat valve

M-SED6 type valve is a solenoid actuation directional seat valve. It controls the start, stop and direction of flow. The valve consists of valve housing (1), solenoid (2), valve seats (7) and (11) and closing element(4). The valve can be operated without energisation of the solenoid by the manual override(6).

The initial position of the valve (normally open "UK" or normally closed "CK") is determined by the arrangement of the spring (5). The chamber (3) behind closing element (4) is connected to port P and closed towards port T. The valve is therefore pressurebalanced with regard to the actuating forces (solenoid and spring).

Due to the special closing element (4), ports P, A and T can be pressurized to the maximum operating pressure (350 bar), and the flow can be directed in both directions.

In the initial position, the closing element (4) is pressed onto seat (11) by the spring (5), and by the solenoid (2) in the switching position. The flow is blocked.

M-4SEW6 4/2 directional seat valve

With a sandwich plate, the Plus-1 plate, under the 3/2 directional seat valve, the function of a 4/2 directional seat valve can be achieved.

Function of the Plus-1 plate:

Initial position:

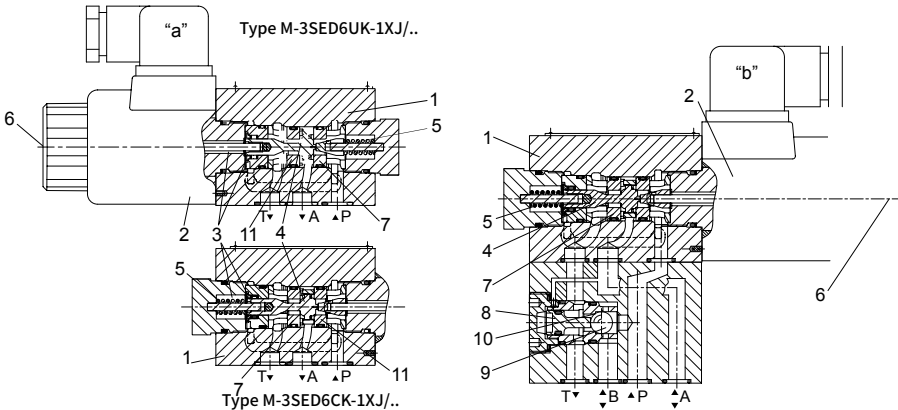
The main valve is not operated. Spring (5) holds closing element (4) on seat (11). Port P is blocked, and A is connected to T. A pilot line is provided from A to the large of pilot spool(8), which is therefore unloaded to tank. the pressure applied via P now shifts ball(9) onto seat(10). This opens the connection from P to B and A to T.

Transition position:

When the main valve is operating, closing element(4) is shifted against spring (5) and pressed onto seat (10). This results in closing of port T, while P, A and B are briefly connected.

Switching position:

P is connected to A. Since the pump pressure acts via A on the large area of the pilot spool(8), ball(9) is pressure onto seat(12). B is therefore connected to T, and P to A. Ball(9) is plus-1 plate has a "positive ove rap".



Cartridge type orifice plug(model M-.SED6.1XJ/...)

For the work status of the valve during switching process, the flow may be over the value permitted by the valve performance limit curve; in this case, a cartridge orifice plug is necessary.

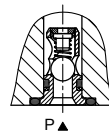
The orifice plug is installed in port P.



Cartridge check valve (model M-.SED6.1XJ/...)

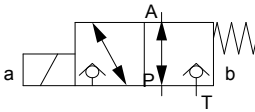
Cartridge check valve allows the oil flows from P to A freely with no leaks from A to P.

One-way valve is installed on port P.

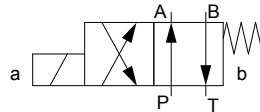


Spool symbols

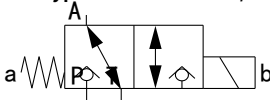
Type M-3SED6UK-1XJ/..



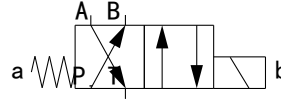
Type M-4SED6D-1XJ/..



Type M-3SED6CK-1XJ/..



Type M-4SED6Y-1XJ/..



Specification

	M	SED	6	-	1XJ	/	350	C		N	/		*
3 work ports	= 3												Further details in clear text
4 work ports	= 4												
Solenoid ball valve													No code = NBR seals V = FKM seals
Size 6		=6											No code = Without cartridge check valve, without cartridge restriction choke P=Without Cartridge check valve
Spool symbols													B12 = Orifice Φ 1.2 mm B15 = Orifice Φ 1.5 mm B18 = Orifice Φ 1.8 mm B20 = Orifice Φ 2.0 mm B22 = Orifice Φ 2.2 mm
I0J ~ 19Jseries					=1XJ								K4 = Without plug Z4 = With square plug Z5L = Square plug with light
Work pressure to 350bar						=350							
Wet-pin solenoid with detachable coil							=C						
12VDC								= G12					
24VDC								= G24					
110VDC								= G110					
205VDC								= G205					
220VDC								= G220					
110VAC								=W110R					
220VAC								=W220R					
With manual emergency button													=N9

Technical data

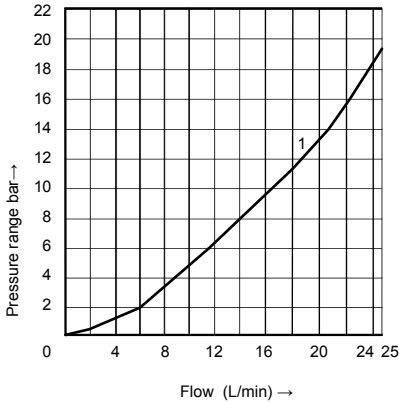
Installation position		Optional	
Environment temperature		°C	-30 to +50 (NBR seal) -20 to +50 (FKM seal)
Weight	2/2,3/2 directional poppet valve	Kg	1.5
	4/2 directional poppet valve	Kg	2.3
Max operation pressure		bar	350
Max flow		L/min	25
Hydraulic fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal	
Hydraulic fluid temperature range		°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)
Viscosity range		mm ² /s	2.8 to 500
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	

Electrical data

Voltage type		DC		AC										
Available voltage		V		12, 24, 110, 205, 220 110, 220 (Only by Z5 rectifier plug)										
Voltage tolerance (nominal voltage)		%		+10 ~ -15										
Power consumption		W		30										
Duty cycle				100%										
Switching time to ISO 6403 (installation position: Solenoid installed horizontally)														
Pressure bar	Flow L/min	DC				AC + rectifier								
		On/ms (without oil tank pressure)				Off/ms		On/ms (without oil tank pressure)				Off/ms		
		UK	CK	D	Y	UK, CK	D, Y	U	C	D	Y	U, C		D, Y
70	25	45	40	50	50	10	15	45	40	45	40	40		40
140	25	60	40	50	50	10	15	55	40	55	40	40		40
210	25	60	45	60	50	10	15	60	45	60	45	40		40
280	25	60	45	60	50	10	15	65	45	65	45	40		40
315	25	65	45	65	50	10	15	65	45	65	45	40		40
350	25	65	45	65	50	10	15	65	45	65	45	40		40
Note: switching time is related to flow direction (P to A / A to T); there may be deviation for reverse flow														
Switching frequency		times/h		Up to 15000										
Type of protection to DIN 40050				IP65										
Max coil temperature		°C		+150										

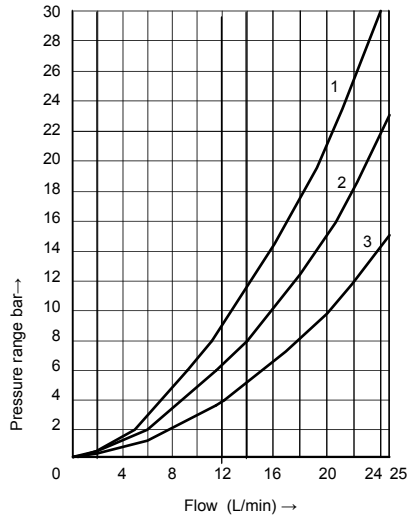
Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

**Δp - q_v characteristic curves
3/2 directional valve**



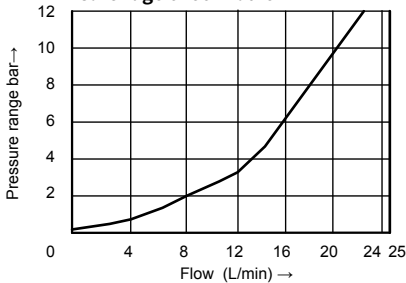
1 M-3SED6^{CK}_{UK...}, P to A and A to T

**Δp - q_v characteristic curves
2-position 4 directional valve**

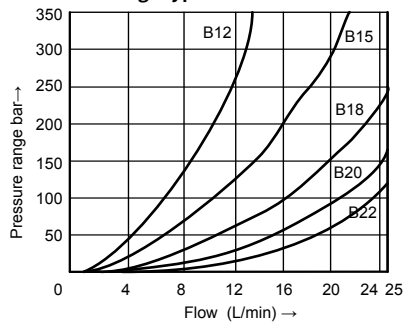


- 1 M-4SED6^D_{Y...}, A to T
- 2 M-4SED6^D_{Y...}, P to A
- 3 M-4SED6^D_{Y...}, P to B, B to T

**Δp - q_v characteristic curves
Cartridge check valve**

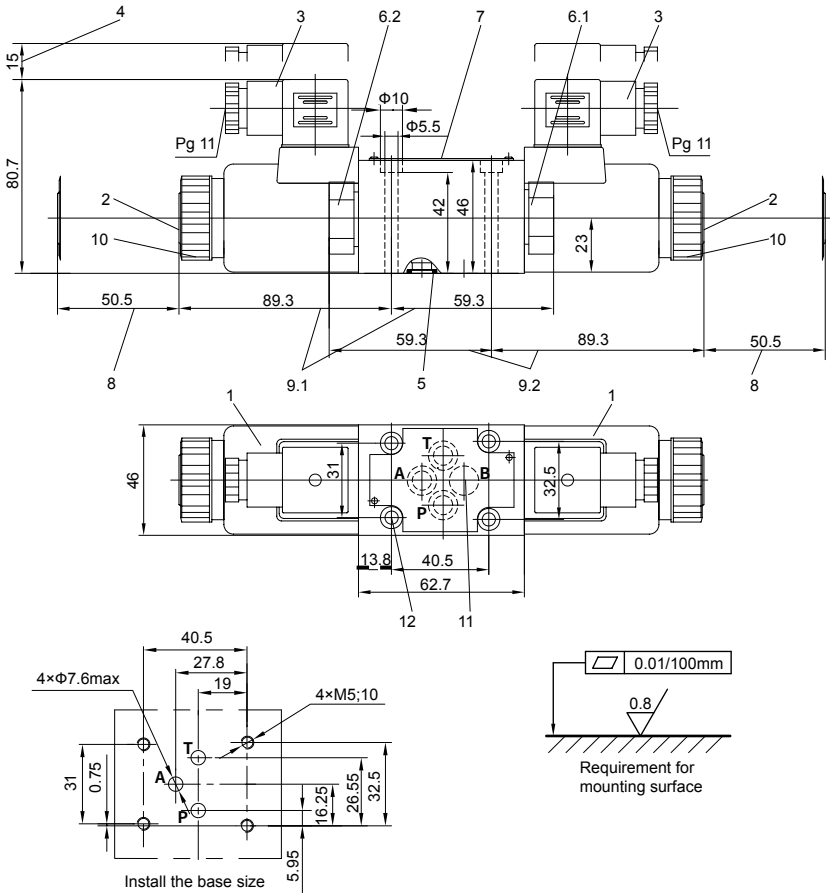


**Δp - q_v characteristic curves
Cartridge type restriction choke**



Unit dimensions

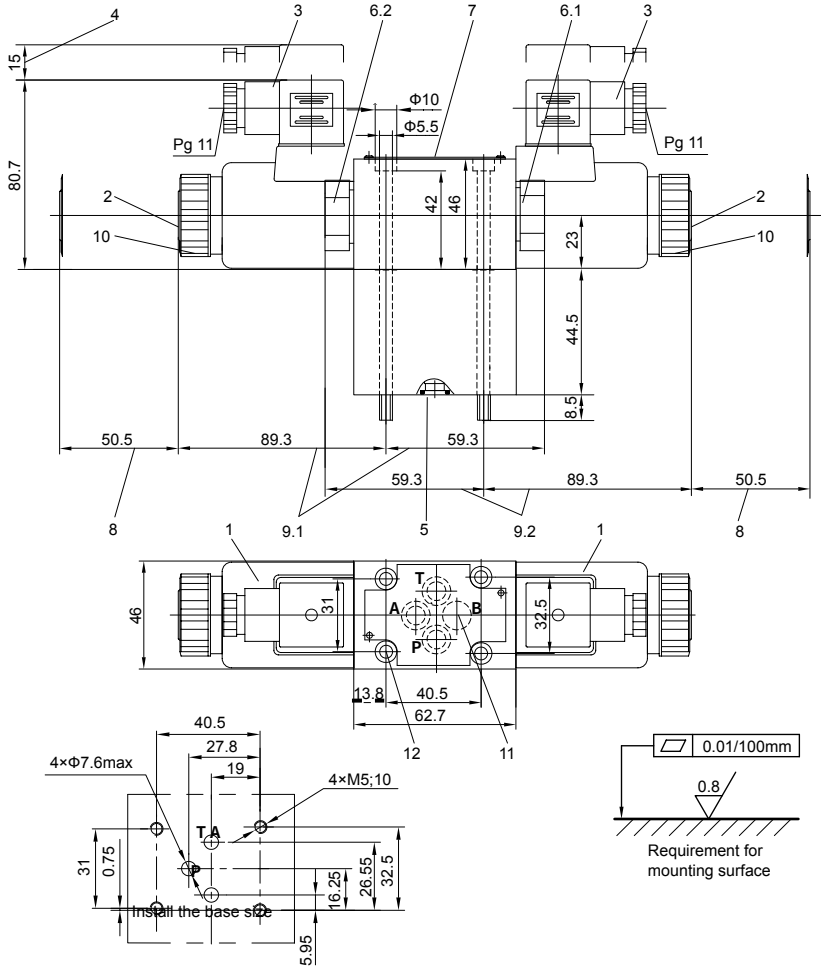
• M-3SED6^{CK}_{UK} -1XJ/...solenoid ball valve



- | | |
|--|--|
| <ul style="list-style-type: none"> 1 Solenoid 2 Manual emergency button 3 Plug as per DIN43650 (can rotate for 90 degrees) 4 Space required to remove cable socket 5 O-ring 9.25 \times 1.78 for port P, T, A and B 6.1 Plug for M-3SED6UK-1XJ/.. 6.2 Plug for M-3SED6CK-1XJ/.. 7 Name plate. | <ul style="list-style-type: none"> 8 Space required to remove coil 9.1 M-3SED6UK-1XJ/.. total length 9.2 M-3SED6CK-1XJ/.. total length 10 Fixing nut, Tightening torque $M_A=4Nm$ 11 Oil port B of the valve is a blind bore. 12 Valve fixing screw:
M5 \times 50 GB/T70.1-10.9
Tightening torque $M_A=8.9Nm$ |
|--|--|

Unit dimensions

·M-4SED6_v^D-1XJ/..solenoid ball valve



- | | |
|--|---|
| <ul style="list-style-type: none"> 1 Solenoid 2 Manual emergency button 3 Plug as per DIN43650 (can rotate for 90 degrees) 4 Space required to remove cable socket 5 O-ring 9.25×1.78 for port P, T, A and B 6.1 Plug for M-4SED6D-1XJ/.. 6.2 Plug for M-4SED6Y-1XJ/.. 7 Name plate. | <ul style="list-style-type: none"> 8 Space required to remove coil 9.1 M-4SED6D-1XJ/.. total length 9.2 M-4SED6Y-1XJ/..total length 10 Fixing nut, Tightening torque$M_A=4Nm$ 11 Oil B of the valve is a blind bore. 12 Valve fixing screw:
M5×50 GB/T70.1-10.9
Tightening torque $M_A=8.9Nm$ |
|--|---|



M-SED 10 type Solenoid Ball Valve



M-SED10...1XJ...type

Size 10

Max. Working Pressure: 315 bar

Max. Flow: 40 L/min

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Technical data	04
Electrical data	04
Characteristic curves	05
Unit dimensions	06-07

Features

- Direct operated directional ball with solenoid actuation
- Mounting face as per DIN24 340 A ISO 4401 and CETOP-RP 121H
- Closed port is leak-free isolated
- keep switch flexibility under high pressure
- Pressure-tight chamber does not need to be opened for a change of the coil
- Solenoid coil can be rotated through 90°
- With concealed manual override, optional

Function and configuration

M-SED10 3/2 directional poppet valve

M-SED10 type valve is direct operated directional poppet valves with solenoid actuation. They control the start, stop and direction of flow. The valve consists of valve housing (1), the solenoid (2), the valve seat (7) and (11) and the control spool (4).

The manual override (6) allows the valve to be operated without solenoid energization.

The initial position of the valve (normally open "UK" or normally closed "CK") is determined by the arrangement of the spring (5). The chamber (3) behind the control spool (4) is connected to port P and sealed against port T. Thus, the valve is pressure-compensated in relation to the actuating forces (solenoid and spring).

By the control spool (4), the port P, A and T can be loaded with maximum operating pressure (350bar) and the flow can be directed in both directions.

In the initial position, the control spool (4) is pressed onto the seat (11) by the spring (5), it is pressed onto the seat (7) by the solenoid (2) in spool position. The flow is blocked.

M-4SED10 4/2 directional poppet valve

With the help of a sandwich plate, the Plus-1 plate, under the 3/2 directional poppet valves, the function of a 4/2 directional poppet valve is achieved.

Function of the Plus-1 plate

Initial position:

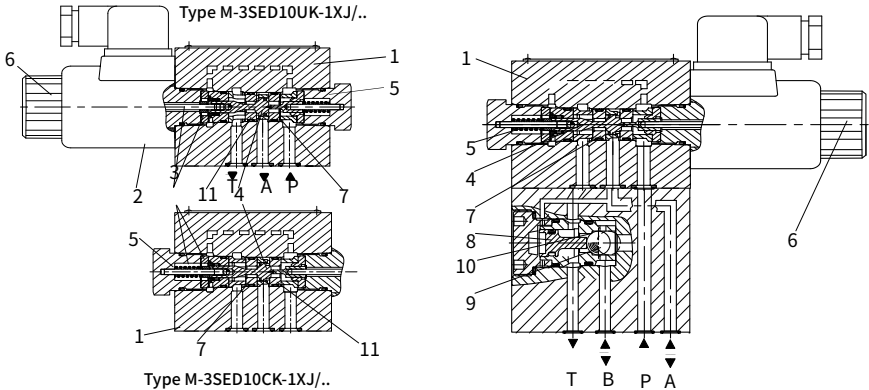
The main valve is not actuated. The spring (5) holds the control spool (4) on the seat (11). Port P is blocked and A is connected to T. Apart from that, one control line is connected from A to the large area of the control spool (8), which is thus unloaded to the tank. The pressure applied via P now pushes the ball (9) onto the seat (10). Now, P is connected to B, and A to T.

Transition position:

When the main valve is actuated, the control spool (4) is shifted against the spring (5) and pressed onto the seat (7). During this, port T is blocked, P, A and B is briefly connected to each other.

Spool position:

P is connected to A. As the pump pressure acts via A on the large area of the control spool (8), the ball (9) is pressed onto the seat (12). Thus, B is connected to T, and P to A. The ball (9) in the Plus-1 plate has a "positive spool overlap".



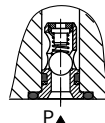
Throttle insert:

The use of a throttle insert is required, if, due to the operating conditions, flows are to be expected during the switching procedure, which are higher than the started maximum performance limits of the valve. The throttle is inserted into port P of the valve.



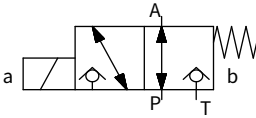
Cartridge check valve:

The cartridge check valve allows free flow from P to A and provides leak-free closed from A to P. The cartridge check valve is inserted into port P of the valve.

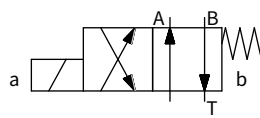


Spool symbols

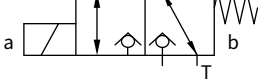
Type M-3SED10UK-1XJ/..



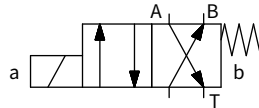
Type M-4SED10D-1XJ/..



Type M-3SED10CK-1XJ/..



Type M-4SED10Y-1XJ/..



Specification

	M	—	SED	10	—	1XJ	/	350	C		N	/		
3 service port	= 3													
4 service port	= 4													
Solenoid ball valve														No code = NBR seals V = FKM seals
Size 10	= 10													No code = Without cartridge check valve, without throttle insert
Spool symbols														P = With cartridge check valve
Series 10J to 19J (10J to 19J: unchanged installation and connection dimensions)	= 1XJ													B12 = Throttle Φ 1.2 mm B15 = Throttle Φ 1.5 mm B18 = Throttle Φ 1.8 mm B20 = Throttle Φ 2.0 mm B22 = Throttle Φ 2.2 mm
Operating pressure 350 bar	= 350													K4 = Din4365 sockets without plug Z4 = Square plug Z5L = Square plug with lamps
Wet-pin solenoid with detachable coil	= C													
12VDC	= G12													
24VDC	= G24													
110VDC	= G110													
205VDC	= G205													
220VDC	= G220													
Plug rectification 110V	= W110R													
Plug rectification 220V	= W220R													
With manual override	= N9													

Technical data

Installation position		Optional	
Environment temperature		°C	-30 to +50 (NBR seal) -20 to +50 (FKM seal)
Weight	Two tee Solenoidic directional valve	Kg	2.6
	Two four-way Solenoidic directional valve	Kg	3.9
Max operation pressure		bar	350
Max flow		L/min	40
Hydraulic fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal	
Fluid temperature range		°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)
Viscosity range		mm ² /s	2.8 to 500
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	

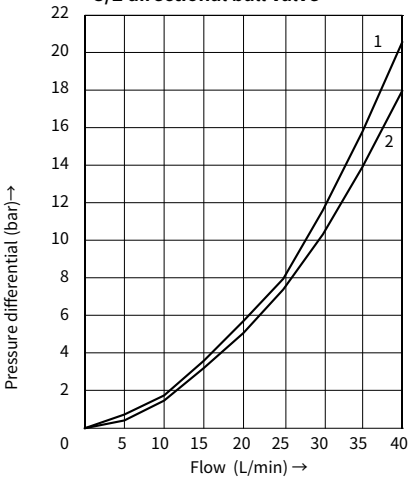
Electrical data

Voltage type		DC		AC+ rectifier									
Voltage version		V		12, 24, 110, 205, 220 110,220 (only possible via Z5 rectifier)									
Permissible voltage(deviation)		%		+10 ~ -15									
Input power		W		30									
Continuous power-on time				Continuous									
Switching time to ISO 6403													
Pressure bar	Flow L/min	DC solenoid						AC + rectifier					
		On/ms (without oil tank pressure)				Off/ms		On/ms (without oil tank pressure)				Off/ms	
		UK	CK	D	Y	UK, CK	D, Y	UK	CK	D	Y	UK, CK	D, Y
70	40	40	30	40	35	10	10	35	30	40	35	40	40
140	40	40	30	40	35	10	10	40	30	40	35	40	40
210	40	45	35	45	35	10	10	45	35	45	35	40	40
280	40	45	35	45	35	10	10	45	35	45	35	40	40
315	40	50	35	50	35	10	10	50	40	50	35	40	40
350	40	50	45	50	45	10	10	50	45	50	45	40	40
Note: The switching types relate to a flow of P to A and A to T. With reversed flows deviations are possible.													
Switching frequency		Cycles/h		to 15000									
IP rating as per DIN 40050				IP65									
Max coil temperature		°C		+150									

Characteristic curves

(Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

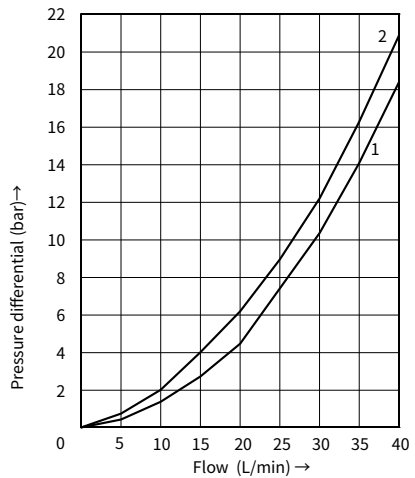
**Δp - q_v characteristic curves
3/2 directional ball valve**



1 M-3SED6^{CK}_{UK}..., P to A

2 M-3SED6^{CK}_{UK}..., P to A

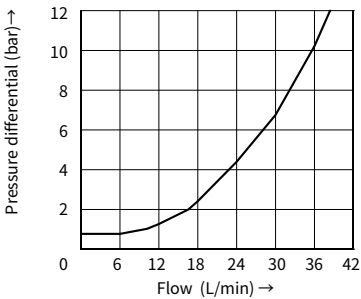
**Δp - q_v characteristic curves
4/2 directional ball valve**



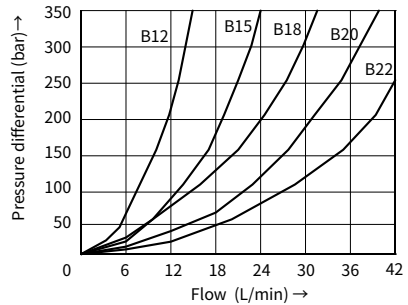
1 M-4SED6^D_V..., P to B, A to T

2 M-4SED6^D_V..., B to T, P to A

**Δp - q_v characteristic curves
Cartridge check valve**

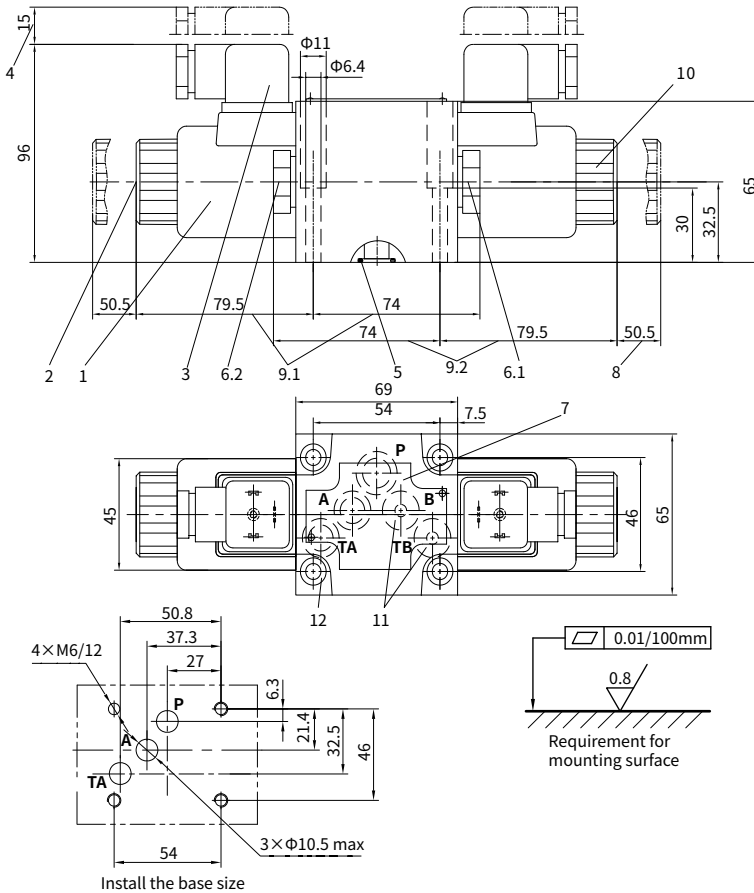


**Δp - q_v characteristic curves
Throttle insert**



Unit dimensions

• M-3SED10^{CK}_{UK}-1XJ/...solenoid ball valve



- 1 Solenoid
- 2 Manual override
- 3 Plug-in connector to DIN 43650 (rotatable 90°)
- 4 Space required to remove the Plug-in connector
- 5 O-rings 12×2 for ports A,B,TA,TB
O-rings 14×2 for port P
- 6.1 Plug for M-3SED10UK-1XJ/
- 6.2 Plug for M-3SED10CK-1XJ/
- 7 Name plate

- 8 Space required to remove the coil
 - 9.1 Total length of M-3SED10UK-1XJ/
 - 9.2 Total length of M-3SED10CK-1XJ/
 - 10 Securing nut tightening torque $M_A = 4Nm$
 - 11 Ports B and TB are a blind counterbore
 - 12 Valve fixing screws
- Internal hexagon screw: M6×40 GB/T 70.1-10.9,
tightening torque $M_A = 15.5 Nm$



M-SEW 6...type Solenoid Ball Valve



M-SEW6...3XJ...type

Size 6

Max. Working Pressure: 420/630 bar

Max. Flow: 25 L/min

Contents

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Technical data	04
Electrical data	04
Characteristic curves	05
Unit dimensions	06-07

Features

- Direct-acting solenoid ball valve
- Mounting face as per DIN24 340 A
ISO 4401 and CETOP-RP 121H
- Free of leakage
- Switching flexibility in
high-pressure state
- Replace the coil, can take pressure operation
- Solenoid coil can rotate for 90 degrees
- Manual emergency operation available

Function and configuration

M-SEW6 2-position 2/3-way solenoid ball valve

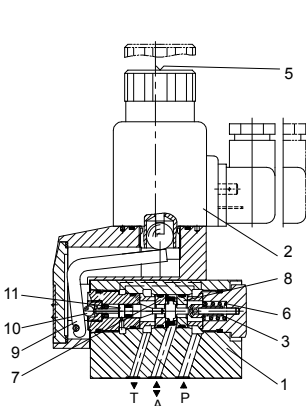
M-SEW6 type valve is a solenoid actuation directional seat valve. It controls start, stop and flow direction.

The valve consists of valve body (1), Solenoid (2), and valve element (3).

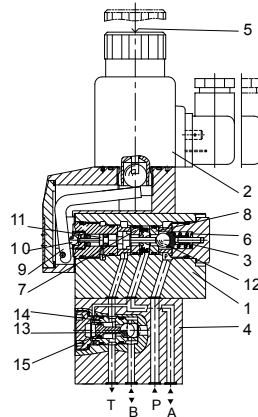
In the initial position, the spool is pressed to the seat by the spring(6). And in the switching position, it is pressed by the solenoid(2). The force of the solenoid(2) acts by the angled lever(9) and ball(10) on the push bar(11) of the two-side seal, the chamber between the two sealing elements is connected to port P. Thus the valve element is pressure-compensated in relation to the actuating force(solenoid or spring). It means that the valve can be used up to 630 bar.

The manual emergency button(5) allows for the switching of the valve without solenoid energization.

Make sure that the specified maximum flow is not exceeded. If necessary, use a throttle insert to limit the flow.



M-3SEW6 2-position 2/3-way solenoid ball valve



M-4SEW6 2-position 4-way solenoid ball valve

M-SEW6 2-position 4-way solenoid ball valve

With a sandwich plate, the Plus-1 plate, under the 3/2 directional seat valve, the function of a 4/2 directional seat valve is achieved.

Function of the Plus-1 plate:

Initial position:

when the Solenoid is not energized, pretention of spring (6) keeps valve element (12) on valve seat (8) on the right, oil port P is closed and port A connected to T; pressure oil supplied from oil port P push steel ball (13) to valve seat (14), upon which oil port P is connected to B and A connected to T; besides, a control oil line is connected from oil port A acts on the big area of control piston (15), which can be used for unloading to oil tank.

Switching position:

after the Solenoid is energized, oil port P is connected to A; pressure oil from the pump goes through the control oil line connected from port A and acts on the big area of control piston (15); steel ball (13) is pushed to the other side of valve seat (14), thus oil port P is connected to A and B connected to T.

Cartridge restriction choke (model M-.SEW6.3XJ/.../B...)

To restrict flow through the valve, a restriction choke can be installed.

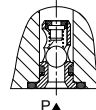
Restriction choke is installed on port P.



Cartridge type one-way valve (model M-.SEW6.3XJ/.../P)

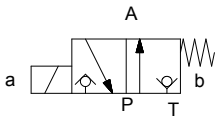
Cartridge type one-way valve allows oil flow in from port P and it is closed for reverse flowing.

One-way valve installed on port P.

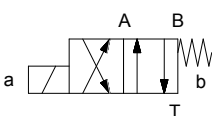


Spool symbols

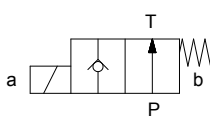
Type M-3SEW6U-3XJ/..



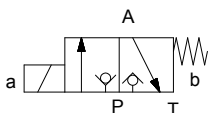
Type M-4SEW6D-3XJ/..



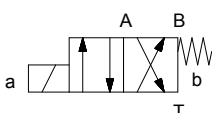
Type M-2SEW6P-3XJ/..



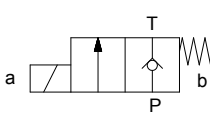
Type M-3SEW6C-3XJ/..



Type M-4SEW6Y-3XJ/..



Type M-2SEW6N-3XJ/..



Specification

M	SEW	6	-	3XJ	/	M	N	/				
---	-----	---	---	-----	---	---	---	---	--	--	--	--

2 work ports = 2

3 work ports = 3

4 work ports = 4

Solenoid ball valve

Diameter 6 =6

Spool symbols

30J ~ 39J series =3XJ

Work pressure to 420 bar =420

Work pressure to 630 bar =630

Coil replaceable (air gap type) Solenoid =M

12VDC = G12

24VDC = G24

110VDC = G110

205VDC = G205

220VDC = G220

110VAC (Need to take rectifying plug Z5) =W110R

220VAC (Need to take rectifying plug Z5) =W220R

With manual emergency button =N9

Further details
in clear text

No code = NBR seals
V = FKM seals

No code = Without cartridge
one-way valve,
without cartridge restriction choke

P= Without Cartridge check valve

B12 = Orifice Φ 1.2 mm

B15 = Orifice Φ 1.5 mm

B18 = Orifice Φ 1.8 mm

B20 = Orifice Φ 2.0 mm

B22 = Orifice Φ 2.2 mm

K4 = Without plug

Z4 = With square plug

Z5L= Square plug with light

Technical data

Installation position		Optional	
Environment temperature		°C	-30 to +50 (NBR seal) -20 to +50 (FKM seal)
Weight	Two two-way Solenoidic directional valve	Kg	1.5
	Two three-way Solenoidic directional valve	Kg	1.5
	Two four-way Solenoidic directional valve	Kg	2.3
Max operation pressure	Port P, A, B	bar	420
	Port T		100
Max flow		L/min	25
Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal	
Fluid temperature range		°C	-30 to +50 (NBR seal) -20 to +50 (FKM seal)
Viscosity range		mm ² /s	2.8 to 500
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	

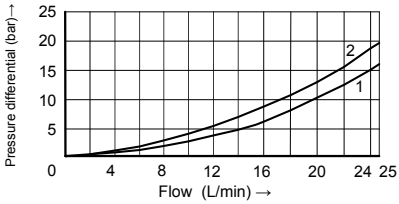
Electrical data

Voltage type		DC				AC							
Available voltage		V		12, 24, 110, 205, 220				110, 220 (Only by Z5 rectifier plug)					
Allowed voltage (deviation)		%		+10 ~ -15									
Required power		W		30									
Continuous power-on time		%		100									
Switching time in compliance with ISO 6403													
Pressure bar	Flow L/min	DC								AC50HZ			
		on/ms (without oil tank pressure)				off/ms				on/ms (without oil tank pressure)			
		U	C	D	Y	U, C	D, Y	U	C	D	Y	U, C	D, Y
140	25	25	30	25	30	10	10	30	40	30	40	35	35
280	25	25	30	25	30	10	10	35	45	35	45	40	40
320	25	25	35	25	35	10	10	35	50	35	50	40	40
420	25	25	35	25	35	10	10	40	50	40	50	50	50
Switching frequency		Time/h		Up to 15000									
IP rating as per DIN 40050		IP65											
Max coil temperature		°C		+150									

Characteristic curves

(Measured at $t=40^{\circ}\text{C}\pm 5^{\circ}\text{C}$, using HLP46)

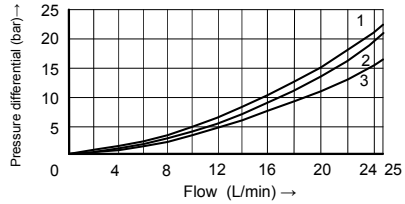
Δp - q_v characteristic curves 2-position 2-way solenoid ball valve



1 M-2SEW6N ..., P to T

2 M-2SEW6P ..., P to T

Δp - q_v characteristic curves 2-position 3-way solenoid ball valve

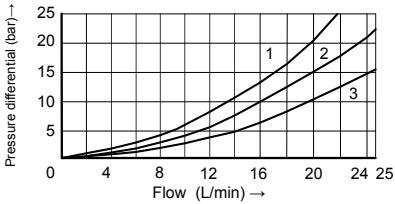


1 M-3SEW6^U_C ..., A to T

2 M-3SED6U ..., P to A

3 M-3SED6C ..., P to A

Δp - q_v characteristic curves 2-position 4-way solenoid ball valve

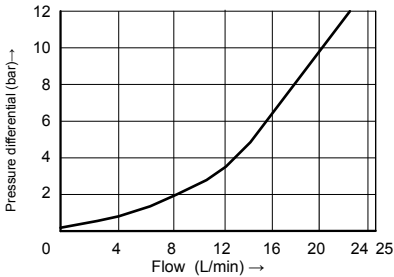


1 M-4SEW6^D_Y ..., A to T

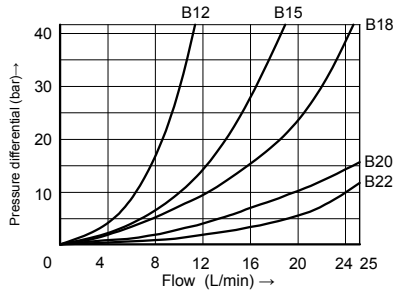
2 M-4SEW6^D_Y ..., P to A

3 M-4SEW6^D_Y ..., P to B, B to T

Δp - q_v characteristic curves Cartridge check valve

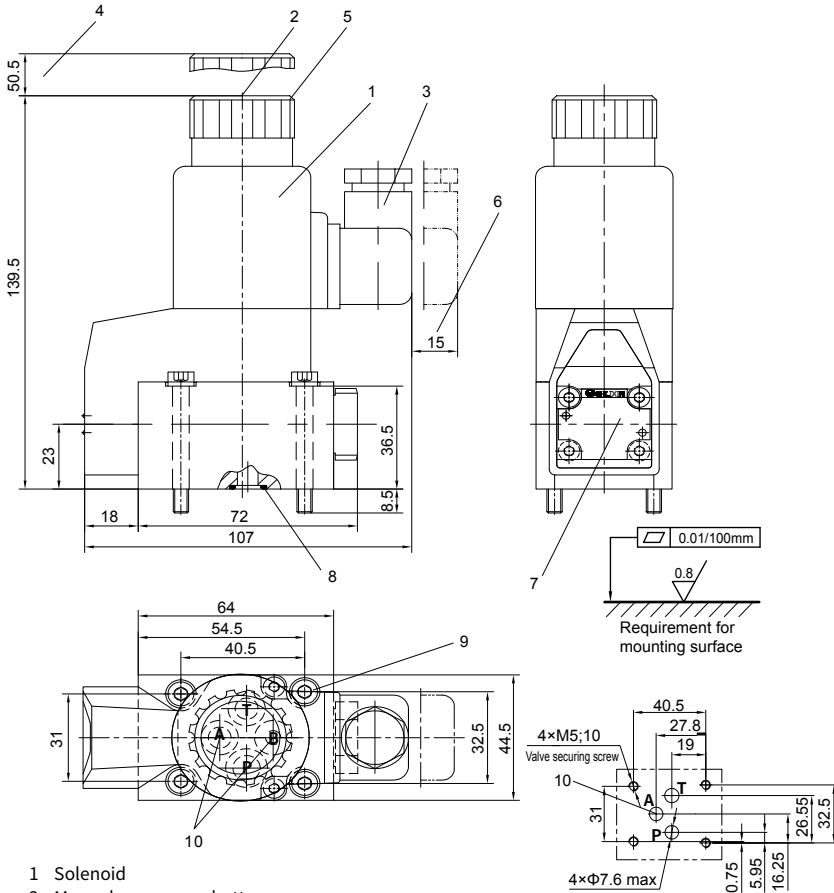


Δp - q_v characteristic curves Cartridge type restriction choke



Unit dimensions

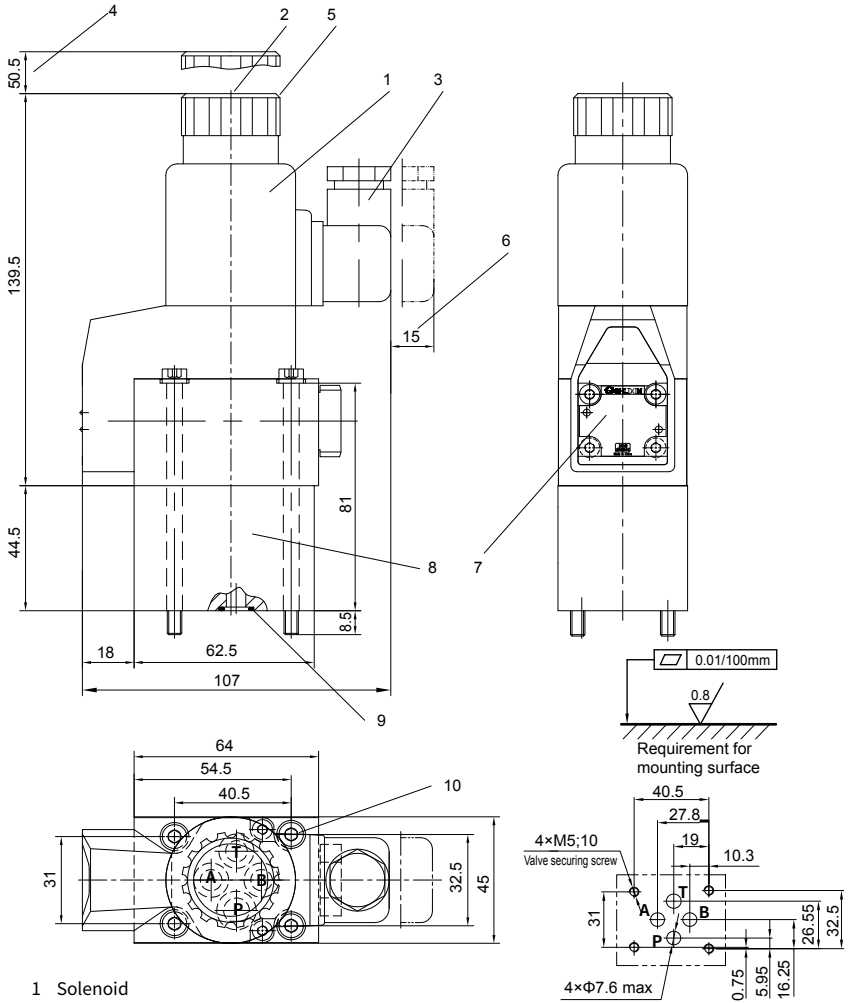
• 2-position 2-way, 2-position 3-way solenoid ball valve



- 1 Solenoid
- 2 Manual emergency button
- 3 Plug as per DIN43650 (can rotate for 90 degrees)
- 4 Remove space needed for Solenoid coil.
- 5 Lock nut, tightening torque $M_A=4\text{Nm}$
- 6 Remove space
- 7 Name plate.
8. Oil port A and B use O ring 9.25×1.78 , P uses O-ring 10×2
9. Valve securing screw: $M5 \times 45$ GB/T70.1- class 10.9, Tightening torque $M_A=8.9\text{Nm}$
- 10 2-position 2-way directional valve has oil port A and B which are blind holes;
3/2 directional poppet valve has oil port A and B which are blind holes.

Unit dimensions

·2-position 4-way solenoid ball valve



- 1 Solenoid
- 2 Manual emergency button
- 3 Plug as per DIN43650 (can rotate for 90 degrees)
- 4 Remove space needed for Solenoid coil.
- 5 Lock nut, tightening torque $M_A=4Nm$
- 6 Remove space
- 7 Name plate.
- 8 Connecting valve body
- 9 Oil port A and B use O ring 9.25×1.78 , P uses O-ring 10×2
- 10 Valve securing screw hole, $M5 \times 90$ GB/T70.1-10.9, Tightening torque $M_A=8.9Nm$



M-SEW 10...type Solenoid Ball Valve



M-SEW10...1XJ...type

Size 10
Max. Working Pressure: 420/630 bar
Max. Flow: 40 L/min

Contents

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Electrical data	04
Characteristic curves	05
Unit dimensions	06-07

Features

- Direct-acting solenoid ball valve
- Mounting face as per DIN24 340 A
ISO 4401 and CETOP-RP 121H
- Free of leakage
- Keeping switching flexibility in
high-pressure state
- DC Solenoid of removable coil
- Solenoid coil can rotate for 90 degrees
- Optional manual emergency operation

Function and configuration

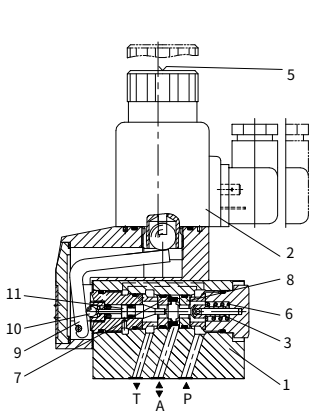
M-SEW10 2-position 3-way solenoid ball valve

M-SEW10 type valve is a solenoid actuation directional seat valve, it controls start, stop and flow direction. The valve main consists of valve body (1), Solenoid (2), and valve element(3).

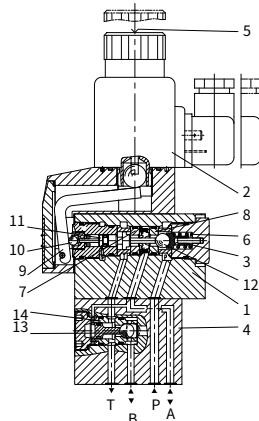
In the initial position, the spool is pressed to the seat by the spring(6), and by the solenoid(2) in the switching position. The force of the solenoid(2) acts by the angled lever(9) and the ball(10) on the push bar(11) with two-side seal. The chamber between the two sealing elements is connected to port P. Thus the valve element is pressure-compensated in relation to the actuating force(solenoid or spring). It means that the valve can be used up to 630 bar.

The manual emergency button(5) allows for the switching of the valve without solenoid energization.

Make sure that the specified maximum flow is not exceeded. If necessary, use a throttle insert to limit the flow.



M-3SEW10 2-position TEE solenoid ball valve



M-4SEW10 2-position 4-way solenoid ball valve

M-4SEW10 2-position 4-way solenoid ball valve

With a sandwich plate, the Plus-1 plate, under the 3/2 directional seat valve, the function of a 4/2 directional seat valve is achieved.

Function of the Plus-1 plate:

1). Initial position:

when the Solenoid is not energized, pretention of spring (6) keeps valve element (12) on valve seat (8) on the right, oil port P is closed and port A connected to T; pressure oil supplied from oil port P push steel ball (13) to valve seat (14), upon which oil port P is connected to B and A connected to T; control oil line is connected from oil port A acts on the larger area of control piston (12), which can be used for unloading to oil tank.

2). Switching position:

after the Solenoid is energized, oil port P is connected to A; pressure oil from the pump goes through the control oil line connected from port A and acts on the larger area of control piston (12); steel ball (13) is pushed to the other side of valve seat (14), thus oil port P is connected to A and B connected to T.

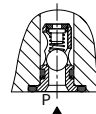
Cartridge restriction choke (model M-.SEW10.1XJ/./B...)

To restrict flow through the valve, a restriction choke can be installed. Restriction choke is installed on port P.



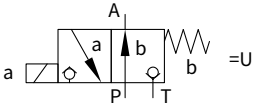
Cartridge type one-way valve (model M-.SEW10.1XJ/./P)

Cartridge type one-way valve allows oil flow in from port P and it is closed for reverse flowing. One-way valve installed on port P.

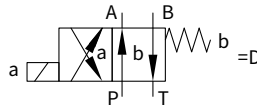


Spool symbols

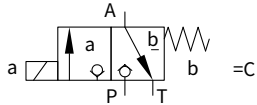
Type M-3SEW10U-1XJ/..



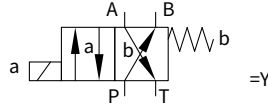
Type M-4SEW10D-1XJ/..



Type M-3SEW10C-1XJ/..



Type M-4SEW10Y-1XJ/..



Specification

M	SEW	10	-	1XJ	/	M	N	/	*
---	-----	----	---	-----	---	---	---	---	---

3 work ports	= 3									Further details in clear text
4 work ports	= 4									
Solenoid ball valve										No code = NBR seals V = FKM seals
Nominal size 10	=10									No code = Without cartridge one-way valve, without cartridge restriction choke
Spool symbols										P= Without Cartridge check valve
10J ~ 19J series (10J to 19J: unchanged installation and connection dimensions)				=1XJ						B12 = Orifice Φ 1.2 mm B15 = Orifice Φ 1.5 mm B18 = Orifice Φ 1.8 mm B20 = Orifice Φ 2.0 mm B22 = Orifice Φ 2.2 mm
Work pressure to 420bar									=420	
Work pressure to 630bar									=630	
Replaceable coil (air gap type) Solenoid									=M	
12VDC									= G12	
24VDC									= G24	
110VDC									= G110	
205VDC									= G205	
220VDC									= G220	
110VAC									=W110R	
220VAC									=W220R	
With manual override									=N9	
										K4 = Without plug Z4 = With square plug Z5L = Square plug with light

Technical data

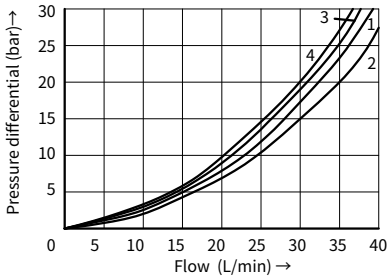
Installation position		Optional	
Environment temperature		°C	-30 to +50 (NBR seal) -20 to +50 (FKM seal)
Weight	Two tee Solenoidic directional valve		kg
	2.0 Two four-way Solenoidic directional valve		
Max operation pressure	Port P, A, B	bar	420
	Port T		100
Max flow	L/min		40
Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal	
Fluid temperature range		°C	-30 to +50 (NBR seal) -20 to +50 (FKM seal)
Viscosity range		mm ² /s	2.8 to 500
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	

Electrical data

Voltage type		DC		AC											
Available voltage		V	12, 24, 110, 205, 220	110, 220 (Only by Z5 rectifier plug)											
Allowed voltage (deviation)		%	+10 ~ -15												
Required power		W	30												
Continuous power-on time		%	100												
Switching time in compliance with ISO 6403															
Pressure bar	Flow L/min	DC						AC50HZ							
		On/ms (without oil tank pressure)				Off/ms		On/ms (without oil tank pressure)				Off/ms			
		U	C	D	Y	U, C	D, Y	U	C	D	Y	U	C	D	Y
140	40	20	40	20	40	12	17	20	40	20	40	60	45	40	50
280	40	25	45	20	45	12	17	20	45	25	45	60	45	45	55
320	40	25	45	20	45	12	17	25	45	25	45	60	45	45	55
420	40	30	45	20	50	12	17	25	45	25	50	60	45	45	55
Switching frequency		Time/h		Up to 15000											
IP rating as per DIN 40050		IP65													
Max coil temperature		°C		+150											

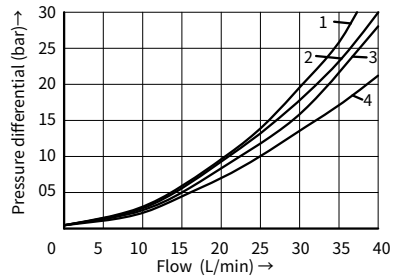
Characteristic curves (Measured at $t=40^{\circ}\text{C}\pm 5^{\circ}\text{C}$, using HLP46)

Δp - q_v characteristic curves
3/2 solenoid ball valve



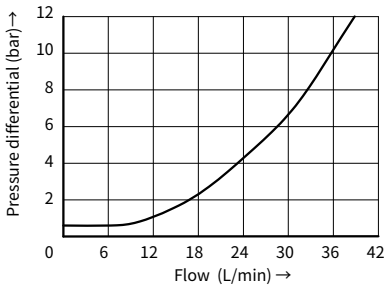
- 1 M-3SEW 10 C ..., P to A
- 2 M-3SEW 10 C ..., A to T
- 3 M-3SEW 10 U ..., P to A
- 4 M-3SEW 10 U ..., A to T

Δp - q_v characteristic curves
2-position 4-way solenoid ball valve

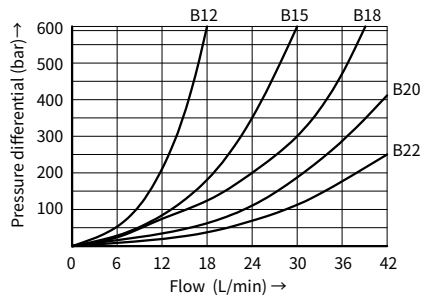


- 1 M-3SEW 10^D_Y ..., A to T
- 2 M-3SEW 10^D_Y ..., P to A
- 3 M-3SEW 10^D_Y ..., P to B
- 4 M-3SEW 10^D_Y ..., B to T

Δp - q_v characteristic curves
Cartridge check valve

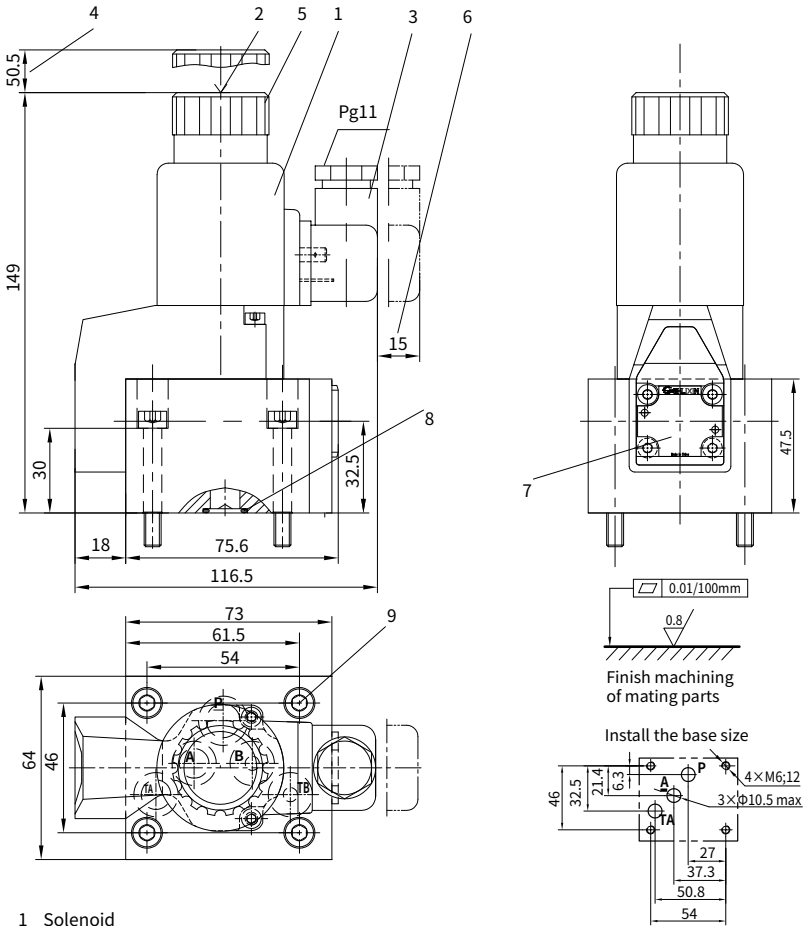


Δp - q_v characteristic curves
Cartridge type restriction choke



Unit dimensions

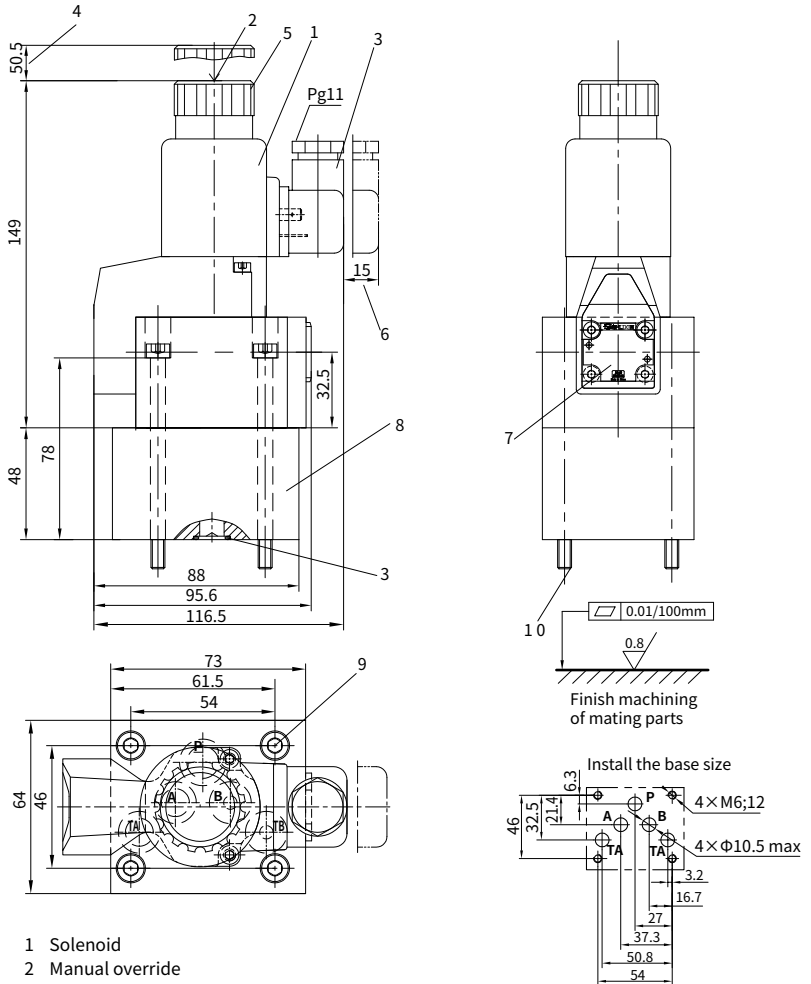
·2-position 3-way solenoid ball valve



- 1 Solenoid
- 2 Manual override
- 3 Plug as per DIN43650 (can rotate for 90 degrees)
- 4 Remove space needed for Solenoid coil
- 5 Lock nut, tightening torque $M_A=4Nm$
- 6 Remove space
- 7 Name plate
- 8 Oil port A. B. TA use O-ring 12×2, Oil port P uses O-ring 14×2
- 9 Valve securing screw, M6×40 GB/T70.1- class 10.9, Tightening torque $M_A=15.5Nm$

Unit dimensions

·2-position 4-way solenoid ball valve



- 1 Solenoid
- 2 Manual override
- 3 Plug as per DIN43650 (can rotate for 90 degrees)
- 4 Remove space needed for Solenoid coil
- 5 Lock nut, tightening torque $M_A=4Nm$
- 6 Remove space
- 7 Name plate.
- 8 Connecting valve body
- 9 Oil port A,B,TA use O-ring 12×2, Oil port P uses O-ring 14×2
- 10 Valve securing screw, M6×90 GB/T70.1- class 10.9, Tightening torque $M_A=15.5Nm$



M-SR...type Plug In Check Valve



M-SR...1XJ...type

Sizes 8, 10, 15, 20, 25, 30
Max. Working Pressure: 315 bar
Max. Flow: 400 L/min

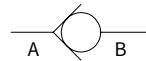
Contents

Configuration	02
Specifications	02
Technical data	03
Characteristic curves	03-04
Cavity dimensions:	05-06

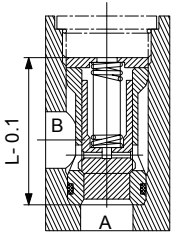
Features

- Installation in manifold blocks
- Leakage-free closure in one direction
- Various cracking pressures, optional

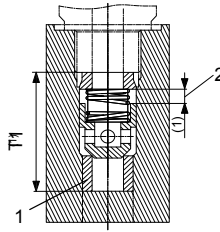
Symbol



Configuration



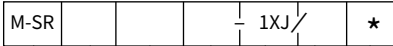
Right angled check valve cartridge



Straight line check valve cartridge
 1-Seat frozen in at -60 °C
 2-Stroke
 (1)-Dimensions below

Size	L
8	36.3
10	39.3
15	45.8
20	55.3
25	74.3
30	83.3

Specifications



Plug in check valve

- size 8 = 8
- size 10 =10
- size 15 =15
- size 20 =20
- size 25 =25
- size 30 =30

Right angled check valve cartridge =KE
 Straight line check valve cartridge =KD

Further details in clear text

No code = NBR seals
 V = FKM seals

1XJ = Series 10J to 19J
 (10J to 19J: unchanged installation and connection dimensions)

- 00= Without spring (not with straight line check valve)
- 02= Crack pressure 0.2bar
- 05= Crack pressure 0.5bar
- 15= Crack pressure 1.5bar
- 30= Crack pressure 3bar
- 50= Crack pressure 5bar

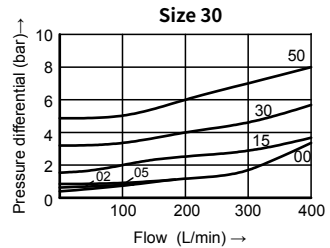
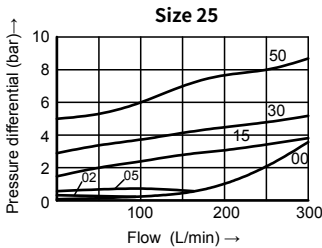
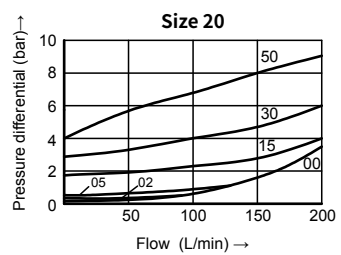
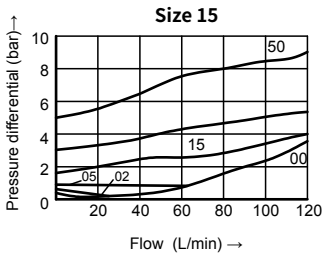
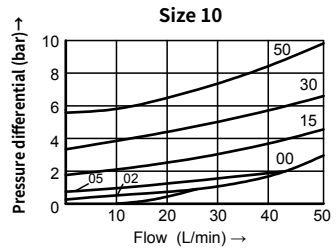
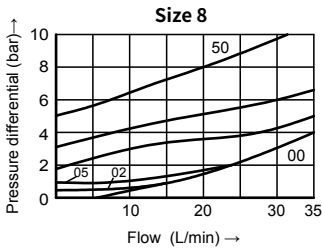
Technical data

Max. operating pressure	bar	315					
Crack pressure	bar	see characteristic curves					
Max. flow-rate	L/min	see characteristic curves					
Viscosity range	mm ² /s	2.8 to 380					
Fluid temperature range	°C	-30 to +80 (NBR seal)					
		-20 to +80 (FKM seal)					
Fluid	Mineral oil suit for NBR and FKM seal						
	Phosphate ester for FKM seal						
Degree of contamination	Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406						
Size		8	10	15	20	25	30
Weight: Right angled check valve cartridge	Kg	0.03	0.05	0.08	0.14	0.32	0.47
	Straight line check valve cartridge	Kg	0.05	0.05	0.1	0.2	0.25

01

Characteristic curves (Measured at t=40°C ± 5°C, using HLP46)

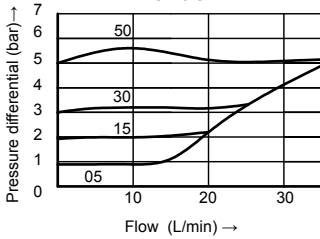
Right angled plug in check valve



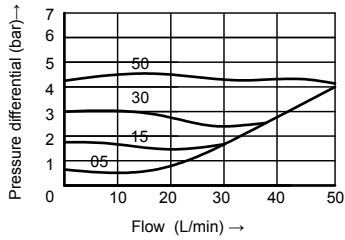
Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

Straight line plug in check valve

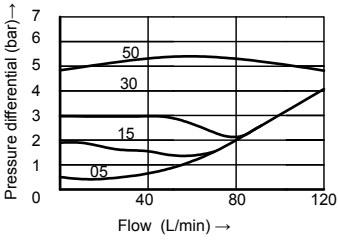
Size 8



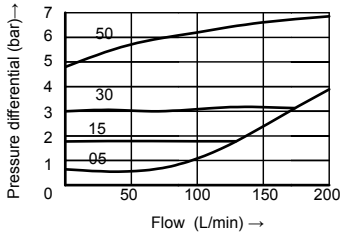
Size 10



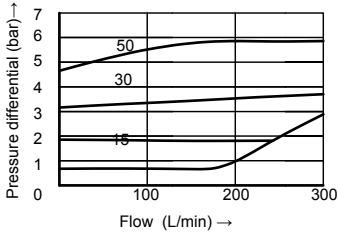
Size 15



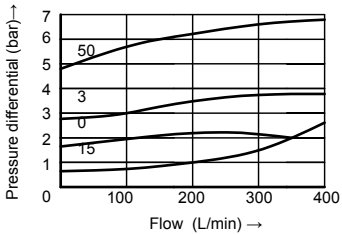
Size 20



Size 25



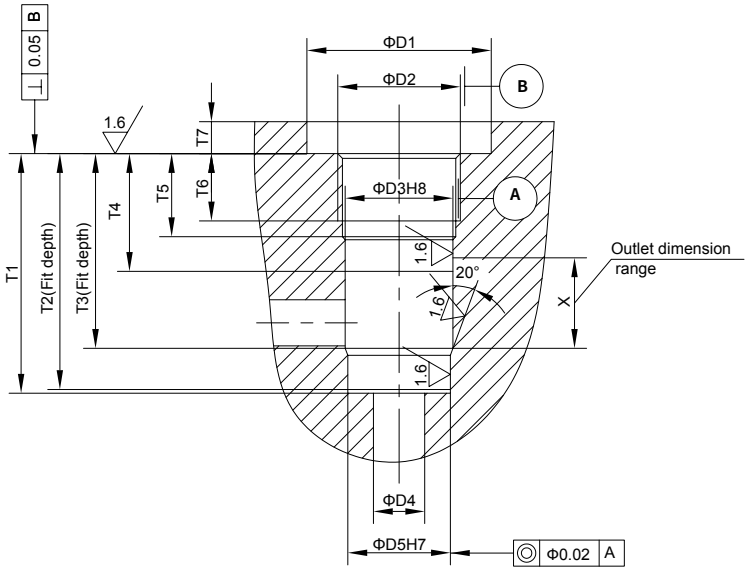
Size 30



Cavity dimensions:

(Dimensions in mm)

Right angled plug in check valve

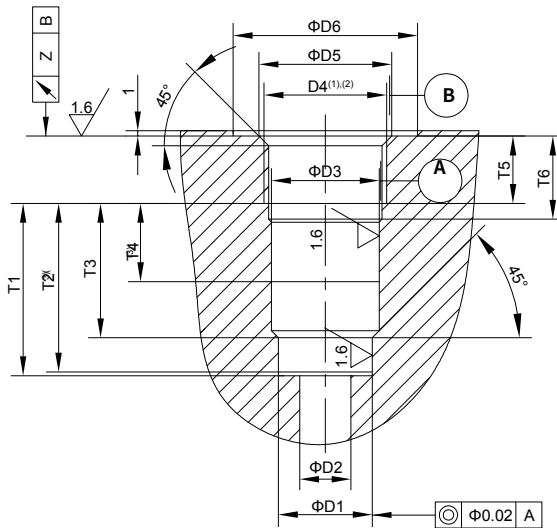


Size	Plug screw	Gasket	ΦD1	D2	ΦD3H8	ΦD4	ΦD5H7	T1+0.2/0	T2	T3	T4	T5	T6	T7	X
8	M18×1.5	JB982	27	M18×1.5	14	8	13	47.5	46.5	37.5	23	17	14	7	18
10	M22×1.5		32	M22×1.5	18	10	17	52.5	51.5	42.5	25	19	16	7	19
15	M27×2		37	M27×2	24	15	22	61	60	49	28	22	18	8	24
20	M33×2		44	M33×2	30	20	28	72.5	71	57.5	28	24	20	8	30
25	M42×2		42	M42×2	38	25	36	93.5	91	75.5	32	27	22	9	43
30	M48×2		48	M48×2	44	30	42	104.5	102	84.5	38	30	24	9	48

Inserted hole dimensions:

(Dimensions in mm)

Straight line plug in check valve



Size	ΦD1H7	ΦD2	ΦD3H8	ΦD4 ⁽¹⁾	ΦD5 ^{±0.1} (1)	D4 ⁽²⁾	ΦD5 ^{±0.1} (2)	ΦD6
8	13	8	14	G3/8	17.1	M18×1.5	18.4	28
10	17	10	18	G1/2	21.4	M22×1.5	22.4	34
15	22	15	24	G3/4	26.8	M27×1.5	27.4	42
20	28	20	30	G1	33.8	M33×2	33.5	47
25	36	25	38	G1 1/4	42.5	M42×2	42.5	58
30	48	30	44	G1 1/2	48.5	M48×2	48.5	65

Size	T1 ⁰ _{-0.1}	T2	T3	T4	T5	T6	Z	Poppet stroke
8	32.8	30.8	22.8	18	12	16	0.05	4
10	38.8	36.8	28.8	21	14	19	0.05	4
15	48.4	46.4	36.4	27	16	21	0.05	5
20	59	57	44	29	18	24	0.05	5
25	73	71	55	39	20	26	0.1	7
30	83	81	63	42	22	28	0.1	7



RVP...type Check Valve



RVP...1XJ...type

Sizes 6, 8, 10, 12, 16, 20, 25, 30, 40
Max. Working Pressure: 315 bar
Max. Flow: 600 L/min

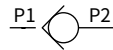
Contents

Function and configuration	02
Specification	02
Characteristic curves	03/
Technical data	03
Dimensions of appearance and connection	04

Features

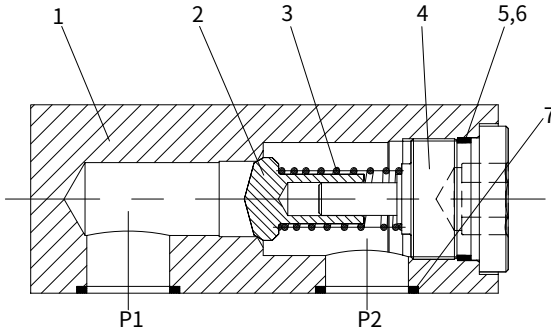
- Taper seat
- Sub-plate mounting
- Various cracking pressures, optional

Symbol



Function and configuration

RVP type check valve is used to allow fluid flowing in one direction and leakage-free closure in opposite direction. When fluid flows via port P1, fluid push poppet(2) to move right way overcoming the spring(3), then connects the chamber P1 and P2. When fluid flows P2 to P1, poppet(2) moves left way and then the check valve closes.

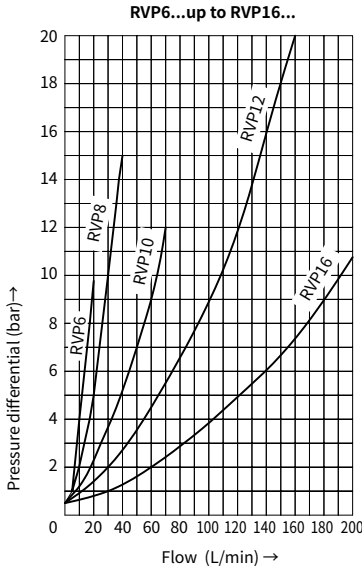


- 1 Housing
- 2 Poppet
- 3 Spring
- 4 spring seat
- 5 O-ring
- 6 Retaining ring
- 7 O-ring

Specification

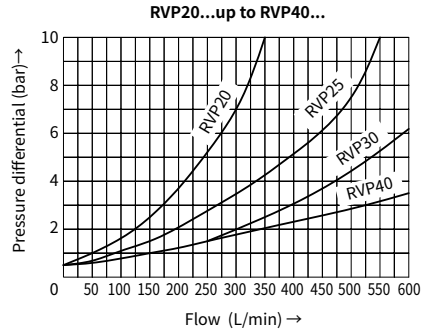
RV	P	—	—	10J	/*
Check valve	Sup-plate mounting				Further details in clear text
Nominal size 6	= 6				No code = NBR seals
Nominal size 8	= 8				V = FKM seals
Nominal size 10	=10				
Nominal size 12	=12				
Nominal size 16	=16				
Nominal size 20	=20				
Nominal size 25	=25				
Nominal size 30	=30				
Nominal size 40	=40				
				10J =	Series 10J to 19J (10J to 19J: unchanged installation and connection dimensions)

Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)



Flow: P1 to P2

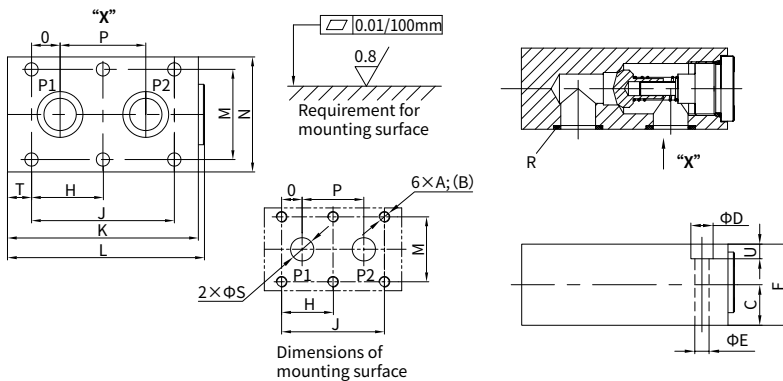
Pressure difference P dependent on flow Q Curve (Measured at $v=38\text{mm}^2/\text{s}$ $t=43^{\circ}\text{C}$)
(Crack pressure: 0.5bar)



Technical data

Nominal size		6	8	10	12	16	20	25	30	40
Max. operating pressure	bar	To 350								
Crack pressure	bar	0.2, 0.5, 1.5, 3, 5								
Viscosity range	mm^2/s	2.8 to 500								
Fluid temperature range	$^{\circ}\text{C}$	-20 to +80								
Fluid		Mineral oil, Phosphat ester								
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406								

Dimensions of appearance and connection



Size	A;(B)	C	D	E	F	H	J	K	L
RVP6	M6;(12)	8	11	6.6	16	-	19	41.5	43
RVP8	M6;(12)	10	11	6.6	20	-	35	63.5	66.8
RVP10	M6;(12)	12.5	11	6.6	25	-	33.5	70	72
RVP12	M6;(12)	16	11	6.6	32	-	38	80	84
RVP16	M8;(12)	22.5	14	9	45	38	76	104	107
RVP20	M8;(16)	25	14	9	50	47.5	95	127	131
RVP25	M10;(20)	27.5	18	11	55	60	120	165	169
RVP30	M12;(24)	37.5	20	14	75	71.5	143	186	190
RVP40	M12;(24)	50	20	14	100	67	133.5	192	196

Size	M	N	O	P	S	R(O-ring)	T	U	Weight(kg)
RVP6	28.5	41.5	1.6	16	5	7×1.5	6.4	7	0.2
RVP8	33.5	46	4.5	25.5	7	12×2	14.3	7	0.4
RVP10	38	51	4	25.5	10	12×2	17	8	0.5
RVP12	44.5	57.5	4	30	12	15×2	21	7	1
RVP16	54	70	11.4	54	16	20.29×2.62	14	9	2.1
RVP20	60	76.5	19	57	20	25×3	16	10	3.3
RVP25	76	100	20.6	79.5	25	32×3	15	11	5.8
RVP30	92	115	23.8	95	30	34.52×3.53	15	13	10.3
RVP40	111	140	25.5	89	40	48×3	16	18	17.9



S...type Check Valve



S...type

Sizes 6, 8, 10, 15, 20, 25, 30
Max. Working Pressure: 315 bar
Max. Flow: 450 L/min

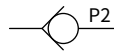
Contents

Function and configuration	02
Specification	02
Technical data	03
Characteristic curves	03
Unit dimensions of threaded connection	04
Unit dimensions of sub-plate mounting	05

Features

- Poppet valve seat
- Threaded connection and sub-plate mounting
- Various cracking pressures, optional

Symbol

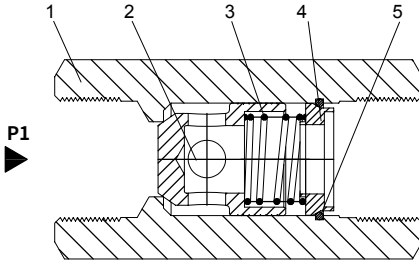


P1

Function and configuration

S type check valve is used to allow fluid flowing in one direction and leakage-free closure in the opposite direction. When fluid flow via port P1, fluid pushes poppet (2) to move overcoming the spring(3), and connects chamber P1 and P2. When fluid flows from P2 to P1, poppet (2) moves left and the check valve closes.

For check valves without a spring, the fixed position should ensure that the poppet will remain at the closed position.



1. Housing
2. Poppet spool
3. Spring
4. Spring seat
5. Steel wire retaining ring

Specification

Check valve

Nominal sizes	Threaded connection	Sub-plate mounting
6	=6	
8	=8	
10	=10	=10
15	=15	
20	=20	=20
25	=25	
30	=30	=30

For threaded connection = A
For sub-plate mounting = P

S J / *

Further details in clear text

Only for sub-plate mounting
No code = NBR seals
V = FKM seals

Only for threaded connection
1= G thread
2= Metric thread

·0J= Threaded connection revision index
-2XJ= Sub-plate mounting series 20J to 29J
(20J to 29J: unchanged installation and connection dimensions)

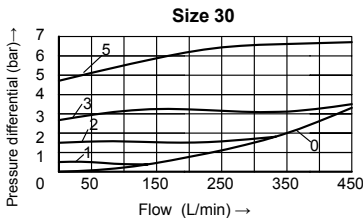
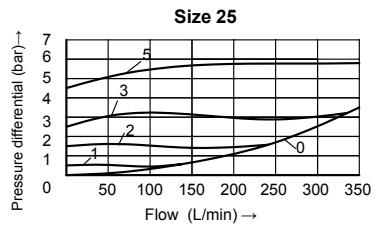
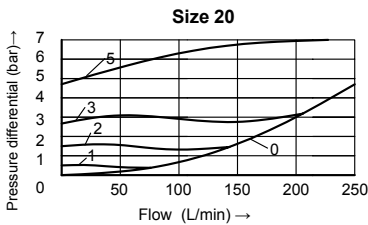
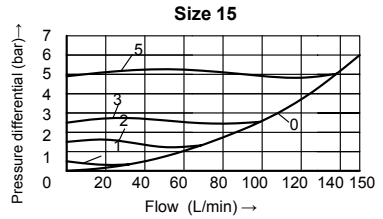
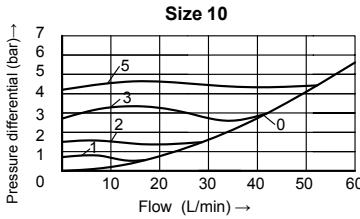
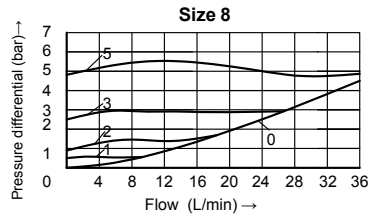
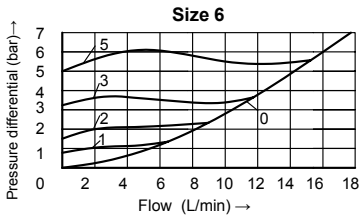
0 = Without spring
1 = Crack pressure 0.5 bar
2 = Crack pressure 1.5bar
3 = Crack pressure 3bar
5 = Crack pressure 5bar

Technical data

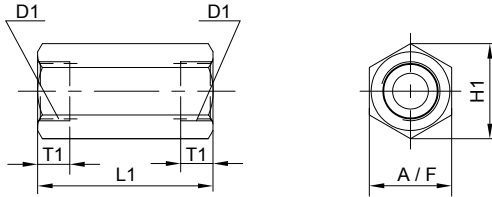
Size		6	8	10	15	20	25	30
Max. flow-rate	L/min	15	30	40	120	200	300	400
Max. operating pressure	bar	315, 210 (NPTF1 1/4, NPTF1 1/2)						
Crack pressure	bar	0.5; 1.5; 2; 3; 4; 5						
Fluid		Mineral oil ; Phosphate ester						
Fluid temperature range	°C	-30 to +80						
Viscosity range	mm ² /s	2.8 to 500						
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406						

01

Characteristic curves (Measured at t=40°C ±5°C, using HLP46)



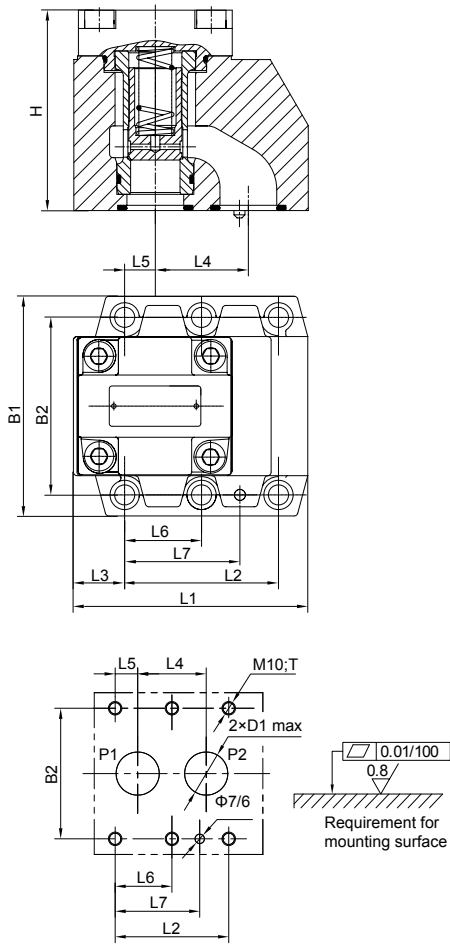
Unit dimensions of threaded connection



Size	6	8	10	15	20	25	30	
D1	G	G 1/4	G 3/8	G 1/2	G 3/4	G 1	G1 1/4	G1 1/2
	Metric	M14×1.5	M18×1.5	M22×1.5	M27×2	M33×2	M42×2	M48×2
	NPTF	NPTF 1/4	NPTF 3/8	NPTF 1/2	—	—	NPTF 1 1/4	NPTF 1 1/2
	SAE	6SAE (9/16-18)	8SAE (3/4-16)	10SAE (7/8-14)	12SAE (1 1/16-12)	16SAE (1 5/16-12)	20SAE (1 5/8-12)	24SAE (1 7/8-12)
H1	22(SAE=28)	28(SAE=34.5)	34.5	41.5	53	69	75	
L1	58(SAE=68)	58(SAE=70)	72(SAE=85)	85(SAE=98)	98(SAE=108)	120 (SAE=130)	132(SAE=142)	
T1	12(SAE=14)	12(SAE=17)	14(SAE=20)	16(SAE=22)	18(SAE=22)	20 (SAE=22)	22(SAE=24)	
A/F	19(SAE=24)	24(SAE=30)	30	36	46	60	65	
Weight(kg)	0.1(SAE=0.23)	0.2(SAE=0.29)	0.3(SAE=0.35)	0.5(SAE=0.58)	1(SAE=1.1)	2(SAE=2.2)	2.5(SAE=2.7)	

Unit dimensions of sub-plate mounting

01



Size	B1	B2	L1	L2	L3	L4	L5	L6	L7	H	D1	T	O-ring	Weight(Kg)
10	85	66.7	78	42.9	18	28.6	7.2	-	31.8	71	Φ13	23	17.12×2.62	2
20	102	79.4	101	60.3	23	38.1	11.1	-	44.5	108	Φ22	24	28.17×3.53	4.3
30	120	96.8	128	84.2	28	50.8	16.7	42.1	62.7	110	Φ30	25	34.52×3.53	7.7



SV/SL...type Hydraulic Operated Check Valve



SV / SL...4XJ...type

Sizes 10, 16, 20, 25, 32
Max. Working Pressure: 315 bar
Max. Flow: 550 L/min

Contents

Function and configurations	02
Symbols	02
Specifications	03
Technical data	03
Characteristic curves	04
Unit dimensions	05-06

Features

- For sub-plate mounting, porting pattern conforms to DIN 24 340 Form D, ISO 5781
- For threaded connection
- With or without drain port
- With or without unloading function
- 4 cracking pressures

Function and configuration

SV and SL type valve is a hydraulic pilot operated check valve of poppet type design which may be opened to permit reverse flow. It is used for the isolation of operating circuits under pressure, to prevent a load from falling or creeping movements of hydraulically locked-in actuators. The valve consists of valve housing (1), poppet (2), compression spring (3), control spool (4) as well as an optional pre-opening ball poppet valve (5).

Type SV

The valve permits free-flow from A to B. In the reverse direction, the poppet (2) is held firmly on to its seat in addition to the spring force by the system pressure.

By applying pressure at control port X the control piston (4) is moved to the right. This lifts the poppet (2) from the seat, then fluid flows from B to A.

In order to ensure the valve opens due to the pressure applied to the control piston (4) a certain minimum pilot pressure is necessary.

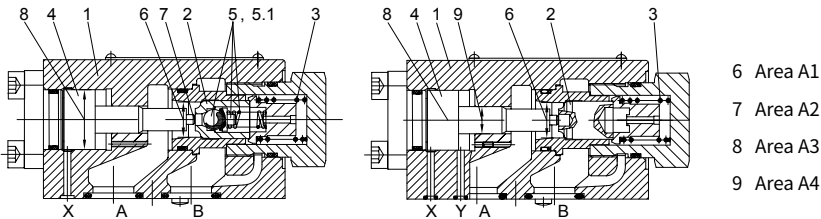
Type SV...A...and SL...A...

This valve has an additional decompression feature. When pressure is applied at control port X the control piston (4) is pushed to the right. The ball poppet (5.1) leaves first then the poppet (2) leaves from the seat. Now the valve may also have a flow from B to A.

Because of the pre-opening there is a dampened decompression of the fluid under pressure to avoid possible pressure shocks.

Type SL...

The function of this valve corresponds to the valve SV. The difference is the additional leakage port Y. The annular area of the control piston (4) is separated from port A. The pressure at port A only effects area A4 (9) of the control piston (4).



Symbols



Symbols type SV

Type SV..PA.-4XJ/...
(without drain port, with pre-opening)



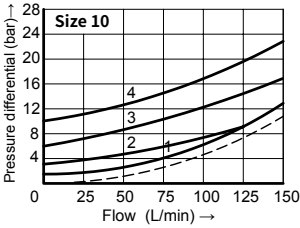
Symbols type SL

Type SL..PB.-4XJ/...
(with drain port, without pre-opening)

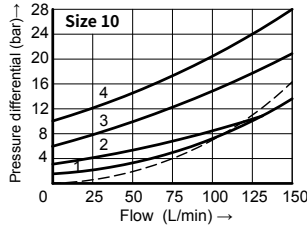
Characteristic curves

(Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

ΔP -Q curves – sub plate mounting

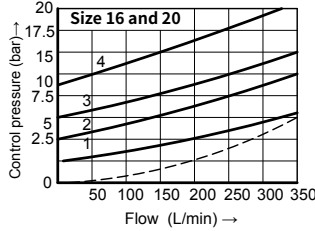
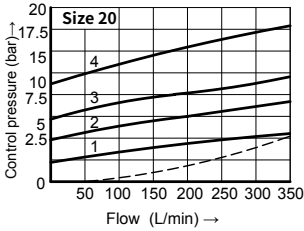


ΔP -Q curves – threaded connection



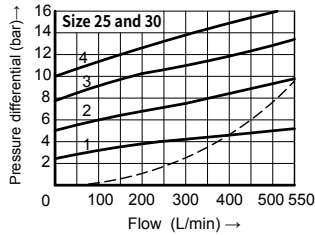
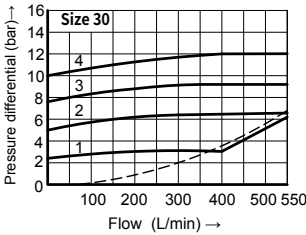
A to B Cracking pressure

- 1 1.5bar
- 2 3bar
- 3 6bar
- 4 10bar
- B to A



A to B Cracking pressure

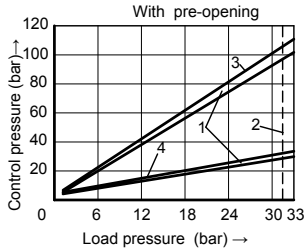
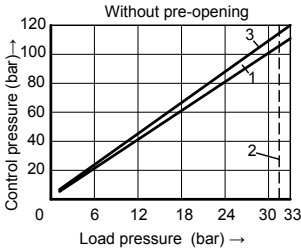
- 1 2.5 bar
- 2 5bar
- 3 7.5bar
- 4 10bar
- B to A



A to B Cracking pressure

- 1 2.5bar
- 2 5bar
- 3 7.5bar
- 4 10bar
- B to A

Control pressure-load pressure curves



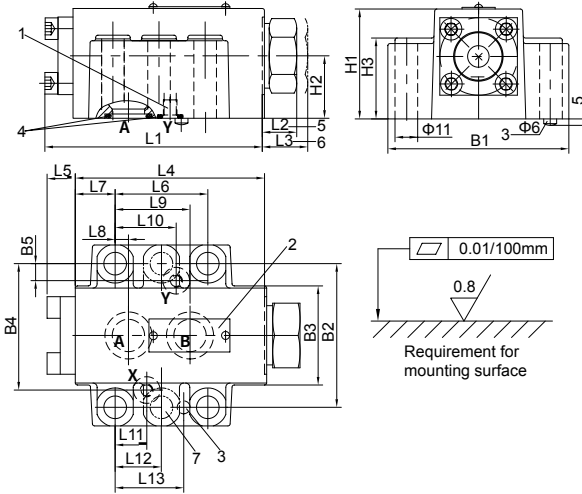
1 Tolerance range

- 2 Limit value
- 3 Poppet
- 4 Pre-opening ball poppet valve

Unit dimensions

(Dimensions in mm)

• sub-plate mounting valve



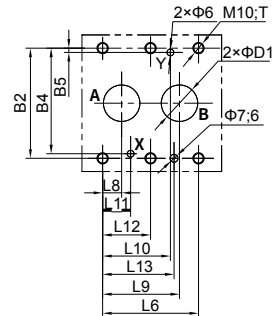
- 1 Port Y with valve type "SL"
(with valve type "SV" this port is closed)
- 2 Name plate
- 3 Locating pin
- 4 O-rings

Size 10

- Ports A and B 17.12×2.62
- Ports X and Y 10×2.5 **Size 20**
- Ports A and B 24×3
- Ports X and Y 10×2.5 **Size 32**
- Ports A and B 34×3
- Ports X and Y 10×2.5

- 5 Valve with cracking pressure versions "1" and "2"
(dimension L2)
- 6 Valve with opening pressure versions "3" and "4"
(dimension L3)
- 7 6 valve mounting holes
with type SV/SL 30

Type	Size	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
SV	10	100.8	15.5	15.5	87.8	13	42.9	18.5	7.2	35.8	-
	20	135	17.7	47.7	117	18	60.3	27.5	11.1	49.2	-
	32	156.1	36.1	46.1	134	22.1	84.2	39	16.7	67.5	-
SL	10	100.8	15.5	15.5	87.8	13	42.9	18.5	7.2	35.8	21.5
	20	135	17.7	47.7	117	18	60.3	27.5	11.1	49.2	39.7
	32	156.1	36.1	46.1	134	22.1	84.2	39	16.7	67.5	59.5

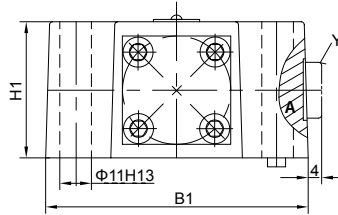
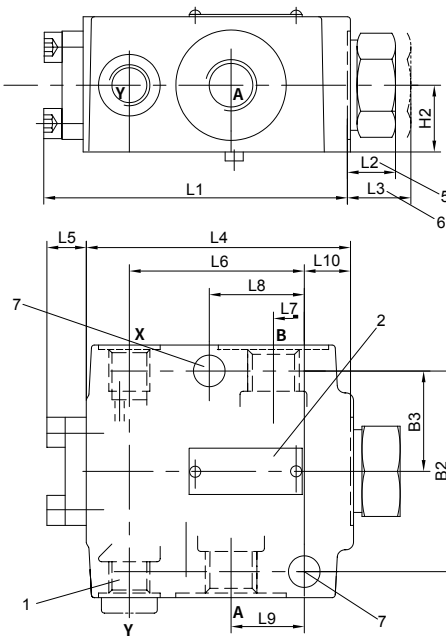


Type	size	L11	L12	L13	B1	B2	B3	B4	B5	H1	H2	H3	D1	T
SV	10	21.5	-	31.8	84	66.7	46	58.8	-	51	29	36	13	23
	20	20.6	-	44.5	100	79.4	63.5	73	-	70	37	55	22	24
	32	24.6	42.1	62.7	118	96.8	75	92.8	-	85	42.5	69	32	25
SL	10	21.5	-	31.8	84	66.7	46	58.8	7.9	51	29	36	13	23
	20	20.6	-	44.5	100	79.4	63.5	73	6.4	70	37	55	22	24
	32	24.6	42.1	62.7	118	96.8	75	92.8	3.8	85	42.5	69	30	25

Unit dimensions

(Dimensions in mm)

• threaded connection valve



- 1 Port Y with valve type "SL" (with valve type "SV" this port is closed)
- 2 Name plate
- 5 Valve with cracking pressure versions "1" and "2" (dimension L2)
- 6 Valve with cracking pressure versions "3" and "4" (dimension L3)
- 7 2 valve mounting holes

Type	Size	Ports	
		A, B	X, Y
SV	10	G1/2 M22×1.5	G1/4 M14×1.5
	16	G3/4 M27×2	
	20	G1 M33×2	
	25	G11/4 M42×2	
	32	G11/2 M48×2	
SL	10	G1/2 M22×1.5	G1/4 M14×1.5
	16	G3/4 M27×2	
	20	G1 M33×2	
	25	G11/4 M42×2	
	32	G11/2 M48×2	

Type	Size	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	B1	B2	B3	H1	H2
SV	10	100.8	15.5	15.5	87.8	13	56.5	10.5	33.5	22.5	17.3	87	66.7	33.4	44	22
	16;20	133	17.7	47.7	115	18	74.5	17	50.5	36	27	105	79.4	39.7	68	34
	25;32	156.1	35.7	45.7	134	22.1	101	24	84	49	18	130	96.8	48.4	86	43
SL	10	100.8	15.5	15.5	87.8	13	56.5	10.5	33.5	22.5	17.3	87	66.7	33.4	44	22
	16;20	133	17.7	47.7	115	18	74.5	17	50.5	36	27	105	79.4	39.7	68	34
	25;32	156.1	35.7	45.7	134	22.1	101	24	84	49	18	130	96.8	48.4	86	43



WE6...Type Solenoid-Operated Directional Valve



WE6...6XJ...type

Size (NG) 6
Max. Working Pressure: 315 bar
Max. Flow: 80 L/min

Contents

Function and configurations	02
Specifications	03
Symbols	04
Characteristic curves	04
Technical data	05
Electric data	05
Performance limits	06-07
Unit dimensions	08-09

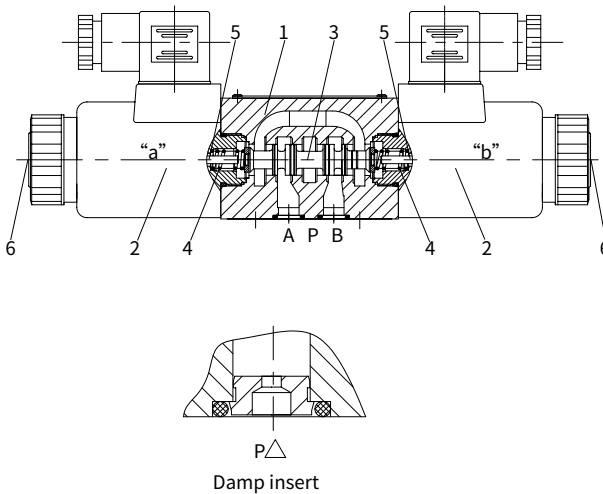
Features

- Direct operated directional solenoid valve,
- Porting pattern according to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H
- Wet-pin AC or DC solenoids with detachable coil
- Pressure-tight chamber needs not to be opened for a coil change
- Electrical connection as individual or central connection

Function and configurations

WE6...6XJ...type valves are solenoid operated directional spool valves. They control the start, stop and direction of hydraulic oil flow. The directional control valves consist of valve body(1), one or two solenoids (2), the valve core (3), and one or two return springs (4). In the de-energized condition the valve core(3) is held in the neutral or initial position by means of return springs (4) (except for impulse spools). The control spool (3) is actuated via wet pin solenoids (2).

To ensure proper operation, the pressure chamber of the solenoid must be filled with oil. The valve core(3) is moved to the expected position by solenoids(2) and pushing rod(5). This gives free-flow from P to A and B to T or P to B and A to T. When solenoid (2) is de-energized, the valve core (3) is returned to its initial position by means of the return springs (4). The solenoids may also control the valve core (3) by an optional override button(6) under the de-energized condition.



Specification



3 ways = 3
(For spool A and B)
4 ways = 4

Solenoid directional valve

Nominal size 6 =6

Symbols e.g. C, E etc.

Series 60J to 69J =6XJ
(60J to 69J: unchanged installation and connection dimensions)

With spring return = No code
Without spring return =O
Without spring return, and with detent =OF

Standard solenoid =E
Large-scope solenoid (Only for 12V and 24V) =N

24V DC =G24 220V
AC 50/60 Hz =W220 Plug
rectification 220V =W220R 110V AC
50/60 Hz =W110

With concealed hand emergency = N9

Further details in clear text

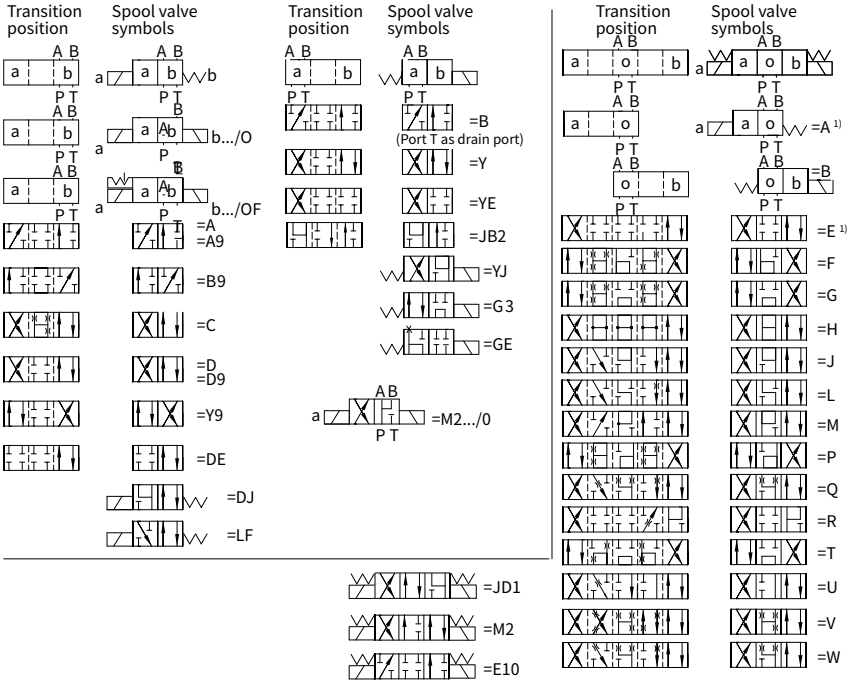
No code=Without locating hole
/60= With locating hole
/62=With locating pin hole
ISO 8752-3×8-St

No code = NBR seals
V = FKM seals

No code = Without throttle insert
B08 = Throttle Ø0.8 mm
B10 = Throttle Ø1.0 mm
B12 = Throttle Ø1.2 mm
B15 = Throttle Ø1.5mm
B20 = Throttle Ø2.0 mm
B25 = Throttle Ø2.5 mm
B30 = Throttle Ø3.0 mm

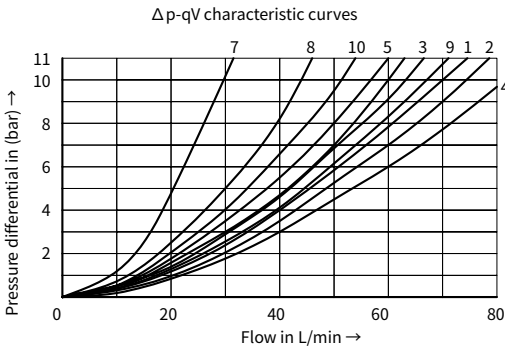
Z4 = square plugs
(not applicable for the integer)
Z5L = square plugs with lamps
K4 = DIN4365 sockets without plugs
DL = Connecting box

Symbols



Characteristic curves

(Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)



- 7 Symbol "R" in switched positions B → A
- 8 Symbol "G" and "T" in neutral position P → T
- 9 Symbol "H" in neutral position P → T

Spool symbol	Flow direction			
	P to A	P to B	A to T	B to T
A, B	3	3	-	-
C	1	1	3	1
D, Y	5	5	3	3
E	3	3	1	1
F	1	3	1	1
T	10	10	9	9
H	2	4	2	2
J, Q	1	1	2	1
L	3	3	4	9
M	2	4	3	3
P	3	1	1	1
R	5	5	4	-
V	1	2	1	1
W	1	1	2	2
U	3	3	9	4
G	6	6	9	9

Technical data

Fixing position			Optional
Environment temperature range		°C	-30 to +50 (NBR seal) -20 to +50 (FKM seal)
Weight	Single solenoid	kg	1.5
	Double solenoids	kg	2.0
Max. operating pressure	Port A,B,P	bar	315
	Port T	bar	210 (DC),160 (AC), when the operating pressure exceed the permission value, port T must be used as drain port for spool symbol A and B
Max. flow-rate		L/min	80 (DC), 60 (AC)
Flow cross section (switching neutral position)		mm ²	for symbol Q 6% of nominal cross section
		mm ²	for symbol W 3% of nominal cross section
Fluid			Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal
Fluid temperature range		°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)
Viscosity range		mm ² /s	2.8 to 500
Degree of contamination			Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406

Electric data

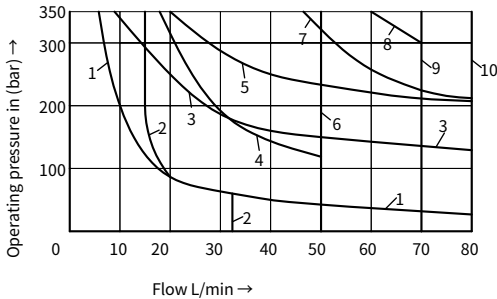
Type of voltage			DC	AC 50Hz
Usable voltage		V	12,24,28 ¹ ,48,96,110,205,220	110, 127, 220
Permissible voltage (deviation)		%	Standard solenoid:+10~-15; Large-scope solenoid:+20~-30	
Power consumption		W	Standard solenoid:30; Large-scope solenoid:32	
Holding power		VA	-	50
Making capacity		VA	-	220
Duty			Continuous working	
Switching time to ISO 6403	ON	ms	25 to 45	10 to 20
	OFF	ms	10 to 25	15 to 40
Switched frequency		times/h	to 15000	to 7200
Type of protection to DIN 40050			IP65(Z4, Z5L plug), IP67 (K7 Deutsch)	
Max. coils temperature		°C	+150	+180

Performance limits

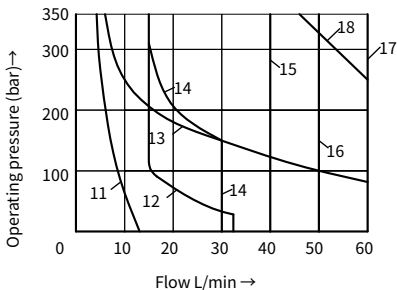
The specified switching performance limits are valid with two directions of flow.

Due to the flow forces acting within the valve, the permissible switching performance limit can be significantly lower with only one direction of flow! The switching performance limit was determined with the solenoid at operating temperature, at 15 % under-voltage and without tank pre-loading.

Solenoid DC		Solenoid AC-50Hz		Solenoid AC-60Hz	
Curve	Spool symbol	Curve	Spool symbol	Curve	Spool symbol
1	A, B ₁₎	11	A, B ₁₎	19	A, B ₁₎
2	V	12	V	20	V
3	A, B	13	A, B	21	A, B
4	F, P	14	F, P	22	F, P
5	J	15	G, T	23	G, T
6	G, H, T	16	H	24	J, L, U
7	A/O, A/OF, L, U	17	A/O, A/OF, C/O,	25	A/O, A/OF, Q, W
8	C, D, Y		C/OF, D/O, D/OF	26	C, D, Y
9	M		E, J, L, M	27	H
10	E, R ₂₎ , C/O, C/OF	18	Q, R ₂₎ , U, W	28	C/O, C/OF, D/O
	D/O, D/OF, Q, W		C, D, Y		D/OF, M, R, E, R ₂₎



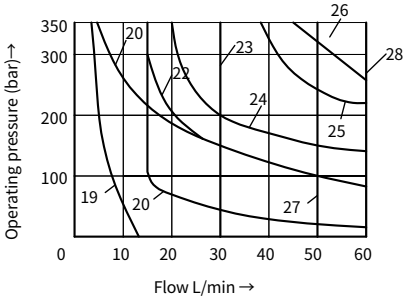
Solenoid DC	
Curve	Solenoid voltage(V)
1 to 10	12, 24, 48, 96, 205



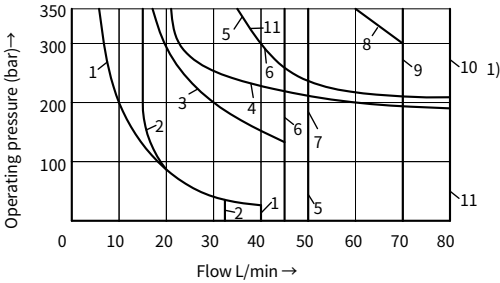
Solenoid AC		
Curve	Solenoid voltage	
11 to 18	W110	110V, 50Hz
	W127	127V, 50Hz
	W230	230V, 50Hz

Performance limits

(Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

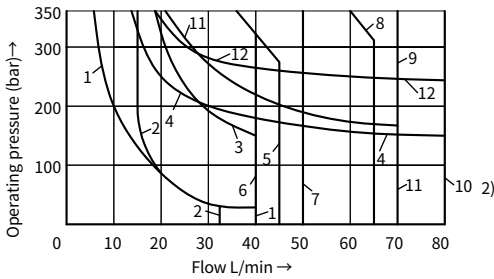


Solenoid AC		
Curve	Solenoid voltage	
19 to 28	W110	110V, 60Hz
	W230	230V, 60Hz



Solenoid DC	
Curve	Solenoid voltage
1 to 10 ₁₎	110, 180

Curve	Spool symbol	Curve	Spool symbol	Curve	Spool symbol
1	A,B	6	T	10 ₁₎	E, R, C/O, C/OF, D/O, D/OF, Q, W
2	V	7	H		
3	F, P	8	C,D	10 ₂₎	R, C/O, C/OF, D/O, D/OF, Q, W
4	J, L, U	9	M	11	A/O, A/OF
5	G			12	E



Solenoid AC	
Curve	Solenoid voltage
1 to 12, see 10 ₂₎	220



WE10...Type Solenoid-Operated Directional Valve



WE10...3XJ...type

Size 10
Max. Working Pressure: 315 bar
Max. Flow: 120L/min

Contents

Function and configuration s	02
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Technical data	05
Electric data	05
Performance limits	06
Unit dimensions	07-08

Features

- Direct operated directional solenoid valve
- Porting pattern according to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H
- Wet pin DC or AC solenoids with detachable coil
- Pressure-tight chamber needs not to be opened for a coil change

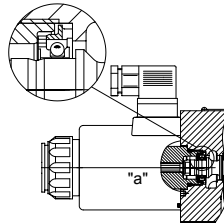
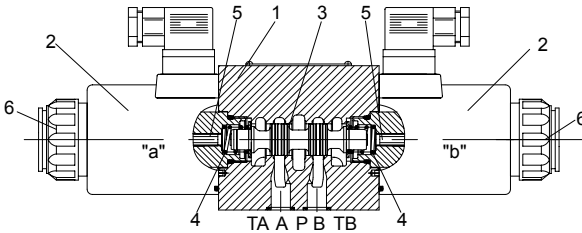
Function and configuration

WE10...3XJ...valves are solenoid operated directional spool valves. They control the start, stop and direction of flow. The directional control valves consist of valve body(1), one or two solenoids (2), the control spool (3), and one or two return springs (4).

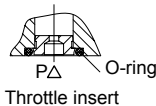
In the de-energized condition the control spool (3) is held in the neutral or initial position by means of return springs (4) (except for pulse spools). The control spool (3) is actuated via wet pin solenoids(2). To ensure proper operation, the pressure chamber of the solenoid must be filled with oil.

The control spool(3) is moved to the expected position by solenoid(2) and pushing rod(5), and this gives free-flow from P to A and B to T or P to B and A to T.

When solenoid (2) is de-energized, the control spool (3) is returned to its neutral position by means of the return springs (4). The solenoids may also control the control spool (3) by an optional override button(6) under the de-energized condition.



Type 4WE10.. 3XJ/OF...
(Impulse spool)



Specification

	WE	10	- 3XJ /				N	/		*
--	----	----	---------	--	--	--	---	---	--	---

3 ways = 3
(For spool A and B)

4 ways = 4

Solenoid directional valve

Nominal size 10 =10

Symbols e.g. C, E etc.

Series 30J to 39J =3XJ
(30J to 39J: unchanged installation and connection dimensions)

With spring return = No code

Without spring return =O

Without spring return, and with detent = OF

Standard solenoid =C

Large-range solenoid (Only for K4 24V DC) =N

24V DC =G24

220V AC 50/60 Hz =W220

Plug rectification 220V =W220R

110V AC 50/60 Hz =W110

Other voltage see next page

With manual override button = N9

Further details
in clear text

No code = NBR seals
V = FKM seals

No code = Without
throttle insert

B08 = Throttle Φ 0.8 mm

B10 = Throttle Φ 1.0 mm

B12 = Throttle Φ 1.2 mm

B15 = Throttle Φ 1.5 mm

B20 = Throttle Φ 2.0 mm

B25 = Throttle Φ 2.5 mm

B30 = Throttle Φ 3.0 mm

Z4 = square plugs
(not applicable for the integer)

Z5L = square plugs with lamps

K4 = DIN4365sockets without plugs

DL = Connecting box

Technical data

Fixing position			Optional	
Environment temperature range		°C	-30 to +50 (NBR seal)	
			-20 to +50 (FKM seal)	
Weight			Independently wiring	central monitoring station
	Single solenoid	kg	4.3(DC), 3.5(AC)	4.4(DC), 3.6(AC)
	Double solenoids	kg	5.9(DC), 4.3(AC)	6.0 (DC), 4.4(AC)
Max.operating pressure	Port A,B,P	bar	315	
	Port T	bar	210 (DC),160 (AC), when the operating pressure exceeds the permission value, spool symbol A and B must make the port T for draining.	
Max. flow-rate		L/min	120	
Flow cross section (switching neutral position)	Version V	mm ²	11(A/B to T), 10.3(PtoA/B)	
	Version W	mm ²	2.5(A/B to T)	
	Version Q	mm ²	5.5(A/B to T)	
Fluid			Mineral oil suitable for NBR and FKM seal	
			Phosphate ester for FKM seal	
Fluid temperature range		°C	-30 to +80 (NBR seal)	
			-20 to +80 (FKM seal)	
Viscosity range		mm ² /s	2.8 to 500	
Degree of contamination			Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	

Electric data

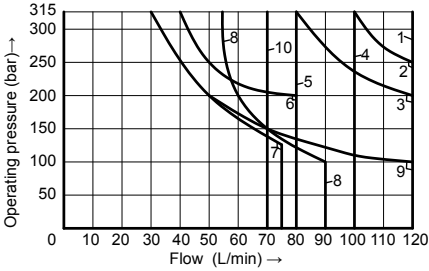
Type of voltage			DC	AC 50Hz
Available voltage		V	12,24,28 ¹⁾ ,48,96,110,205,220	110,127,220
Voltage tolerance (nominal voltage)		%	Standard solenoid:+10~-15, large-scope solenoid:+20~-30	
Power consumption		W	Standard solenoid: 35, large-scope solenoid: 42	
Holding power		VA	-	50
Making capacity		VA	-	550
Duty			Continuous working	
Switching time to ISO 6403	ON	ms	45 to 60	15 to 25
	OFF	ms	20 to 30	20 to 30
Switched frequency		times/h	to 15000	to 7200
Type of protection to DIN 40050			IP65(Z4,Z5L plug), IP67 (K7 Deutsch)	
Max. coils temperature		°C	+150	+180

Performance limits

The performance limits shown are valid when the valve is used with two directions of flow.

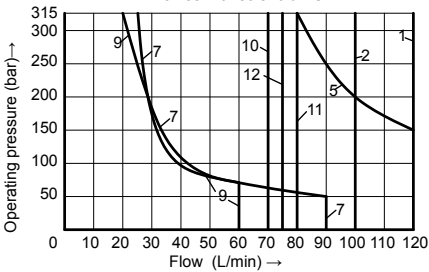
Due to the flow forces occurring within the valves, the permissible switching performance limits can be significantly lower with only one direction of flow! (For these applications, please consult us.) The performance limit was determined with the solenoids at their operating temperature, 15% under voltage and with no pre-loading of the tank.

Valves with solenoid DC

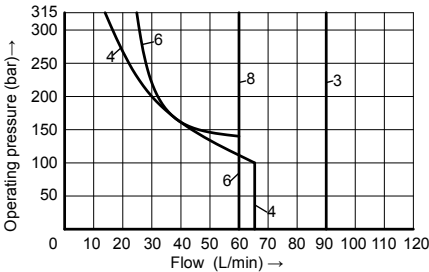


Curve	Spool symbol	Curve	Spool symbol
1	C, C/O, C/OF; D, D/O, D/OF; Y, M	5 ₁₎	R, L ₂₎ , U ₂₎
		6	G
2	E	7	T
3	A/O, A/OF; L, U, J, Q, W	8	F, P
		9	A, B
4	H	10	V

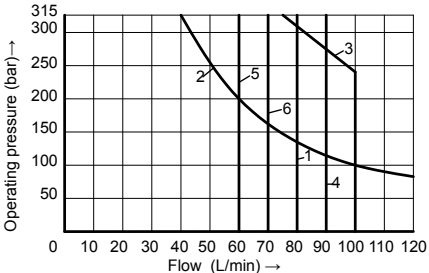
Valves with solenoid AC



Curve	Spool symbol	Curve	Spool symbol
1	C, C/O, C/OF; D, D/O, D/OF; Y	6	G
		7	F, P
		8	V
2	E, L, U, Q, W	9	T
3	M	10	H
4	A, B	11	R
5	A/O, A/OF, J	12 ₁₎	L, U



Curve	Spool symbol	Curve	Spool symbol
1	C, C/O, C/OF; D, D/O, D/OF; Y	3	E
		4	M
		5	V
2	A/O, A/OF	6	H

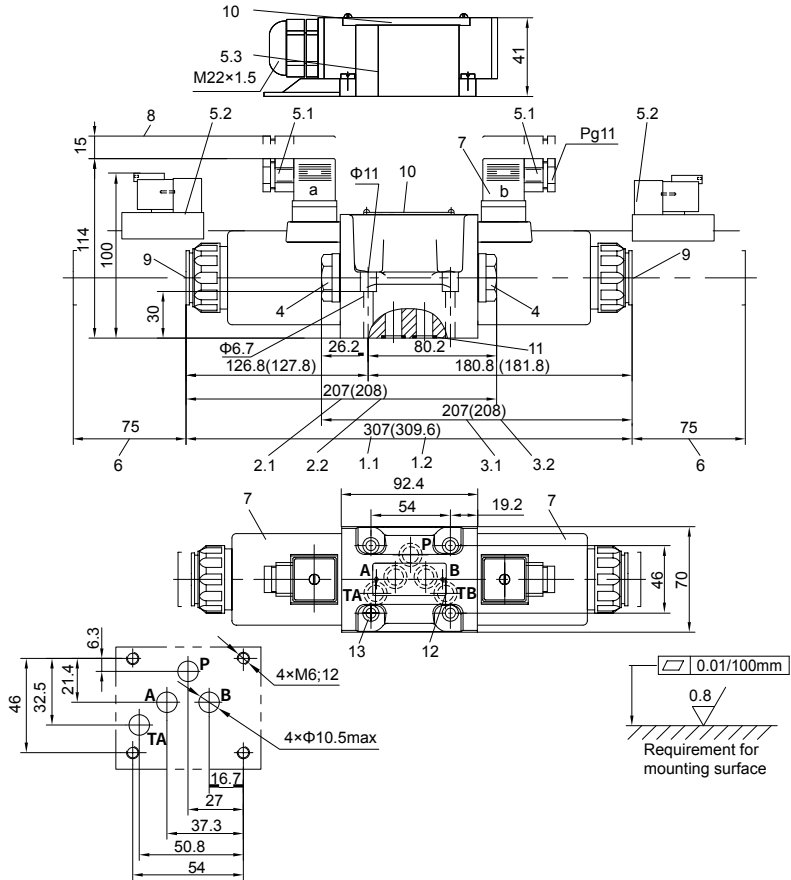


48V 60Hz, 110V 60Hz, 127V 60Hz, 220V 60Hz

Unit dimensions

(Dimensions in mm)

Valve with DC or rectification AC solenoid



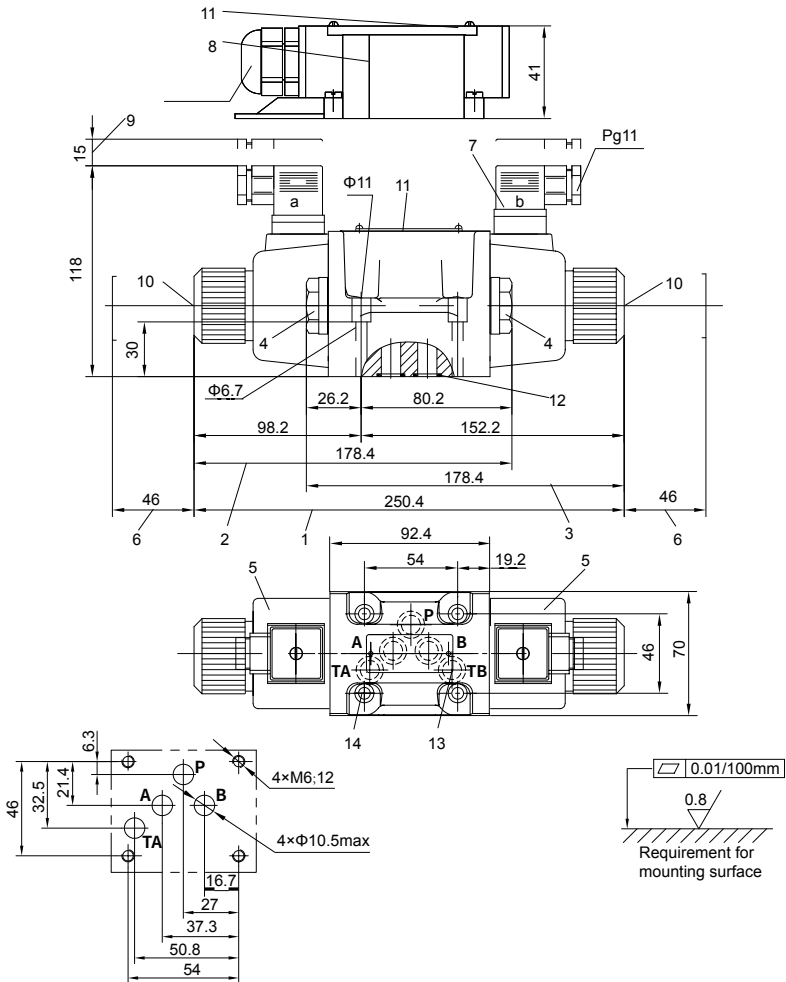
- 1.1 Dimension of 3-position, standard version
- 1.2 Dimension of 3-position, large-scope
Type of voltage
- 2.1 Dimension of 2-position with solenoid at 'A',
standard version
- 2.2 Dimension of 2-position with solenoid at 'A',
large-scope Type of voltage
- 3.1 Dimension of 2-position with solenoid at 'B',
standard version
- 3.2 Dimension of 2-position with solenoid at 'B',
large-scope Type of voltage
- 4 Plug for valves with one solenoid
- 5.1 Plug-in connector to DIN 43 650 (rotatable 90 °)
- 5.2 Deutsch connector assembly
- 5.3 Junction box with lead and light, M22×1.5 interface

- 6 Space required to remove solenoid
- 7 Solenoid
- 8 Space required to remove Plug-in connector
- 9 Fault inspection override 'N' button
- 10 Nameplate
- 11 O-ring 12×2
- 12 Fix additional port TB on the manifold
when necessary
- 13 Valve fixing screws:
M6×40 GB/T 70.1-10.9, Tightening torque
M_s=15.5Nm, must be ordered separately.

Unit dimensions

(Dimensions in mm)

Valve with AC solenoid



- 1 3-position valve
- 2 2-position valve with one solenoid(A,C,D,EA...)
- 3 2-position valve with one solenoid(B,Y,EB...)
- 4 Plug for valves with one solenoid
- 5 Solenoid
- 6 Space required to remove the solenoid
- 7 Plug-in connector to DIN 43 650 (Rotatable 90°)
- 8 Junction box with lead and light, M22×1.5 interface
- 9 Space required to remove Plug-in connector
- 10 Fault inspection override 'N' button

- 11 Nameplate
- 12 O-ring 12×2
- 13 Fix additional port TB on the manifold when necessary
- 14 Valve fixing screws:
M6×40 GB/T 70.1-10.9, Tightening torque $M_t = 15.5\text{Nm}$, must be ordered separately.



WE10...Type Solenoid-Operated Directional Valve



WE10...5XJ...type

Size (NG) 10
Max. Working Pressure: 315 bar
Max. Flow: 150L/min

Contents

Function and configuration	02
Specification	03
Symbols	04
Technical data	05
Electrical data	05
Characteristic curves	06
Performance limits	06
Unit dimensions	07

Features

- Solenoid direct operated directional spool valve
- Porting pattern according to DIN 24 340 Form A, ISO 4401, and CETOP-RP121H
- Wet-pin DC solenoids with detachable coil (AC voltages possible via a rectifier)
- Solenoid coil can be rotated through 90°
- The coil can be replaced without opening the pressure-tight chamber
- Adjustable spool switching time, optional

Function and configuration

WE10...5XJ...type valves are solenoid operated directional spool valves. They control the start, stop and direction of flow. The directional valves consist of valve body(1), one or two solenoids (2), the control spool (3), and one or two return springs (4).

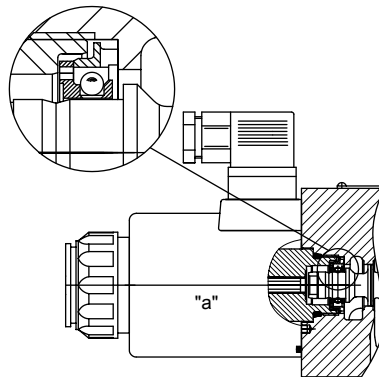
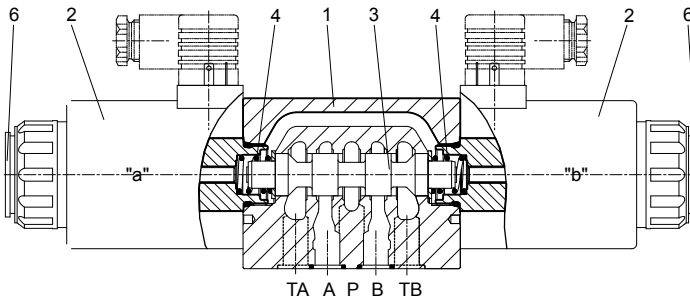
In de-energized condition, the control spool (3) is held in the central position or in the initial position by the return springs (4) (except for version "O").

The control spool (3) is actuated by wet-pin electronic solenoids (2). The force of electronic solenoid (2) acts via the plunger(5) on the control spool (3) will push the control spool(3) from its rest position to the required end position. This enables free-flow from P to A and B to T or P to B and A to T.

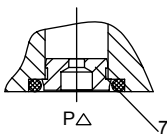
The return spring (4) will push the control spool (3) back to its rest position when the electronic solenoid is de-energized.

A manual override (6) allows for the manual switching of the valve without solenoid energization.

To ensure proper functioning, make sure that the pressure chamber of the solenoid is filled with oil.



Type:WE10...5XJ/OF ... (Impulse spool)



Throttle insert

Throttle insert "B..."

Using a throttle insert (7) in channels P, A, B or T increases the flow resistance at the valve. This is required in prevailing operating conditions, flows occur during the switching processes, which exceed the performance limit of the valve.

Specification

	WE	10	-5XJ	/			N	/		*
--	----	----	------	---	--	--	---	---	--	---

3 work ports
(Symbol A, B) = 3
4 work ports = 4

Solenoid directional valve

Nominal size 10 = 10

Symbols

Series 50J to 59J = 5XJ
(50J to 59J: unchanged installation
and connection dimensions)

With spring return = No code
Without spring return = O
Without spring return with detent = OF

High-performance solenoid = E

24VDC = G24

With manual override = N9

Square plug = Z4
Square plug with indicator light = Z5L
Connecting box = DL
DIN4365 sockets without plugs = K4

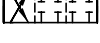
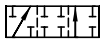
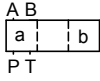
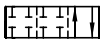
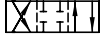
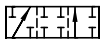
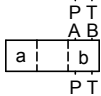
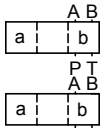
Further details in clear
text

No code= NBR seals
V = FKM seals

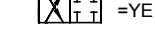
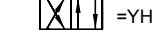
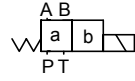
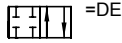
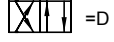
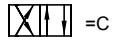
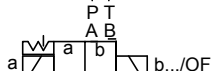
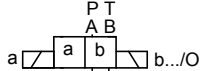
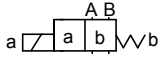
No code= Without throttle insert
B08= Throttle ϕ 0.8 mm
B10= Throttle ϕ 1.0 mm
B12= Throttle ϕ 1.2 mm
B15= Throttle ϕ 1.5 mm
B20= Throttle ϕ 2.0 mm
B25= Throttle ϕ 2.5 mm
B30= Throttle ϕ 3.0 mm

Symbol

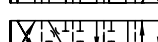
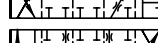
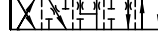
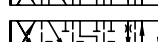
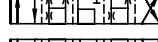
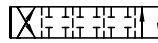
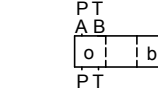
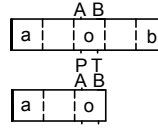
Transition position



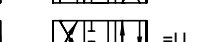
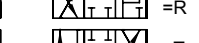
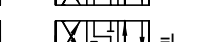
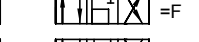
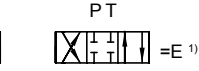
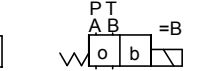
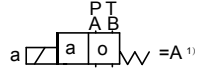
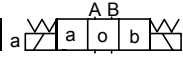
Spool valve symbol



Transition position



Spool valve symbol



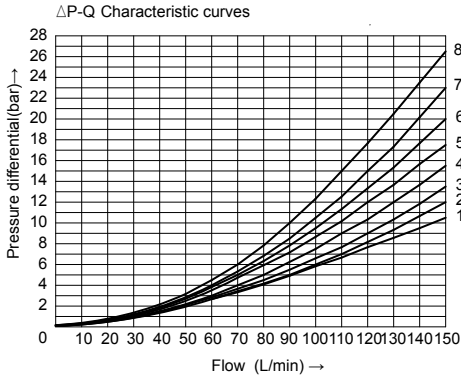
Technical data

Fixing position			Optional
Ambient temperature range		°C	- 30 to + 50 (with NBR seals) - 20 to + 50 (with FKM seals)
Weight	Valve with 1 solenoids	kg	4.3 (DC)
	Valve with 2 solenoids	kg	5.9 (DC)
Max.operating pressure	Port A,B,P	bar	350
	Port T	bar	210 (DC), With symbols A and B, port T must be used as a drain port, if the operating pressure is higher than the permissible tank pressure.
Maximum flow		L/min	150
Pressure fluid			Mineral oil (HL, HLP) to DIN 51 524, suitable for NBR and FKM Phosphate ester, suitable for FKM
Pressure fluid temperature range		°C	- 30 to + 80 (with NBR seals) - 20 to + 80 (with FKM seals)
Viscosity range		mm ² /s	2.8 to 500
ISO code cleanliness class			Maximum permissible degree of contamination of the pressure fluid is to ISO 4406 (C) class 20/18/15

Electrical data

Voltage type			DC
Available voltages		V	24
Voltage tolerance (nominal voltage)		%	Super performance solenoid: +10 ~ -15
Power consumption		W	39
Duty			Continuous
Switching time to ISO 6403 (without switching time adjustment)	ON	ms	45 to 60
	OFF	ms	20 to 30
Switched frequency		cycles/h	Up to 15000
Protection to DIN 40 050			Z4, Z5L, K4:IP65; K7:IP67
Maximum coil temperature		°C	+150

Characteristic curves (Measured with HLP46, oil = 40 ± 5 °C [104 ± 9 ° F])

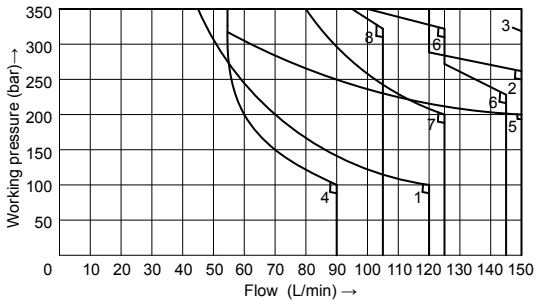


Spool symbol	Flow direction				
	P to A	P to B	A to T	B to T	P to T
A	4	4	-	-	-
B	4	5	-	-	-
C, J, Y, YH	2	3	5	7	-
D	2	2	5	7	-
E	3	3	6	7	-
F	1	3	3	8	4
G	4	5	6	8	7
H	1	1	6	8	7
L	3	3	5	7	-
P	3	1	5	6	5
R	3	4	5	6	-
U	2	2	5	7	-
DE	3	-	-	6	-
YE	-	3	6	-	-

Performance limits (Measured with HLP46, oil = 40 ± 5 °C [104 ± 9 ° F])

Due to the flow forces acting within the valves, the admissible Performance limits may be considerably lower with only one direction of flow.

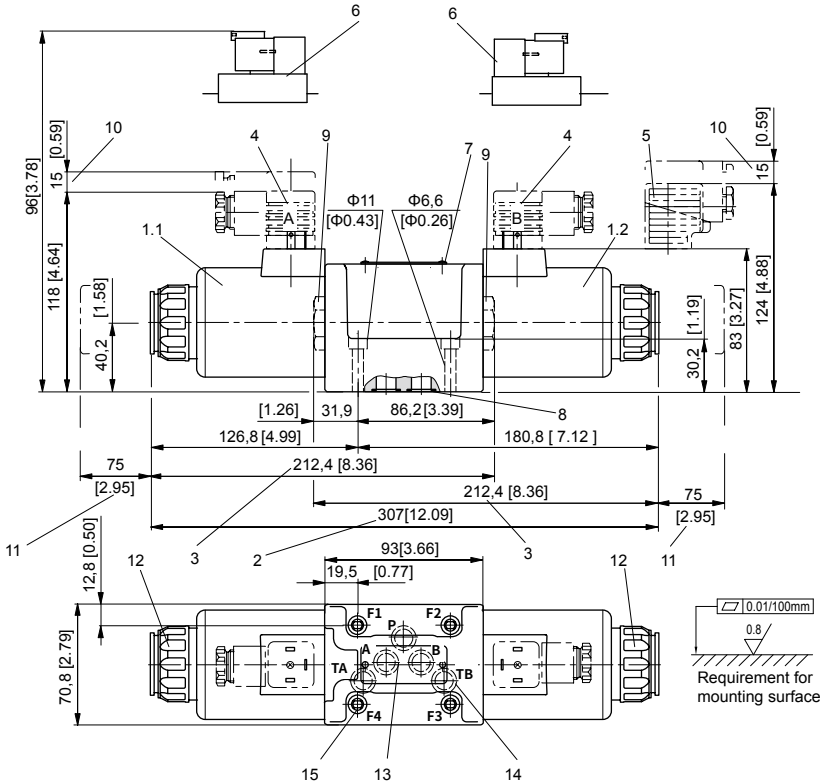
In such cases of application, please consult us! The switching Performance limit was established while the solenoids were at operating temperature, at 10% undervoltage and without tank preloading.



Curve	Symbol
1	A, B
2	C, D, Y, YH
3	E
4	F, P
5	G
6	H, L, U
7	J
8	R

Unit dimensions

(Dimensions in mm)



- 1.1 Solenoid "a"
- 1.2 Solenoid "b"
- 2 Dimension of 3-position valves
- 3 Dimension of 2-position valves
- 4 Connector without indicator light according to DIN EN 175301-803
- 5 Connector with indicator light according to DIN EN 175301-803
- 6 DT04-2P Deutsch connector
- 7 Name plate
- 8 Identical seal rings for ports A, B, P, TA and TB
- 9 Plug screw for valves with one solenoid
- 10 Space required to remove connector
- 11 Space required to remove coil
- 12 Securing nut, tightening torque $M_A = 6+2 \text{ Nm}$ [4.43 +1.48 ft-lbs]
- 13 Porting pattern according to ISO 4401-05-04-0-05 and DIN 24340 A10
- 14 TB can be used in connection with separately produced bore
- 15 Valve fixing screws:
4 hexagon socket head cap screws, metric ISO 4762-M6×40-10.9
Tightening torque $M_A = 15.5 \text{ Nm}$ [11.4 ft-lbs] $\pm 10 \%$
With different friction coefficients, the tightening torques can be adjusted accordingly!



WEH...Type Electro-hydraulic Directional Control Valve



WEH 10, 16, 25, 32 type

Sizes 10,16,25,32

Max. Working Pressure: 315 bar

Max. Flow: 1100L/min

Contents

Function and configuration	02-05
Specification	06-07
Symbols	08-10
Technical data	11-14
Characteristic curves	15-16
Performance limit	17-18
Unit dimensions	19-25

Features

- Electro-hydraulic operation (WEH)
- Valves used to control the start, stop and direction of a fluid flow
- Porting pattern conforms to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H
- Wet pin DC or AC solenoids, optional
- Hand override, optional
- Electrical connections as an individual or central connection
- Spring or pressure centered, spring or hydraulic offset.

Function and configurations

WEH type valves are directional spool valves with electro-hydraulic operation. They control the start, stop and direction of a flow.

This valve consists of the main valve with housing(1), the main control spool(2), one or two return springs(3), the pilot control valve(4) with one or two solenoids(5).

The main valve spool(2) is held in the central or the initial position by the spring or by the pressure.

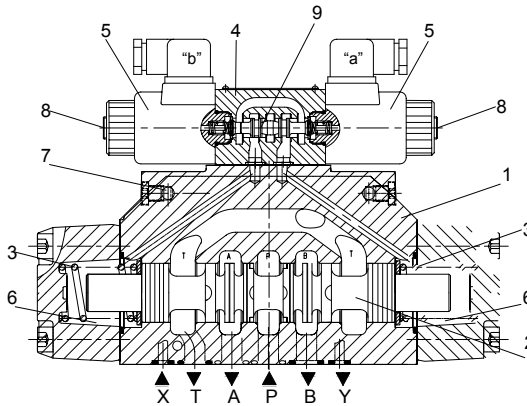
The two spring chambers(6) in the initial position are connected with the tank through the pilot control valve (4). By the control line (7), the pilot control valve is supplied with pilot oil. Supply can be implemented internally or externally (externally via port X).

When one of the main control spool(2) is pressurised by the pilot control valve(4), the spool(2) will be moved to the expected position. This gives free-flow from P to A and B to T or P to B and A to T.

The pilot oil return is implemented internally or externally. An optional manual override(8) allows for moving of the pilot control spool(9) without solenoid energization.

Main valves are 4/3-way directional valve with spring centring of the control spool.

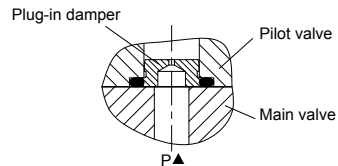
When one of the two ends of the main control spool(2) is pressurised with pilot pressure, the spool is moved to the switched position. The required ports in the valve are then opened to flow. When the pilot pressure is removed, the spring on the opposite side to the pressurised spool area causes the spool to return to its neutral or initial position.



Structure chart of spring centering electro-hydraulic directional valve

Throttle insert:

The use of a throttle insert is required if the pilot oil supply in the P channel of the pilot valve is to be limited. This throttle is inserted in the P channel of the pilot valve.



Structure chart of plug-in dampers

Function and configurations

Pilot oil supply:

1. Type WEH10

(1) Conversion between internal supply and external supply:

P channel on the top of main valve bodies with M6 bolt(2) is external supply and with M6 bolt (2) dismantled is internal supply.

(2) Conversion between internal drain and external drain:

Dismounting plug screws(1) and installing M6 bolt(2) is external drain; dismantling M6 bolt(2) is internal drain.

2. Type WEH16

(1) Conversion between internal supply and external supply:

Dismounting plug screw(10) form P channel on the sidesurface of main valves and installing M6 bolt(9) is internal supply. Dismounting M6 plug bolt(9) is internal supply.

(2)Conversion between internal drain and external drain:

Dismounting plug screw(10) form T hole on the top of main valves and installing M6 plug bolt(9) is internal drain. Dismounting M6 bolt(9) is external drain.

3. Type WEH25

(1)Conversion between internal supply and external supply:

P channel on the top of main valve bodies with M6 bolt(6) is external supply and with M6 bolt (6) dismantled is internal supply.

(2)Conversion between internal drain and external drain:

Dismounting plug bolt(6) form T hole on the top of main valves and installing M6 plug bolt(9) is internal drain. Dismounting M6 bolt(9) is external drain.

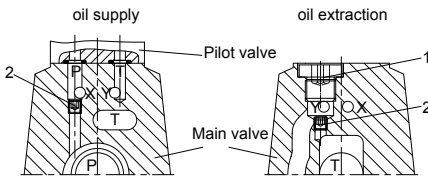
4. Type WEH32

(1) Conversion between internal supply and external supply:

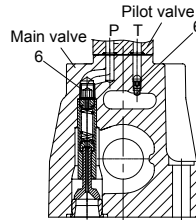
Dismounting plug screw(9) form P hole on the undersurface of main valves and installing M6 bolt(9) is internal supply. Dismounting M6 plug bolt(9) id internal supply.

(2)Conversion between internal drain and external drain:

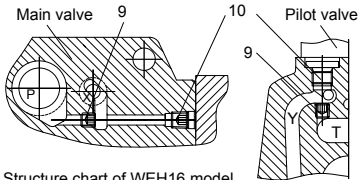
Dismounting plug screw(9) form T hole on the top of main valves and installing M6 plug bolt(9) is internal drain. Dismounting M6 bolt(9) is external drain.



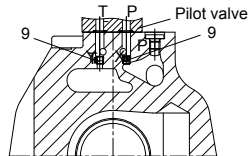
Structure chart of WEH10 model supply and discharge



Structure chart of WEH25 model supply and discharge



Structure chart of WEH16 model supply and discharge



Structure chart of WEH32 model supply and discharge

Function and configurations

Switching time adjustment:

A double throttle check valve has to be fitted between pilot valves and main valves to influence the switching time of the main valve, that controls oil supply from pilot valves into main valve spools, thus adjusting the switching time of main valves.

Regulating bolt rotation clockwise, the time for switching of main valves is long, otherwise the time is short.

The throttle check valve has two kinds: meter-in throttling and meter-out throttling. If there is a need of changing meter-in throttling into meter-out throttling, just install the valve after rotating 180° around the longitudinal axis again and then install pilot valves.

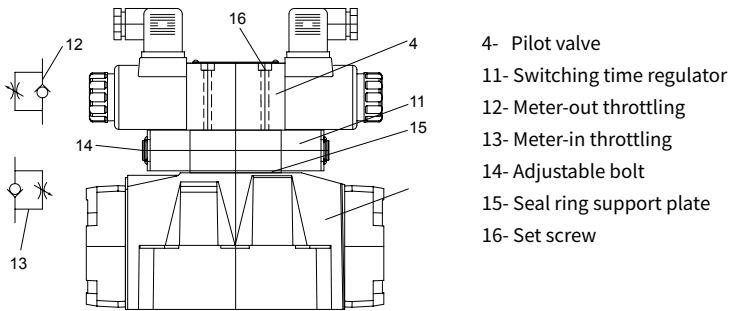
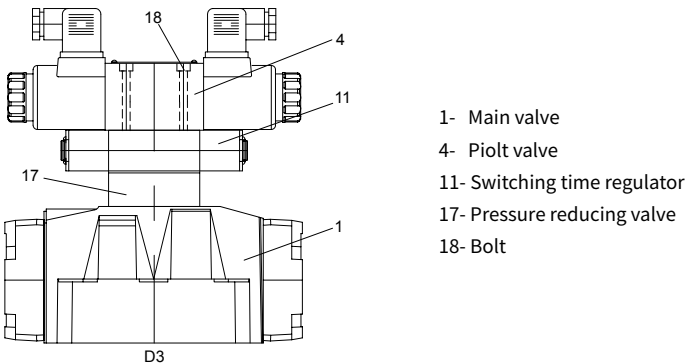


Figure of WEH.....S or S2 type commutating time regulator for valve installation

Pressure reducing valves:

The pressure reducing valve (8) must be used if the pilot pressure is higher than 250 bar (for type 4WEH 22 ...: 210 bar). Pressure reducing ratio of constant-ratio pressure reducing valves (D1) 1:0.66. Pressure reducing pressure of constant-ratio pressure reducing valves shall not exceed 40bar. Minimum control pressure of technical specifications shall improve $1/0.66=1.515$ after installing bottom plate pressure reducing valves.

Constant-ratio pressure reducing valves shall not be used when controlling internal oil drain and using back pressure valves (P0.45) with control pressure decreased to 3bar.

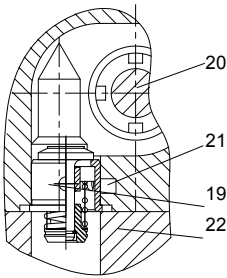


Structure chart of WEH.../...S...D1 or D3 type valve with pressure reducing valves

Function and configurations

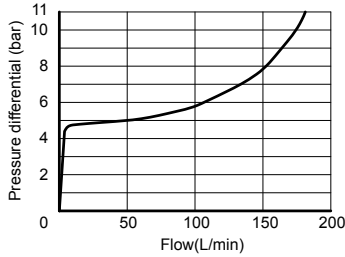
Back pressure valve:

Valves controlling oil inner supply with unloading passages, such as C, Z, G, H, P, S, T and V, In valves with zero pressure circulation and internal pilot oil supply, a back pressure valve (9) must be installed in the P-channel of the main valve to build up the minimum pilot pressure. The pressure differential of the back pressure valve must be added to the pressure differential of the main valve (see characteristic curves) in order to determine the actual value. The opening pressure of this valve is approx. 4.5 bar. NG10 valves do not have back pressure valves.

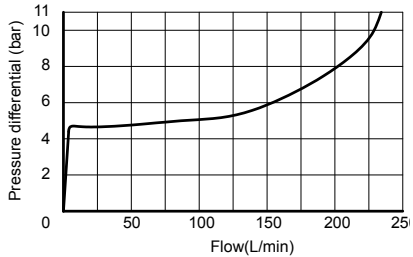


WEH16(32).../.../...PO.45 type
Structure chart of back pressure
valve of electro-hydraulic directional valve

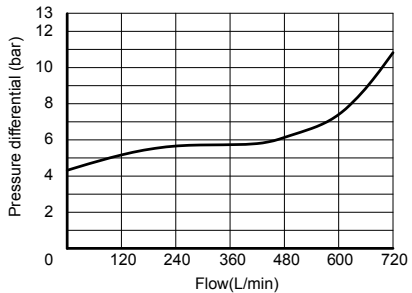
- 19- Back pressure valve
- 20- Main valve
- 21- Control oil chamber(X)
- 22- Connecting plate



Pressure loss curve of **WEH16** type electro-hydraulic directional valves passing through back pressure valves (Test condition: use HLP46, $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)



Pressure loss curve of **WEH25** type electro-hydraulic directional valves passing through back pressure valves (Test condition: use HLP46, $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)



Pressure loss curve of **WEH32** type electro-hydraulic directional valves passing through back pressure valves (Test condition: use HLP46, $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

Specifications

		WEH10		-4XJ	/				/			*
--	--	-------	--	------	---	--	--	--	---	--	--	---

Working pressure
280bar = no code
Working pressure
350bar = H-

3 ways = 3
(For spool A and B)
4 ways = 4

Spring centering or reset = No code
Hydraulic reset = H
(only 2-position valve A,B,C,D,K,Z,Y)

See function symbols

Series 40J to 49J = 4XJ
(40J to 49J:unchanged installation and connection dimensions)

When pilot valves 2-position valves of 2 solenoid and main valves are 2-position valves of hydraulic reset, "H" shall be indicated clearly, at this time, when pilot valves Without spring return = O
Without spring return with detent = OF
(O and OF do not apply to B,Y)

High-performance solenoid pilot valve = 6E
Low power solenoid pilot valve(onlyDC24V) = 6H

DC24V = G24
AC 220V, 50HZ = W220-50
The integer110V(plugZ5L) = W110R
The integer220V = W220R

With manual override buttons = N9

Control oil supply and drain Type:
external supply external drain = No code
internal supply external drain = E
internal supply and internal drain = ET
(Not available for function C, Z, F, G, H, P, T, V) external supply
internal drain = T

Further details
in clear text

No code = NBR seals
V = FKM seals

No code= without
pressure reducing valves
D3= with constant-value
pressure reducing valves

No code = without
cartridge dampers
B08= with dampers 0.8mm
B10= 1.0mm
B12= 1.2mm
B15= 1.5mm

Z4 = square plugs
(not applicable for the integer)
Z5L = square plugs with lamps
K4 =DIN4365sockets without plugs
DL =Junction boxes with lead wires
and lamps (M22×1.5 interface)

No code = Without switching time
adjustment
S = Switching time
adjustment as meter-in control
S2 = Switching time
adjustment as meter-out control

Specification



Working pressure
280bar =No code
Working pressure
350bar = H-

3 ways = 3
(For spool A and B)
4 ways = 4

Sizes: 16 = 16
25 = 25
32 = 32

Main valve spring reset or centering=no code
Main valve hydraulic reset or centering =H

See slide valve function marks

Series 70J to 79J = 7XJ
(70J to 79J:unchanged installation and connection dimensions)

When pilot valves use 2-position valves of 2 solenoid, main valves are hydraulic reset, "H" must be indicated clearly before Type code at this time when pilot valves:
Without reset spring = O
Without reset spring,with detent = OF
(O and OF not applicable to B and Y function)

High-performance solenoid pilot valve = 6E
Low power solenoid pilot valve(onlyDC24V) = 6H

DC24V = G24
AC 220V, 50HZ = W220-50
The integer110V(plugZ5L) = W110R
The integer110V220V = W220R

With manual override buttons = N9

Control oil supply and drain Type:
external supply external drain = No code
internal supply and drain = ET
internal supply external drain = E
external supply internal drain = T
3-position valves of hydraulic centering applying E1 Type and E2 Type must meet the condition: P control pressure \geq 2×P return oil+lowest control pressure

Further details
in clear text

No code = NBR seals
V = FKM seals

No code= without
pressure reducing valves
D3= with constant-value
pressure reducing valves

No code= without
back pressure valves
P0.45=with back pressure valves
cracking pressure 4.5bar
P0.70=with back pressure valves:
cracking pressure 7bar

No code= without throttle insert
B08= with throttle 0.8mm
B10= with throttle 1.0mm
B12= with throttle 1.2mm
B15= with throttle 1.5mm

Additional device number
(see location plan
of additional devices)

Z4 = square plugs
(not applicable for the integer)
Z5L= square plugs with lamps
K4 = DIN4365sockets without plugs
DL = Junction boxes with lead wires
and lamps (M22×1.5 interface)

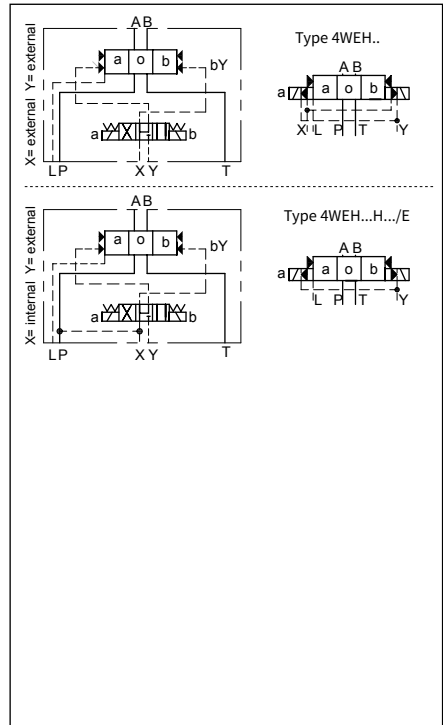
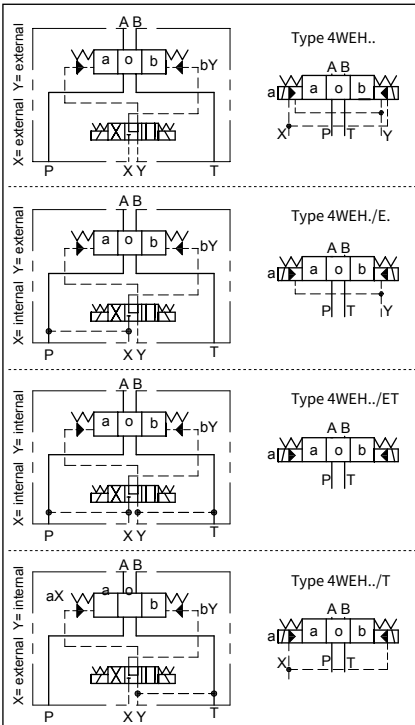
No code= Without switching
time adjustment
S = Switching time adjustment
as meter-in control
S2 = Switching time adjustment
as meter-out control

Symbols

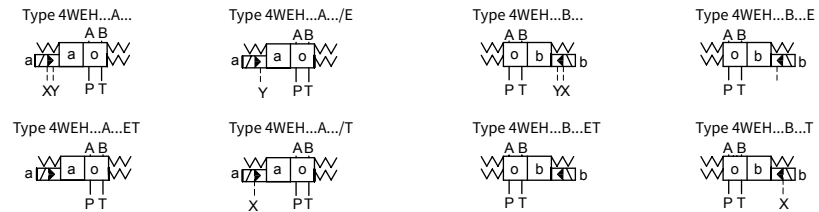
Detailed and simplified symbols for 3-position valves

Valves with spring centred

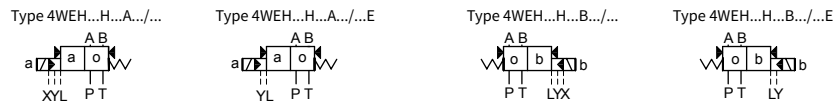
Valves with hydraulic centred



Valves with spring offset (At position A or B of 2-position valve derived from 3-position)



Valves with hydraulic offset (At position A or B of 2-position valve derived from 3-position)



Symbols

Spools of 3-position valves

3-position valve

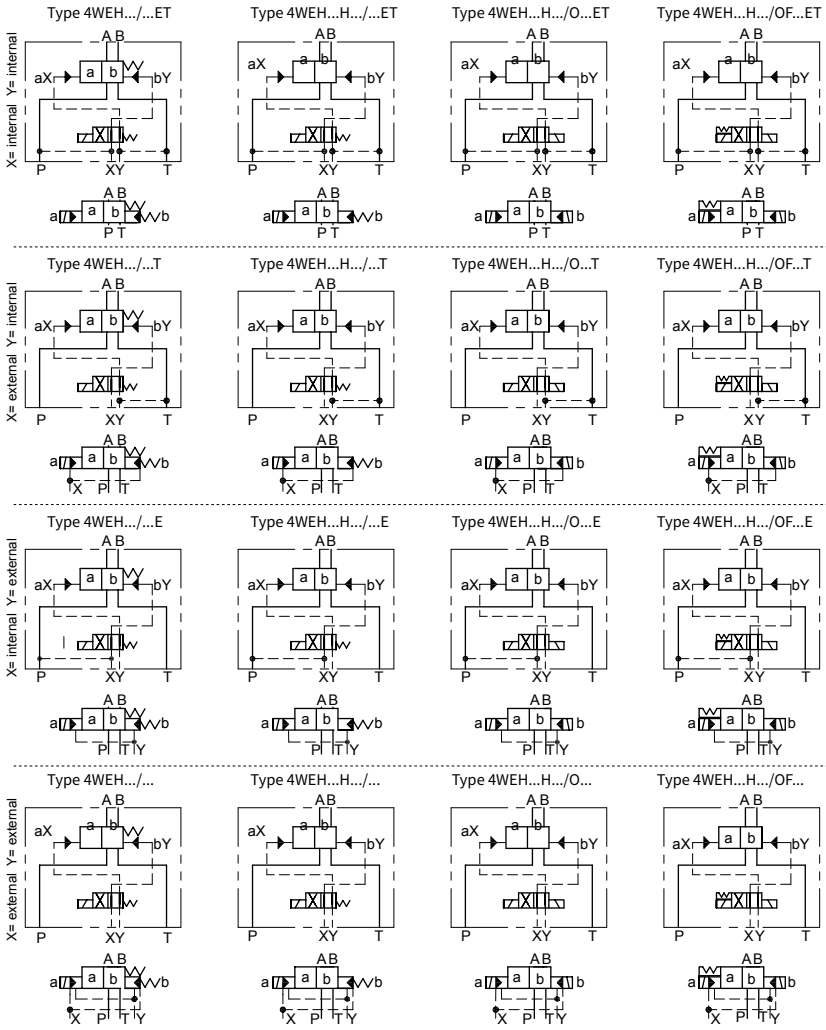
3-position valve type	Symbol	Crossover Symbol
4WEH...E.../...	E	
4WEH...F.../...	F	
4WEH...G.../...	G	
4WEH...H.../...	H	
4WEH...J.../...	J	
4WEH...L.../...	L	
4WEH...M.../...	M	
4WEH...P.../...	P	
4WEH...Q.../...	Q	
4WEH...R.../...	R	
4WEH...S.../...	S	
4WEH...T.../...	T	
4WEH...U.../...	U	
4WEH...V.../...	V	
4WEH...W.../...	W	
4WEH...M1.../...	M1	
4WEH...M2.../...	M2	
4WEH...J2.../...	J2	

2-position derivative from 3-position

2-position valve type	Symbol (solenoid at A end)	2-position valve type	Symbol (solenoid at B end)
4WEH...EA.../...		4WEH...EB.../...	
4WEH...FA.../...		4WEH...FB.../...	
4WEH...GA.../...		4WEH...GB.../...	
4WEH...HA.../...		4WEH...HB.../...	
4WEH...JA.../...		4WEH...JB.../...	
4WEH...LA.../...		4WEH...LB.../...	
4WEH...MA.../...		4WEH...MB.../...	
4WEH...PA.../...		4WEH...PB.../...	
4WEH...QA.../...		4WEH...QB.../...	
4WEH...RA.../...		4WEH...RB.../...	
4WEH...SA.../...		4WEH...SB.../...	
4WEH...TA.../...		4WEH...TB.../...	
4WEH...UA.../...		4WEH...UB.../...	
4WEH...VA.../...		4WEH...VB.../...	
4WEH...WA.../...		4WEH...WB.../...	
4WEH...M1A.../...		4WEH...M1B.../...	
4WEH...M2A.../...		4WEH...M2B.../...	
4WEH...J2A.../...		4WEH...J2B.../...	

Symbols

Detailed and simplified symbols for 2-position valves



Spools of 2-position valves

Spools:	A	C	D,DE	K	Z	B	Y,YE
Spool symbols:	a b	a b	D a b DE a b	a b	a b	a b Port T for draining	Y a b YE a b
Transition symbols:							

Technical details

SIZE		10	16	25	32	
Maximum working pressure: P,A,B (bar)		4WEH	280	280	280	280
		H-4WEH	350	350	350	350
Port T (bar)	With external pilot oil drain		315	250	250	250
	With internal pilot oil drain		DC210		AC160	
Port Y (bar)	With external pilot oil drain		DC210		AC160	
Max.control pressuer (bar)		250				
Internal pilot oil supply X(not apply to C,F,G,H,P,T,V,Z)		4.5				
Hydraulic fluid		Mineral oil, phosphate oil				
Temperature range of Hydraulic fluid		NBR seals		-30 to +80		
		FKM seals		-20 to +80		
Viscosity range (mm ² /s)						
Pilot volume for switching process (cm ³)	3-spool position valve, spring-centered		2.0	5.72	7.64	29.4
	2-spool position valve		4.0	11.45	15.28	58.8
	3-spool position valve, pressure-centered					
	-from zero position to "a" position		-	2.83	7.15	14.4
	-from "a" position to zero position		-	2.9	7.0	15.1
	-from zero position to "b" position		-	5.73	14.15	29.4
	-from "b" positiuon to zero position		-	2.83	5.73	14.4
	Pilot flow for shortest switching time, approx (L/min)		35	35	35	45
Weight, approx (kg)	Valve with one solenoid		6.4	8.5	17.8	40.5
	Valve with two solenoids, spring-centered		6.8	8.9	18.0	41.0
	Valve with two solenoids, pressure-centered		6.8	8.9	19.0	41.0
Installation position	Any(except C,D,K,Z,Y type hydraulic -return valves are installed					

Technical details

Switching time														
Size 10	From zero position to switched position(AC and DC solenoid)													
	Control pressure (bar)	70		140		210		250						
		AC	DC	AC	DC	AC	DC	AC	DC					
	3-position valve (ms)	30	65	25	80	20	55	15	50					
	2-position valve (ms)	35	80	30	75	25	70	20	65					
	3-position valve (ms)	30												
2-position valve (ms)	35	40	30	75	25	30	20	25						
Size 16	From zero position to switched position													
	Control pressure (bar)	50		150				250						
		AC	D	AC	DC		AC	DC						
	3-position valve, spring-centered	35	6	30	60		30	58						
	2-position (ms)	45	6	35	55		30	50						
	3-position valve, pressure-centered	a	b	a	b	a	b	a	b	a	b	a	b	
	(ms)	30	30	65	65	25	25	55	63	20	25	55	60	
	3-position valve (ms)	30												
	2-position valve (ms)	45	45	35	35	30	30							
	3-position valve, hydraulic-centered	a	b	a	b	a	b	a	b	a	b	a	b	
(ms)	20	20	20	20	20	20	20	20	20	20	20	20		

Technical details

Switching time																		
Size 25	Pilot control pressure	50				140				210				250				
	(bar)	AC		DC		AC		DC		AC		DC		AC		DC		
	3-position valve, spring-centered (ms)	50		85		40		75		35		70		30		65		
	2-position valve	120		160		100		130		85		120		70		105		
	3-position valve, hydraulic-centered (ms)	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	
		30	35	55	65	30	35	55	65	25	30	50	60	25	30	50	60	
	3-position valve																	
	2-position valve	120		125		95		100		85		90		75		80		
	3-position valve, hydraulic-centered (ms)	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	
		20	35	30	35	30	35	30	35	30	35	30	35	30	35	30	35	
Size 32	From zero position to switched position(AC and DC solenoid)																	
	Pilot valve pressure	50				150				250								
	(bar)	AC		DC		AC		DC		AC		DC						
	3-position valve, spring-centered (ms)	65		80		50		90		35		105						
	2-position valve	100		130		75		100		60		115						
	3-position valve, hydraulic-centered (ms)	a	b	a	b	a	b	a	b	a	b	a	b					
		55	60	100	105	40	45	85	95	35	40	85	95					
	3-position valve																	
	2-position valve	115		90		35		70		65		65						
	3-position valve, hydraulic-centered (ms)	a	b	a	b	a	b	a	b	a	b	a	b					
30		50	30	40	60	75	30	30	105	140	50	50						

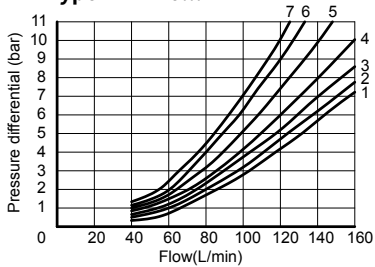
Technical details

2. Electrical data

Type of voltage	Direct voltage		Alternating voltage
Voltage (allowable fluctuation of $\pm 10\%$)	12, 24, 28 ¹⁾ , 48, 96 110, 205, 220		110, 127, 220
Power(W)	High-performance solenoid valve 30	Low-powered solenoid valve 16	
Holding power (VA)			50
Starting power (VA)			220
Operating state	Continuous		
Temperature range of environment (°C)	~ +50		
Temperature range of coil (°C)	~ +150		
Protection class to DIN40050	IP65		

Characteristic curves (Measured at t=40°C ±5°C, using HLP46)

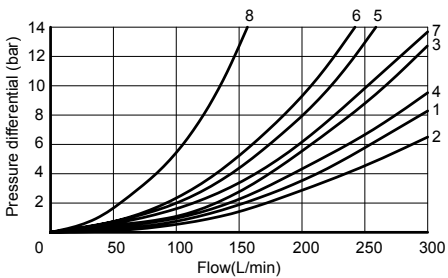
Type WEH 10...



Pressure loss curve graph of **WEH10** Type electro-hydraulic directional control valve

Enginyer symbol	Switching position				Enginyer symbol	Neutral position		
	P → A	P → B	A → T	B → T		A → T	B → T	P → T
E, Y, D	2	2	4	5				
F	1	4	1	4	F	3	-	6
G, T	4	2	2	6	G, T	-	-	7
H, C	4	4	1	4	H	1	3	5
J, K	1	2	1	3				
L	2	3	1	4	L	3	-	-
M	4	4	3	4				
P	4	1	3	4	P	-	7	5
Q, V, W, Z	2	2	3	5				
R	2	2	3	-				
U	3	3	3	4	U	-	4	-

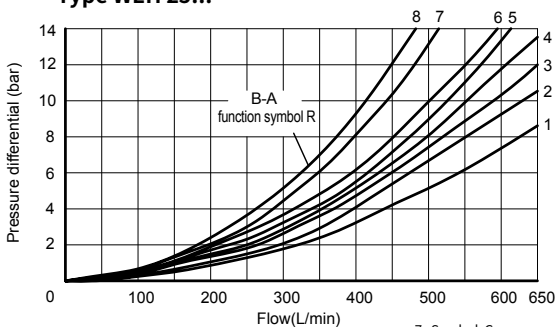
Type WEH 16...



Pressure loss curve graph of **WEH16** Type electro-hydraulic directional control valve

Symbol	Switching position				
	P → A	P → B	A → T	B → T	P → T
E, Y, D	1	1	1	3	-
F	2	2	3	3	-
G, T	5	1	3	7	6
H, C, Q, V, Z	2	2	3	3	-
J, K, L	1	1	3	3	-
M, W	2	2	4	3	-
R	2	2	4	-	-
U	1	1	4	7	-
S	4	4	4	-	8

Type WEH 25...



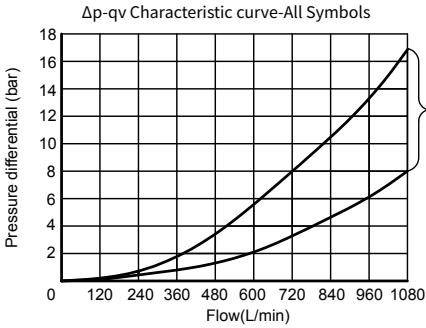
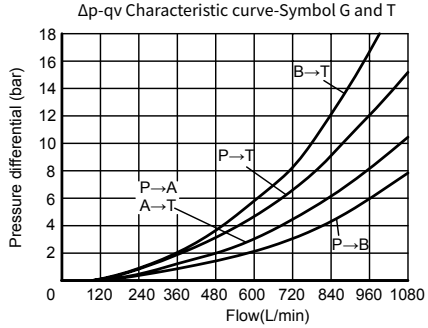
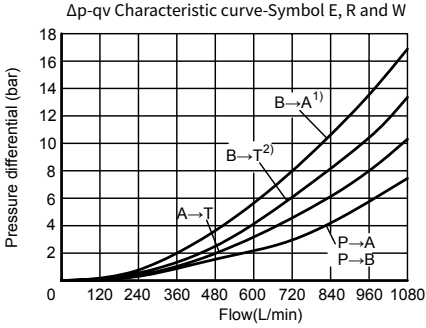
Pressure loss curve graph of **WEH25** Type electro-hydraulic directional control valve

7 Symbol G
Neutral position P-T
8 Symbol T
Neutral position P-T

Symbol	Switching position			
	P → A	P → B	A → T	B → T
E	1	1	1	3
F	1	4	3	3
G	3	1	2	4
H	4	4	3	4
J, Q	2	2	3	5
L	2	2	3	3
M	4	4	1	4
P	4	1	1	5
R	2	1	1	-
U	4	1	1	6
V	2	4	3	6
W	1	1	1	3
T	3	1	2	4

Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

Type WEH 32...



Pressure loss curve graph of **WEH32** Type electro-hydraulic directional control valve

When valve is at the middle position, open area of all flow directions

Size	Enginery	Open area (mm^2)			
		P → A	P → B	A → T	B → T
WEH10	Q	-	-	13	13
	V	13	13	13	13
	W	-	-	2.4	2.4
WEH16	Q	-	-	32	32
	V	32	32	32	32
	W	-	-	6	6
WEH25	Q	-	-	83	83
	V	83	83	83	83
	W	-	-	14	14
WEH32	Q	-	-	78	78
	V	73	73	84	84
	W	-	-	20	20

Performance limit

The switching function of valves depends on filtration due to adhesive effects. To achieve the specified permissible flow values, we recommend full-flow filtration with 25 µm. The flow forces acting within the valves also have an influence on the flow performance. With 4-way directional valves, the specified flow data are therefore valid for normal applications with 2 directions of flow. If the fluid flows in only one direction, the permissible flow may be significantly lower in critical cases.

Type: WEH10 electro-hydraulic directional control valve

3-position valve, spring centering				2-position valve, main valve without spring			
Flow(L/min)	Pressure stage(bar)			Flow(L/min)	Pressure stage(bar)		
Symbol	200	250	315	Symbol	200	250	315
E, J, L, M, Q, U, W, R, V	160			HC HD HK HZ HY	160		
H	160	150	120	HC.../O HD.../O HK.../O HZ.../O	160		
G, T	160		140	HC.../OF... HD.../OF... HK.../OF... HZ.../OF...	160		
F, P	160	140	120				
2-position valve whose main valve has a returning spring							
C, D, K, Z, Y	160						

Type: WEH16 electro-hydraulic directional control valve

Spring-centering 3-position valve						2-position valve					
Flow(L/min)	Pressure stage(bar)					Flow(L/min)	Pressure stage(bar)				
Symbol	70	140	210	280	350	Symbol	70	140	210	280	350
E, H, J, L, M, Q, U, W, R	300	300	300	300	300	C	300	300	300	300	300
F, P	300	250	180	170	150	D, Y	300	270	260	250	230
G, T	300	300	240	210	190	K	300	250	240	230	210
S	300	300	300	250	220	Z	300	260	190	180	160
V	300	250	210	200	180	Hydraulic-return 2-position valve					
Hydraulic-centering 3-position valve (min.control pressure 16 bar)						HC, HD, HK, HZ, HY	300	300	300	300	300
All functions	300	300	300	300	300	When control oil is supplied internally and pressure valve is equipped, the flow of spool valve's engring of H, F, P, G, T, S, V, C and Z Types reaches 160L/min .					

Performance limit

Type: WEH25 electro-hydraulic directional control valve

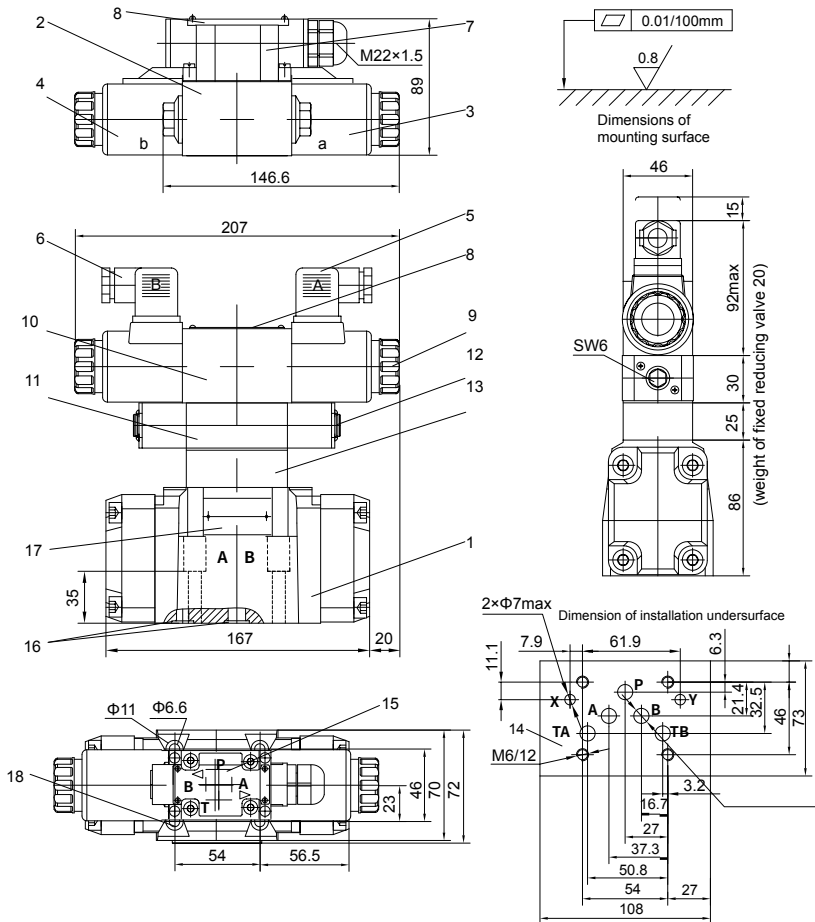
3-position valve of spring centering						2-position valve					
Flow(L/min)	Pressure stage(bar)					Flow(L/min)	Pressure stage(bar)				
Symbol	70	140	210	280	350	Symbol	70	140	210	280	350
E, L, M	650	650	650	650	650	G, D, K, Z, Y	650	650	650	650	650
U, W, Q						Hydraulic-return 2-position valve (main valve without spring)					
G, T	400	400	400	400	400	HC HD HK HZ HY	650	650	650	650	650
F	650	550	430	330	300	HC.../O					
H	650	650	550	400	360	HD.../O	650	650	650	650	650
J	650	650	650	600	520	HK.../O					
P	650	550	430	330	300	HZ.../O					
V	650	550	400	350	310	HC.../OF...					
R	650	650	650	650	580	HD.../OF...	650	650	650	650	650
Hydraulic-centering 3-position valve (minimum control pressure 18bar)						HK.../OF...					
E, F, H, J, L, M P, Q, R, U, V, W	650	650	650	650	650	HZ.../OF...					
G, T	400	400	400	400	400	When control oil is supplied internally and pressure valve is equipped, the flow of spool valve's enginery of G, Z, V, F, H, P, T Types reaches 180L/min.					
Hydraulic-centering 3-position valve (minimum control pressure 30bar)											
G, T	650	650	650	650	650						

Type: WEH32 electro-hydraulic directional control valve

3-position valve of spring centering						2-position valve					
Flow(L/min)	Pressure stage(bar)					Flow(L/min)	Pressure stage(bar)				
Symbol	70	140	210	280	350	Symbol	70	140	210	280	350
E, J, L, M, R U, W, R	1100	1040	860	750	680	C, D, K, Z, Y	1100	1040	860	750	680
H, G	1100	1000	680	500	450	Hydraulic-return 2-position valve					
F, T, P	820	630	510	450	400	HC, HD, HK, HZ, HY	1100	1040	860	750	680
Hydraulic-centering 3-position valve (minimum control pressure 8.50bar)											
All functions	1100	1040	860	750	680	When control oil is supplied internally and pressure valve is equipped, the flow of spool valve's enginery of C, G, T, F, P, H, V and Z Types reaches 180L/ min.					

Unit dimensions

Unit dimensions of WEH 10 electro-hydraulic directional control valve



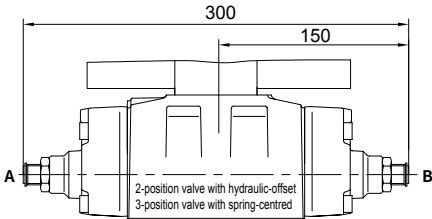
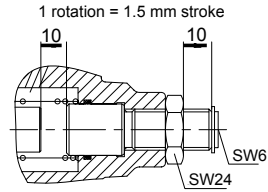
- 1 Main valve
- 2 2-position valve, with one solenoid
- 3 Solenoid a
- 4 Solenoid b
- 5 Plug of solenoid a
- 6 Plug of solenoid b
- 7 Junction box with lead and light, M22x1.5 interface
- 8 Label of pilot valve
- 9 Manual button
- 10 Double-solenoid 2-position valve, double-solenoid 3-position valve
- 11 Switching time regulator
- 12 Section flow of Switching time regulator "full open"

- 13 Reducing valve
- 14 Arrangement of main valve's oil outlets (attachment face of valve)
- 15 Position of leading oil outlet
- 16 O-ring of A, B, P and T outlets: 12x2; O-ring of X and Y: 10.82x1.78
- 17 Nameplate
- 18 Bolt4-M6x45 GB/T70.1-2000-10.9 grade Moment $M_n=15.5\text{Nm}$ (bolt of vertical stack components combined with electro-hydraulic directional valve is selected according to actual height)

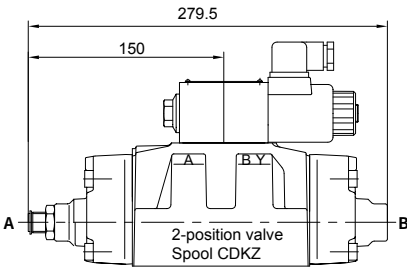
Unit dimensions

Dimension of additional devices of valve type WEH16

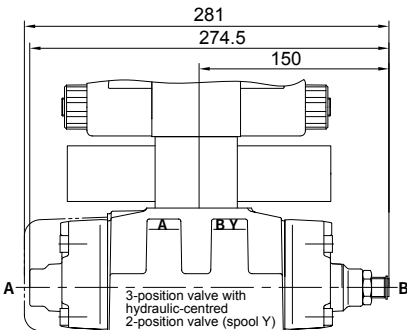
Range of stroke adjustment is 10 mm to adjust main spool stroke. Loosen the lock-up nut and rotate the rod clockwise, thus, shorten the stroke of the main spool.



- Stroke adjustment fixed on end "A" and "B" 10
- Stroke adjustment fixed on end "A" 11
- Stroke adjustment fixed on end "B" 12



- Stroke adjustment fixed on end "A" 11



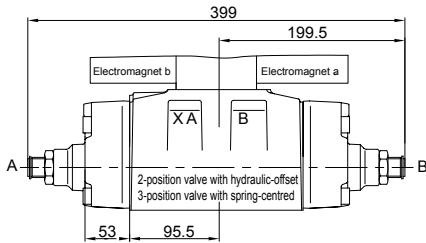
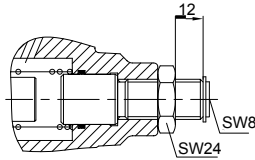
- Stroke adjustment fixed on end "B" 12

Unit dimensions

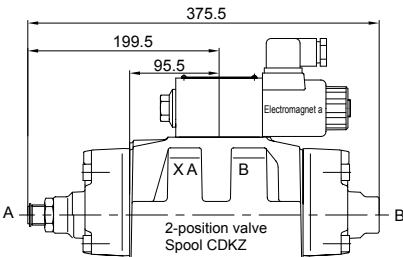
Dimension of additional devices of valve type WEH25.

Range of stroke adjustment is 12 mm to adjust main spool stroke. Loosen the lock-up nut and rotate the rod clockwise, thus, shorten the stroke of the main spool.

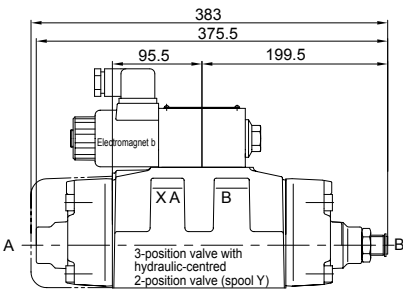
1 rotation = 1.5 mm stroke



- Stroke adjustment fixed on end "A" and "B" 10
- Stroke adjustment fixed on end "A" 11
- Stroke adjustment fixed on end "B" 12



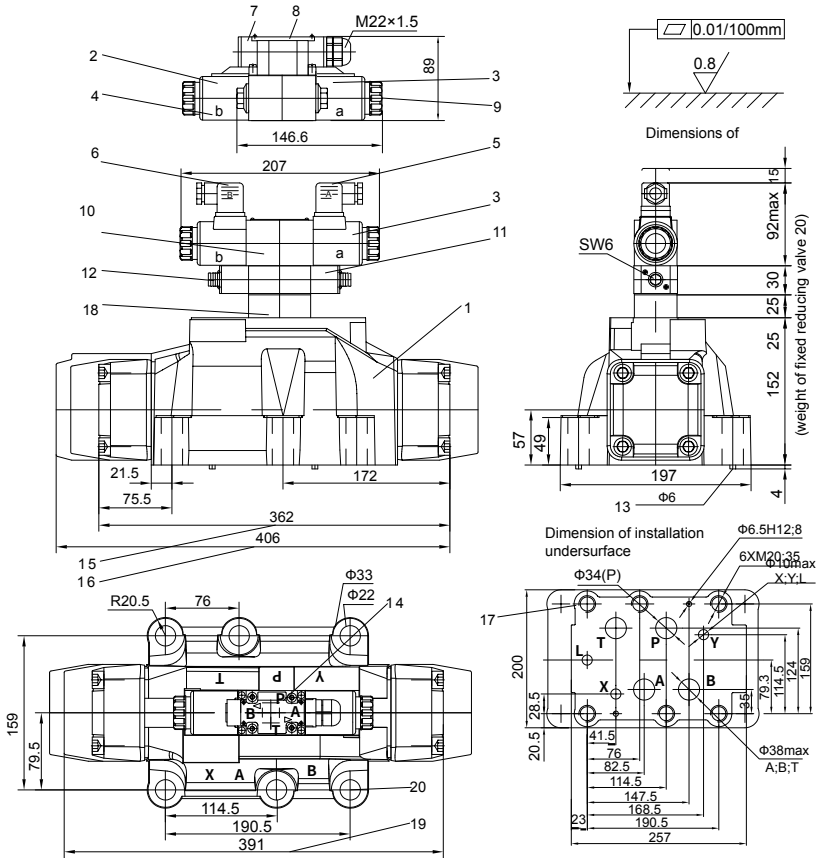
- Stroke adjustment fixed on end "A" 11



- Stroke adjustment fixed on end "B" 12

Unit dimensions

Unit dimensions of WEH 32 electro-hydraulic directional control valve

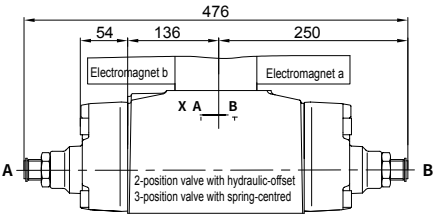
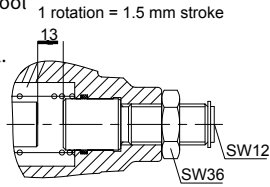


- 1 Main valve
- 2 2-position valve with one solenoid
- 3 Solenoid a
- 4 Solenoid b
- 5 Plug of solenoid a
- 6 Plug of solenoid a
- 7 Junction box with lead and light, M22×1.5 interface
- 8 Label of pilot valve
- 9 Manual button
- 10 Double-solenoid 2-position valve, Double-solenoid 3-position valve
- 11 Switching time regulator
- 12 The location when section flow full open
- 13 2 locating pins
- 14 Locating diagram of connector of pilot-operated solenoid valve
- 15 Size of spring-centering 3-position valve and hydraulic-return 2-position valve
- 16 Hydraulic-centering 3-position valve
- 17 Locating diagram of connector of main valve
- 18 Reducing valve
- 19 Spring-return 2-position valve
(Icon size is Y Type engring.
For C, D, K, Z on the right head protruding function)
- 20 Bolt6-M20×80 GB/T70.1-2000-10.9 (M_t=430Nm)
(bolt of vertical stack components combined with electro-hydraulic directional valve is selected according to actual height)
P, T, A, B port O-rings: 42×3
X, Y, L port O-rings: 19×3

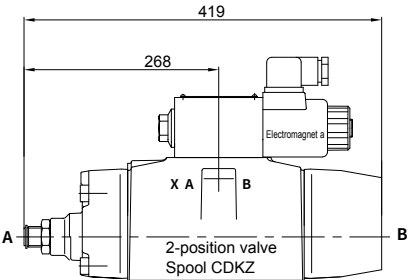
Unit dimensions

Dimension of additional devices of valve type WEH32

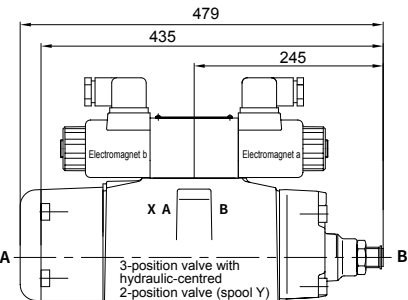
Range of stroke adjustment is 13 mm to adjust main spool stroke. Loosen the lock-up nut and rotate the rod clockwise, thus, shorten the stroke of the main spool.



- Stroke adjustment fixed on end "A" and "B" 10
- Stroke adjustment fixed on end "A" 11
- Stroke adjustment fixed on end "B" 12



- Stroke adjustment fixed on end "A" 11



- Stroke adjustment fixed on end "B" of 12



WH...type Hydraulic Directional Control Valve

WH 10, 16, 25, 32 type

Sizes 10, 16, 25, 32

Max. Working Pressure: 315 bar

Max. Flow: 1100L/min



Contents

Function and configurations	02
Specifications	03
Symbols	04
Connection dimensions and sub-plate	04

Features

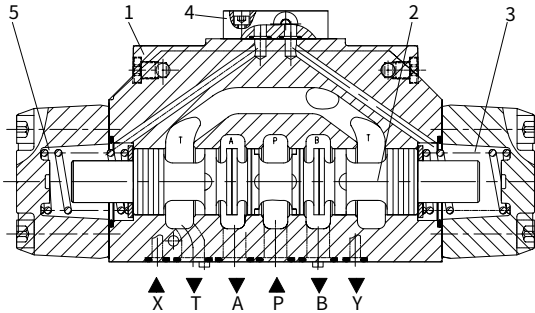
- Valves used to control the start, stop and direction of a fluid flow
- Hydraulic operation (WH)
- Porting pattern conforms to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H

Function and configuration

WH type valves are directional spool valves with hydraulic operation. They control the start, stop and direction of a flow.

1. Spring-centred valve:

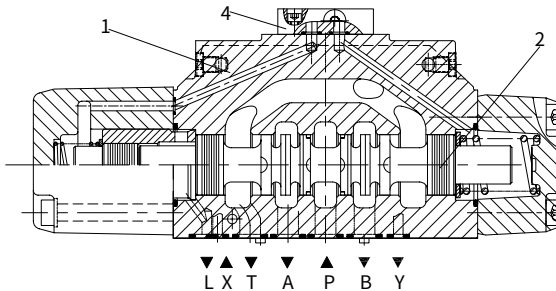
The main spool (2) is kept in the centre position by the return springs (3). If external control fluid enters main valve(1) from port X then enters left spring chamber(5) via cover(4), the main spool is pushed into the switching position. The oil of right spring chamber returns to tank from port Y. When the control fluid is cancelled, the main spool returns to centre position via the action of right spring force. And if the control fluid enters from port Y, then the main spring moves to left to switching direction and the oil of left spring chamber returns to tank from port X.



Structure chart of valve type WH25 with spring-centred

2. Hydraulic-centred valve:

Pressure fluid acts on both sides of main spool (2) and main spool(2) is fixed by a locating sleeve. It moves under pressure at opposite side to switch direction when one side of the main spool is unloaded. If the control fluid enters left chamber of main valve from port X, the main spool moves right, the fluid of right chamber returns to tank from port Y; and if the control fluid enters right chamber from port Y, the main spool moves left, the fluid of left chamber returns to tank from port X. Internal leakage oil directly returns to tank from port L.



Structure chart of valve type WH25 with spring-centred

Switching time adjustment (see WEH)

Characteristic curve (see WEH)

Performance limits (see WEH)

Flow area when valve is in central position (see WEH)

Technical data (see hydraulic part of WEH technical data)

Additional device (stroke adjustment) (see WEH)

Specification



280 bar = No code
 350 bar = H-
 (Not for size 10)

3 way = 3
 (only for spool A and B)
 4 way = 4

Nominal size: 10 = 10
 16 = 16
 25 = 25
 32 = 32

Spring-centred or offset = No code
 Hydraulic-centred or offset = H
 (For size 10, only symbols A, B, C, D, K, Z, Y with H)

Spool symbol (see spool symbols)

Further details
 in clear text

No code = NBR seals
 V = FKM seals

Additional device code
 (see WEH)
 (not for size 10)

No code = Without switching time
 adjustment

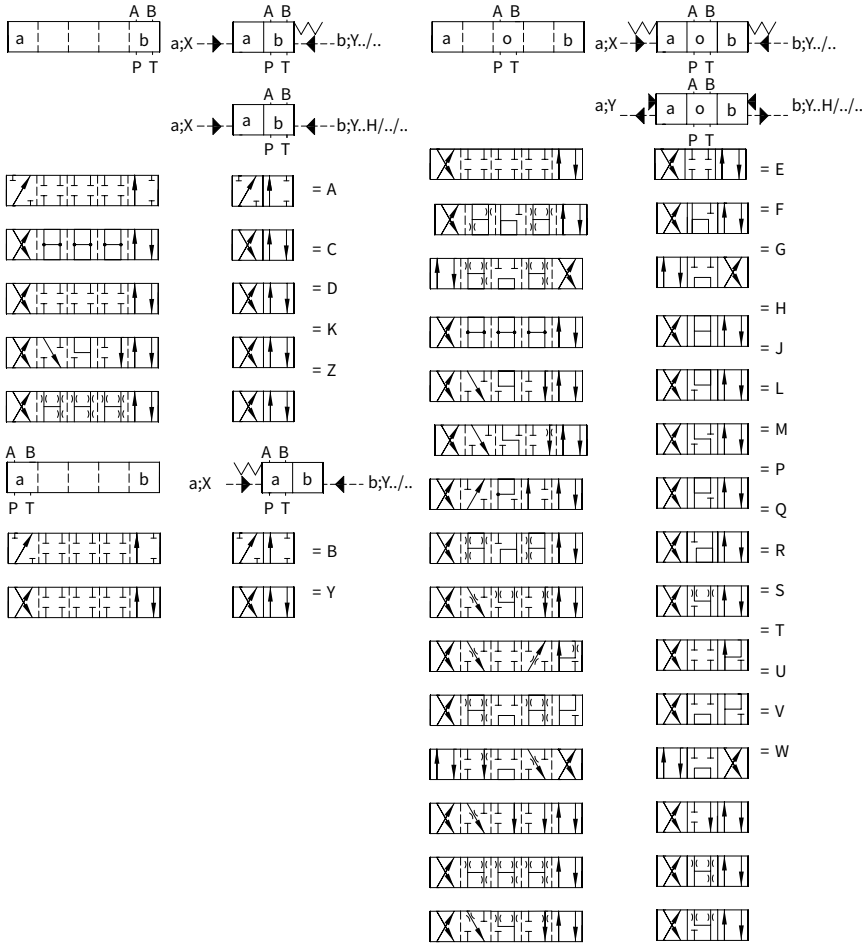
S = With switching time
 adjustment, meter in throttle

S2 = With switching time
 adjustment, meter out throttle

4XJ= Series 40J to 49J (size 10)

7XJ= Series 70J to 79J (size 16,25 and 32)

Symbols



Connection dimensions and sub-plate

1. The installation, connection dimensions and sub-platesame of type WH is as same as type WEH.
2. Regarding dimention, only the height of type WH is different from that of type WEH.
For type WH, there is a cover (height:12mm) on top of the main valve.
Also switching time adjusted can be topped with a height of 40mm. Details see WEH.



WMM 6...type Manual Operated Directional Control Valve



WMM6...6XJ... type

Size 6
Max. Working Pressure: 315 bar
Max. Flow: 60L/min

Contents

Function and configuration	02
Specification	03
Symbols	03
Technical data	04
Characteristic curves	04
Operating limitation	05
Unit dimensions	06

Features

- Direct operating directional spool valves
- For sub-plates mounting
- Hand lever
- Porting pattern confirms to DIN 24 340 form A, and ISO 4401

Function and configurations

WMM6...6XJ... type manual directional Valves are direct operated spool valves which switch the flow fluid by rotating the handle to move the spool axially. The valves consist of valve housing(1), handle(2), control spool(3), and one or two return springs(4).

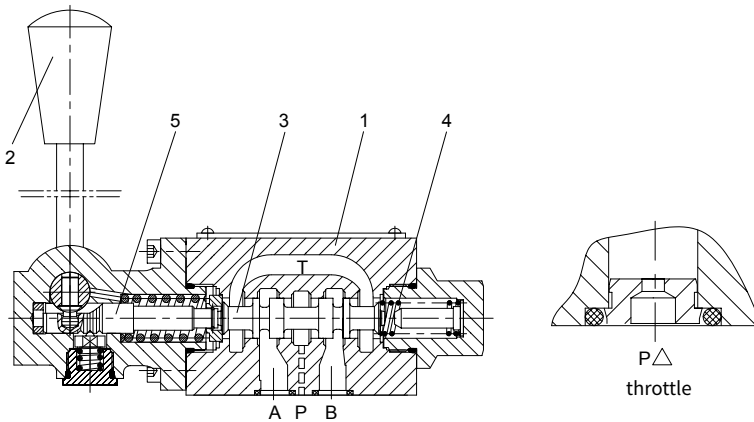
The return springs (4) maintain the control spool (3) in central position when the handle is not operate. If the rotary button is actuated with a detent, the control spool (3) is moved to the desired spool position by the type of actuation (2).

Detent

Directional valves with rotary button are generally designed with detent. Directional valves with hand lever are optionally available as 2 or 3 position valves with detent. Directional valves with roller plunger are generally designed without detent. If types of actuation with detent are used, each spool position can be locked, depending on the valve type.

Throttle

The use of a throttle insert is required when due to given operating conditions, flows can occur during the switching processes that exceed the performance limit of the valve. These throttles are to be inserted into the P-channel of the directional valve.



Specification

3 ways

(version A and B) =3

4 ways =4

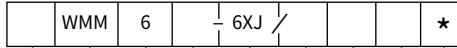
Manual directional valve

Nominal size 6 =6

Symbols e.g. C, E, EA, EB etc. see below)

Series 60J to 69J =6XJ

(60J to 69J: unchanged installation and connection dimensions)



Further details in clear text

No code = NBR seals

V = FKM seals

No code = Without cartridge throttle

B08 = Throttle - Φ 0.8 mm

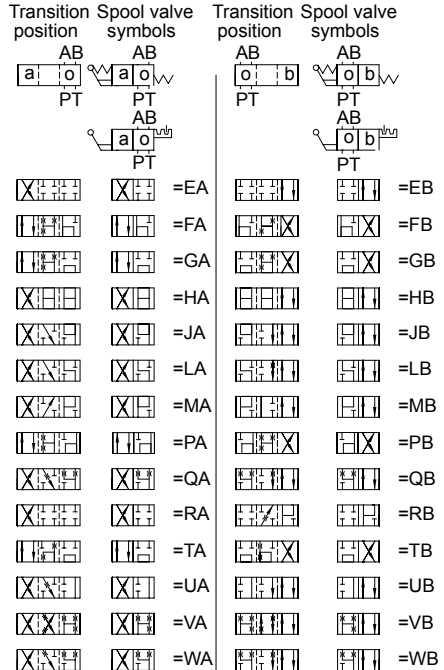
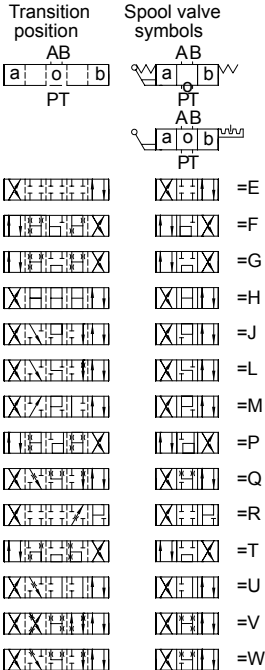
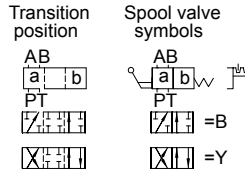
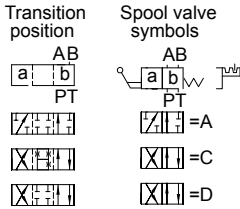
B10 = Throttle - Φ 1.0 mm

B12 = Throttle - Φ 1.2 mm

No code = Return spring

F = With detent

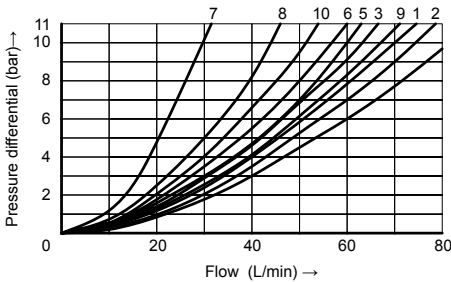
Symbols



Technical data

Fixing position		Optional	
Fluid temperature range		°C	
		-30 to +80 (NBR seal)	
		-20 to +80 (FKM seal)	
Max. operating pressure	Port A,B,P	bar	315
	Port T	bar	160
Max. flow-rate		L/min	60
Flow cross section (switching neutral position)	Type Q	mm ²	For symbol Q 6% of nominal cross section
	Type W	mm ²	For symbol W 3% of nominal cross section
Fluid		Mineral oil for NBR and FKM seal	
		Phosphate ester for FKM seal	
Viscosity range		mm ² /s	2.8 to 500
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	
Weight		kg	1.6

Characteristic curves (Measured at t=40°C ±5°C, using HLP46)



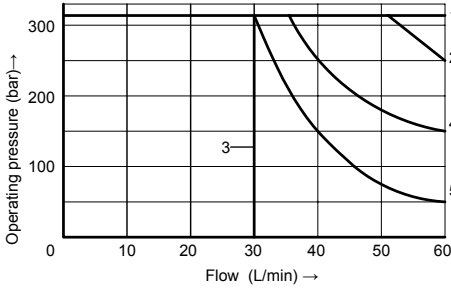
- 7 Symbol "R" in switched positions B → A
- 8 Symbol "G" and "T" in neutral position P → T
- 9 Symbol "H" in neutral position P → T

Spool symbol	Flow direction			
	P to A	P to B	A to T	B to T
AB	3	3	-	-
C	1	1	3	1
DY	5	5	3	3
E	3	3	1	1
F	1	3	1	1
T	10	10	9	9
H	2	4	2	2
JQ	1	1	2	1
L	3	3	4	9
M	2	4	3	3
P	3	1	1	1
R	5	5	4	-
V	1	2	1	1
W	1	1	2	2
U	3	3	9	4
G	6	6	9	9

Operating limitations

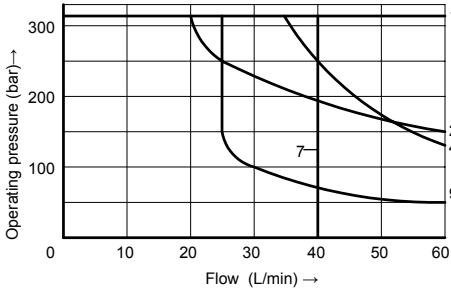
The switching function of the valves depends on the filtration. To achieve the specified admissible flow values, we recommend full flow filtration with 25 µm. The flow forces acting within the valves also affect the flow performance. With 4 way valves the specified flow data thus apply to normal operation with 2 volume flow directions . If only one flow direction is available, in certain cases, the admissible flow can be significantly smaller.

Without detent

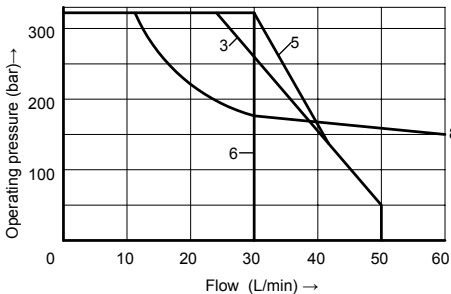


Curve		Spool symbol
Without detent	1	M E,J L,Q,U,W C,D,Y,G H,R
	2	A,B
	3	V
	4	F,P
	5	T

With detent



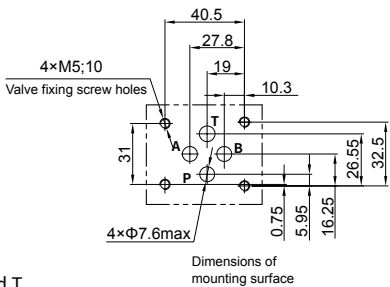
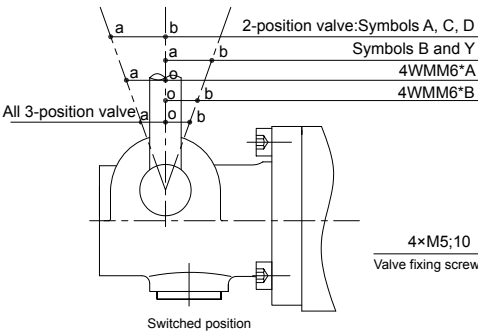
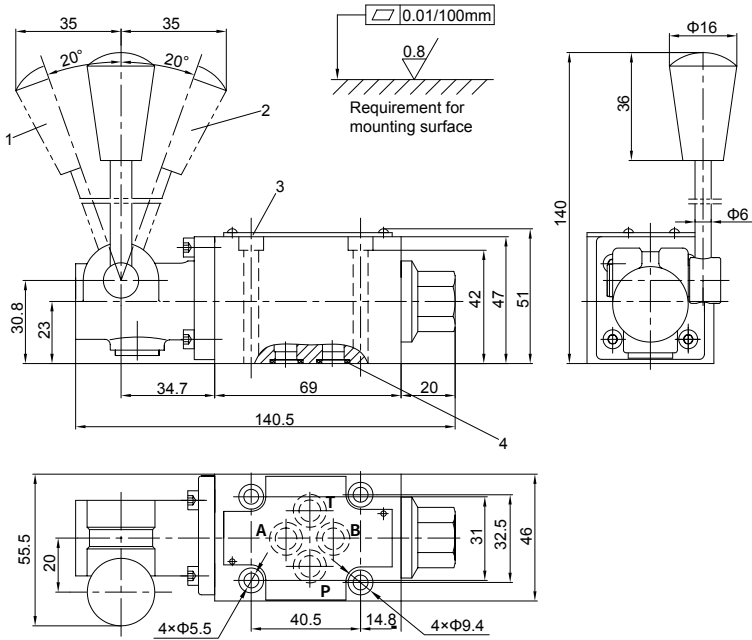
Curve		Spool symbol
With detent	1	M H,C D,Y
	2	E,J,Q,L U,W
	3	A,B
	4	G,T
	5	F
	6	V
	7	P
	8	R
	9	T



Unit dimensions

(Dimensions in mm)

02



- 1 Switched position $b \rightarrow a, o \rightarrow a$
- 2 Switched position $a \rightarrow b, o \rightarrow b$
- 3 Nameplate
- 4 O-ring 9.25×1.78 for ports A, B, P and T



WMM 10...type Manual Operated Direction Control Valve



WMM10...4XJ... type

Size 10

Max. Working Pressure: 315 bar

Max. Flow: 160L/min

Contents

Function and configurations	02
Specifications	03
Symbols	03
Technical data	04
Characteristic curves	04
Operating limitations	04
Unit dimensions	05

Features

- Direct operating directional spool valves with mechanical, manual operation
- For sub-plates mounting
- Hand lever
- Porting pattern conforms to DIN 24 340 form A, and ISO 4401

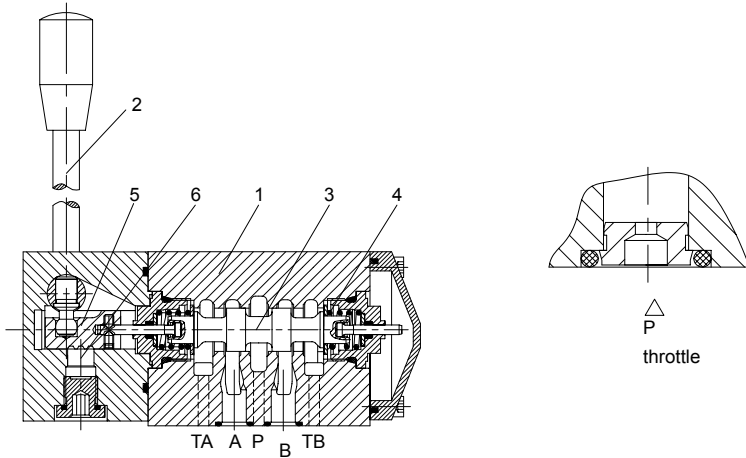
Function and configurations

WMM 10...4XJ... type are manually actuated directional spool valves. They control the start, stop and direction of a flow. The directional valves consist of valve housing (1), handle (2), control spool (3), and one or two return springs (4). When de-energized, the control spool (3) is held in the central position or in the initial position by the return springs (4). The control spool (3) is moved to the desired spool position by means of the types of actuation.

Throttle

The use of a throttle insert is required, when, operating , flows can occur during the switching processes that exceed the performance limit of the valve.

These throttles are to be inserted into the P-channel of the directional valve. Directional valves type WMM10...4XJ...type have two handles options with different pulling direction , the detail refer to the 'Specification' and 'Unit dimensions'.



Specification

3 ways

(version A and B) =3

4 ways =4

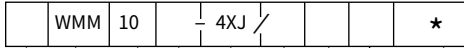
Manual directional valve

Nominal size 10 =10

Symbols e.g. C, E, EA, EB etc. see below

Series 40J to 49J =4XJ

(40J to 49J: unchanged installation and connection dimensions)



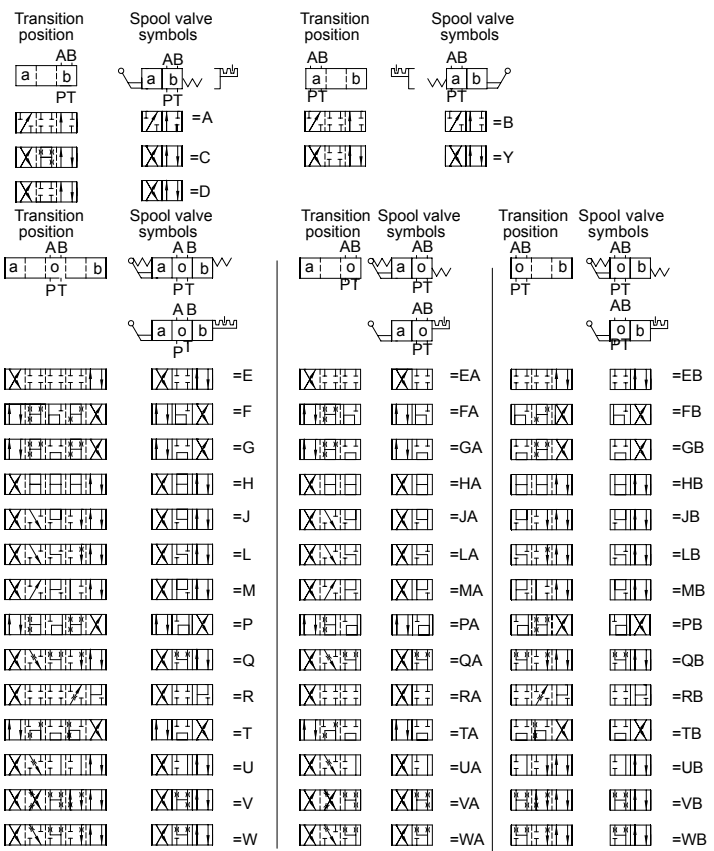
Further details in clear text

No code = NBR seals
V = FKM seals

No code = Without cartridge throttle
B08 = Throttle - Φ 0.8 mm
B10 = Throttle - Φ 1.0 mm
B12 = Throttle - Φ 1.2 mm

No code = Return spring
F = With detent

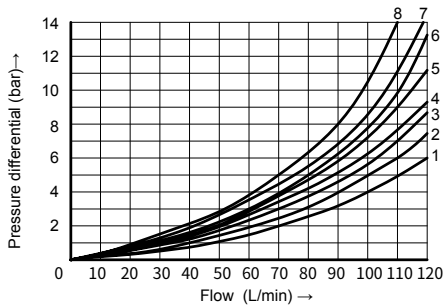
Symbols



Technical data

Fluid temperature range		°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)
Max. operating pressure	Port A,B,P	bar	315
	Port T	bar	160
Max. flow-rate		L/min	120
Flow cross section (switching neutral position)	Type V	mm ²	For symbol V 11(A/B to T) 10.3(P to A/B)
	Type W	mm ²	For symbol W 2.5(A/B to T)
	Type Q	mm ²	For symbol Q 5.5(A/B to T)
Fluid			Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal
Viscosity range		mm ² /s	2.8 to 500
Degree of contamination			Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406
Weight		kg	4.4

Characteristic curves (Measured at t=40°C ±5°C , using HLP46)

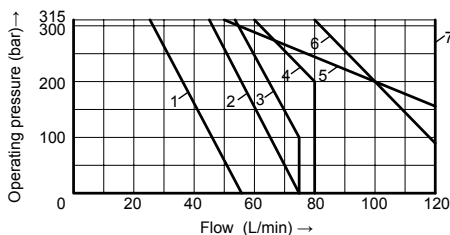


Spool symbol	Flow direction				Spool symbol	Flow direction			
	P to A	P to B	A to T	B to T		P to A	P to B	A to T	B to T
A	4	3	-	-	L	3	3	2	4
B	3	4	-	-	M	1	1	4	4
C	3	3	4	4	P	3	1	5	5
D	3	3	5	5	Q	2	2	2	2
E	2	2	4	4	R	3	4	3	-
F	1	2	3	4	U	3	3	5	2
G,T	4	4	7	7	V	2	2	3	3
H	1	1	5	5	W	3	3	3	3
J	2	2	3	3	Y	4	4	6	6

- 8 Symbols "G" and "T" in neutral position (P → T)
- 8 Symbol "R" in position (A → B)

Operating limitations

The switching performance of the valves depends on the filtration. To achieve the specified flow values, we recommend full flow filtration with 25 µm. The flow forces acting within the valves also affect the flow performance. With 4 way valves the specified flow data thus apply to normal operation with 2 volume flow directions. If only one flow direction is available, in certain cases, the admissible flow can be significantly smaller.

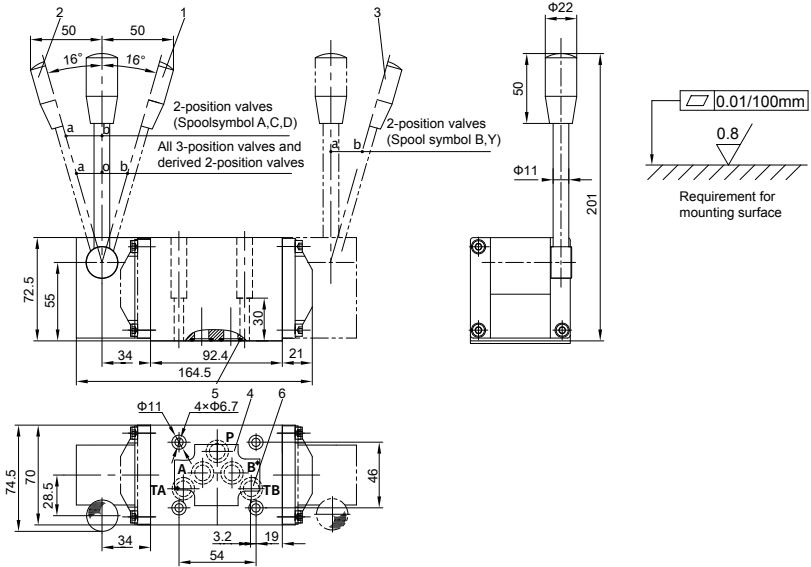


Curve	Spool symbol
1	A,B
2	A/O
3	H
4	F,G,P,R,T
5	J,L,Q,U,W
6	C,D,E,M,V,Y
7	C/O,C/OF,D/O,D/OF

Unit dimensions

(Dimensions in mm)

WMM10...-4XJ...



- 1 Switched position 0 → b
- 2 Switched position 0 → a,b → a
- 3 Switched position a → b
- 4 Nameplate
- 5 O-ring 12×2 , for ports A, B, P,TA and TB
- 6 Additional return port when using control block



WMM...type Manual Operated Directional Control Valve



WMM16, 25 type

Size 16 , 25
Max. Working Pressure: 315 bar
Max. Flow: 450L/min

Contents

Function and configurations	02
Specifications	02
Symbols	03
Technical data	03
Characteristic curves	04-05
Unit dimensions	06-07

Features

- Direct operating directional spool valves with mechanical, manual operation
- For sub-plates mounting
- Hand lever
- Porting pattern conforms to DIN 24 340 form A, and ISO 4401

Function and configurations

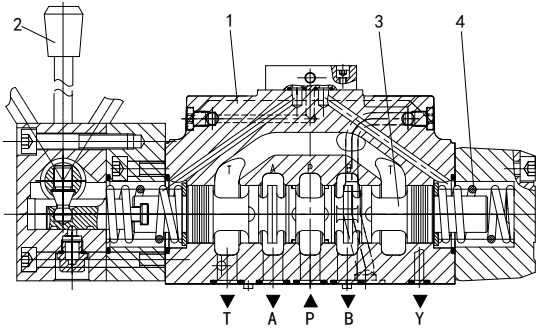
WMM type valves are hand lever operation directional spool valves. They control the start, stop and direction of a flow. The directional valves basically comprise of a valve housing (1), handle (2), control spool (3), one or two return springs (4).

In the unoperated condition the control spool (3) is held in the neutral or its initial position by the return springs (4). The control spool (3) is actuated by the hand lever (2) via a joint and a pin. The spool is moved from the initial position to the switched position.

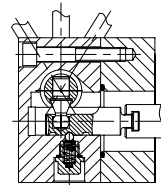
After the hand lever (2) has been returned to the zero switched position, the spool (3) is returned to the neutral position via the return springs (4).

4WMM.../F... (With the detent)

The directional valves with one detent, 2 or 3 switched position, can be orientated at any switched position.



Type 4WMM...7XJ

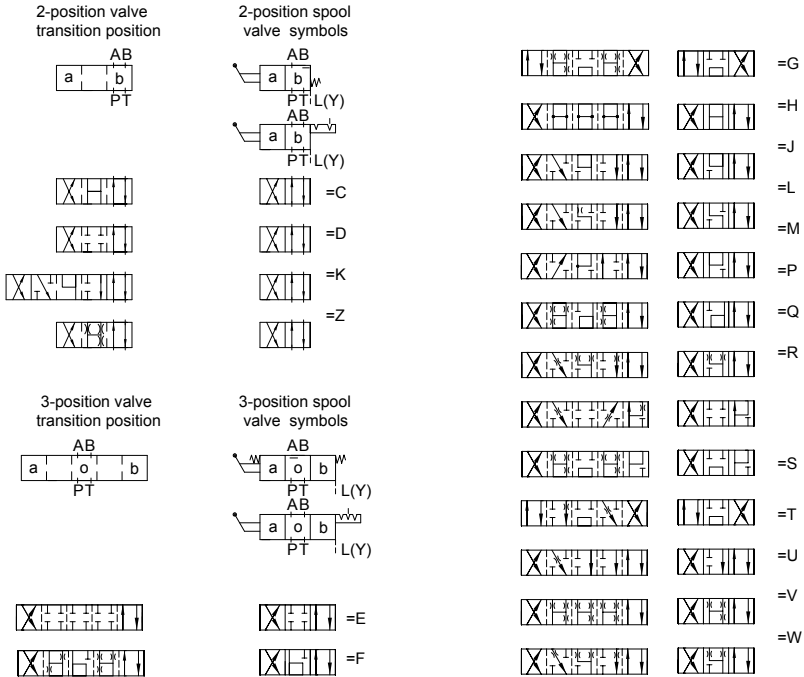


Type 4WMM...7XJ/F
(with detent)

Specification

4	WMM		-	7XJ	/		*
4 ways	= 4						Further details in clear text
Nominal size 16	=16					No code =	NBR seals
Nominal size 25	=25					V =	FKM seals
Symbols e.g. C, E etc. see below						No code =	Return spring
						F =	With detent
						7XJ =	Series 70J to 79J (70J to 79J: unchanged installation and connection dimensions)

Symbols



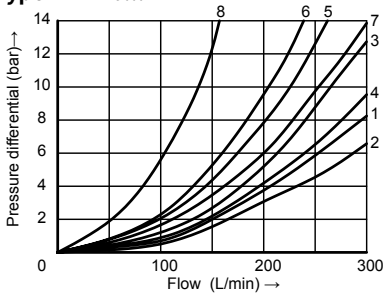
Technical data

Nominal size		16	25
Weight	kg	Approx.8	Approx.12.2
Actuation force –with spring return	N	Approx.75	Approx.105
–with detent	N	Approx.75	Approx.105
Actuation angle about the neutral position	°	2×26°	2×32°
Max.operating pressure port A,B,P	bar	315	
Port T	bar	250	
Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal	
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)	
Viscosity range	mm ² /s	2.8 to 380	
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	

Characteristic curves

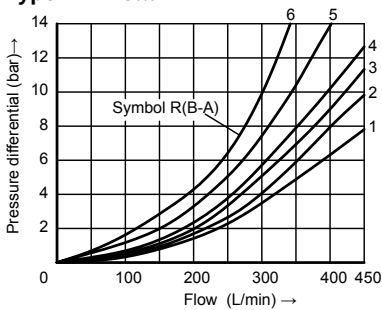
(Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

Type 4MM16...



Spool symbol	Flow direction				
	P to A	P to B	A to T	B to T	P to T
E, Y, D	1	1	1	3	-
F	2	2	3	3	-
G, F	5	1	3	7	6
H, C, Q	2	2	3	3	-
J, K, L	1	1	3	3	-
M, W	2	2	4	3	-
R	2	2	4	-	-
U	1	1	4	7	-
S	4	4	4	-	8

Type 4MM25...



Spool symbol	Flow direction				
	P to A	P to B	A to T	B to T	P to T
E	2	2	1	4	-
F	1	2	1	2	4
G	2	2	2	4	6
H	2	2	1	3	2
J	2	2	1	3	-
L	2	2	1	2	-
M	2	2	1	4	-
P	2	2	1	4	6
Q	2	2	1	4	-
R	1	2	1	-	-
T	2	2	2	4	5
U	2	2	1	4	-
V	2	2	1	4	-
W	2	2	1	3	-

Characteristic curves

(Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

The switching performance of the valves depends on the filtration. To achieve the specified admissible flow values, we recommend full flow filtration with $25\ \mu\text{m}$. The flow forces acting within the valves also affect the flow performance. With 4 way valves the specified flow data thus apply to normal operation with 2 volume flow directions. If only one flow direction is available, in certain cases, the admissible flow can be significantly smaller.

Nominal size 16

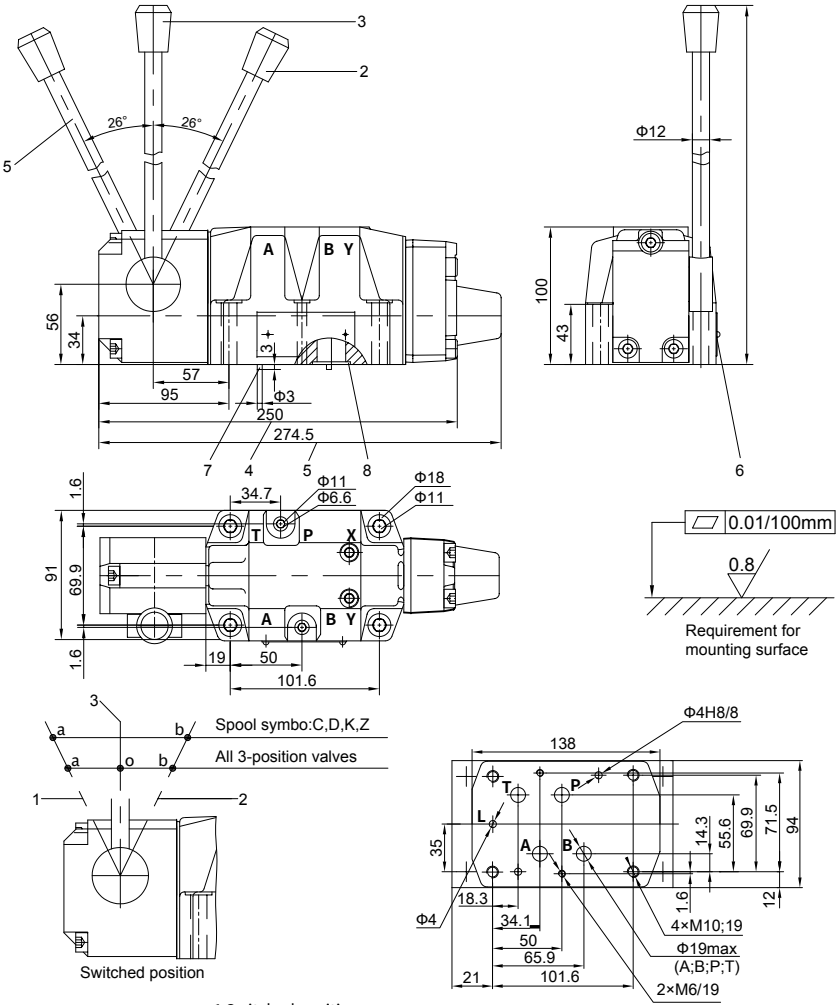
Allowing flow q_v L/min, 2-position valve						Allowing flow q_v L/min, 3-position valve					
Symbol	Operating pressure P bar					Symbol	Operating pressure P bar				
	70	140	210	280	315		70	140	210	280	315
Return spring						Return spring					
C	300	300	300	260	220	E,H,J,L,M,Q,R,U,W	300	300	300	300	300
D	300	300	210	190	160	F,P	300	300	210	190	170
K	300	300	200	150	130	G,S,T	300	300	220	210	180
Z	300	240	190	170	150	V	300	260	200	180	170
With detent						With detent					
C,D,K,Z	300	300	300	300	300	E,H,J,L,M,Q,R,U,W	300	300	300	300	300
						F,P	300	300	280	230	230
						G,S,T	300	300	230	230	230
						V	300	300	250	230	230

Nominal size 25

Allowing flow q_v L/min, 2-position valve						Allowing flow q_v L/min, 3-position valve					
Symbol	Operating pressure P bar					Symbol	Operating pressure P bar				
	70	140	210	280	315		70	140	210	280	315
Return spring						Return spring					
C	450	300	250	200	180	E,J,L,M,Q,R,U,W	450	450	450	450	450
D	350	300	275	250	200	F	450	250	200	135	110
K	200	150	140	130	120	G,T	450	330	290	230	180
Z	300	270	240	220	200	H	450	450	400	400	350
						P	450	310	240	215	150
						V	450	310	280	270	200
With detent						With detent					
C, D, K, Z	450	450	450	450	450	E, F, G, H, J, L, M, P, Q, R, T, U, W	450	450	450	450	450
						V	450	450	400	350	300

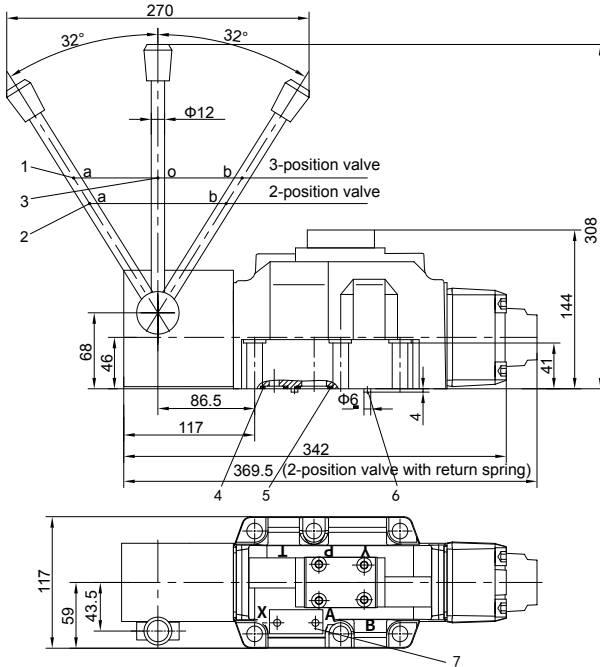
Unit dimensions: nominal size 16

02

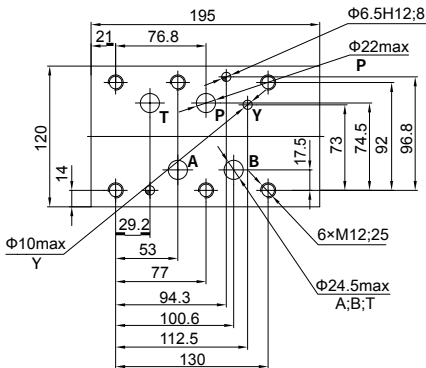


- 1 Switched position a
- 2 Switched position b
- 3 Switched position 0 (a and b for 2-position valve)
- 4 2-position and 3-position valves with detent, 3-position valve with spring centered
- 5 2-position valve with return spring
- 6 Nameplate
- 7 2 locating pins 3x8
- 8 O-ring 22x2.5 (ports A, B, P and T) O-ring 10x2 (port L)

Unit dimensions: nominal size 25



Port X and L unavailable, port Y is used as drain port



- 1 Switched position a
- 2 Switched position b
- 3 Switched position 0
- 4 O-ring 19×3 (ports X and Y)
- 5 O-ring 27×3 (ports A, B, P and T)
- 6 2 locating pins 6×12
- 7 Nameplate



Z2FS6...type Modular Restrictive Check Valve



Z2FS6...4XJ...type

Size 6
Max. Working Pressure: 315 bar
Max. Flow: 80 L/min

Contents

Function and configurations	02
Specifications	03
Symbols	03
Technical data	04
Characteristic curves	04
Unit dimensions	05

Features

- Sandwich plate valve
- Porting pattern to DIN 24 340 form A and ISO4401
- 3 adjustment elements:
 - Screw with locknut and protective cap
 - Two insert pressure relief valve
 - Rotary knob with scale
- For limiting the main or pilot fluid flow of 2 actuator connections
- For meter-in or meter-out control

Function and configuration

Z2FS6 type valve is a double throttle check valve with sandwich plate structure. It is used for the main or pilot flow limitation of one or two actuator ports. In the opposite direction, fluid flows freely through the check valve.

For meter-in control fluid passes from port A1 to port A2 via the throttling point (1), which is made up of the valve seat (2) and the throttling spool (3). The throttling spool (3) is axially adjustable through the adjustment screw (4).

Fluid flows from A2 to A1, valve seat (2) is opened against spring (5) and valve acts as check valve. Depending on the installation position, the throttling effect may be arranged as a meter-in or a meter-out control.

Main flow limitation(Z2FS6.../2Q)

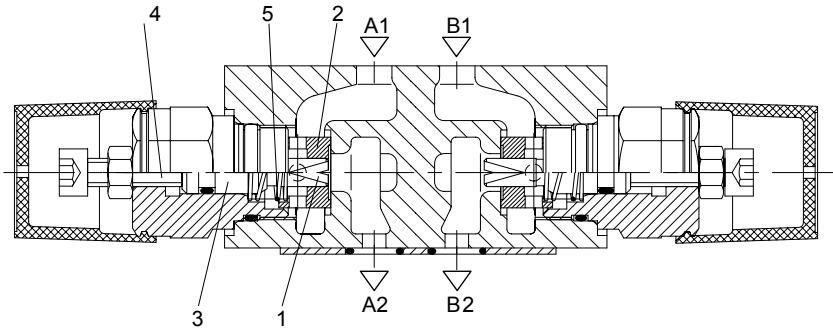
In order to change the velocity of an actuator (limiting of main flow), the double throttle/check valve is installed between the directional valve and the sub-plate.

Pilot flow limitation(Z2FS6.../1Q)

In order to limit the pilot flow, the double throttle/check valve is installed between the main valve and the pilot valve.

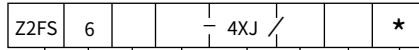
04

Type: Z2FS6-2-4XJ/2Q



This installed position is for meter-in control

Specification

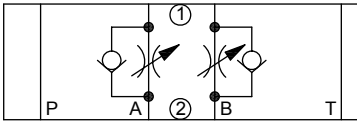


Modular restrictive check valve	
Nominal size 6	=6
Throttle/check valve ports A and B	= -
Throttle/check valve port A	= A
Throttle/check valve port B	= B
Screw with locknut and protective cap	= 2
Lockable rotary knob with scale	= 3
Rotary knob with scale	= 7

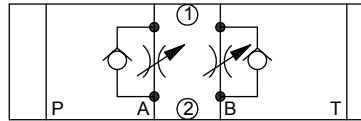
Further details in clear text	
No code =	NBR seals
V =	FKM seals
1Q =	With fine control
2Q =	Standard version
4XJ =	Series 40J to 49J (40J to 49J: unchanged installation and connection dimensions)

Symbols (① = valve side, ② = sub-plate side)

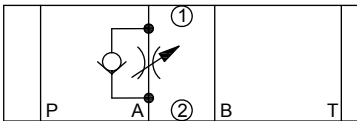
Type:Z2FS6-...-4XJ/ (meter-in control)



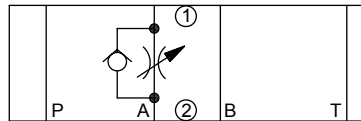
Type:Z2FS6-...-4XJ/ (meter-out control)



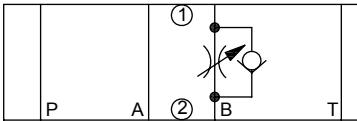
Type:Z2FS6A-...-4XJ/ (meter-in control)



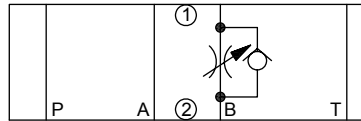
Type:Z2FS6A-...-4XJ/ (meter-out control)



Type:Z2FS6B-...-4XJ/ (meter-in control)



Type:Z2FS6B-...-4XJ/ (meter-out control)



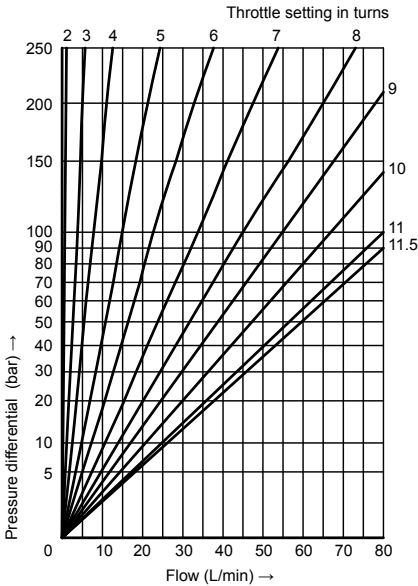
Technical data

Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80(FKM seal)
Viscosity range	mm ² /s	10 to 800
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406
Max. working pressure	bar	315
Max. flow-rate	L/min	80
Weight	kg	Approx.1.0

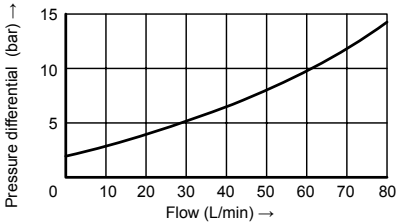
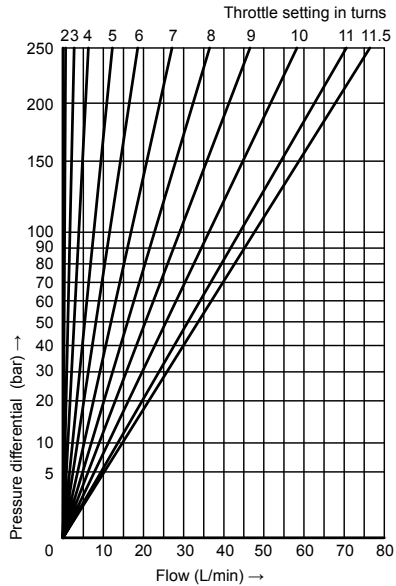
Characteristic curves

(Measured at t=40°C ±5°C , using HLP46)

ΔP-Q_v curve-Z2FS6-...-4XJ/2QV



ΔP-Q_v curve-Z2FS6-...-4XJ/1QV

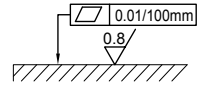
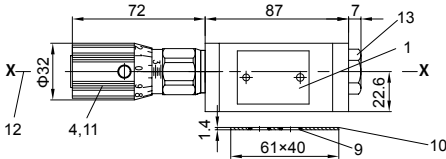


Through check valve (throttle closed)

Unit dimensions

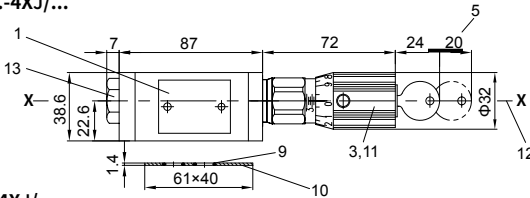
(Dimensions in mm)

Type: Z2FS6A-...-4XJ/ ...

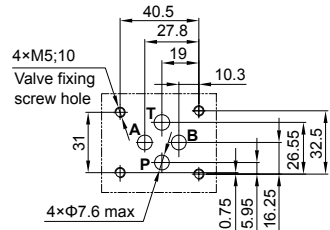
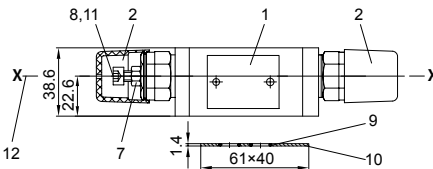


Requirement for mounting surface

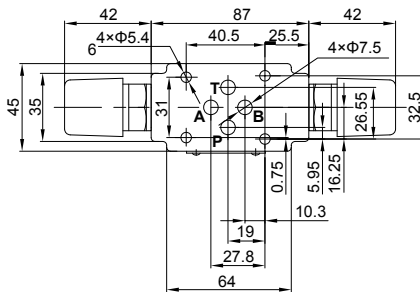
Type: Z2FS6B-...-4XJ/...



Type: Z2FS6-...-4XJ/ ...



Dimensions of mounting surface



- 1 Nameplate
- 2 Adjustment element "2"
- 3 Adjustment element "3"
- 4 Adjustment element "7"
- 5 Space required to remove the key
- 6 Valve fixing holes
- 7 Lockable nut S=10
- 8 Internal hexagon screw S=5
- 9 O-rings 9.25×1.78 (Port A, B, P, T)
- 10 O-ring plate
- 11 For all adjustment elements:
turn anti-clockwise=increases flow
turn clockwise=decreases flow
- 12 To change from meter-in to meter-out,
rotate the unit around the 'X-X' axis
- 13 End cap S=22



Z2FS...type Modular Restrictive Check Valve

Z2FS...30J...type

Sizes 6, 10, 16, 22
Max. Working Pressure: 315 bar
Max. Flow: 360 L/min



Contents

Function and configurations	02
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Technical data	04
Characteristic curves	05
Unit dimensions	06-07

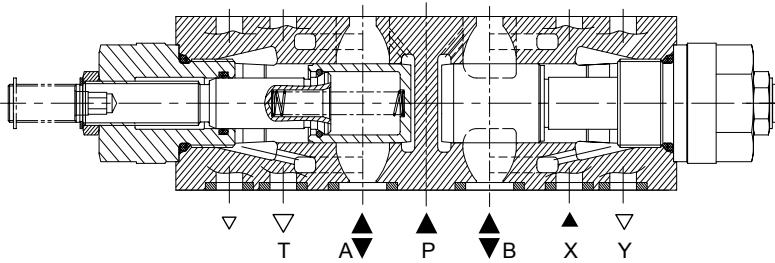
Features

- Sandwich plate valve
- Porting pattern to DIN 24 340 form A and ISO4401
- For limiting the main or control fluid flow of 2 actuator connections
- 3 adjustment elements:
 - Lockable rotary knob with scale
 - Spindle with internal hexagon and scale
 - Rotary knob with scale
- For meter-in or meter-out control

Function and configuration

Z2FS type valve is a modular restrictive check valve with sandwich plate structure.

It is used to control the flow by changing the throttling. In the opposite direction, fluid flows freely through the check valve. For Z2FS10, depending on the installation position, the throttling effect may be arranged as a meter-in or a meter-out control. While for Z2FS16 and 22, depending on the model (S or S2) throttling may take place in either meter-in or meter-out, and the two operating oil chambers are connected.

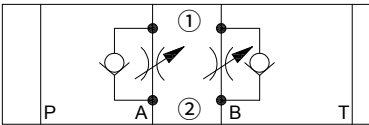


Structure chart of double throttle/Check Valve

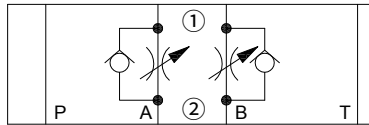
Symbols (① = valve side, ② = sub-plate side)

size:6

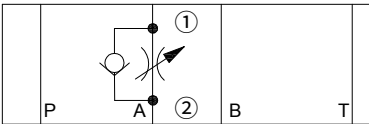
Type:Z2FS6-30J/ (meter-in control)



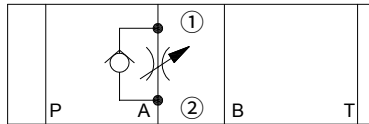
Type:Z2FS6-30J/ (meter-out control)



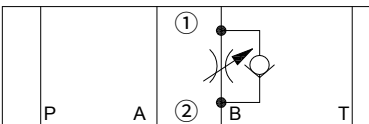
Type:Z2FS6A-30J/ (meter-in control)



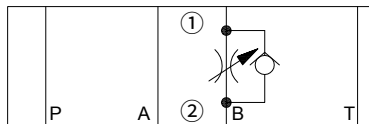
Type:Z2FS6A-30J/ (meter-out control)



Type:Z2FS6B-30J/ (meter-in control)



Type:Z2FS6B-30J/ (meter-out control)

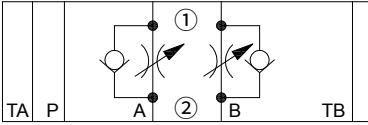


Symbols

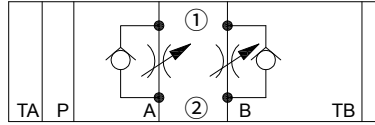
(① =valve side, ② = sub-plate side)

size:10

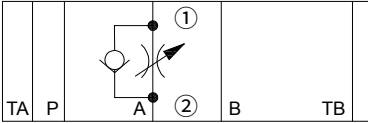
Type:Z2FS10-30J/ (meter-in control)



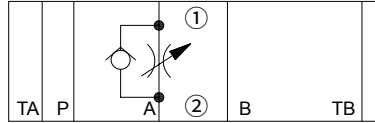
Type:Z2FS10-30J/ (meter-out control)



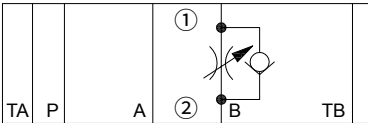
Type:Z2FS10A-30J/ (meter-in control)



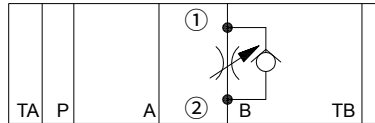
Type:Z2FS10A-30J/ (meter-out control)



Type:Z2FS10B-30J/ (meter-in control)



Type:Z2FS10B-30J/ (meter-out control)

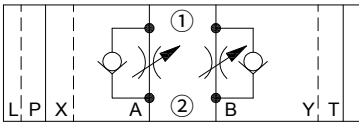


Symbols

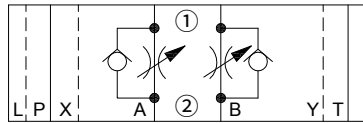
(① =valve side, ② = sub-plate side)

size:16, 22

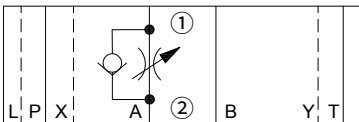
Type:Z2FS...-30J/ (meter-in control)



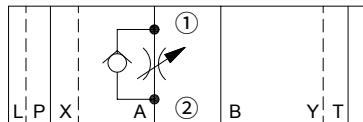
Type:Z2FS...-30J/ (meter-out control)



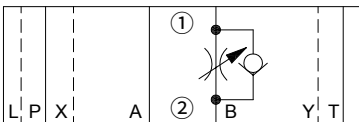
Type:Z2FS...A-30J/ (meter-in control)



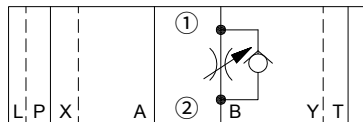
Type:Z2FS...A-30J/ (meter-out control)



Type:Z2FS...B-30J/ (meter-in control)



Type:Z2FS...B-30J/ (meter-out control)



04

Specification

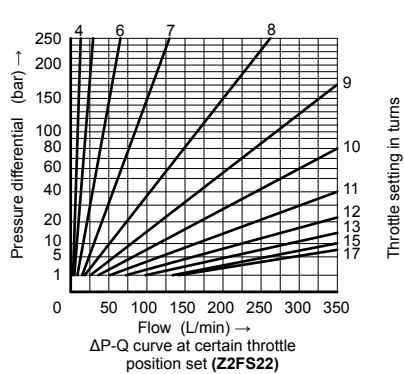
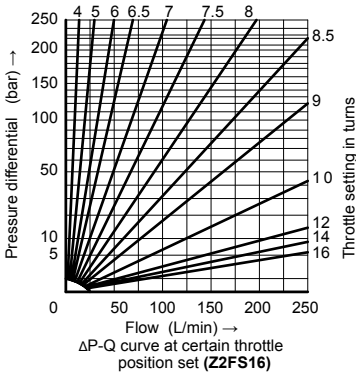
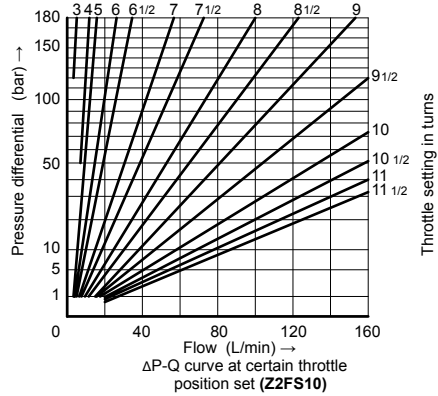
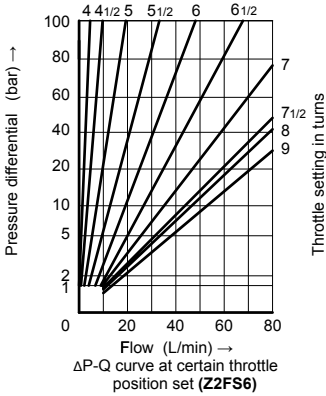
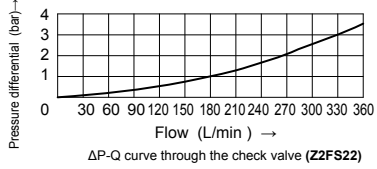
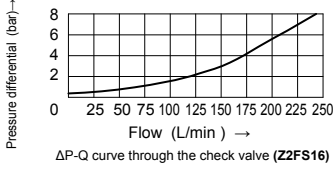
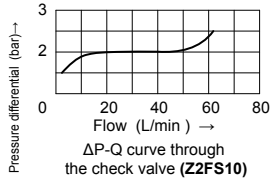
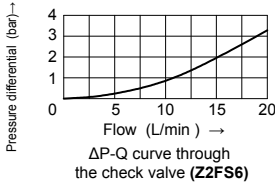
Z2FS				30J		*
Modular Restrictive check valve						Further details in clear text
Nominal size 6	=6					No code = NBR seals V = FKM seals
Nominal size 10	=10					
Nominal size 16	=16					
Nominal size 22	=22					
Throttle/check valve ports A and B = -						No code= Meter-in /meter-out control
Throttle/check valve port A = A						S = Meter-in contro
Throttle/check valve port B = B						S2 = Meter-out control
30J Series				=30J		

Technical data

Installation position	Optional
Flow direction	One direction throttle, return through the check valve by another direction
Fluid	Mineral oil suitable for NBR and FKM seal, Phosphate ester for FKM seal
Fluid temperature range °C	-20 to +80
Degree of contamination	Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406
Viscosity range mm ² /s	10 to 800
Max.operating pressure bar	to 350
Nominal size	6 10 16 22
Weight kg	0.9 3.1 4.7 8

Characteristic curves

(Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

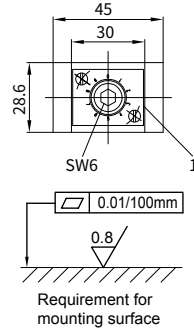
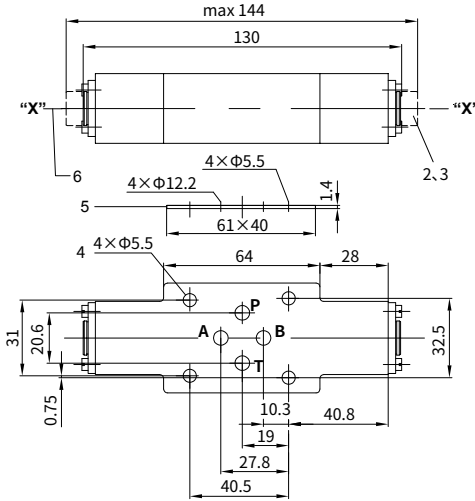


04

Unit dimensions:

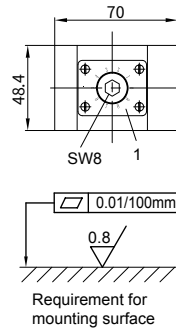
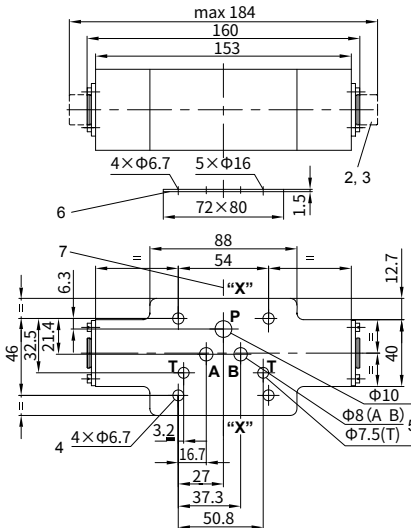
(Dimensions in mm)

• Outline dimension of Modular Restrictive Check Valve Type Z2FS6



- 1 Nameplate
- 2 Adjustable bolt
- 3 Turn anti-clockwise=increases flow, turn clockwise=decreases flow
- 4 Valve fixing holes
- 5 O-ring plate
- 6 To change from meter-in to meter-out, rotate the unit around the "X - X" axis

• Outline dimension of Modular Restrictive Check Valve Type Z2FS10

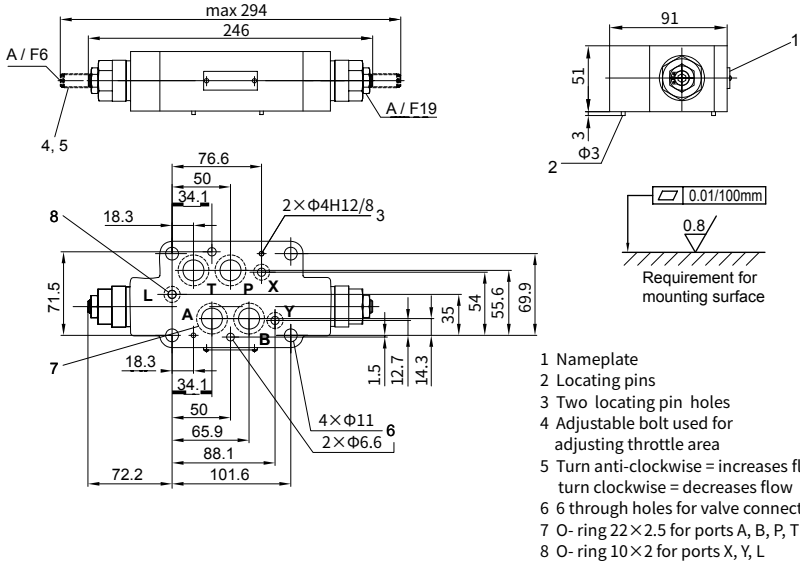


- 1 Nameplate
- 2 Adjustable bolt
- 3 Turn anti-clockwise = increases flow, turn clockwise = decreases flow
- 4 Valve fixing holes
- 5 Port (A, B, P, T)
- 6 O-ring plate
- 7 To change from meter-in to meter-out, rotate the unit around the "X - X" axis

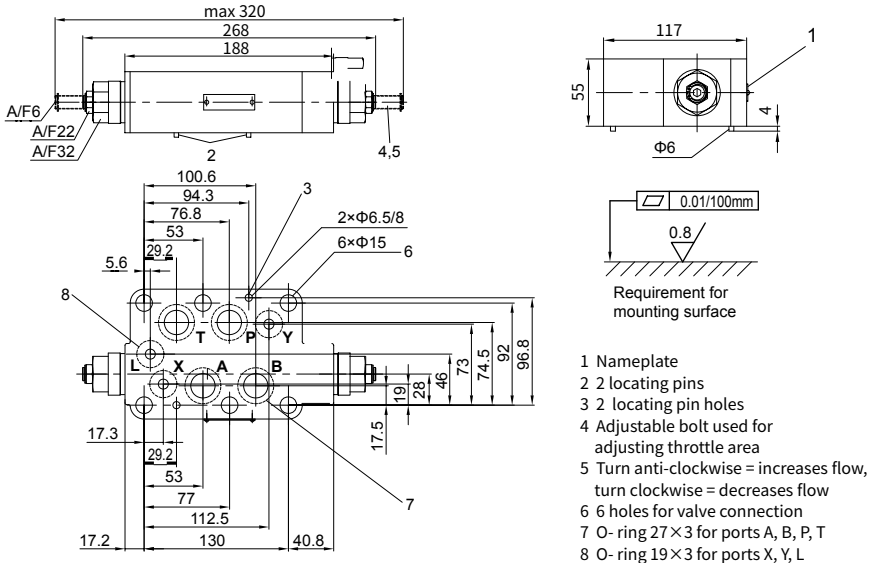
Unit dimensions:

(Dimensions in mm)

• Outline dimension of Modular Restrictive Check Valve Type Z2FS16



• Outline dimension of Modular Restrictive Check Valve Type Z2FS22





Z2S10...type Modular Hydraulic Operated Check Valve



Z2S10...3XJ...type

Size 10
Max. Working Pressure: 315 bar
Max. Flow: 120 L/min

Contents

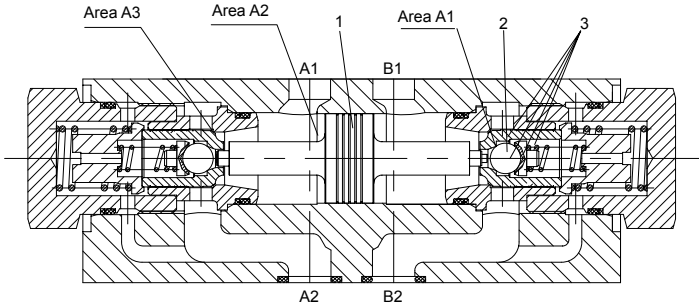
Function and configuration	02
Symbols	02
Specification	03
Technical data	03
Characteristic curves	03
Unit dimensions	04

Features

- Porting pattern to DIN 24 340
- Leakage-free closure for one or two ports
- Sandwich plate valve, for use in vertical stacking assemblies
- 4 cracking pressures, optional

Function and configuration

Z2S10 type valve is a releasable check valve in sandwich plate design. It is used for the leakage-free closure of one or two ports, also in case of long periods of time. Fluid flows freely from A1 to A2 or B1 to B2. Flow in the opposite direction is blocked. When fluid flows from A1 to A2, the spool (1) is pressurised and is pushed to the right, thereby opening the ball poppet valve (2) which then opens the check valve (3). In order to make the reliable closure of the two check valves in the neutral position, the service ports A1 and B1 must be connected to tank.

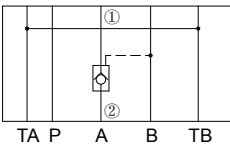


Z2S10..3XJ/...modular hydraulic check valve

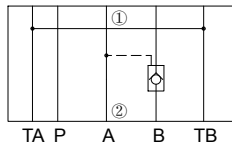
1 Spool 2 Ball poppet valve 3 Check valve

Symbols (① = valve side, ② = sub-plate side)

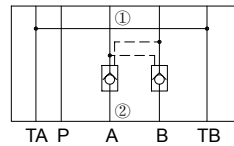
Z2S10A..3XJ/...



Z2S10B..3XJ/...



Z2S10..3XJ/...



Specification

Z2S	10			3XJ	*
-----	----	--	--	-----	---

Modular Hydraulic check valve

Nominal size 10 =10

Leak-free closure in channels A and B = -
 Leak-free closure in channel A = A
 Leak-free closure in channel B = B

Further details in clear text

No code = NBR seals
 V = FKM seals

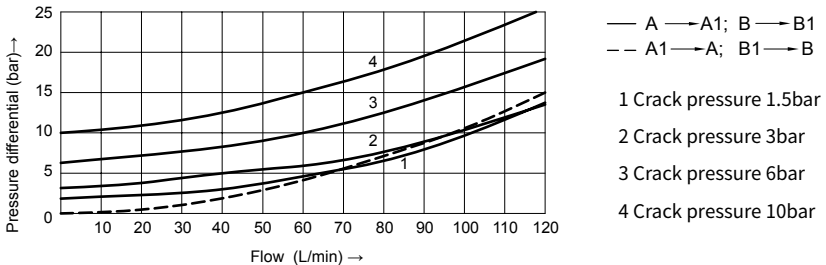
3XJ= Series 30J to 39J
 (30J to 39J: unchanged installation and connection dimensions)

1 = Crack pressure 1.5bar
 2 = Crack pressure 3bar
 3 = Crack pressure 6bar
 4 = Crack pressure 10bar

Technical data

Fluid	Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal	
Degree of contamination	Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)
Viscosity range	mm ² /s	2.8 to 500
Operating pressure	bar	315
Max.flow-rate	L/min	120
Flow direction	See symbol	
Crack pressure(free flow direction)	bar	1.5, 3, 6, 10
Area ratio	A1/A2=1/13.4 A3/A2=1/2.68 (Please refer to page "02/04" for section drawing)	
Weight	kg	3

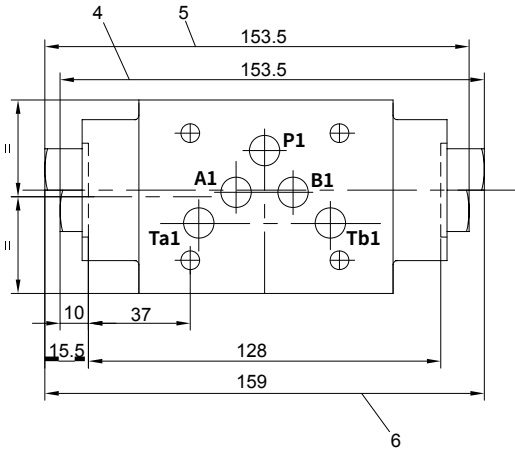
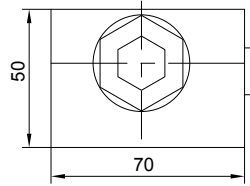
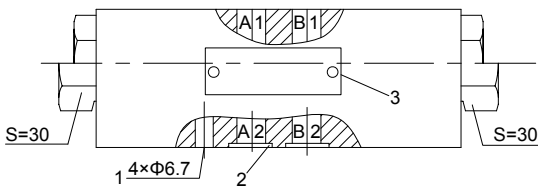
Characteristic curves (Measured at t=40°C ±5°C , using HLP46)



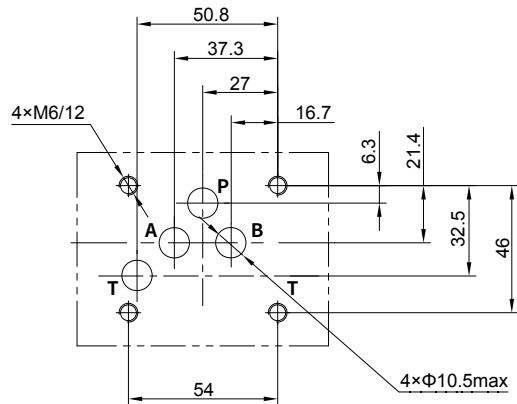
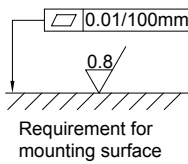
Unit dimensions

(Dimensions in mm)

01



- 1 4 through holes for valve mounting screws
- 2 O-rings 12×2 for ports A, B, T
- 3 Name plate
- 4 Check valve in port B
- 5 Check valve in port A
- 6 Check valve in both port A and B





Z2S16...type Modular Hydraulic Operated Check Valve



Z2S16...5XJ...type

Size 16
Max. Working Pressure: 315 bar
Max. Flow: 300 L/min

Contents

Function and configuration	02
Symbols	02
Specification	03
Technical data	03
Characteristic curves	03
Unit dimensions	04

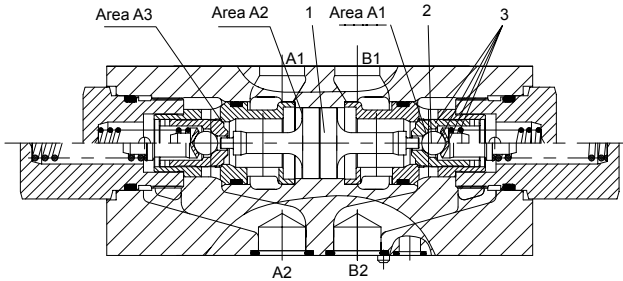
Features

- Porting pattern to DIN 24 340
- Leakage-free closure for one or two ports
- Sandwich plate valve,
for use in vertical stacking assemblies
- 4 cracking pressures, optional

Function and configuration

Z2S16 type valve is a releasable check valve in sandwich plate design. It is used for the leakage-free closure of one or two service ports, also in case of long periods of time. Free flow occurs from A1 to A2 or B1 to B2. Flow in the opposite direction is blocked.

When fluid flows from A1 to A2, the spool (1) is pressurised and is pushed to the right, thereby opening the ball poppet valve (2) which then opens the check valve (3). Flow in the opposite direction is blocked.

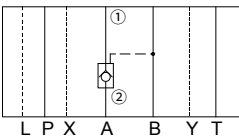


Z2S16..5XJ/...modular hydraulic check valve

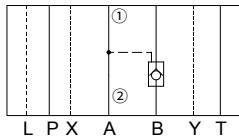
1 Spool 2 Ball poppet valve 3 Check valve

Symbols (① =valve side, ② = sub-plate side)

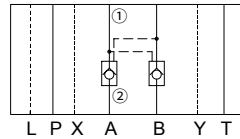
Z2S16A..5XJ/...



Z2S16B..5XJ/...



Z2S16..5XJ/...



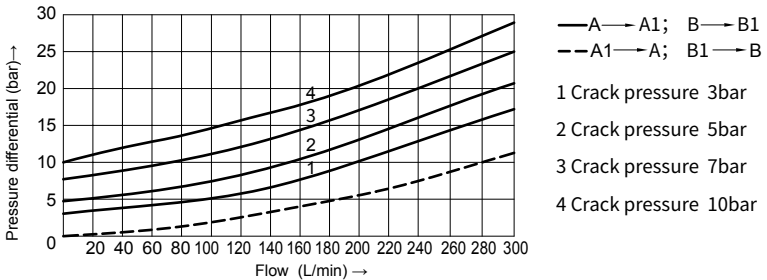
Specification

Z2S	16			5XJ	*
Modular Hydraulic check valve		Further details in clear text			
Size 16	=16	No code =		NBR seals	
Leak-free closure in channels A and B = -		V =		FKM seals	
Leak-free closure in channel A = A		5XJ= Series 50J to 59J			
Leak-free closure in channel B = B		(50J to 59J: unchanged installation and connection dimensions)			
		1 =		Crack pressure 3bar	
		2 =		Crack pressure 5bar	
		3 =		Crack pressure 7.5bar	
		4 =		Crack pressure 10bar	

Technical data

Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)
Viscosity range	mm ² /s	2.8 to 500
Operating pressure	bar	315
Max.flow-rate	L/min	300
Flow direction		See symbols
Crack pressure(free flow direction)	bar	3, 5, 7.5, 10
Area ratio		A1/A2=1/11.8 A3/A2=1/2.8 (Please refer to page"02/04"for section drawing)
Weight	kg	6.8

Characteristic curves (Measured at t=40°C ±5°C , using HLP46)





Z2S22...type Modular Hydraulic Operated Check Valve



Z2S22...5XJ...type

Size 22
Max. Working Pressure: 315 bar
Max. Flow: 450 L/min

Contents

Function and configurations	02
Symbols	02
Specifications	03
Technical data	03
Characteristic curves	03
Unit dimensions	04

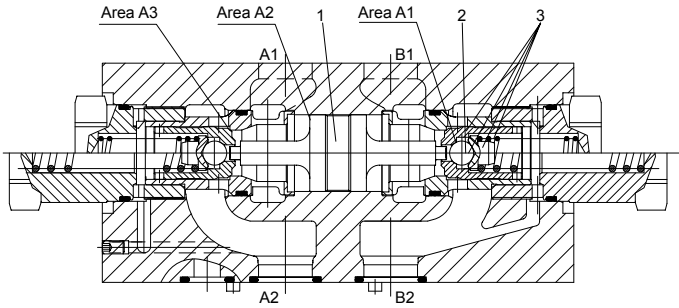
Features

- Porting pattern confirms to DIN 24 340
- Leakage-free closure for one or two ports
- Sandwich plate valve, for use in vertical stacking assemblies
- 4 cracking pressures, optional

Function and configuration

Z2S22 type valve is a releasable check valve in sandwich plate design. It is used for the leakage-free closure of one or two service ports, even for long periods of time. Free flow occurs from A1 to A2 or B1 to B2. Flow in the opposite direction is blocked. When fluid flows from A1 to A2, the spool (1) is pressurised and is pushed to the right, thereby opening the ball poppet valve (2) which then opens the check valve (3).

In order to make reliable closure of the two check valves in the central position, the service ports A1 and B1 of the directional valve must be connected to returning line .

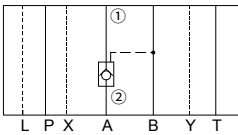


Z2S22..5XJ/...check valve, hydraulic pilot operated

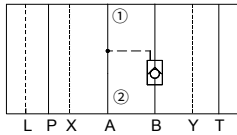
1 Spool 2 Ball poppet valve 3 Check valve

Symbols (① =valve side, ② = sub-plate side)

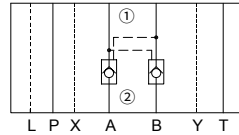
Z2S22A..5XJ/...



Z2S22B..5XJ/...



Z2S22..5XJ/...



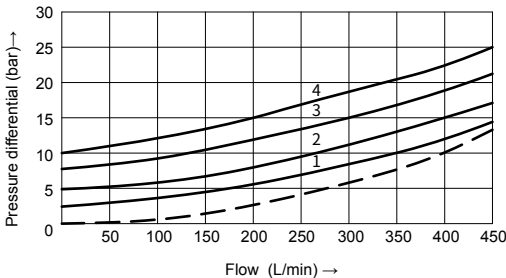
Specification

Z2S	22			5XJ	/	*
Modular Hydraulic check valve		Further details in clear text				
Nominal size 22 = 22		No code = NBR seals V = FKM seals				
Check valve in channel A and B = -		5XJ= Series 50J to 59J (50J to 59J: unchanged installation and connection dimensions)				
Check valve in channel A = A		1 = Cracking pressure 3bar				
Check valve in channel B = B		2 = Cracking pressure 5bar				
		3 = Cracking pressure 7.5bar				
		4 = Cracking pressure 10bar				

Technical data

Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406
Fluid temperature rang	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)
Viscosity range	mm ² /s	2.8 to 500
Operating pressure	bar	315
Max.flow-rate	L/min	450
Flow direction		See symbol Crack
pressure(free flow direction)	bar	3, 5, 7.5, 10
Area ratio		A1/A2=1/13.6, A3/A2=1/2.8 (Please refer to page "02/04" for section drawing)
Weight	kg	12.8

Characteristic curves (Measured at t=40°C ±5°C , using HLP46)

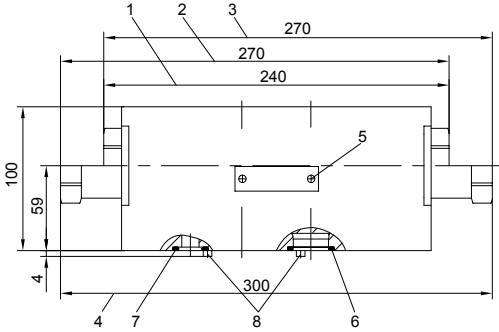


- A → A1; B → B1
- - A1 → A; B1 → B
- 1 Cracking pressure 3bar
- 2 Cracking pressure 5bar
- 3 Cracking pressure 7.5bar
- 4 Cracking pressure 10bar

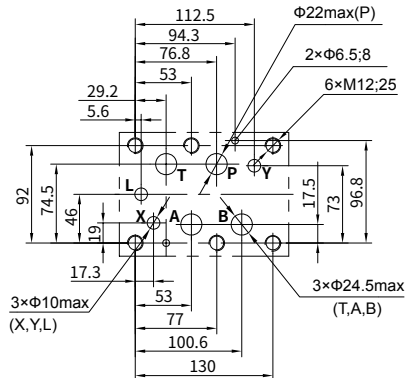
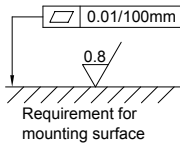
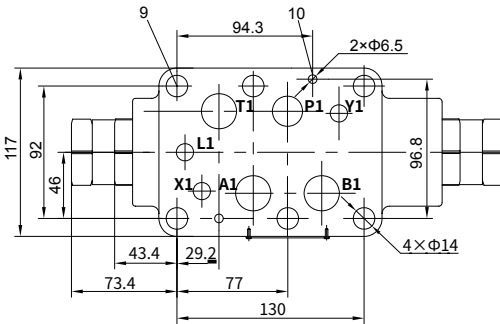
Unit dimensions

(Dimensions in mm)

01



- 1 Valve with version 1 or 2 cracking pressure, check valve in port A and/or port B
- 2 Valve with version 3 or 4 cracking pressure, check valve in port B.
- 3 Valve with version 3 or 4 cracking pressure, check valve in port A.
- 4 Valve with version 3 or 4 cracking pressure, check valve in port A and B
- 5 Name plate
- 6 O-rings
27×3 for ports A, B, P, T
- 7 O-rings
19×3 for ports X, Y, L
- 8 Locating pin
- 9 Fixing holes
- 10 Locating holes





ZDB6...type Modular Relief Valve



ZDB/ Z2DB 6..4XJ...type

Size 6
Max. Working Pressure: 315 bar
Max. Flow: 60 L/min

Contents

Function and configuration	02
Symbols	02
Specification	03
Technical data	03
Characteristic curves	03
Unit dimensions	04-05

Features

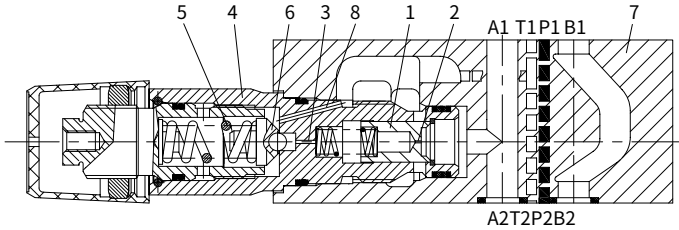
- Sandwich plate valve
- Porting pattern to DIN 24 340 form A and ISO 4401
- For threaded connection and sub-plate mounting
- 4 pressure ranges
- 5 circuit options
- 4 adjustment elements:
 - Rotary knob
 - Adjustable bolt with protective cap
 - Lockable rotary knob with scale
 - Rotary knob with scale

Function and configuration

ZDB and Z2DB type valve is pilot operated pressure relief valve and of sandwich plate design. It is used to limit the pressure in a hydraulic system. It consists of the valve housing (7), together with one or two pressure relief valve cartridges (4). The system pressure is set by the adjustment element (4).

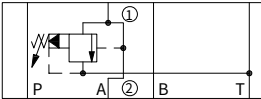
At static position, the valves are closed. Pressure in port A acts on the spool (1). Pressure fluid flows through orifice (2) to the spring loaded side of the spool (1) and through orifice (3) to the pilot poppet (6). If the pressure in port A rises beyond the value setting at spring (5), the pilot poppet (6) opens. Fluid can flow from the spring loaded side of spool (1), orifice (3), and channel (8) into port T. The pressure drop moves spool (1) to open the connection from A to T, while the setting pressure at spring (5) is maintained.

Pilot oil returns from the two spring chambers is taken externally via port T.

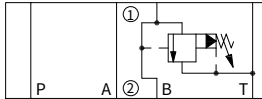


Symbols

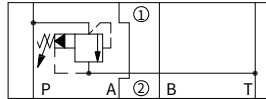
Type ZDB6VA...



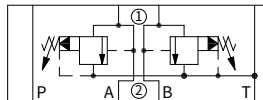
Type ZDB6VB...



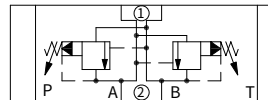
Type ZDB6VP...



Type ZDB6VC...



Type ZDB6VD...



① = valve side

② = sub-plate side

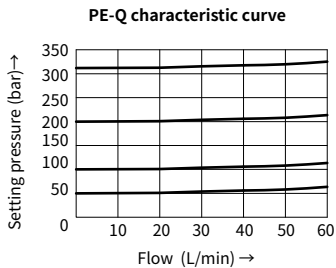
Specification

Z	DB	6	- 4XJ /	★
Sandwich plate = Z				Further details in clear text
Only applies to versions VC and VD: With 2 pressure relief valve cartridges =2				No code = NBR seals V = FKM seals
Pressure relief valve = DB				50 = Pressure adjustable up to 50bar 100 = Pressure adjustable up to 100bar 200 = Pressure adjustable up to 200bar 315 = Pressure adjustable up to 315bar
Nominal size 6 =6				4XJ = Series 40J to 49J (40J to 49J: unchanged installation and connection dimensions)
Relief function from → to:				
A → T				=VA
P → T				=VP
B → T				=VB
A → T and B → T				=VC
A → B and B → A				=VD
				1= Rotary knob 2= Adjustable bolt with protective cap 3= Lockable rotary knob with scale 7= Rotary knob with scale

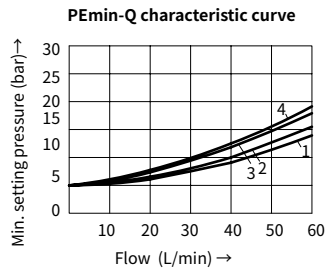
Technical data

Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)
Viscosity range	mm ² /s	10 to 800
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15 , ISO4406
Max.operating pressure	bar	to 315
Max.adjustable pressure	bar	50;100;200;315
Max. flow-rate	L/min	60
Weight	Type ZDB6 kg Type Z2DB6 kg	Approx.1.2 Approx.1.9

Characteristic curves (Measured at t=40°C ±5°C , using HLP46)



The curves are measured at zero back pressure.

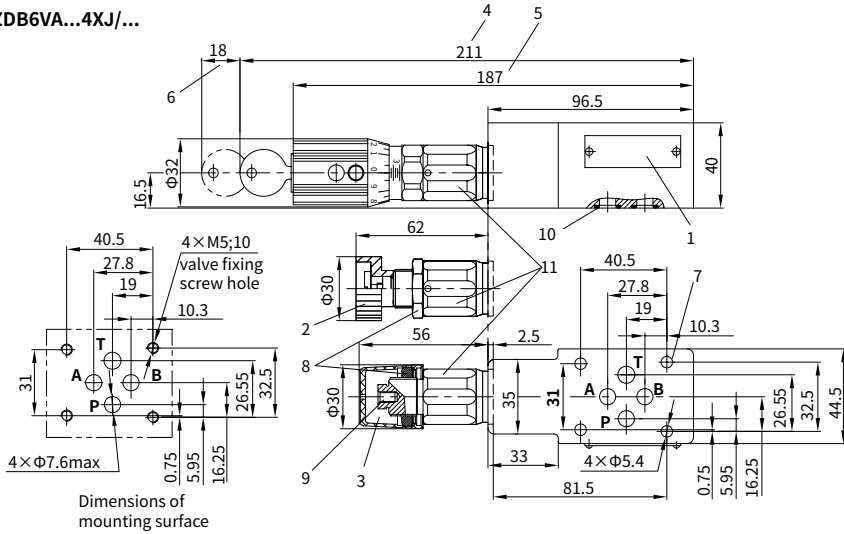


- | | |
|---------------|----------------------|
| 1. VD(A to B) | 3. VB and VC |
| 2. VA | 4. VP and VD(B to A) |

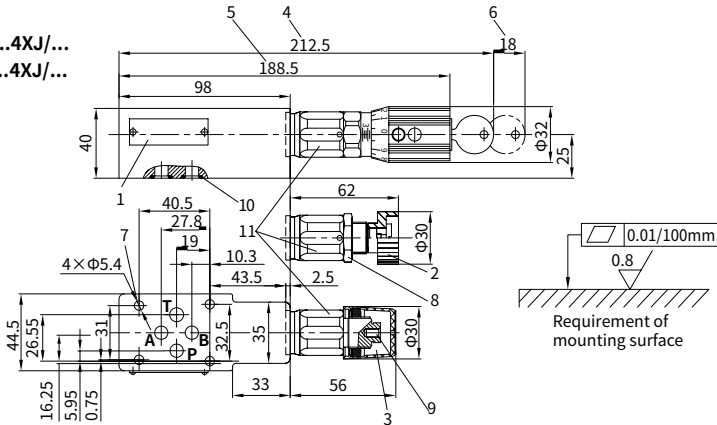
Unit dimensions

(Dimensions in mm)

Type ZDB6VA...4XJ/...



Type ZDB6VB...4XJ/... Type ZDB6VP...4XJ/...

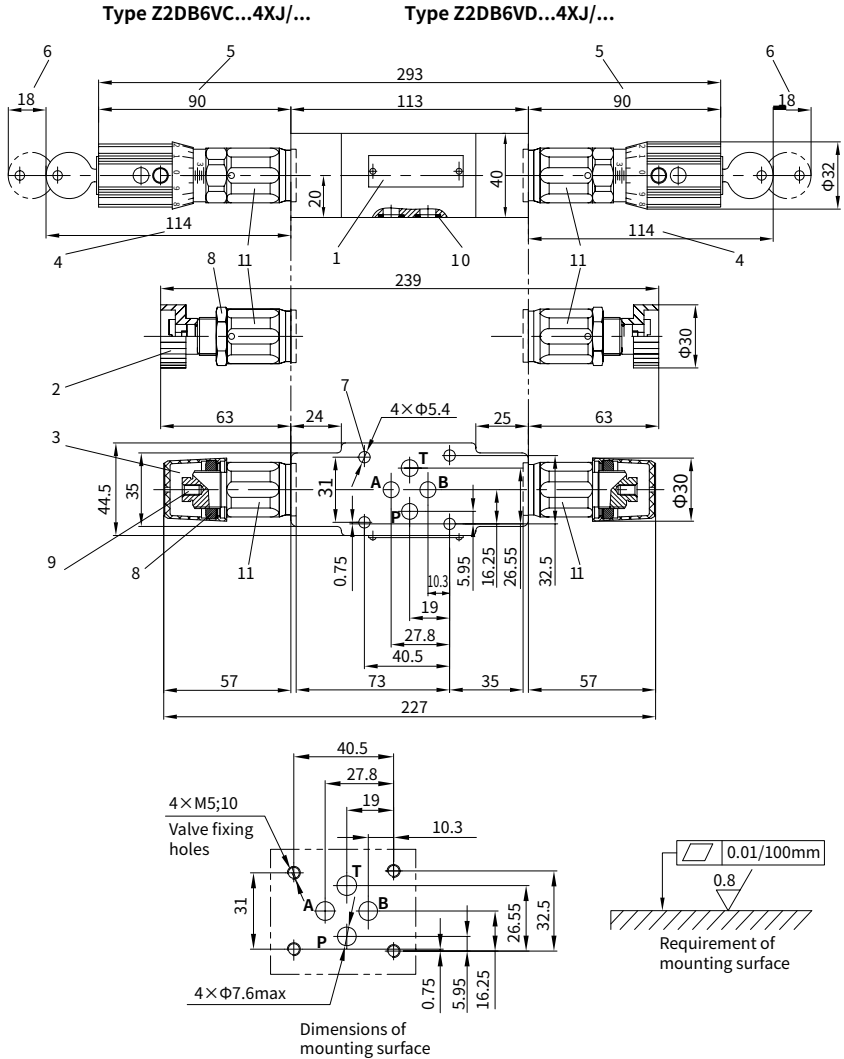


- 1 Nameplate
- 2 Adjustment element "1"
- 3 Adjustment element "2"
- 4 Adjustment element "3"
- 5 Adjustment element "7"
- 6 Space required to remove the key

- 7 Valve fixing holes
 - 8 Nut for locking S=24
 - 9 External hexagon screw S=10
 - 10 O-ring 9.25 × 1.78(A2,B2,P2,T2)
 - 11 External hexagon S=24
- Tightening torque $M_A = 50 \text{ Nm}$

Unit dimensions

(Dimensions



- 1 Nameplate
- 2 Adjustment element "1"
- 3 Adjustment element "2"
- 4 Adjustment element "3"
- 5 Adjustment element "7"
- 6 Space required to remove the key

- 7 Valve fixing holes
- 8 Lockable nut S=24
- 9 External hexagon screw S=10
- 10 O-ring 9.25×1.78 (A2,B2,P2,T2)
- 11 External hexagon S=24, Tightening torque $M_A=50 Nm$



ZDB10...type Modular Relief Valve



ZDB / Z2DB 10..4XJ...type

Size 10
Max. Working Pressure: 315 bar
Max. Flow: 100 L/min

Contents

Function and configuration	02
Symbols	02
Specification	03
Technical data	03
Characteristic curves	03
Unit dimensions	04-06

Features

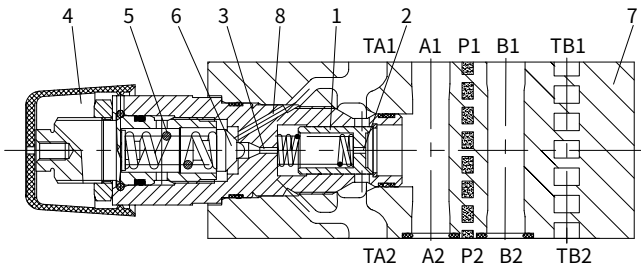
- Sandwich plate valve
- Porting pattern to DIN 24 340 form A and ISO 4401
- For threaded connection, and sub-plate mounting
- 4 pressure ratings
- 6 circuit options
- With one or two pressure relief cartridges
- 4 adjustment elements:
 - Rotary knob
 - Adjustable bolt with protective cap
 - Lockable rotary knob with scale
 - Rotary knob with scale

Function and configuration

ZDB and Z2DB type pressure valve is pilot operated relief valve in sandwich plate design. It is used for limiting a system pressure. It consists of the housing (7), together with one or two pressure relief valves cartridges. And the system pressure is set by means of relief valve(4).

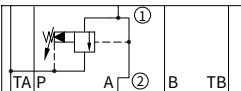
In the initial position, the valves are closed. Pressure in port A acts on the spool (1). Pressure fluid flows through orifice (2) to the spring loaded side of the spool (1) and through orifice (3) to the pilot poppet(6). If the pressure in port A rises beyond the value setting at spring (5), the pilot poppet (6) opens. Fluid can flow from the spring loaded side of spool (1), orifice (3), and channel (8) into port T. The pressure drop moves spool (1) to open the connection from A to T, while the setting pressure at spring (5) is maintained. Pilot oil returns from the two spring chambers via port T externally.

Type ZDB10VA2-4XJ/...

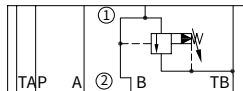


Symbols

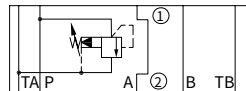
Type ZDB10VA..



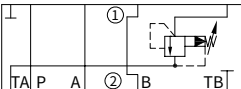
Type ZDB10VB..



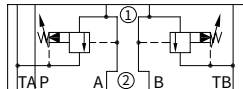
Type ZDB10VP..



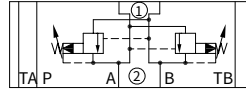
Type ZDB10VT..



Type Z2DB10VC..



Type Z2DB10VD..



① = valve side ② = sub-plate side

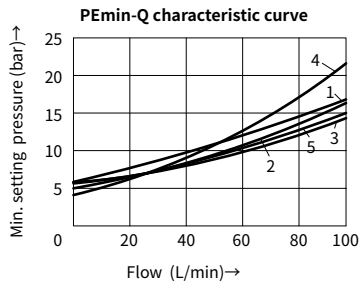
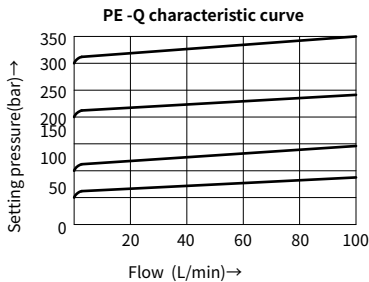
Specifications

Z	DB	10	- 4XJ /	*
Sandwich plate = Z				Further details in clear text
Only applies to models VC and VD: With 2 pressure relief valve cartridges = 2				No code = NBR seals V = FKM seals
Pressure relief valve = DB				50 = Pressure adjustable up to 50bar 100 = Pressure adjustable up to 100bar 200 = Pressure adjustable up to 200bar 315 = Pressure adjustable up to 315bar
Nominal size 10 = 10				4XJ = Series 40J to 49J (40J to 49J: unchanged installation and connection dimensions)
Relief function from → to:				1 = Rotary knob 2 = Adjustable bolt with protective cap 3 = Lockable rotary knob with scale 7 = Rotary knob with scale
A → TA =VA				
P → TA =VP				
TB1 → TA2 =VT				
B → TB =VB				
A → TA and B → TB =VC				
A → B and B → A =VD				

Technical data

Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal	
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)	
Viscosity range	mm ² /s	10 to 800	
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	
Max.operating pressure	bar	to 315	
Max.adjustable pressure	bar	50;100;200;315	
Max. flow-rate	L/min	100	
Weight	Type ZDB10	kg	Approx.2.7
	Type Z2DB10	kg	Approx.3.1

Characteristic curves (Measured at t=40°C ±5°C, using HLP46)



The curves were measured at zero back pressure.

- 1. VD(A to B)
- 2. VA
- 3. VB and VC
- 4. VP and VD(B to A)

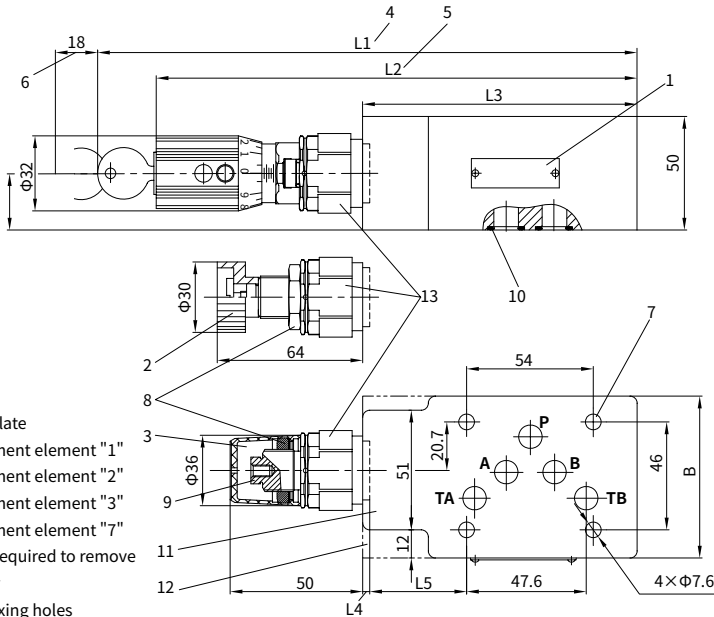
Unit dimensions

(Dimensions in mm)

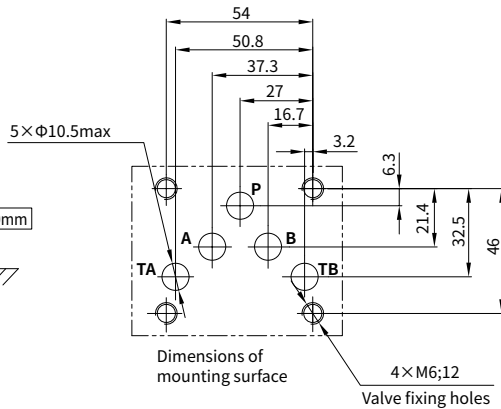
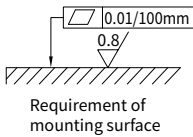
Type ZDB10VA...4XJ../..

Type ZDB10VP...4XJ../..

Type ZDB10VT...4XJ../..



- 1 Nameplate
 - 2 Adjustment element "1"
 - 3 Adjustment element "2"
 - 4 Adjustment element "3"
 - 5 Adjustment element "7"
 - 6 Space required to remove the key
 - 7 Valve fixing holes
 - 8 Lockable nut S=24
 - 9 External hexagon screw S=10
 - 10 O-ring 12×2 (A2,B2,P2,TA2,TB2)
 - 11 Type ZDB10 VA and VP version
 - 12 Type ZDB10 VT version
 - 13 External hexagon S=30
- Tightening torque $M_t=50\text{Nm}$

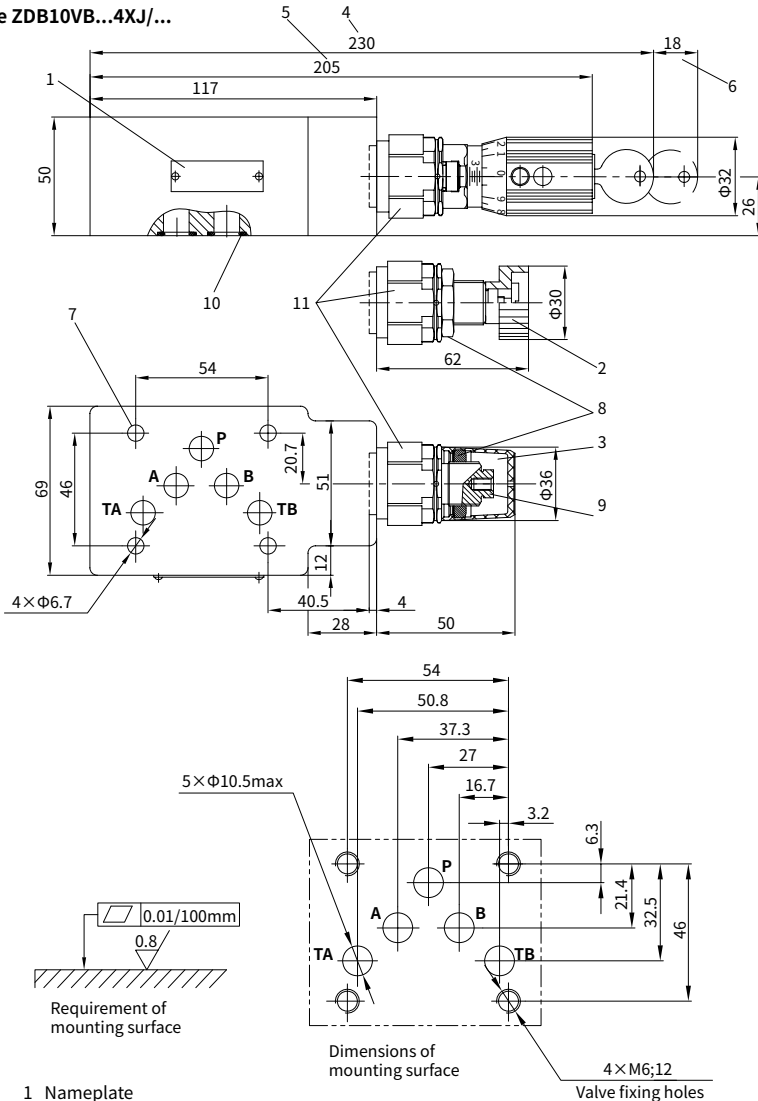


Type	B	L1	L2	L3	L4	L5
VA and VP	69	230	205	117	4	40.5
VT	70	218	193	105	2	27.8

Unit dimensions

(Dimensions in mm)

Type ZDB10VB...4XJ/...



1 Nameplate

2 Adjustment element "1"

3 Adjustment element "2"

4 Adjustment element "3"

5 Adjustment element "7"

6 Space required to remove the key

7 Valve fixing holes

8 Lockable nut S=24

9 External hexagon screw S=10

10 O-ring 12 x 2 (A2, B2, P2, TA2, TB2)

11 External hexagon S=30

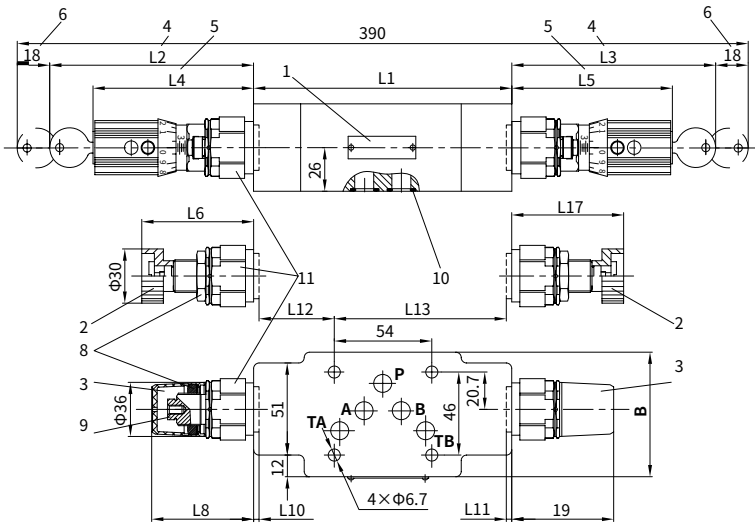
Tightening torque $M_A=50\text{Nm}$

Unit dimensions

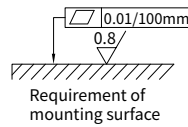
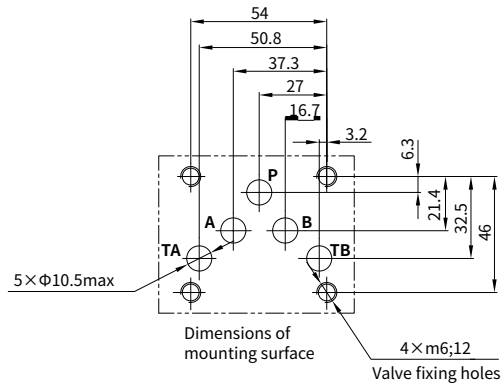
(Dimensions in mm)

Type Z2DB10VC...4XJ/..

Type Z2DB10VD...4XJ/..



- 1 Nameplate
- 2 Adjustment element "1"
- 3 Adjustment element "2"
- 4 Adjustment element "3"
- 5 Adjustment element "7"
- 6 Space required to remove the key
- 7 Valve fixing holes
- 8 Lockable nut S=24
- 9 External hexagon bolt S=10
- 10 O-ring 12×2 (A2,B2,P2,TA2,TB2)
- 11 External hexagon S=30
Tightening torque $M_A = 50 \text{ Nm}$



Type	B	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13
VC	69	123	115	116	90	91	64	65	52	53	2	1	32.5	87.5
VD	70	132	111	111	86	86	60	60	48	48	6	6	33	87



ZDB type... Modular Relief Valve



ZDB /Z2DB...4XJ...type

Sizes 16, 22
Max. Working Pressure: 315 bar
Max. Flow: 250 L/min

Contents

Function and configuration	02
Symbols	02
Specification	03
Technical data	03
Characteristic curves	03
Unit dimensions	04-09

Features

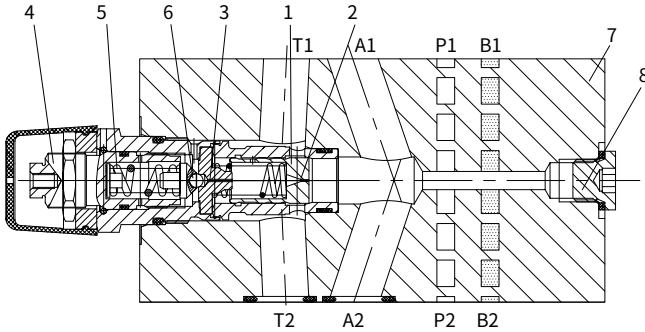
- Sandwich plate valve
- Porting pattern to DIN 24 340 form A and ISO4401
- For threaded connection, and sub-plate mounting
- 4 pressure ratings
- 5 circuit options
- With one or two pressure relief cartridges
- 1 adjustment elements:
 - Adjustable bolt with protective cap

Function and configuration

ZDB and Z2DB type pressure valve is pilot operated relief valve in sandwich plate design. It is used to limit a system pressure. It consists of the valve housing (7), together with one or two pressure relief valve cartridges. The system pressure is set by means of adjustment element (4).

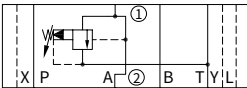
In zero position, the valves are closed. Pressure in port A acts on the spool (1). Pressure fluid flows through orifice (2) to the spring loaded side of the spool (1) and through orifice (3) to the pilot poppet (6). If the pressure in port A rises beyond the value setting at spring (5), the pilot poppet (6) opens. Fluid can flow from the spring loaded side of spool (1), orifice (3), and channel (8) into port T. The pressure drop moves spool (1) to open the connection from A to T, while the setting pressure at spring (5) is maintained. Pilot oil returns from the two spring chambers via port T externally. Pressure tapping (8) can measure the pressure.

Type ZDB16VA2-4XJ/...

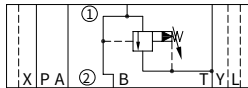


Symbols

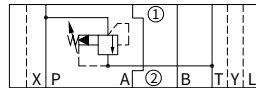
Type ZDB..VA..



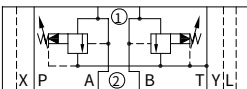
Type ZDB..VB..



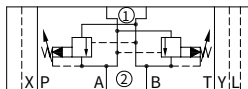
Type ZDB..VP..



Type Z2DB..VC..



Type Z2DB..VD..



① = valve side ② = sub-plate side

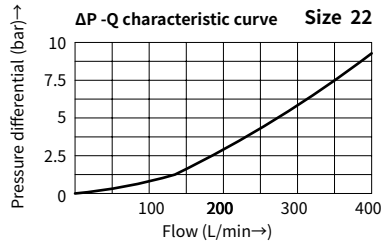
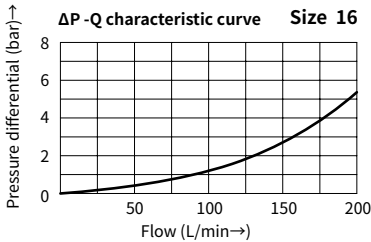
Specification

Z	DB	4XJ	★
Sandwich plate = Z			Further details in clear text
Only applies to versions VC and VD: With 2 pressure relief valve cartridges = 2			No code = NBR seals V = FKM seals
Pressure relief valve = DB			50 = Pressure adjustable up to 50bar 100 = Pressure adjustable up to 100bar 200 = Pressure adjustable up to 200bar 315 = Pressure adjustable up to 315bar
Nominal size 16 = 16 Nominal size 22 = 22			4XJ = Series 40J to 49J (40J to 49J: unchanged installation and connection dimensions)
Relief function from - to: A → T =VA P → T =VP B → T =VB A → T and B → T =VC A → B and B → A =VD			Regulation form: 2= Adjustable bolt with protective cap

Technical data

Fluid	Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal		
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)	
Viscosity range	mm ² /s	10 to 800	
Degree of contamination	Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15 , ISO4406		
Max.operating pressure	bar	to 315	
Max.adjustable pressure	bar	50; 100; 200; 315	
Size		16	22
Max. flow-rate	L/min	200	400
Weight	Type ZDB	kg	Approx.9.4
	Type Z2DB	kg	Approx.11.8
			Approx.10.3

Characteristic curves (Measured at t=40°C ±5°C , using HLP46)

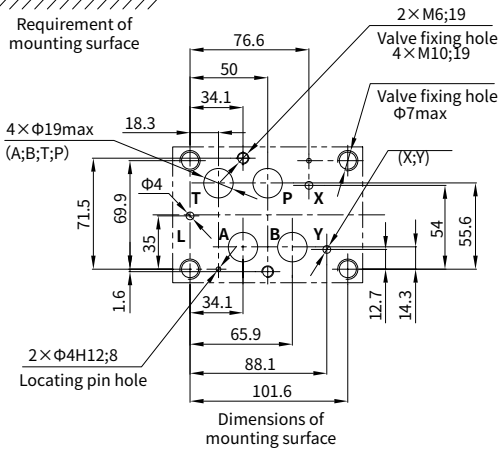
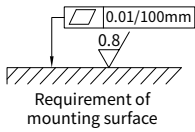
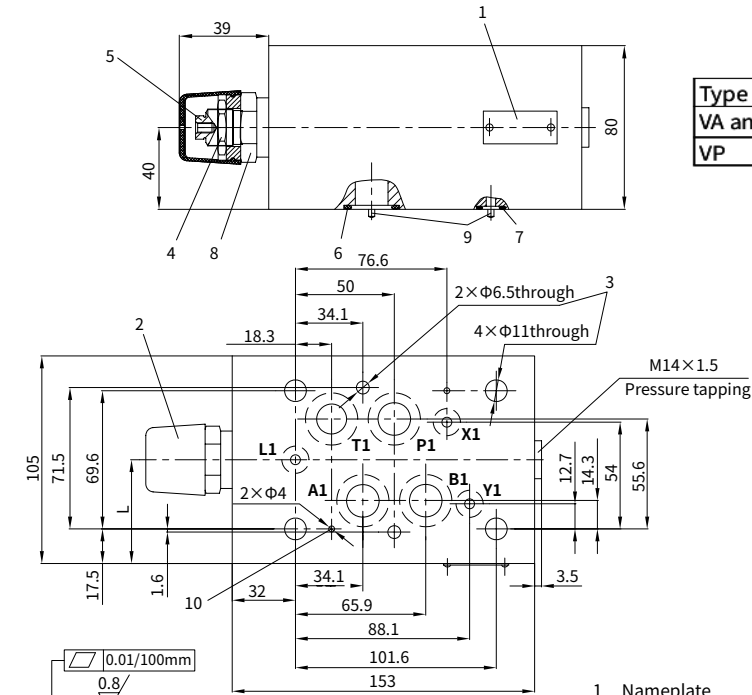


Unit dimensions

(Dimensions in mm)

Type ZDB16VA...4XJ../. Type ZDB16VB...4XJ../. Type ZDB16VP...4XJ../.

Type	L
VA and VB	52.5
VP	61.5



- 1 Nameplate
- 2 Adjustment element "2"
- 3 Valve fixing holes
- 4 Lockable nut S=24
- 5 External hexagon screw S=10
- 6 O-ring 22x2.5 (A2, B2, P2, T2)
- 7 O-ring 10x2 (X2, Y2, L2)
- 8 External hexagon S=30
Tightening torque $M_s=50$ Nm
- 9 Locating pin
- 10 Locating pin hole

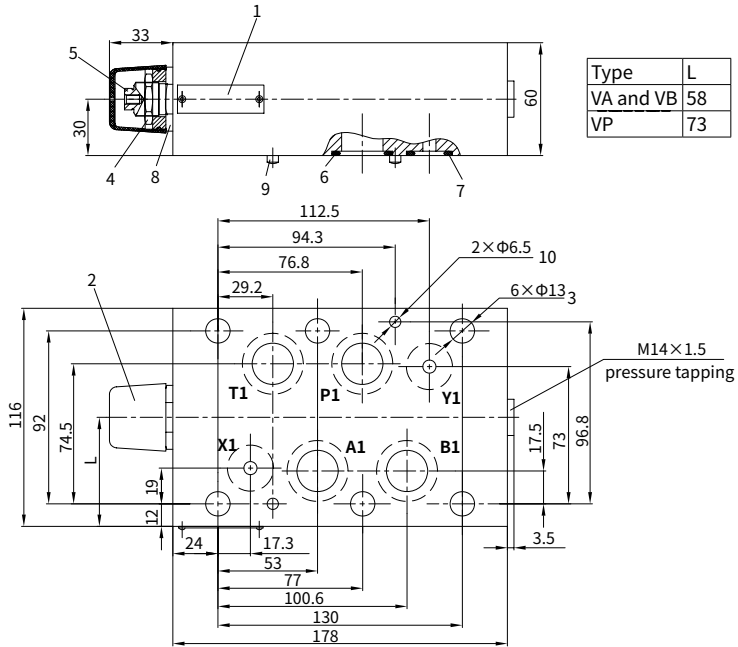
Unit dimensions

(Dimensions in mm)

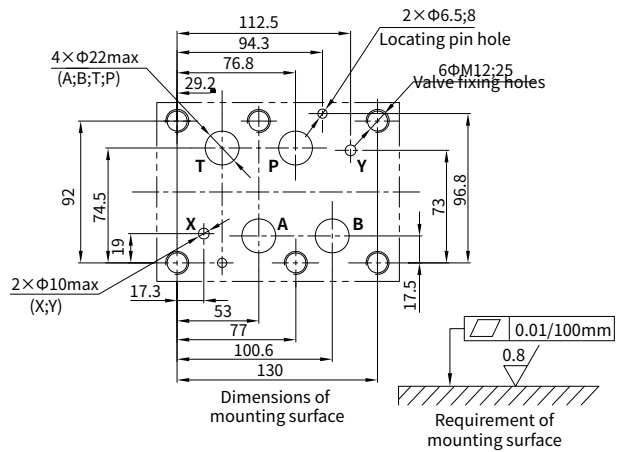
Type ZDB22VA...4XJ/..

Type ZDB22VB...4XJ/..

Type ZDB22VP...4XJ/..



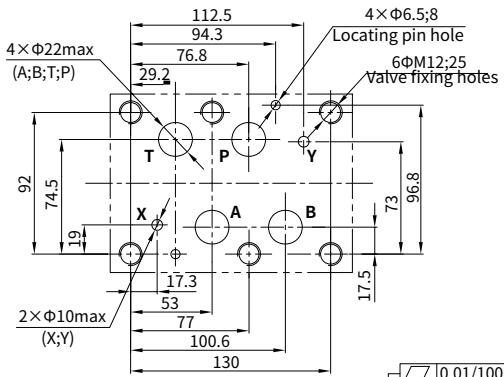
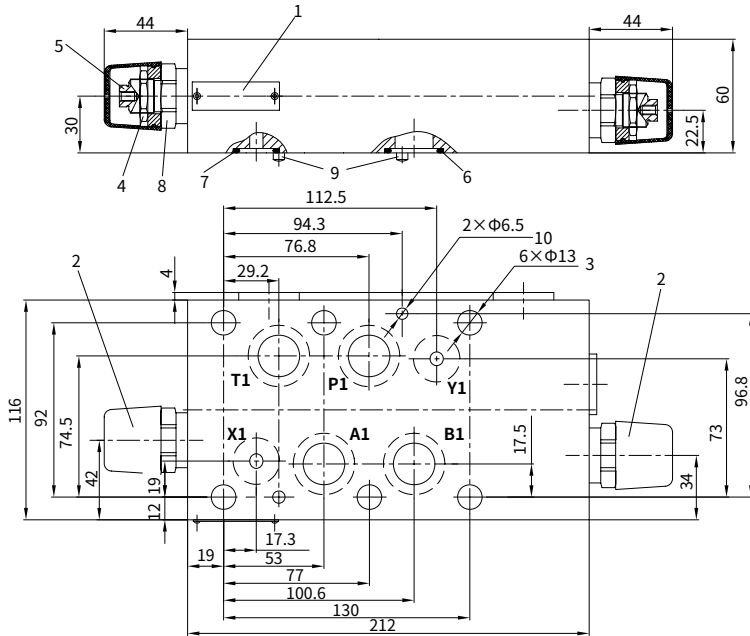
- 1 Nameplate
- 2 Adjustment element "2"
- 3 Valve fixing holes
- 4 Lockable nut S=24
- 5 External hexagon screw S=10
- 6 O-ring 27×3 (A2,B2,P2,T2)
- 7 O-ring 19×3 (X2,Y2,L2)
- 8 External hexagon S=30
Tightening torque $M_A = 50\text{Nm}$
- 9 Locating pin
- 10 Locating pin hole



Unit dimensions

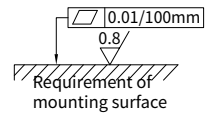
(Dimensions in mm)

Type Z2DB22VC...4XJ/..



- 1 Nameplate
- 2 Adjustment element "2"
- 3 Valve fixing holes
- 4 Lockable nut S=24
- 5 External hexagon screw S=30
- 6 O-ring 27×3 (A2,B2,P2,T2)
- 7 O-ring 19×3 (X2,Y2,L2)
- 8 External hexagon S=30
Tightening torque $M_A = 50 \text{ Nm}$
- 9 Locating pin
- 10 Locating pin hole

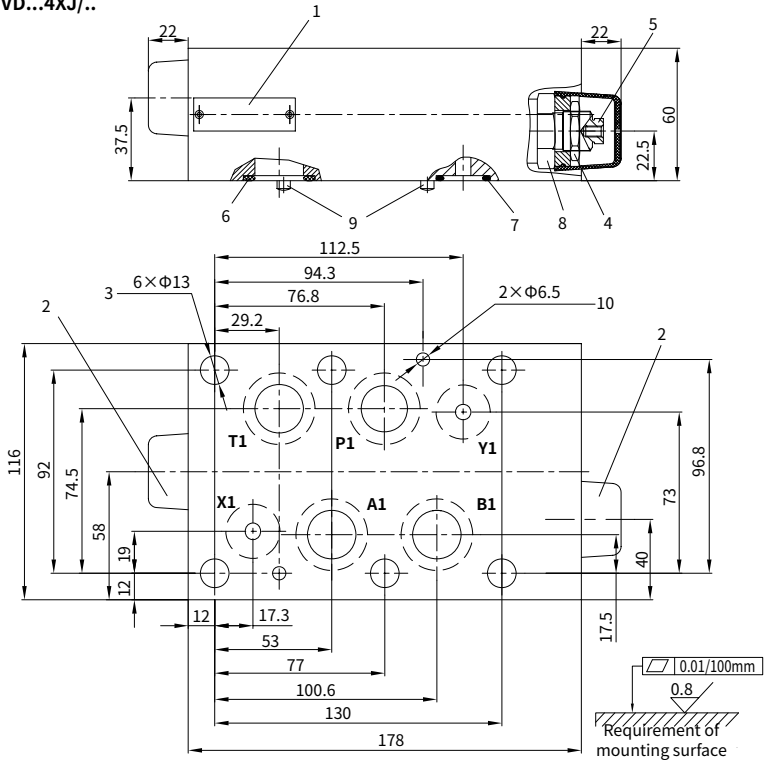
Dimensions of mounting surface



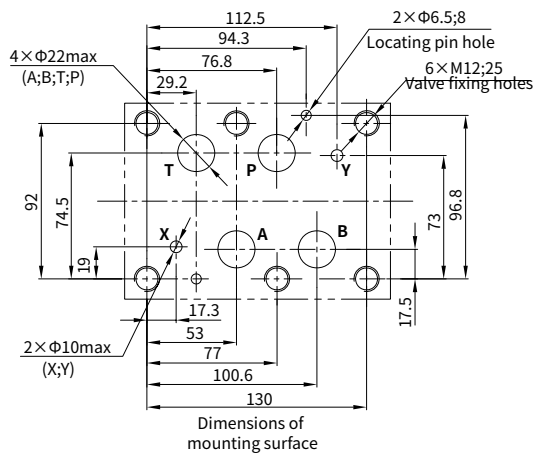
Unit dimensions

(Dimensions in mm)

Type Z2DB22VD...4XJ/..



- 1 Nameplate
- 2 Adjustment element "2"
- 3 Valve fixing holes
- 4 Lockable nut S=24
- 5 External hexagon screw S=10
- 6 O-ring 27×3 (A2,B2,P2,T2)
- 7 O-ring 19×3 (X2,Y2,L2)
- 8 External hexagon S=30
Tightening torque $M_A = 50Nm$
- 9 Locating pin
- 10 Space locating pin hole





ZDR6...type Modulaer Reducing Valve

ZDR6D...4XJ...type

Size 6
Max. Working Pressure: 210 bar
Max. Flow: 50 L/min



Contents

Function and configurations	02
Symbols	03
Specification	03
Technical data	03
Characteristic curves	04
Unit dimensions	05

Features

- Sandwich plate design
- Mounting face meeting requirements for DIN24340 A and ISO4401
- 4 pressure ranges
- 2 adjustment forms
 - Rotary Knob
 - Adjusting screw with protective cover
- Connector with pressure gauge
- Selectable one-way valve

Function and configuration

ZDR6 type valve is a direct operated pressure reducing valve in sandwich plate design with pressure limitation of the secondary circuit. It is used to reduce the system pressure. The valve consists of the valve housing (1), the control spool (2), two compression springs (3), the adjustment element (4), and the optional check valve.

The secondary pressure is set by the adjustment element(4).

Model DA:

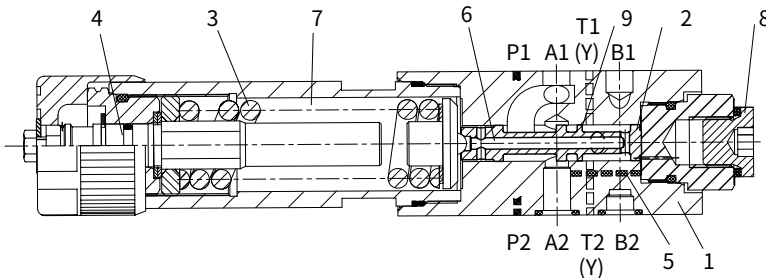
At static state, the valve is normally open, and fluid can flow freely from port P2 to port P1 (version "DP") or from port A1 to port A2(version "DA"). Pressure in port P1 acts at the spool area via control line (5) and is balanced with the setting value of the compression spring (3). When the pressure in port P1 exceeds the setting value of the spring (3), the control spool (2) moves further towards the compression spring (3), the opening aperture at port P is getting smaller until fluid at port P1 flows back to the tank through the orifice (6) of the control spool (2) to prevent any further rise in pressure. The leakage oil in spring chamber(7) is always drained to tank through port T (Y). A check valve can be fitted optionally in version "DA" for free flow from ports A2 to ports A1 . A pressure gauge connection (8) permits the secondary pressure to be monitored. In model DA, one-way valve can only be mounted with the oil port from A2 to A1 to make the flow passage smooth.

Model DP and DB:

In model DP, oil port P1 is pressure reduced; signal and control oil is provided from the inside of oil port P1.

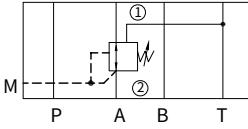
In model DB, oil port P1 is pressure reduced; but control oil is from oil port B.

Type:ZDR6DA1-4XJ/...YM...

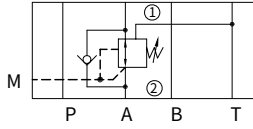


Symbols

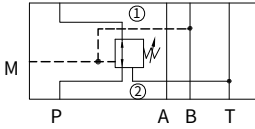
Type:ZDR6DA...4XJ/..YM



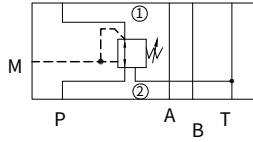
Type:ZDR6DA...4XJ/..Y



Type:ZDR6DB...4XJ/..YM

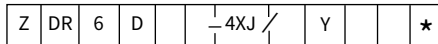


Type:ZDR6DP...4XJ/..YM



- ① =valve side;
- ② =bottom plate side

Specification



Superposition structure	=Z	
Pressure reduce valve	=DR	
Size 6	=6	
Direct-acting type	=D	
Oil port A2 pressure relieved	=A	
Oil port B2 pressure relieved	=B	
Oil port P1 pressure relieved	=P	
Knob	=1	
Adjusting bolt with protective cover	=2	
Knob with lock	=3	
Knob without lock	=7	
Series 40J to 49J	=4XJ	
(40J to 49J: unchanged installation and connection dimensions)		

Further details in clear text	
No code =	NBR seals
V =	FKM seals
No mark =	With one-way valve (just for model DA)
M =	Without one-way valve
Y=	Control oil supplied from inside and drained to the outside
25=	Max. secondary pressure 25bar
75=	Max. secondary pressure 75bar
150=	Max. secondary pressure 150bar
210=	Max. secondary pressure 210bar

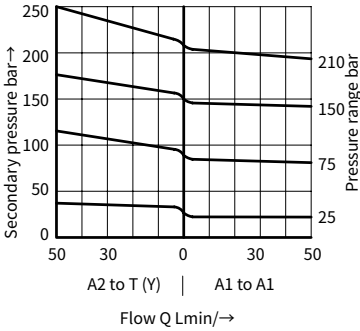
Technical data

Fluid		Mineral oil suitable for NBR and FKM seal Phosphate ester for FKM seal
Fluid temperature range	°C	-30 to +80 (NBR seal) -20 to +80 (FKM seal)
Viscosity range	mm ² /s	10 to 800
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406
Max secondary pressure (inlet)	bar	315
Max secondary pressure (outlet)	bar	25;75;150;210
Backpressure oil port T(Y)	bar	160
Max flow	L/min	50
Weight	kg	About 1.2

Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

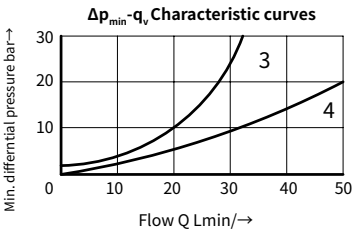
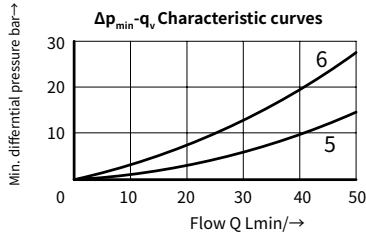
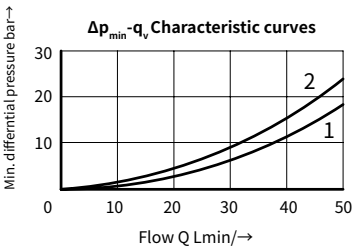
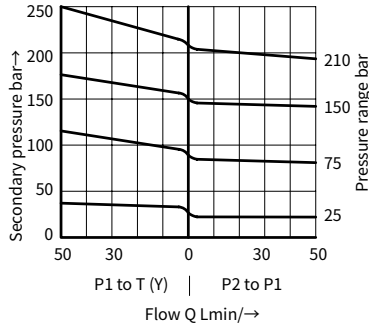
Type ZDR6DA

p_A - q_v Characteristic curves



Type ZDR6DP and ZDR6DB

p_A - q_v Characteristic curves

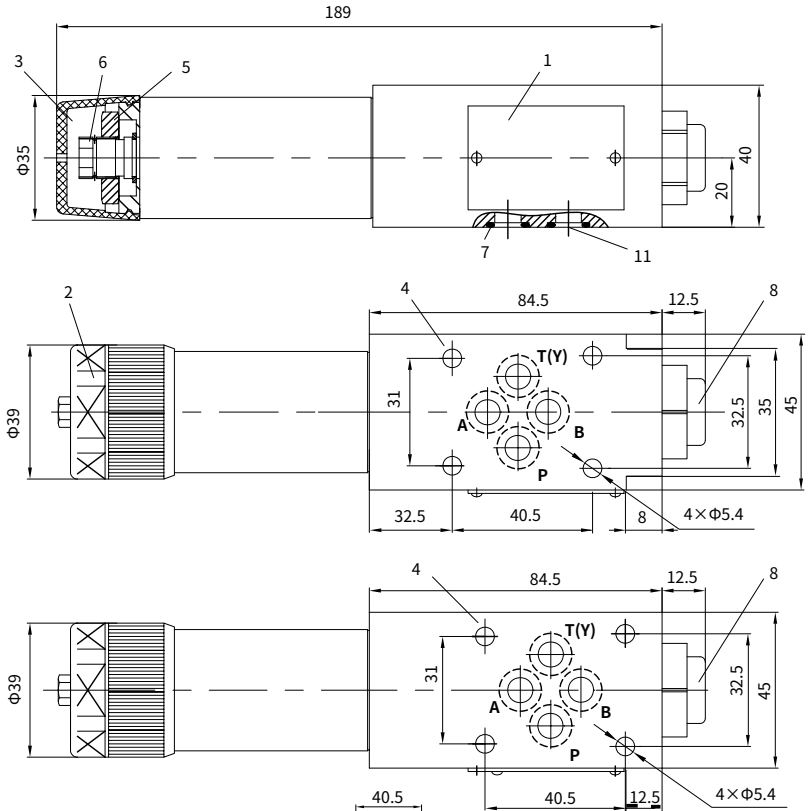


- 1 A1 to A2
- 2 A2 to T(Y) (the third flow route)
- 3 Flow from A2 to A1 just goes through one-way valve.
- 4 Flow from A2 to A1 just goes through one-way valve and fully-open main valve.
- 5 P2 to P1
- 6 P1 to T(Y) (the third flow route)

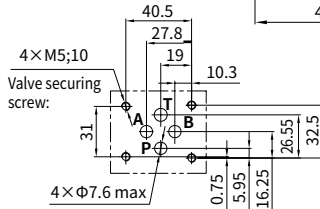
This work curve is effective to the relief function in case of outlet pressure = 0 within the overall range.

Unit dimensions

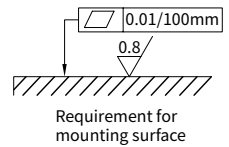
(Dimensions in mm)



- 1 Plate
- 2 Adjusting element "1"
- 3 Adjusting element "2"
- 4 Valve securing screw hole
- 5 Lock nut S=24
- 6 Socket adjusting screw S=10
- 7 O-ring 9.25×1.78(A, B, P, T)
- 8 Pressure gauge interface G1/4 or M14×1.5; in depth 12, Hex wrench S=6



Size of the installed base



Requirement for mounting surface



ZDR10...type Modular Reducing Valve

ZDR10D...5XJ...type

Size 10
Max. Working Pressure: 210 bar
Max. Flow: 80 L/min



Contents

Function and configuration	02
Symbols	02
Specification	03
Technical data	03
Characteristic curves	04
Unit dimensions	05

Features

- Sandwich plate structure
- Porting pattern to DIN 24 340, form A and ISO 4401
- 4 pressure ratings
- 4 adjustment elements:
 - Rotary knob
 - Adjustable bolt with protective cap
 - Lockable rotary knob
 - Rotary knob with scale
- Pressure reduction in ports A, B or P
- Check valve, optional

Function and configuration

ZDR10 type valve is a direct operated pressure reducing valve in sandwich plate design with a pressure limitation of the secondary circuit. It is used to reduce the system pressure. The valve consists of the valve housing (1), the control spool (2), a compression spring (3), the adjustment (4) and the optional check valve. The secondary pressure is set by the pressure adjustment element (4).

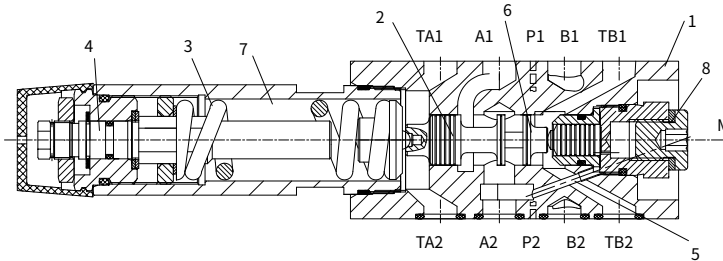
Model "DA"

At rest, the valve is normally open, and fluid can flow unhindered from port A1 to port A2. The pressure in port A2 is at the same time via the control line (5) present at the spool area opposite to the compression spring (3). When the pressure in port A2 exceeds the pressure level set at the compression spring (3), the control spool (2) moves into the control position against the compression spring (3) and holds the set pressure in port A2 constant. The control pressure and pilot oil are taken from port A2 via control line (5). If the pressure in port A2 rises still further due to external forces, the control spool (2) is moved still further towards the compression spring (3). This causes a flow path to be opened at port A2 via control land (6) on the control spool (2) and housing (1) to tank (port TB). Sufficient fluid then flows to tank to prevent any further rise in pressure. The spring chamber (7) is always drained to tank externally via port TA. A pressure gauge connection (8) permits the secondary pressure at the valve to be monitored. It is only possible to fit a check valve for free flow in ports A2 to A1 in version "DA".

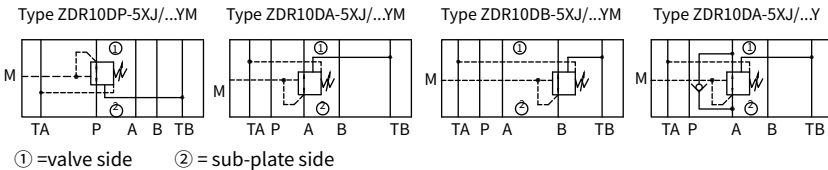
Models "DP" and "DB"

In model "DP", the pressure is reduced in port P1. The control pressure and the pilot oil is taken internally from port P1. In model "DB", the pressure in port P1 is reduced, and the pilot oil taken from port B.

Type ZDR10DA...-5XJ/...YM...



Symbols



Specification

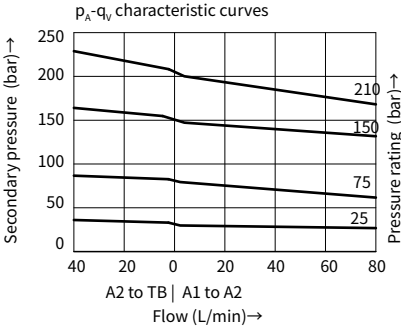
	Z	DR	10	D			- 5XJ /	Y		*	
Sandwich plate	= Z										Further details in clear text
Pressure reducing valve	= DR										No code = NBR seals
Size 10	=10										V = FKM seals
Direct operated				= D							No code = With check valve
Pressure reduction in port A2				= A							(not possible for pressure reduction in port P1)
Pressure reduction in port P1 (Pilot oil from port B)				= B							M = Without check valve
Pressure reduction in port P1				= P							Y= Pilot oil supply internal and drain external
Rotary knob											25 = Max. secondary pressure 25 bar
Adjustable bolt with protective cap											75 = Max. secondary pressure 75 bar
Lockable rotary knob											150 = Max. secondary pressure 150 bar
Rotary knob with scale											210 = Max. secondary pressure 210 bar
Series 50J to 59J											=5XJ

Technical data

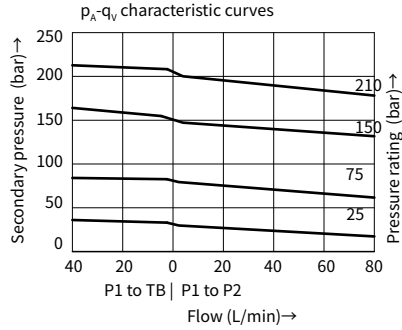
Fluid		Mineral oil suitable for NBR and FKM seal
		Phosphate ester for FKM seal
Fluid temperature range	°C	-30 to +80 (NBR seal)
		-20 to +80 (FKM seal)
Viscosity range	mm ² /s	10 to 800
Degree of contamination		Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406
Max. operating pressure (inlet)	bar	up to 315
Max. secondary pressure (output)	bar	up to 25; up to 75; up to 150; up to 210
Back pressure	bar	150
Max. flow-rate	L/min	80
Weight	Kg	Approx. 2.8

Characteristic curves (Measured at $t=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$, using HLP46)

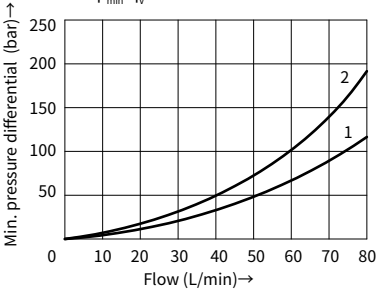
Type ZDR 10 DA...-5XJ/...



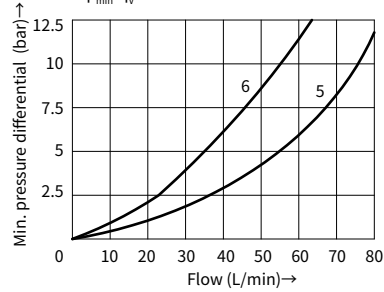
Type ZDR 10 DP...-5XJ/... and Type ZDR 10 DB...-5XJ/...



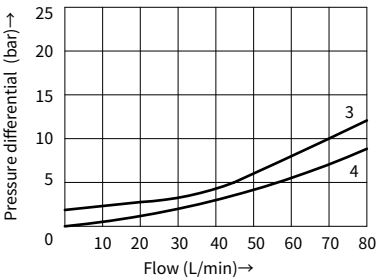
Δp_{\min} - q_v characteristic curves



Δp_{\min} - q_v characteristic curves



Δp - q_v characteristic curves

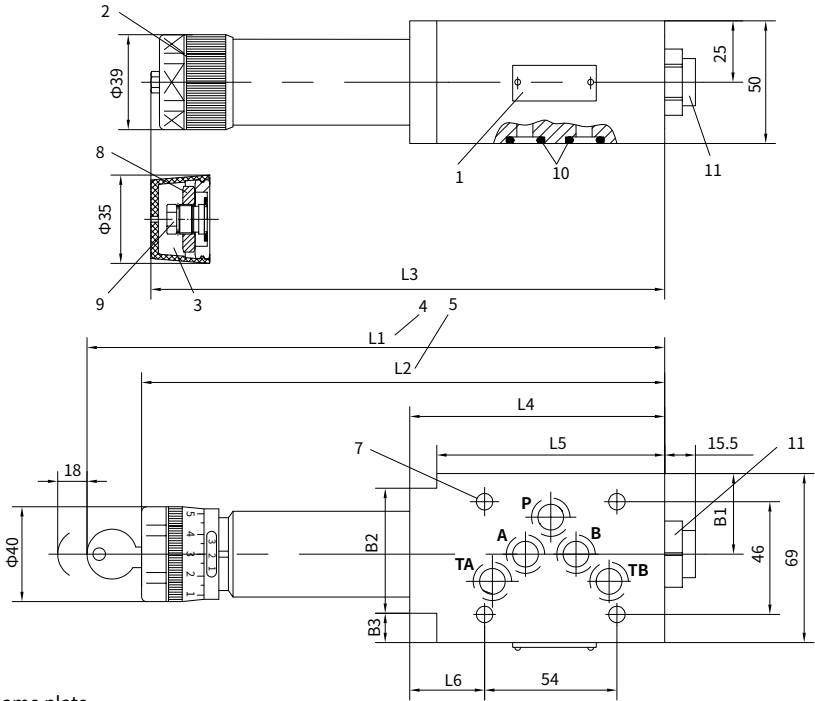


- 1 A1 to A2
- 2 A2 to TB (3rd. flow path)
- 3 A2 to A1 flow via check valve only
- 4 A2 to A1 flow via check valve and fully open control cross section
- 5 P2 to P1
- 6 P1 to TB (3rd. flow path)

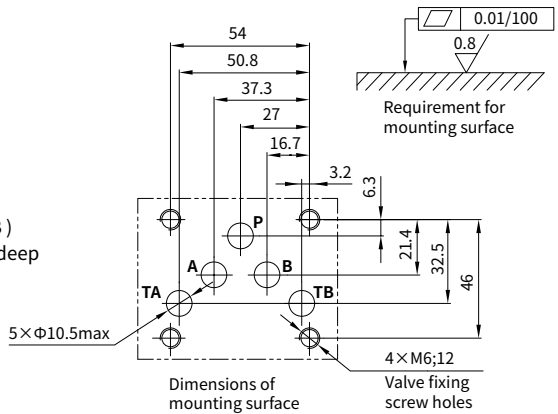
The characteristic curves for the pressure relief function are valid for the outlet pressure = zero over the entire flow range!

Unit dimensions

(Dimensions in mm)



- 1 Name plate
- 2 Adjustment element "1"
- 3 Adjustment element "2"
- 4 Adjustment element "3"
- 5 Adjustment element "7"
- 6 Space required to remove key
- 7 Valve mounting screw holes
- 8 Lock nut 24 A/F
- 9 Hexagon 10 A/F
- 10 O-rings 12×2 (Port A,B,P,TA,TB)
- 11 Pressure gauge port G 1/4; 12 deep internal hexagon 6 A/F



Model	L1	L2	L3	L4	L5	L6	B1	B2	B3
"DA"	254	230	210	104	93	31.5	32.9	51	12
"DB" and "DP"	242	218	198	91	-	18.5	35	-	-