

Snijder Filtertechniek bv

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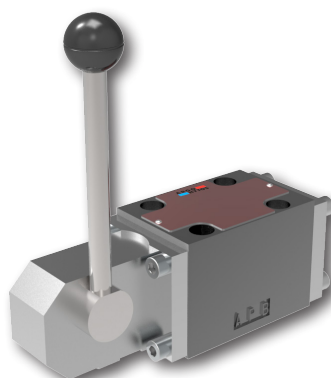
info@snijderfiltertechniek.nl

Whatsapp: 06 1997 5550

4/2 and 4/3 Directional Control Valve, Manually Operated

RPR3-06

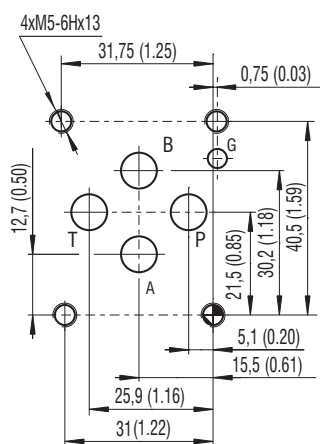
Size 06 (D03) • Q_{max} 80 l/min (21 GPM) • p_{max} 350 bar (5100 PSI)



Technical Features

- › Direct acting manually operated directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03)
- › High transmitted hydraulic power up to 350 bar, optimized design for minimized pressure drop
- › Three chamber housing design for production cost saving
- › Manual lever and actuation element can be rotated in 90° increments for flexible installation
- › Wide range of interchangeable spools available
- › Springless, detented valves available, valve holds last selected position, available for all spools
- › In the standard version, the valve housing is phosphated and steel parts zinc-coated for 240 h salt spray protection acc. to ISO 9227
- › Enhanced surface protection for mobile sector available (ISO 9227, 520 h salt spray)

ISO 4401-03-02-0-05



Ports P, A, B, T - max $\varnothing 7.5$ mm (0.29 in)

Model Code	Z11	R11	J15
Symbol			

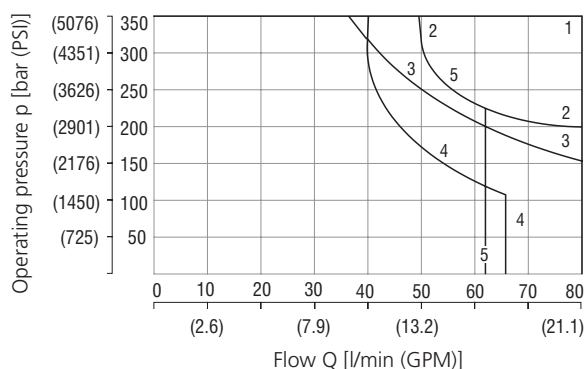
Technical Data

Valve size	06 (D03)	
Max. flow	l/min (GPM)	80 (21.1)
Max. operating pressure at ports P, A, B	bar (PSI)	350 (5080)
Max. operating pressure at port T	bar (PSI)	100 (1450)
Operating force	N (lbf)	< 50 (11.2)
Fluid temperature range (NBR)	°C (°F)	-30 ... +100 (-22 ... +212)
Fluid temperature range (FPM)	°C (°F)	-20 ... +120 (-4 ... +248)
Service life	cycles	10 ⁶
Weight	kg (lbs)	1.6 (3.53)
	Datasheet	Type
General information	GI_0060	Products and operating conditions
Mounting interface	SMT_0019	Size 06
Spare parts	SP_8010	

Characteristics measured at $v = 32$ mm²/s (156 SUS)

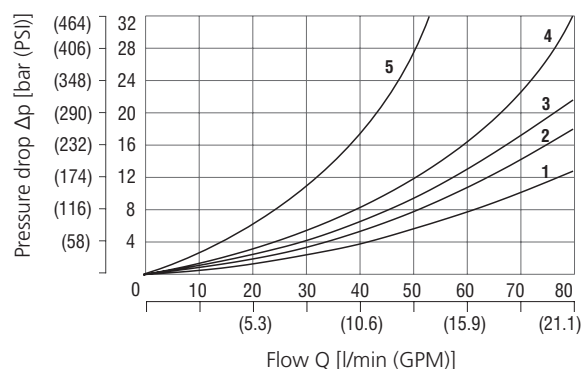
Operating limits

Operating limits for maximum hydraulic power and rated lever force.



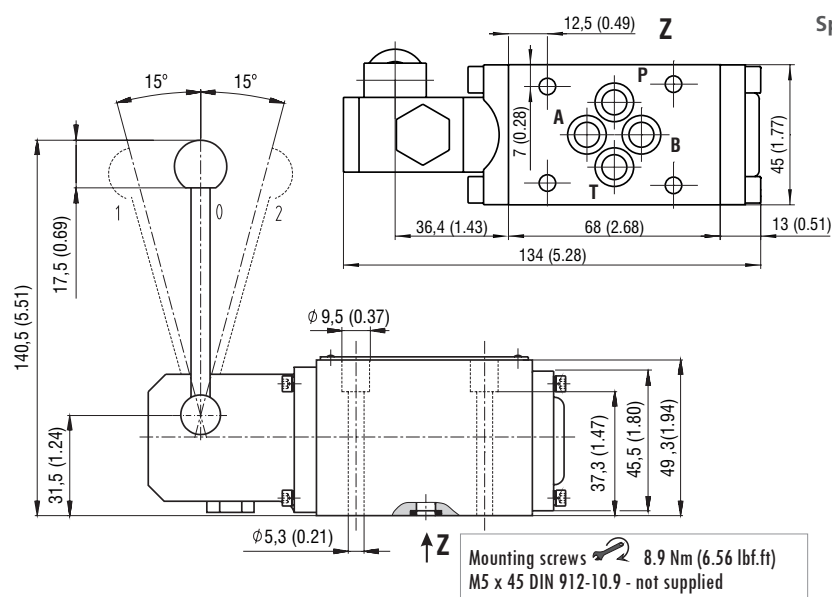
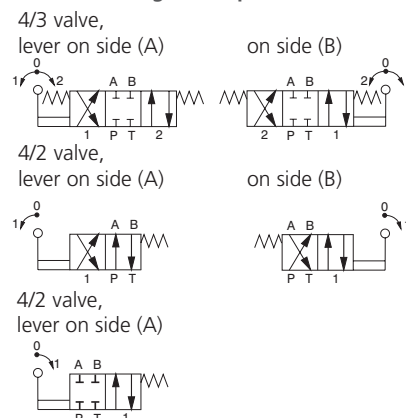
A51	3	H15	1	R11	1
B11	5	J15	1	Y11	2
B15	1	J75	1	Y15	1
C11	4	P11	1	Z11	1
C15	1	P15	1	Z15	1
H11	3				

Pressure drop related to flow rate



	P-A	P-B	A-T	B-T	P-T
Z11, Z15, B11, B15R11, J15	2	2	3	3	
C11, C15	3	3	4	3	5
H11, H15	2	2	2	2	3
P11, P15	1	1	3	3	
Y11, Y15	2	2	2	2	
A51, J75	2	2			

For operating limits under conditions and flow directions other than shown contact our technical support. Admissible operating limits may be considerably lower with only one direction of flow (A or B plugged, or without flow.)

Dimension in millimeters (inches)

Spool position according to the position of hand lever


Manual lever and actuating section are shown in the most frequently used standard position. Both elements can be rotated in 90° increments. For other positions of lever and actuating section contact our technical support.

Spool Symbols

Type	Symbol	Interposition	Type	Symbol	Interposition	Type	Symbol	Interposition
Z11			B15			X11		
C11			Y14			X21		
H11			Z21			C55		
P11			P11			Z15		
Y11			H11			Z55		
B11			C51			Y55		
L21			Z11			J15		
Z15			H51			J75		
C15			Y11			P55		
H15			R11			R25		
P15			A51			X15		
Y15			R21					

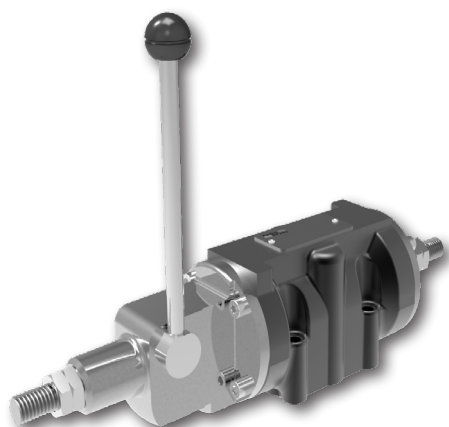
Ordering Code

RPR3-06				/			-	
4/2 and 4/3 directional control valve, manually operated								
Valve size								
Number of valve positions								
two positions		2						
three positions		3						
Spool symbols								
see the table "Spool Symbols"								

4/2, 4/3 Directional Control Valve, Manually Operated

RPR1-10

Size 10 (D05) • Q_{max} 140 l/min (37 GPM) • p_{max} 350 bar (5100 PSI)

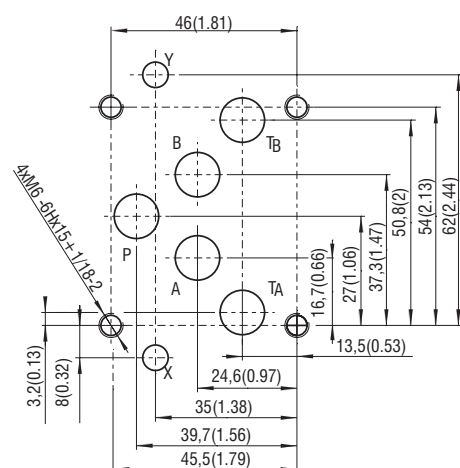


Technical Features

- › Directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 05)
- › High transmitted hydraulic power up to 350 bar with optimized design to minimize pressure drops
- › Three chamber housing design for production cost saving
- › Manual lever and actuation element can be rotated in 90° increments for flexible installation
- › Wide range of interchangeable spools available
- › Springless, detented valves available, valve holds last selected position, available for all spools
- › Spool end position sensing option
- › Spool stroke limit option
- › In the standard version, the valve housing is phosphated and steel parts zinc-coated for 240 h salt spray protection acc. to ISO 9227
- › Enhanced surface protection for mobile sector available (ISO 9227, 520 h salt spray)

Model Code	Z11	Z11 with Sensors	R11	J15
Symbol				

ISO 4401-05-04-0-05



Ports P, A, B, T - max $\varnothing 11.2$ mm (0.44 in)

Technical Data

Valve size		10 (D05)
Max. flow	l/min (GPM)	140 (37)
Max. operating pressure at ports P, A, B	bar (PSI)	350 (5080)
Max. operating pressure at port T	bar (PSI)	100 (1450) 50 (725) for versions with sensor
Operating force	N (lbf)	< 40 (9)
Fluid temperature range (NBR)	°C (°F)	-30 +100 (-22 ... +212)
Fluid temperature range (FPM)	°C (°F)	-20 +120 (-4 ... +248)
Service life	cycles	106
Weight	kg (lbs)	3.4 (7.5)

Technical Data Sensor and Connector		S1, S4
Rated power supply voltage	V	24 DC
Power supply voltage range	V	10 ... 30 DC
Rated current	mA	200
Enclosure type of sensor to EN 60529		IP 67
Switching frequency	Hz	1000
Ambient temperature range	°C (°F)	-25 ... +80 (-13 ... +176)

	Datasheet	Type
General information	GI_0060	Products and operating conditions
Mounting interface	SMT_0019	Size 10
Spare parts	SP_8010	

Ordering Code

RPR1 -10				/		-		-		-		/		-		-	
4/2 and 4/3 directional control valve, manually operated																	
Valve size																	
Number of valve positions																	
two positions		2															
three positions		3															
Spool symbols		see the table "Spool Symbols"															
Spool flow rate																	
directional control valve spool		No designation															
prop. spool, nominal flow 30 l/min (7.9 GPM)		30															
prop. spool, nominal flow 60 l/min (15.8 GPM)		60															
Manual lever and actuating section position																	
standard, lever on side A, upward		A1															
standard, lever on side B, upward		B1															
Stroke limit option																	
without stroke limiter		0															
with stroke limiter, side A		SLA															
with stroke limiter, side A		SLB															
with stroke limiter, side A and B		SLC															
Surface treatment																	
No designation		standard															
A		zinc-coated (ZnCr-3), ISO 9227 (240 h)															
B		zinc-coated (ZnNi), ISO 9227 (520 h)															
Seals																	
No designation		NBR															
V		FPM (Viton)															
Spool and position sensor type																	
No designation		without sensor															
S1		normally-open sensor															
S4		normally closed sensor															
Spool position sensor supply voltage																	
No designation		without sensor															
24		rated supply voltage, 24 V DC															
Spool position sensor																	
0		without spool position sensor															
A		one spool position sensor, side A															
B		one spool position sensor, side B															
C		one spool position sensor, side A and B															

The port restrictor plugs can be ordered separately from the spare parts data sheet SP_8010.

Mounting bolts M6 x 45 DIN 912-10.9 or studs must be ordered separately. Tightening torque is 14 Nm (10.3 lbf.ft).

Besides the commonly used valve versions shown other special models are available. Contact our technical support for their identification, feasibility and operating limits.

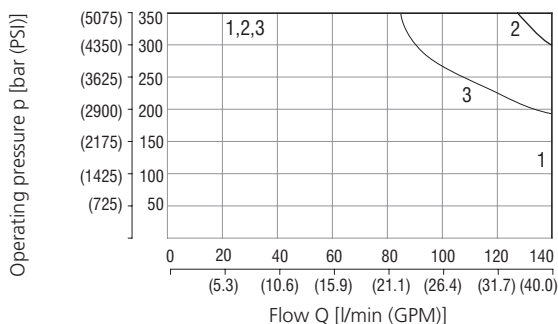
Spool Symbols

Type	Symbol	Interposition	Type	Symbol	Interposition
Z11			P15		
C11			R11		
H11			R21		
P11			Z15		
Y11			J15		
C15			R25		
H15			Y15		
Z11			Y11		

Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

Operating limits (Directional valve)

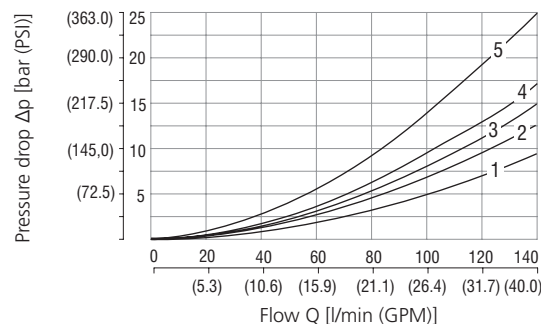
Operating limits for maximum hydraulic power and rated lever force



Z11	1	H11	1
Y11	1	C11	3
P11	1	R11	2

For operating limits under conditions and flow directions other than shown contact our technical support. Admissible operating limits may be considerably lower with only one direction of flow (A or B plugged, or without flow.)

Pressure drop related to flow rate

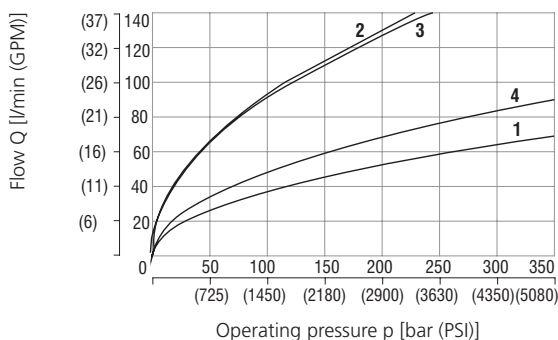


	P-A	P-B	A-T	B-T	P-T		P-A	P-B	A-T	B-T	P-T
Z11	1	1	3	3		H11	1	1	1	1	3
Y11	1	1	2	2		C11	1	1	3	3	5
P11	1	1	3	3		R11	1	1	4	4	

Operating limits (Proportional valve)

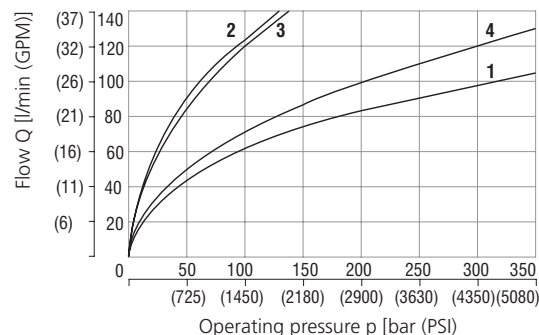
Operating limits for maximum hydraulic power and rated lever force

30 l/min (7.9 GPM)



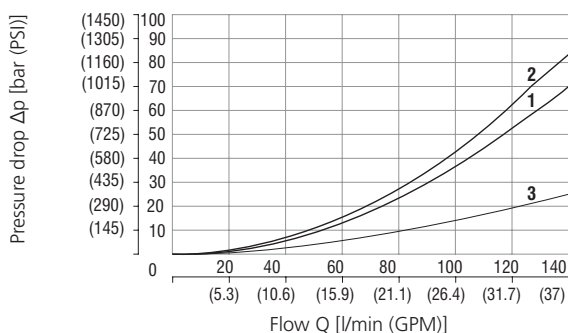
s	50% [2.3mm (0.09in)]	100% [4.6mm (0.18in)]
Z11/30	1	2
Y11/30	3	4

60 l/min (15.8 GPM)



s	50% [2.3mm (0.09in)]	100% [4.6mm (0.18in)]
Z11/60	1	2
Y11/60	3	4

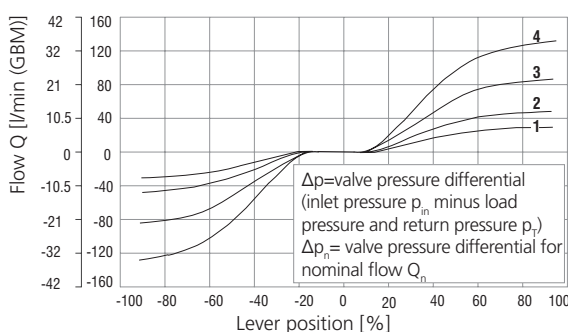
Pressure drop related to flow rate



	P-A	P-B	A-T	B-T
Z11/30	1	1	2	2
Y11/30	1	1	2	2
Z11/60	3	3	3	3
Y11/60	3	3	3	3

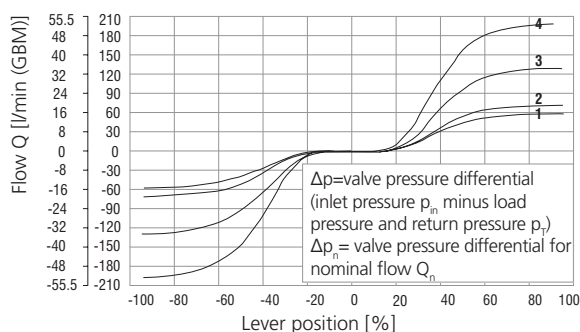
Proportional Valve Actuation Characteristics

Proportional spool flow rate 30 l/min (7.9 GPM)



1	$\Delta p_n = 10 \text{ bar (145 PSI)}$	3	$\Delta p = 160 \text{ bar (2321 PSI)}$
2	$\Delta p = 50 \text{ bar (725 PSI)}$	4	$\Delta p = 350 \text{ bar (5076 PSI)}$

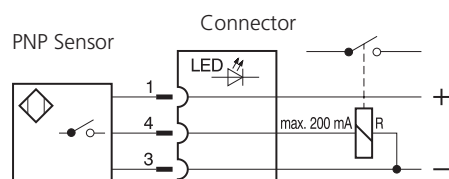
Proportional spool flow rate 60 l/min (15.8 GPM)



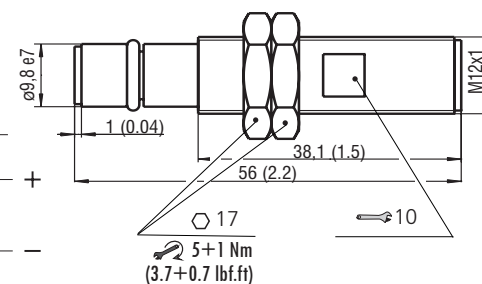
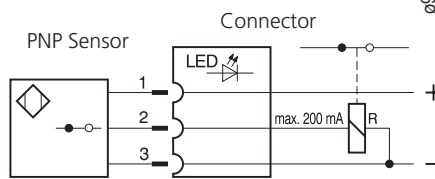
1	$\Delta p_n = 10 \text{ bar (145 PSI)}$	3	$\Delta p = 160 \text{ bar (2321 PSI)}$
2	$\Delta p = 50 \text{ bar (725 PSI)}$	4	$\Delta p = 350 \text{ bar (5076 PSI)}$

Technical Data - Sensor in millimeters (inches)

S1 Circuit diagram of the normally - **OPEN** sensor



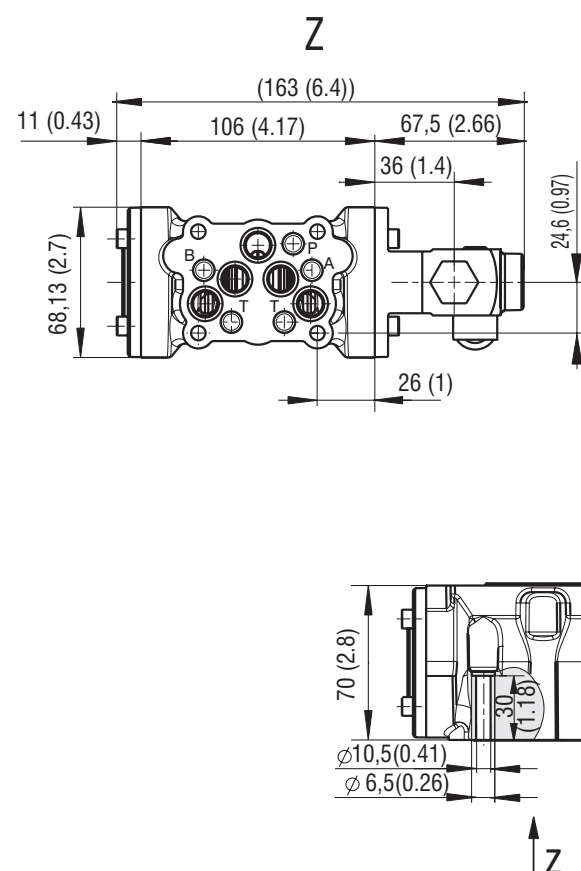
S4 Circuit diagram of the normally - **CLOSED** sensor



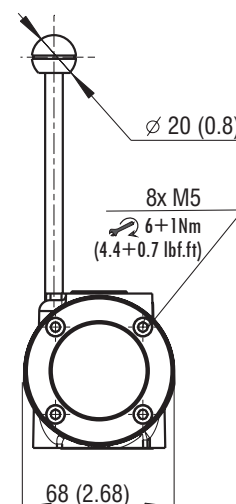
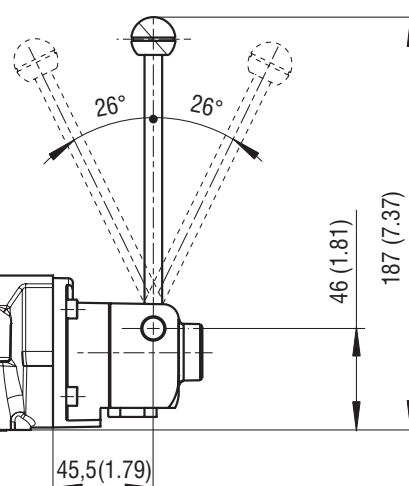
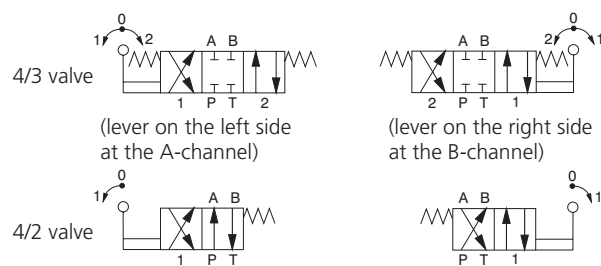
Dimensions in millimeters (inches)

RPR1-10*/A1-0-0

without stroke limiter and position sensor

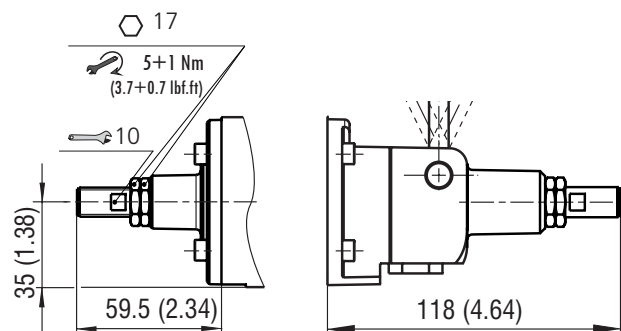


Spool position according to the position of hand lever



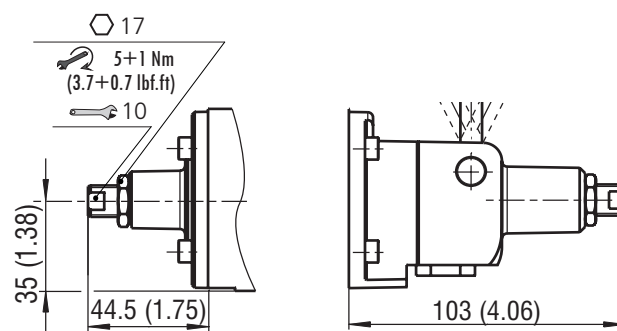
RPR1-10*/A(B,C)

Position sensor



RPR1-10*/SL*

Stroke limiter

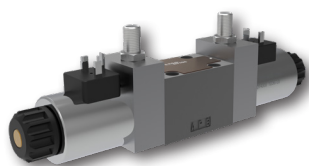


Manual lever and actuating section are shown in the most frequently used standard position. Both elements can be rotated in 90° increments. For other positions of lever and actuating section contact our technical support.

4/2 and 4/3 Directional Control Valve, Solenoid Operated

RPE3-06

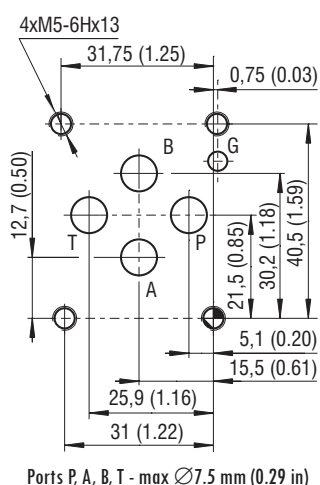
Size 06 (D03) • Q_{max} 80 l/min (21 GPM) • p_{max} 350 bar (5100 PSI)



Technical Features

- › Direct acting, directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03)
- › High transmitted hydraulic power up to 350 bar with optimized design to minimize pressure drop
- › Five chamber housing design with reduced hydraulic power dependence on fluid viscosity
- › The valve is available with interchangeable DC solenoids, also for AC power supply using a built-in rectifier bridge
- › Wide range of solenoid electrical terminal versions available
- › Wide range of interchangeable spools and manual overrides available
- › CSA Certificate upon request
- › Inductive contactless Normally Open and Normally Closed spool position sensor option
- › Soft-shift spool speed control option
- › The coil is fastened to the core tube with a retaining nut and can be rotated by 360° to suit the available space
- › In the standard version, the valve housing is phosphated for basic surface corrosion protection and as preparation for painting. Steel parts are zinc-coated for 240 h salt spray protection acc. to ISO 9227
- › Enhanced surface protection for mobile sector available for the valve housing and steel parts (ISO 9227, 520 h salt spray)

ISO 4401-03-02-0-05



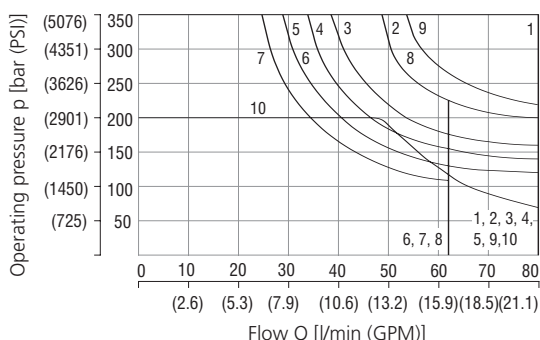
Technical Data

Valve size	06 (D03)	
Max. flow	80 (21.1)	
Max. operating pressure at ports P, A, B	bar (PSI)	standard 350 (5080)
		320 (4640) acc. to CSA
Max. operating pressure at port T	bar (PSI)	210 (3050)
Fluid temperature range (NBR)	°C (°F)	-30 ... +80 (-22 ... +176)
Fluid temperature range (FPM)	°C (°F)	-20 ... +80 (-4 ... +176)
Ambient temperature range	°C (°F)	-30 ... +50 (-22 ... +122)
Supply voltage tolerance	%	AC: ± 10 DC: ± 10
Max. switching frequency	1/h	15 000
Switching time at $v=32$ mm/s (156 SUS)	ON	ms
	OFF	ms
Weight	- valve with 1 solenoid	kg (lbs)
	- valve with 2 solenoids	kg (lbs)
		1.6 (3.52)
		2.2 (4.85)
General information		Datasheet
Coil types / connectors		Type
Mounting interface		Products and operating conditions
Spare parts		C22B* / K*
		Size 06

Characteristics measured at $v = 32$ mm/s (156 SUS)

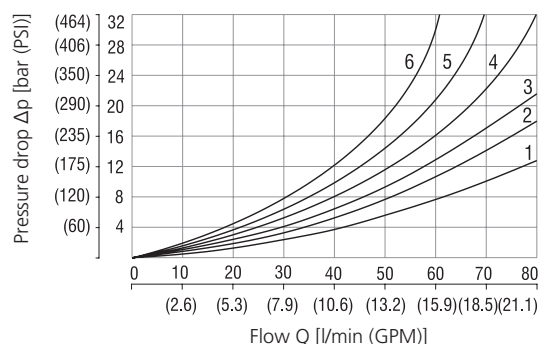
Operating limits

Operating limits for maximum hydraulic power at rated temperature and supply voltage equal to 90 % nominal.



Spool symbol			
1 Z11	5 F11	7 Z91	
6 C11	3 R11	5 R31	
5 H11	4 R21	5 H51	
1 P11	5 A51	7 F51	
2 Y11	1 P51	3 X11	
5 L21	2 Y51	7 K11	
8 B11	6 C51	7 N11	
6 Y41	1 Z51	10 X25	
1 Z21	7 Z71	1 J15	
5 C41	7 Z81	9 J75	

Pressure drop related to flow rate



Spool symbol	P-A	P-B	A-T	B-T	P-T
Z11,L21,B11,R11	2	2	3	3	
R21,X11,N11,J15	5	5	5	6	3
C11	2	2	2	3	3
H11	1	1	3	3	
P11	2	2	2	2	
Y11	3	3	3	3	
Y41		2	3		
Z21,Z51,H51		4			5
C41	1	2		3	3
F11	2	2			
A51,J75					

For operating limits under conditions and flow directions other than shown contact our technical support. Admissible operating limits may be considerably lower with only one direction of flow (A or B plugged, or without flow.)

Ordering Code

4/2 and 4/3 directional control valve, solenoid operated		RPE3 - 06		No designation U		CSA Certified without certification CSA marking	
Valve size				No designation		Surface treatment standard	
Number of spool positions two positions 2 three positions 3				A zinc-coated (ZnCr-3), ISO 9227 (240 h) B zinc-coated (ZnNi), ISO 9227 (520 h)			
Spool symbols see the table "Spool Symbols"				No designation S1 S4		Spool monitoring without sensors normally-open sensor normally-closed sensor	
Rated supply voltage of solenoids (at the coil terminals)		12 V DC / 2.72 A 01200 24 V DC / 1.29 A 02400 27 V DC / 1.07 A 02700 205 V DC / 0.15 A 20500 24 V AC / 1.56 A / 50 (60 Hz) 02450 120 V AC / 0.26 A / 60 Hz 12060 230 V AC / 0.15 A / 50 (60) Hz 23050		No designation V		Seals NBR FPM (Viton)	
CSA upon request - only for 320 bar (4640 PSI)				No designation T1		Soft-shift spool speed control without soft-shift control orifice Ø 0.7 mm (0.03 inch) in solenoid	
Connector EN 175301-803-A E1 with quenching diode AMP Junior Timer - axial direction (2 pins; male) E3A with quenching diode EN 175301-803-A with integrated rectifier Loose conductors (two insulated wires) E8 with quenching diode Deutsch DT04-2P - axial direction (2 pins; male) E12A with quenching diode		E1 E2 E3A E4A E5 E8 E9 E12A E13A		No designation N1 N2 N3 N4 N5 N7 N8 N9		Manual override standard cap nut covered rubber boot protected detent assembly with the ball hand screw socket head screw, size 3 detent assembly with the nut with ball without manual override	

- For directional valves with two solenoids, one solenoid must be de-energized before the other solenoid can be charged.
- For AC voltage supply use coils with connector type E5.
- For other solenoid voltage supply options see data sheet C_8007.

- The solenoid operated valves are delivered without connectors. For available connectors see data sheet K_8008.
- The orifice to the P port can be ordered separately, see data sheet SP_8010.
- Mounting bolts M5 x 45 DIN 912-10.9 or studs must be ordered separately. Tightening torque is 8.9+1 Nm (6.56+0.7 lbf.ft).
- Besides the commonly used valve versions shown other special models are available. Contact our technical support for their identification, feasibility and operating limits.

Spool Symbols

Type	Symbol	Interposition	Type	Symbol	Interposition	Type	Symbol	Interposition
Z11			R11			Z11		
C11			R21			X11		
H11			A51			C11		
P11			P51			H11		
Y11			Y51			K11		
L21			C51			N11		
B11			Z51			F11		
Y41			Z71			X25		
Z21			Z81			J15		
C41			Z91			J75		
F11			R31					
			H51					
			F51					

Type of Solenoid Coil in millimeters (inches)

E1, E2 / IP65	E3A, E4A / IP67	E5 / IP65	E8, E9	E12A, E13A / IP67 / 69K

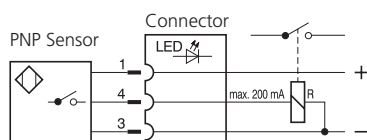
The indicated IP protection level is only achieved if the connector is properly mounted.

Manual Override in millimeters (inches)

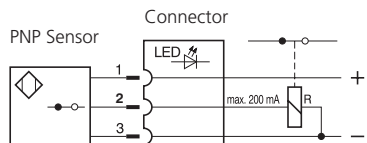
No designation - standard	N1- cap nut covered	N2- rubber boot protected	N3 - detent assembly with the ball	N4 - hand screw
N5 - socket head screw, size 3	N7 - detent assembly with the nut	N8 - with ball	N9 - without manual override	In case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override as long as the pressure in port T does not exceed 25 bar (363 PSI). For alternative manual overrides contact our technical support.

Spool Position Sensor

S1 - Circuit diagram for the normally - OPEN sensor



S4 - Circuit diagram of the normally - CLOSED sensor



Function of the position sensor:

In the basic position (when the solenoid is switched off), a steel core, connected to the spool, is under the position sensor. The sensor is activated, it means contacts of the sensor S1 are closed and contacts of the sensor S4 are open. After switching on the solenoid the spool with core moves out of the sensor range and the sensor is deactivated.

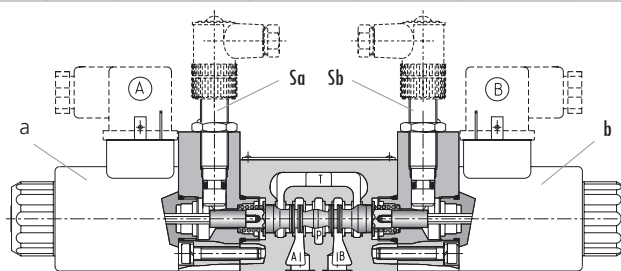
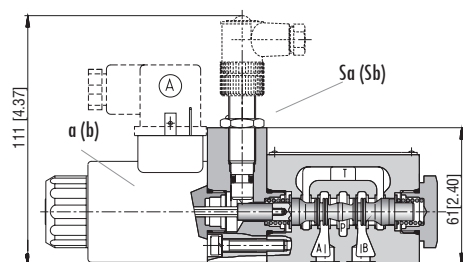
Typical configurations of the valve with a sensor:

3-position valve with two solenoids, equipped with two sensors
 2-position valve with one solenoid, equipped with one sensor on the solenoid side
 2-position valve with a detent assembly of spool, equipped with one sensor on the side of the solenoid which moves the spool from the basic position to the switched position according to the spool symbol
Note: the sensor always indicates the change of spool position realised by the energised solenoid, mounted on the side of the sensor.

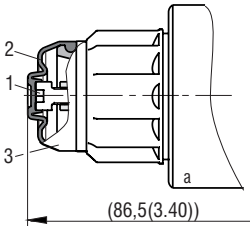
Technical Data of the Sensor		S1, S4
Rated power supply voltage	V	24 DC
Power supply voltage range	V	10 ... 30 DC
Rated current	mA	200
Sensor enclosure protection (EN 60529)		IP 67
Max. operating pressure at port T	bar (PSI)	210 (3046)
Switching frequency	Hz	1000
Ambient temperature range	°C (°F)	-25 ... +80 (-13 ... +176)
Technical Data of the Connector		
Power supply voltage range	V	10 ... 30 DC
Ambient temperature range	°C (°F)	-25 ... +80 (-13 ... +176)
Indicator		yellow LED

Two-Position Directional Control Valve				
① a(b)	③ Sa(Sb)	LED		
	S1	S4	S1	S4
0	1	0	ON	OFF
1	0	1	OFF	ON

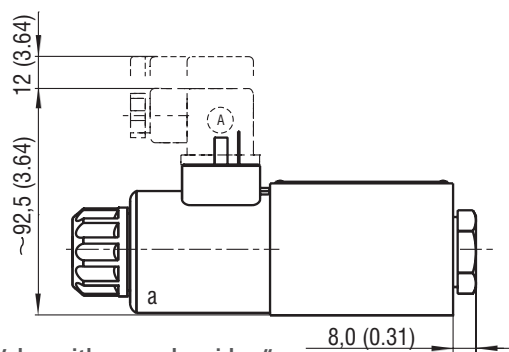
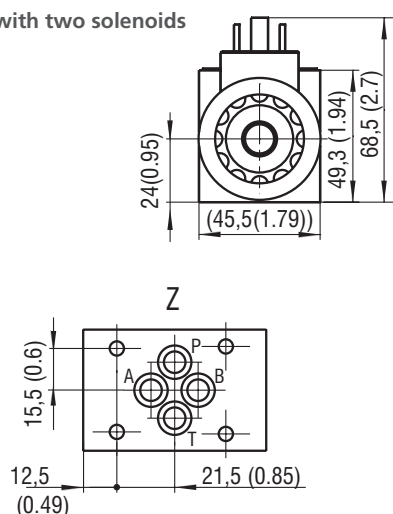
Three-Position Directional Control Valve									
① a(b)		③ Sa(Sb)				LED			
		S1		S4		S1		S4	
		Sa	Sb	Sa	Sb	Sa - LED	Sb - LED	Sa - LED	Sb - LED
0	0	1	1	0	0	ON	ON	OFF	OFF
1	0	0	1	1	0	OFF	ON	ON	OFF
0	1	1	0	0	1	ON	OFF	OFF	ON



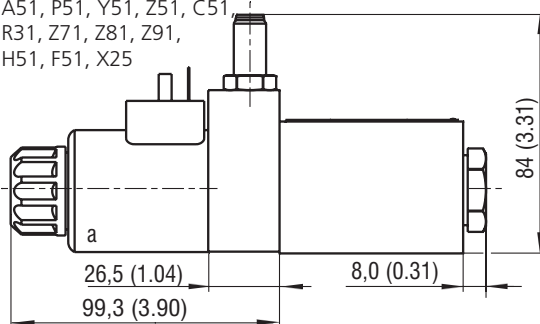
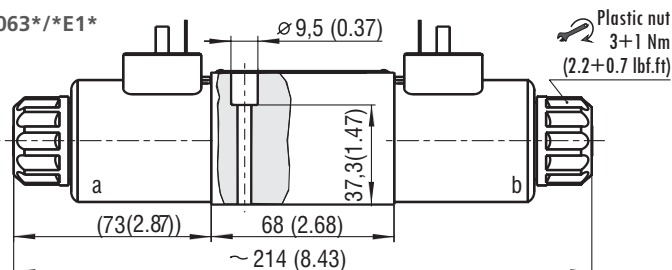
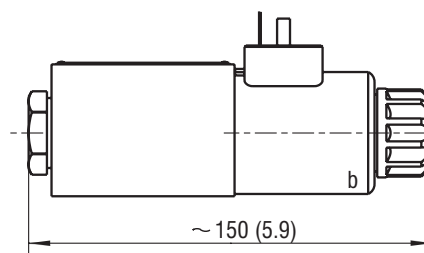
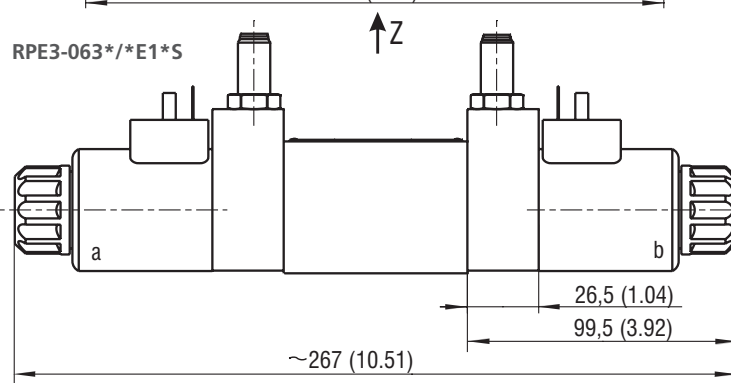
Spool Speed Control in millimeters (inches)

Designation T1	Important:
	This directional valve provides the means to control spool soft shifting by an orifice situated in the solenoid armature. To ensure the proper function of the valve, unobstructed venting of the solenoid is required through the bleeding plug (1). The plugs are accessible after removing the rubber boot (2) from the solenoid cap nut (3).
Switching time ON and OFF	300 ... 800 ms
The switching times shown are valid for viscosity $\nu = 32 \text{ mm}^2/\text{s}$ (156 SUS) and nominal voltage. They depend on working pressure and flow rate of the directional control valve.	

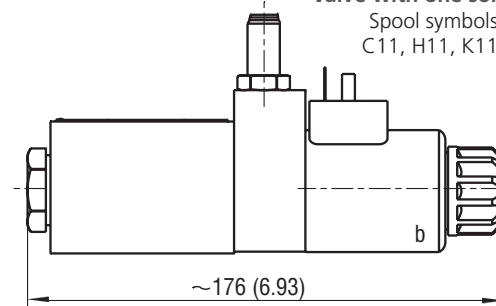
Dimensions in millimeters (inches)

Valve with two solenoids

Valve with one solenoid „a“

Spool symbols R11, R21, A51, P51, Y51, Z51, C51, R31, Z71, Z81, Z91, H51, F51, X25


RPE3-063*/E1*

RPE3-063*/E1*S

Valve with one solenoid „b“

Spool symbols X11, Z11, C11, H11, K11, N11, F11

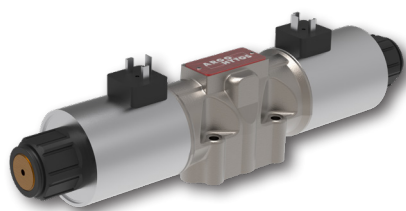


Mounting screws  8.9+1 Nm (6.56+0.7 lbf.ft)
M5x45 DIN 912-10.9

4/2 and 4/3 Directional Control Valve, Solenoid Operated

RPE4-10

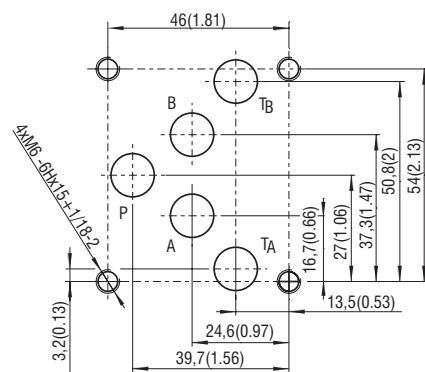
Size 10 (D05) • Q_{max} 140 l/min (37 GPM) • p_{max} 350 bar (5100 PSI)



Technical Features

- › Direct acting directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 05)
- › High transmitted hydraulic power up to 350 bar with optimized design to minimize pressure drop
- › Five chamber housing design with reduced hydraulic power dependence on fluid viscosity
- › The valve is available with interchangeable DC solenoids, also for AC power supply using a built-in rectifier bridge
- › Wide range of solenoid electrical terminal versions available
- › Wide range of interchangeable spools and manual overrides available
- › Inductive contactless Normally Open and Normally Closed spool position sensor option
- › Soft-shift spool speed control option
- › The coil is fastened to the core tube with a retaining nut and can be rotated by 90° to suit the available space.
- › In the standard version, the valve housing is phosphated and steel parts zinc-coated for 240 h salt spray protection acc. to ISO 9227. Enhanced surface protection for mobile sector available (ISO 9227, 520 h salt spray)

ISO 4401-05-04-0-05



Ports P, A, B, T - max Ø11.2 mm (0.44 in)

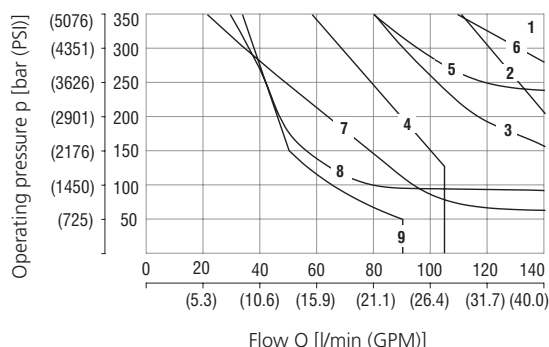
Technical Data

Valve size		10 (D05)
Max. flow	l/min (GPM)	140 (37)
Max. operating pressure at ports P, A, B	bar (PSI)	standard 350 (5080)
Max. operating pressure at port T	bar (PSI)	210 (3050)
Fluid temperature range (NBR)	°C (°F)	-30 ... +80 (-22 ... +176)
Fluid temperature range (FPM)	°C (°F)	-20 ... +80 (-4 ... +176)
Ambient temperature range	°C (°F)	-30 ... +50 (-22 ... +122)
Supply voltage tolerance	%	AC: ±10 DC: ±10
Max. switching frequency	1/h	15 000
Switching time at $v=32 \text{ mm}^2/\text{s}$ (156 SUS)	ON	AC: 30 ... 40 DC: 30 ... 40
	OFF	AC: 30 ... 70 DC: 10 ... 50
Enclosure type acc. to EN 60529		IP65 / IP67 (see Dimensions, page 3)
Weight	kg (lbs)	3,4 (7.50) 4,9 (10.80)
	Datasheet	Type
General information	GI_0060	Products and operating conditions
Coil types / connectors	C_8007 / K_8008	C31* / K*
Mounting interface	SMT_0019	Size 10
Spare parts	SP_8010	

Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

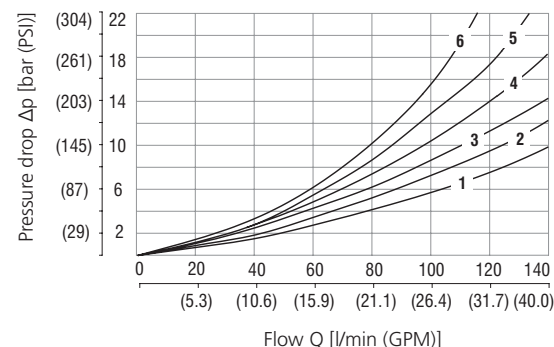
Operating limits

Operating limits for maximum hydraulic power at rated temperature and supply voltage equal to 90% nominal.



Spool symbol			
Z11, Z51, H11, H51, P11, P51	1	J15, J75	6
R11, X11, R21	2	L21	7
C11, C51	3	A51	8
B11, B51	4	C21	9
Y11, Y51	5		

Pressure drop related to flow rate



Spool symbol	P-A	P-B	A-T	B-T	P-T			P-A	P-B	A-T	B-T	P-T
Z11, P11, Y11, R11, X11, B11	1	1	2	2			C11	4	3	4	5	1
Z51, Y51, B51		1	2				C51	4			5	1
H11	1	1	2	2	1		L21	1	1	1	2	2
H51		1	2		1		R21	1	1	1	3	
P51		1	2				J15	1	1	2	3	
J75, A51	1	1					C21	6	6	6	6	4

For operating limits under conditions and flow directions other than shown contact our technical support. Admissible operating limits may be considerably lower with only one direction of flow (A or B plugged, or without flow.)

Type of Solenoid Coil in millimeters (inches)

E1, E2 Protection degree IP65	E3, E4 Protection degree IP65	E5 Protection degree IP65	E12A, E13A Protection IP67 / IP69K

The indicated IP protection level is only achieved if the connector is properly mounted.

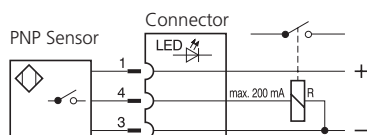
Manual Override in millimeters (inches)

No designation - standard	Designation N1 - cap nut covered	Designation N2 - rubber boot protected	Designation N4 - hand screw	Designation N5 - socket head screw size 3	Designation N9 - without manual override

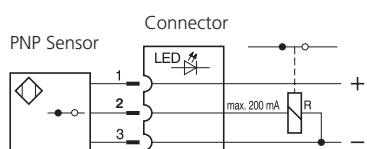
In case of solenoid malfunction or power failure, the spool of the valve can be shifted by manual override as long as the pressure in port T does not exceed 25 bar (363 PSI). For alternative manual overrides contact our technical support.

Spool Position Sensor

S1 - Circuit diagram of the normally - **OPEN** sensor



S4 - Circuit diagram of the normally - **CLOSED** sensor



Function of the position sensor:

In the basic position (when the solenoid is switched off), a steel core, connected to the spool, is under the position sensor. The sensor is activated, it means contacts of the sensor S1 are closed and contacts of the sensor S4 are open. After switching on the solenoid the spool with core moves out of the sensor range and the sensor is deactivated.

Technical Data of the Sensor		S1, S4
Rated power supply voltage	V	24 DC
Power supply voltage range	V	10 ... 30 DC
Rated current	mA	200
Sensor enclosure protection (EN 60529)		IP67
Max. operating pressure	bar (PSI)	210 (3046)
Switching frequency	Hz	1000
Ambient temperature range	°C (°F)	-25 ... +80 (-13 ... +176)
Technical Data of the Connector		
Power supply voltage range	V	10 ... 30 DC
Ambient temperature range	°C (°F)	-25 ... +80 (-13 ... +176)
Indicator		yellow LED

Typical configurations of the valve with a sensor:

3-position valve with two solenoids, equipped with two sensors

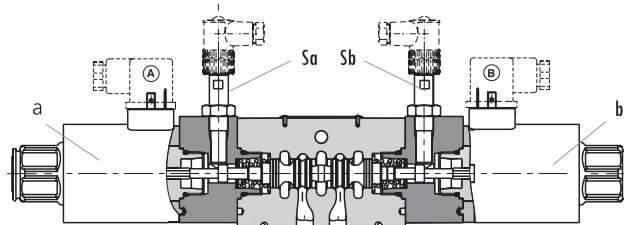
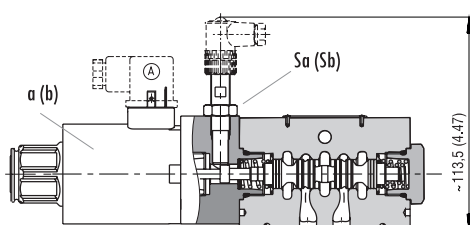
2-position valve with one solenoid, equipped with one sensor on the solenoid side

2-position valve with a detent assembly of spool, equipped with one sensor on the side of the solenoid which moves the spool from the basic position to the switched position according to the spool symbol

Note: the sensor always indicates the change of spool position realised by the energised solenoid, mounted on the side of the sensor.

Two-Position Directional Control Valve		LED			
Signal of solenoid ① a(b)	Signal of sensor ③ Sa(Sb)	S1		S4	
		S1	S4	S1	S4
0	1	0	ON	OFF	OFF
1	0	1	OFF	ON	ON

Three-Position Directional Control Valve		LED							
Signal of solenoid ① a(b)	Signal of sensor ③ Sa(Sb)	S1				S4			
		Sa	Sb	Sa	Sb	Sa - LED	Sb - LED	Sa - LED	Sb - LED
0	0	1	1	0	0	ON	ON	OFF	OFF
1	0	0	1	1	0	OFF	ON	ON	OFF
0	1	1	0	0	1	ON	OFF	OFF	ON



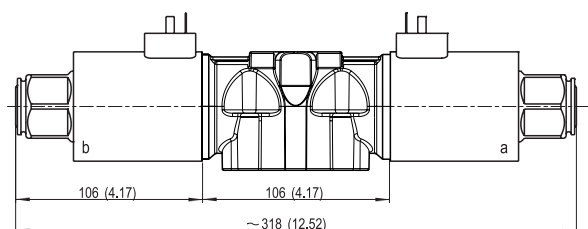
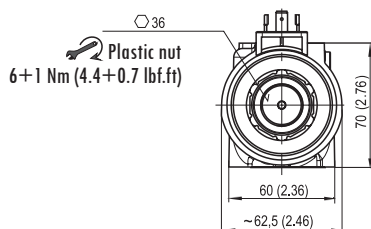
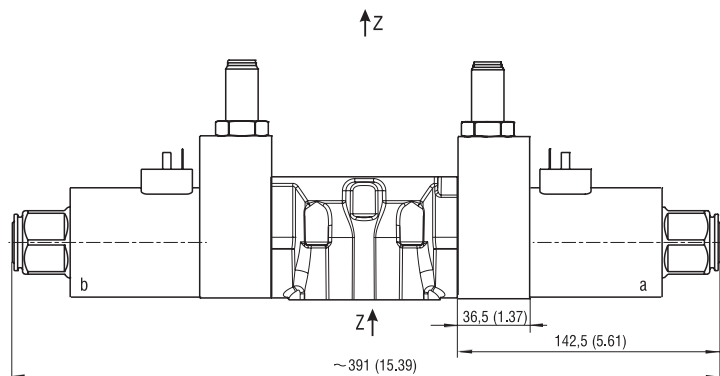
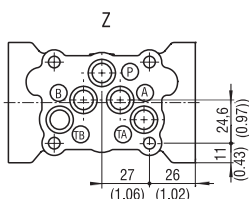
Spool Speed Control in millimeters (inches)

Designation T0 - Plug VSTI M10x1	Designation T2 - Orifice $\varnothing 0.6$ (0.02)	Designation T3 - Needle valve

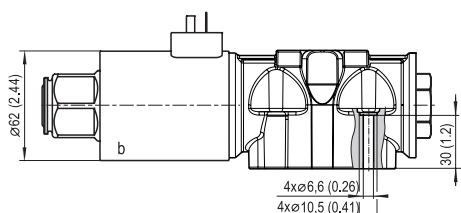
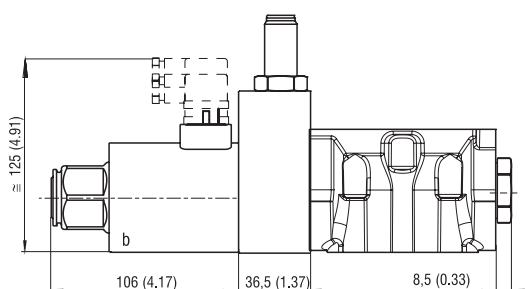
Plugged cavity for optional soft-shift control devices installation (T2, T3)	Switching time ON and OFF	The orifice extends the valve shifting time.	The needle valve allows continuous adjustment of the shifting time.
		120 ... 350 ms	30 ... 2000 ms

The switching times shown are valid for viscosity $\nu = 32 \text{ mm}^2/\text{s}$ (156 SUS) and nominal voltage. They depend on working pressure and flow rate of the directional control valve.

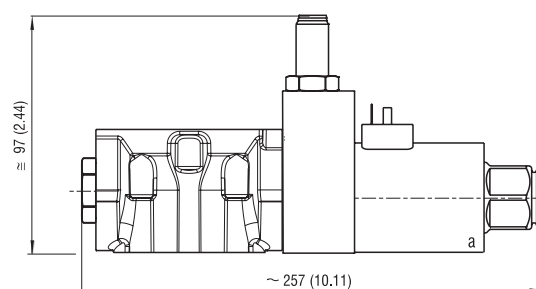
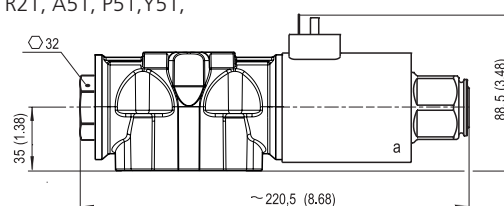
Dimensions in millimeters (inches)

Valve with two solenoids
RPE4-103*/*E1

RPE4-103*/*E1*S

Valve with one solenoid „b“

Spool symbols X11, C11, H11

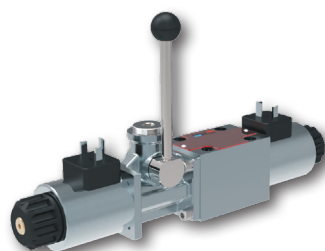

RPE4-102*/*E1*S

Valve with one solenoid „a“

Spool symbols R11, R21, A51, P51, Y51, C51, B51, Z51, H51



Mounting screws 14+1 Nm (10.3+0.7 lbf.ft)
M6 x 45 DIN 912-10.9

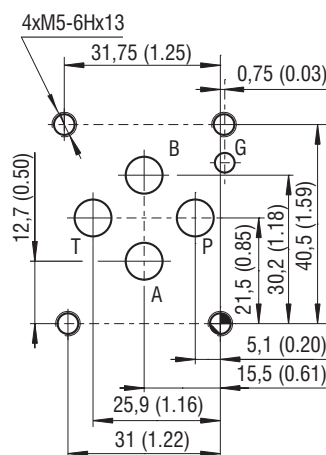
Solenoid Operated Directional Control Valve with Auxiliary Lever Override
RPER3-06

 Size 06 (D03) • Q_{max} 80 l/min (21 GPM) • p_{max} 350 bar (5100 PSI)

Technical Features

- › Auxiliary lever overrides for ON-OFF solenoid valves of the type RPE3-06 (Datasheet No. 4010) with Size 06 and mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03)
- › Auxiliary lever operators allow the valve to be operated when electrical system is de-energized, e.g. emergency operation, electrical failures, maintenance activities
- › Manual lever and actuation element can be rotated in 90° increments for flexible installation
- › When the valve is electrically operated the hand lever remains stopped in its neutral position
- › The lever override does not affect the performances of the base valve
- › In the standard version, the valve housing is phosphated for basic surface corrosion protection and as preparation for painting. Steel parts are zinc-coated for 240 h salt spray protection acc. to ISO 9227
- › Enhanced surface protection for mobile sector available for the valve housing and steel parts (ISO 9227, 520 h salt spray)

Technical Data

ISO 4401-03-02-0-05



Valve size		06 (D03)
Max. flow	l/min (GPM)	80 (21.1)
Max. operating pressure at port P, A, B	bar (PSI)	350 (5080)
Max. operating pressure at port T	bar (PSI)	100 (1450)
Fluid temperature range (NBR)	°C (°F)	-30 ... +80 (-22 ... +176)
Fluid temperature range (FPM)	°C (°F)	-20 ... +80 (-4 ... +176)
Ambient temperature range	°C (°F)	-30 ... +50 (-22 ... +122)
Service life	cycles	10 ⁶
Rated power supply voltage	%	AC: ±10 DC: ±10
Max. switching frequency	1/h	10 000
Lever characteristics		
Total stroke angle	deg	±20
Working stroke angle		±12 to 20
Operating force	N (lbf)	40 (29.5)
Lever device weight	kg (lbs)	0.59 (1.3)
General information		
Coil types / connectors	GI_0060	Products and operating conditions
Mounting interface	C_8007 / K_8008	C22B* / K*
Spare parts	SMT_0019	Size 06

Objednávací klíč
RPER3-06

4/2 and 4/3 solenoid operated directional control valve with auxiliary lever override

Valve size
Number of valve positions

 two
three

Spool symbols

see the table "Spool Symbols"

Rated supply voltage of solenoids

(at the coil terminals)

 12 V DC / 2,72 A
 24 V DC / 1,29 A
 27 V DC / 1,07 A
 205 V DC / 0,15 A
 24 V AC / 1,56 A / 50 (60) Hz
 120 V AC / 0,26 A / 60 Hz
 230 V AC / 0,15 A / 50 (60) Hz

01200
02400
02700
20500
02450
12060
23050

For directional valves with two solenoids, one solenoid must be de-energized before the other solenoid can be charged.
 For AC voltage supply use coils with connector type E5.
 For other solenoid voltage supply options see data sheet C_8007.
 The solenoid operated valves are delivered without connectors.
 For available connectors see data sheet K_8008.
 The orifice to the P port can be ordered separately, see data sheet SP_8010.
 Mounting bolts M5 x 45 DIN 912-10.9 or studs must be ordered separately
 Tightening torque is 8.9+1 Nm (6.56+0.7 lbf.ft)

Surface treatment

 No designation standard
 A zinc-coated (ZnCr-3), ISO 9227 (240 h)
 B zinc-coated (ZnNi), ISO 9227 (520 h)

Lever override length

No designation standard 102 mm

Manual lever and position of override actuating section

 A19 standard, lever on side A, upward
 B19 standard, lever on side B, upward

Seals

 No designation NBR
 V FPM (Viton)

Manual override at actuator system

No designation standard

Connector

 E1 EN 175301-803-A
 E2 E1 with quenching diode
 E3A AMP Junior Timer - axial direction (2 pins; male)
 E4A E3A with quenching diode
 E5 EN 175301-803-A with integrated rectifier
 E8 loose conductors (two insulated wires)
 E9 E8 with quenching diode
 E12A Deutsch DT04-2P - axial direction (2 pins; male)
 E13A E12A with quenching diode

Besides the commonly used valve versions shown other special models are available.
 Contact our technical support for their identification, feasibility and operating limits.

For operating limits and pressure drop refer to Datasheet No. 4010 of the base valve RPE3-06.

Spool Symbols

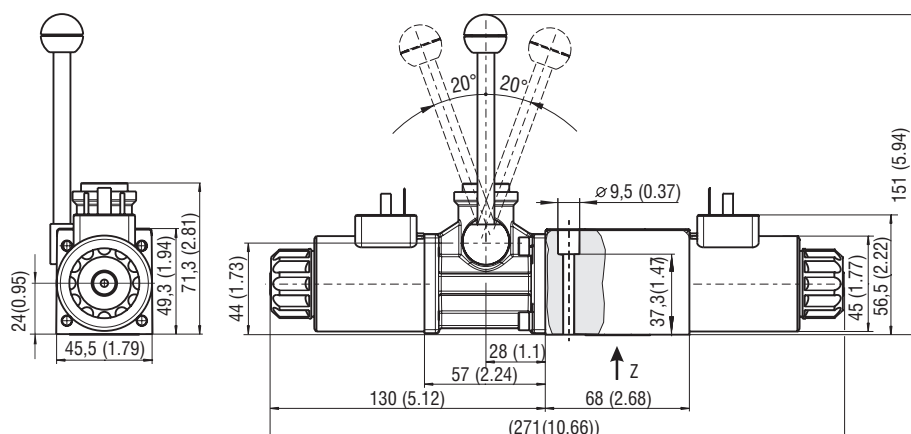
Type	Symbol	Interposition	Type	Symbol	Interposition
Z11			R11		
C11			H51		
H11					
Y11					

Dimensions in millimeters (in)

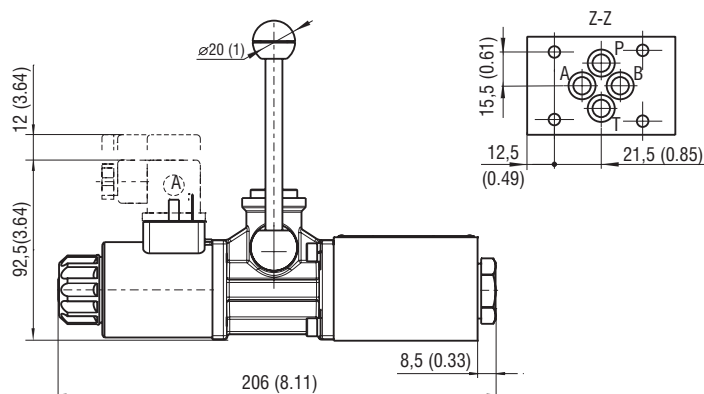


The lever operator should never be used when any solenoid is energized.

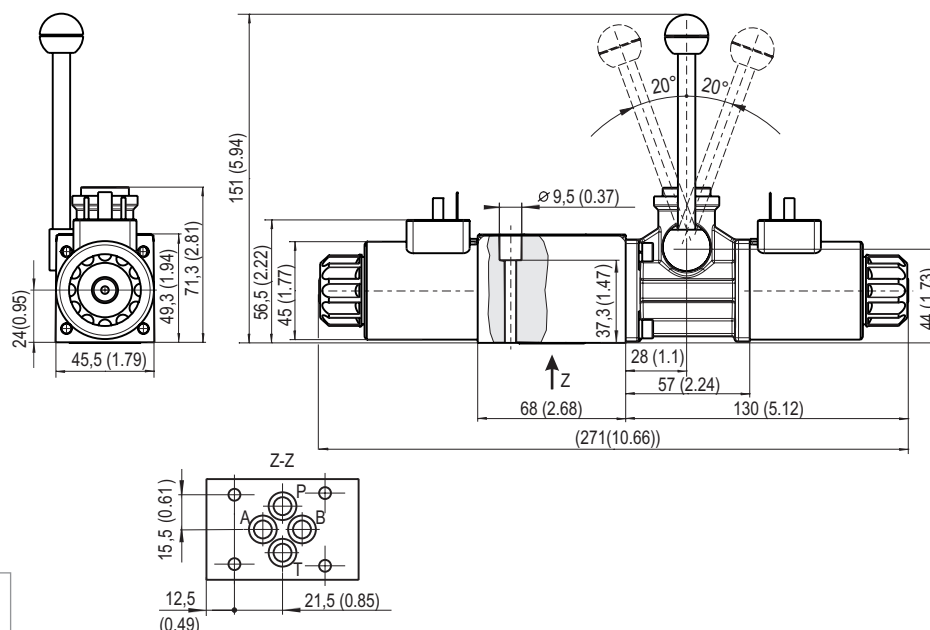
RPER3-063*/A19



RPER3-062*/A19



RPER3-063*/B19



Manual lever and actuating section is shown in the standard supplied position which is the most frequently used. Both elements can be rotated to various positions 90° apart. For other positions of lever and actuating section consult our technical department for their identification.

Mounting screws 8.9+1 Nm (6.56+0.7 lbf.ft)
M5x45 DIN 912-10,9



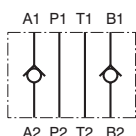
Technical Features

- › Poppet-type check valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03)
- › Sandwich plate design for use in vertical stacking assemblies
- › Leak-free closing in one or two service ports, suitable for fast cycling with long life
- › Sharp-edged steel seats for dirt-tolerant performance
- › High flow capacity
- › Optional bias spring ranges for back-pressure control
- › In the standard version, the valve housing is phosphated and steel parts are zinc-coated for 240 h protection acc. to ISO 9227

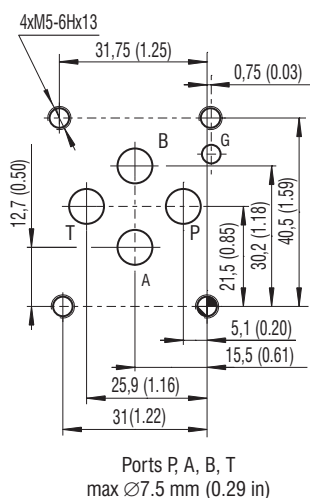
Functional Description

These check valves in sandwich plate design allow flow in one and prevent flow in the other direction. The sandwich design enables vertical stacking with other components of the same size. The check valves can be built into one or two channels, the other passages are unobstructed. The cracking pressure depends on the selected bias spring.

Symbol



ISO 4401-03-02-0-05



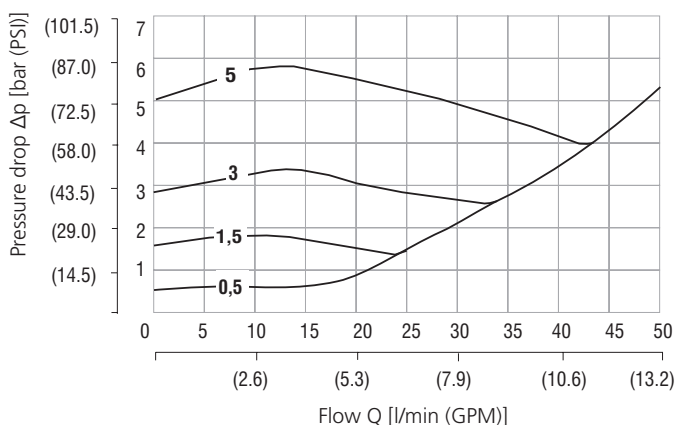
Technical Data

Valve size	06 (D03)				
Max. flow	l/min (GPM)				
Max. operating pressure	bar (PSI)				
Cracking pressure	bar	0.5	1.5	3	5
	(PSI)	(7.3)	(21.8)	(43.5)	(72.5)
Fluid temperature range (NBR)	°C (°F)	-30 +100 (-22 ... +212)			
Fluid temperature range (FPM)	°C (°F)	-20 +120 (-4 ... +248)			
Mass	kg (lbs)	0.8 (1.76)			

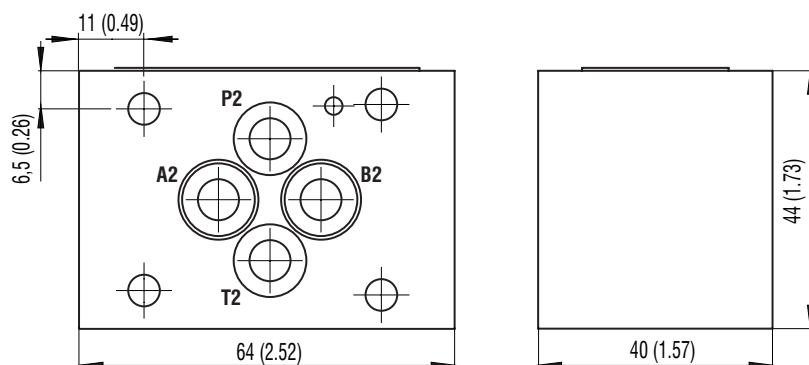
	Datasheet	Type
General information	GI_0060	Products and operating conditions
Mounting interface / Tolerances	SMT_0019	Size 06
Spare parts	SP_8010	

Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

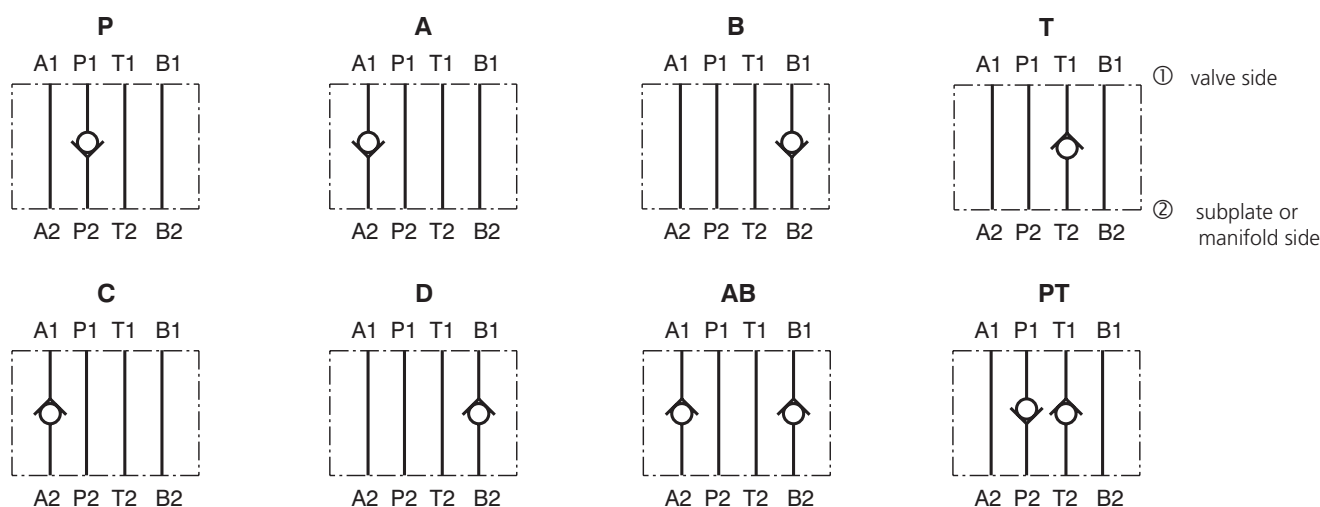
Pressure drop related to flow rate



Dimensions in millimeters (inches)



Functional Symbols



Note: The orientation of the symbol on the name plate corresponds with the valve function.

Ordering Code

MVJ3-06			-		-		-		
Check Valve, poppet-type, modular									Surface treatment No designation body phosphated, steel parts A zinc-coated (ZnCr-3), ISO 9227 (240 h) B zinc-coated (ZnCr-3), ISO 9227 (240 h) zinc-coated (ZnNi), ISO 9227 (520 h)
Valve size									
Functional symbols check valve in line P check valve in line A check valve in line B check valve in line T check valve in line A, inverted check valve in line B, inverted check valve in line A and B check valve in line P and T	P A B T C D AB PT								No designation V
									Seals NBR FPM (Viton)
									Cracking pressure 0.5 bar (7.3 PSI) 1.5 bar (21.8 PSI) 3.0 bar (43.5 PSI) 5.0 bar (72.5 PSI)

Check Valve, Poppet-type, Modular

MVJ3-10

Size 10 (D 05) • $Q_{\max}$ 100 l/min (26 GPM) • $p_{\max}$ 350 bar (5100 PSI)



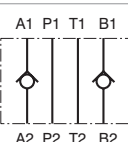
Technical Features

- › Poppet-type check valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 05)
- › Sandwich plate design for use in vertical stacking assemblies
- › Leak-free closing in one or two channels, suitable for fast cycling with long life
- › Sharp-edged steel seats for dirt-tolerant performance
- › High flow capacity
- › Optional bias spring ranges for back-pressure control
- › In the standard version, the valve housing is phosphated and steel parts are zinc-coated for 240 h protection acc. to ISO 9227

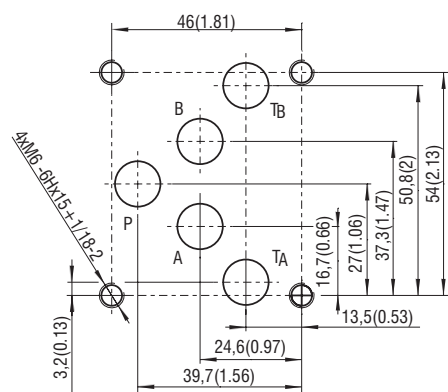
Functional Description

These check valves in sandwich plate design allow flow in one and prevent flow in the other direction. The sandwich design enables vertical stacking with other components of the same size. The check valves can be built into one or two channels, the other passages are unobstructed. The cracking pressure depends on the selected bias spring.

Symbol



ISO 4401-05-04-0-05



Ports P, A, B, T
max $\varnothing 11.2$ mm (0.44 in)

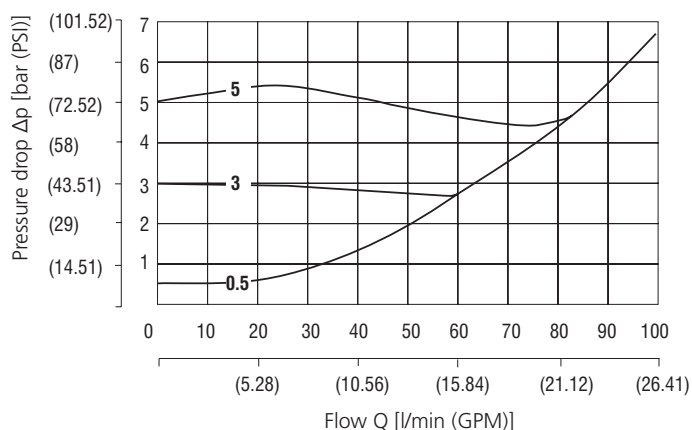
Technical Data

Valve size		10 (D05)		
Max. flow	l/min (GPM)	100 (26.4)		
Max. operating pressure	bar (PSI)	350 (5080)		
Cracking pressure	bar (PSI)	0.5 (7.3)	3 (43.5)	5 (72.5)
Fluid temperature range (NBR)	°C (°F)	-30 +100 (-22 ... +212)		
Fluid temperature range (FPM)	°C (°F)	-20 +120 (-4 ... +248)		
Mass	kg (lbs)	2.25 (4.96)		

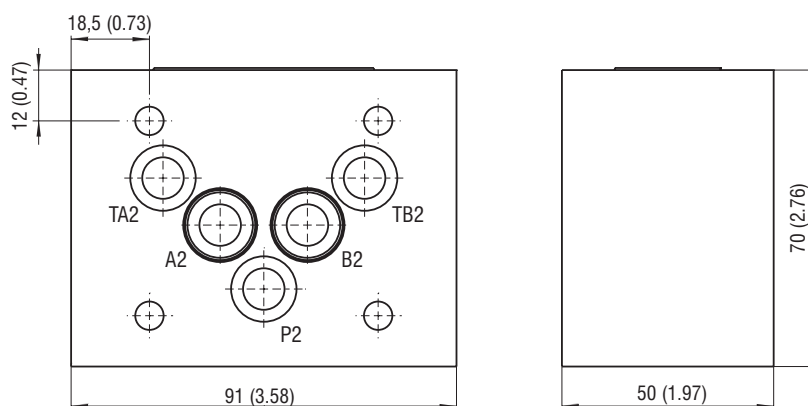
	Datasheet	Type
General information	GI_0060	Products and operating conditions
Mounting interface / Tolerances	SMT_0019	Size 10
Spare parts	SP_8010	

Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

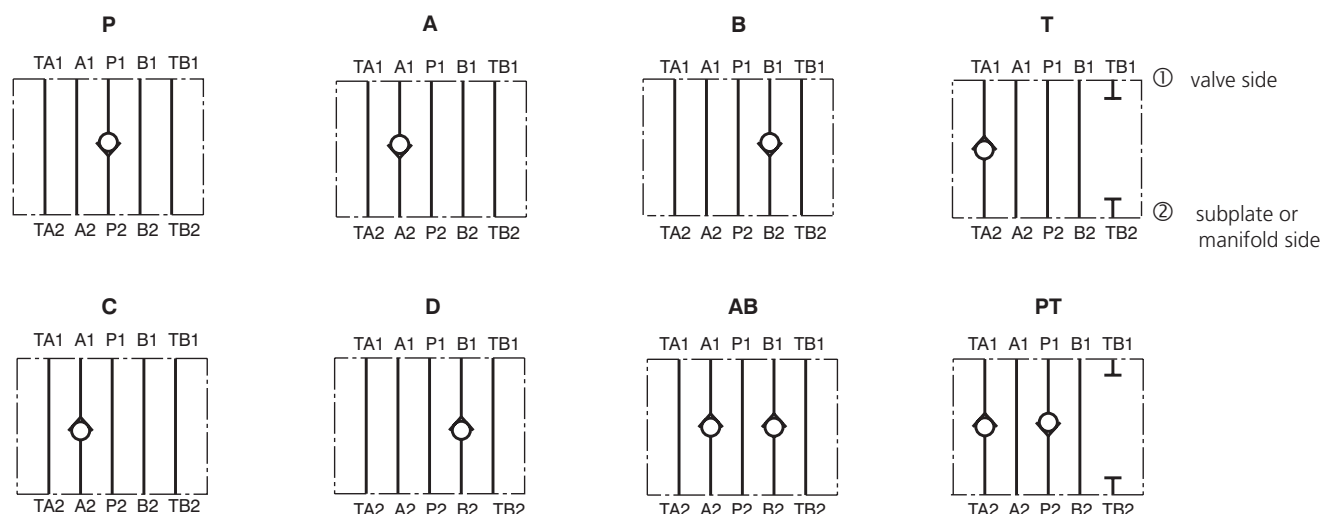
Pressure drop related to flow rate



Dimensions in millimeters (inches)

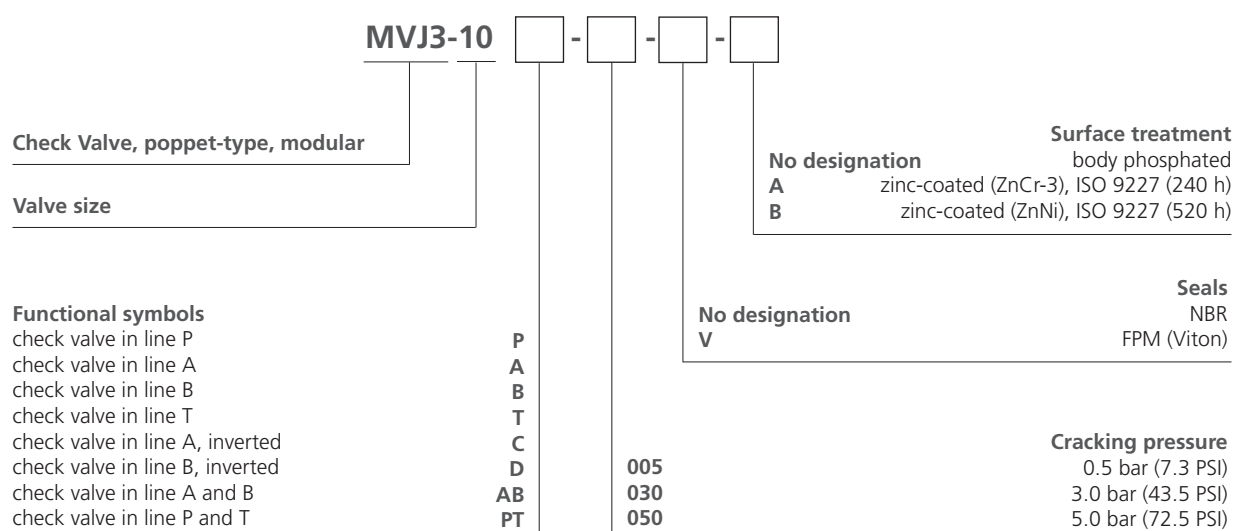


Functional Symbols



Note: The orientation of the symbol on the name plate corresponds with the valve function.

Ordering Code



Check Valve, Poppet Type, Pilot to Open, Modular

2RJV1-06/M

Size 06 (D03) • Q_{max} 60 l/min (16 GPM) • p_{max} 320 bar (4600 PSI)



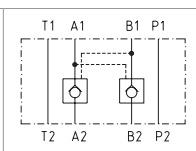
Technical Features

- › Pilot to open check valve, poppet type with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03)
- › Sandwich plate design for use in vertical stacking assemblies
- › Sharp-edged steel seats for dirt-tolerant performance
- › Leak-free closing, suitable for fast cycling with long life
- › High flow capacity
- › Optional bias spring ranges for back-pressure control
- › Three pilot ratios available
- › In the standard version, the valve housing is phosphated and steel parts are zinc-coated for 240 h protection acc. to ISO 9227

Functional Description

The valve allows flow to pass from port A(B)1 to A(B)2 while normally closing flow from A(B)2 to A(B)1 with load. When pressure is applied at pilot port. The flow passes from port 2 to 1. The valve has three pilot ratios option. This requires at least one-third (ratio 3:1), one-sixth (ratio 6:1) or one-ninth (ratio 9:1) of the load pressure to be applied at the opposite port to open the valve. The check valve is spring closed to secure the holding position in static conditions and without load. The valve is offered with optional bias spring ranges for back-pressure control.

Symbol



Technical Data

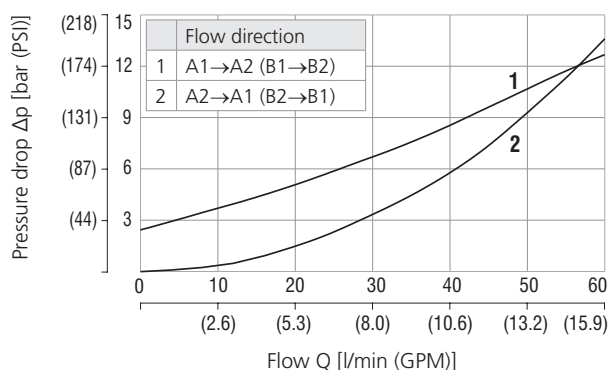
Valve size		06 (D03)
Max. flow	l/min (GPM)	60 (15.9)
Max. operating pressure	bar (PSI)	320 (4640)
Cracking pressure	bar (PSI)	3 (43.5) 4 (58) 5 (72.5) 8 (116) 12 (174)
Fluid temperature range (NBR)	°C (°F)	-30 +100 (-22 ... +212)
Fluid temperature range (FPM)	°C (°F)	-20 +120 (-4 ... +248)
Pilot ratio		3:1 / 6:1 / 9:1
Weight	kg (lbs)	0.8 (1.76)

	Datasheet	Type
General information	GI_0060	Products and operating conditions
Mounting interface	SMT_0019	Size 06
Spare parts	SP_8010	

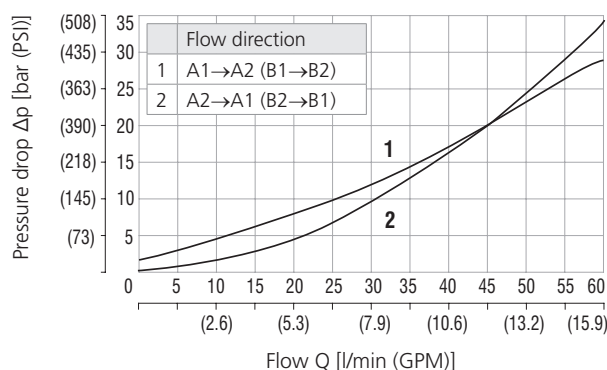
Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

Pressure drop related to flow rate

Pilot ratio 3 : 1

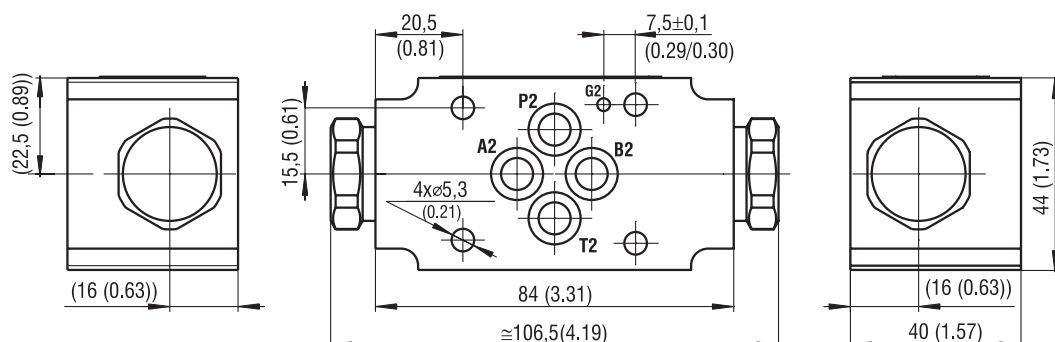


Pilot ratio 6 : 1

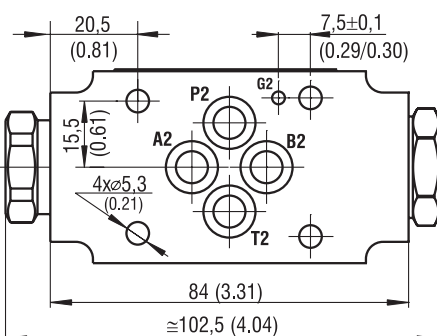


Dimensions in millimeters (inches)

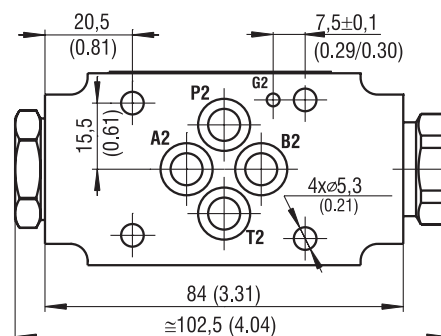
Model MC



Model MA

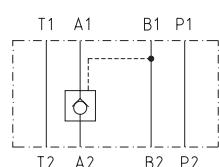


Model MB

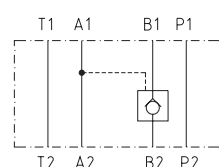


Functional symbols

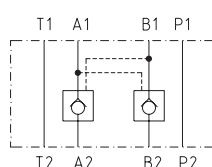
2RJV1-06/MA



2RJV1-06/MB



2RJV1-06/MC



- ① valve side
- ② subplate or manifold side

Notes: The orientation of the symbol on the name plate corresponds with the valve function.

Ordering Code

2RJV1 - 06 / M - -

Check valve, pilot to open, poppet type, modular

Valve size

Modular sandwich plate design

Functional symbols

check valve in line A
 check valve in line B
 check valve in line A and B

Pilot ratio

3 : 1 (for all cracking pressures except 2 bar) **3**
 6 : 1 (only for cracking pressure 2 bar) **6**
 9 : 1 (only for cracking pressure 0 bar and 3 bar) **9**

A
B
C

Surface treatment
No designation body phosphated, steel parts
 zinc-coated (ZnCr-3), ISO9227 (240 h)
A zinc-coated (ZnCr-3), ISO 9227 (240 h)
B zinc-coated (ZnNi), ISO 9227 (520 h)

Seals
No designation NBR
V FPM (Viton)

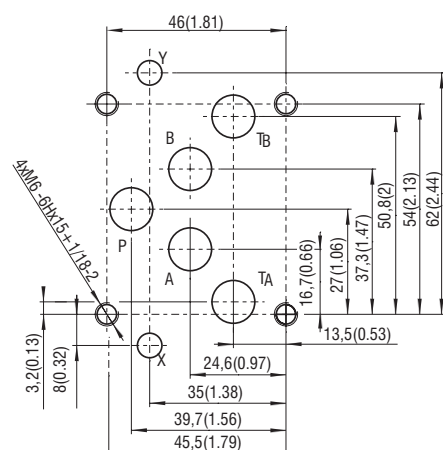
Cracking pressure
000 (for all pilot ratios) no spring
020 (for pilot ratio 6 : 1) 2 bar (29.0 PSI)
030* (for pilot ratio 3 : 1 and 9 : 1) **3 bar (43.5 PSI)**
040 (for pilot ratio 3 : 1) 4 bar (58.0 PSI)
050 (for pilot ratio 3 : 1) 5 bar (72.5 PSI)
080 (for pilot ratio 3 : 1) 8 bar (116 PSI)
120 (for pilot ratio 3 : 1) 12 bar (174 PSI)

*Preferred type for pilot ratio 3 : 1 respective 9 : 1

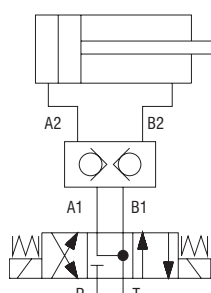
Pilot to Open Operated Check Valve, Poppet Type, Modular
VJR3-10/M

Size 10 (D05) • $Q_{\max}$ 140 l/min (37 GPM) • $p_{\max}$ 350 bar (5100 PSI)


ISO 4401-05-04-0-05



Ports P, A, B, T - max. Ø11,2 mm (0.44 in)

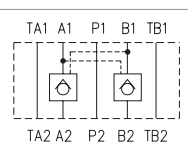
Typical circuit with pilot operated check valve

Technical Features

- › Pilot to open operated check valve, poppet type with subplate mounting surface acc. to ISO 4401, DIN 24340 (CETOP 05) standards
- › Sandwich plate design for use in vertical stacking assemblies
- › Sharp-edged ground steel seats for dirt-tolerant performance
- › Leak-free closing and suitable for fast cycling with long life
- › High flow capacity
- › Valve is fitted with decompression stage facilitating steady opening without pressure peaks
- › In the standard version, the valve housing is phosphated and steel parts zinc coated for 240 h protection acc. to ISO 9227

Functional Description

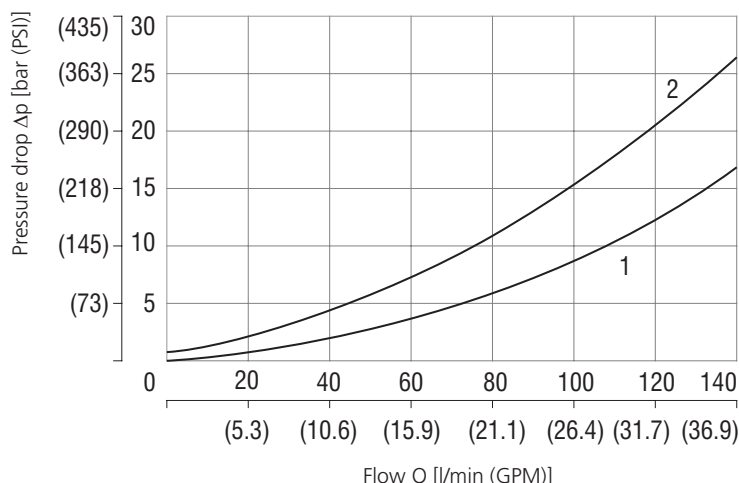
The valve allows flow to pass from port A(B)1 to A(B)2 while normally closing flow from A(B)2 to A(B)1 with load. When pressure is applied at pilot port. The flow passes from port 2 to 1. The valve has a 6:1 pilot ratio. The check valve is also spring closed to secure holding position in static conditions without the load. The valve is offered with optional bias spring ranges for back-pressure control.

Symbol


Technical Data

Valve size		10 (D05)
Max. flow	l/min (GPM)	140 (37)
Max. operating pressure	bar (PSI)	350 (5080)
Cracking pressure	bar (PSI)	2 (29)
Fluid temperature range (NBR)	°C (°F)	-30 +100 (-22 ... +212)
Fluid temperature range (FPM)	°C (°F)	-20 +120 (-4 ... +248)
Pilot ratio		6:1
Weight	kg (lbs)	2.2 (4.85)
	Datasheet	Type
General information	GI_0060	products and operating conditions
Mounting interface / tolerances	SMT_0019	Size 10
Spare parts	SP_8010	

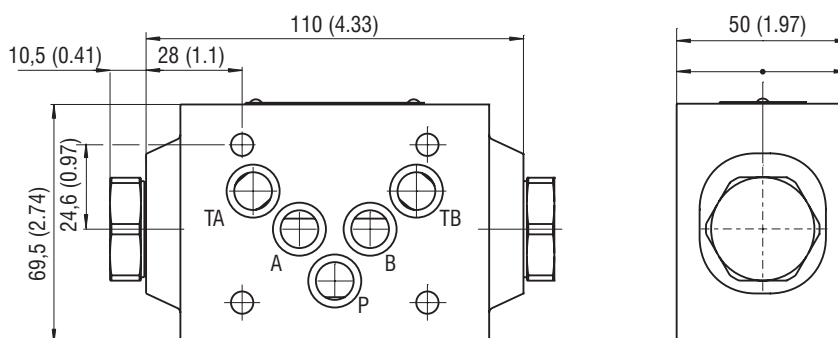
Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

Pressure drop related to flow rate


	Flow direction
1	A1→A2 (B1→B2)
2	A2→A1 (B2→B1)

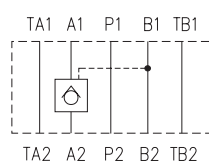
Dimensions in millimeters (inches)

Model "C,,

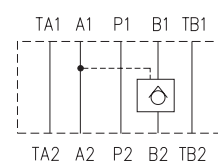


Functional symbols

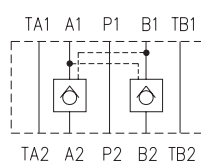
VJR3-10/MA



VJR3-10/MB



VJR3-10/MC



① valve side

② subplate or manifold side

Notes: The orientation of the symbol on the name plate corresponds with the valve function.

Ordering Code

VJR3-10 / M

Check valve, pilot to open, poppet type, modular

Valve size

Modular sandwich plate design

Functional symbols

Check valve in line A
 Check valve in line B
 Check valve in line A and B

Pilot ratio

6:1

A
 B
 C

6

No designation

Surface treatment

body phosphated, steel parts
 zinc-coated (ZnCr-3), ISO 9227 (240 h)
 A zinc-coated (ZnCr-3), ISO 9227 (240 h)
 B zinc-coated (ZnNi), ISO 9227 (520 h)

No designation
 V

Seals

NBR
 FPM (Viton)

Cracking pressure

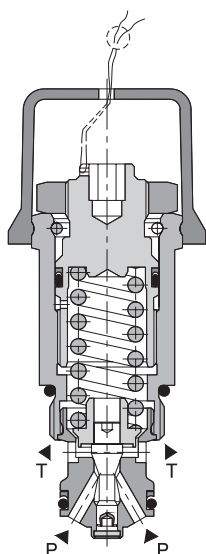
2.0 bar (29 PSI)

020

Pressure Relief Valve, Poppet Type, Direct Acting

VPP2-04/S

M22x1.5 • Q_{max} 40 l/min (11 GPM) • p_{max} 320 bar (4600 PSI)



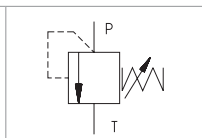
Technical Features

- › Excellent stability throughout flow range with rapid response to dynamic pressure changes
- › Low hysteresis, accurate pressure control and low pressure drop
- › Wide pressure range up to 320 bar
- › Hardened precision parts
- › Sharp-edged steel seats for dirt-tolerant performance
- › Leak-free closing, suitable for fast cycling with long life
- › Adjustable by allen key or hand screw
- › In the standard version, the valve is zinc-coated for 240 h protection acc. to ISO 9227

Functional Description

A poppet type, direct acting hydraulic relief valve in the form of a screw-in cartridge intended for use as a pressure limiting device for common hydraulic circuit protection. The spring acts on the poppet and presses it onto the valve seat. If the hydraulic pressure is below the pre-set value, the valve is closed. If the hydraulic force exceeds the pre-set value the valve opens and flow passes to the tank port until the system pressure falls below the spring pre-set value and the valve closes again.

Symbol



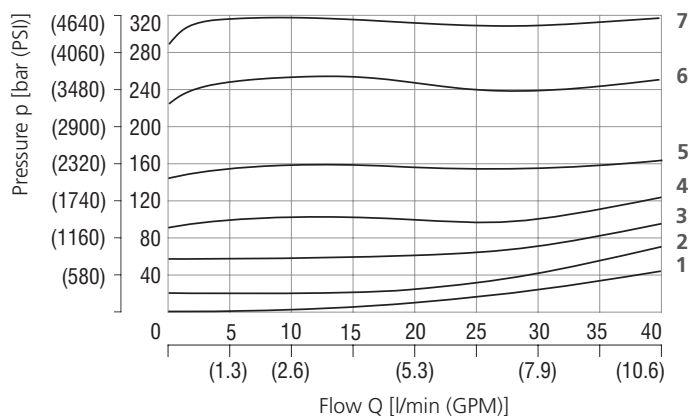
Technical Data

Valve size / Cartridge cavity		M22x1.5 / QG2
Max. flow	l/min (GPM)	40 (10.6)
Max. operating pressure	bar (PSI)	320 (4640)
Fluid temperature range (NBR)	°C (°F)	-30 ... +100 (-22 ... 212)
Fluid temperature range (FPM)	°C (°F)	-20 ... +120 (-4 ... 248)
Mass	kg (lbs)	0.17 (0.37)

		Datasheet	Type
General information		GI_0060	Products and operating conditions
Valve bodies	In-line mounted	SB_0018	SB-QG2*
	Sandwich mounted	SB-04(06)_0028	SB-*QG2*
Cavity details		SMT_0019	SMT-QG2*
Spare parts		SP_8010	SMT-B2*

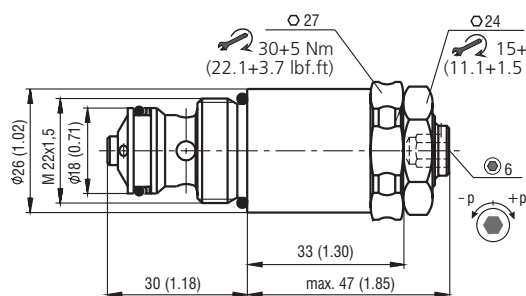
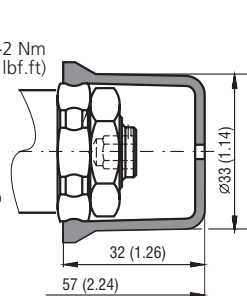
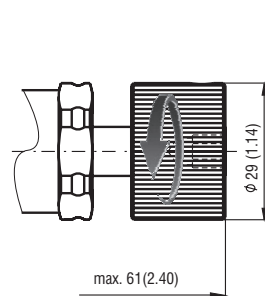
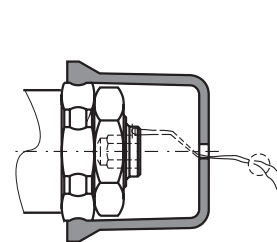
Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

Relief pressure related to flow rate



	Pressure range
7	32
6	25
5	16
4	10
3	6
2	2
1	Min. pressure setting

Dimensions in millimeters (inches)

Model S

Model T

Model RS

Model L


Ordering Code

VPP2-04 / S

**Pressure relief valve, poppet type,
direct acting** **M22x1.5**

Model
screw-in cartridge

S

Pressure range

up to 25 bar (360 PSI) **2**
up to 63 bar (910 PSI) **6**
up to 100 bar (1450 PSI) **10**
up to 160 bar (2320 PSI) **16**
up to 250 bar (3630 PSI) **25**
up to 320 bar (4600 PSI) **32**

S
T
RS
L

No designation
V

Surface treatment

A zinc-coated (ZnCr-3), ISO 9227 (240 h)
B zinc-coated (ZnNi), ISO 9227 (520 h)

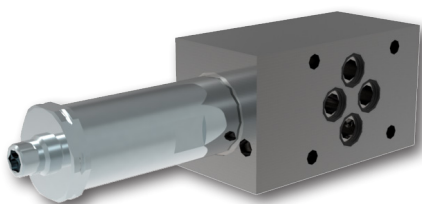
Seals

NBR
FPM (Viton)

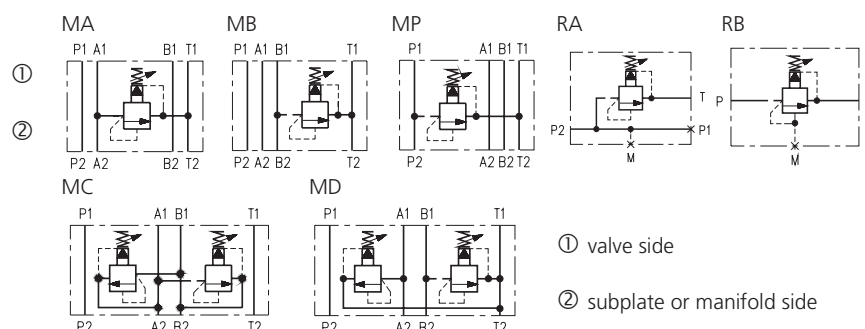
Adjustment option

allen key (hex. 6), without protective cap
allen key (hex. 6), with protective cap
hand screw, metal
allen key (hex. 6), with protective cap, sealable
(lockwire holes)

VPN1-06/M(R)

 Size 04 (D02), 06 (D03) • Q_{max} 70 l/min (18.5 GPM) • p_{max} 320 bar (4600 PSI)

Technical Features

- › Pressure relief valve, spool type, pilot operated, with mounting interface acc. to ISO 4401, DIN 24340 (CETOP 02 and 03) or in-line design
- › Excellent stability throughout flow range with rapid response to dynamic pressure changes
- › Low hysteresis, accurate pressure control and low pressure drop
- › Wide pressure range up to 320 bar
- › High flow capacity
- › Hardened precision parts
- › Ideal for use as control valve where accuracy and repeatability is required
- › Adjustable by allen key or hand screw, optionally sealable (lockwire holes)
- › In the standard version, the valve housing is phosphated and steel parts are zinc-coated for 240 h protection acc. to ISO 9227

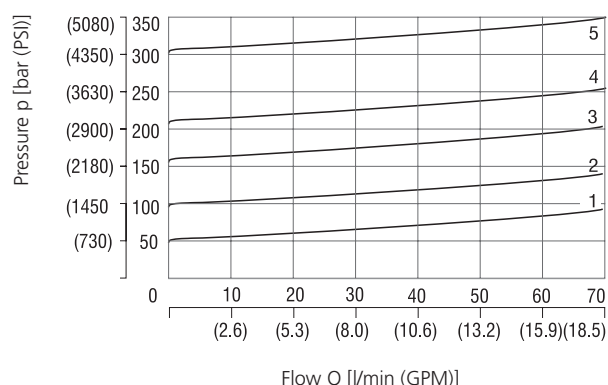
Functional Symbols


Notice: The orientation of the symbol on the name plate corresponds with the valve function.

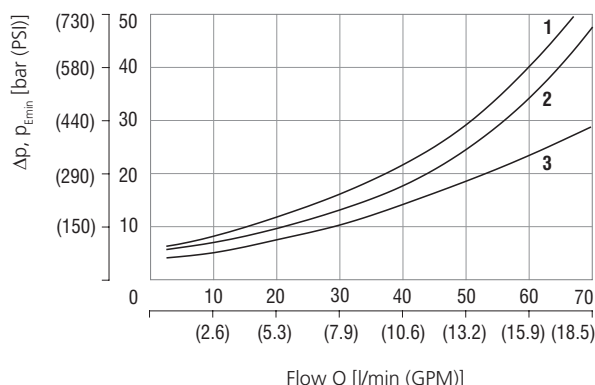
Technical Data

Valve size		04 (D02), 06 (D03)
Max. flow	l/min (GPM)	70 (18.5)
Max. pressure (ports P, T)	bar (PSI)	320 (4640)
Fluid temperature range (NBR)	°C (°F)	-30...+100 (-22...+212)
Fluid temperature range (FPM)	°C (°F)	-20...+120 (-4...+248)
Weight - models MA (B, P) 04	kg (lbs)	0.82 (1.81)
- models MC (D) 04		1.32 (2.91)
- models MA (B, P) 06		1.2 (2.64)
- models MC (D) 06		1.5 (3.31))
- models RA1 (2), RB1 (2)		1.25 (2.76)
	Datasheet	Type
General information	GI_0060	Products operating conditions
Mounting interface	SMT_0019	Size 04 / 06
Spare parts	SP_8010	

Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

Relief pressure related to flow rate


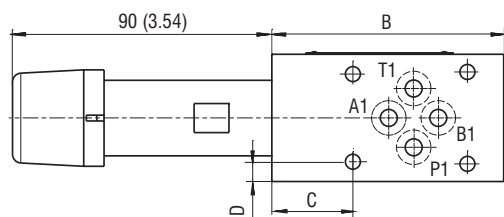
Pressure range	6	10	16	21	32
	1	2	3	4	5

Minimum set and circulation pressure


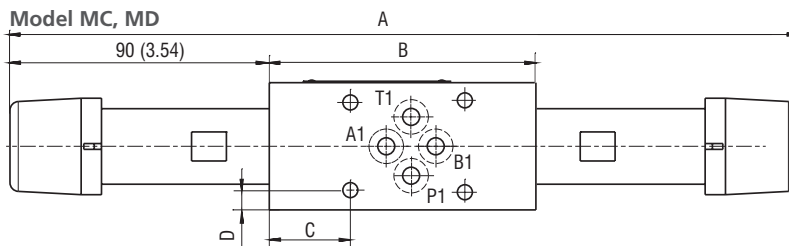
Models	MC	MA, MB MP, MD	RA, RB
	1	2	3

Dimensions in millimeters (inches)

Model MA

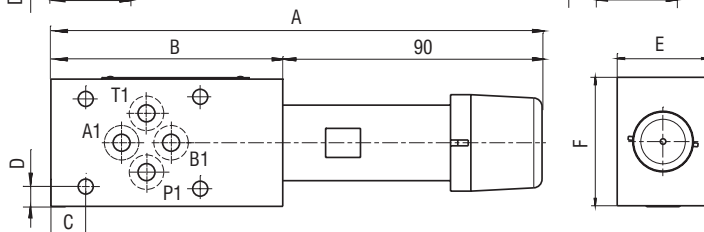


Model MC, MD



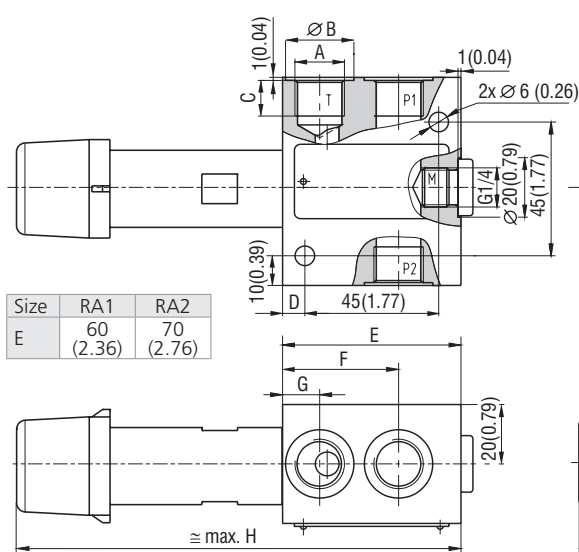
Model MB, MP

Size	04 (D02)	06 (D03)
MA, MB, MC, MD, MP		
D	6.25 (0.25)	7 (0.28)
E	34.6 (1.36)	40 (1.57)
F	35 (1.38)	45 (1.77)



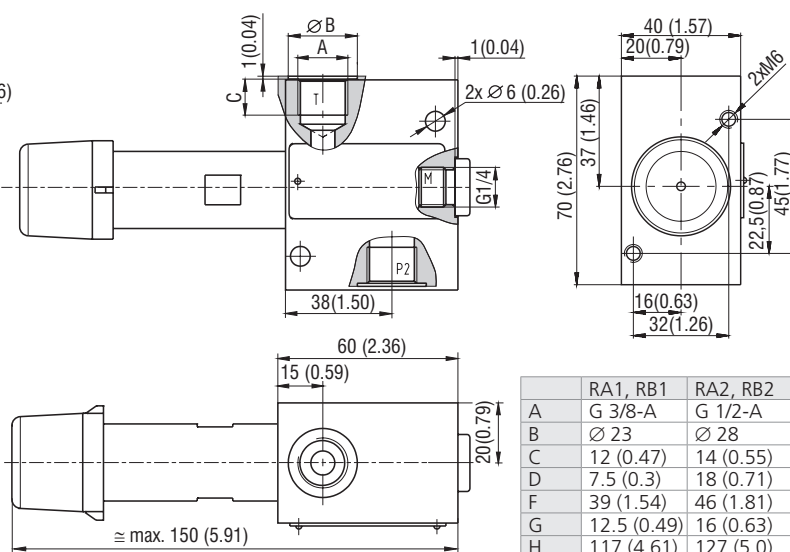
Version	Size	04 (D02)	06 (D03)
MA (B,P)	A	170 (6.70)	
MC (D)	A	284 (11.18)	274 (10.79)
MA (B,P)	B	80 (3.15)	
MC (D)	B	104 (4.09)	94 (3.70)
MA (C,D)	C	40 (1.57)	25.5 (1.0)
MB (P)	C	16 (0.63)	11.5 (0.45)

Model RA1, RA2



Size	RA1	RA2
E	60 (2.36)	70 (2.76)

Model RB1, RB2



	RA1, RB1	RA2, RB2
A	G 3/8-A	G 1/2-A
B	Ø 23	Ø 28
C	12 (0.47)	14 (0.55)
D	7.5 (0.3)	18 (0.71)
F	39 (1.54)	46 (1.81)
G	12.5 (0.49)	16 (0.63)
H	117 (4.61)	127 (5.0)

Ordering Code

VPN1-06 / [] - [] - [] - [] - []

Pressure relief valve, spool type,
pilot operated, modular

Model

modular, valve from A to T
modular, valve from B to T
modular, valve from P to T
modular, valve from A to B and B to A
modular, valve from A to T and B to T
in-line valve, three ports, thread G 3/8 (P1, P2, T)
in-line valve, three ports, thread G 1/2 (P1, P2, T)
in-line valve, two ports, thread G 3/8 (P, T)
in-line valve, two ports, thread G 1/2 (P, T)

MA
MB
MP
MC
MD
RA1
RA2
RB1
RB2

Modular plate size

ISO 4401-02-01-0-05, DIN 24340 (CETOP 02), size 04
ISO 4401-03-02-0-05, DIN 24340 (CETOP 03), size 06

04
06

No designation

Surface treatment
standard
A zinc-coated (ZnCr-3), ISO 9227 (240 h)
B zinc-coated (ZnNi, ISO 9227 (520 h)

No designation

Seals
NBR
FPM (Viton)

Adjustment option*

allen key (hex. 6), without protective cap
allen key (hex. 6), with protective cap
hand screw, metal
hand screw, plastic
allen key (hex. 6), with protective cap, sealable
(lockwire holes)

Model with two pressure relief cartridges

A side, allen key (hex. 6), without protective cap
B side, hand screw, metal

*for dimensions of adjustment options see data sheet No.5161

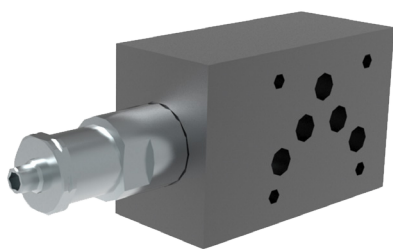
Pressure range

up to 63 bar (910 PSI)
up to 100 bar (1450 PSI)
up to 160 bar (2320 PSI)
up to 210 bar (3050 PSI)
up to 320 bar (4600 PSI)

Pressure Relief Valve, Spool Type, Pilot Operated, Modular

VPN2-10/M(R)

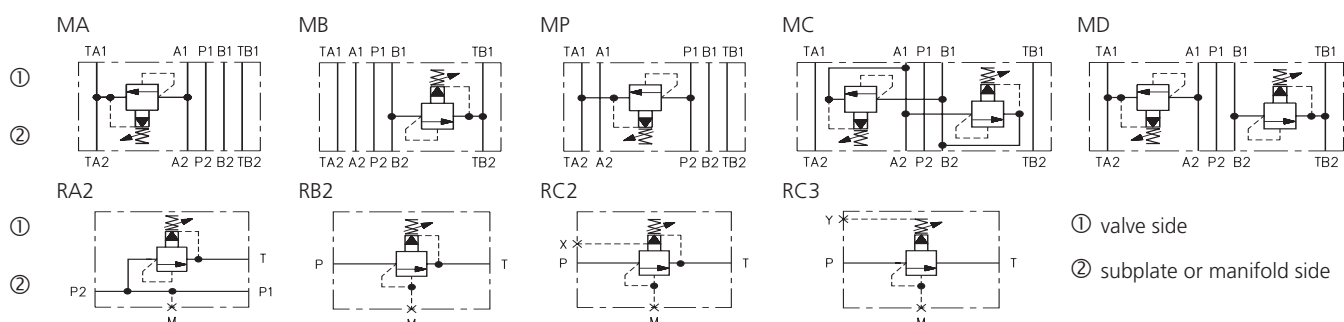
Size 10 (D05) • Q_{max} 150 l/min (40 GPM) • p_{max} 350 bar (5100 PSI)



Technical Features

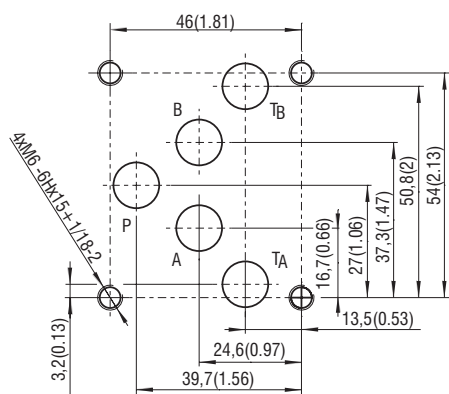
- › Pressure relief valve, spool type, pilot operated, with mounting interface acc. to ISO 4401, DIN 24340 (CETOP 05) or in-line design
- › Low hysteresis, accurate pressure control and low pressure drop
- › Wide pressure range up to 350 bar
- › High flow capacity
- › Hardened precision parts
- › Ideal for use as control valve where accuracy and repeatability is required
- › Adjustable by allen key or hand screw, optionally sealable (lockwire holes)
- › In the standard version, the valve housing is phosphated and steel parts are zinc-coated for 240 h protection acc. to ISO 9227

Functional Symbols



Notice: The orientation of the symbol on the name plate corresponds with the valve function.

ISO 4401-05-04-0-05



Ports P, A, B, T - max. $\varnothing$ 11.2 mm (0.44 in)

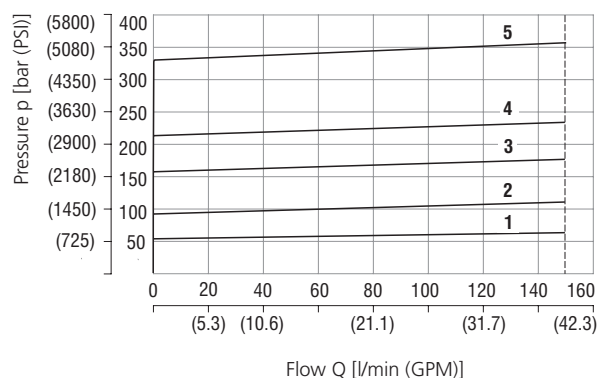
Technical Data

Valve size		10 (D05)
Max. flow	l/min (GPM)	150 (40)
Max. operating pressure	bar (PSI)	350 (5080)
Fluid temperature range (NBR)	°C (°F)	-30 ... +100 (-22 ... 212)
Fluid temperature range (FPM)	°C (°F)	-20 ... +120 (-4 ... 248)
Mass	kg (lbs)	- models MA (B, P) 10 2.15 (4.74)
		- models MC (D) 10 3.0 (6.61)
		- models RA2, RB2, RC2 (3) 2.7 (5.95)

	Datasheet	Type
General information	GI_0060	Products and operating conditions
Mounting interface	SMT_0019	Size 10
Spare parts	SP_8010	

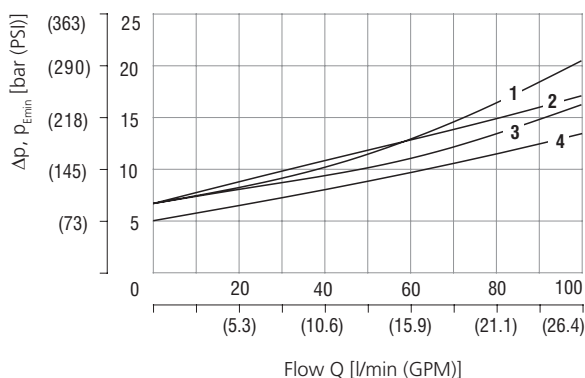
Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

Relief pressure related to flow rate



Pressure range	6	10	16	21	32
	1	2	3	4	5

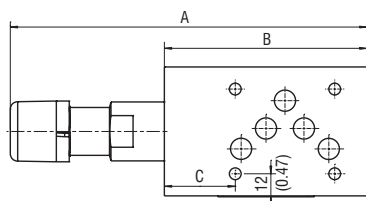
Minimum set and circulation pressure



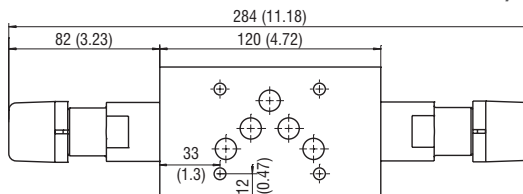
Models	MC	MP	MA, MB	RA, RB, RC
	1	2	3	4

Dimensions in millimeters (inches)

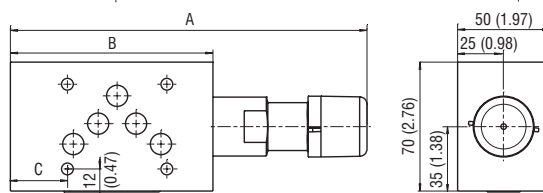
Model MA, MP



Model MC, MD



Model MB

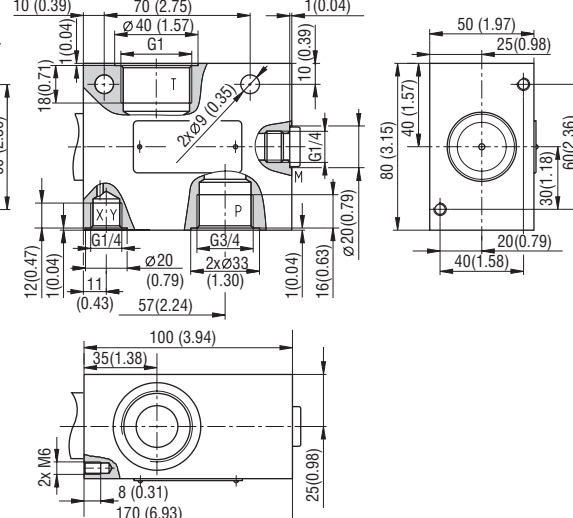
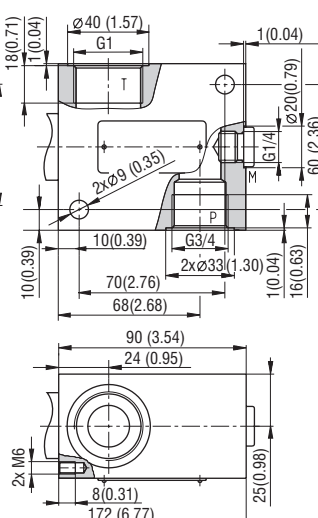
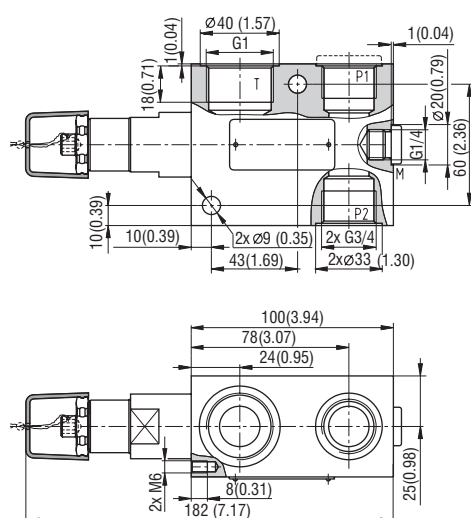


Size 10	A	B	C
MA	187 (7.36)	105 (4.13)	33 (1.30)
MB			38.5 (1.52)
MP	192 (7.56)	110 (4.33)	18 (0.71)

Model RA2

Model RB2

Model RC2, RC3



Ordering Code

Pressure relief valve, spool type,
pilot operated, modular

Model

modular, valve from A to TA
 modular, valve from B to TB
 modular, valve from P to TA
 modular, valve from A to B and B to A
 modular, valve from A to TA and B to TB
 in-line valve, three ports, thread P1, P2-G3/4, T-G1
 in-line valve, two ports, thread P-G3/4, T-G1
 in-line valve, two ports, thread P-G3/4, T-G1, X-G1/4
 in-line valve, two ports, thread P-G3/4, T-G1, Y-G1/4

MA
MB
MP
MC
MD
RA2
RB2
RC2
RC3

Modular plate size

ISO 4401-05-04-0-05, DIN 24340 (CETOP 05), size 10

10

VPN2-10 / [] - [] - [] - [] - []

Surface treatment
No designation body phosphated, steel parts
 zinc-coated (ZnCr-3), ISO 9227 (240 h)
A zinc-coated (ZnCr-3), ISO 9227 (240 h)
B zinc-coated (ZnNi), ISO 9227 (520 h)

Seals
No designation NBR
V FPM (Viton)

Adjustment option*
S allen key (hex. 6), without protective cap
T allen key (hex. 6), with protective cap
RS hand screw, metal
RP hand screw, plastic
L allen key (hex. 6), with protective cap, sealable (lockwire holes)
Model with two pressure relief cartridges
S/RS A side, allen key (hex. 6), without protective cap
 B side, hand screw, metal

*for dimensions of adjustment options see data sheet No.5163

Pressure range
6 up to 63 bar (910 PSI)
10 up to 100 bar (1450 PSI)
16 up to 160 bar (2320 PSI)
21 up to 210 bar (3050 PSI)
32 up to 320 bar (4600 PSI)

Model with two pressure relief cartridges
32/10 320 bar (4600 PSI) in port A, 100 bar (1450 PSI) in port B

Restrictor Valve with Reverse Flow Check, Modular

2VS3-06

Size 06 (D03) • Q_{max} 80 l/min (21 GPM) • p_{max} 320 bar (4600 PSI)

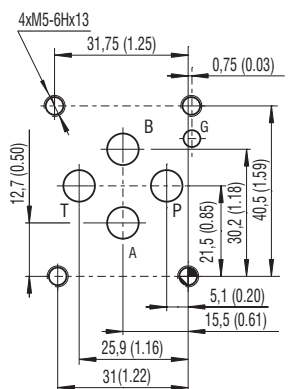

Technical Features

- › Restrictor valve with reverse flow check, mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03)
- › Meter-in or meter-out flow control
- › Leak-free closing in one or two service ports
- › Linear adjustment and positive seat overlap
- › Desired settings may be locked down
- › Optionally adjustable by allen key with protective cap, or by hand screw
- › In the standard version, the sandwich plate of valve is phosphated for basic surface corrosion protection and as preparation for painting. Steel parts are zinc-coated for corrosion protection 240 h in NSS acc. to ISO 9227
- › Enhanced surface protection for mobile applications is available. The sandwich plate and steel parts are zinc-coated with corrosion protection 520 h in NSS

Functional Description

Dual hydraulic flow restrictor valves with an optional by-pass check valve are used to control flow rates in two separate lines (A, B) of a hydraulic circuit. The modular design provides six functional versions. The valve restricts the fluid flow in one direction while providing free reverse flow in the opposite direction. The throttle is adjusted by a set screw, which can be operated by a key, a hand screw, or a hand screw with key lock. The sandwich design supports stacking with other components of the same size. The separate O-ring plate provides sealing of the valve on a connecting surface. Depending on the valve installation it functions as a meter-in or meter-out flow control device. Changing the valve from meter-in to meter-out mode can be done by turning the valve by 180° around its horizontal. The orientation of the throttle check valve(s) in the valve body corresponds with the symbol on the nameplate.

ISO 4401-03-02-0-05

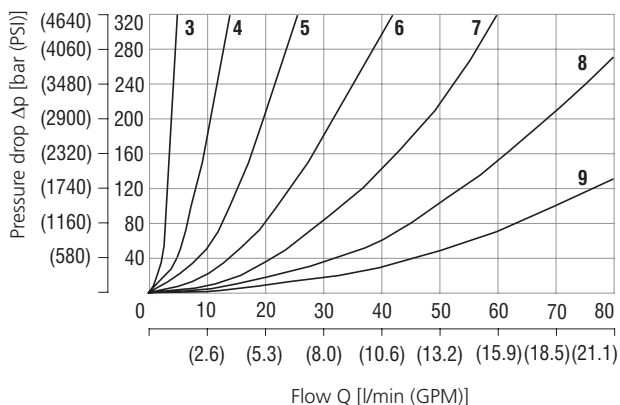

Ports P, A, B, T - max $\varnothing$ 7.5 mm (0.29 in)

Technical Data

Valve size		06 (D03)
Max. flow	l/min (GPM)	80 (21.1)
Max. operating pressure	bar (PSI)	320 (4640)
Fluid temperature range (NBR)	°C (°F)	-30 ... +100 (-22 ... 212)
Fluid temperature range (FPM)	°C (°F)	-20 ... +120 (-4 ... 248)
Weight	kg (lbs)	1.2 (2.65)
	Datasheet	Type
General information	GI_0060	Products and operating conditions
Mounting interface	SMT_0019	Size 06
Spare parts	SP_8010	

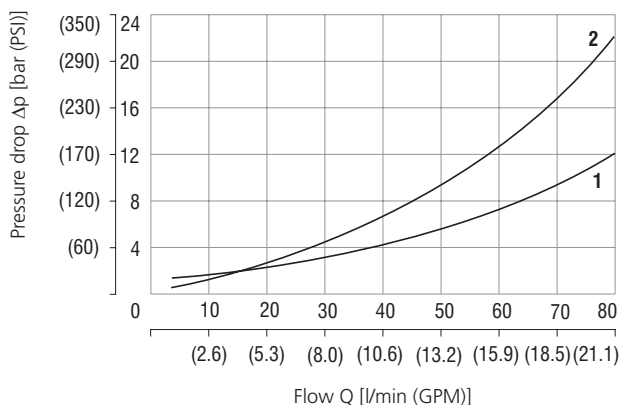
Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

Pressure drop related to flow rate



Number of turns of the adjustment screw							
3	4	5	6	7	8	9	

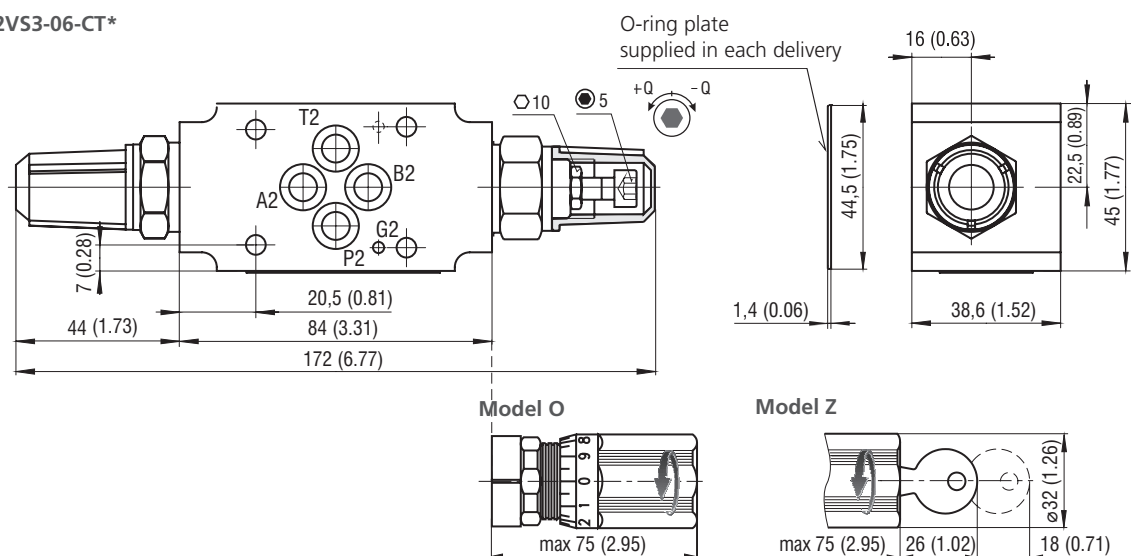
Check valve pressure drop related to flow rate



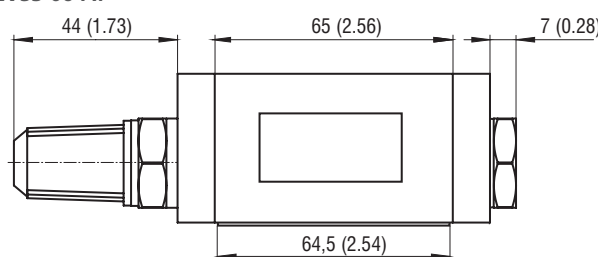
Throttle valve closed	Throttle fully open
1	2

Dimensions in millimeters (inches)

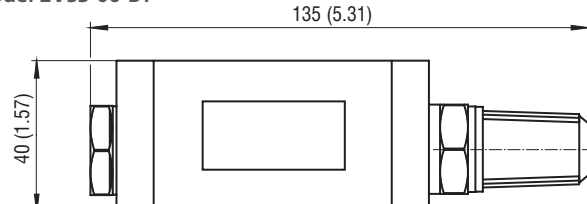
Model 2VS3-06-CT*



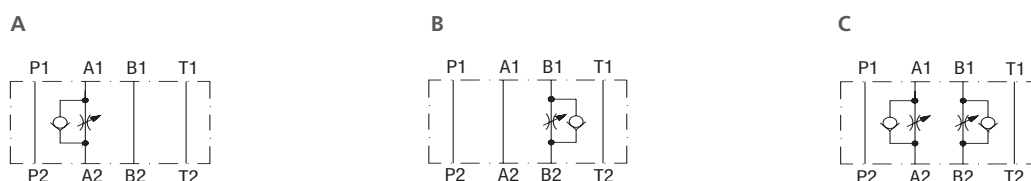
Model 2VS3-06-AT*



Model 2VS3-06-BT*



Functional Symbols



Notice: The orientation of the symbol on the name plate corresponds with the valve function.

With the separate O-ring plate the valve body may be mounted 180° rotated, which changes the valve function from meter-in to meter-out.

Ordering Code

2VS3 - 06 -						
Restrictor valve with reverse flow check, modular	Valve size	Functional symbols	A B C	T O Z	No designation	Surface treatment
					A B	body phosphated, steel parts zinc-coated (ZnCr-3), ISO 9227 (240 h) zinc-coated (ZnCr-3), ISO 9227 (240 h) zinc-coated (ZnNi), ISO 9227 (520 h)
					No designation	Seals
					V	NBR FPM (Viton)
						Adjustment option
						allen key (hex. 5), with protective cap non-lockable cylindrical hand screw lockable cylindrical hand screw

*see table of functional symbols

Changing the valve's function from meter-in to meter-out is accomplished by mounting the valve rotated 180° around its horizontal axis.

Restrictor Valve with Reverse Flow Check, Modular
VSO3-10/M

 Size 10 (D05) • Q_{max} 160 l/min (42 GPM) • p_{max} 350 bar (5100 PSI)

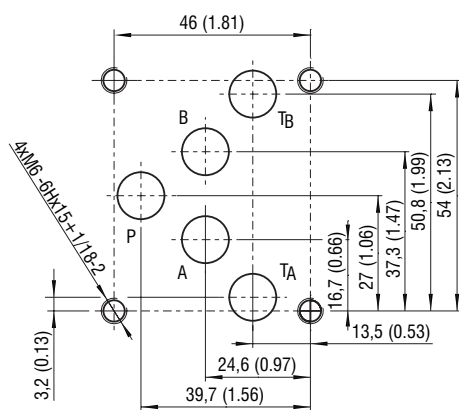
Technical Features

- › Restrictor valve with reverse flow check with subplate mounting surface acc. to ISO 4401, DIN 24340 (CETOP 05) standards
- › Meter-in or meter-out flow control
- › Leak-free closure in one or two service ports
- › Linear adjustment and positive seat closing
- › Desired settings may be locked down
- › Adjustment option with allen head and protective cup
- › In the standard version, the valve is zinc coated for 240 h protection acc. to ISO 9227 and valve body is phosphated

Functional Description

Dual hydraulic flow restrictor valve with by pass check valve option are used to control flow rates in two separate lines (A,B) of a hydraulic circuit. The modular design provides six functional versions. The valve restricts the fluid flow in one direction while providing reverse free-flow in the opposite direction. The throttling is adjusted by means of a set screw. The sandwich design enables simple stacking with other components of the same size. The separate o-ring plate with fitted o-rings provides sealing of the valve connecting surface. According to the valve arrangement, the meter-in or meter-out control is provided. Changing the meter-in mode into the meter-out mode can be done by turning the valve by 180° around its x-axis. The orientation of the throttle check valves in the valve body corresponds with the symbols shown on the nameplate. The set screw can be operated by a key, handknob or by a handknob with key lock.

ISO 4401-05-04-0-05



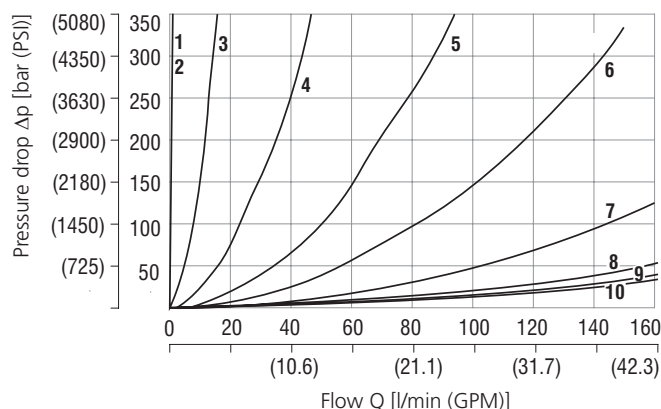
Ports P, A, B, T - max Ø11.2 mm (0.44 in)

Technical Data

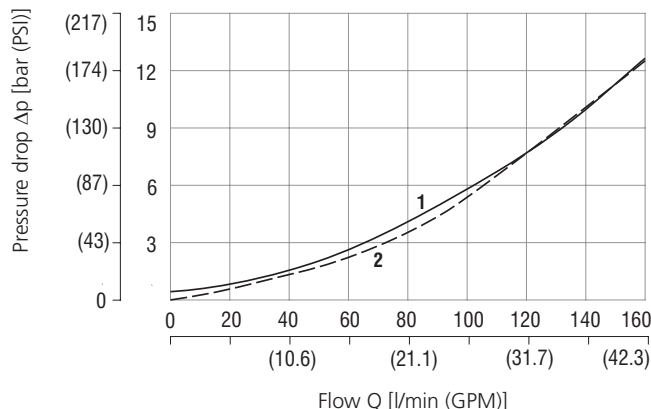
Valve size		10 (D05)
Max. flow	l/min (GPM)	160 (42)
Max. operating pressure	bar (PSI)	350 (5080)
Fluid temperature range (NBR)	°C (°F)	-30 +100 (-22 ... +212)
Fluid temperature range (FPM)	°C (°F)	-20 +120 (-4 ... +248)
Weight	kg (lbs)	2.15 (4.74)

	Datasheet	Type
General information	GI_0060	products and operating conditions
Mounting interface	SMT_0019	Size 06
Spare parts	SP_8010	

Characteristics measured at $v = 32 \text{ mm}^2/\text{s}$ (156 SUS)

Pressure drop related to flow rate


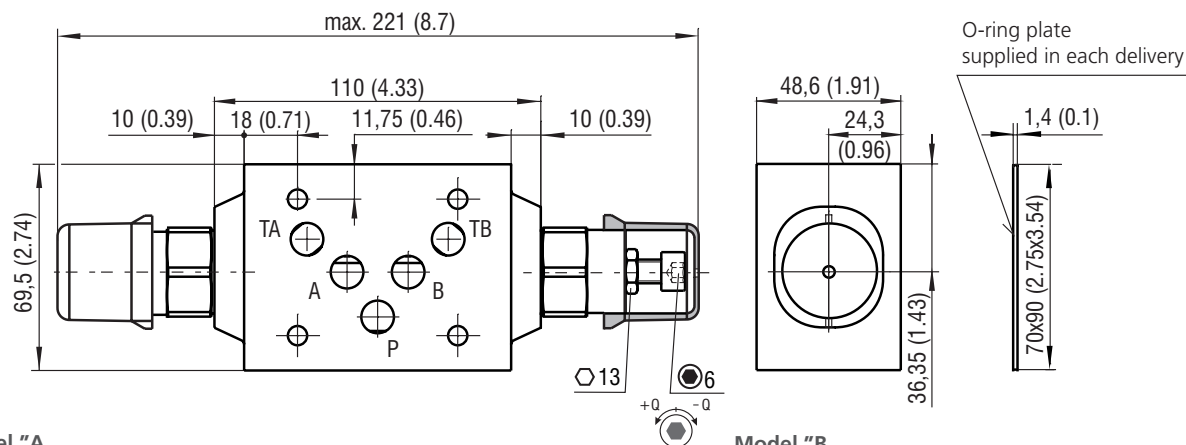
Number of turns the screw										
2	3	4	5	6	7	8	9	10	11	

Check valve pressure drop related to flow rate


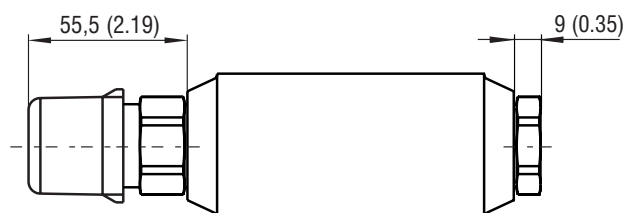
Throttle valve closed	Throttle fully open
1	2

Dimensions in millimeters (inches)

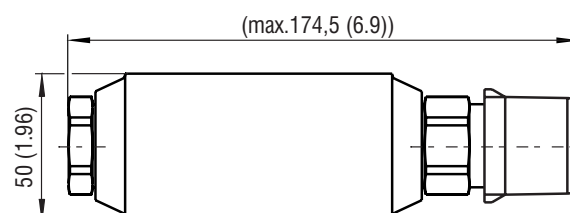
Model "C,,



Model "A,,

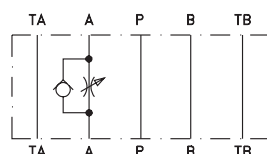


Model "B,,

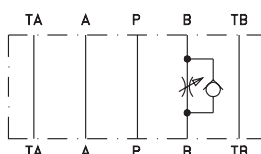


Functional symbols

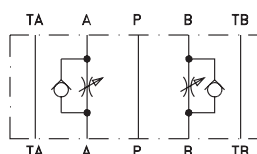
VSO3-10/MA



VSO3-10/MB



VSO3-10/MC



Caution!

The orientation of the symbol shown on the name plate corresponds with the function of the valve.

The separate o-ring plate allows to turn around the body. The meter-out throttling can be changed to the meter-in throttling by simple rotating the plate only at MC type. At the types MA and MB, the valve position in channels A and B is changed due to the one axis symmetry of the mounting interface of modular plate. This can be solved by ordering the opposite type (see table below) or by additional changing the valve and end plug positions each other.

Recommended types depending on valve position and throttling mode:

Type / valve in channel	Meter-out throttling	Meter-in throttling
MA / A	VSO3-10/MA	VSO3-10/MB, turn the plate
MB / B	VSO3-10/MB	VSO3-10/MA, turn the plate
MC / A, B	VSO3-10/MC	VSO3-10/MC, turn the plate

Ordering Code

VSO3 - 10 / M -

Restrictor valve with reverse flow check, modular

Valve size

Modular design

Functional symbols

Check valve in line A, meter-out

Check valve in line B, meter-out

Check valve in line A and B, meter-out

A

B

C

T

No designation

Surface treatment

phosphated body, valve for 240 h salt spray test (ISO 9227)

A body and valve for 240 h salt spray test (ISO 9227)

B body and valve for 520 h salt spray test (ISO 9227)

Seals

NBR

FPM (Viton)

No designation

V

Adjustment option

allen head (hex.5) with protective cap

The valves are assembled in meter-out version.

To get meter-in version for variant MC with valves in both channels, just turn it.

Remember: the channels A and B are changed in meter-in version.

It is important when meter-in is required for variant MA or MB.