

# Check valve, pilot operated

## Type Z2S

**RE 21553**

Edition 2015-11

Replaces: 07.10



- ▶ Size 10
- ▶ Component series 3X
- ▶ Maximum operating pressure 315 bar [4568 psi]
- ▶ Maximum flow 120 l/min [31.7 US gpm]

### Features

- ▶ Sandwich plate valve for use in vertical stackings
- ▶ Porting pattern according to ISO 4401-05-04-0-05, ISO 4401-05-05-0-05 and NFPA T3.5.1 R2-2002 D05
- ▶ For the leakage-free blocking of one or two actuator ports, optional
- ▶ Various cracking pressures
- ▶ With pre-opening (standard); without pre-opening (optional)
- ▶ Check valve installation sets available individually
- ▶ Special versions upon request

### Contents

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**Ordering codes**

01	02	03	04	05	06	07	08	09	10	11
<b>Z2S</b>	<b>10</b>			<b>-</b>	<b>3X</b>	<b>/</b>				<b>*</b>

01	Check valve, sandwich plate	<b>Z2S</b>
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02	Size 10	<b>10</b>
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**Leakage-free blocking**

03	In channel A and B	<b>-</b>
	In channel A	<b>A</b>
	In channel B	<b>B</b>

**Cracking pressure**

04	1.5 bar [21.7 psi]	<b>1</b>
	3 bar [43.5 psi]	<b>2</b>
	6 bar [87.0 psi]	<b>3</b>
	10 bar [145.0 psi]	<b>4</b>

05	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	<b>3X</b>
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**Corrosion resistance** (outside; thick film passivation according to DIN 50979 – Fe//Zn8//Cn//T0)

06	None (valve housing primed)	<b>no code</b>
	Improved corrosion protection (240 h salt spray test according to EN ISO 9227)	<b>J3</b>

**Seal material**

07	NBR seals	<b>no code</b>
	FKM seals	<b>V</b>
	Observe compatibility of seals with hydraulic fluid used! (Other seals upon request)	

**Additional pilot oil ports X and Y<sup>1)</sup>**

08	<b>Without</b> X and Y	<b>no code</b>
	<b>With</b> X and Y	<b>XY</b>

**Spool position monitoring<sup>2)</sup>**

09	<b>Without</b> position switch	<b>no code</b>
	<b>- Inductive position switch type QM</b> (version "3" only)	
	Monitored spool position "a"	<b>QMA</b>
	Monitored spool position "b"	<b>QMB</b>

**Special version**

10	<b>Without</b>	<b>no code</b>
	Check valve with stroke limitation	<b>SO14</b>
	Control open by external port G1/4 (only version "A" and "B")	<b>SO40</b>
	<b>Without</b> pre-opening	<b>SO41</b>
	Control spool unloaded to port T	<b>SO60</b>
	<b>With</b> pre-opening and control open from channel P	<b>SO150</b>
	For symbols (examples), see page 3	

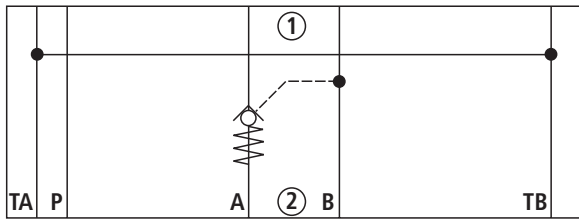
11	For further information, see the plain text	<b>*</b>
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<sup>1)</sup> In version "SO150", ports X and Y are already in place.  
(No ordering code required)

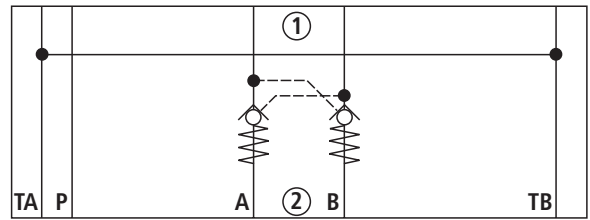
<sup>2)</sup> Only with version "3" (cracking pressure 6 bar) and on side with leakage-free blocking. E.g. Z2S 10 **A3-3X/QMA**

**Symbols** (① = component side, ② = plate side)

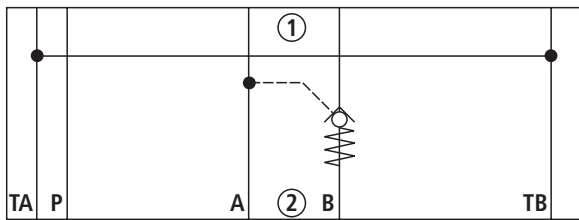
Version "A"



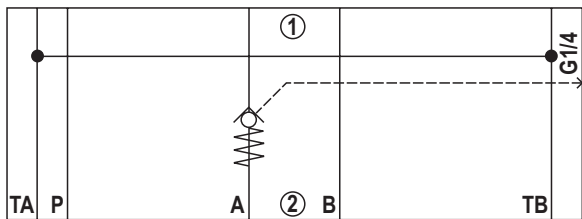
Version "-", "-...SO41" and "-...SO14"



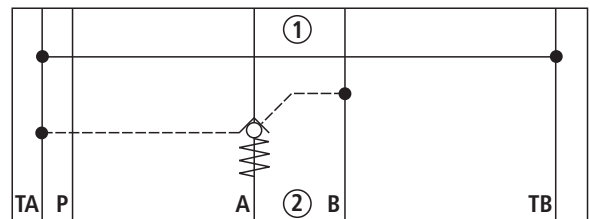
Version "B"



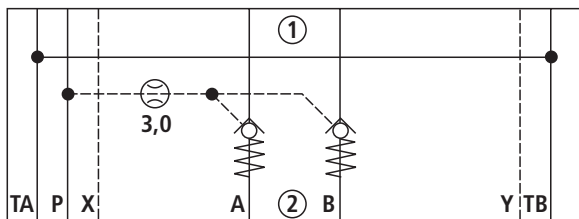
Version "A...SO40"



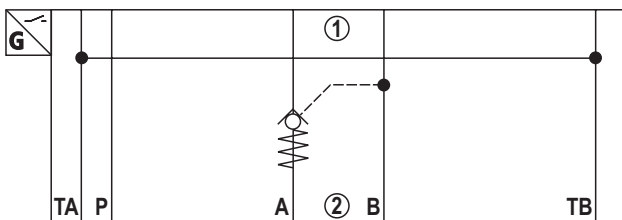
Version "A...SO60"



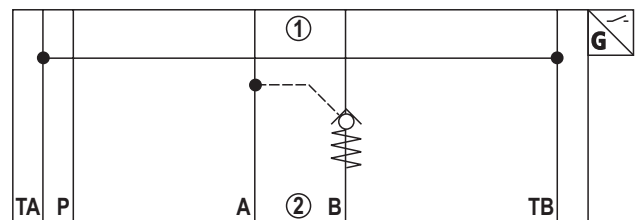
Version "-...SO150"



Version "A3...QMA"



Version "B3...QMB"



**Notice:**

Deviating from ISO 4401, port T is called TA and port T1 is called TB in this data sheet.

### Function, sections, circuit example

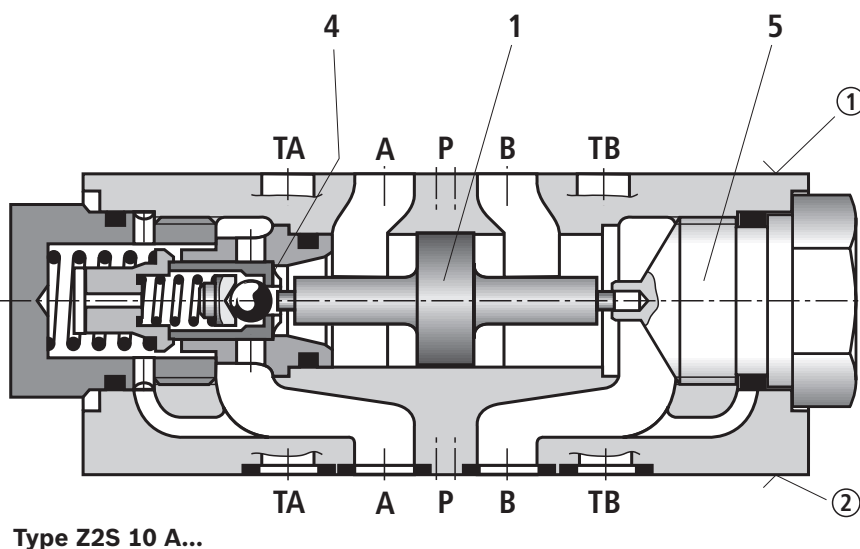
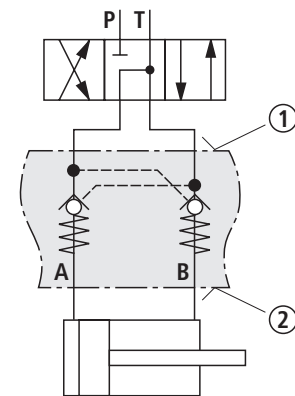
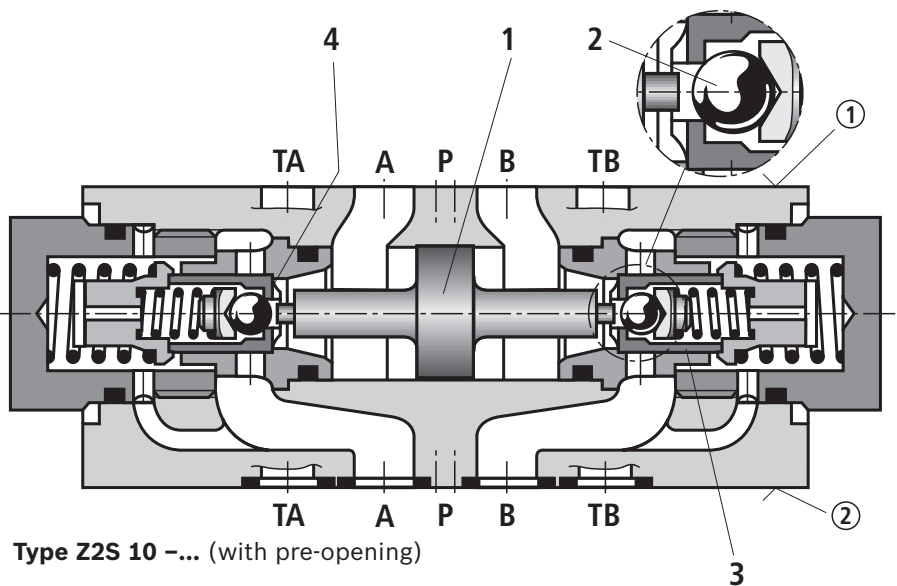
The isolator valve type Z2S is a releasable check valve in sandwich plate design. It is used for the leakage-free blocking of one or two actuator ports, also in case of longer standstill times. In direction A① to A② or B① to B②, there is a free flow; in the opposite direction, the flow is blocked. If, for example, there is a flow through the valve in direction A① to A②, the control spool (1) is moved in the direction of the B side, opens the ball seat valve (2) and then pushes the poppet (3) off its seat. Hydraulic fluid can now flow from B② to B①.

In order to allow the ball seat valve (2) to be safely closed, the control spool (1) must be hydraulically unloaded (see circuit example).

Due to the pre-opening, there is a damped decompression of the pressurized liquid. Thus, possible switching shocks are avoided.

#### Pre-opening

- ▶ The two-stage set-up with an increased control open ratio means even low pilot pressure can be unloaded securely.
- ▶ Avoidance of switching shocks due to dampened decompression of the pressure volume on the actuator side.

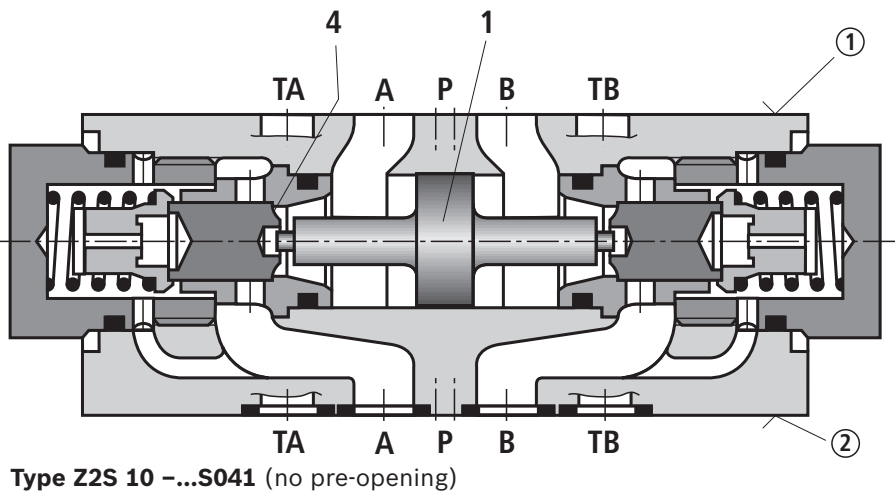
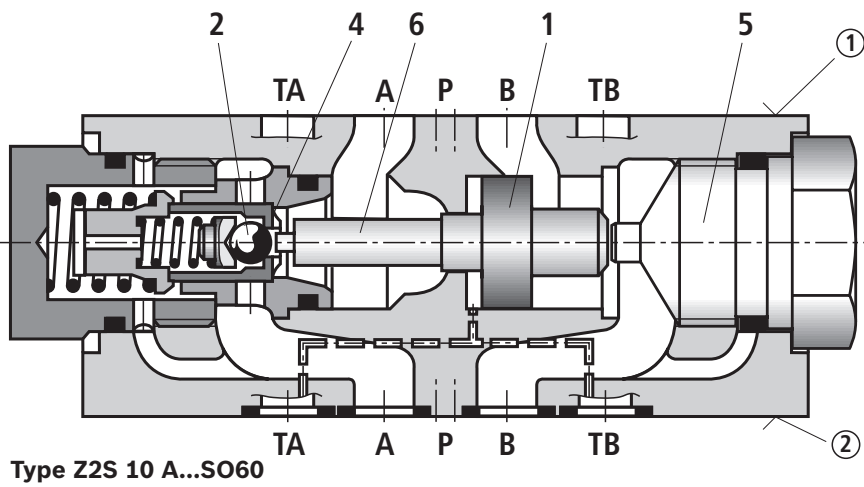
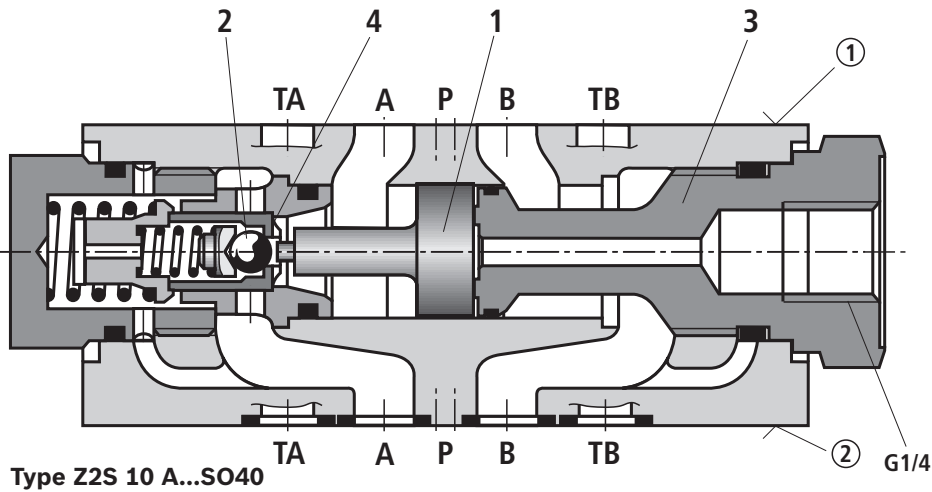


- ① = component side
- ② = plate side

- 1 Control spool, area  $A_2$
- 2 Ball, area  $A_3$
- 4 Poppet, area  $A_1$
- 5 Stop

**Notice:**  
Deviating from ISO 4401, port T is called TA and port T1 is called TB in this data sheet.

Function, sections

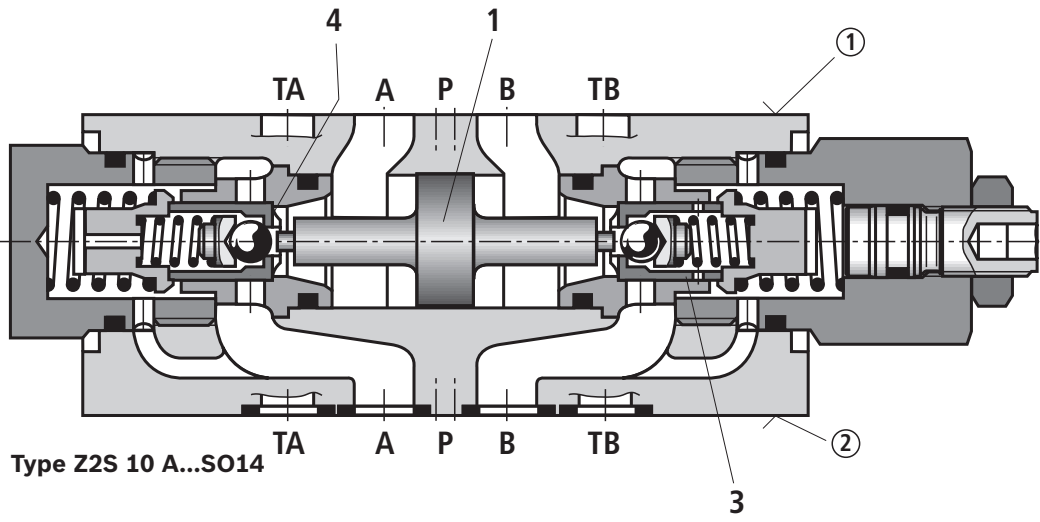


- ① = component side
- ② = plate side
- 1 Control spool, area  $A_2$
- 2 Ball, area  $A_3$
- 4 Poppet, area  $A_1$
- 5 Stop
- 6 Control spool, area  $A_4$

Notices:

- ▶ In valves without pre-opening, sudden unloading of pent-up pressure volume may occur. Resulting switching shocks may lead to premature wear on installed components, as well as noise formation.
- ▶ Deviating from ISO 4401, port T is called TA and port T1 is called TB in this data sheet.

### Function, sections



① = component side  
② = plate side

**1** Control spool, area  $A_2$   
**4** Poppet, area  $A_1$

## Technical data

(For applications outside these values, please consult us!)

general		
Weight	kg [lbs]	Approx. 3 [6.6]
Installation position		Any
Ambient temperature range	°C [°F]	-30 ... +80 [-22 ... +176] (NBR seals) -20 ... +80 [-4 ... +176] (FKM seals)

hydraulic		
Maximum operating pressure	bar [psi]	315 [4568]
Cracking pressure in free direction		see characteristic curves page 8
Maximum flow	l/min [US gpm]	120 [31.7]
Direction of flow		See symbols page 3
Hydraulic fluid		See table below
Hydraulic fluid temperature range (at the valve service ports)	°C [°F]	-30 ... +80 [-22 ... +176] (NBR seals) -20 ... +80 [-4 ... +176] (FKM seals)
Viscosity range	mm <sup>2</sup> /s [SUS]	2.8 ... 500 [35 ... 2320]
Maximum admissible degree of contamination of the hydraulic fluid cleanliness class according to ISO 4406 (c)		Class 20/18/15 <sup>1)</sup>
Area ratio	▶ Without pre-opening	A <sub>1</sub> /A <sub>2</sub> ~ 1/3 (see sectional drawing page 4 ... 6)
	▶ With pre-opening	A <sub>3</sub> /A <sub>2</sub> ~ 1/11.5 (see sectional drawing page 5 and 6)
	▶ Version "SO60"	A <sub>1</sub> /A <sub>4</sub> ~ 1/6 (see sectional drawing page 5)

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



### Important information on hydraulic fluids:

- ▶ For more information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- ▶ There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- ▶ The flash point of the hydraulic fluid used must be 40 K higher than the maximum solenoid surface temperature.

### ▶ Flame-resistant – containing water:

- Maximum pressure differential per control edge 50 bar
- Pressure pre-loading at the tank port > 20 % of the pressure differential, otherwise increased cavitation
- Life cycle as compared to operation with mineral oil HL, HLP 50 to 100 %

<sup>1)</sup> The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components. Available filters can be found at [www.boschrexroth.com/filter](http://www.boschrexroth.com/filter).



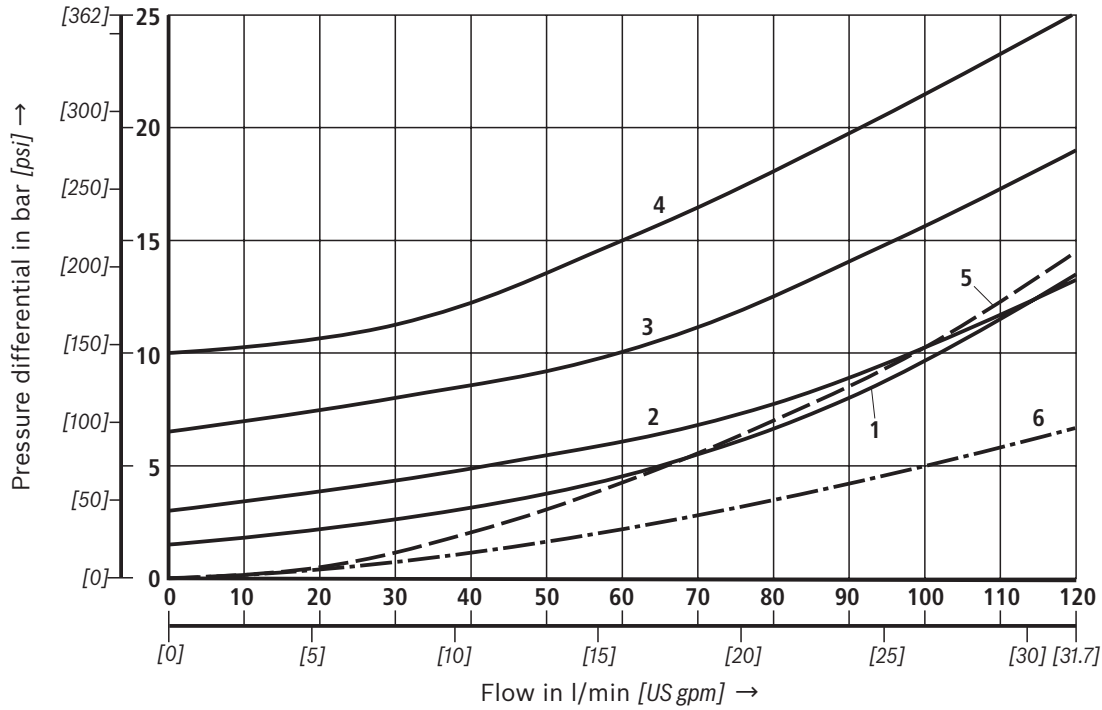
### Notice:

Selection of optimal sealing material (see ordering code page 2) also depends on the type of hydraulic fluid used.

### Characteristic curves

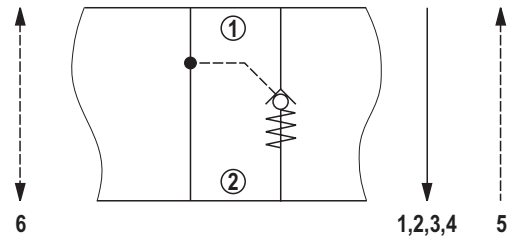
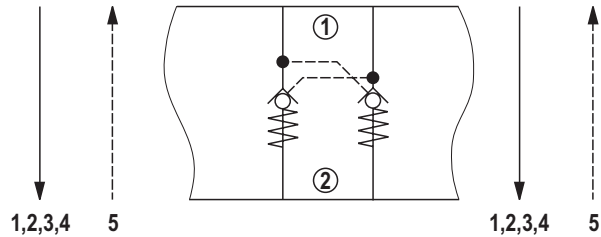
(measured with HLP46,  $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$  [ $104 \pm 9 \text{ }^\circ\text{F}$ ])

$\Delta p$ - $q_v$  characteristic curves



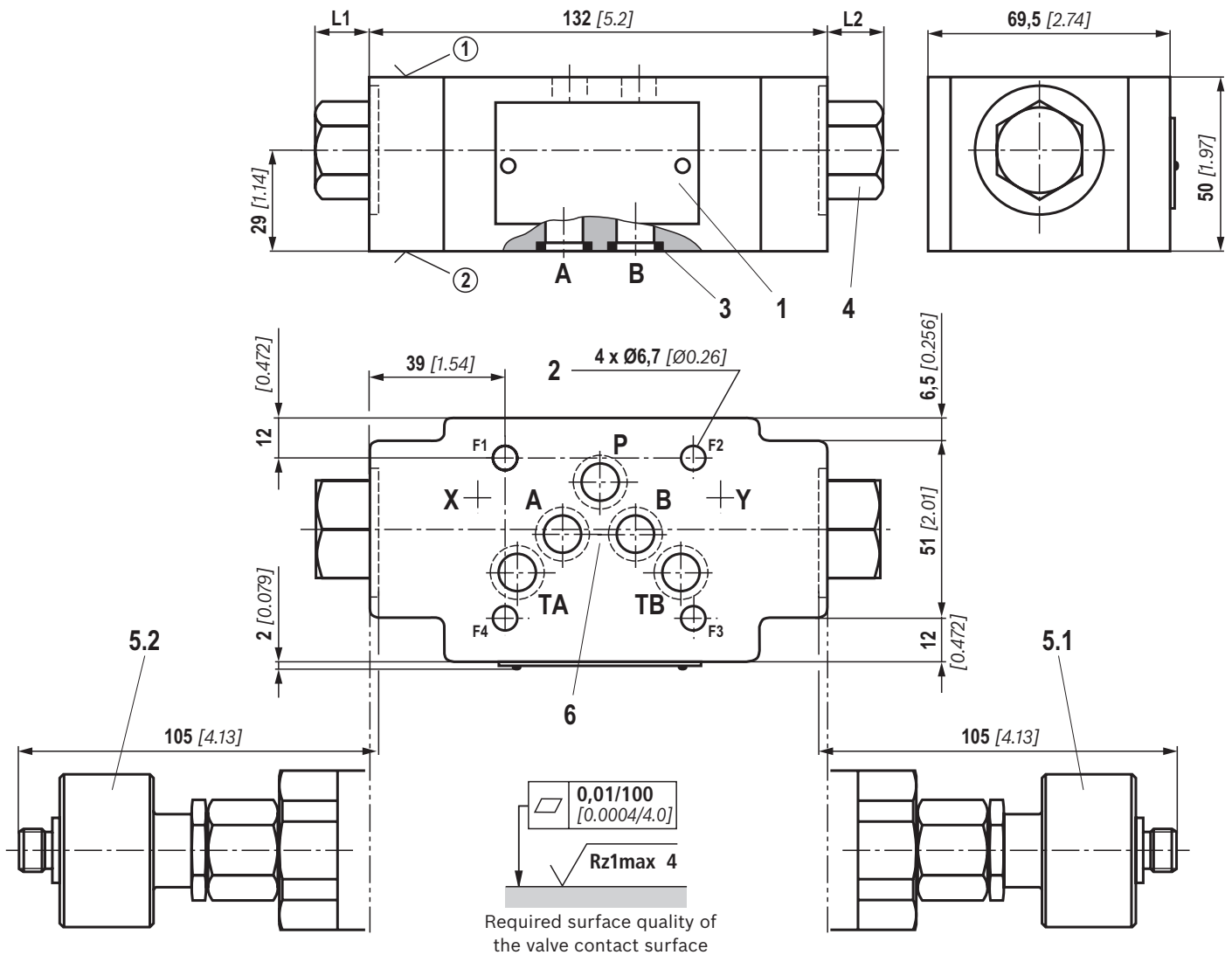
**Cracking pressure:**

- 1 1.5 bar [21.7 psi]
- 2 3 bar [43.5 psi]
- 3 6 bar [87.0 psi]
- 4 10 bar [145.0 psi]
- 5 Check valve controlled open via control spool
- 6 Free flow (without check valve use), version "A" and "B"





**Dimensions**  
(dimensions in mm [inch])



	"SO14"	"no code"	"SO40"		"SO41"	"SO60"	"SO150"
			Version "A"	Version "B"			
L1 in mm [inch]	13.5 [0.53]	13.5 [0.53]	6.5 [0.26]	13.5 [0.53]	13.5 [0.53]	13.5 [0.53]	13.5 [0.53]
L2 in mm [inch]	38.5 [1.52]	13.5 [0.53]	13.5 [0.53]	6.5 [0.26]	13.5 [0.53]	13.5 [0.53]	13.5 [0.53]

- ① component side
- ② plate side
- 1 Name plate
- 2 Through hole for valve mounting
- 3 Identical seal rings for ports A, B, P, TA, and TB
- 4 Plug screw SW30, tightening torque  $M_A = 40^{+5}$  Nm [29.5<sup>+3.7</sup> ft-lbs]
- 5.1 Version with position switch "QMA" (circuitry see page 10)
- 5.2 Version with position switch "QMB" (circuitry see page 10)
- 6 Porting pattern according to ISO 4401-05-04-0-05, ISO 4401-05-05-0-05 and NFPA T3.5.1 R2-2002 D05; deviating from ISO 4401, port T is called TA and port T1 is called TB in this data sheet.

**Valve mounting screws** (separate order)  
**4 hexagon socket head cap screws ISO 4762 - M6 - 10.9**  
**4 hexagon socket head cap screws 1/4-20 UNC**



**Notice:**

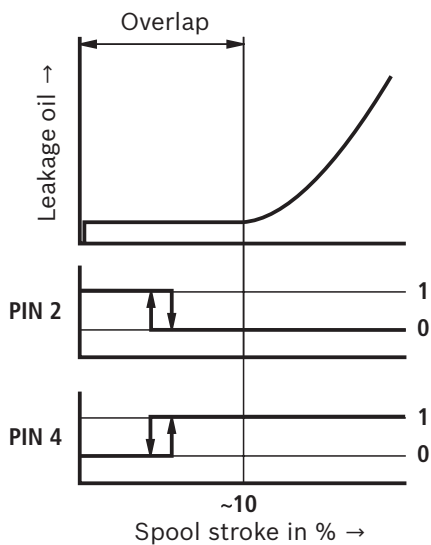
The length of the valve mounting screws of the sandwich plate valve must be selected according to the components mounted under and over the isolator valve. Depending on the application, screw type and tightening torque must be adjusted to the circumstances. Please ask Rexroth for screws with the required length.

### Inductive position switch type QM: Electrical connection

The electric connection is realized via a 4-pole mating connector (separate order, see page 11) with connection thread M12 x 1.

<b>Connection voltage:</b>	24 V +30 %/-15 %, direct voltage
<b>Admissible residual ripple:</b>	≤ 10 %
<b>Load capacity:</b>	Maximum 400 mA
<b>Switching outputs:</b>	PNP transistor outputs, load between switching outputs and GND
<b>Pinout:</b>	
	<b>1</b> +24 V <b>2</b> Switching output: 400 mA <b>3</b> 0 V, GND <b>4</b> Switching output: 400 mA

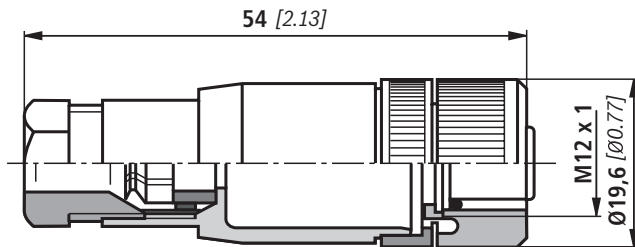
### Inductive position switch type QM: Switching logics



## Mating connectors (dimensions in mm [inch])

Mating connector suitable for K24 4-pole, M12 x 1 with screw connection, cable gland Pg 9.

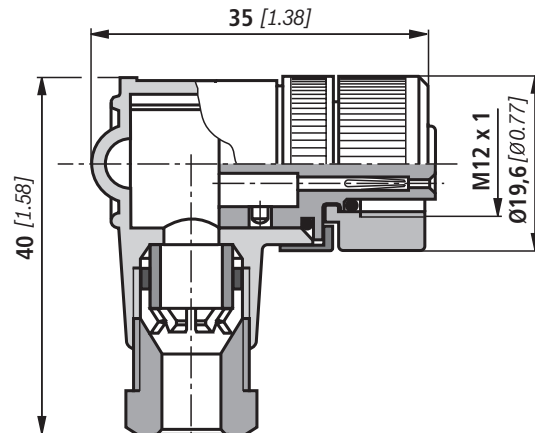
Material no. **R900031155**



Mating connector suitable for K24 4-pole, M12 x 1 with screw connection, cable gland Pg 9, angled.

Housing rotatable by 4 x 90° in relation to the contact insert.

Material no. **R900082899**



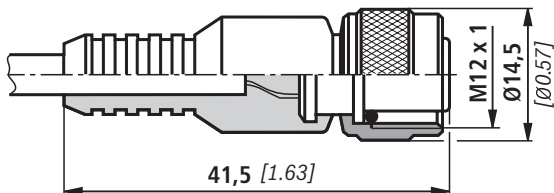
Mating connector suitable for K24-3m 4-pole, M12 x 1 with potted-in PVC cable, 3 m long.

Line cross-section: 4 x 0.34 mm<sup>2</sup>

Core marking:

1	brown
2	white
3	blue
4	black

Material no. **R900064381**



**For further information refer to data sheet 08006.**

## Further information

▶ Subplates	Data sheet 45052
▶ Inductive position switch and proximity sensors (contactless)	Data sheet 24830
▶ Smoothly switching version	Data sheet 23183
▶ Hydraulic fluids on mineral oil basis	Data sheet 90220
▶ Environmentally compatible hydraulic fluids	Data sheet 90221
▶ Flame-resistant, water-free hydraulic fluids	Data sheet 90222
▶ Flame-resistant hydraulic fluids - containing water (HFAE, HFAS, HFB, HFC)	Data sheet 90223
▶ Reliability characteristics according to EN ISO 13849	Data sheet 08012
▶ Hexagon socket head cap screw, metric/UNC	Data sheet 08936
▶ Hydraulic valves for industrial applications	Operating instructions 07600-B
▶ General product information on hydraulic products	Data sheet 07008
▶ Assembly, commissioning and maintenance of industrial valves	Data sheet 07300
▶ Selection of filters	<a href="http://www.boschrexroth.com/filter">www.boschrexroth.com/filter</a>
▶ Information on available spare parts	<a href="http://www.boschrexroth.com/spc">www.boschrexroth.com/spc</a>

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