

Directional spool valves, direct operated, with hydraulic actuation

Type LS 1377



- ▶ Size 16
- ▶ Component series 1X
- ▶ Maximum operating pressure 250 bar
- ▶ Maximum flow 250 l/min

Features

- ▶ 6/2 directional design
- ▶ For subplate mounting
- ▶ Spool position monitoring, optional

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Ordering code

01	02	03	04	05	06
LS 1377	X201	-	1X	/	*

01	Directional spool valve, direct operated, hydraulically actuated	LS 1377
02	Symbol see below	X201
03	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	1X

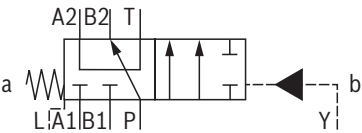
Spool position monitoring

04	Without position switch	no code
	- Inductive position switch type QM	
	Monitored spool position "a"	QMAG24
	Monitored spool position "b"	QMBG24
	Monitored spool position "a" and "b"	QMABG24
	For further details, refer to page 9... 11 and data sheet 24830	

Seal material (observe compatibility of seals with hydraulic fluid used, see page 5)

05	NBR seals	no code
	FKM seals	V
06	Further details in the plain text	*

Symbols



Function, section

Valve type LS 1377 is a directional spool valve with hydraulic actuation. It controls the start, stop and direction of a flow.

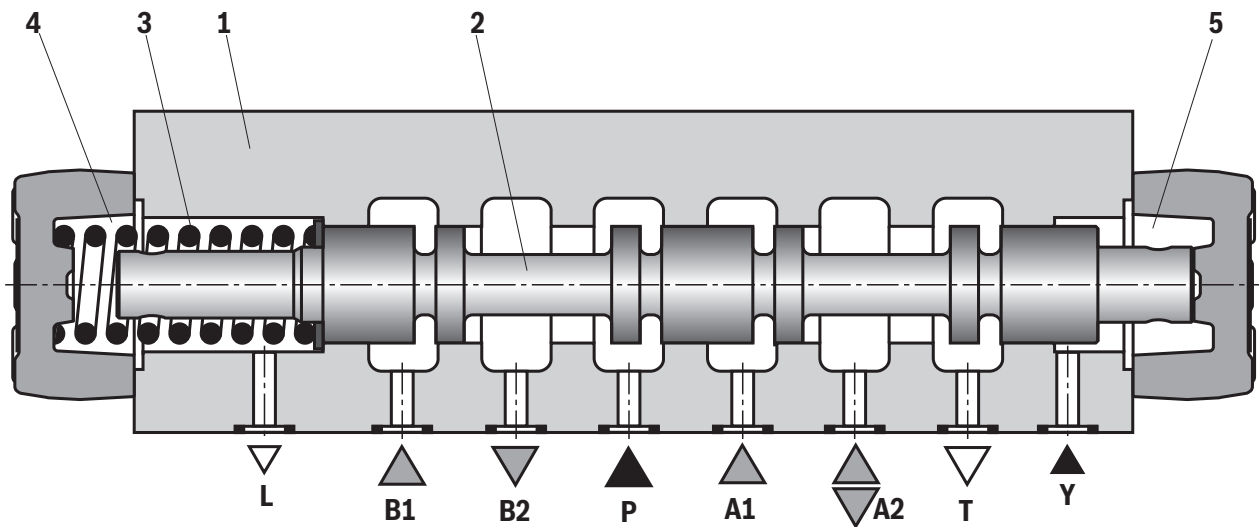
The directional valves basically consist of the main valve with housing (1), the main control spool (2) and a return spring (3).

The spring chamber (4) is depressurized and connected to port L. This is to prevent back pressure in the spring chamber (4) from building up due to internal leakage.

The cover chamber (5) is connected to port Y.

With pilot pressure loading of the front side of the main control spool (2) in the cover chamber (5) via port Y, the spool is moved to the spool position. In the valve, the required ports are connected in this way.

If the loaded control spool area is depressurized, the return spring (3) in the spring chamber (4) causes the valve to return to its initial position.



Technical data

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

General		
Weight	kg	15.3
Installation position		Horizontal
Ambient temperature range	°C	−30 ... +50
Storage temperature range	°C	+5 ... +40
Surface protection (valve body)		Painting
MTTF _d value according to EN ISO 13849	years	150 (for further details, see data sheet 08012)
Hydraulic		
Maximum operating pressure	bar	250
Maximum pilot pressure	bar	250
Minimum pilot pressure	bar	30
Maximum flow	l/min	250
Hydraulic fluid		See table below
Hydraulic fluid temperature range (at the valve working ports)	°C	−30 ... +70
Viscosity range	mm ² /s	2.8 ... 380
Maximum admissible degree of contamination of the hydraulic fluid cleanliness class according to ISO 4406 (c)		Class 20/18/15 ¹⁾
Switching time according to ISO 6403 ²⁾	► ON	
	– Pilot pressure 30 bar	ms 250
	– Pilot pressure 150 bar	ms 150
	► OFF	ms 200

¹⁾ 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.

For the selection of filters, see www.boschrexroth.com/filter.

²⁾ The switching times for hydraulically actuated valves depend on pilot pressure and pilot flow. The indicated values were calculated on the basis of a pilot flow of 25 l/min, a pilot pressure of 150 bar and a viscosity of 46 cSt (hydraulic fluid temperature: 40 °C).

**Notice:**

Switching times may vary dependent on operating time, hydraulic fluid temperature and application conditions.

Technical data

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

Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HL, HLP, HLPD, HVLP, 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 (glycol base)	ISO 12922	90222
		HFDU (ester base)		
		HFDR		
	► Containing water	HFC (Fuchs: Hydrotherm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046)	ISO 12922	90223



Important information on hydraulic fluids:

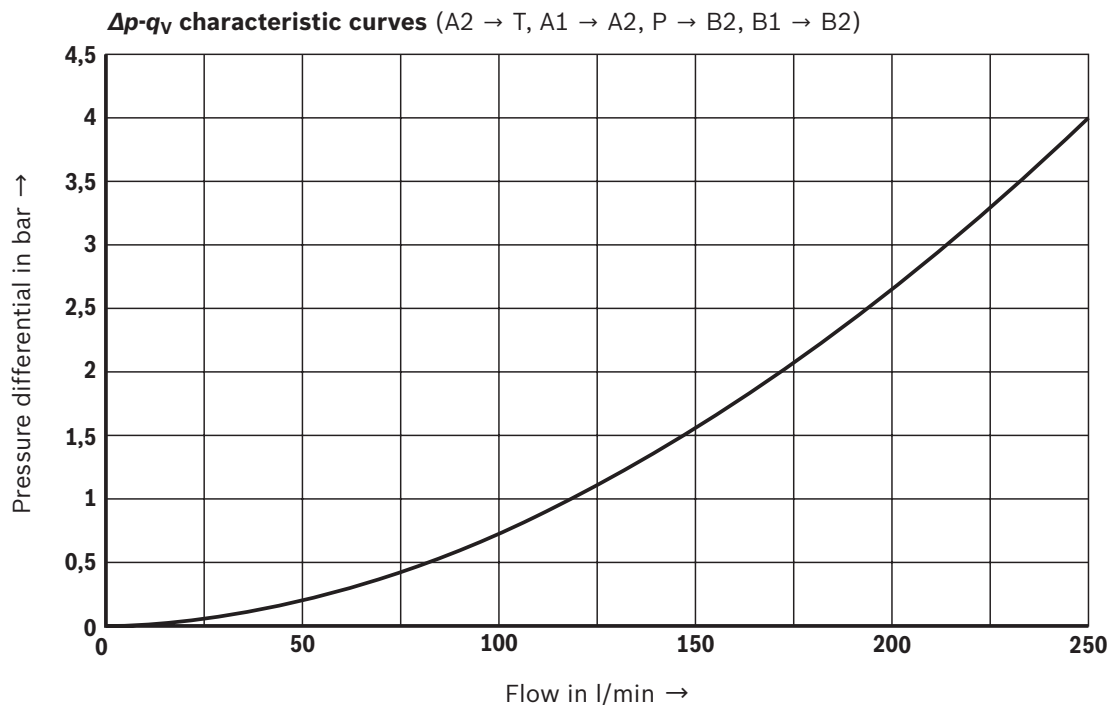
- For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- **Bio-degradable and flame-resistant – containing water:**
If components with galvanic zinc coating (e.g. version "J3" or "J5") or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause accelerated aging of the hydraulic fluid. Zinc soap may form as a chemical reaction product, which may clog filters, nozzles and solenoid valves – particularly in connection with local heat input.

► Flame-resistant – containing water:

- Due to increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30 % as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended – if possible specific to the installation – to back up the return flow pressure in ports T to approx. 20 % of the pressure differential at the component.

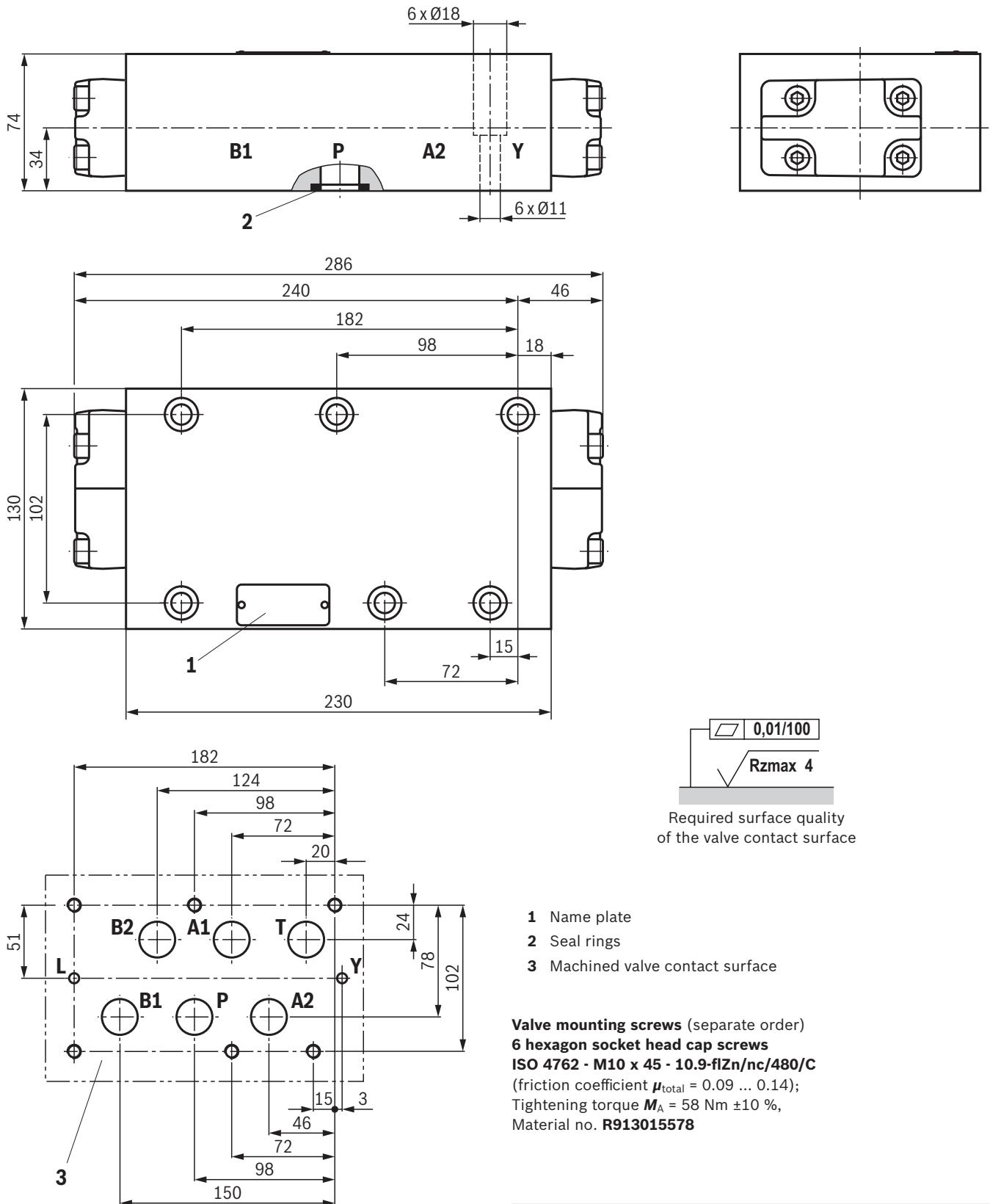
Characteristic curves

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



Dimensions

(dimensions in mm)



Notice:

The dimensions are nominal dimensions which are subject to tolerances.

Inductive position switches

With on/off valves, contactless position switches with integrated switching amplifiers are switched after reaching of the spool position to be monitored. The spool position reached is displayed by a binary signal.

Advantages of the position switches:

- ▶ Short-circuit-proof
- ▶ Available with M12 x 1 plug-in connections
- ▶ Direct monitoring of the spool position at the control spool
- ▶ Long life cycle
- ▶ High reliability due to no use of dynamic seals
- ▶ Reaction time of the switch upon operation approx. 15 ms.

Notes:

Valves with inductive position switches in safety-relevant controls may only be assembled and commissioned by hydraulically and electrically trained specialists. Adjustment and maintenance work requires special tools and devices. This work may only be performed by authorized specialists or in the factory!

Improper work at safety equipment leads to a risk of personal injury and damage to property!

- ▶ The essential valve components are coordinated with each other in the production plant and adjusted during assembly. They must not be interchanged. In case of valve or position switch defects, the complete valve must be exchanged!
- ▶ The factory setting of the position switch must not be changed. The position switch may only be set by the valve manufacturer.
- ▶ The position switch must be automatically monitored by the machine control to prevent initiation of a new machine cycle even in case of a failure of the position switch.
- ▶ The machine control and the selected components are to be designed so that the leakage cannot lead to an inadmissible closing movement.
- ▶ Position switches have an attenuating effect, i.e. the switching times specified in the basic data sheets of the valves may be increased.
- ▶ The switching times according to ISO 6403 specified in the respective valve data sheets do **not** correspond to the reaction times of the position switch (time between signal change at the solenoid and the signal change of the position switch). Temporal query mechanisms should be set at least to 80...100 ms.

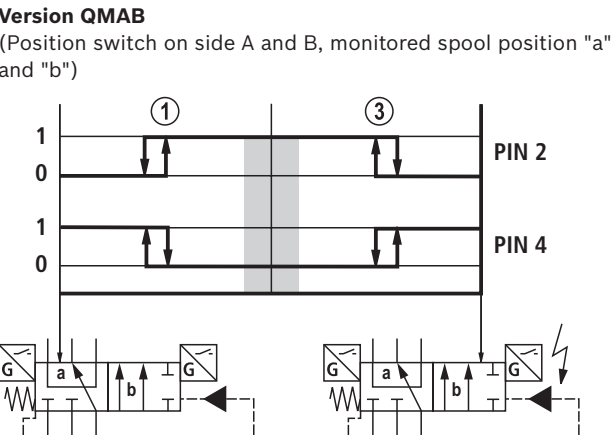
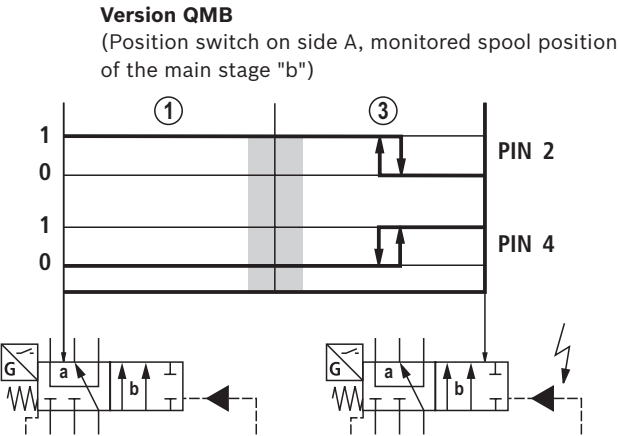
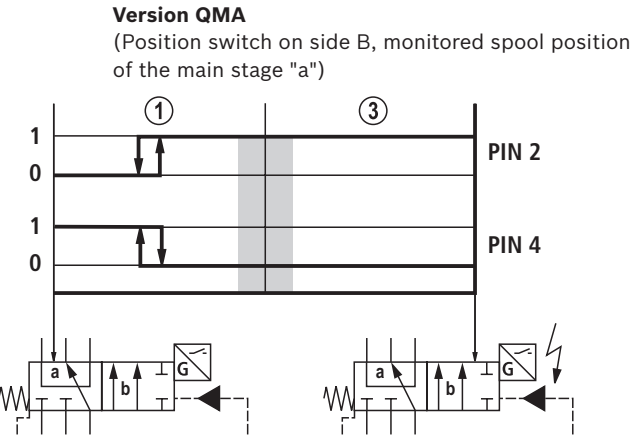
Inductive position switch type QM: Electrical connection

The electric connection is realized via a 4-pole mating connector (separate order, see page 12) with connection thread M12 x 1.

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

Inductive position switch type QM: Switching logics

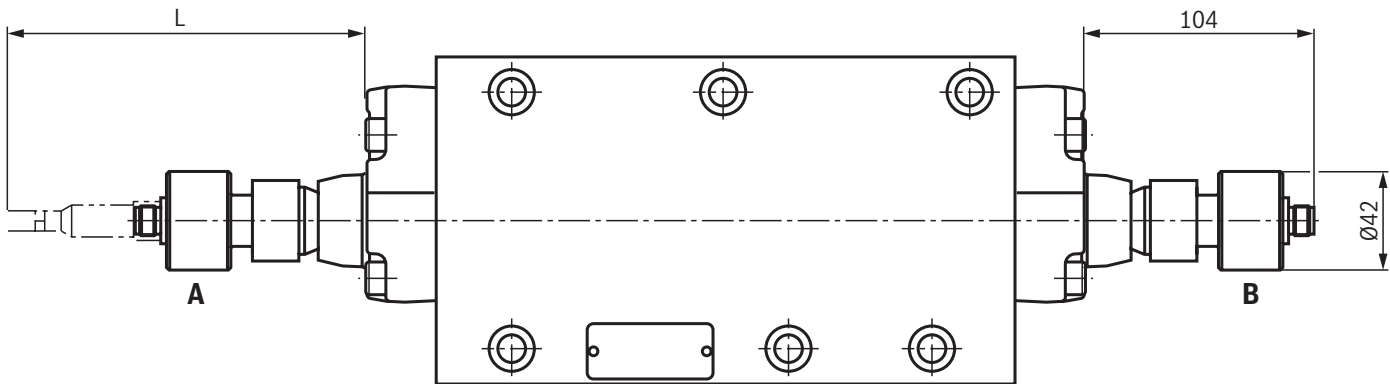
Depending on the spool position to be monitored, the switching outputs have the following function:



- 0 Contacts open (0 V)
- 1 Contacts closed (24 V)
- Overlap area / hydraulic symbol change

- ① Rest position
- ③ Solenoid "b" switched

Inductive position switch type QM: Dimensions
(dimensions in mm)



Mating connector (separate order, see page 12)	L in mm ²⁾
Mating connector straight	186
Mating connector angled	117
Mating connector with potted-in cable (3 m)	156

Version	Monitored spool position	Position switch on side
"QMAG24"	"a"	B
"QMBG24"	"b"	A
"QMABG24"	"a" and "b"	A and B

- 1) Without mating connector
2) With mating connector, 10 mm removal space and minimum bending radius for the connection line

Pinout see page 9.
Switching logics see page 10.



Notice:

The dimensions are nominal dimensions which are subject to tolerances.

Accessories (separate order)**Mating connectors and cable sets**

Designation	Version	Short designation	Material number	Data sheet
Mating connectors; for sensors and valves with "K24", "K35" and "K72" connectors, 4-pole	M12 x 1, straight, PG 9	4PZ24	R900031155	08006
	M12 x 1, angled, PG 7		R900082899	
Cable sets; for sensors and valves with "K24", "K35" and "K72" connectors, 4-pole	M12 x 1, straight, 3.0 m	4PZ24	R900064381	

Further information

- ▶ Inductive position switch and proximity sensors (contactless) Data sheet 24830
- ▶ Mating connectors and cable sets for valves and sensors Data sheet 08006
- ▶ 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
- ▶ Hydraulic valves for industrial applications Operating instructions 07600-B
- ▶ Selection of filters www.boschrexroth.com/filter
- ▶ Information on available spare parts www.boschrexroth.com/spc

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