

Directional spool valves, direct operated, with hydraulic actuation

Type LS 1378



- ▶ Size 32
- ▶ Component series 1X
- ▶ Maximum operating pressure 210 bar
- ▶ Maximum flow 500 l/min

Features

- ▶ 6/2-way version
- ▶ For subplate mounting
- ▶ Spool position monitoring

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Ordering code

01	02	03	04	05	06
LS 1378	X201	-	1X	/	QSABG24W / / *

01	Directional spool valve, direct operated, hydraulically actuated	LS 1378
02	Symbol see below	X201
03	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	1X

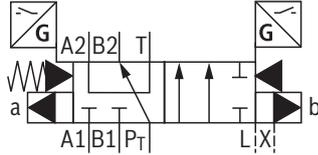
Spool position monitoring

04	- Inductive proximity sensor type QS	
	Monitored spool position "a" and "b"	QSABG24W
	For further details, refer to page 8 and 9, as well as 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 1378 is a directional spool valve with hydraulic actuation. It controls the start, stop and direction of flow.

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

The spring chamber (6) is internally connected to port P. The control chamber (5) is externally supplied with pilot oil via channel X and supplies the control chamber (5) of the control spool (4).

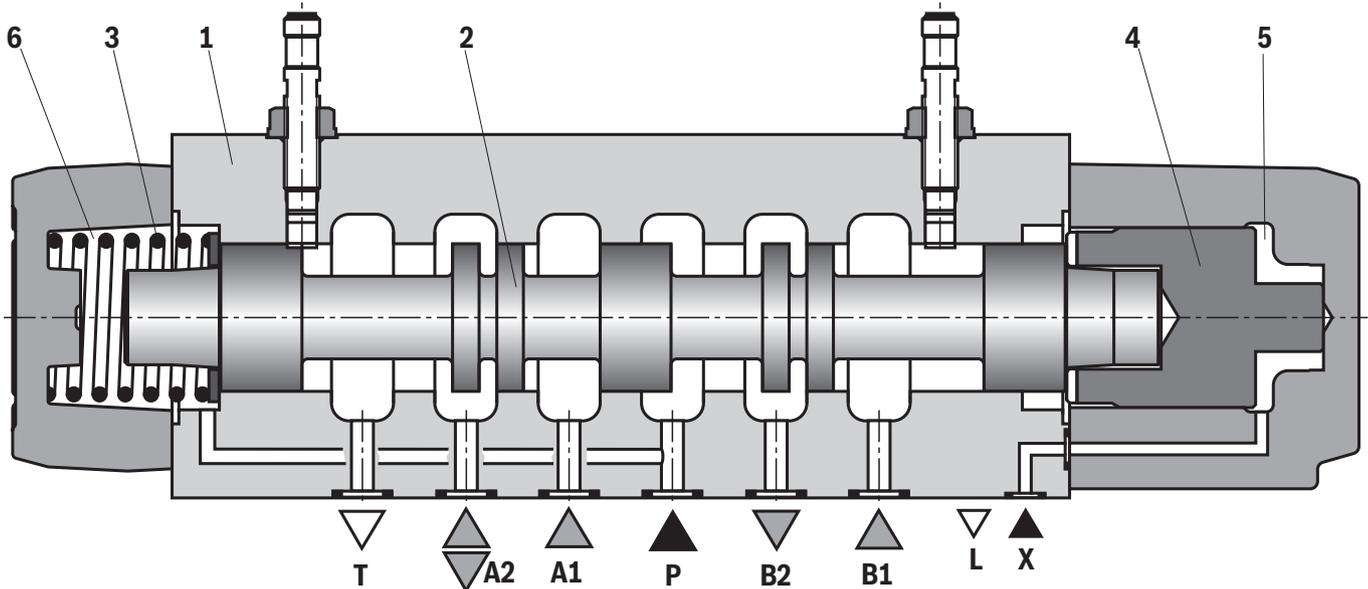
The main control spool (2) is held in spool position "b" by the pressurization of the two front faces with identical pilot pressure.

In this spool position, the control spool (4) rests on the housing and fixes the position of the main control spool (2). Following a pressure relief of the control spool (4) area, the main control spool (2) moves into spool position "a". The unloaded control spool (4) area displaces the returning pilot oil via channel X into the tank.

The required pilot pressure at port X depends on the operating pressure at port P since the main control spool (2) in the spring chamber (6) is connected to port P. For a correct switching function, the pilot pressure at port X must correspond to the operating pressure at port P. Pilot pressure = system pressure (see page 4)

Notice:

With this valve, the compression spring (3) does not have a reset function. In depressurized condition and with horizontal installation, it holds the main control spool (2) in the basic position.



Technical data

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

General		
Mass	kg	30
Installation position		Horizontal
Ambient temperature range	°C	-30 ... +50
Storage temperature range	°C	-20 ... +70
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	210
Maximum pilot pressure	bar	210
Minimum pilot pressure	bar	35
Maximum flow	l/min	500
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⁾

- 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. Available filters can be found at www.boschrexroth.com/filter.

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, HVLPD	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)	NBR	ISO 12922



Important notices 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 an 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 the 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.
- Dependent on the hydraulic fluid used, the maximum ambient and hydraulic fluid temperature must not exceed 50 °C. In order to reduce the heat input into the component, a maximum duty cycle of 50% in continuous operation has to be set for on/off valves (measuring period 300 s). If this is impossible due to the function, an energy-reducing control of these components is recommended, e.g. via a PWM plug-in amplifier.

Electric

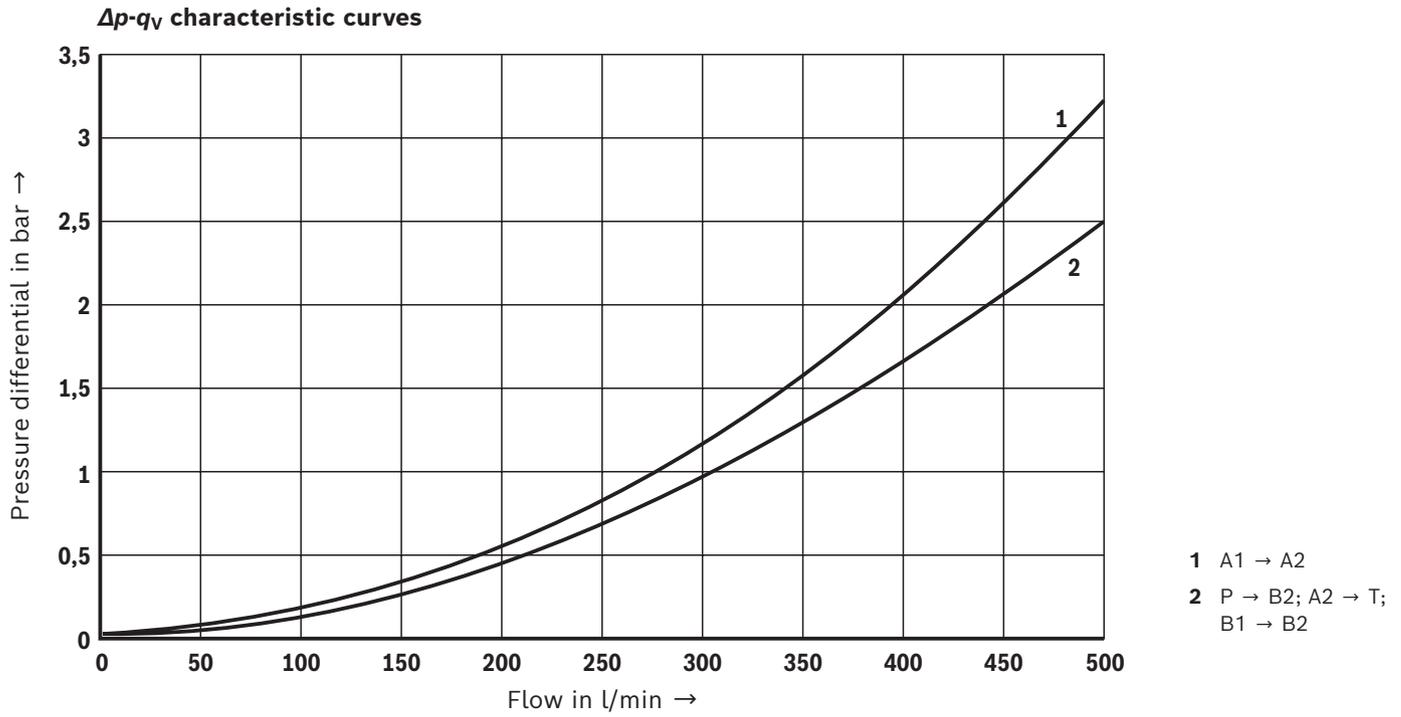
Switching time according to ISO 6403 ²⁾	▶ ON	s	1.0
	▶ OFF	s	1.3

²⁾ The switching times were determined at a hydraulic fluid temperature of 40 °C and a viscosity of 46 cSt. Deviating hydraulic fluid temperatures can result in different switching times. Switching times change dependent on operating time and application conditions.

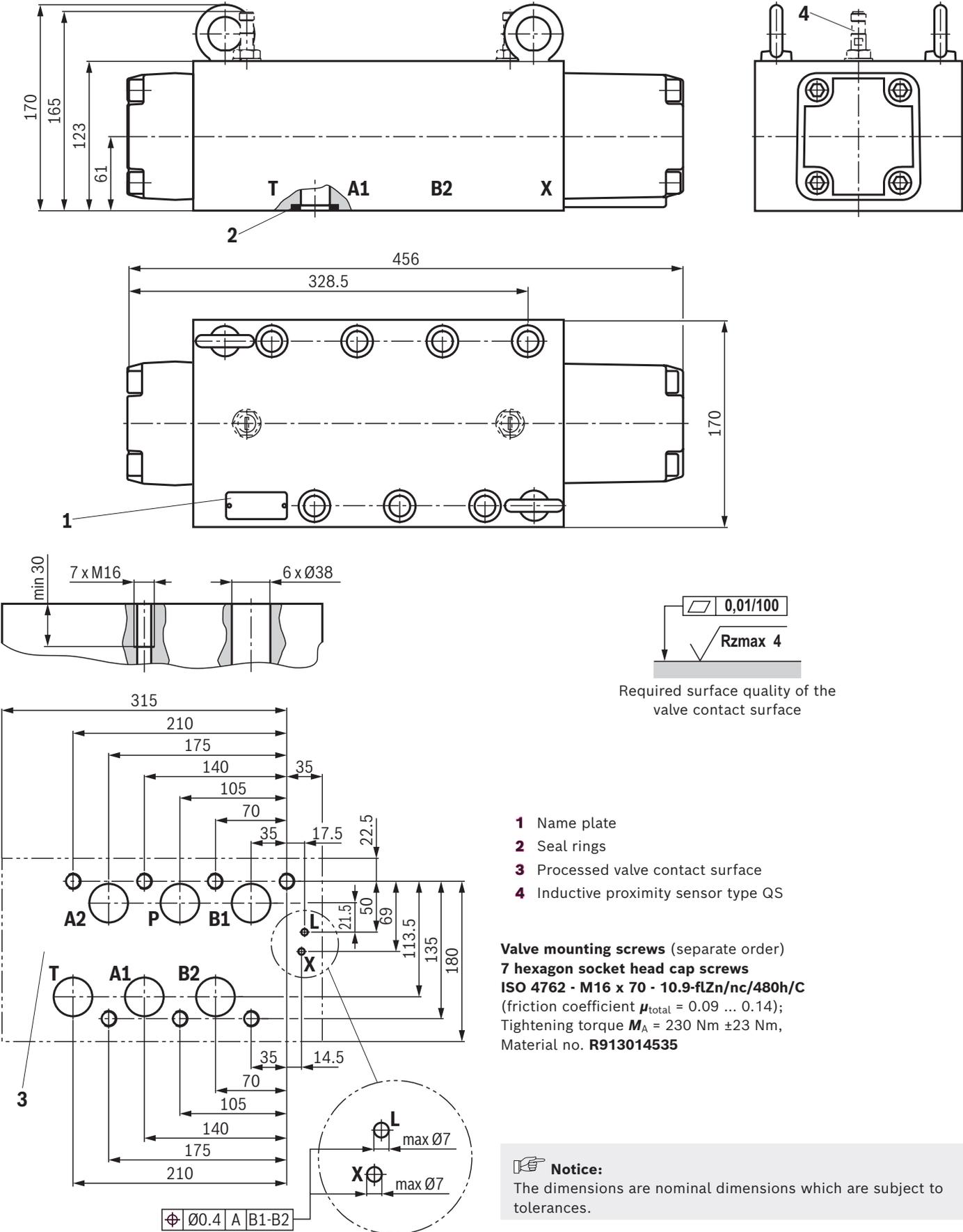
In the electrical connection, the protective grounding conductor (PE \perp) is to be properly connected.

Characteristic curves

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



Dimensions
(dimensions in mm)



- 1** Name plate
- 2** Seal rings
- 3** Processed valve contact surface
- 4** Inductive proximity sensor type QS

Valve mounting screws (separate order)
7 hexagon socket head cap screws
ISO 4762 - M16 x 70 - 10.9-fZn/nc/480h/C
 (friction coefficient $\mu_{total} = 0.09 \dots 0.14$);
 Tightening torque $M_A = 230 \text{ Nm} \pm 23 \text{ Nm}$,
 Material no. **R913014535**

Notice:
 The dimensions are nominal dimensions which are subject to tolerances.

Inductive proximity sensors

With on/off valves, contactless proximity sensors 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 proximity sensors:

- ▶ 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 since no dynamic seals are used
- ▶ Reaction time of the switch upon operation approx. 15 ms.

Notice:

Valves with proximity sensors in safety-relevant controls may only be assembled and commissioned by hydraulically and electrically trained specialists. 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 danger 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 entire valve must be exchanged!
- ▶ The factory setting of the proximity sensor must not be changed. The proximity sensor may only be set by the valve manufacturer.
- ▶ The proximity sensor must be automatically monitored by the machine control to prevent initiation of a new machine cycle even in case of a failure of the proximity sensor.
- ▶ The machine control and the selected components are to be designed so that the leakage cannot lead to an inadmissible closing movement.
- ▶ The switching times according to ISO 6403 specified in the respective valve data sheets do **not** correspond to the reaction times of the proximity sensor (time between signal change at the solenoid and the signal change of the proximity sensor). Temporal query mechanisms should be set to a minimum of 80...100 ms.

Inductive proximity sensor type QS: Electrical connection

The electric connection is realized via a 4-pole mating connector (separate order, see page 10) with connection thread M12 x 1.

Connection voltage:	24 V ±25%, direct voltage
Admissible residual ripple:	≤ 15%
Load capacity:	Maximum 200 mA
Switching outputs:	PNP transistor outputs, load between switching outputs and GND

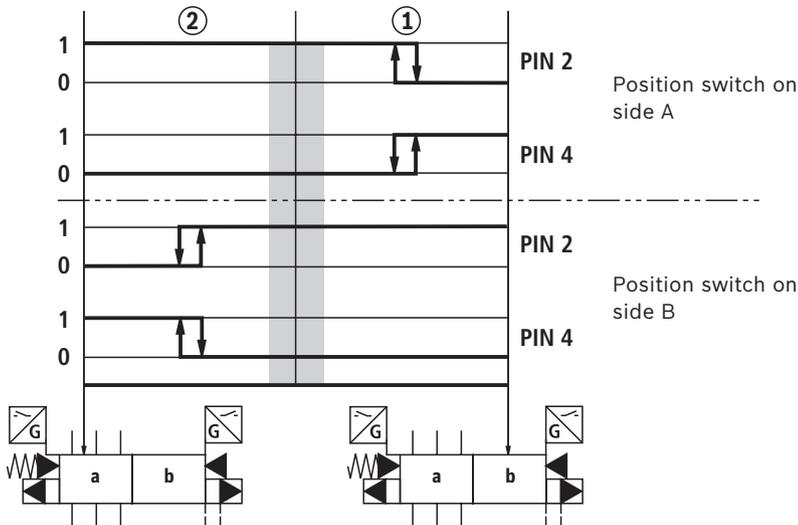
Pinout:	1 +24 V
	2 Switching output: 200 mA
	3 0 V, GND
	4 Switching output: 200 mA

Inductive proximity sensor type QS: Switching logics

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

Version QSABG24W

(Proximity sensor on side A and B, monitored spool position "a" and "b")



- ① Spool position "b"
- ② Spool position "a" (rest position)

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

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
- ▶ 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
- ▶ Mating connectors and cable sets for valves and sensors Data sheet 08006
- ▶ 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

Bosch Rexroth AG
Industrial Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/40 30 20
my.support@boschrexroth.de
www.boschrexroth.de

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Bosch Rexroth AG
Industrial Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52/40 30 20
my.support@boschrexroth.de
www.boschrexroth.de

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