RE 29391
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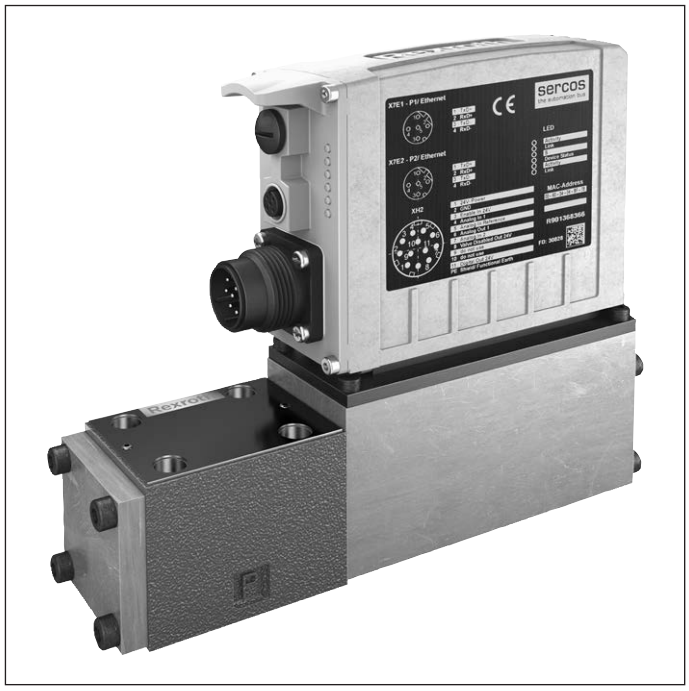
Replaces: 2016-02

rexroth
A Bosch Company

Directional control valve, direct operated, with integrated digital axis controller (IAC-Multi-Ethernet)

Type 4WRPDH



- Sizes 6 and 10
- Component series 2X
- Maximum operating pressure 350 bar
- Maximum flow 100 l/min (***Δp*** = 70 bar)

Features

- Open
  - Integrated digital axis control functionality (IAC Multi Ethernet)
  - Bus connection/service interface (sercos, EtherCAT, EtherNet/IP, PROFINET RT, POWERLINK, VARAN)
- Scalable
  - 2 configurable analog sensor inputs
  - 1 input for linear position measurement system (SSI, 1Vpp or EnDat 2.2)
- Safe
  - Internal safety function (can be used up to category 4/PL e according to EN 13849-1)
  - CE conformity according to EMC Directive 2004/108/EC
- Precise
  - Best-in-class hydraulic controller
  - High response sensitivity and low hysteresis

Contents

Ordering code

01	02	03	04	05	06	07	08	09		10		11		12	13	14	15	16
4	**WRP**	**D**	**H**			**B**			**–**	**2X**	**/**		**/**	**24**		**D6**		

01	4 main ports	**4**
02	Directional control valve	**WRP**
03	With integrated digital axis controller	**D**
04	Control spool/sleeve	**H**
05	Size 6	**6**
	Size 10	**10**
06	Symbols; possible version see page 3	
07	Installation side of the inductive position transducer	**B**

Rated flow at 70 bar pressure differential (35 bar/control edge)

08		Flow characteristic			
		"L"	**"P"** (inflection 40%)	**"P"** (inflection 60%)	
	– Size 6				
	2 l/min	✓	–	–	**02**
	4 l/min	✓	✓	–	**04**
	12 l/min	✓	–	–	**12**
	15 l/min	–	–	✓	**15**
	24 l/min	✓	–	–	**24**
	25 l/min	–	–	✓	**25**
	40 l/min	✓	✓	–	**40**
	– Size 10				
	50 l/min	✓	✓	–	**50**
	100 l/min	✓	✓	–	**100**

Flow characteristic

09	Linear	**L**
	Inflected characteristic curve (inflection 60% for NG6 with rated flows "**15**" and "**25**", otherwise inflection 40%)	**P**
10	Component series 20 ... 29 (20 ... 29: unchanged installation and connection dimensions)	**2X**

Seal material (observe compatibility of seals with hydraulic fluid used, see page 7)

11	NBR seals	**M**
	FKM seals	**V**
12	Supply voltage 24 V	**24**

Ethernet interface

13	EtherNET/IP	**E**
	PROFINET RT	**N**
	Sercos	**S**
	EtherCAT (CANopen profile)	**T**
	POWERLINK (CANopen profile)	**W**
	VARAN	**V**

Electrical interface

14	±10 VDC or 4 ... 20 mA	**D6**

Ordering code

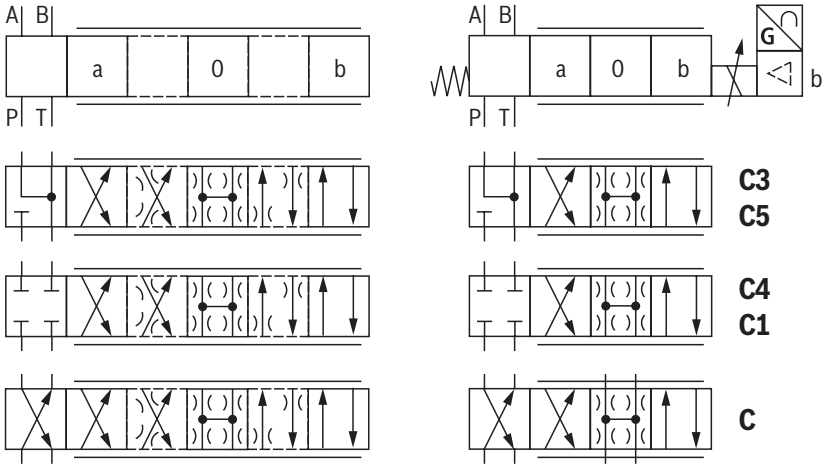
01	02	03	04	05	06	07	08	09		10		11		12	13	14	15	16
4	**WRP**	**D**	**H**			**B**			**–**	**2X**	**/**		**/**	**24**		**D6**		

Sensor interfaces

15	0 ... 10 V/4 ... 20 mA/EnDat 2.2	**S**
	0 ... 10 V/4 ... 20 mA/SSI	**T**
	0 ... 10 V/4 ... 20 mA/1Vpp	**U**

16	Further details in the plain text	*

Symbols

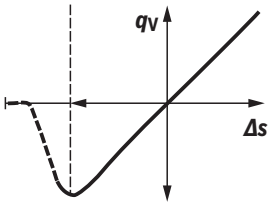
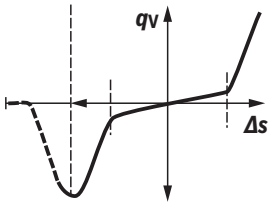
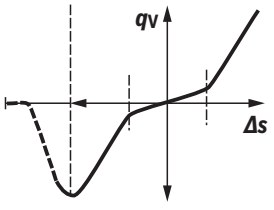
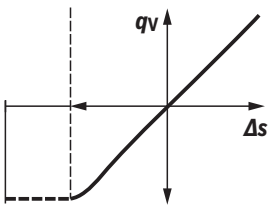


With symbols C5 and C1: [1)]
P → A: $q_{V\,nom}$ B → T: $q_{V\,nom}/2$
P → B: $q_{V\,nom}/2$ A → T: $q_{V\,nom}$

☞ **Notice:**
Representation according to DIN ISO 1219-1.
Hydraulic interim positions are shown by dashes.

[1)] Standard = 1:1, , $q_{V\,nom}$ 2:1 from rated flow = 40 l/min (version "40")

Flow characteristic

Symbol	**Linear characteristic curve** (version "L")	**Inflected characteristic curve** (version "P")	
		Inflection 60% ($q_{V\,nom}$ = 15, 25 l/min)	Inflection 40% ($q_{V\,nom}$ = 4, 40 l/min – NG6) ($q_{V\,nom}$ = 50, 100 l/min – NG10)
C3, C5 **C4, C1**			
C		–	–

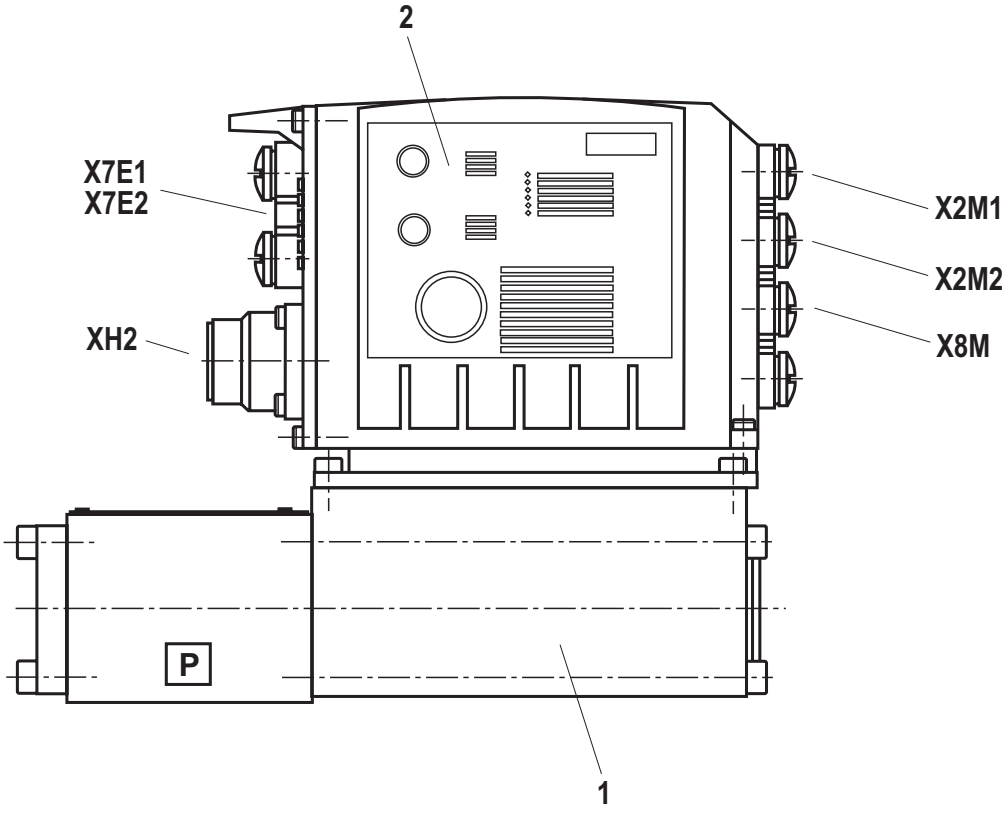
Function, section

Set-up

The directional control valve with IAC-Multi-Ethernet electronics mainly consists of:

- Direct operated directional control valve (1) with control spool and sleeve in servo quality
- Integrated digital axis controller (2) with:
  - analog/digital interface (XH2)
  - Ethernet interfaces (X7E1, X7E2)
  - analog sensor interfaces (X2M1, X2M2)
  - digital sensor interface (X8M)

Directional control valve with integrated axis controller, analog interfaces (X2M1, X2M2), digital interfaces (XH2, X8M) and Ethernet interfaces (X7E1, X7E2)



Function, section

Functional description

The **IAC-Multi-Ethernet** valve (**I**ntegrated **A**xis **C**ontroller based on directional control valves) is a digital directional control valve with integrated axis controller and the following functionalities:

- Position control
- Pressure/force control
- Closed-loop speed control
- Substitutional closed-loop control (position - pressure/force)
- Substitutional control (flow - pressure/force)
- pQ function (flow-controlled)

This enables, amongst others, the following operating modes:

- Valve direct control
- Drive-controlled position control
- Drive-controlled positioning
- Positioning block operation

- The command values are preset via the Ethernet interface (X7E1 or X7E2) or, alternatively, via the analog/digital interface (XH2)
- The feedback information of the actual value signals to the superior control system is provided optionally either via the Ethernet interface (X7E1 or X7E2) or the analog/digital interface (XH2)
- The controller parameters are set via the Ethernet interface (X7E1 or X7E2)

Monitoring

The digital control electronics enable comprehensive monitoring functions/error detection including:

- Undervoltage
- Communication error
- Cable break for analog sensor inputs and digital position measurement system
- Short-circuit monitoring for analog/digital outputs
- Monitoring of the microcontroller (watchdog)
- Temperature of the integrated electronics

IndraWorks DS PC program

To implement the project planning task and to parameterize the IAC-Multi-Ethernet valves, the user may use the IndraWorks DS engineering tool (see accessories):

- Project planning
- Parameterization
- Commissioning
- Diagnosis
- Comfortable administration of all data on a PC
- PC operating systems: Windows XP (SP3), Windows 7

Safety function

The integrated control electronics of the valve enables the additional shut-off of a channel according to EN 13849-1 in the direction P to A (depending on the application, the fail-safe position must be adhered to). For this purpose, a suitable control system must be provided to perform the plausibility check between the direction-dependent valve signals "enable input" and "enable acknowledgement" (signal fed back by the valve).
It is not possible to switch off direction P to B in a safety-relevant manner according to EN 13849-1 (depending on valve type).

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

General				
Size		NG	6	10
Type of connection			Plate connection, porting pattern according to ISO 4401	
Weight		kg	3.2	7.2
Installation position			any	
Ambient temperature range		°C	–20 ... +60	
Storage temperature range		°C	+5 ... +40	
Maximum solenoid surface temperature		°C	150	
$MTTF_d$ value according to EN ISO 13849	▶ Hydraulic (category 1)	Years	150 (for further details, see operating instructions 29391-B)	
Vibration resistance	▶ Sine test according to DIN EN 60068-2-6		10 ... 2000 Hz / maximum of 10 g / 10 cycles / 3 axes	
	▶ Noise test according to DIN EN 60068-2-64		20 ... 2000 Hz / 10 g_{RMS} / 30 g peak / 30 min / 3 axes	
	▶ Transport shock according to DIN EN 60068-2-27		15 g / 11 ms / 3 axes	
Maximum relative humidity (no condensation)		%	95	

Hydraulic									
Maximum operating pressure	▶ Ports A, B, P	bar	350						315
	▶ Port T	bar	250						
Hydraulic fluid			see table page 7						
Hydraulic fluid temperature range (flown-through)		°C	–20 ... +60						
Viscosity range	▶ Recommended	mm^2/s	20 ... 100						
	▶ Maximum admissible	mm^2/s	10 ... 800						
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)			Class 18/16/13 [2]						
Rated flow (***Δp*** = 35 bar per edge [1])		l/min	2	4	12	15	24/25	40	50	100
Leakage flow (at 100 bar)	▶ Linear characteristic curve "L"	cm^3/min	< 150	< 180	< 300	–	< 500	< 900	< 1200	< 1500
	▶ Inflected characteristic curve "P"	cm^3/min	–	–	–	< 180	< 300	< 450	< 600 (1:1) < 500 (2:1)	< 600
Limitation of use (transition in fail safe position)	▶ Symbol C3, C5	bar	350	350	350	350	350	160	315	160
	▶ Symbols C4, C1	bar	350	350	350	280	250	100	250	100

[1] Flow for deviating ***Δp:***

$$q_x = q_{Vnom} \times \sqrt{\frac{\Delta p_x}{35}}$$

[2] 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.

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	FKM	ISO 15380	90221
		HEES	FKM		
	▶ Soluble in water	HEPG	FKM	ISO 15380	
Flame-resistant	▶ Water-free	HFDU (glycol base)	FKM	ISO 12922	90222
		HFDU (ester base)	FKM		
		HFDR	FKM		
	▶ Containing water	HFC (Fuchs: Hydrotherm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046)	NBR	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 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 – backing 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 environment and hydraulic fluid temperature must not exceed 50 °C. In order to reduce the heat input into the component, the command value profile is to be adjusted for proportional and high-response valves.

Static/dynamic		
Hysteresis	%	≤ 0.2
Manufacturing tolerance q_{Vmax}	%	≤ 10
Temperature drift	%/10 K	Zero shift < 0.25
Pressure drift	%/100 bar	Zero shift < 0.15
Zero compensation		ex plant ±1%

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

Electrical, integrated electronics (OBE)				
Size		NG	6	10
Supply voltage [3; 4]	▶ Nominal voltage	VDC	24	
	▶ Lower limit value	VDC	18	
	▶ Upper limit value	VDC	36	
Maximum admissible residual ripple		Vpp	2.5 (comply with absolute supply voltage limit values)	
Current consumption	▶ Maximum [5]	A	2.5	
	▶ Impulse current	A	4	
Maximum power consumption		W	40	60
Relative duty cycle		%	100 (continuous operation)	
Protection class according to EN 60529			IP 65 with mounted and locked plug-in connectors	
Required fuse protection, external		A	4, time-lag	
Protective grounding conductor and screening			see connector pin assignment (CE-compliant installation) page 12 and 13	
Adjustment			calibrated in the plant, see characteristic curves page 15 ... 18	
Booting time		s	< 15	
Scan time pressure and force controller (minimum)		ms	0.5	
Scan time position controller (minimum)		ms	1	
AD/DA resolution	▶ Analog inputs	Bit	12	
	▶ Analog output	Bit	10	
Parameterization interface			Ethernet	
Conformity			CE according to EMC directive 2004/108/EC tested according to EN 61000-6-2 and EN 61000-6-3	

[3] Supply voltage is used directly for sensor connections X2M1, X2M2 and X8M (no internal voltage limitation)

[4] Voltage limit values must be observed directly at the connector of the valve (observe line length and cable cross-section!)

[5] When using the sensor inputs or the switching output, the maximum current consumption will increase according to the external load

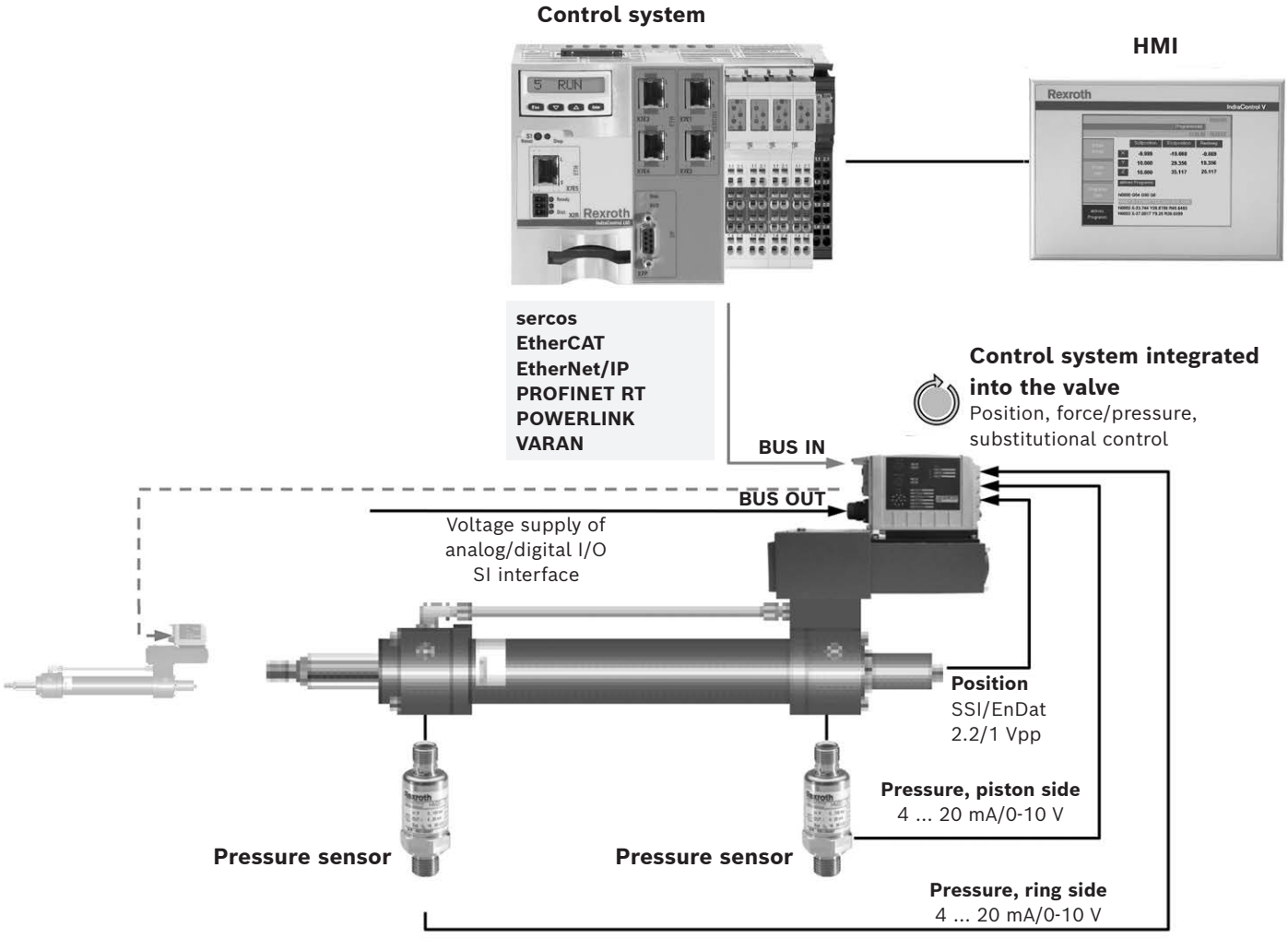
Electrical, integrated electronics (OBE)			
Digital inputs XH2	▶ Quantity		optionally up to 2, configurable (analog inputs are omitted)
	▶ Low level	V	–3 ... 5
	▶ High level	V	15 ... U_B
	▶ Current consumption at high level	mA	< 1
	▶ Reference potential		Pin 5
Digital outputs XH2	▶ Quantity		1
	▶ Low level	V	0 ... 3
	▶ High level	V	15 ... U_B
	▶ Current carrying capacity	A	1.5 (short-circuit-proof)
	▶ Signal delay time	msec	< 2 (depending on set scan time)
	▶ Reference potential		GND

Technical data

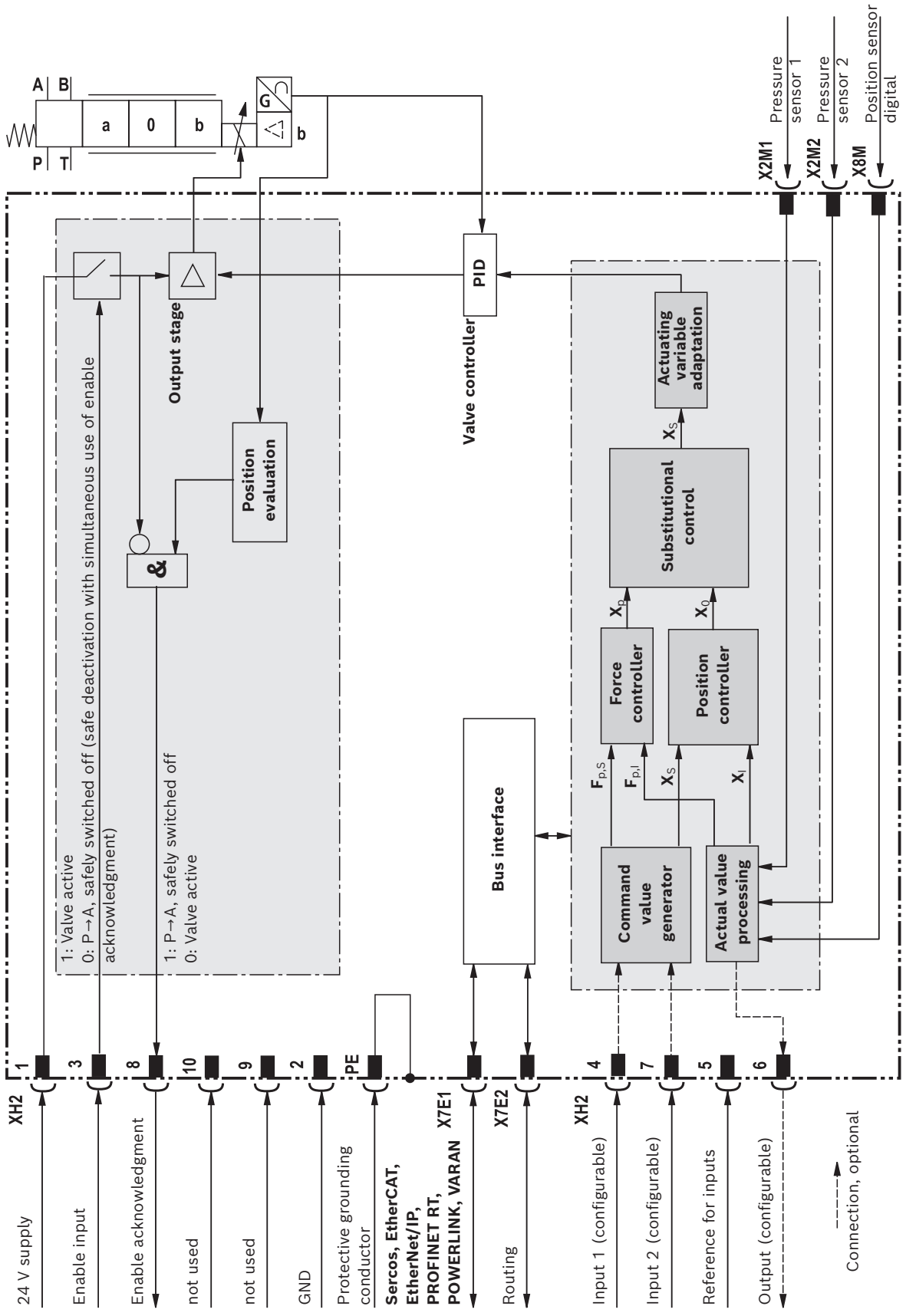
(For applications outside these values, please consult us!)

Analog inputs XH2	▶ Number (current and voltage input parameterizable)			optionally up to 2, configurable (digital inputs are no longer required)
	▶ AD resolution		bit	12
	▶ Voltage inputs (differential inputs)			
	– Measurement range		V	–10 ... +10
	– Input resistance		kΩ	80 +10%
	– Temperature drift			< 14 mV / 10 K
	▶ Current inputs (reference to AGND)			
	– Input current			4 ... 20 (0 ... 20 physically)
	– Input resistance		Ω	200, measuring resistance plus FET
	– Temperature drift			< 25 µA / 10 K
Analog outputs XH2	▶ Number (current and voltage input parameterizable)			1
	▶ DA resolution		bit	14
	▶ Voltage outputs			
	– Output range		V	–10 ... +10 (0 ... 10 by software)
	– Minimum load impedance		kΩ	10
	– Temperature drift			< 5 mV / 10 K
	▶ Current outputs			
	– Output range		mA	0 ... 20 (4 ... 20 by software)
	– Maximum load		Ω	200
Analog sensors X2M1, X2M2	▶ Number (current and voltage input configurable)			1 per connector
	▶ Supply voltage		V	24 (corresponding to supply voltage applied to XH2)
	▶ Maximum supply current		mA	350 (sum X2M1, X2M2 and X8M)
	▶ AD resolution		bit	12
	▶ Voltage inputs			
	– Measurement range		V	0 ... 10
	– Input resistance		kΩ	80 +10%
	– Temperature drift			< 15 mV / 10 K
	▶ Current inputs (reference to AGND)			
	– Input current			4...20 (0...20 physically)
	– Input resistance		Ω	200, measuring resistance plus PTC
	– Temperature drift			< 10 µA / 10 K
Digital sensor X8M	▶ Supply voltage			24 V or 5 V
	▶ Maximum supply current	– 24 V	mA	350 (sum X2M1, X2M2 and X8M)
		– 5 V	mA	250
	▶ SSI transducer			
	– Coding			Gray
	– Data width			12 ... 28 bit
	– Transfer frequency			80 kHz ... 1 MHz
	– Line receiver / driver			RS485
	▶ Endat encoder			2.2
	– Line receiver / driver			RS485
	– Resolution			minimum 10 nm and multiple
	▶ 1Vpp-encoder			
	– Transfer frequency		kHz	250

Representation of the axis controller in the system network



Block diagram/controller function block



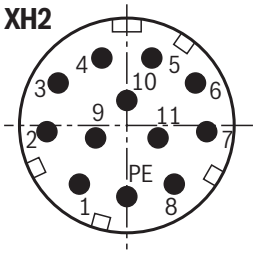
Detailed description of the safety function:
After the signal at the enable input has been removed, the output stage, and thus the solenoid of the valve, are internally separated from the available supply voltage. The enable acknowledgment will only be activated after the safe valve spool position has been achieved. For a detailed description of the safety function, refer to the operating instructions 29391-B.

Electrical connections, assignment

Connector pin assignment XH2, 11-pole + PE according to EN 175201-804

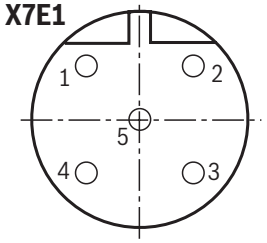
Pin	Core marking		Interface D6 assignment
	Cable, one-part [1]	Cable, split [2]	
1	1	1	24 V DC supply voltage
2	2	2	GND
3	3	white	Enable input 24 V DC (high ≥ 15 V; low < 2 V)
4	4	yellow	Command values 1 (4 ... 20 mA/±10 V) [3]
5	5	green	Reference for command values
6	6	violet	Actual value (4 ... 20 mA/±10 V) [3; 4]
7	7	pink	Command value 2 (4 ... 20 mA/±10 V) [3]
8	8	red	Enable acknowledgment 24 V DC (I_{max} 50 mA) [5]
9	9	brown	not used
10	10	black	not used
11	11	blue	Switching output 24 V, configurable (fault-free operation (24 V)/error (0V) or power circuit signal), maximum 1.5 A [3; 5]
PE	green-yellow	green-yellow	Functional ground (connected directly to metal housing)

1) Core marking of the connection lines for mating connector with cable set (see accessories, page 22, material numbers R901268000, R901272854, R901272852)
2) Core marking of the connection lines for mating connector with cable set (see accessories, page 22, material numbers R900884671, R900032356, R900860399)
3) Selection via commissioning software
4) For diagnostic purposes, precise actual value response via Ethernet interface
5) A load increases the current consumption on pin 1



Connector pin assignment for Ethernet interfaces "X7E1" and "X7E2" (coding D), M12, 4-pole, socket

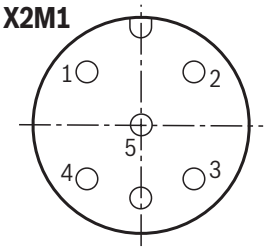
Pin	Assignment
1	TxD +
2	RxD +
3	TxD –
4	RxD –
5	not used



Analog configurable sensor interfaces, connections "X2M1", "X2M2" (coding A), M12, 5-pole, socket

Pin	Assignment
1	+24 V voltage output (sensor supply) [1; 2]
2	Sensor signal input current (4 ... 20 mA) [3]
3	GND
4	Sensor signal input voltage (0 ... 10 V) [3]
5	Negative differential amplifier input to pin 4 (optional)

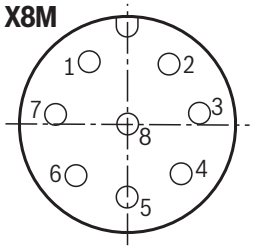
1) Voltage output same as voltage supply connected to input XH2. (Maximum load capacity see page 13)
2) A load increases the current consumption of the valve (pin 1 on the connector XH2)
3) Only one signal input per interface, configurable



Electrical connections, assignment

Digital sensor interface SSI, EnDat 2.2 or 1Vpp measurement system "X8M", M12, 8-pole, socket

Pin	SSI pin assignment [1]	EnDat 2.2 pin assignment [1; 2]	1Vpp pin assignment
1	GND	GND	GND
2	+24 V [3]	+5 V [3]	+5 V [3]
3	Data +	Data +	A +
4	Data –	Data –	A –
5	GND	GND	B +
6	Clock –	Clock –	B –
7	Clock +	Clock +	R +
8	+24 V [3]	+5 V [3]	R –



1) Pins 2, 8 and 1, 5 have the same assignment each

2) Supported resolution ≥ 10 nm

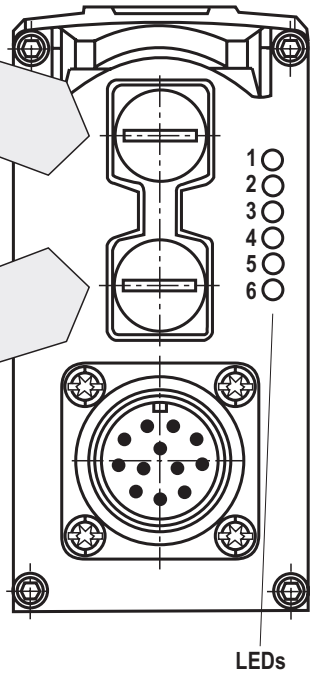
3) A load increases the current consumption of the valve (pin 1 on the connector XH2)

☞ **Notices:**

- Reference potential for all signals: GND
- We recommend connecting the shields on both sides via the metal housings of the plug-in connectors.
  Using connector pins will affect the shielding effect! Internal screens are not required.

LED displays

LED	Interface	Sercos	EtherNET/IP	EtherCAT	PROFINET RT	POWERLINK	VARAN
1	X7E1	Activity	Activity	not used	Activity	not used	Active
2		Link	Link	Link/activity	Link	Link/data activity	Link
3	Electronics module	S	Network status	Network status	Network status	Status/error	Network status
4		Module status	Module status	Module status	Module status	Module status	Module status
5	X7E2	Activity	Activity	not used	Activity	not used	not used
6		Link	Link	Link/activity	Link	Link/data activity	not used



Displays of the status LEDs

Module status LED (LED 4)	Display status
Aus	No voltage supply
Green-red, flashing	Initialization
Green, flashing	Drive ready for operation
Green	Drive active
Orange, flashing	Warning
Red, flashing	Error

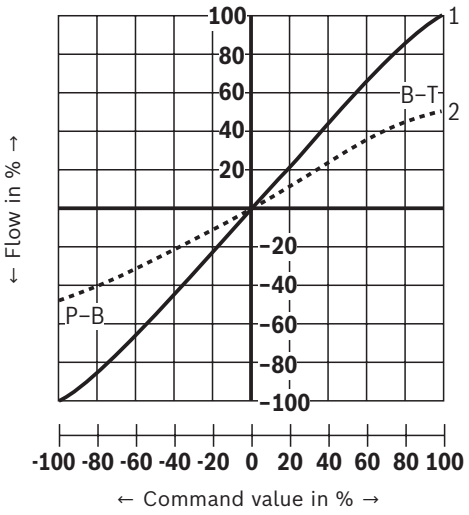
Network status LED (LED 3)	Display status
Aus	No voltage supply
Green	Operation

☞ **Notices:**
- ▶ LEDs 1, 2, 5 and 6 relate to interfaces "X7E1" and "X7E2"
  - – Link: Cable plugged in, connection established (permanently lit)
  - – Activity: Data sent/received (flashing)
- ▶ Module status LEDs 3 and 4 relate to the electronics module
- ▶ For a detailed description of the diagnosis LEDs, please refer to the functional description Rexroth HydraulicDrive HDx.

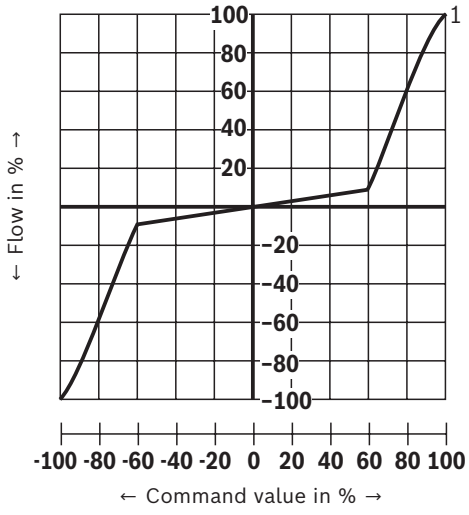
Characteristic curves: Size 6 – Flow characteristic (measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Flow/signal function

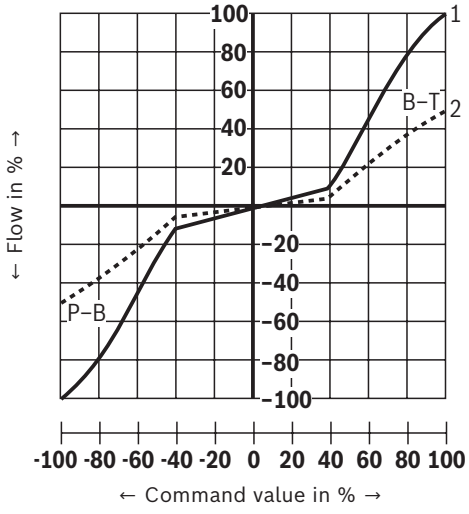
Linear characteristic curve "L"



Inflected characteristic curve "P", inflection at **60%**

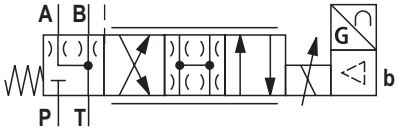
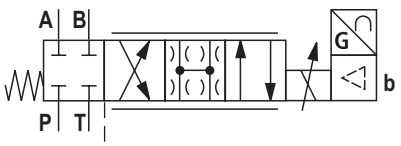


Inflected characteristic curve "P", inflection at **40%**



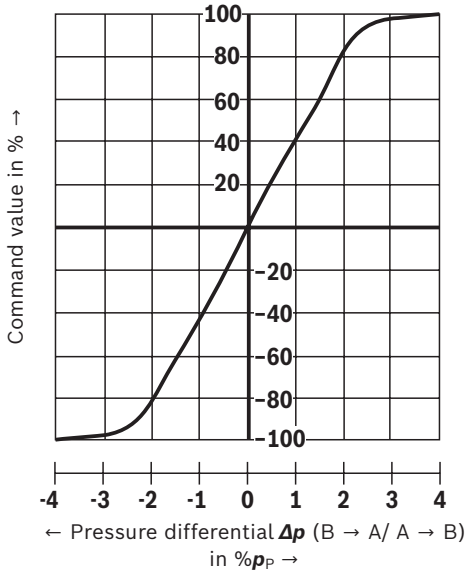
1 $q_{vA} : q_{vB}$ = 1:1
2 $q_{vA} : q_{vB}$ = 2:1

Fail-safe position

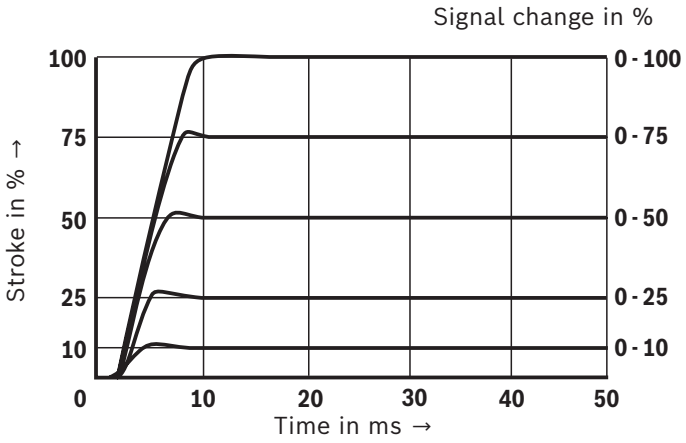
	Leakage flow at 100 bar	P→A P→B	50 cm³/min 70 cm³/min
	Flow at Δp = 35 bar	A→T B→T	10 ... 20 l/min 7 ... 20 l/min
	Leakage flow at 100 bar	P→A P→B	50 cm³/min 70 cm³/min
		A→T B→T	70 cm³/min 50 cm³/min
Fail-safe	p = 0 bar → 7 ms	Enable "off" or internal shut-off if an error has occurred U_B ≤ 18 V or I ≤ 2 mA (with 4 ... 20 mA signal, cable break detection: current threshold configurable)	
	p = 100 bar → 10 ms		

Characteristic curves: Size 6
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

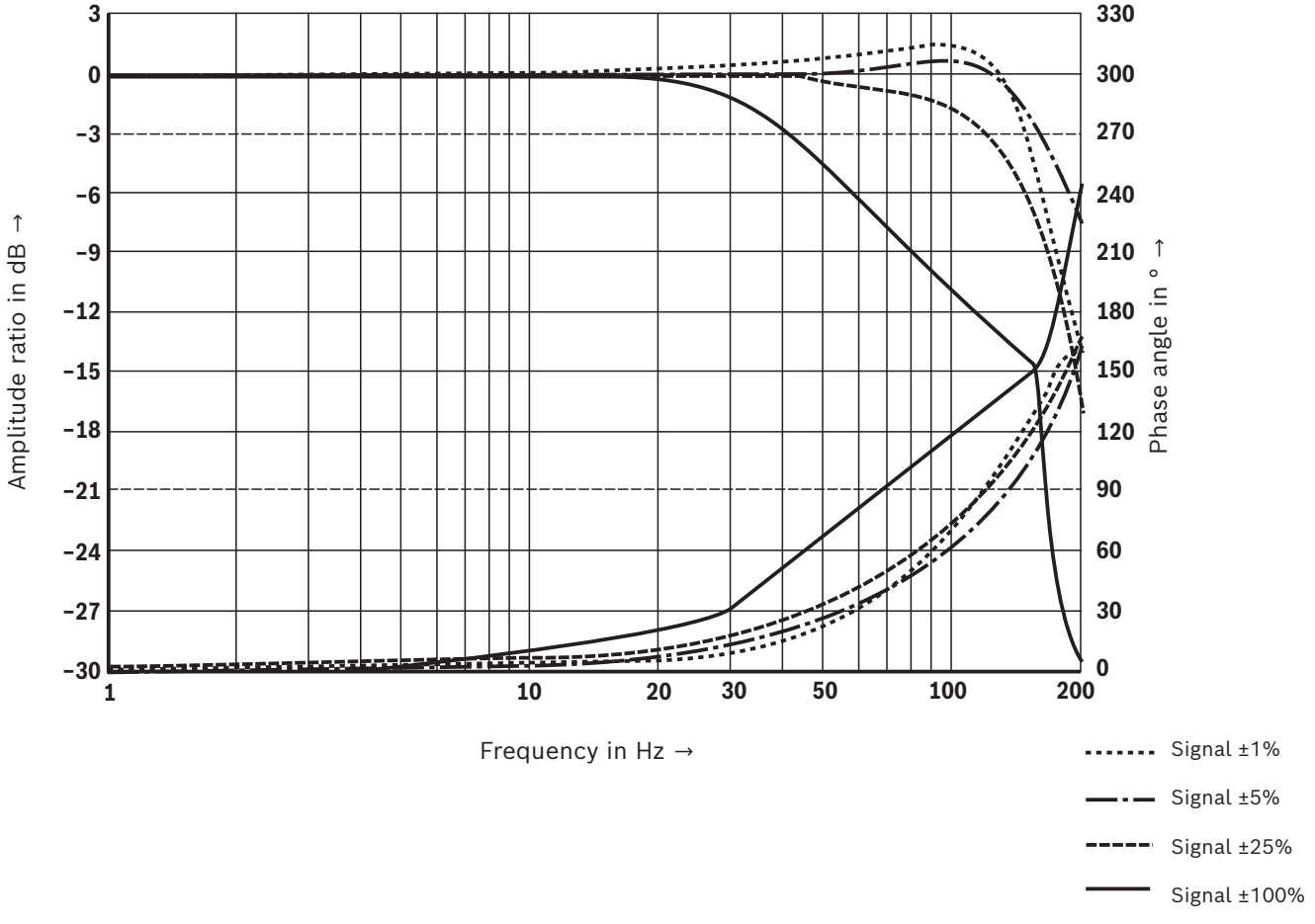
Pressure/signal characteristic curve



Transition function with stepped electric input signals



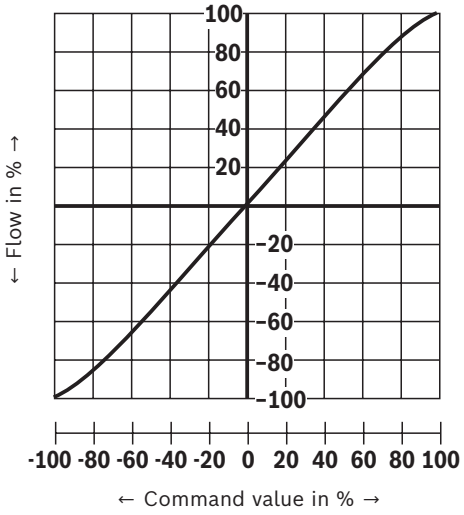
Frequency response



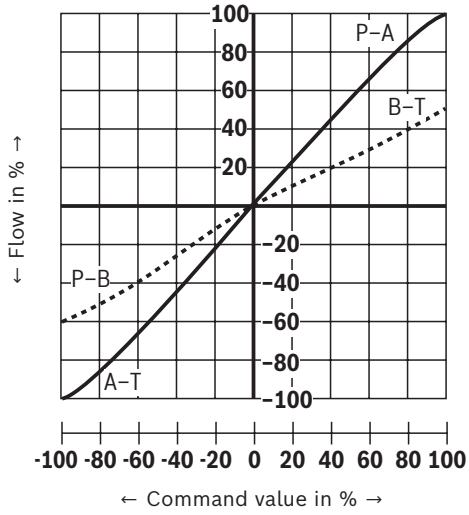
Characteristic curves: Size 10 – Flow characteristic (measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Flow/signal function

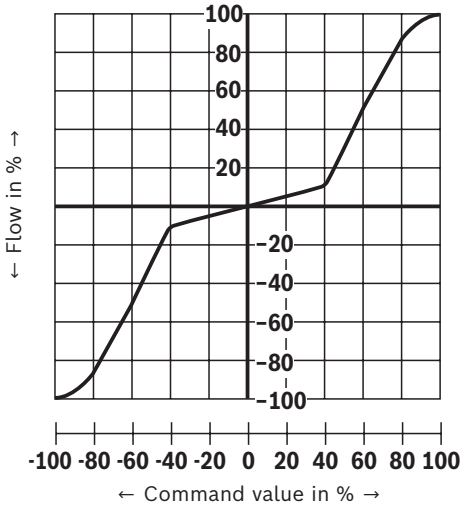
Linear characteristic curve "L" (1:1)



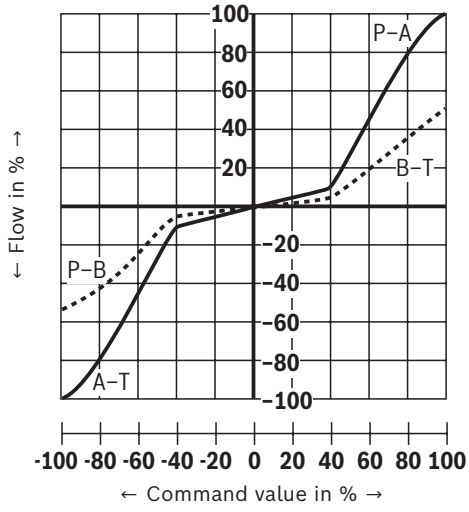
Linear characteristic curve "L" (2:1)



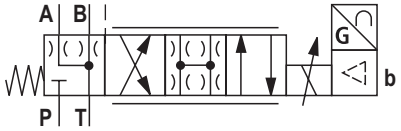
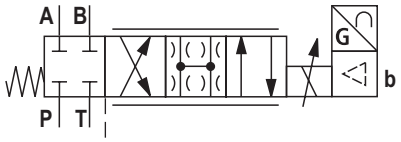
Inflected characteristic curve "P", inflection at **40%** (1:1)



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

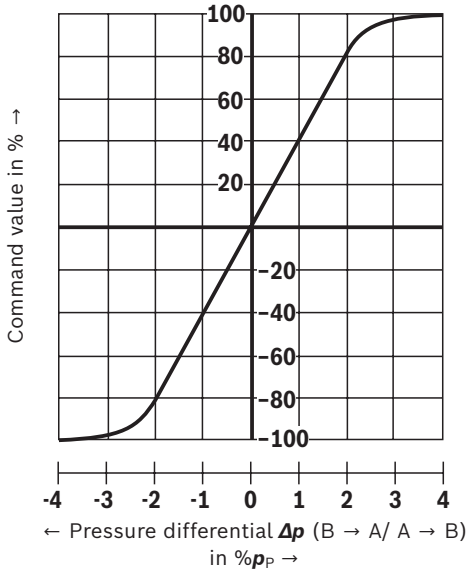


Fail-safe position

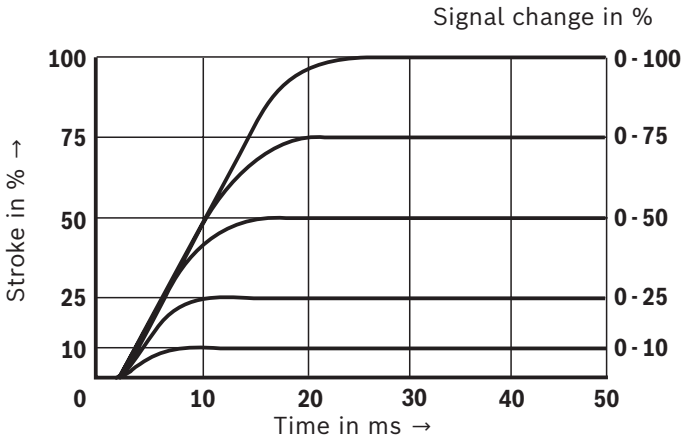
		Leakage flow at 100 bar	P→A P→B	50 cm³/min 70 cm³/min
		Flow at Δp = 35 bar	A→T B→T	100 ... 110 l/min 10 ... 25 l/min
		Leakage flow at 100 bar	P→A P→B	50 cm³/min 70 cm³/min
			A→T B→T	70 cm³/min 50 cm³/min
Fail-safe	p = 0 bar → 12 ms	Enable "off" or internal shut-off if an error has occurred U_B ≤ 18 V or I ≤ 2 mA (with 4 ... 20 mA signal, cable break detection: current threshold configurable)		
	p = 100 bar → 16 ms			

Characteristic curves: Size 10
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

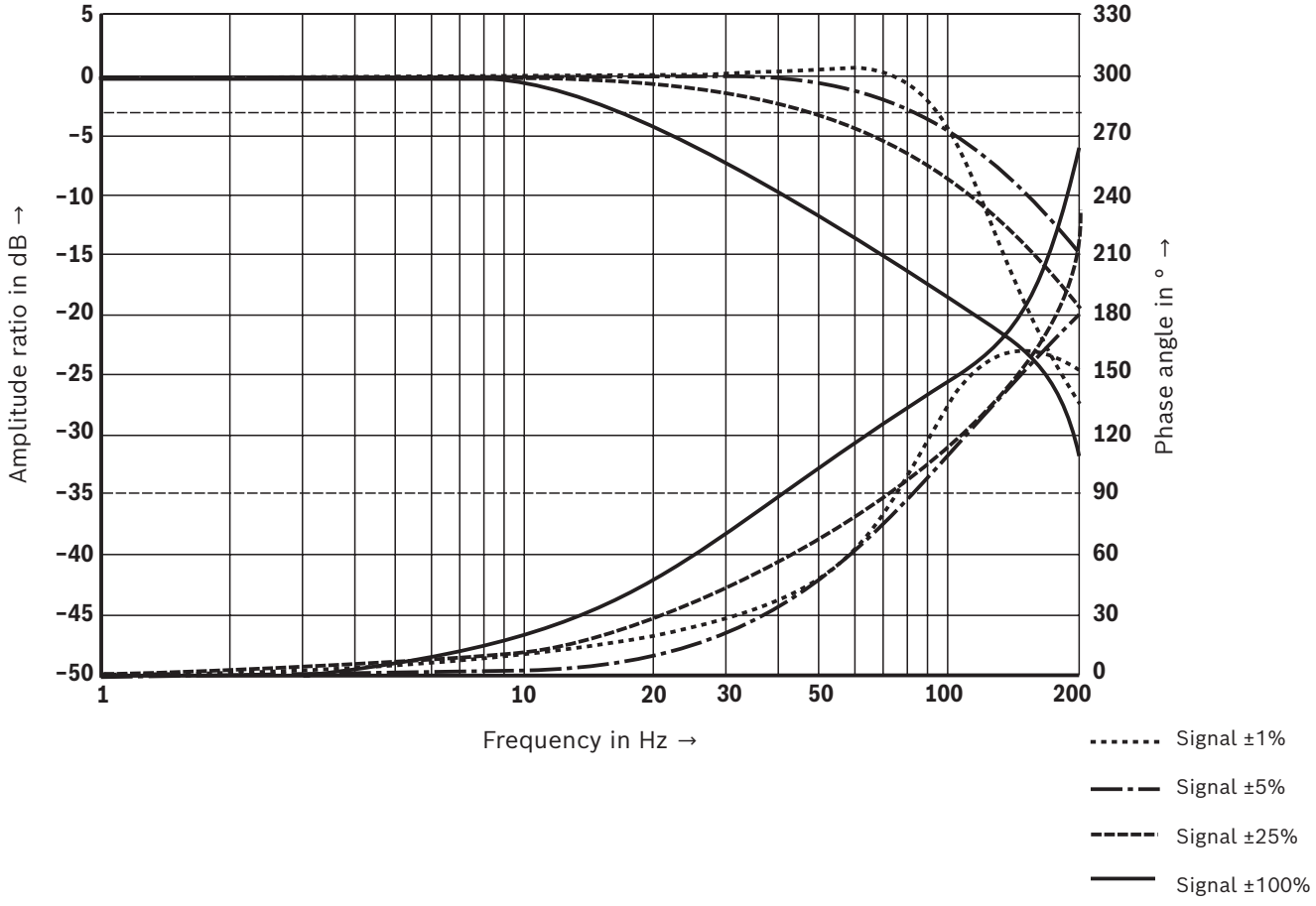
Pressure/signal characteristic curve



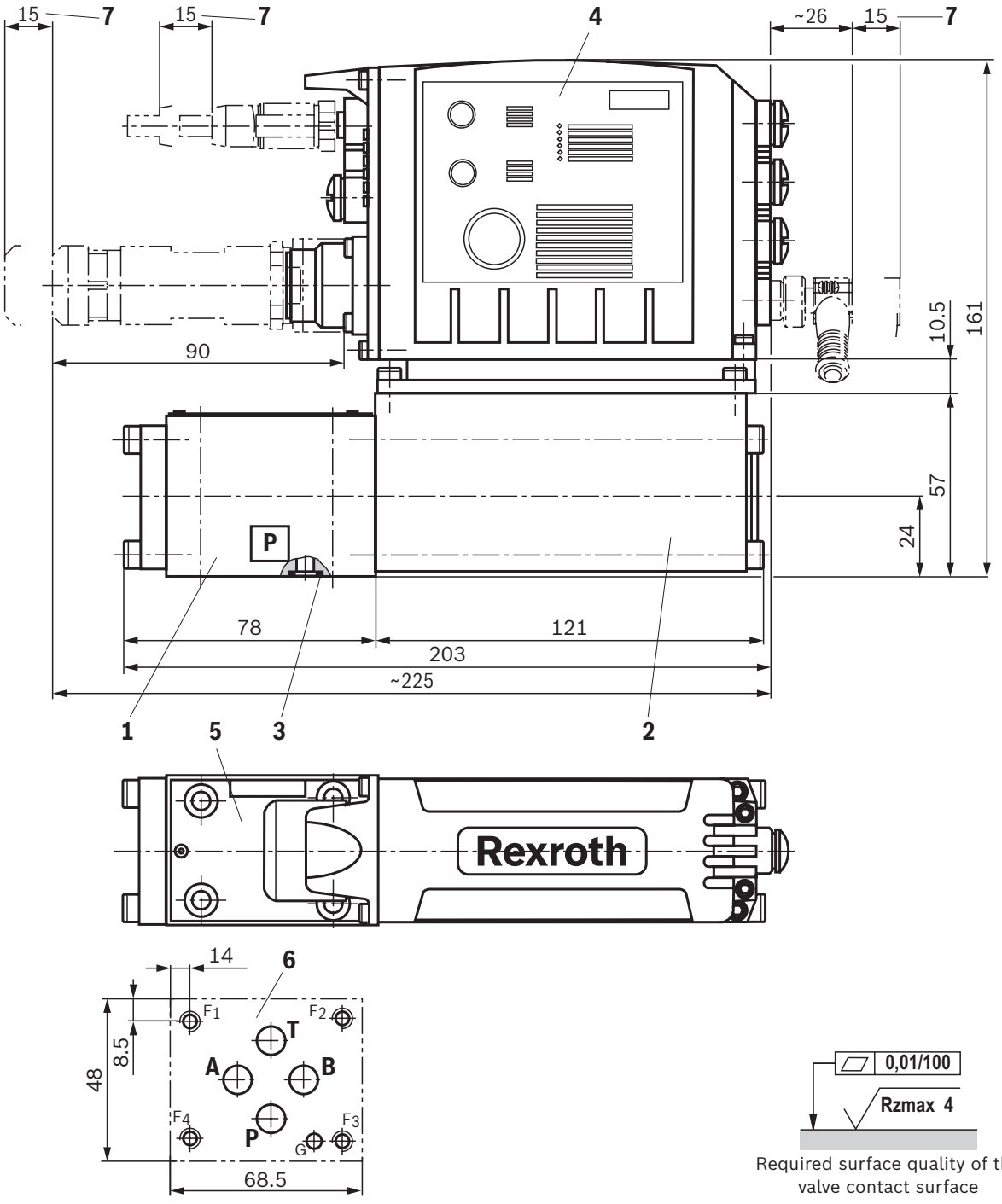
Transition function with stepped electric input signals



Frequency response



Dimensions: Size 6
(dimensions in mm)



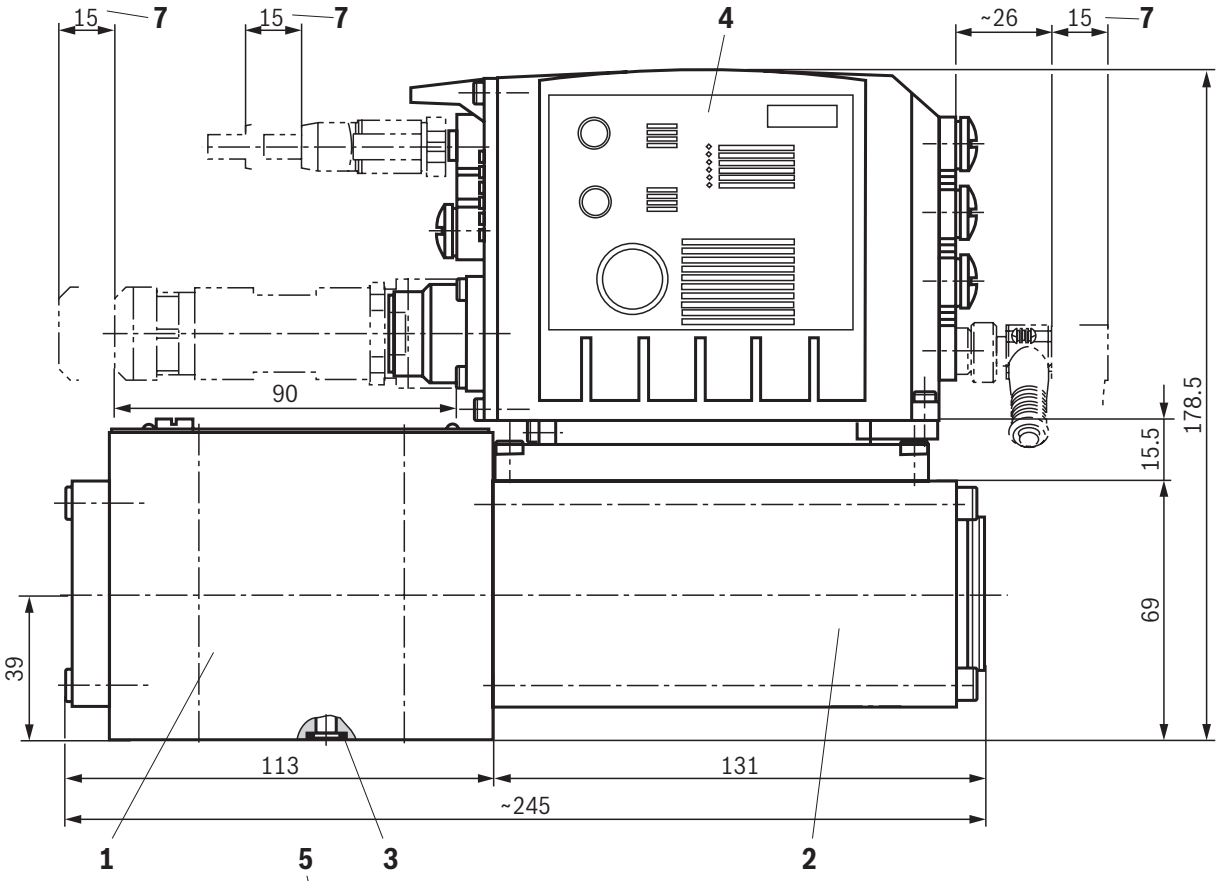
Required surface quality of the valve contact surface

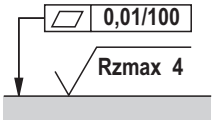
1 Valve housing
2 Control solenoid with position transducer
3 Identical seal rings for ports A, B, P, T
4 Integrated digital control electronics
5 Name plate
6 Machined valve contact surface, porting pattern according to ISO 4401-03-02-0-05
7 Space required to remove the mating connectors

☞ **Notices:**
The dimensions are nominal dimensions which are subject to tolerances.

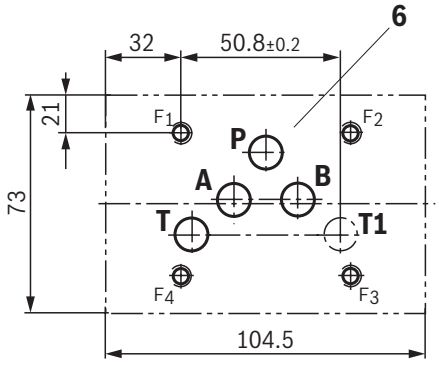
Valve mounting screws see page 21.

Dimensions: Size 10
(dimensions in mm)





Required surface quality of the valve contact surface



1 Valve housing
2 Control solenoid with position transducer
3 Identical seal rings for ports A, B, P, T, T1
4 Integrated digital control electronics
5 Name plate
6 Machined valve contact surface, porting pattern according to ISO 4401-05-04-0-05
Deviating from the standard:
Port T1 exists additionally
7 Space required to remove the mating connectors

☞ **Notices:**
The dimensions are nominal dimensions which are subject to tolerances.

Valve mounting screws see page 21.

Dimensions

Valve mounting screws (separate order)

Size	Hexagon socket head cap screws	Material number
6	**4 hexagon socket head cap screws ISO 4762 - M5 x 30 - 10.9-N67F 821 70** (galvanized according to Bosch standard N67F821 70) Tightening torque $M_A = 6^{+2}$ Nm	**2910151166**
10	**4 hexagon socket head cap screws ISO 4762 - M6 x 40 - 10.9-N67F 821 70** (galvanized according to Bosch standard N67F821 70) Tightening torque $M_A = 11^{+3}$ Nm	**2910151209**

☞ **Notice:**
The tightening torque of the hexagon socket head cap screws refers to the maximum operating pressure.

Accessories (separate order)

Mating connectors and cable sets

Port	Designation	Version	Short designation	Material number	Data sheet
XH2	Mating connector; for valves with round connector, 11-pole + PE	Metal, shielded	12PN11... EMC	**R901268000**	08006
		Plastic, two cable outlets	12PN11...2XD8	**R900884671**	
	Cable sets; for valves with round connector, 11-pole + PE	Metal, shielded, 5 m	12PN11REFS EMV...BG	**R901272854**	
		Metal, shielded, 20 m		**R901272852**	
		Plastic, shielded, 5 m	12PN11REFF 2X...	**R900032356**	
		Plastic, shielded, 20 m		**R900860399**	
X7E1, X7E2	Cable set; shielded, 4-pole, D coding	Straight connector M12, on straight connector M12, line cross-section 0.25 mm², CAT 5e, length freely selectable (= xx.x)	–	**R911172111** [1]	–
	Cable set; shielded, 4-pole	Straight connector M12, on straight connector RJ45, line cross-section 0.25 mm², CAT 5e, length freely selectable (= xx.x)	–	**R911172135** [2]	–
X2M1, X2M2	Cable set; shielded, 5-pole, for connecting Rexroth pressure sensors, type HM20, A coding	PUR/PVC, straight connector M12, on straight socket M12, line cross-section 0.34 mm², 0.6 m	–	**R901111709**	–
		PUR/PVC, straight connector M12, on straight socket M12, line cross-section 0.34 mm², 1.0 m	–	**R901111712**	–
		PUR/PVC, straight connector M12, on straight socket M12, line cross-section 0.34 mm², 2.0 m	–	**R901111713**	–
	Cable set; shielded, 5-pole, A coding	Straight connector M12, on free line end, line cross-section 0.34 mm², 1.5 m	–	**R901111752**	–
		Straight connector M12, on free line end, line cross-section 0.34 mm², 3.0 m	–	**R901111754**	–
		Straight connector M12, on free line end, line cross-section 0.34 mm², 5.0 m	–	**R901111756**	–
		Straight connector M12, on free line end, line cross-section 0.34 mm², 10.0 m	–	**R913005147**	–
	Plug-in connector; 5-pole, M12 x 1, pins, A-coding	Metal (cable diameter 4 ... 6 mm2)	–	**R901075542**	–
X8M	Cable set; Shielded, 8-pole, A-coding (only SSI, 1Vss) [3]	Straight connector M12, on free line end, line cross-section 0.25 mm², 10 m	–	**R913002641**	–

[1] Additional indication of type designation RKB0040/xx.x

[2] Additional indication of type designation RKB0044/xx.x

[3] **Recommendation:** If an EnDat 2.2 sensor is used, please refer to the sensor manufacturer Heidenhain with respect to a cable set.

☞ **Notices:**

- Tighten the M12 connector with a manual torque wrench by 1 Nm.
- Self-locking M12 cables must be used.
- It must be ensured that cables are secured without radial forces.
- All cables connected to XH1, X7E1 and X7E2 must be bundled in a wire harness after 20cm the latest. The wire harness must be fixed after further 20 ... 30cm. Make sure that there is no relative motion between the fixation and the valve.
- Before the fixation point, there must not be any cable loops.
- In general, the information on installation provided by the cable manufacturers must be observed.
- Respectively, the cables of X2M1, X2M2 and X8M, if used, are also fixed as described above.
- For further information, see operating instructions 29391-B

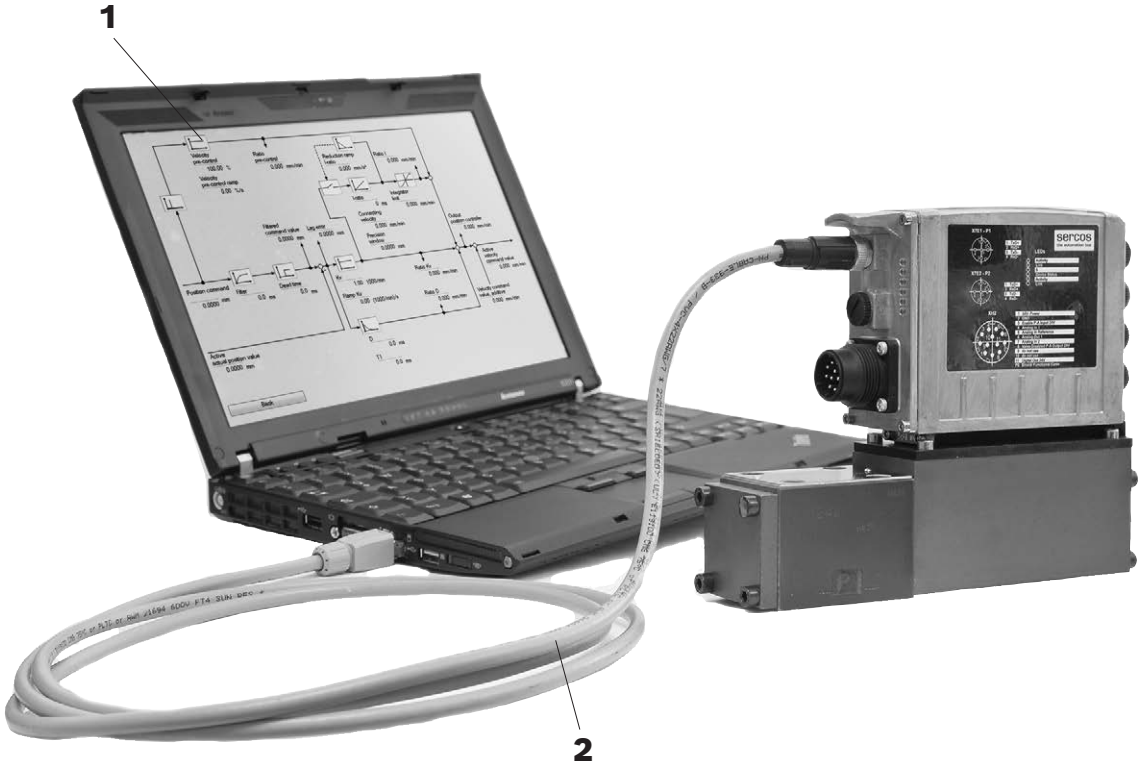
Accessories (separate order)

Protective cap

Protective cap M12	Version	Material number
		**R901075563**

Parameterization

The following is required for the parameterization with PC		Material number/download
1 Commissioning software	IndraWorks, Indraworks D, Indraworks DS	www.boschrexroth.com/IAC
2 Connection cable, 3 m	Shielded, M12 on RJ45, length can be freely selected (= xx.x)	**R911172135** (additional indication of type designation RKB0044/xx.x)



Project planning and maintenance instructions

- The supply voltage must be permanently connected; otherwise, bus communication is not possible.
- If electro-magnetic interference is to be expected, take appropriate measures to ensure the function (depending on the application, e.g. shielding, filtration).
- The devices have been tested in the plant and are supplied with default settings.
- Only complete devices can be repaired. Repaired devices are returned with default settings. User-specific settings will not be applied. The machine end-user will have to retransfer the corresponding user parameters.

Further information

▶ Directional control valves, direct operated, with electrical position feedback and integrated electronics (OBE)	Data sheet 29035 and 29037
▶ Directional control valve with integrated digital axis controller (IAC-R) and field bus interface	Data sheet 29191
▶ Directional control valve with integrated digital axis controller (IAC-R) and clock synchronized PROFIBUS DP/V2 (PROFIdrive profile)	Data sheet 29291
▶ Directional control valve with integrated digital axis controller	Operating instructions 29391-B
▶ CE Declaration of Conformity	Upon request
▶ Subplates	Data sheet 45100
▶ 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
▶ Hydraulic valves for industrial applications	Operating instructions 07600-B
▶ General product information on hydraulic products	Data sheet 07008
▶ Installation, commissioning and maintenance of servo valves and high-response valves	Data sheet 07700
▶ Assembly, commissioning and maintenance of hydraulic systems	Data sheet 07900
▶ Operation IAC-Multi-Ethernet electronics (xx = software version): – Functional description Rexroth HydraulicDrive HDx-xx – Parameter description Rexroth HydraulicDrive HDx-xx – Description of diagnosis Rexroth HydraulicDrive HDx-xx	
▶ Commissioning software and documentation on the Internet	www.boschrexroth.com/IAC
▶ Selection of filters	www.boschrexroth.com/filter
▶ Information on available spare parts	www.boschrexroth.com/spc

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