

Directional control valve, direct operated, with integrated field bus (IFB-Multi-Ethernet)

Type 4WRPFH



H8148+8149+8150

- ▶ Size 6
- ▶ Component series 3X
- ▶ Maximum operating pressure 350 bar
- ▶ Rated flow 40 l/min ($\Delta p = 35$ bar)



Features

- ▶ Open
 - Integrated fieldbus (IFB Multi-Ethernet)
 - Bus connection/service interface (Sercos, EtherCAT, EtherNet/IP, PROFINET RT, VARAN)
- ▶ Scalable
 - 2 configurable analog pressure sensor inputs
- ▶ Safe
 - Internal safety function (can be used up to category 4/PL e according to EN 13849-1)
 - CE conformity according to EMC Directive 2014/30/EU
- ▶ Precise
 - Integrated pressure/force control, optional
 - High response sensitivity and low hysteresis

Contents

Features	1
Ordering code	2, 3
Symbols	3, 4
Function	5, 6
Technical data	7 ... 9
Representation in the system network	10
Block diagram/controller function block	11
Electrical connections, assignment	12
LED displays	13
Characteristic curves	14, 15
Dimensions	16 ... 18
Accessories	18, 19
Project planning and maintenance instructions	20
Further information	20

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
4	WRP	F	H	6		B			-	3X	/		/	24		D9	

01	4 main ports	4
02	Directional control valve	WRP
03	With integrated fieldbus	F
04	Control spool/sleeve	H
05	Size 6	6
06	Symbols e.g. C, C1 etc.; for 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%)	
	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

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 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	3X

Seal material (observe compatibility of seals with hydraulic fluid used, see page 8)

11	NBR seals	M◇
	FKM seals	V

Pressure sensor (pressure rating)

12	Without pressure rating	0
	Pressure rating 280 bar	G

Internal pressure sensor (position)

13	Without internal pressure sensors	0
	In port A	A
	In port B	B
	In ports A and B	C

14	Supply voltage 24 V	24
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Ethernet interface

15	EtherNET/IP	E
	PROFINET RT	N
	Sercos	S
	EtherCAT (CANopen profile)	T
	VARAN	V

Ordering code

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
4	WRP	F	H	6		B			-	3X	/		/	24		D9	

Connector

16	Voltage supply, enable acknowledgment	D9
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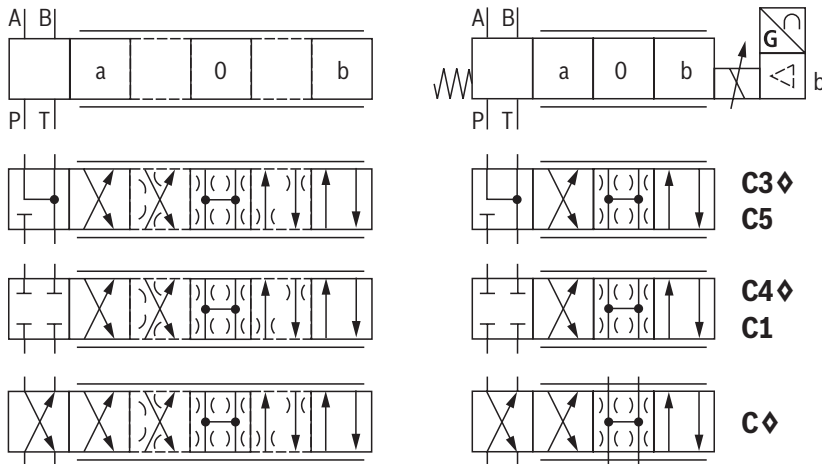
Pressure sensor interface

17	Without interface	0
	Analog, a maximum of 3 external pressure sensors (0 ... 10 VDC)	5 ¹⁾
18	Further details in the plain text	*

¹⁾ Only with version "0" at positions 12 and 13 ("4WRPFH 6 .B...3X/.00/24.D95")

Notice: \diamond = Preferred type

Symbols



With symbols C5 and C1: ¹⁾

P → A: $q_{V \text{ nom}}$ B → T: $q_{V \text{ nom}}/2$

P → B: $q_{V \text{ nom}}/2$ A → T: $q_{V \text{ nom}}$

Notice:

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

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

Symbols

Flow characteristic

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

Function

General

The **IFB Multi-Ethernet** valve (Integrated **Fieldbus**) is a digital directional control valve with integrated fieldbus.

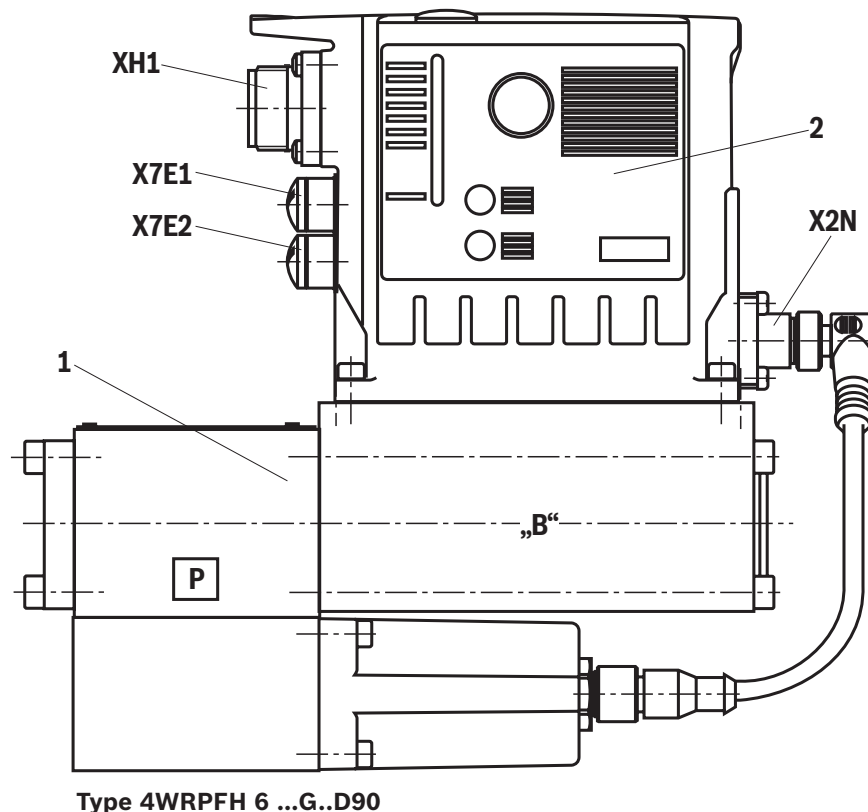
The following operating modes are possible:

- ▶ Standard:
 - Valve direct control
 - Flow control
- ▶ Version "5" or with internal pressure sensors:
 - Pressure/force control
 - Active damping
 - Alternating control (flow – pressure/force); pQ function (flow-controlled)
- ▶ Command value presetting is done purely digitally via the Ethernet interface (X7E1 or X7E2)
- ▶ The feedback information of the actual value signals to the higher-level control is provided via the Ethernet interface (X7E1 or X7E2)
- ▶ The controller parameters are set via the Ethernet interface (X7E1 or X7E2)

Set-up

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

- ▶ Direct operated directional control valve (1) with control spool and sleeve in servo quality
- ▶ Integrated fieldbus (3) with:
 - connector, voltage supply, safety shut-down (XH1)
 - Ethernet interfaces (X7E1, X7E2)
 - Analog sensor interfaces (X2N, optional)



Function

Function

When the control solenoid of the valve is switched off (enable pin D, low signal), the spring-operated control spool is in the fail-safe position.

When the control solenoid is activated (enable pin D, high signal), the digital electronics (OBE) compares the specified command value to the position actual value. In case of control deviations, the control of the solenoid is changed so as to be compensated. Due to the change in magnetic force, the control spool is adjusted against the spring. Stroke/control spool cross-section is regulated proportionally to the command value. In case of a command value presetting of 0, the electronics adjusts the control spool against the spring to central position. In deactivated condition, the spring is untensioned to a maximum and the valve is in fail-safe position.

Safety function

Thanks to the control solenoid (enable pin D, low signal) at the connector (XH1), shut-off is enabled.

After shut-off, the control spool of the valve is in fail-safe position.

Enable acknowledgment pin C for solenoid B is "high".

By connection of the control solenoid (enable pin D, high signal), the valve can be regulated in both directions by command value presetting.

Enable acknowledgment pin C for solenoid B is "low".

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 acknowledgment" (diagnosis signal fed back by the valve) and react in an error case.

It is not possible to switch off direction P→B in a safety-relevant manner according to EN 13849-1 (depending on valve type).

Monitoring

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

- ▶ Undervoltage
- ▶ Communication error
- ▶ Cable break for analog sensor inputs
- ▶ Monitoring of the microcontroller (watchdog)
- ▶ Temperature of the integrated electronics

IndraWorks DS PC program

To implement the project planning task and to parameterize the valve, 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 7-10



Notice:

- ▶ 4/4 directional control valves do not have a leakage-free basic locking when deactivated. Leakage must be considered when designing the drive. While the electrical supply voltage is being switched off, the drive may be accelerated for a short time in functional direction P→B.
- ▶ Valve type 4WRPFH can be used as shut-off element cat. 3 or 4 (up to PL e according to EN 13849-1). For both categories, an additional shut-off element is required to achieve a two-channel shut-off. For further information on the safety application, see operating instructions 29391-B.

Technical data

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

General	
Type of connection	Subplate mounting
Porting pattern	ISO 4401-03-02-0-05
Weight	► Versions "00..D90" and "00..D95" kg 3.5
	► Versions "GA..D90", "GB..D90" and "GC..D90" kg 4.8
Installation position	any
Ambient temperature range	°C -20 ... +60
Storage temperature range	°C +5 ... +40
Maximum storage time	years 1 (if the storage conditions are observed, refer to the operating instructions 07600-B)
Maximum relative humidity (no condensation)	% 95
Maximum surface temperature	°C 150
MTTF _d value according to EN ISO 13849	years 150 (for further details, see operating instructions 29391-B)
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 ... 200 0Hz/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
Conformity	► CE according to EMC directive 2014/30/EU, tested according to
	► RoHS directive
EN 61000-6-2 and EN 61000-6-3	
2011/65/EU ¹⁾	
Protection class according to EN 60529	IP65 (if suitable and correctly mounted mating connectors are used)

Hydraulic							
Maximum operating pressure	► Ports A, B, P bar 350						
	► Port T bar 250						
Hydraulic fluid	see table page 8						
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 ($\Delta p = 35$ bar per control edge ³⁾)	l/min	2	4	12	15	24/25	40
Leakage flow (at 100 bar)	► Linear characteristic curve "L" cm ³ /min	< 150	< 180	< 300	–	< 500	< 900
	► Inflected characteristic curve "P" cm ³ /min	–	–	–	< 180	< 300	< 450
Limitation of use (transition to fail-safe position)	► Symbols C3, C5 bar	350	350	350	350	350	160
	► Symbols C4, C1 bar	350	350	350	280	250	100

¹⁾ The product fulfills the substance requirements of the RoHS directive 2011/65/EU.

²⁾ The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.

³⁾ Flow for deviating Δp (per control edge):

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

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 ambient 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 point calibration	%	±1 (ex works)

Technical data

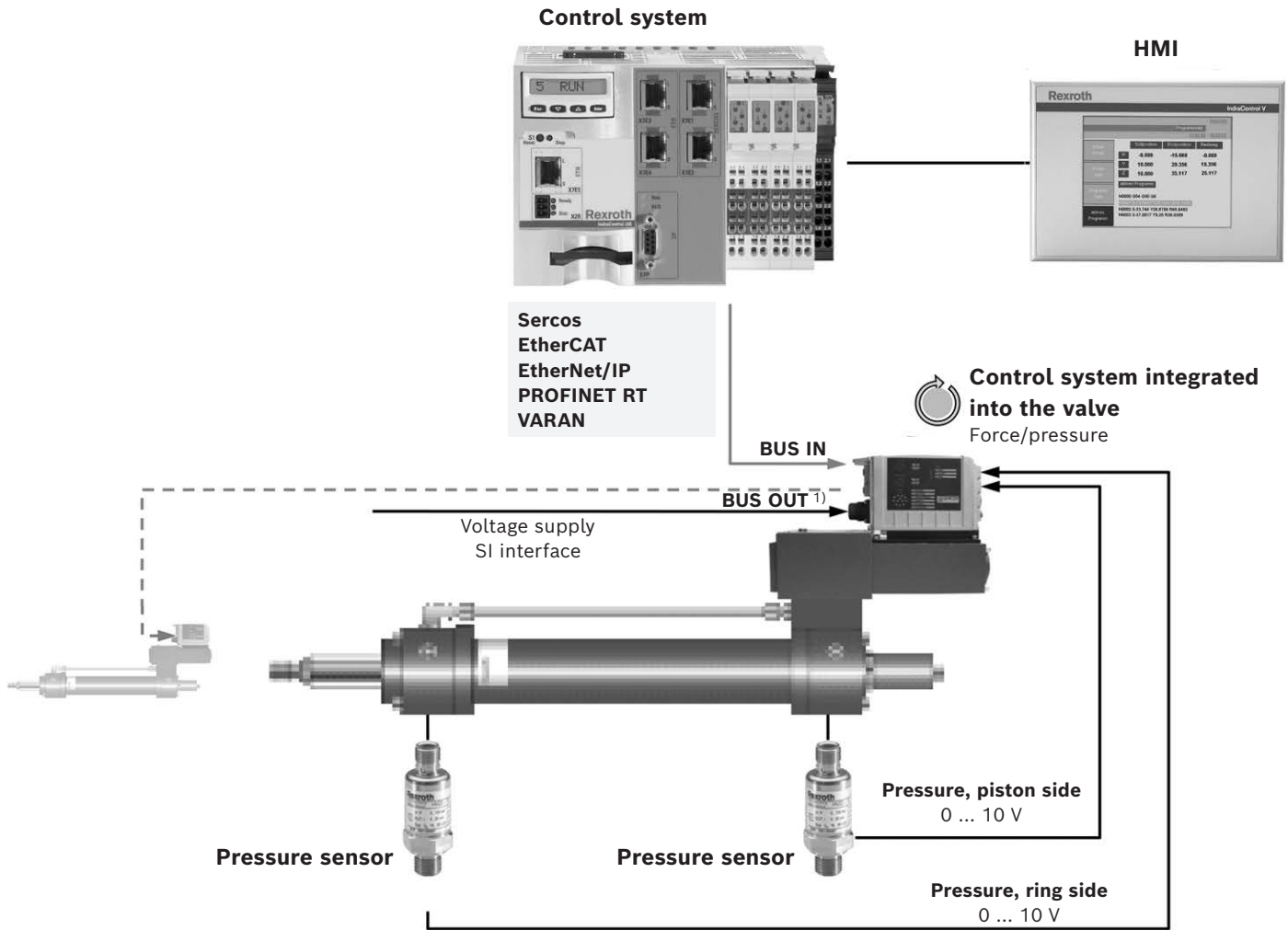
(For applications outside these values, please consult us!)

Electrical, integrated electronics (OBE)			
Supply voltage ⁴⁾	▶ Nominal value	VDC	24
	▶ Minimum	VDC	18
	▶ Maximum	VDC	36
	▶ Maximum residual ripple	V _{pp}	2.5 (comply with the absolute supply voltage limit values)
Current consumption	▶ Maximum ⁵⁾	A	2.5
	▶ Impulse current	A	4
Maximum power consumption		W	40
Relative duty cycle		%	100 (continuous operation)
Fuse protection, external		A	4, time-lag
Functional ground and screening	see connector pin assignment (CE-compliant installation) page 12		
Booting time		s	<15
Switching input Enable XH1	▶ Quantity		1
	▶ Low level	V	-3 ... 5
	▶ High level	V	15 ... U_B
	▶ Maximum current consumption at high level	mA	<1
Switching output Enable acknowledgment XH1	▶ Quantity		1
	▶ Low level	V	0 ... 3
	▶ High level	V	15 ... U_B
	▶ Current carrying capacity	mA	50 (short-circuit-proof)
	▶ Inductive load admissible		no
Analog sensors X2N	▶ Quantity		3 (version "5")
	▶ Supply voltage	V	24
	▶ Maximum supply current	mA	50
	▶ Voltage inputs		
	– Measurement range	V	0 ... 10
	– Input resistance	kΩ	100 +10%

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

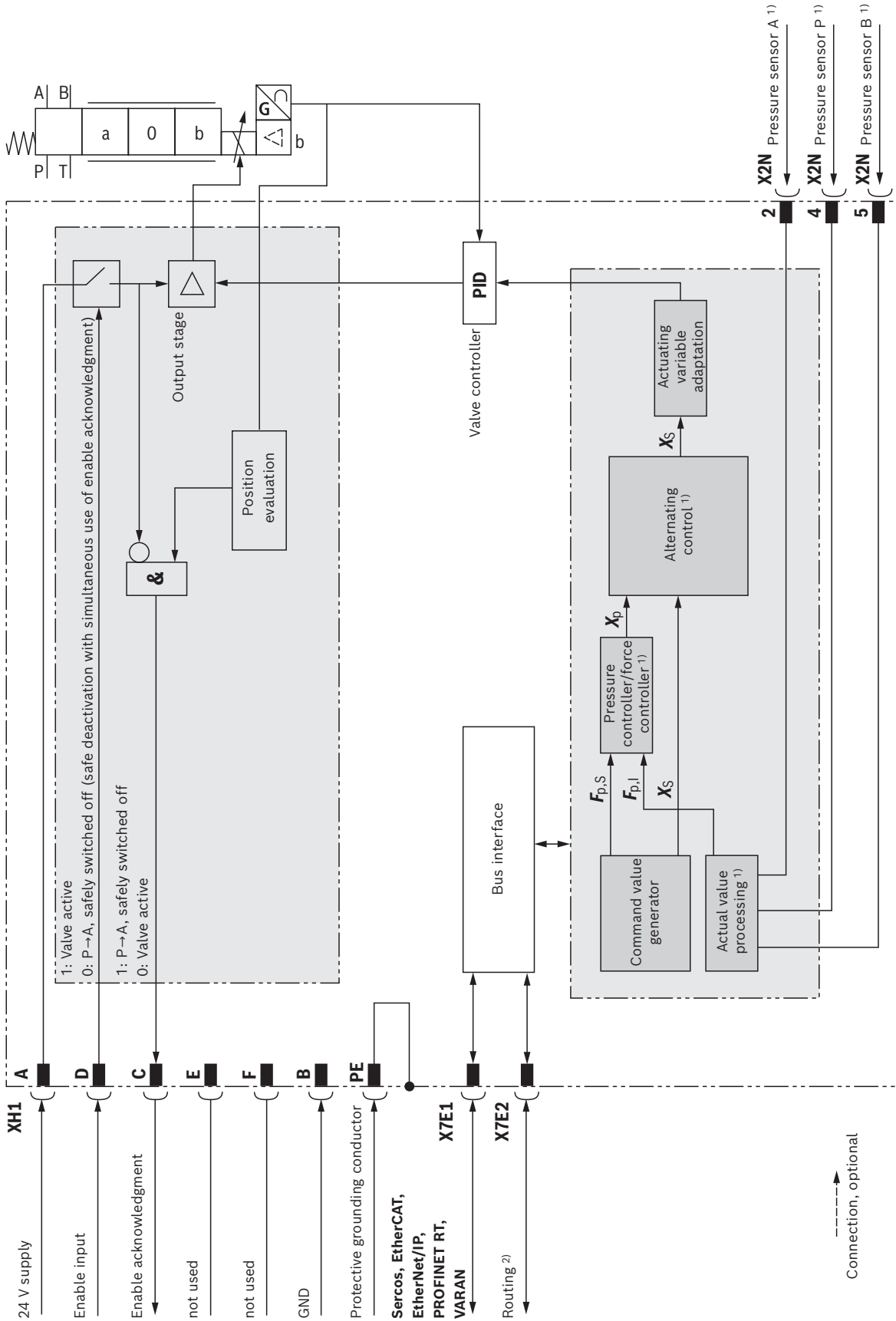
⁵⁾ The maximum current consumption will increase when using the sensor inputs or the switching output according to the external load

Representation in the system network (version "5")



1) Not with "VARAN"

Block diagram/controller function block

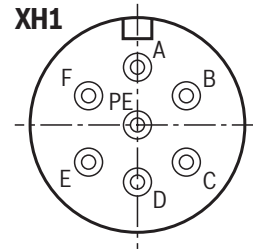


1) Only with version "5"
 2) Not with "VARAN"

Electrical connections, assignment

Connector pin assignment XH1, 6-pole + PE according to DIN 43563

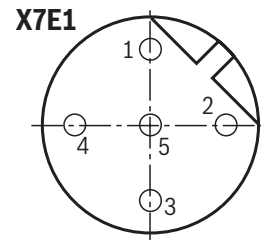
Pin	Assignment of interface D9
A	24 VDC supply voltage ¹⁾
B	GND
C	Enable acknowledgment 24 VDC (I_{\max} 50 mA) ²⁾ (high \geq 15 V; low $<$ 2 V)
D	Enable input 24 VDC (high \geq 15 V; low $<$ 2 V)
E	not used
F	not used
PE	Functional ground (connected directly to metal housing)



- 1) A load increases the current consumption on pin A
- 2) Enable acknowledgment is issued only if the valve has safely switched off according to EN 13849-1, see operating instructions 29391-B.

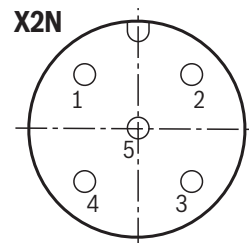
Connector pin assignment for Ethernet interface "X7E1" and "X7E2" (coding D), M12, 4-pole, socket

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



Analog configurable sensor interface, port "X2N" (coding A), M12, 5-pole, socket

Pin	Assignment
1	+24 V voltage output
2	Analog sensor input 2 (0 ... 10 V)
3	GND
4	Analog sensor input 4 (0 ... 10 V)
5	Analog sensor input 3 (0 ... 10 V)



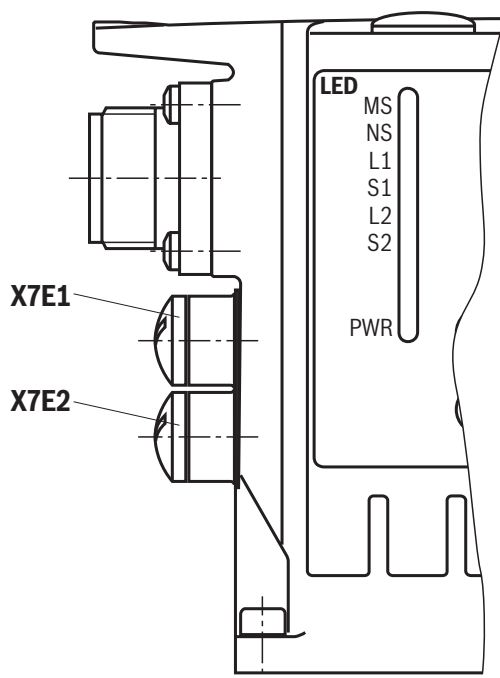
Only with version "5"

Notice:

- ▶ 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 effectiveness of the shielding effect. Internal screens are not required.

LED displays

LED	Interface	Sercos	EtherNET/IP	EtherCAT	PROFINET RT	VARAN
MS	Electronics module	Module status	Module status	Module status	Module status	Module status
NS		S	Network status and others	Network status and others	Network status and others	Network status and others
L1	X7E1	Link and others	Link and others	Link/activity	Link and others	Link and others
S1		Activity and others	Activity and others	not used	Activity and others	Active and others
L2	X7E2	Link and others	Link and others	Link/activity	Link and others	not used
S2		Activity and others	Activity and others	not used	Activity and others	not used
PWR	XH1	Power	Power	Power	Power	Power



Displays of the status LEDs

Power LED (LED PWR)	Display status
Off	No voltage supply
Green	Operation

Module status LED (LED MS)	Display status
Off	No voltage supply
Green-red, flashing	Initialization
Green, flashing	Drive ready for operation
Green	Drive active
Orange, flashing	Warning
Red, flashing	Error
Green, rapidly flashing	Firmware must be loaded

Link LED (LED L1)	Display status
Permanently lit	Cable plugged in, connection established

Activity LED (LED S1)	Display status
Flashing	Data sent/received

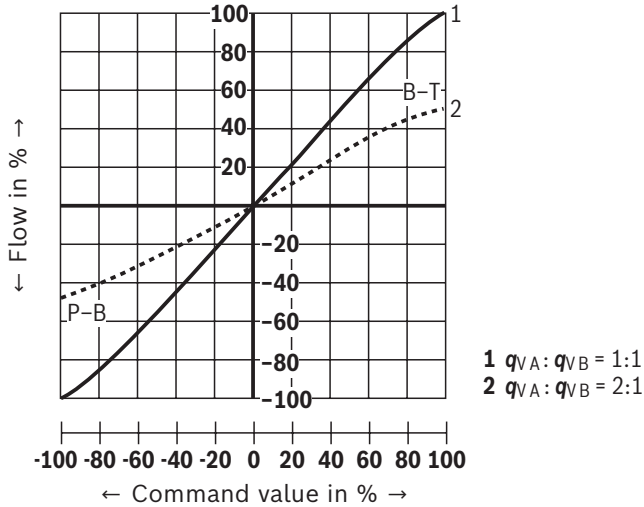
Notice:

- ▶ For the connection to the M12 sockets, we recommend using self-locking mating connectors
- ▶ The MS module status LED relates to the electronics module
- ▶ The NS network status LED indicates the status of the control communication, see application description 30338-FK
- ▶ LEDs L1, S1, L2 and S2 relate to interfaces "X7E1" and "X7E2"
- ▶ For a detailed description of the diagnosis LEDs, please refer to the functional description Rexroth HydraulicDrive HDx.
- ▶ Function is only available after start-up of the electronics.

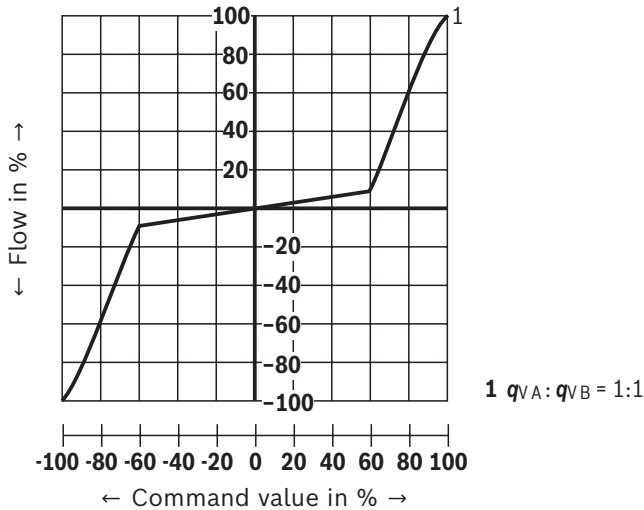
Characteristic curves: Flow characteristic (measured with HLP46, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Flow/signal function

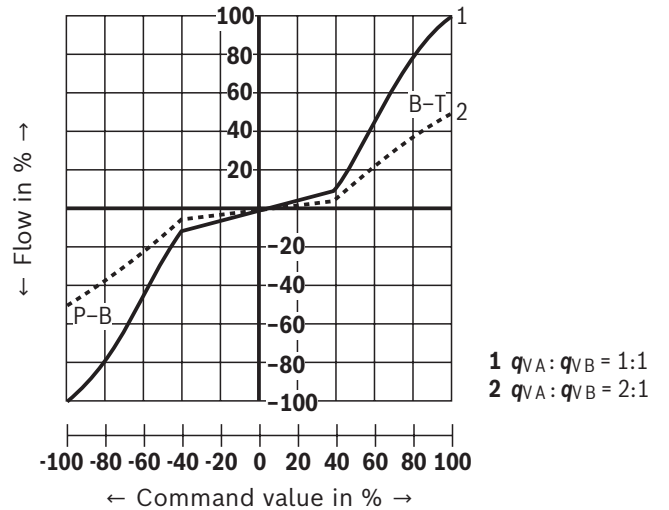
Linear characteristic curve "L"



Inflected characteristic curve "P", inflection at 60%



Inflected characteristic curve "P", inflection at 40%

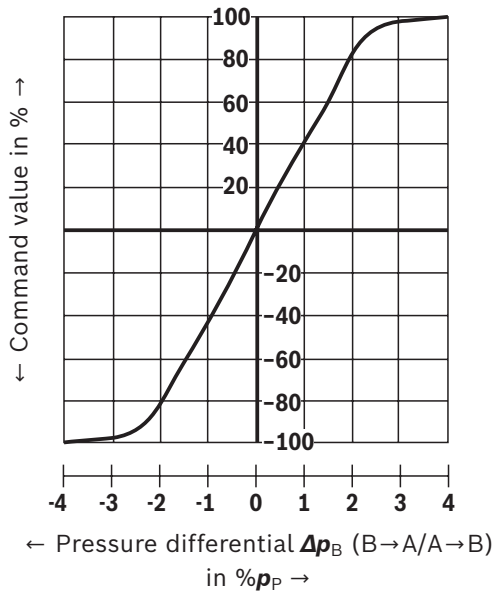


Fail-safe position			
	Leakage flow at 100 bar	P→A P→B	50 cm ³ /min 70 cm ³ /min
	Flow at $\Delta p = 35$ bar	A→T B→T	10 ... 20 l/min 7 ... 20 l/min
	Leakage flow at 100 bar	P→A P→B	50 cm ³ /min 70 cm ³ /min
		A→T B→T	70 cm ³ /min 50 cm ³ /min
Fail-safe	<p>$p = 0 \text{ bar} \rightarrow 7 \text{ ms}$</p> <p>$p = 100 \text{ bar} \rightarrow 10 \text{ ms}$</p>	Enable "off" or internal shut-off if an error has occurred $U_B \leq 18 \text{ V}$ or $I \leq 2 \text{ mA}$ (with 4 ... 20 mA signal, cable break detection: current threshold configurable)	

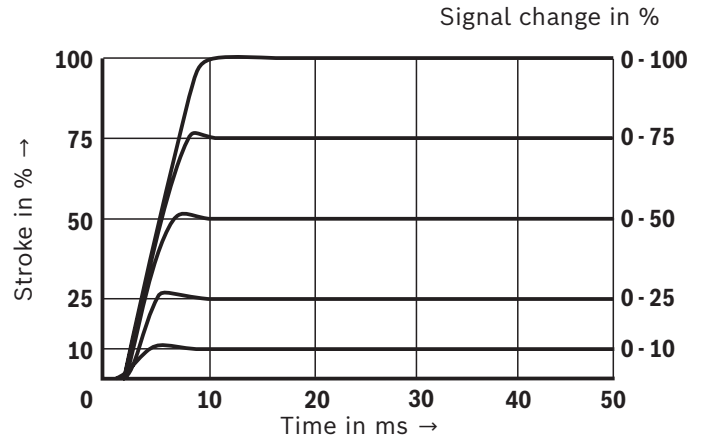
Characteristic curves

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

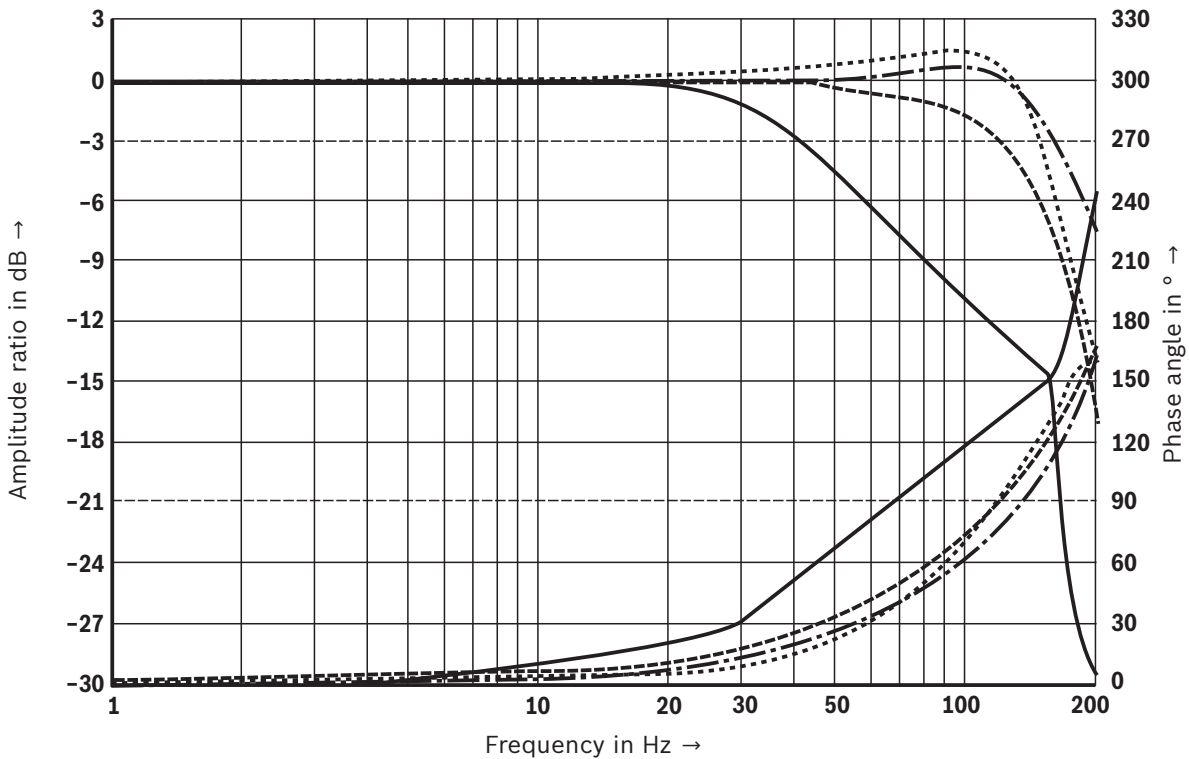
Pressure/signal characteristic curve



Transition function with stepped electric input signals

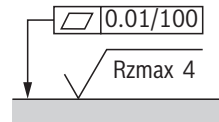
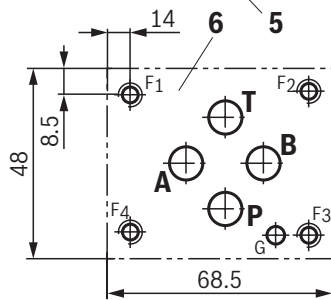
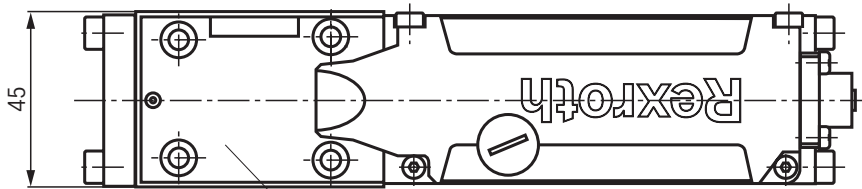
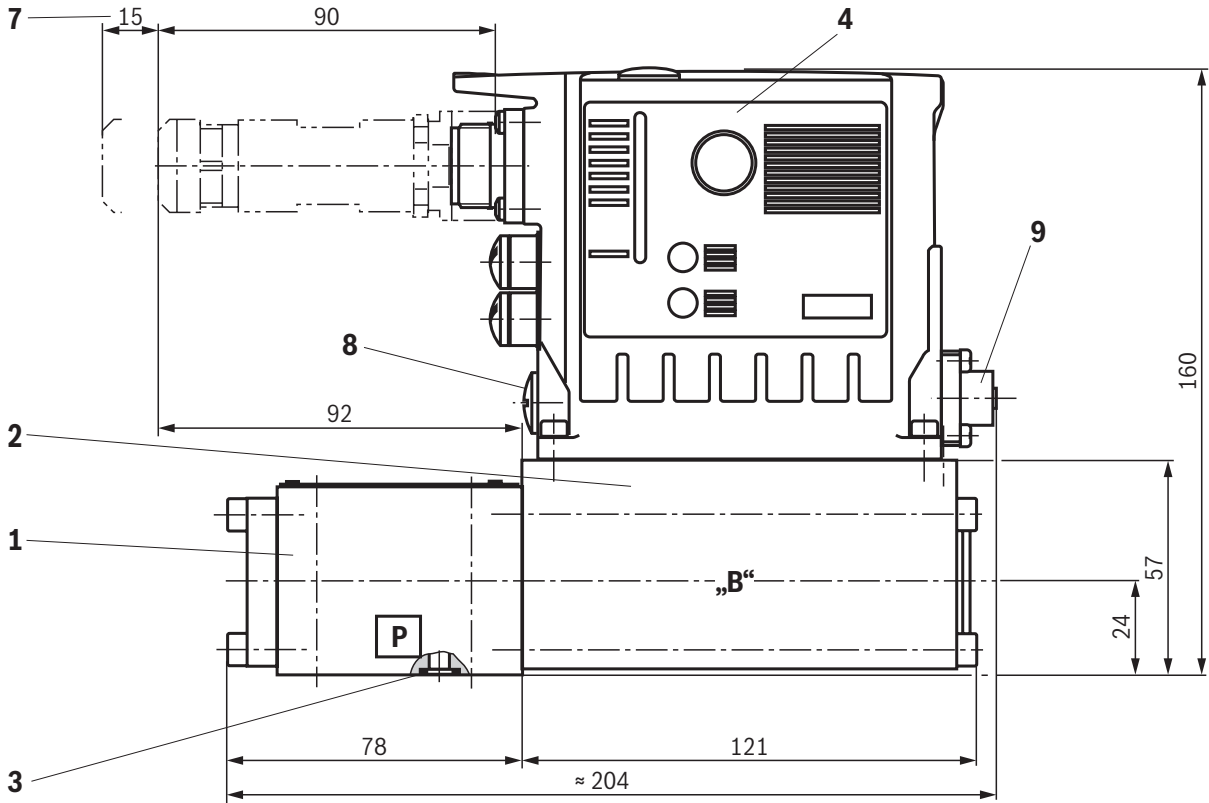


Frequency response



- Signal ±1%
- · - · Signal ±5%
- - - - Signal ±25%
- Signal ±100%

Dimensions: Versions "00..D90" and "00..D95"
(dimensions in mm)



Required surface quality of the valve contact surface

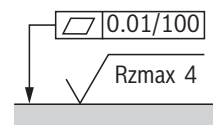
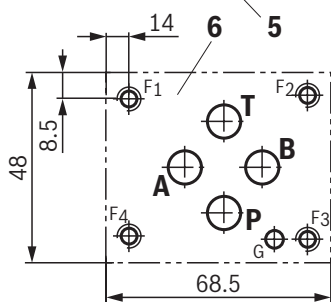
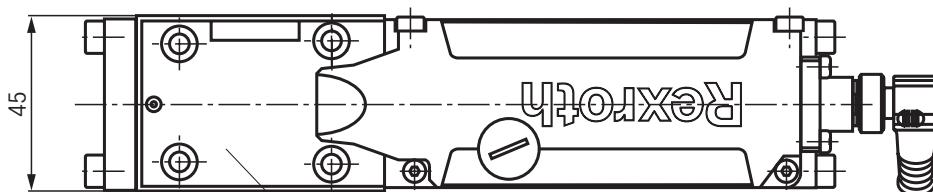
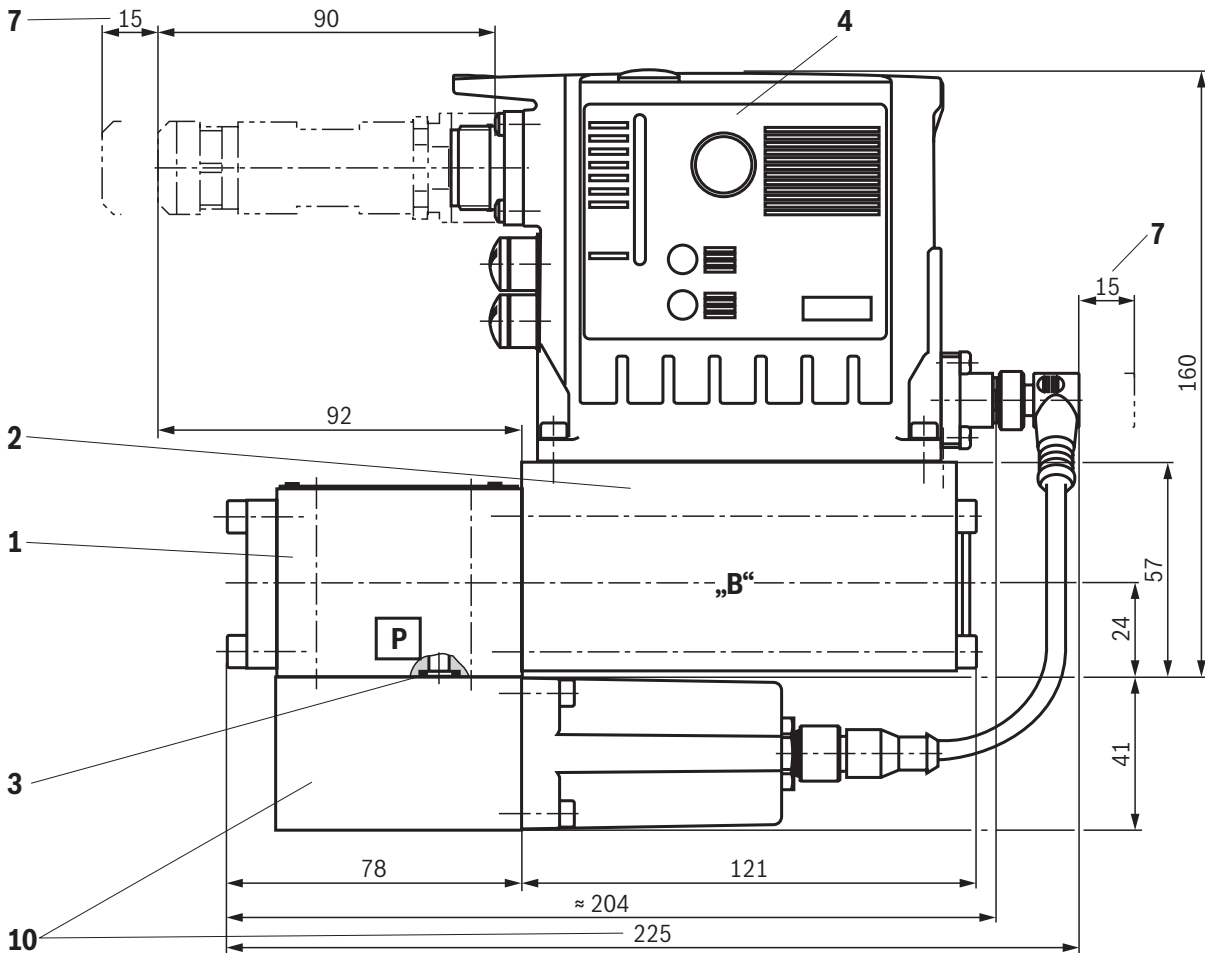
- 1 Valve housing
- 2 Control solenoid with position transducer
- 3 Identical seal rings for ports A, B, P, T
- 4 Integrated digital control electronics
- 5 Name plate
- 6 Machined valve contact surface, porting pattern according to ISO 4401-03-02-0-05
- 7 Space required to remove the mating connectors
- 8 Plug screw PG, version "00..D90" only
- 9 Version "00..D95" only

Valve mounting screws see page 18.

Notice:

The dimensions are nominal dimensions which are subject to tolerances.

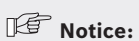
Dimensions: Versions "GA..D90", "GB..D90" and "GC..D90"
(dimensions in mm)



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
- 10 Integrated pressure sensor

Valve mounting screws see page 18.



Notice:

The dimensions are nominal dimensions which are subject to tolerances.

Dimensions

Valve mounting screws (separate order)

Version	Hexagon socket head cap screws	Material number
"00..D90", "00..D95"	4 hexagon socket head cap screws ISO 4762 - M5 x 30 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$; tightening torque $M_A = 6^{+2} \text{ Nm}$	R913048086
"GA..D90", "GB..D90", "GC..D90"	4 hexagon socket head cap screws ISO 4762 - M5 x 70 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B Friction coefficient $\mu_{\text{total}} = 0.09 \dots 0.14$; tightening torque $M_A = 8.9 \text{ Nm} \pm 10\%$	R913043762




Notice:

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

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/IFB
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)

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

Port	Designation	Version	Short designation	Material number	Data sheet	
XH1	Mating connector; for valves with round connector, 6-pole + PE	Straight, metal	7PZ31...M	R900223890	08006	
		Straight, plastic	7PZ31...K	R900021267		
		Angled, plastic	–	R900217845	–	
	Cable sets; for valves with round connector, 6-pole + PE	Plastic, 3.0 m	7P Z31 BF6	–	R901420483	08006
		Plastic, 5.0 m			R901420491	
		Plastic, 10.0 m			R901420496	
		Plastic, 20.0 m	–	R901448068	–	
X7E1, X7E2	Cable set; shielded, 4-pole, D coding	Straight connector M12, on straight connector M12, line cross-section 0.25 mm ² , 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 mm ² , CAT 5e, length freely selectable (= xx.x)	–	R911172135 ²⁾	–	
X2N ³⁾	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 mm ² , 0.6 m	–	R901111709	–	
		PUR/PVC, straight connector M12, on straight socket M12, line cross-section 0.34 mm ² , 1.0 m	–	R901111712	–	
		PUR/PVC, straight connector M12, on straight socket M12, line cross-section 0.34 mm ² , 2.0 m	–	R901111713	–	
	Cable set; shielded, 5-pole, A coding	Straight connector M12, on free line end, line cross-section 0.34 mm ² , 1.5 m	–	R901111752	–	
		Straight connector M12, on free line end, line cross-section 0.34 mm ² , 3.0 m	–	R901111754	–	
		Straight connector M12, on free line end, line cross-section 0.34 mm ² , 5.0 m	–	R901111756	–	
		Straight connector M12, on free line end, line cross-section 0.34 mm ² , 10.0 m	–	R913005147	–	

1) Additional indication of type designation RKB0040/xx.x

2) Additional indication of type designation RKB0044/xx.x

3) Only with connection of an external sensor, type HM20

**Notice:**

- ▶ 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 force.
- ▶ All cables connected to “XH1”, “X7E1” and “X7E2” must be bundled in a wire harness after 20 cm the latest. The wire harness must be fixed after further 20 ... 30 cm. 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 cable of “X2N” (if used) is also fixed as described above.
- ▶ For further information, see operating instructions 29391-B

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 for ensuring 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

- | | |
|--|--|
| ▶ High-response/proportional valve with Multi-Ethernet interface | Operating instructions 29391-B |
| ▶ Operation fieldbus electronics (xx = software version): | |
| – Functional description Rexroth HydraulicDrive HDx-20 | – 30338-FK |
| – Parameter description Rexroth HydraulicDrive HDS-16, HDx-17 ... HDx-20 | – 30330-PA |
| – Description of diagnosis Rexroth HydraulicDrive HDS-16, HDx-17 ... HDx-20 | – 30330-WA |
| ▶ 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 |
| ▶ Hexagon socket head cap screws, metric/UNC | Data sheet 08936 |
| ▶ Hydraulic valves for industrial applications | Operating instructions 07600-B |
| ▶ Directional control valves, direct operated, with electrical position feedback and integrated electronics (OBE) | Data sheet 29035 |
| ▶ 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 |
| ▶ CE Declaration of Conformity | upon request |
| ▶ 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 |
| ▶ Commissioning software and documentation on the Internet | www.boschrexroth.com/IFB |
| ▶ Information on available spare parts | www.boschrexroth.com/spc |

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