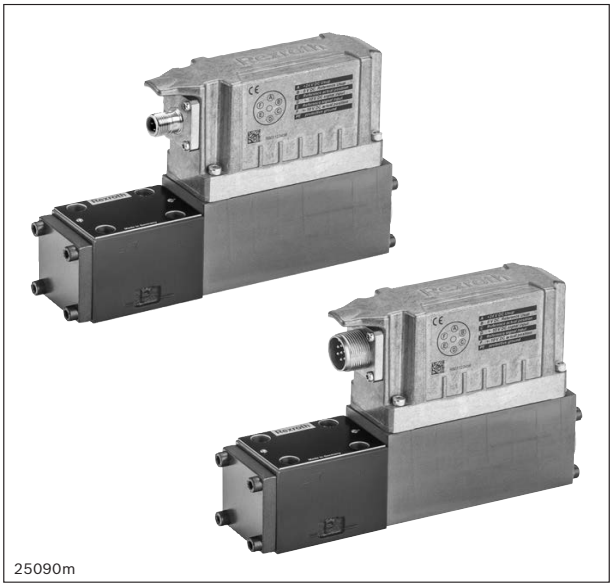
RE 29121
Edition: 2022-08
Replaces: 2019-02

rexroth
A Bosch Company

Directional control valves, direct operated, with electrical position feedback and integrated electronics (OBE)

Type 4WRPEH



- Size 6
- Component series 3X
- Maximum operating pressure 350 bar
- Rated flow 4 ... 40 l/min
- Digital interface, IO link for I4.0

CE

IO-Link

Features

- Reliable - proven and robust design
- Safe - fail-safe position of the control spool in switched-off condition
- Energy-efficient - no pilot oil demand
- High quality - control spool and sleeve in servo quality
- Flexible - suitable for position, velocity and pressure control
- Precise - high response sensitivity and little hysteresis
- IO-Link interface, optional. Use of the valve with IO-Link as a shut-off element up to category 3, PL d according to EN 13849-1.

Contents

Ordering code

01	02	03	04	05	06	07	08	09		10		11		12	13	14	15	16
4	**WRP**	**E**	**H**	**6**		**B**			**–**	**3X**	**/**		**/**		**24**			*****

01	4 main ports	**4**
02	Directional control valve, direct operated	**WRP**
03	With integrated electronics	**E**
04	Control spool/sleeve	**H**
05	Size 6	**6**
06	Symbols; possible version see page 3	
07	Installation side of the inductive position transducer	**B**

Nominal flow (***Δp*** = 35 bar per control edge)

08		Flow characteristic		
		"L"	**"P"**	
	4 l/min	✓	✓ (Inflection at 20%)	**04**
	12 l/min	✓	–	**12**
	15 l/min	–	✓ (Inflection at 60%)	**15**
	24 l/min	✓	–	**24**
	25 l/min	–	✓ (Inflection at 60%)	**25**
	40 l/min	✓ ◇	✓ (Inflection at 40%)	**40**

Flow characteristic

09	Linear	**L ◇**
	Inflected characteristic curve, linear	**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 7)

11	NBR seals	**M ◇**
	FKM seals	**V**
12	**Without** damping plate	**no code**
	With damping plate	**D**
13	Supply voltage of the integrated electronics 24 VDC	**24**

Interfaces of the control electronics

14	Command value input ±10 V	**A1 ◇**
	Command value input 4 ... 20 mA	**F1 ◇**
	IO-Link interface	**L1 ◇**
	Command value ±10 mA, actual value 4 ... 20 mA, release (connector 6+PE)	**C6**
15	**Without** electronics protection membrane	**no code ◇**
	With electronics protection membrane	**-967**
16	Further details in the plain text	

☞ **Notice:** ◇ = Preferred type

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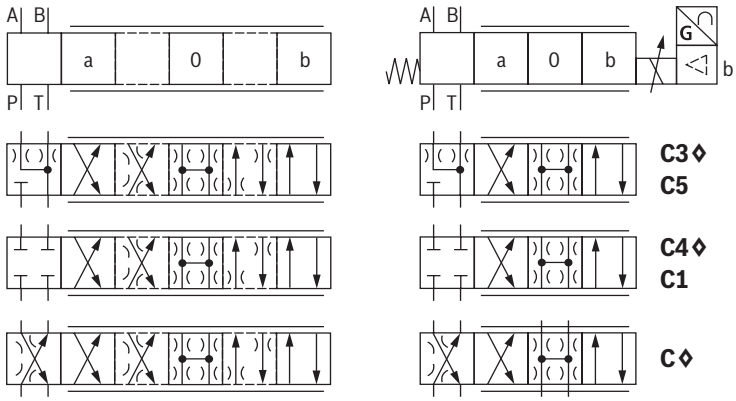
Symbols



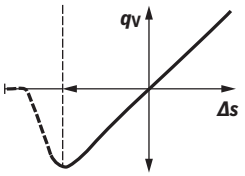
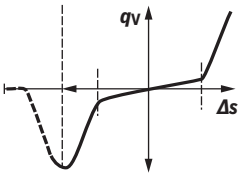
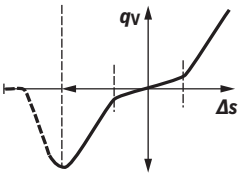
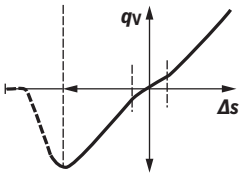
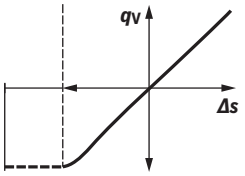
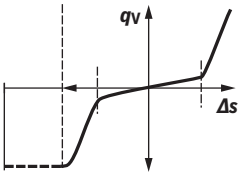
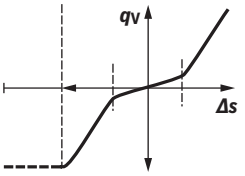
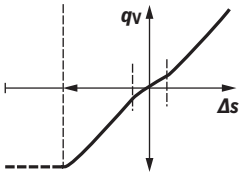
With symbols C5 and C1: [1]
P → A: $q_{V\,nom}$ B → T: $q_{V\,nom}/2$
P → B: $q_{V\,nom}/2$ A → T: $q_{V\,nom}$

[1] $q_{V\,nom}$ 2:1 in connection with flow characteristic "P" only for rated flow 40 l/min (version "40")

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

Notice: ◊ = Preferred type

Flow characteristic

Symbol	Linear characteristic curve (version "L")	Inflected characteristic curve (version "P")		
		Inflection 60% ($q_{V\,nom}$ = 15.25 l/min)	Inflection 40%	Inflection 20%
C3, C5 C4, C1				
C				

Function, section

Valves of type 4WRPEH are direct operated directional control valves with electrical position feedback and integrated electronics (OBE).

Set-up

The 4WRPEH high-response valve mainly consists of:

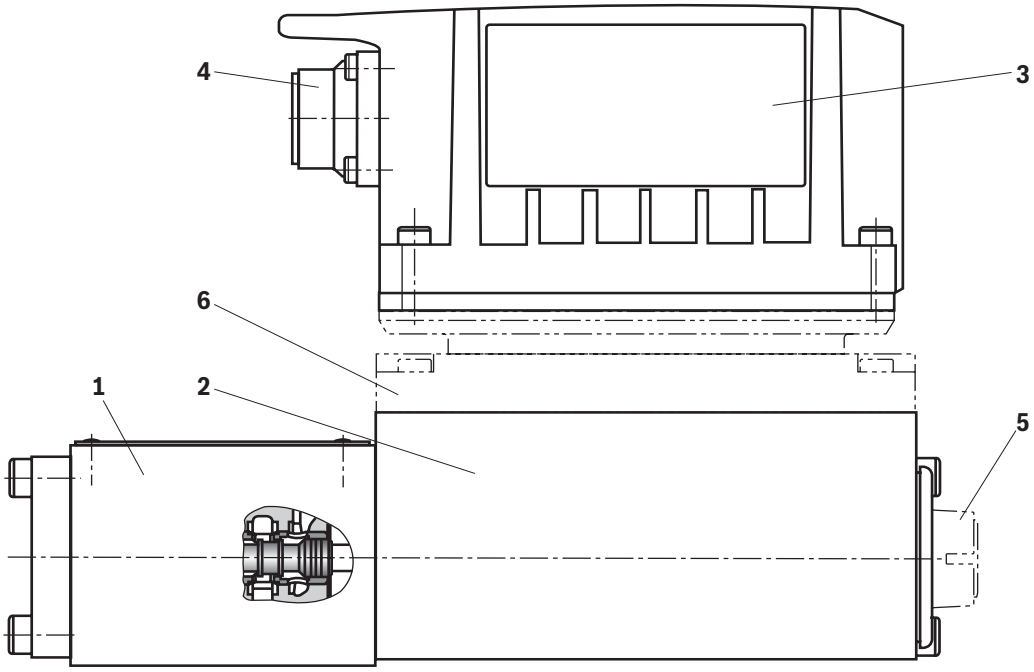
- Valve housing with control spool and sleeve in servo quality (1)
- Control solenoid with position transducer (2) (optionally with electronics protection membrane (5))
- On-board electronics (OBE) (3) with analog or IO-Link interface (4) (optionally with damping plate (6))

Function

The integrated electronics (OBE) compares the specified command value to the position actual value. In case of control deviations, the stroke solenoid will be activated. Due to the changed solenoid force, the control spool is adjusted against the spring. Stroke/control spool cross-section is controlled 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 (IO-Link shut-off)

By shutting off the supply voltage at the IO-Link master (Class B-Port), pins 2 and 5, the IO-Link valve can be safely switched off. After shut-off of the supply voltage, the control spool of the valve is set to fail-safe position. In order to also guarantee the hydraulic prerequisite for the safety shut-down, the overlap of control spool/sleeve must also be considered.
Sufficient overlap is guaranteed by the symbols C3, C5, C4 and C1 ($MTTF_D$values see data sheet 08012).
Depending on the category or application, additional safety measures must be taken according to EN 13849-1 and operating instructions 29118-B must be observed.
The safe shut-off is not part of the IO-Link valve and must be taken into account for the safe design of the machinery.



Function, section

Control solenoid shut-off
In case of the following errors, the control solenoids are de-energized by the integrated electronics (OBE) and the control spool is set to fail-safe position:

- Falling below the minimum supply voltage
- Only at interface "F1":
  - Falling below the minimum current command value of 2 mA (includes cable break of the command value line (current loop))
- Only at interface "L1":
  - Enable inactive, communication interruption (watchdog)
  - In case of internal IO-Link error
- Only at interface "C6":
  - Additionally, release inactive

Damping plate "D"
The damping plate reduces the acceleration amplitudes on the on-board electronics (frequencies >300 Hz).

☞ **Notice:**
Use of the damping plate is not recommended for applications with mainly low-frequency excitation <300 Hz

Electronics protection membrane "-967"
To prevent condensate formation in the housing of the integrated electronics (OBE), an electronics protection membrane (5) can be used.
Recommended for use outside industry-standard conditions with high ambient air humidity and significant cyclic temperature changes (e.g. outdoors).

☞ **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.
- When using the valve with IO-Link interface in compliance with category 3 according to EN 13849-1, adequate cyclic diagnosis or monitoring of the valve function outside of the valve by the control system must be implemented by the machine integrator. Without suitable diagnostic measures, only cat. B or 1 according to EN 13849-1.

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		kg	2.9
Installation position			Any
Ambient temperature range		°C	–20 ... +60
Transport temperature		°C	–30 ... +80
Maximum storage time		Years	1 (if the storage conditions are observed, refer to the operating instructions 07600-B)
Maximum relative humidity (no condensation)		%	95
Protection class according to EN 60529			IP65 (if suitable and correctly mounted mating connectors are used)
Maximum surface temperature		°C	150
$MTTF_D$ value according to EN ISO 13849		Years	150 (for further details see data sheet 08012)
Sine test according to DIN EN 60068-2-6	▶ Without damping plate		10 ... 2000 Hz / maximum of 10 g / 10 cycles / 3 axes
	▶ With damping plate [1]		10 ... 2000 Hz / maximum of 10 g / 10 cycles / 3 axes
Noise test according to DIN EN 60068-2-64	▶ Without damping plate		20 ... 2000 Hz / 10 g_{RMS} / 30 g peak / 30 min. / 3 axes
	▶ With damping plate [1]		20 ... 2000 Hz / 10 g_{RMS} / 30 g peak / 24 h / 3 axes
Transport shock according to DIN EN 60068-2-27	▶ Without damping plate		15 g / 11 ms / 3 shocks / 3 axes
	▶ With damping plate [1]		15 g / 11 ms / 3 shocks / 3 axes
Shock according to DIN EN 60068-2-27	▶ With damping plate [1]		35 g / 6 ms / 1000 shocks / 3 axes
Conformity	▶ CE according to EMC directive 2014/30/EU, tested according to		EN 61000-6-2 and EN 61000-6-3
	▶ RoHS directive		2011/65/EU [2]

Hydraulic							
Maximum operating pressure	▶ Ports A, B, P	bar	350				
	▶ Port T	bar	250				
Hydraulic fluid			See table on page 7				
Viscosity range	▶ Recommended	mm^2/s	20 ... 100				
	▶ Maximum admissible	mm^2/s	10 ... 800				
Hydraulic fluid temperature range (flown-through)		°C	–20 ... +70				
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)			Class 18/16/13 [3]				
Rated flow (Δp = 35 bar per control edge) [4]		l/min	4	12	15	24/25	40
Limitation of use (Δp) with regard to the transition to failsafe (values apply to summated edge)	▶ Symbols C3, C5, C	bar	350	350	350	350	160
	▶ Symbols C1, C4	bar	350	350	280	250	100

[1] Not recommended for applications with mainly low-frequency excitation <300 Hz

[2] The product fulfills the substance requirements of the RoHS directive 2011/65/EU.

[3] 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.

[4] Flow for deviating Δp (per control edge):

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

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, Fuchs 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	%	<0.1
Range of inversion	%	<0.05
Response sensitivity	%	<0.05
Manufacturing tolerance q_{Vmax}	%	<10
Temperature drift (temperature range 20 °C ... 80 °C)		Zero shift <0.25% with $\Delta\vartheta$ = 10 K
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) – Interface "A1"			
Supply voltage	▶ Nominal value	VDC	24
	▶ Minimum	VDC	19
	▶ Maximum	VDC	36
	▶ Maximum residual ripple	Vpp	2.5
	▶ Maximum power consumption	VA	40
	▶ Fuse protection, external	A_T	2.5 (time-lag)
Relative duty cycle time according to VDE 0580		%	S1 (continuous operation)
Functional ground and screening			See pin assignment on page 11 (CE-compliant installation)
Maximum voltage of the differential inputs against 0 V			D → B; E → B (max. 18 V)
Command value (differential amplifier)	▶ Measurement range	V	±10
	▶ Input resistance	kΩ	>100
Actual value (test signal)	▶ Output range	V	±10
	▶ Minimum load impedance	kΩ	>1

Electrical, integrated electronics (OBE) – Interface "F1"			
Supply voltage	▶ Nominal value	VDC	24
	▶ Minimum	VDC	19
	▶ Maximum	VDC	36
	▶ Maximum residual ripple	Vpp	2.5
	▶ Maximum power consumption	VA	40
	▶ Fuse protection, external	A_T	2.5 (time-lag)
Relative duty cycle time according to VDE 0580		%	S1 (continuous operation)
Functional ground and screening			See pin assignment on page 11 (CE-compliant installation)
Maximum voltage of the differential inputs against 0 V			D → B; E → B (max. 18 V)
Command value	▶ Input current range	mA	4 ... 20
	▶ Input resistance	kΩ	200
Actual value (test signal)	▶ Output range	mA	4 ... 20
	▶ Maximum load	Ω	500

Electrical, integrated electronics (OBE) – Interface "C6"			
Supply voltage	▶ Nominal value	VDC	24
	▶ Minimum	VDC	19
	▶ Maximum	VDC	36
	▶ Maximum residual ripple	Vpp	2.5
	▶ Maximum power consumption	VA	40
	▶ Fuse protection, external	A_T	2.5 (time-lag)
Relative duty cycle time according to VDE 0580		%	S1 (continuous operation)
Functional ground and screening			See page 11 (EMC-compliant installation)
Command value	▶ Input current range	mA	±10
	▶ Input resistance	Ω	200
Actual value (test signal)	▶ Output range	mA	4 ... 20
	▶ Maximum load	Ω	500
Enable	▶ Low level range	V	–3 ... 5
	▶ High level range	V	11 ... $\boldsymbol{U}_B$
	▶ Maximum current consumption at high level	mA	7.25 ($\boldsymbol{U}_B$ = 24 V); 11 ($\boldsymbol{U}_{B\,max}$)

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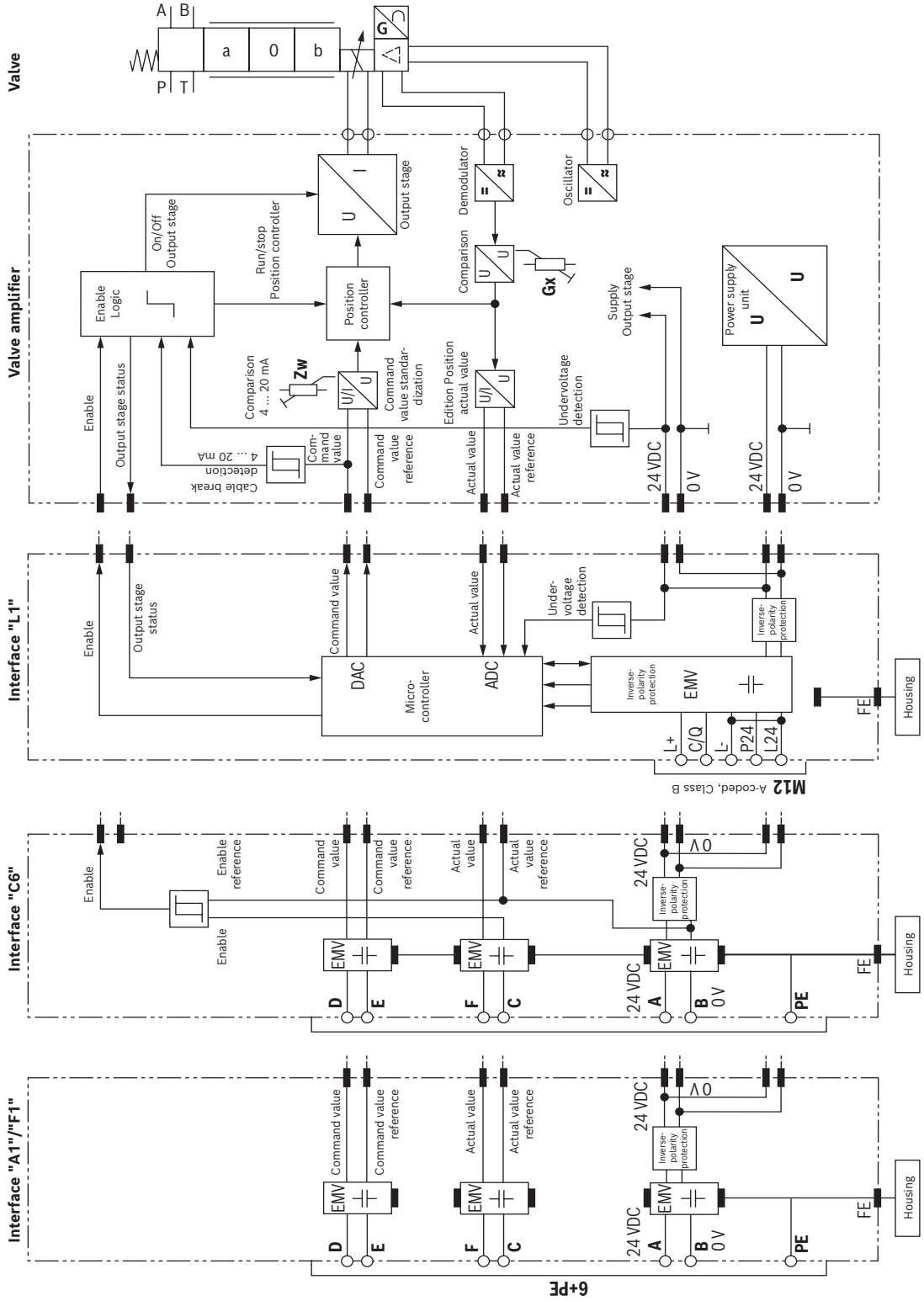
Technical data

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

Electrical, integrated electronics (OBE) – Interface "L1"			
Supply voltage	▶ Valve amplifiers		
	– Nominal value	VDC	24
	– Minimum	VDC	18
	– Maximum	VDC	30
	– Maximum residual ripple	Vpp	1.3
	– Maximum power consumption	VA	40
	▶ IO-Link interface		
	– Nominal value	VDC	24
	– Minimum	VDC	18
	– Maximum	VDC	30
	– Maximum residual ripple	Vpp	1.3
	– Maximum power consumption	VA	1.2
Relative duty cycle time according to VDE 0580		%	S1 (continuous operation)
Functional ground and screening			Provide via valve block
Bit rate COM3		kBaud (kbit/s)	230.4
Required master port class			Class B
Directive			IO-Link Interface and System Specification Version 1.1.2

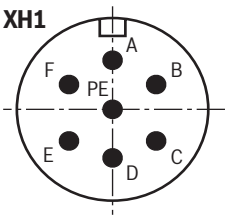
Block diagram/controller function block



Electrical connections and assignment

Contact	Interface assignment		
	"A1" (6 + PE)	**"F1"** (6 + PE)	**"C6"** (6 + PE)
A	Supply voltage	Supply voltage	Supply voltage
B	GND	GND	GND, reference potential actual value/enable (Current loop I_{F-B} feedback)
C	Reference potential actual value	Reference potential actual value (Current loop I_{F-C} feedback)	Enable input
D	Command value	Command value	Command value
E	Reference potential command value	Reference potential command value (Current loop I_{D-E} feedback)	Reference potential command value (Current loop I_{D-E} feedback)
F	Actual value	Actual value	Actual value
FE	Functional ground (directly connected to the valve housing)		

XH1

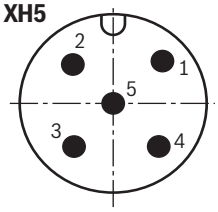


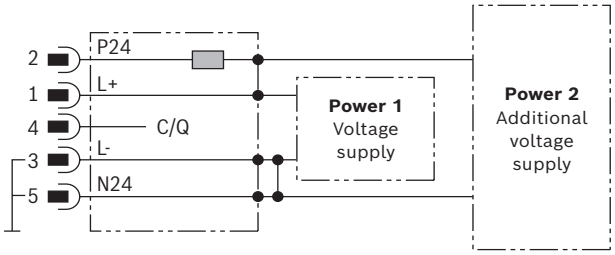
Command value	▶ Positive command value (0 ... 10 V or 12 ... 20 mA) at D and reference potential at E cause flow from P → A and B → T.
	▶ Negative command value (0 ... −10 V or 12 ... 4 mA) at D and reference potential at E cause flow from P → B and A → T.
Connection cable	▶ Up to 20 m cable length type LiYCY 7 x 0.75 mm²
	▶ Up to 40 m cable length type LiYCY 7 x 1.0 mm²
	▶ EMC-compliant installation: – Apply screening to both line ends – Use metal mating connector (see page 22) ▶ Alternatively up to 30 m cable length admissible – Apply screening on supply side – Plastic mating connector (see page 22) can be used

☞ **Notice**:
Mating connectors, separate order, see page 22 and data sheet 08006.

Connector pin assignment "L1" (M12-5, A-coded, class B)

XH5





☞ **Notice:**
- ▶ M12 sensor/actuator connection line, 5-pole; M12 connector/bush, A-coded, without shield, maximum cable length 20 m (observe the voltage drop over the cable; wire cross-section at least 0.34 mm² for a cable length of up to 5 m).
- ▶ Mating connectors, separate order, see page 22 and data sheet 08006.
- ▶ For the communication and parameter description see data sheet 29400-PA

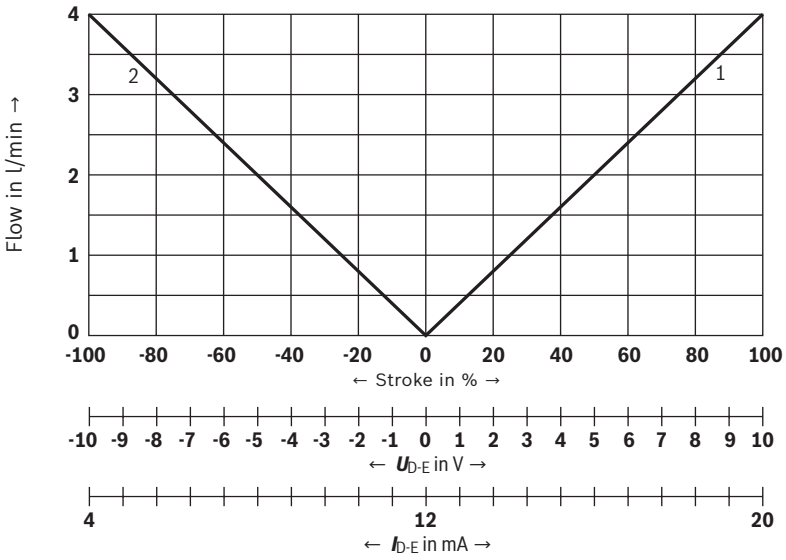
Pin	Signal	Allocation interface "L1"
1	L+	Voltage supply IO-Link
2	P24	Voltage supply valve electronics and power part (current consumption 2 A)
3	L-	Reference potential pin 1 [1]
4	C/Q	Data line IO-Link (SDCI)
5	N24	Reference potential pin 2 [1]

[1] Pin 3 and 5 are linked with each other in the valve electronics. The reference potentials L- and N24 of the two supply voltages must also be linked with each other on the power supply unit side.

Characteristic curves: Flow characteristic "L"
(measured with HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 35 bar/control edge)

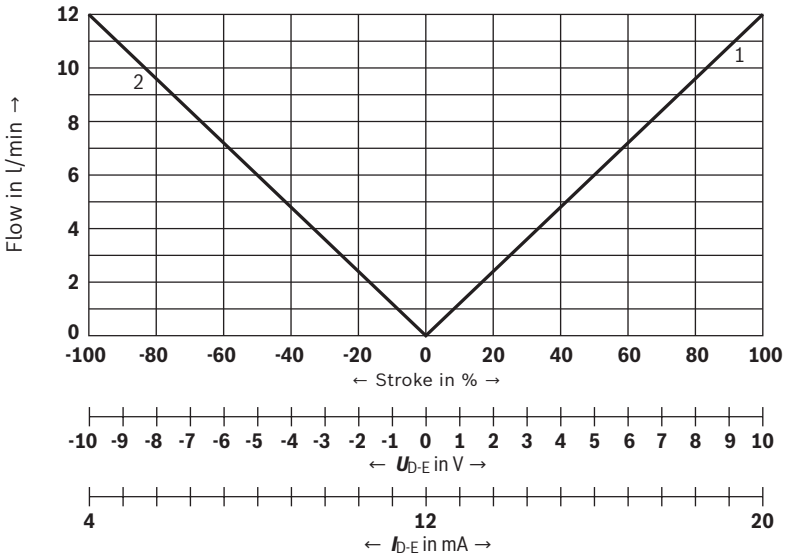
Flow/signal function

Symbol C, C3 and C4 – Version "04"



1 P–A; B–T
2 P–B; A–T

Symbol C, C3 and C4 – Version "12"

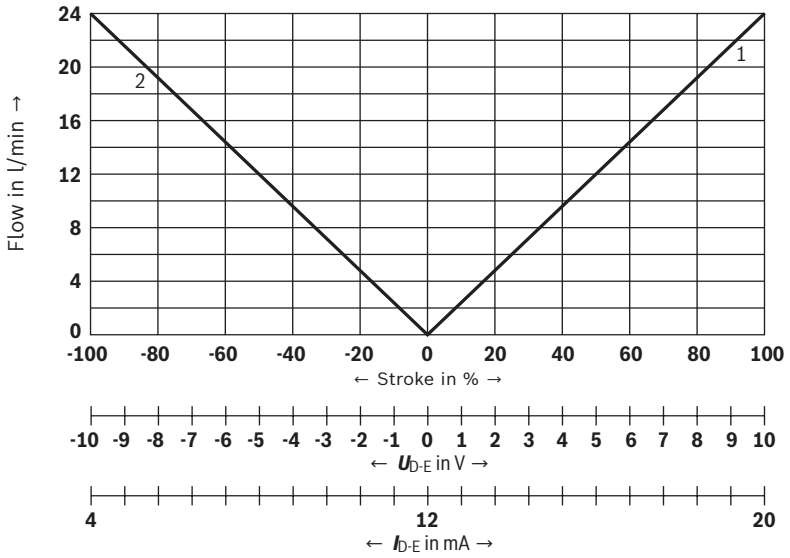


1 P–A; B–T
2 P–B; A–T

Characteristic curves: Flow characteristic "L"
(measured with HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 35 bar/control edge)

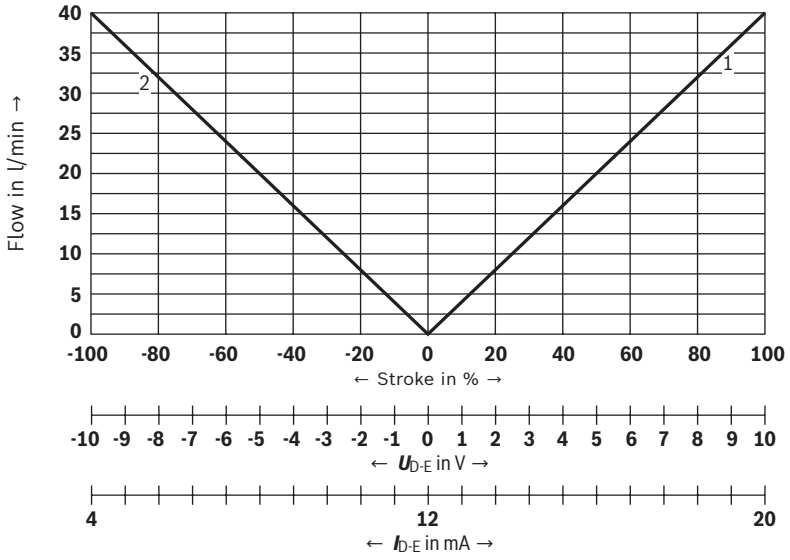
Flow/signal function

Symbol C, C3 and C4 – Version "24"



1 P–A; B–T
2 P–B; A–T

Symbol C, C3 and C4 – Version "40"

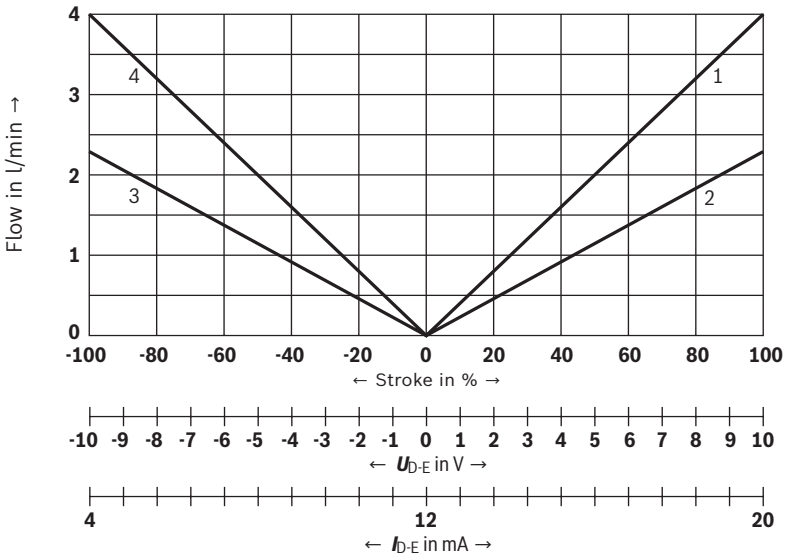


1 P–A; B–T
2 P–B; A–T

Characteristic curves: Flow characteristic "L"
(measured with HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 35 bar/control edge)

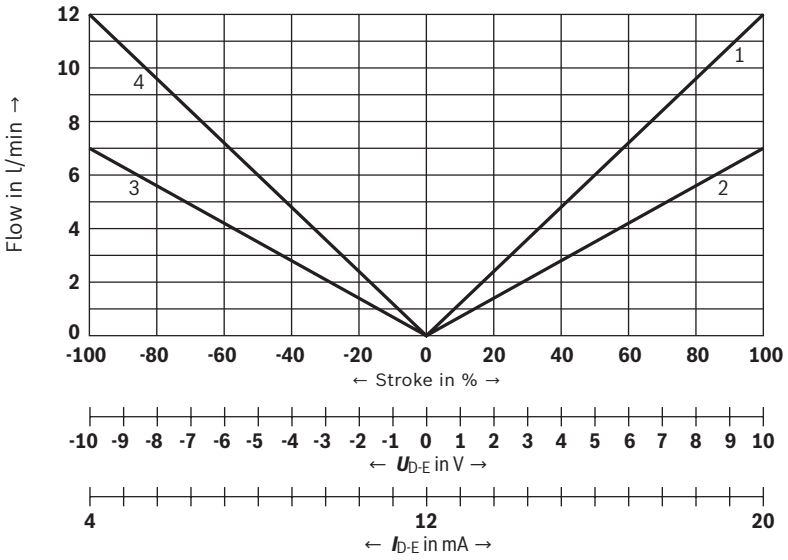
Flow/signal function

Symbol C1 and C5 – Version "04"



1 P–A
2 B–T
3 P–B
4 A–T

Symbol C1 and C5 – Version "12"

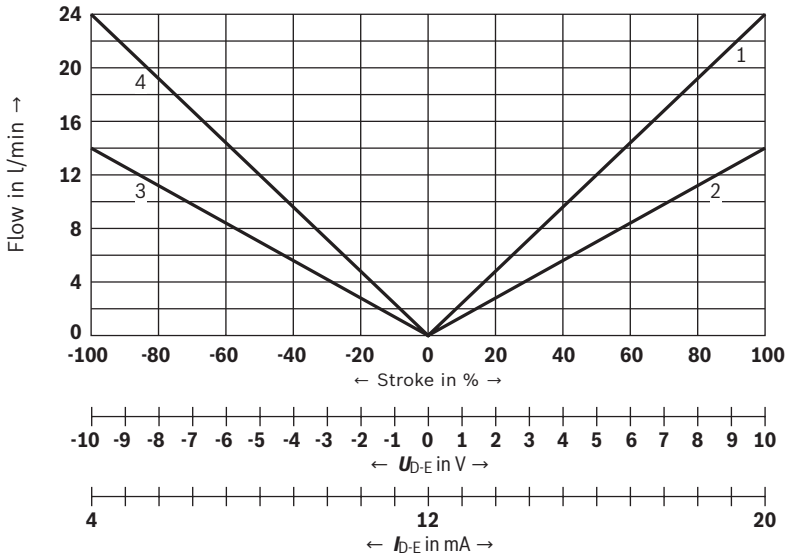


1 P–A
2 B–T
3 P–B
4 A–T

Characteristic curves: Flow characteristic "L"
(measured with HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 35 bar/control edge)

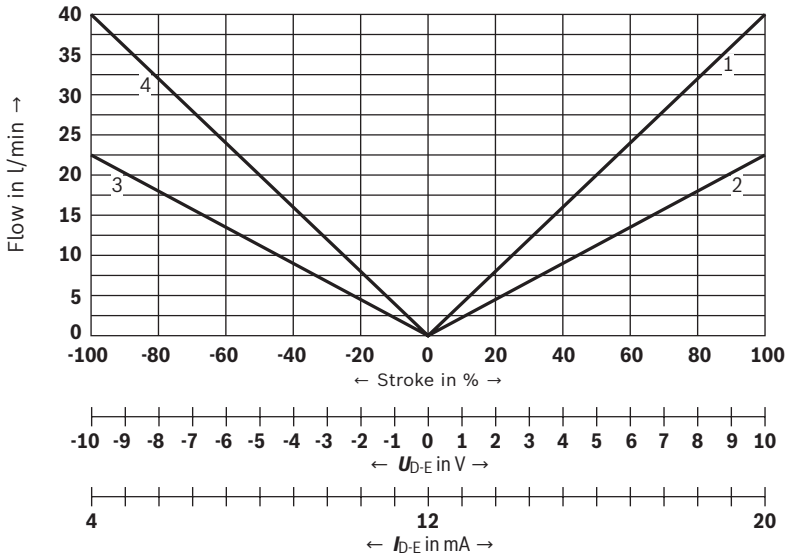
Flow/signal function

Symbol C1 and C5 – Version "24"



1 P–A
2 B–T
3 P–B
4 A–T

Symbol C1 and C5 – Version "40"

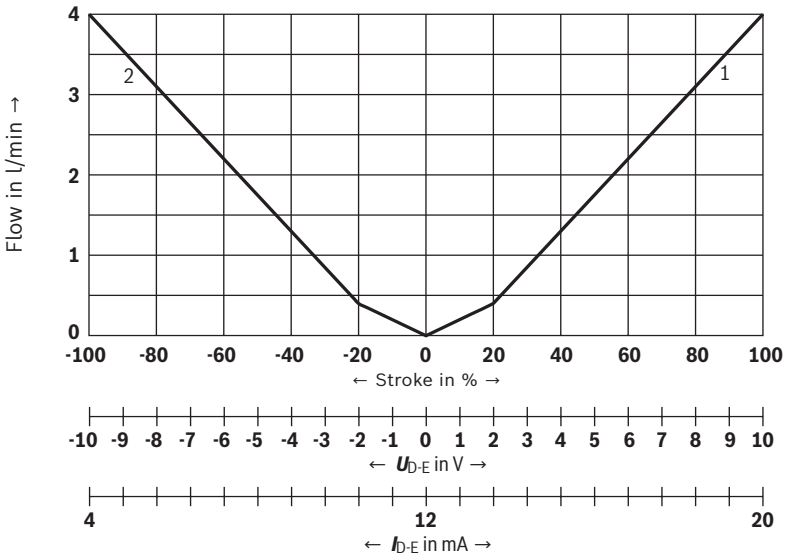


1 P–A
2 B–T
3 P–B
4 A–T

Characteristic curves: Flow characteristic "P"
(measured with HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 35 bar/control edge)

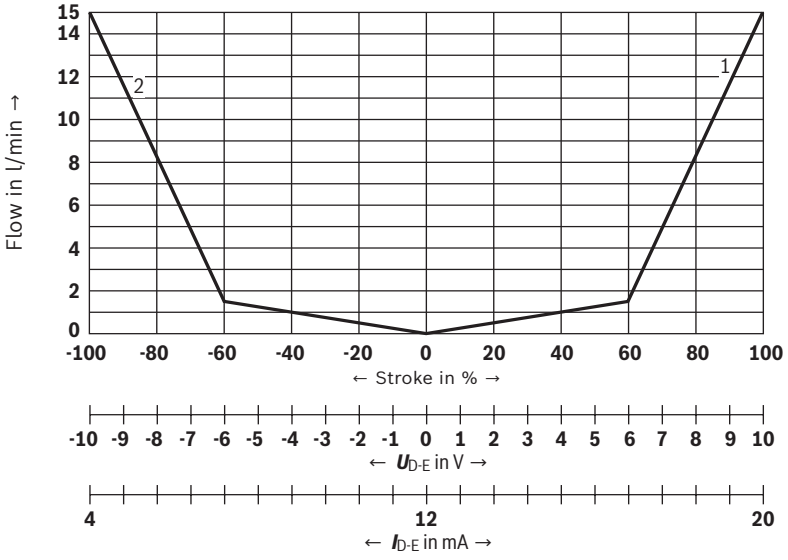
Flow/signal function

Symbol C, C3 and C4 – Version "04"



1 P–A; B–T
2 P–B; A–T

Symbol C, C3 and C4 – Version "15"

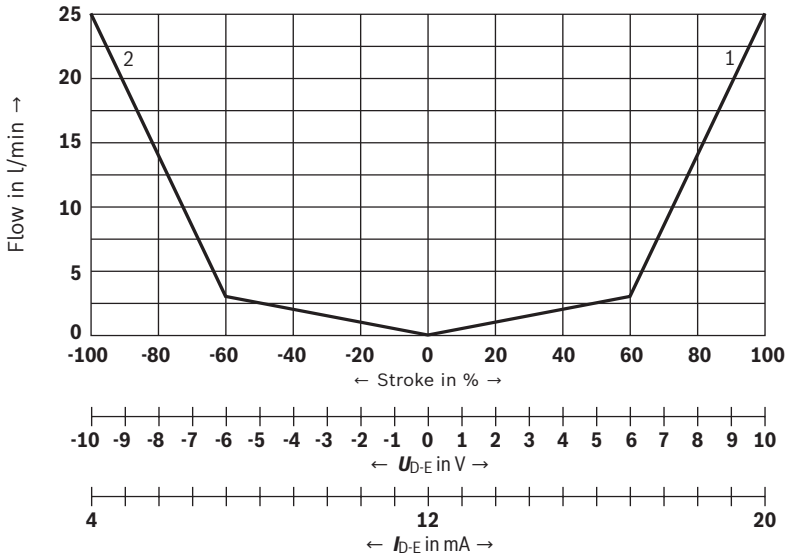


1 P–A; B–T
2 P–B; A–T

Characteristic curves: Flow characteristic "P"
(measured with HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 35 bar/control edge)

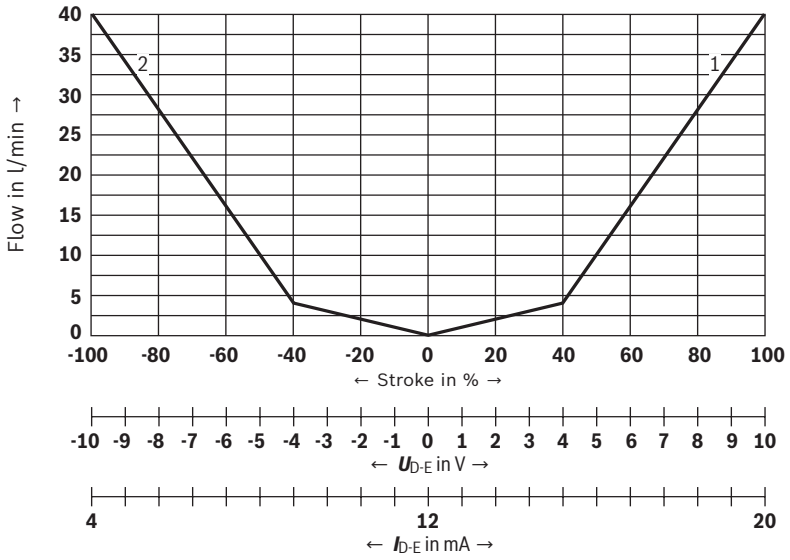
Flow/signal function

Symbol C, C3 and C4 – Version "25"



1 P–A; B–T
2 P–B; A–T

Symbol C, C3 and C4 – Version "40"

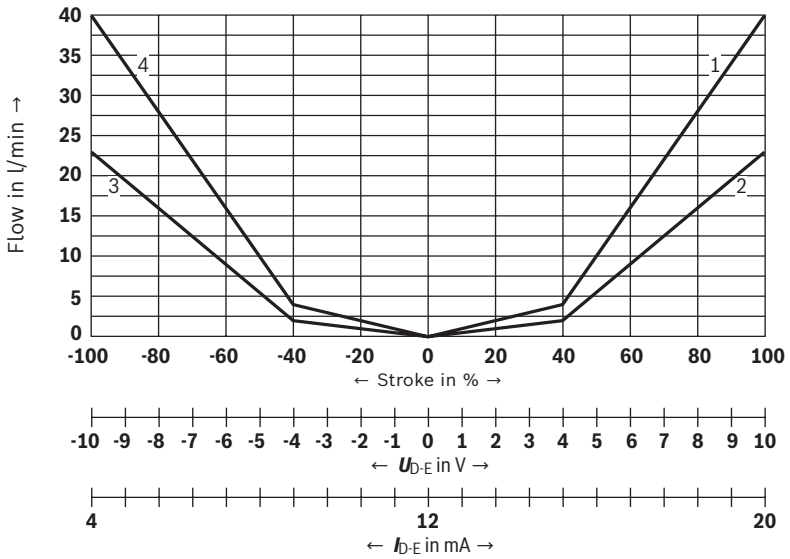


1 P–A; B–T
2 P–B; A–T

Characteristic curves: Flow characteristic "P"
(measured with HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 35 bar/control edge)

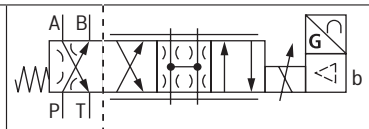
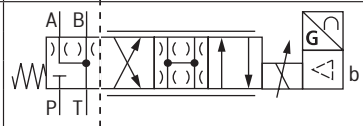
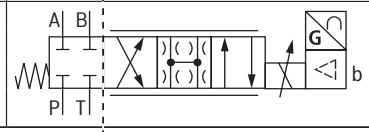
Flow/signal function

Symbol C1 and C5 – Version "40"



1 P–A
2 B–T
3 P–B
4 A–T

Fail-safe position: Flow/leakage flow

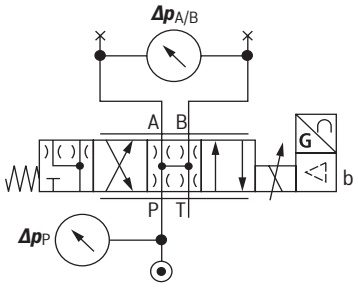
	Fail-safe position	Rated flow at Δp = 35 bar/control edge		l/min	4	12	15	24/25	40
C		Flow at Δp = 35 bar/control edge		l/min	4	10	13	18	20
C3, C5		Leakage flow at 100 bar	P→A	cm³/min	50				
			P→B	cm³/min	70				
		Flow at Δp = 35 bar	A→T	l/min	10 ... 20				
			B→T	l/min	7 ... 20				
C4, C1		Leakage flow at 100 bar	P→A	cm³/min	50				
			P→B	cm³/min	70				
			A→T	cm³/min	70				
			B→T	cm³/min	50				

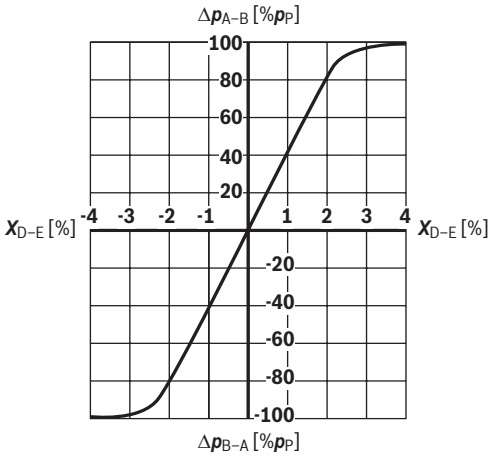
	**Fail-safe**	p = 0 bar ⇒ 7 ms p = 100 bar ⇒ 10 ms

Internal shut-off in case of the following errors:
- Drop of supply voltage U_B ≤15 V and restarting at U_B ≥17.5 V.
- Only at interface "F1":
  - Falling below the minimum current command value of 2 mA (includes cable break of the command value line (current loop))
- Only at interface "L1":
  - Enable inactive, communication interruption (watchdog)
  - In case of internal IO-Link error

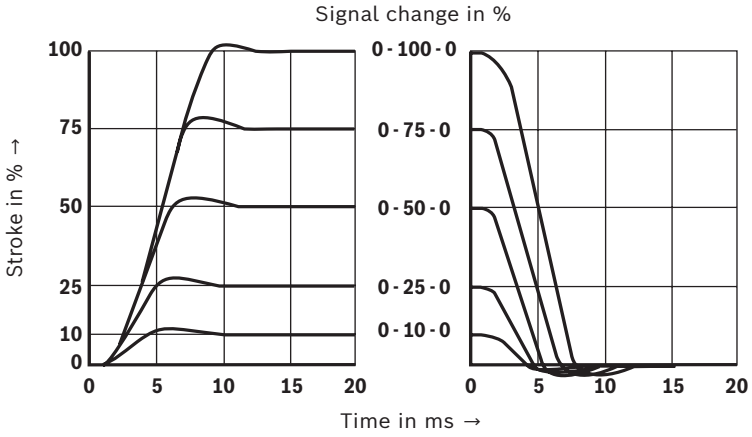
Characteristic curves
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Pressure/signal characteristic curve





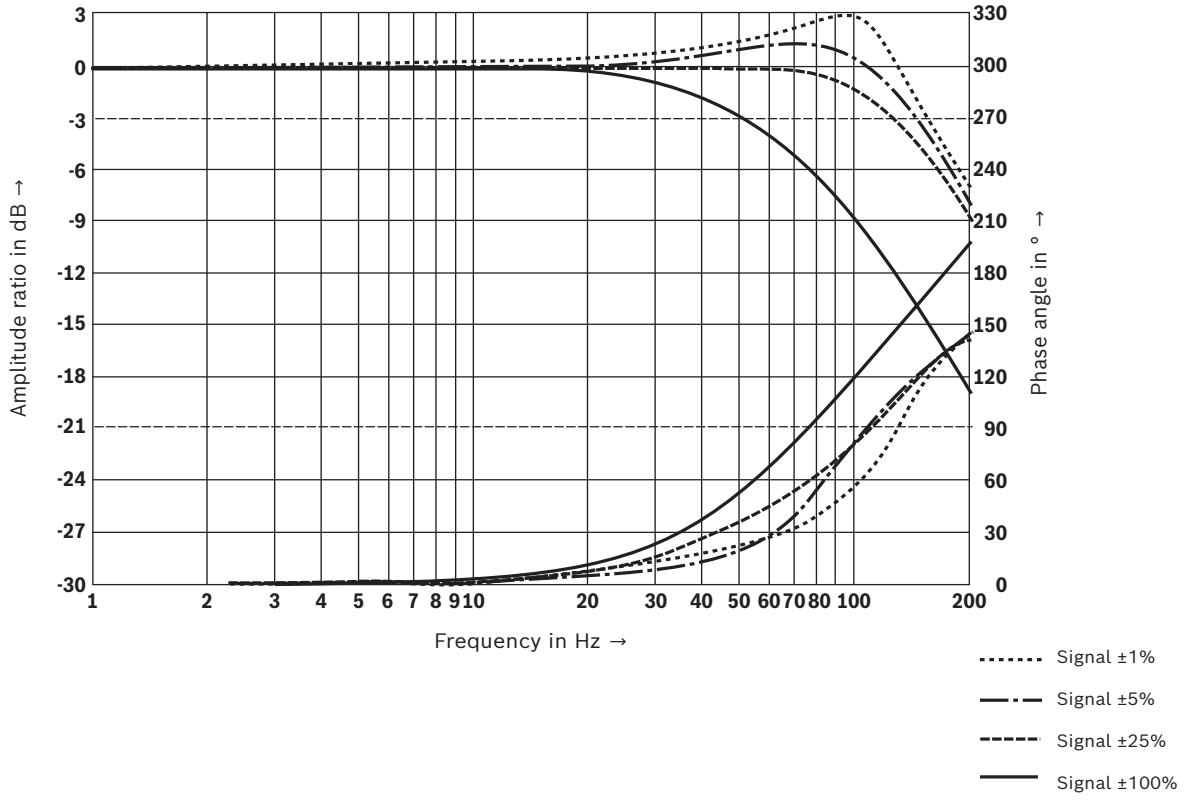
Transition function with stepped electric input signals



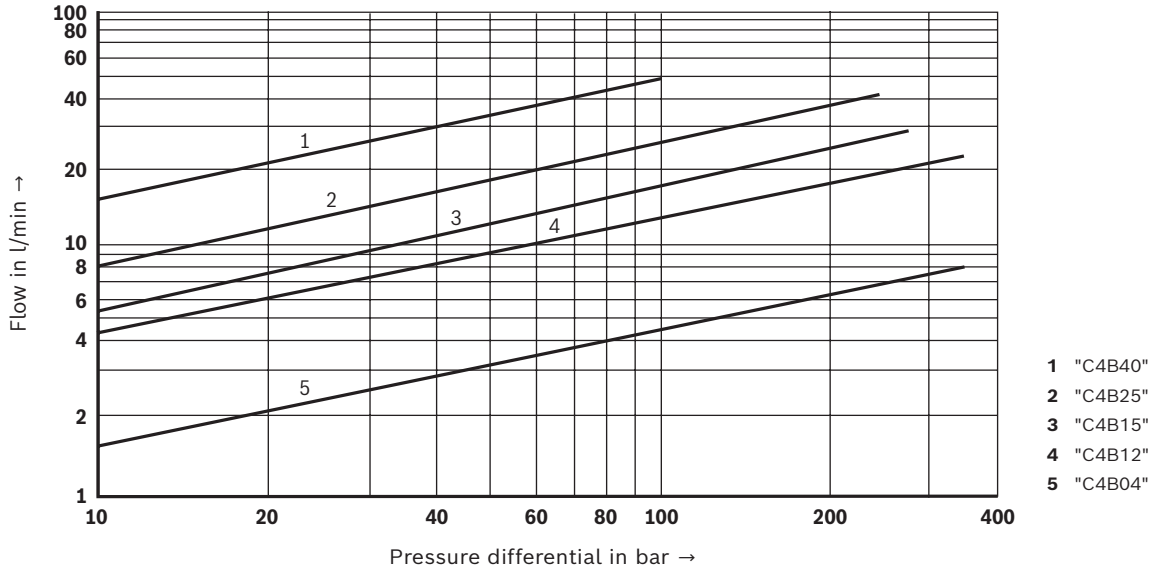
RE 29121, edition: 2022-08, **Bosch Rexroth AG**

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

Frequency response

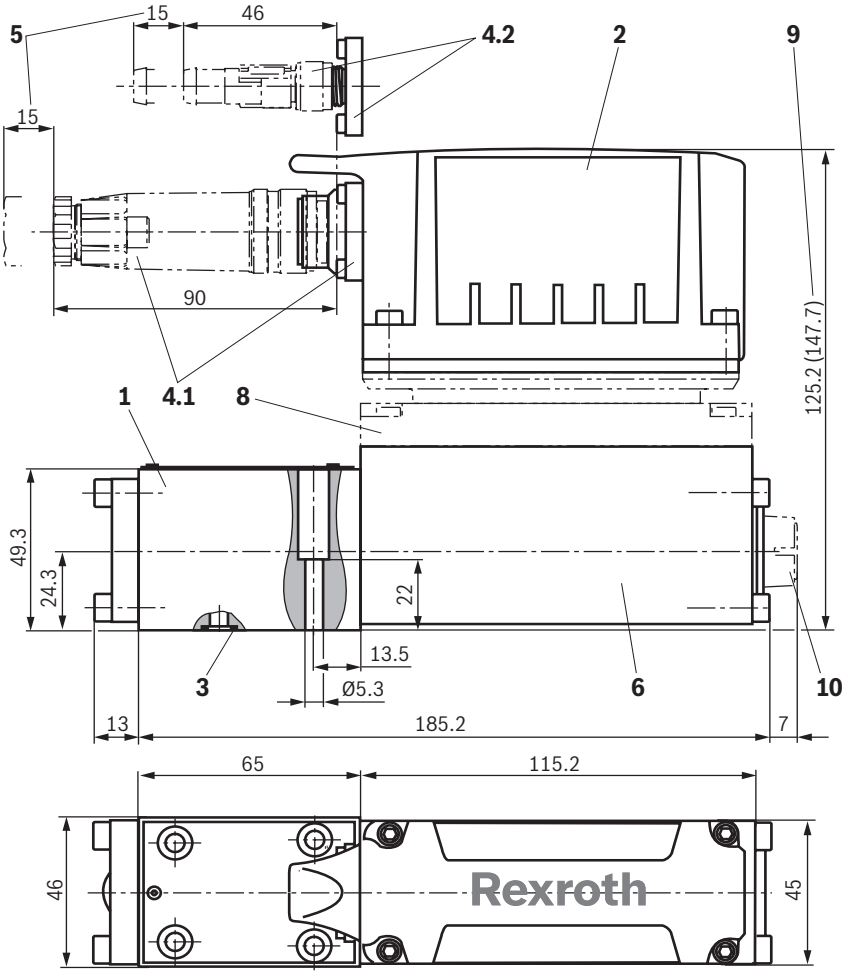


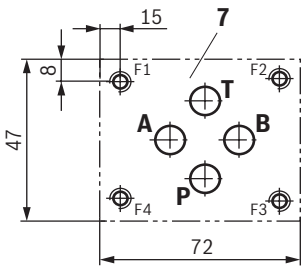
Flow/load function with maximum valve opening

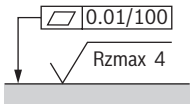


Bosch Rexroth AG, RE 29121, edition: 2022-08

Dimensions
(dimensions in mm)







Required surface quality
of the valve contact surface

1 Valve housing
2 Integrated electronics (OBE)
3 Identical seal rings for ports P, A, B, T
4.1 Mating connectors with version "A1", "F1" and "C6", separate order, see page 22 data sheet 08006
4.2 Mating connectors with version "L1", separate order, see page 22 data sheet 08006
5 Space required for removing the mating connector
6 Control solenoid with position transducer
7 Machined valve contact surface, porting pattern according to ISO 4401-03-02-0-05
Deviating from the standard: Ports P, A, B, T Ø8 mm
Minimum screw-in depth:
- ▶ Ferrous metal 1.5 x Ø
- ▶ Non-ferrous 2 x Ø

8 Damping plate "D"
9 Dimension in () for version with damping plate "D"
10 Electronics protection membrane "-967"

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

RE 29121, edition: 2022-08, **Bosch Rexroth AG**

Dimensions

Valve mounting screws (separate order)

4 hexagon socket head cap screws	**Material number**
ISO 4762 - M5 x 30 - 10.9-CM-Fe-ZnNi-5-Cn-T0-H-B Tightening torque M_A = 7 Nm ±10%	**R913048086**
or	
ISO 4762 - M5 x 30 - 10.9 Tightening torque M_A = 8.9 Nm ±10%	Not included in the Rexroth delivery range
or	
ASME B18.3 - 10-24 UNC x 1 1/4" - ASTM-A574 Tightening torque M_A = 8.0 Nm ±10%	Not included in the Rexroth delivery range

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

Subplates (separate order) with porting pattern according to ISO 4401-03-02-0-05 see data sheet 45100.

Accessories (separate order)

Valves with integrated electronics

Mating connectors 6-pole + PE	**Design**	**Version**	**Material number**	**Data sheet**
For the connection of valves with integrated electronics, round connector 6+PE, line cross-section 0.5 ... 1.5 mm²	Straight	Metal	**R900223890**	08006
	Straight	Plastic	**R900021267**	08006
	Angled	Plastic	**R900217845**	–

Cable sets 6-pole + PE	**Length** in m	**Material number**	**Data sheet**
For the connection of valves with integrated electronics, round connector 6+PE, straight connector, shielded, potted-in mating connector, line cross-section 0.75 mm²	3.0	**R901420483**	08006
	5.0	**R901420491**	08006
	10.0	**R901420496**	08006
	20.0	**R901448068**	–

Valves with integrated electronics and IO-Link interface

Cable sets for IO-Link	**Length** in m	**Material number**	**Data sheet**
For the connection of valves with IO-Link interface, M12-5, A-coded, unshielded, line cross-section 5 x 0.34 mm²	1.5	**R901508849**	–
	3.0	**R901554223**	–
	5.0	**R901415747**	–

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Accessories (separate order)

Test and service devices

	Material number	Data sheet
Service case with test device for proportional servo valves with integrated electronics (OBE)	**R901049737**	29685

Project planning information

- The use of the valves with IO-Link as a shut-off element up to category 3, PL d according to EN 13849-1 is possible from component series 32. For additional application notes regarding safe "shut-off", see operating instructions 29118-B.
- For component series 30 and 31, the valve cannot be used for "safe shut-off".

Further information

Hydraulic valves for industrial applications	Data sheet 07600-B
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
Flame-resistant hydraulic fluids – containing water (HFAE, HFAS, HFB, HFC)	Data sheet 90223
Reliability characteristics according to EN ISO 13849	Data sheet 08012
Hexagon socket head cap screw, metric/UNC	Data sheet 08936
Installation, commissioning and maintenance of servo valves and high-response valves	Data sheet 07700
Assembly, commissioning and maintenance of hydraulic systems	Data sheet 07900
Directional control valves, direct operated, with electrical position feedback and IO link interface	Data sheet 29400-PA
Directional control and proportional directional valves with IO-Link interface	Operating instructions 29118-B
Information on available spare parts	
Connecting hydraulic systems via IO-Link	