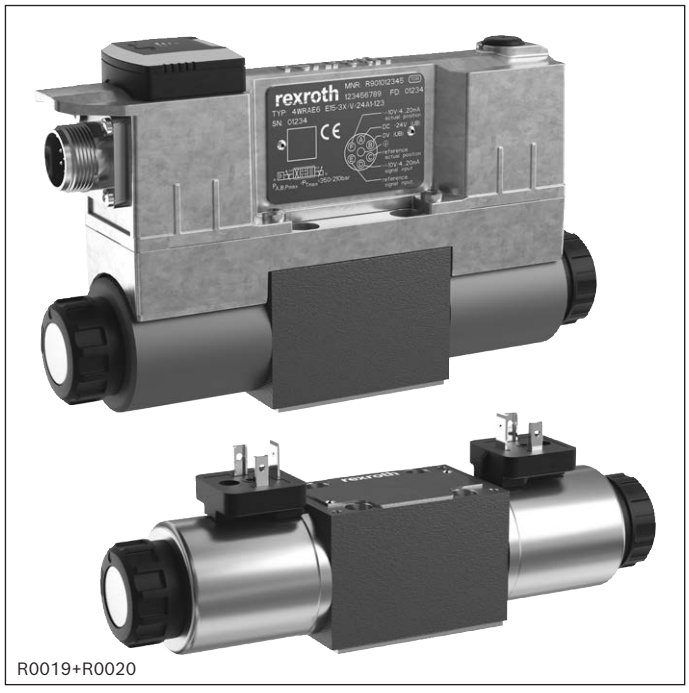
RE 29128
Edition: 2023-11
Replaces: 29055 (NG6)

rexroth
A Bosch Company

Proportional directional valve, direct operated, without electrical position feedback, with or without digital on-board electronics (OBED)

Type 4WRA and 4WRAE



R0019+R0020

- Size 6
- Component series 3X
- Maximum operating pressure 350 bar
- Maximum flow 42 l/min

CE

Features

- 4/2 or 4/3-way version
- For subplate mounting
- Porting pattern according to ISO 4401-03-02-0-05
- Control of flow direction and size
- Operation by means of proportional solenoids with central thread
- Spring-centered control spool
- Digital on-board electronics (OBED), optional
- CE conformity according to EMC Directive 2014/30/EU
- Digital (IO-Link, Bluetooth®) and analog interfaces, optional
- Optional via Bluetooth®, fast and easy analysis and structural adjustment by means of app function

Contents

Ordering code

01	02	03	04	05	06	07		08		09	10	11		12	13	14	15
4	**WRA**		**6**				**–**	**3X**	**/**				**/**	**24**			*****

01	4 main ports	**4**
02	Proportional directional valve, direct operated, without electrical position feedback	**WRA**
03	For external control electronics	**no code**
	With digital on-board electronics (OBED)	**E**
04	Size 6	**6**
05	Symbols; possible version see page 3	

Nominal flow (***Δp*** = 5 bar per control edge)

06	7 l/min	**7**
	15 l/min	**15**
	26 l/min	**30**
07	Without overlap jump (opening point 25% with covered valve)	**no code**
	With overlap jump (opening point 5% with covered valve)	**J**
08	Component series 30 ... 39 (30 ... 39: unchanged installation and connection dimensions)	**3X**

Seal material (observe compatibility of seals with hydraulic fluid used, see page 6)

09	FKM seals	**V**
	NBR seals	**M** ◇
10	With concealed manual override	**N9**
	Without manual override	**no code**

Corrosion resistance (outside)

11	None (valve housing with standard painting)	**no code**
	High corrosion protection (720 h salt spray test according to EN ISO 9227)	**J5**

Supply voltage

12	Direct voltage 24 V	**24**

Interfaces of the control electronics

13	External control electronics	**K4**
	Command value input ±10 V	**A1** ◇
	Command value input 4 ... 20 mA	**F1**
	IO-Link interface	**L1** ◇

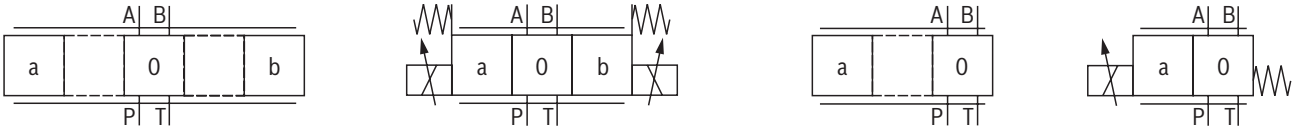
Accessories, service interface

14	Without Bluetooth® interface	**no code**
	With Bluetooth® interface (only with digital on-board electronics "E")	**B** ◇
15	Further details in the plain text	

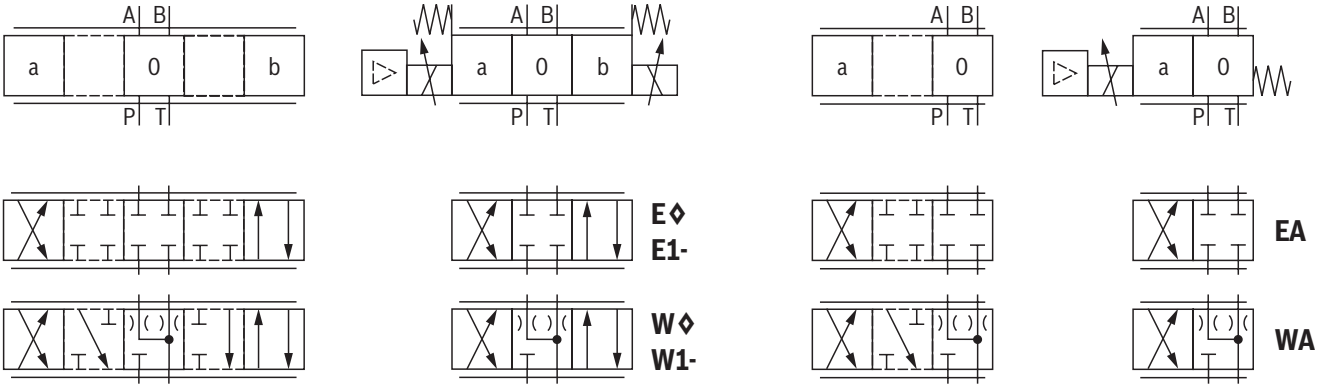
☞ **Notice:** ◇ = Preferred type

Symbols

External control electronics
Type 4WRA



With digital on-board electronics (OBED)
Type 4WRAE



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

With symbols E1- and W1-:

P→A: $q_{V\,max}$	B→T: $q_V/2$
P→B: $q_V/2$	A→T: $q_{V\,max}$

☞ **Notice:** ◊ = Preferred type

Function, section

The valve type 4WRA(E) is a direct operated proportional directional valve without electrical position feedback.
The solenoids are optionally controlled by external control electronics or digital on-board electronics (OBED).

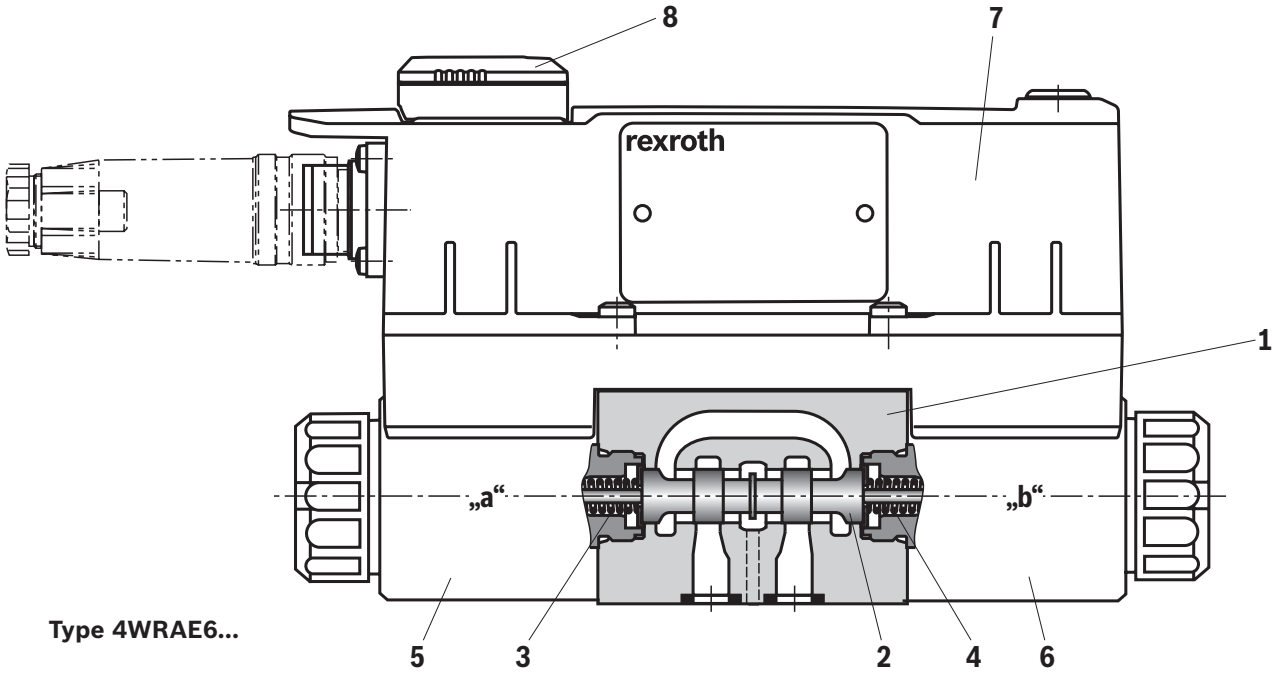
Set-up
The valve basically consists of:
- Housing (1) with connection surface
- Control spool (2) with compression springs (3 and 4)
- Solenoids (5 and 6) with central thread
- Digital on-board electronics (7), optional

Function
- With de-energized solenoids (5 and 6), central position of the control spool (2) by compression springs (3 and 4)
- Direct operation of the control spool (2) by energization of a proportional solenoid, e.g. control of solenoid "b" (6)
  - Displacement of the control spool (2) to the left proportional to the electric input signal
  - Connection from P → A and B → T via orifice-type cross-sections with progressive flow characteristic
- Switching off the solenoid (6)
  - The compression spring (3) brings the control spool (2) back into the central position

☞ **Notice:**
- Due to the design principle, internal leakage is inherent to the valves, which may increase over the life cycle.
- The tank line must not be allowed to run empty. With corresponding installation conditions, a preload valve (preload pressure approx. 2 bar) must be installed.

Bluetooth® function
The digital on-board electronics (OBED) provide the user with a digital diagnosis interface via a Bluetooth® dongle (Bluetooth® Low Energy).
It may also be ordered as an accessory and retrofitted.
The Bluetooth® dongle may only be assembled and disassembled when the valve is de-energized.
By means of the "easy2connect app", the valve status can be displayed and configurations at the valve can be carried out via the Bluetooth® dongle (8).

☞ **Notice:**
- The "easy2connect app" can be downloaded in the App Store (iOS) or Google Play Store (Android).
- Further information on the Bluetooth® dongle VT-ZBT-1-1X (R901505294) as well as set-up and installation of the app is available in data sheet 30581 and operating instructions 30581-B.



Type 4WRAE6...

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	▶ Type 4WRA	kg	2.0
	▶ Type 4WRAE	kg	2.5
Installation position			Any
Ambient temperature range	▶ Type 4WRA	°C	–20 ... +80
	▶ Type 4WRAE		–20 ... +60
Storage temperature range (with UV protection)		°C	+5 ... +40
Transport temperature range		°C	–30 ... +80
Maximum storage time		Years	1
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
$MTTF_D$ values according to EN ISO 13849		Years	150 (for further details see data sheet 08012) [1]
Sine test according to EN 60068-2-6			10 ... 2000 Hz / maximum of 10 g / 10 cycles / 3 axes
Noise test according to EN 60068-2-64			20 ... 2000 Hz / 10 g_{RMS} / 30 g peak / 24 h / 3 axes
Transport shock according to EN 60068-2-27			15 g / 11 ms / 3 shocks / 3 axes
Environmental compatibility	▶ Climate		Environmental audit according to EN 60068-2
Conformity	▶ CE according to EMC Directive 2014/30/EU, tested according to		EN 61000-6-2 and EN 61000-6-3
	▶ RoHS Directive		2015/65/EU [2]
	▶ REACH Regulation		(EC) no. 1907/2006

Hydraulic			
Maximum operating pressure	▶ Ports A, B, P	bar	350
	▶ Port T	bar	210
Hydraulic fluid			See table page 6
Hydraulic fluid temperature range		°C	–20 ... +70
Viscosity range	▶ Recommended	mm^2/s	30 ... 46
	▶ Maximum admissible	mm^2/s	20 ... 380
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)			Class 20/18/15 [3]
Nominal flow (***Δp*** = 5 bar per control edge)		l/min	7; 15; 26
Maximum flow		l/min	42 (80 with double flow)

1) "OBED" voltage supply switched off.

2) The product fulfills the substance requirements of the RoHS Directive 2015/65/EU.

3) 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.

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	%	<5
Range of inversion	%	<1
Response sensitivity	%	<0.5

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

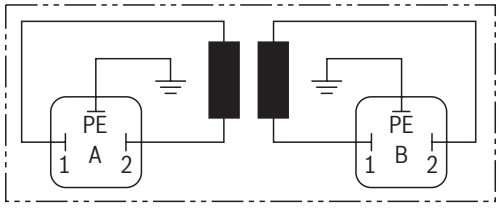
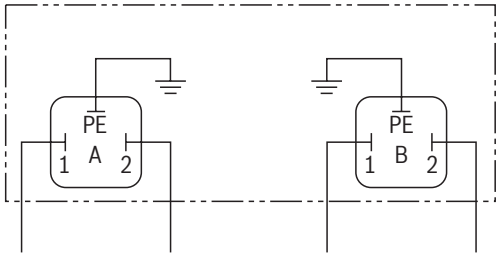
Electrical, digital on-board electronics (OBED) – Interface "A1"				
Supply voltage	▶ Nominal value		VDC	24
	▶ Minimum		VDC	19
	▶ Maximum		VDC	30
	▶ Maximum residual ripple		Vpp	2.5
	▶ Maximum power consumption		VA	24
	▶ Current consumption	Maximum	A	1.2
		Impulse current	A	2.7
	▶ Fuse protection, external		A_T	4 (time-lag)
Relative duty cycle time according to VDE 0580				S1 (continuous operation)
Functional ground and screening				See pin assignment page 9
Maximum voltage of the differential inputs against 0 V				D→B; E→B (max. 30 V)
Command value (differential amplifier)	▶ Measurement range		V	±10
	▶ Input resistance		kΩ	>100

Electrical, digital on-board electronics (OBED) – Interface "F1"				
Supply voltage	▶ Nominal value		VDC	24
	▶ Minimum		VDC	19
	▶ Maximum		VDC	30
	▶ Maximum residual ripple		Vpp	2.5
	▶ Maximum power consumption		VA	24
	▶ Current consumption	Maximum	A	1.2
		Impulse current	A	2.7
	▶ Fuse protection, external		A_T	4 (time-lag)
Relative duty cycle time according to VDE 0580				S1 (continuous operation)
Functional ground and screening				See pin assignment page 9
Maximum voltage of the differential inputs against 0 V				D→B; E→B (max. 30 V)
Command value	▶ Input current range		mA	4 ... 20
	▶ Input resistance		Ω	120

Electrical, digital on-board electronics (OBED) – Interface "L1"				
Supply voltage	▶ Valve amplifiers			
	– Nominal value		VDC	24
	– Minimum		VDC	19
	– Maximum		VDC	30
	– Maximum residual ripple		Vpp	2.5
	– Maximum power consumption		VA	24
	– Current consumption	Maximum	A	1.2
		Impulse current	A	2.7
	▶ IO-Link interface			
	– Nominal value		VDC	24
	– Minimum		VDC	19
	– Maximum		VDC	30
	– Maximum residual ripple		Vpp	1.3
	– Maximum power consumption		VA	1.2
	– Minimum process cycle time		ms	1
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 1.1.3

Electrical connections and assignment

External control electronics

Connection at connector	Connection at mating connector
	

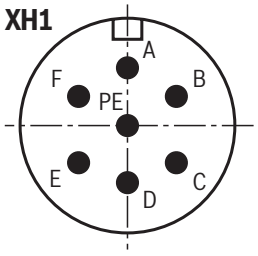
☞ **Notice:**
Mating connectors, separate order, see page 15 and data sheet 08006.

Electrical connections and assignment

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

Pin	Interface assignment	
	"A1"	**"F1"**
A	Supply voltage	Supply voltage
B	GND	GND
C	Not assigned; no function	Not assigned; no function
D	Command value	Command value
E	Reference potential command value	Reference potential command value
F	Not assigned; no function	Not assigned; no function
PE	Functional ground (directly connected to the valve housing)	

XH1

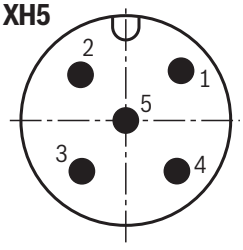


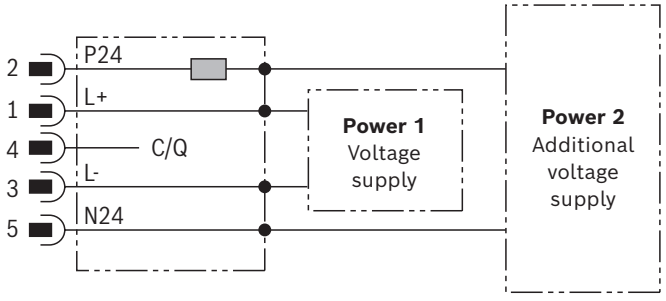
			Solenoid side	
			"a" and **"b"**	**"a"**
Command value	Positive	0 ... +10 V; 12 ... 20 mA	P→A; B→T	–
		0 ... +10 V; 4 ... 20 mA	–	P→B; A→T
	Negative	0 ... −10 V; 12 ... 4 mA	P→B; A→T	–
Connection cable	▶ Up to 20 m cable length type LiYCY 7 x 0.75 mm²			
	▶ Up to 40 m cable length type LiYCY 7 x 1.0 mm²			
	▶ EMC-compliant installation: – Apply screening to both line ends – Use metal mating connector (see page 15) ▶ Alternatively up to 30 m cable length admissible – Apply screening on supply side – Plastic mating connector (see page 15) can be used			

☞ **Notice:**
Mating connectors, separate order, see page 15 and data sheet 08006.

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

XH5



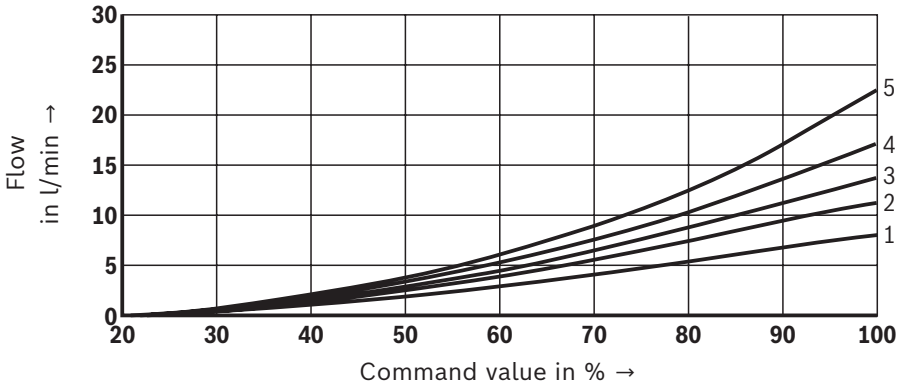


☞ **Notice:**
- ▶ M12 sensor/actuator connection line, 5-pole; M12 connector/bush, A-coded, without shield, maximum cable length 20 m (observe the voltage drop over the cable; wire cross-section at least 0.34 mm² for a cable length of up to 5 m).
- ▶ Mating connectors, separate order, see page 15 and data sheet 08006.
- ▶ For communication and parameter description, see functional description 29128-FK

Pin	Signal	Allocation interface "L1"
1	L+	Voltage supply IO-Link
2	P24	Voltage supply for valve electronics Bluetooth® dongle (incl. LEDs, etc.) and power section of max. 1.2 A continuous current and up to 2 A as making current. Potential is galvanically separated from supply L+ and L-.
3	L-	Reference potential pin 1
4	C/Q	Data line IO-Link (SDCI)
5	N24	Reference potential pin 2 (galvanically separated from supply L+ and L-)

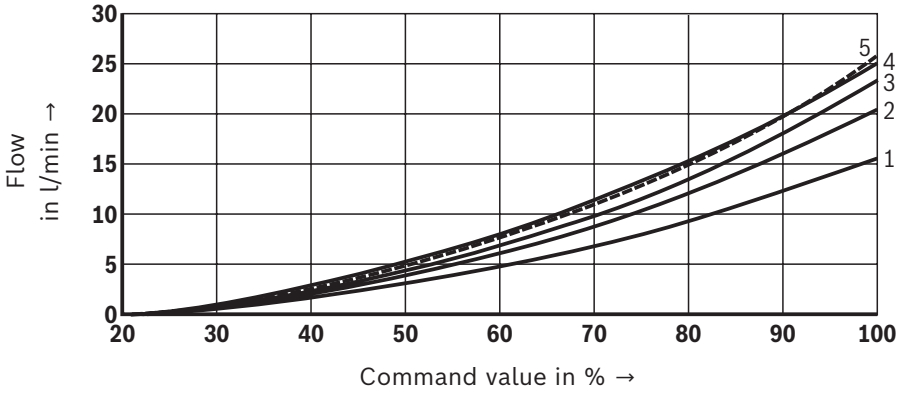
Characteristic curves
(measured with HLP46, ϑ_{oil} = 40±5 °C)

Flow/signal function (rated flow **7 l/min** with ***Δp*** = 10 bar)
P→A; B→T or P→B; A→T



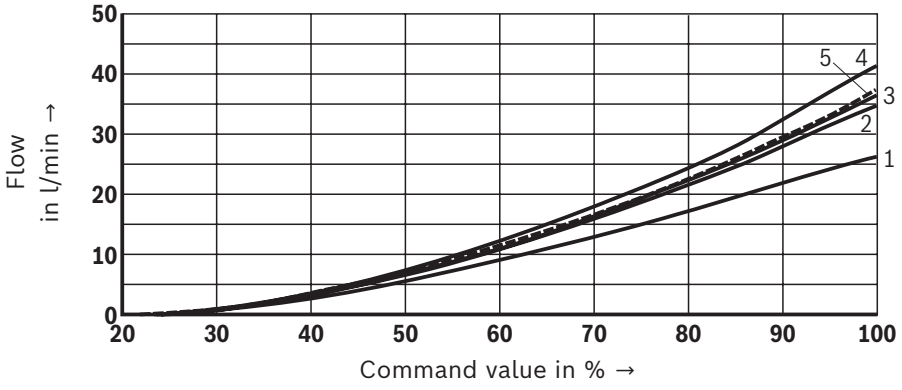
1 ***Δp*** 10 bar constant
2 ***Δp*** 20 bar constant
3 ***Δp*** 30 bar constant
4 ***Δp*** 50 bar constant
5 ***Δp*** 100 bar constant

Flow/signal function (rated flow **15 l/min** with ***Δp*** = 10 bar)
P→A; B→T or P→B; A→T



1 ***Δp*** 10 bar constant
2 ***Δp*** 20 bar constant
3 ***Δp*** 30 bar constant
4 ***Δp*** 50 bar constant
5 ***Δp*** 100 bar constant

Flow/signal function (rated flow **26 l/min** with ***Δp*** = 10 bar)
P→A; B→T or P→B; A→T

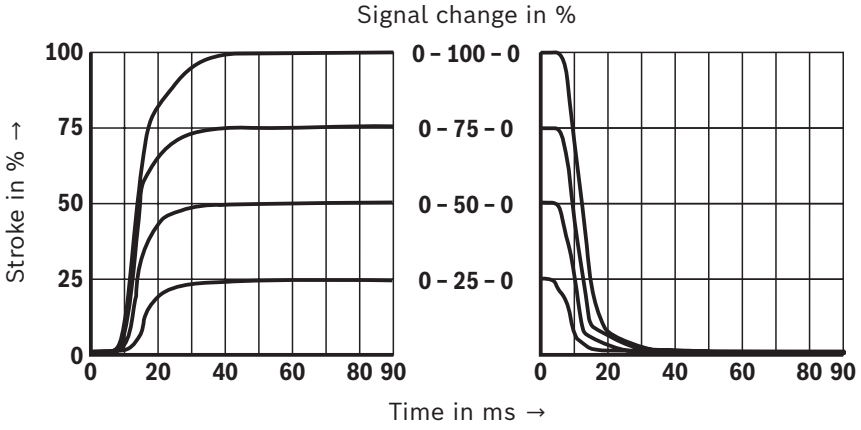


1 ***Δp*** 10 bar constant
2 ***Δp*** 20 bar constant
3 ***Δp*** 30 bar constant
4 ***Δp*** 50 bar constant
5 ***Δp*** 100 bar constant

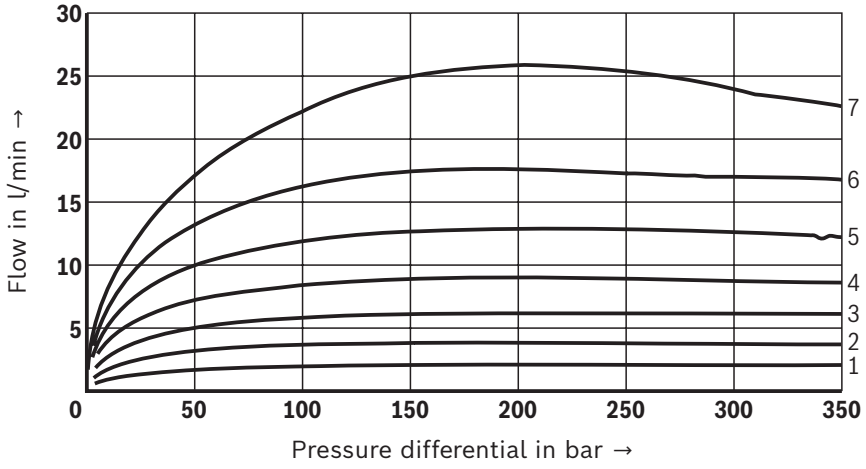
☞ **Notice:**
Typical characteristic curves which are subject to tolerance variations.

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

Transition function with stepped electric input signals



Performance limit (rated flow **7 l/min**)
P→A; B→T or P→B; A→T

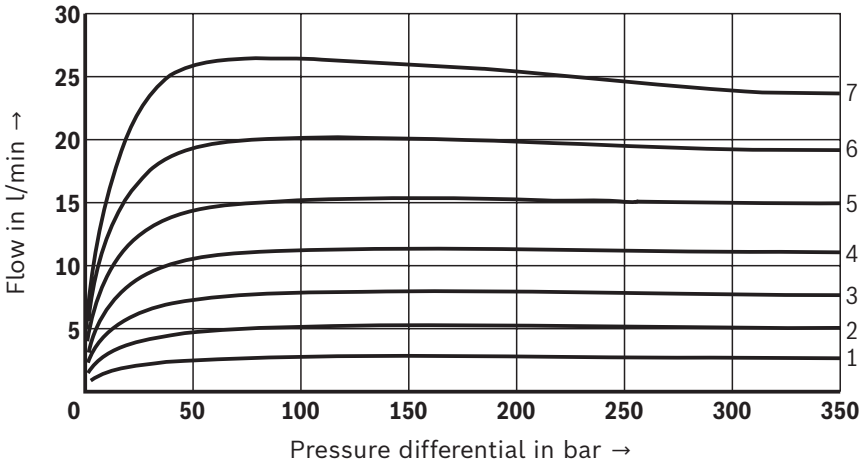


1 Command value 40%
2 Command value 50%
3 Command value 60%
4 Command value 70%
5 Command value 80%
6 Command value 90%
7 Command value 100%

☞ **Notice:**
- If the performance limit is exceeded, flow forces occur which lead to uncontrolled spool movements.
- Typical characteristic curves which are subject to tolerance variations.

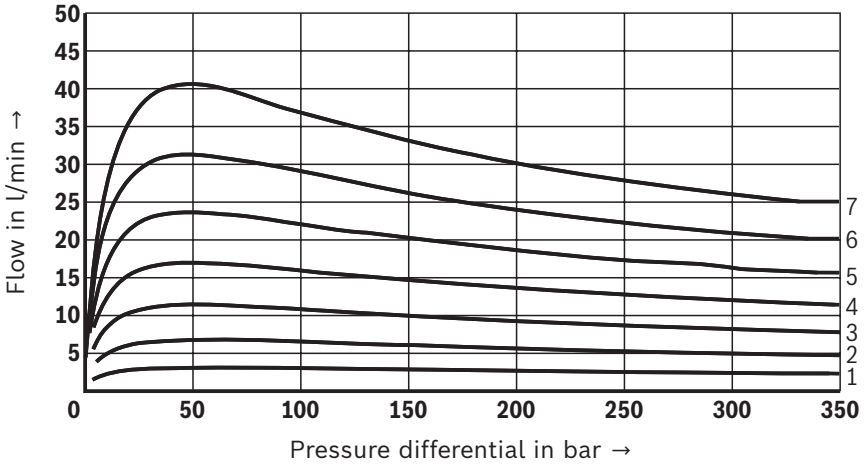
Characteristic curves
(measured with HLP46, ϑ_{oil} = 40±5 °C)

Performance limit (rated flow **15 l/min**)
P→A; B→T or P→B; A→T



1 Command value 40%
2 Command value 50%
3 Command value 60%
4 Command value 70%
5 Command value 80%
6 Command value 90%
7 Command value 100%

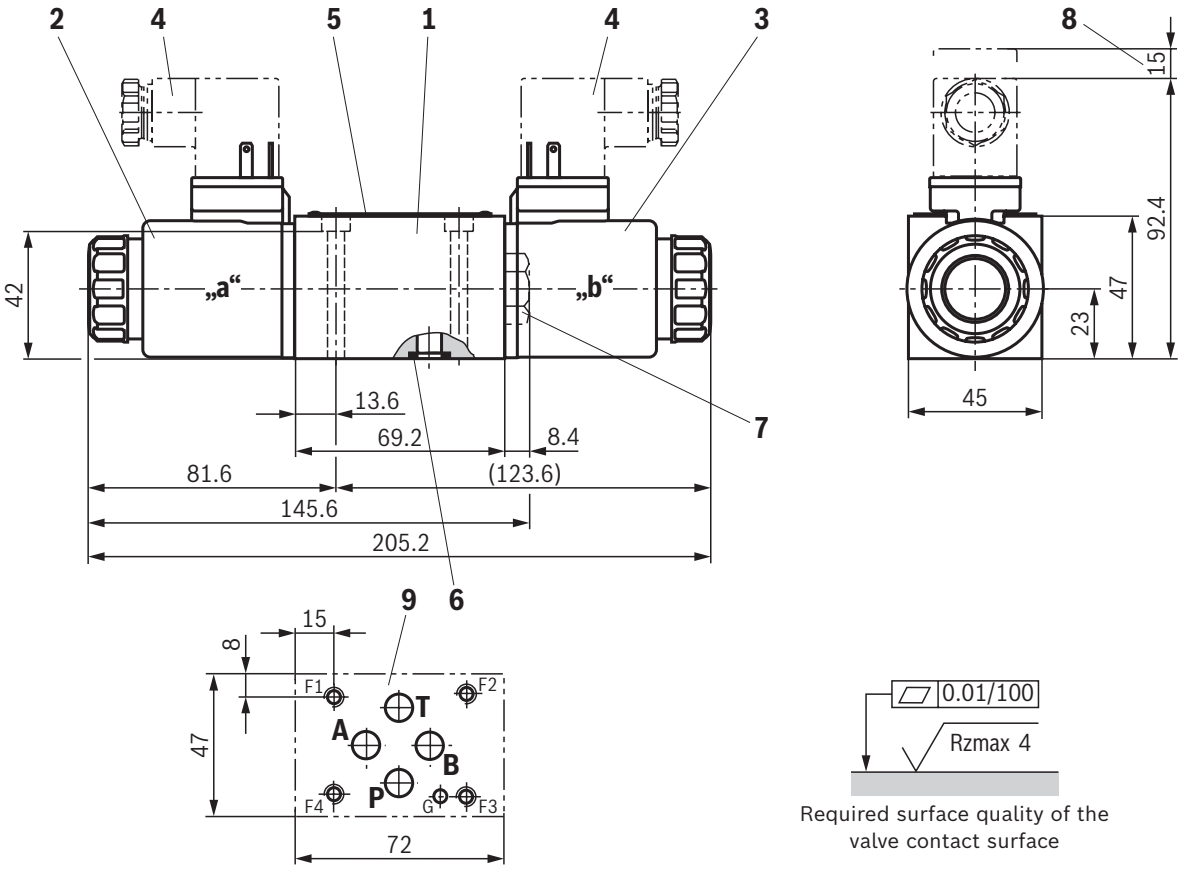
Performance limit (rated flow **26 l/min**)
P→A; B→T or P→B; A→T



1 Command value 40%
2 Command value 50%
3 Command value 60%
4 Command value 70%
5 Command value 80%
6 Command value 90%
7 Command value 100%

☞ **Notice:**
- If the performance limit is exceeded, flow forces occur which lead to uncontrolled spool movements.
- Typical characteristic curves which are subject to tolerance variations.

Dimensions: Type 4WRA
(dimensions in mm)



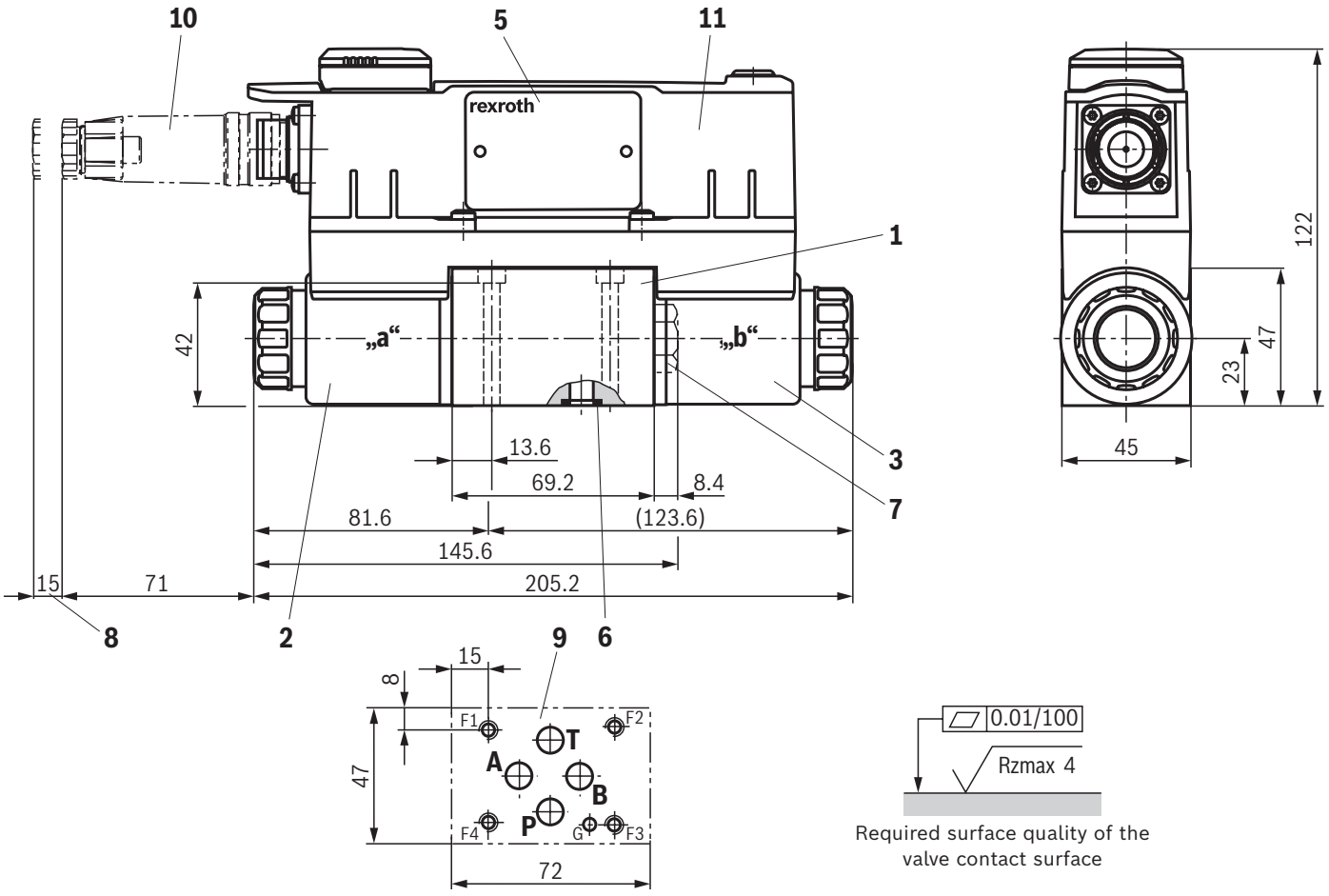
Required surface quality of the valve contact surface

1 Valve housing
2 Proportional solenoid "a"
3 Proportional solenoid "b"
4 Mating connector without circuitry for connector "K4" (separate order, see page 15 and data sheet 08006)
5 Name plate
6 Identical seal rings for ports A, B, P, and T
7 Plug screw for valves with one solenoid (symbols EA and WA)
8 Space required to remove the mating connector
9 Machined valve contact surface; porting pattern according to ISO 4401-03-02-0-05; deviating from the standard: without locating hole; connection P, A, B and T with Ø8 mm

Valve mounting screws and **subplates**, see page 15.

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

Dimensions: Type 4WRAE
(dimensions in mm)



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6 Identical seal rings for ports A, B, P, and T
7 Plug screw for valves with one solenoid (symbols EA and WA)
8 Space required to remove the mating connector
9 Machined valve contact surface; porting pattern according to ISO 4401-03-02-0-05; deviating from the standard: without locating hole; connection P, A, B and T with Ø8 mm
10 Mating connector (separate order, see page 15 and data sheet 08006)
11 Digital on-board electronics (OBED)

Valve mounting screws and **subplates**, see page 15.

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

Dimensions

Valve mounting screws (separate order)

Size	Quantity	Version	Hexagon socket head cap screws	Material number
6	4	Standard	**ISO 4762 - M5 x 50 - 10.9** Tightening torque M_A = 7 Nm ±10%	**R900006710**
	or			
	4	Improved corrosion protection	**ISO 4762 - M5 x 50 - 10.9** Friction coefficient μ_{total} = 0.09 ... 0.14; tightening torque M_A = 7 Nm ±10%	**R913043758**
	or			
	4	–	**ASME B18.3 - 10-24 UNC x 2"** Tightening torque M_A = 8 Nm *[5.9 ft-lbs]* ±10%	Not included in the Rexroth delivery range

☞ **Notice:**
For reasons of stability, exclusively the specified valve mounting screws may be used.

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

Accessories (separate order)

Mating connectors and cable sets

Pos. [1]	Designation	Version	Short designation	Material number	Data sheet
4	Mating connector; for valves with "K4" connector, 2-pole + PE, design A	Without circuitry, M16 x 1.5, 12 ... 240 V, "a"	Z4	**R901017010**	08006
		Without circuitry, M16 x 1.5, 12 ... 240 V, "b"		**R901017011**	
10	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**	–
–	Cable sets; for valves with IO-Link interface, M12-5, A-coded	1.5	–	**R901508849**	–
		3.0	–	**R901554223**	–
		5.0	–	**R901415747**	–

[1] See dimensions on page 13 and 14.

Control electronics (type 4WRAE)

		Type	Data sheet
Command value module	Analog	VT-SWMA-1-1X/...	29902

External control electronics (type 4WRA)

		Type	Data sheet
Modular design	Analog	VT-MSPA1-2X...	30232

Test and service devices

	Material number	Data sheet
Service case with test device for continuous control valves with digital on-board electronics (OBED)	**R901049737**	29685
Measuring adapter (6P + PE)	–	30068

Safety instructions

IT security
The operation of installations, systems and machines basically requires the implementation of a holistic IT security concept which is state-of-the-art in terms of technology.
Accordingly, Rexroth products and their properties have to be considered as components of installations, systems and machines for their holistic IT security concept.

Unless otherwise documented, Rexroth products are designed for operation in local, physically and logically secured networks with access restrictions for authorized persons, and they are not classified according to IEC 62443-4-2.

Certification

Title	Document number
EU Declaration of Conformity	DCTC-31000-175
China certificate	DCTC-31000-181
India certificate	DCTC-31000-182
South Korea certificate	DCTC-31000-183
US certificate	DCTC-31000-184

☞ **Notice:**
The Bluetooth® dongle is certified for the regions and/or economic areas included in the table.

Project planning information

For valves with Bluetooth interface, the password should be changed using the "easy2connect app" during commissioning. For further information, see functional description 29128-FK.

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
▶ Bluetooth® dongle	Data sheet 30581
▶ Reliability characteristics according to EN ISO 13849	Data sheet 08012
▶ Hexagon socket head cap screw, metric/UNC	Data sheet 08936
▶ Bluetooth® dongle	Operating instructions 30581-B
▶ Proportional directional valve, direct operated, with digital on-board electronics (OBED)	Functional description 29128-FK
▶ Information on available spare parts	
▶ Connecting hydraulic systems via IO-Link	
▶ CE Declaration of Conformity	