Rexroth
Bosch Group

4/3 directional high-response control valves, direct operated, with integrated control electronics (OBE)

RE 29067/11.05 1/14
Replaces: 02.03

Type 4WRSE



Type 4WRSE 6 -...-3X/... with integrated control electronics (OBE)



Type 4WRSE 10 -...-3X/... with integrated control electronics (OBE)

Sizes 6 and 10
Series 3X
Maximum operating pressure 315 bar
Maximum flow 180 l/min

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Features

- Direct operated directional high-response control valve with integrated control electronics (OBE) for controlling the direction and magnitude of a flow
- Suitable for position and velocity control
- Actuation by control solenoids
- Electrical position feedback
- High response sensitivity and low hysteresis
- Integrated control electronics (OBE) with interface ±10 V or 4 … 20 mA
- For subplate mounting:
  Porting pattern to DIN 24340 form A and ISO 4401
  Subplates to data sheets RE 45052 and RE 45054 (separate order), see pages 12 and 13

Ordering code

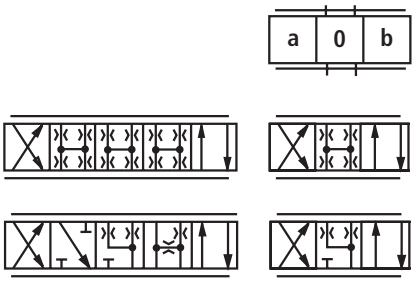
4WRS	E					–3X	G24	K0		V	*

Integrated control electronics (OBE) **= E**

Without sleeve **= No code**

Size 6 **= 6**
Size 10 **= 10**

Spool symbols



= V, V1-

= Q2-

With symbol V1-:

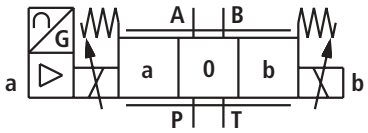
P → A: q_V B → T: $q_V/2$
P → B: $q_V/2$ A → T: q_V

With symbol Q2-:

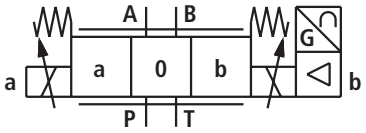
P → A: q_V B → T: q_V
P → B: $q_V/3$ A → T: q_V

Note:
Spools V and V1 have an overlap of –1.0 % … +1.0 %.

Side of inductive position transducer



= No code (standard)



= C

Seal material

V = FKM seals, suitable for mineral oils (HL, HLP) to DIN 51524 and phosphate ester (HFD-R)

Interface of control electronics

A1 = Command value input ±10 V
F1 = Command value input 4 … 20 mA

Electrical connection

K0 = With component plug to DIN EN 175201-804
Without cable socket
Cable socket – separate order, see page 5

Supply voltage of control electronics

G24 = 24 V DC

3X = Component series 30 … 39 (30 … 39: unchanged installation and connection dimensions)

Nominal flow at 10 bar valve pressure differential

Size 6

04 = 4 l/min (only with symbol V)
10 = 10 l/min
20 = 20 l/min
35 = 35 l/min

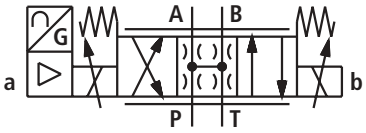
Size 10

25 = 25 l/min
50 = 50 l/min
80 = 75 l/min

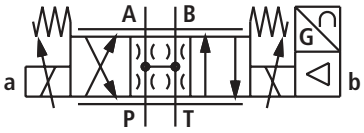
Further details in clear text

Symbols

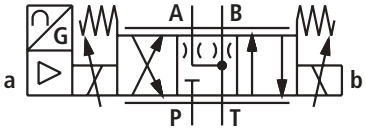
Type 4WRSE..**V** (standard)



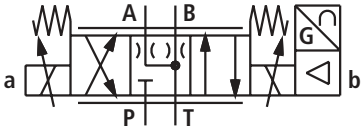
Type 4WRSE..**VC**



Type 4WRSE..**Q2** (standard)



Type 4WRSE..**Q2C**



Standard types

Size 6

Type	Material number
4WRSE 6 V04-3X/G24K0/A1V	R900938307
4WRSE 6 V1-10-3X/G24K0/A1V	R900909078
4WRSE 6 V1-20-3X/G24K0/A1V	R900906155
4WRSE 6 V1-35-3X/G24K0/A1V	R900904794
4WRSE 6 V10-3X/G24K0/A1V	R900558830
4WRSE 6 V20-3X/G24K0/A1V	R900576060
4WRSE 6 V35-3X/G24K0/A1V	R900579447

Size 10

Type	Material number
4WRSE 10 Q2-50-3X/G24K0/A1V	R900916872
4WRSE 10 V1-80-3X/G24K0/A1V	R900556812
4WRSE 10 V1-25-3X/G24K0/A1V	R900922997
4WRSE 10 V1-50-3X/G24K0/A1V	R900579140
4WRSE 10 V25-3X/G24K0/A1V	R900579637
4WRSE 10 V50-3X/G24K0/A1V	R900579943
4WRSE 10 V80-3X/G24K0/A1V	R900579286

Function, section

These 4/3 directional high-response valves are direct operated components of sandwich plate design. They are actuated by control solenoids. The solenoids are controlled by integrated control electronics (OBE).

Structure:

The valve basically consists of:

– Housing (1) with connection face
– Control spool (2) with compression springs (3 and 4)
– Solenoids (5 and 6)
– Position transducer (7)
– Integrated control electronics (OBE) (8)
– Zero point adjustment (9) accessible via Pg9 cover

Functional description:

– When solenoids (5 and 6) are de-energised, control spool (2) is held by compression springs (3 and 4) in the central position
– Direct operation of control spool (2) through energisation of the control solenoid

  e.g. controlling of solenoid "b" (6)

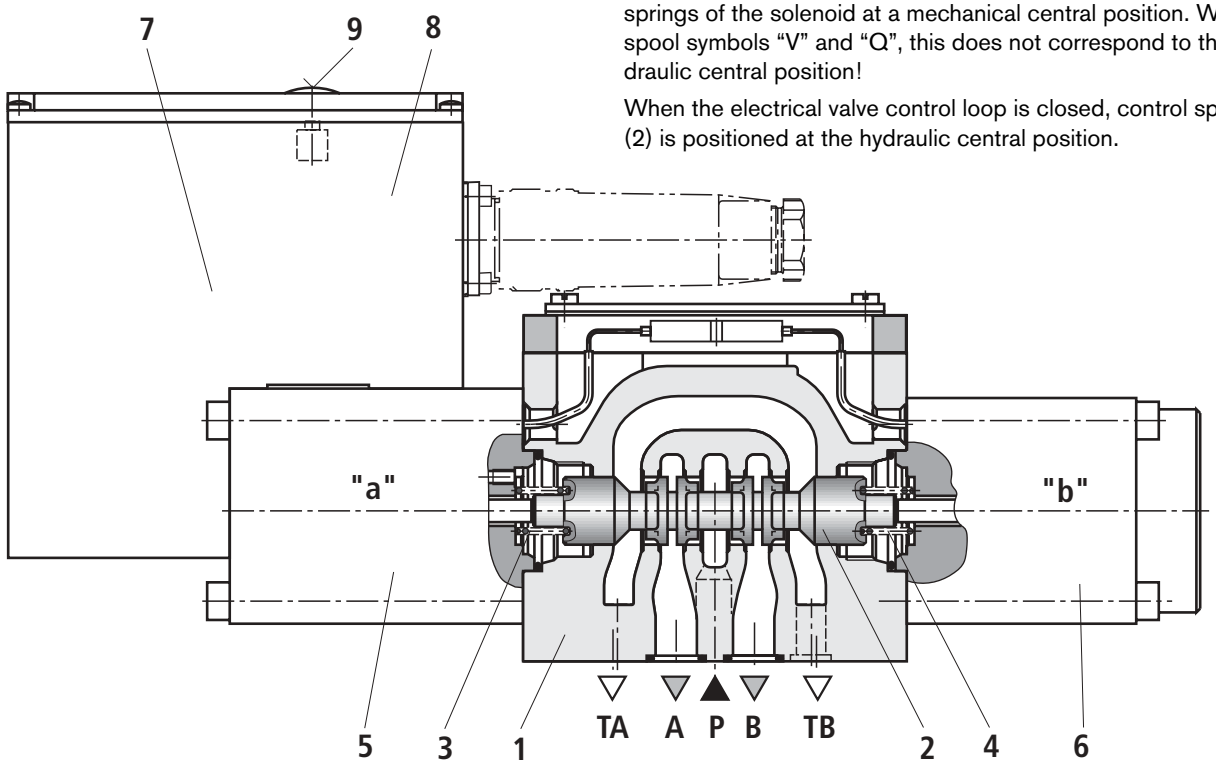
  • Control spool (2) is pushed to the left in proportion to the electrical input signal
  • Connection open from P → A and B → T via orifice-like cross-sections with linear flow characteristics

– De-energisation of solenoid (6)
  Control spool (2) is returned by compression spring (3) to the central position

In the de-energised state, control spool (2) is held by the return springs of the solenoid at a mechanical central position. With spool symbols “V” and “Q”, this does not correspond to the hydraulic central position!

When the electrical valve control loop is closed, control spool (2) is positioned at the hydraulic central position.

Type 4WRSE 10 V…



Technical data (for applications outside these parameters, please consult us!)

General

Sizes			**Size 6**	**Size 10**
Weight		kg	3.0	7.3
Installation orientation			Optional, preferably horizontal	
Ambient temperature range		°C	–20 … +50	
Storage temperature range		°C	–20 … +80	

Hydraulic (measured with HLP46, $\vartheta_{oil} = 40$ °C ± 5 °C and $p = 100$ bar)

Operating pressure	Ports P, A, B	bar	up to 315	up to 315
	Port T	bar	up to 315	up to 315
Nominal flow $q_{V\,nom}$ ±10 % at $\Delta p = 10$ bar		l/min	4	25
			10	50
(Δp = valve pressure differential)			20	75
			35	–
Max. permissible flow		l/min	80	180
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524 and phosphate ester (HFD-R), further hydraulic fluids on enquiry	
Hydraulic fluid temperature range		°C	–20 … +80	
Viscosity range		mm^2/s	20 … 380, preferably 30 … 46	
Max. permissible degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)			Class 18/16/13 [1]	
Hysteresis		%	≤ 0.05	
Range of inversion		%	≤ 0.03	
Response sensitivity		%	≤ 0.03	
Zero point balancing		%	≤ 1	
Zero point drift with change in:			**Size 6**	**Size 10**
	Hydraulic fluid temperature	%/10 K	< 0.1	< 0.1
	Operating pressure	%/100 bar	< 0.5	< 0.3

Electrical

Operating voltage	Nominal value (limits)	VDC	24	(19.4 … 35)
Current consumption	Size 6	A	max. 2	Impulse load: 4 A
	Size 10	A	max. 2.8	Impulse load: 4 A
Interface “A1“	Command value signal	V	±10	$R_i > 50$ kΩ
	Actual value signal	V	±10	$I_{max} = 2$ mA
Interface “F1“	Command value signal	mA	4 … 20	$R_e > 100$ Ω
	Actual value signal	mA	4 … 20	max. load resistance 500 Ω
Duty cycle		%	100	
Coil temperature [1]		°C	up to 150	
Type of protection of valve to EN 60529			IP 65 with cable socket correctly mounted and locked	

1) Due to the surface temperatures of solenoid coils, observe European standards EN 563 and EN 982!

Note: For details with regard to environment simulation testing in the fields of EMC (electromagnetic compatibility), climate and mechanical stress, see RE 29067-U (declaration on environmental compatibility).

Electrical connection

Component plug pin assignment	Contact	Signal	
		Interface A1	Interface F1
Supply voltage	A	24 VDC (19.4 … 35 VDC), I_{max} = 2 A (size 6), I_{max} = 2.8 A (size 10), impulse load: 4 A	
	B	0 V	
Actual value reference potential	C	Connect reference potential for contact F to ⊥ on the control side (star-shape)	Reference potential for contact F
Comand value signal	D	±10 V, R_i > 50 kΩ	4 … 20 mA, R_i > 100 Ω
	E	Reference potential for contact D	
Actual value	F	±10 V I_{max} = 2 mA	4 … 20 mA, max. load resistance 500 Ω
Protective conductor	PE	Connected to heat sink and valve body	

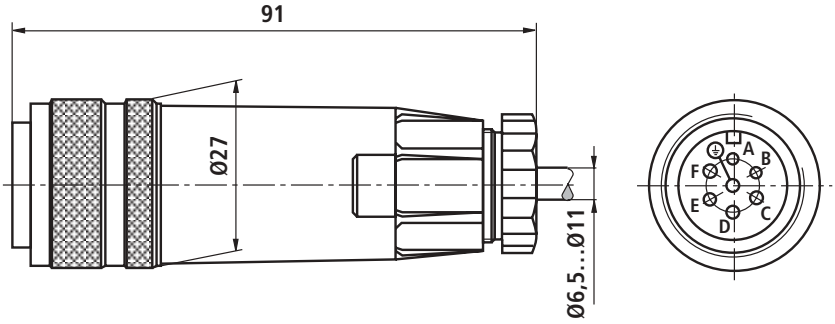
Command value: Positive command value at D (interface A1) or 12 ... 20 mA (interface F1) and reference potential at E causes a flow from P → A and B → T.
Negative command value at D (interface A1) or 12 ... 4 mA (interface F1) and reference potential at E causes a flow from P → B and A → T.

Actual value: Interface A1: Positive signal at F and reference potential at C means flow from P → A.
Interface F1: 12 ... 20 mA means flow from P → A.

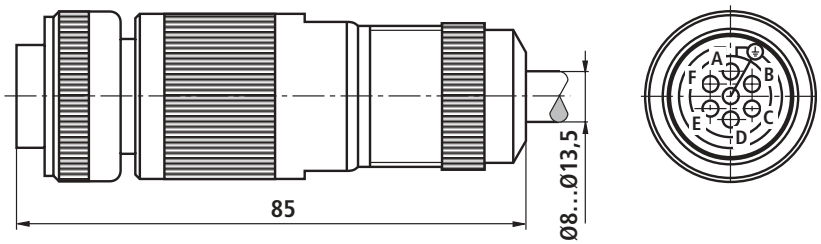
Connecting cable: Recommendation: – up to 25 m cable length: Type LiYCY 7 x 0.75 mm²
– up to 50 m cable length: Type LiYCY 7 x 1.0 mm²
Outer diameter 6.5 … 11 mm or 8 … 13.5 mm, respectively
Connect shield to ⊥ only on the supply side.

Cable sockets

Cable socket (plastic version)
to DIN EN 175201-804
Separate order,
material no. **R900021267**



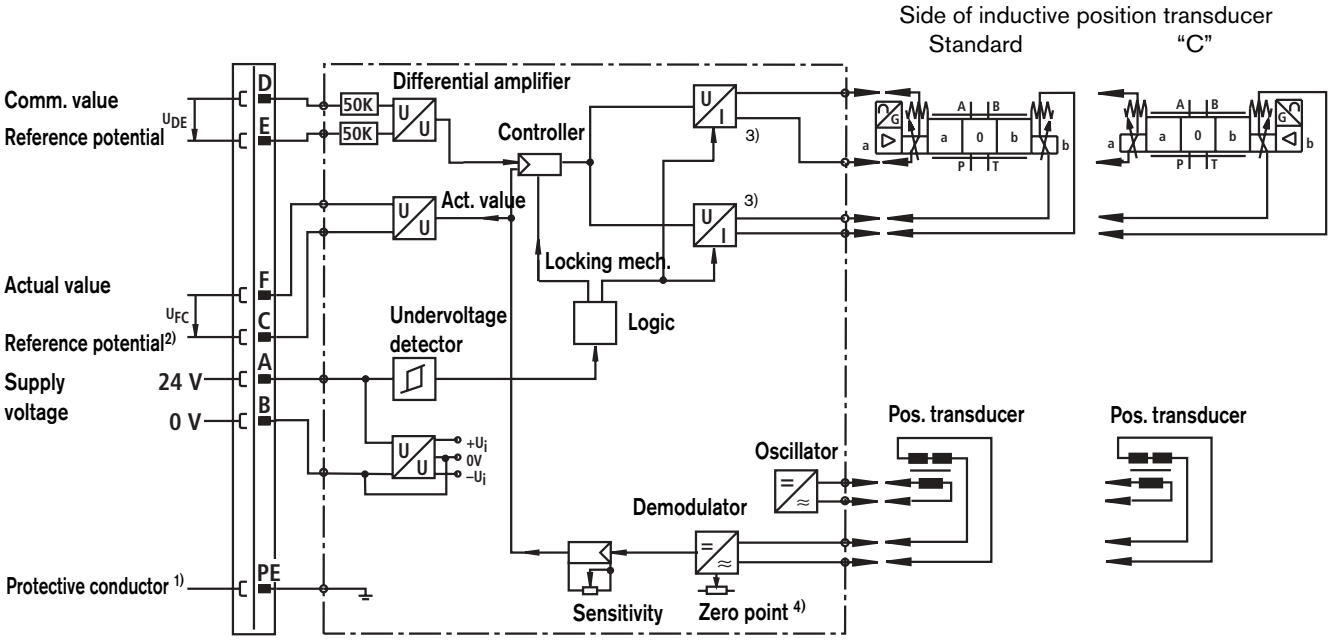
Cable socket (metal version)
to DIN EN 175201-804
Separate order,
material no. **R900223890**



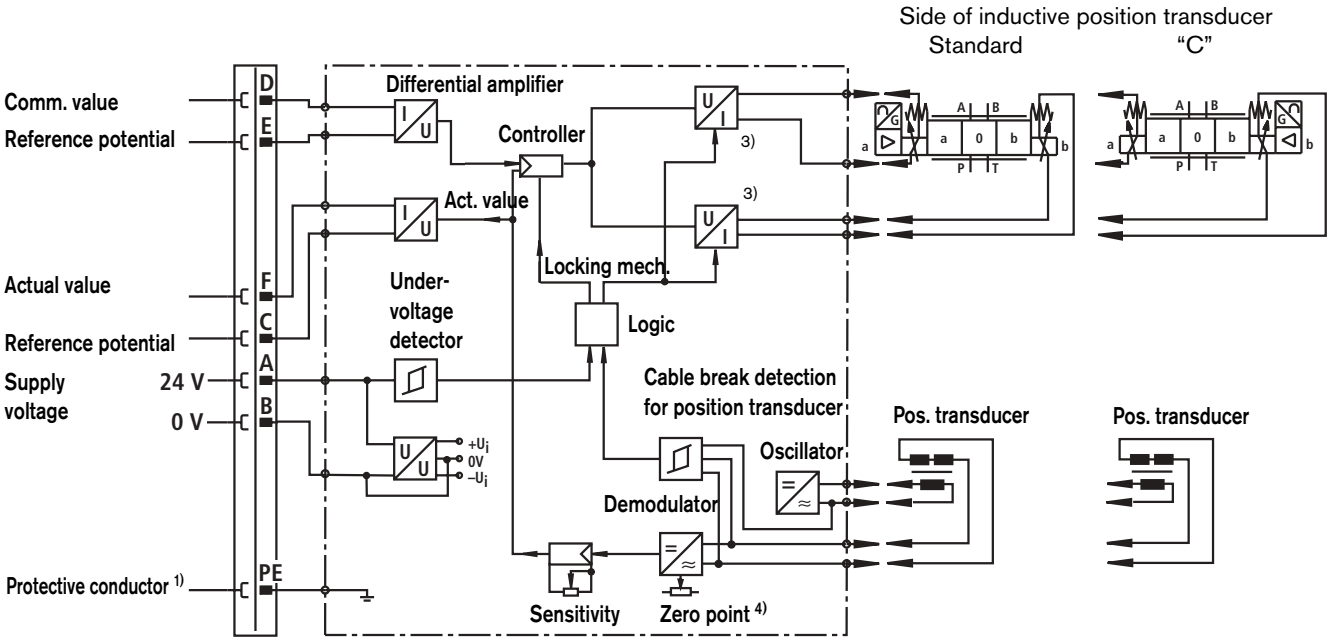
Integrated control electronics (OBE)

Block circuit diagram / pin assignment of integrated control electronics (OBE)

Interface A1



Interface F1



Note:

Electrical signals brought out via control electronics (e.g. actual value) must not be used for switching off safety-relevant machine functions! (See also European standard EN 982, "Safety requirements for fluid power systems and components - hydraulics")

1) PE connection connected to heat sink and valve body

2) Connect pin C to ⊥ on the control side

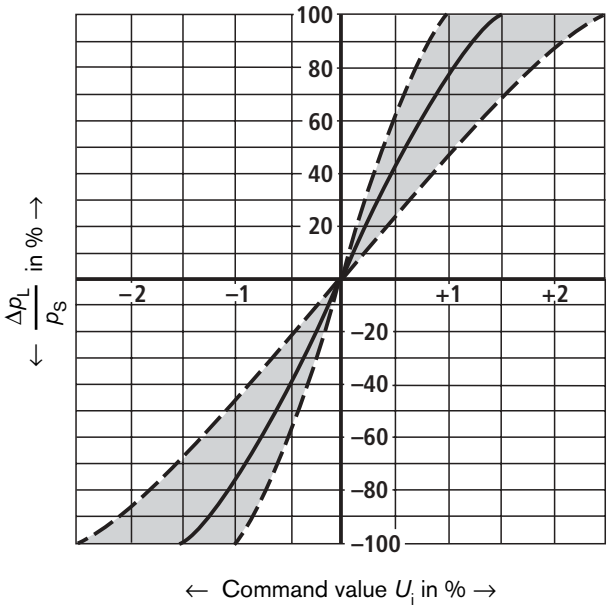
3) Output stage current regulated

4) Zero point externally adjustable

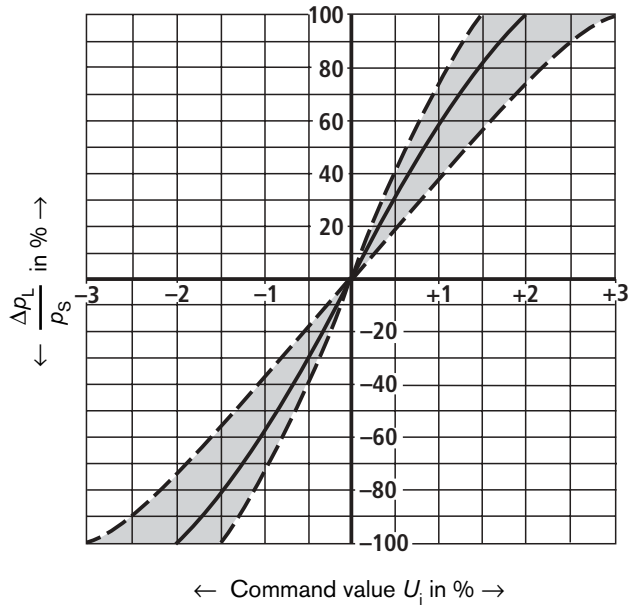
Characteristic curves (measured with HLP46, $\vartheta_{oil} = 40\ °C \pm 5\ °C$)

Pressure/signal characteristic curves (V spool) $p_S = 100$ bar

Size 6
Type 4WRSE 6 V…

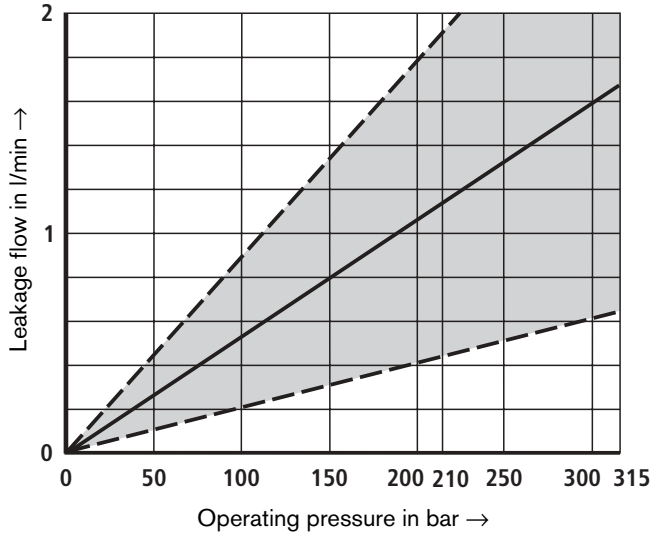


Size 10
Type 4WRSE 10 V…

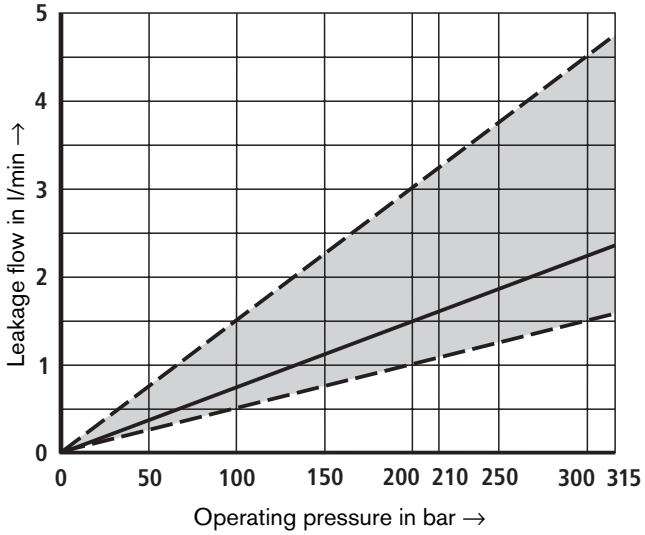


Typical leakage flow

Size 6
Type 4WRSE 6 V.35…



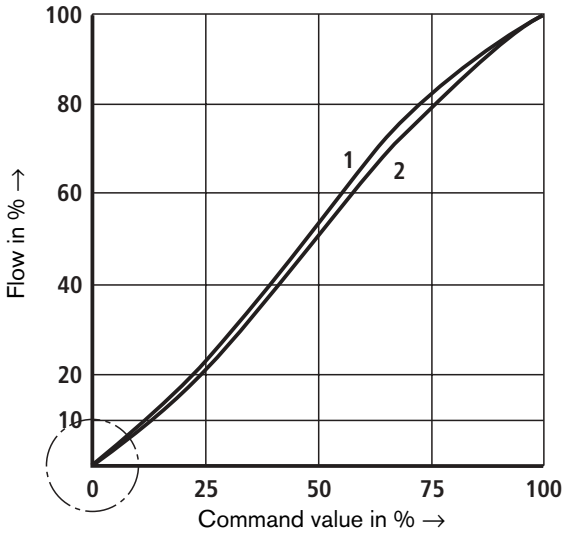
Size 10
Type 4WRSE 10 V.80…



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

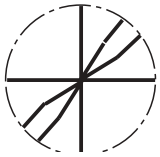
Typical flow characteristic curve (V, V1 spool)

at 10 bar valve pressure differential or 5 bar per control land



1 = Nominal flow 35 l/min
2 = Nominal flow 10 l/min

Spool … 20 between characteristic curves 1 and 2

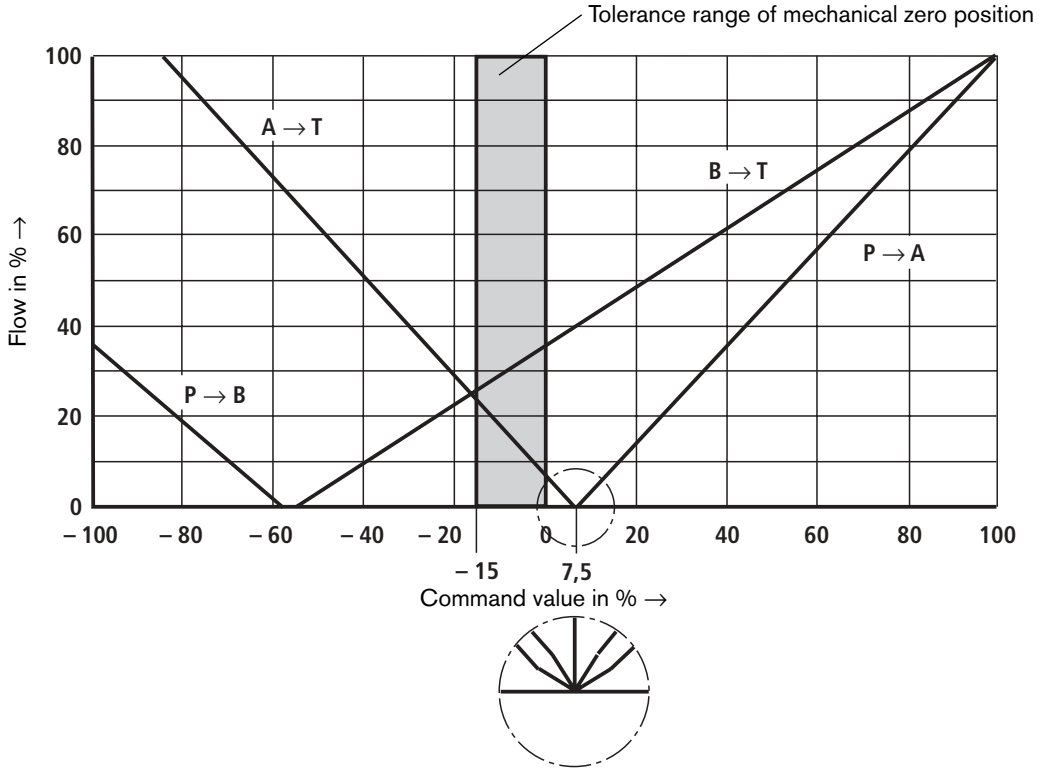


Zero point passage depending on manufacturing tolerance

Valve overlap –1 % … +1 %

Typical flow characteristic curve (Q2 spool)

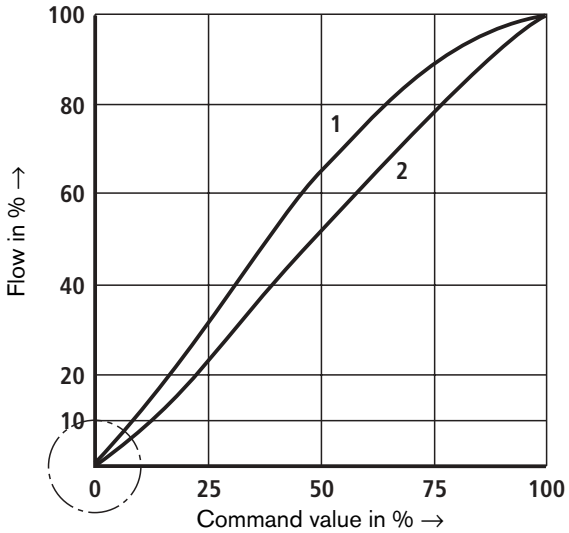
at 10 bar valve pressure differential or 5 bar per control land



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

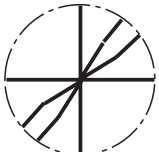
Typical flow characteristic curve (V, V1 spool)

at 10 bar valve pressure differential or 5 bar per control land



1 = Nominal flow 75 l/min
2 = Nominal flow 25 l/min

Spool … 50 between characteristic curves 1 and 2

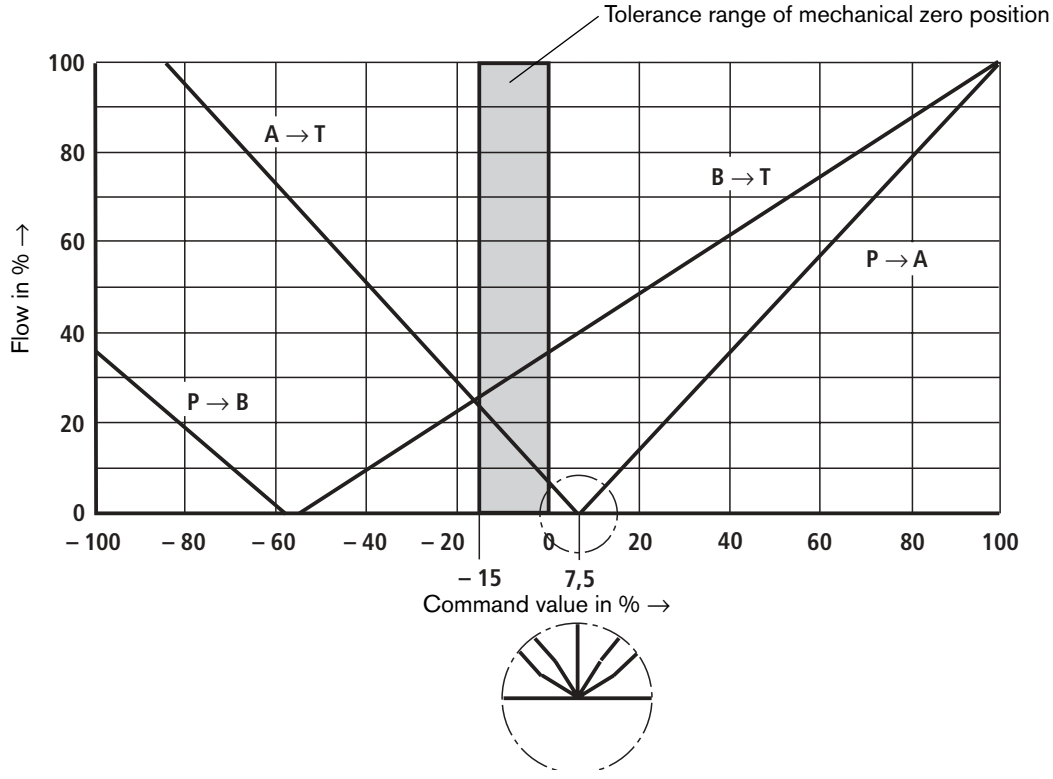


Zero point passage depending on manufacturing tolerance

Valve overlap –1 % … +1 %

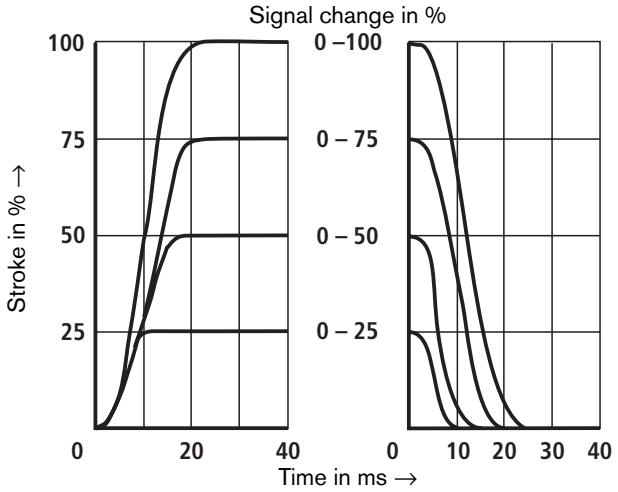
Typical flow characteristic curve (Q2 spool)

at 10 bar valve pressure differential or 5 bar per control land



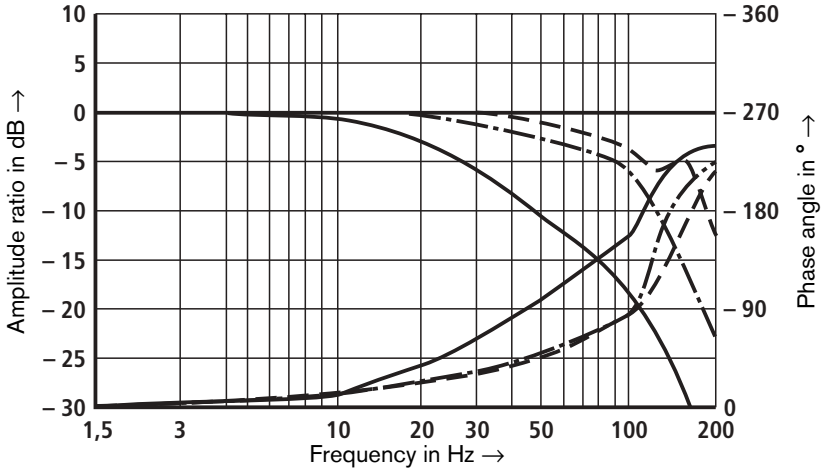
Characteristic curves of size 6 (measured with HLP46, $\vartheta_{oil} = 40\ °C \pm 5\ °C$)

Transient function with stepped electrical input signals



Measured at:
$p_S = 10$ bar
$\nu = 46\ mm^2/s$
$\vartheta = 40\ °C$

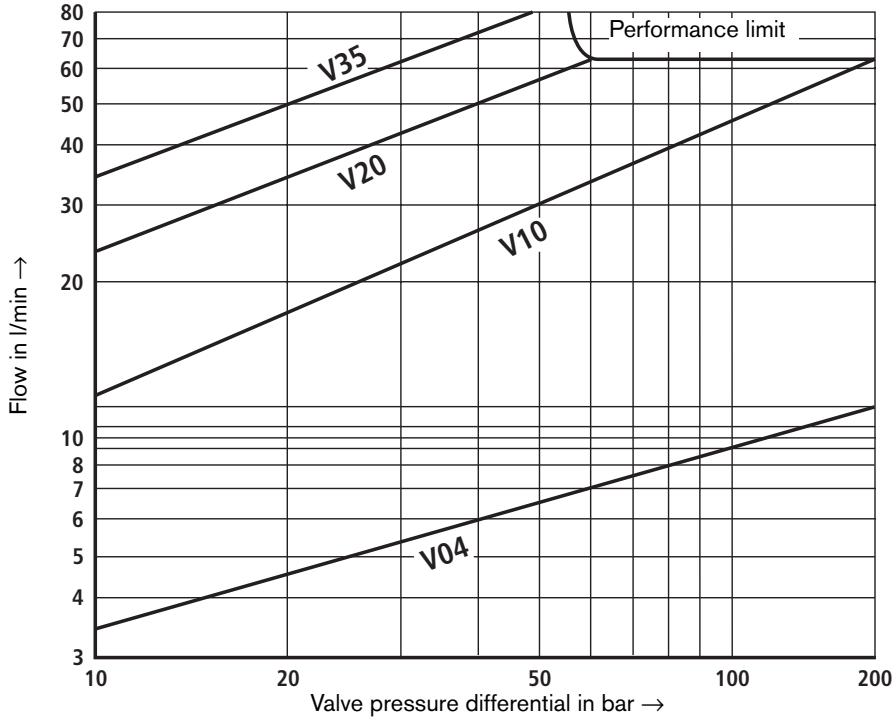
Frequency response characteristic curves



Measured at:
$p_S = 10$ bar
$\nu = 46\ mm^2/s$
$\vartheta = 40\ °C$

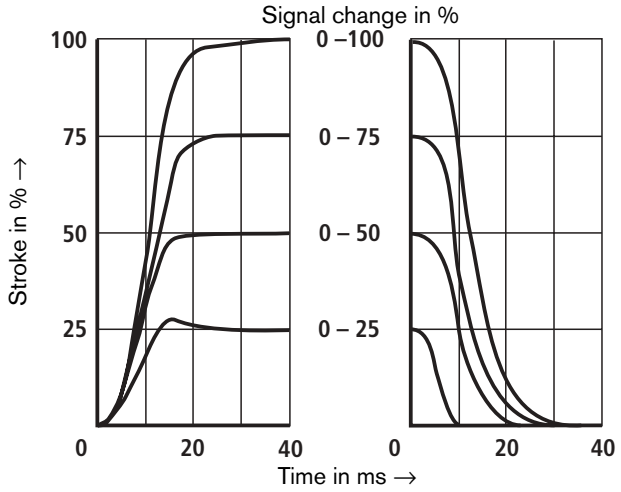
Signal ±10 %
Signal ±25 %
Signal ±100 %

Flow/load function at max. valve aperture (tolerance ±10%)



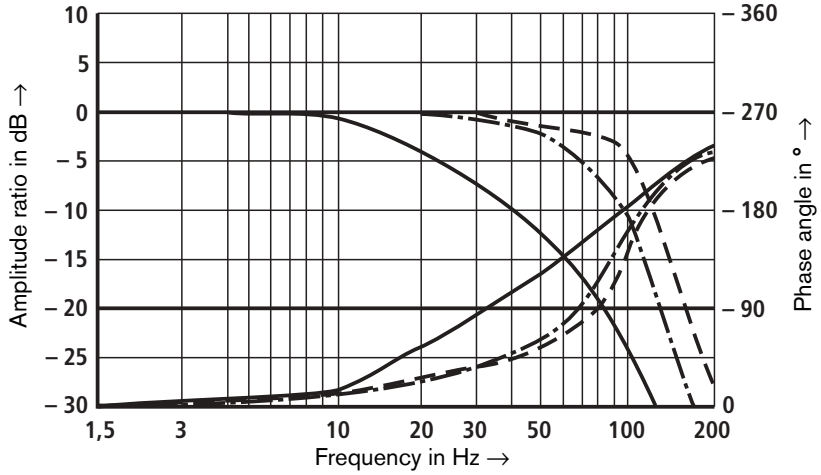
Characteristic curves of size 10 (measured with HLP46, $\vartheta_{oil} = 40\ °C \pm 5\ °C$)

Transient function with stepped electrical input signals



Measured at:
$p_S = 10$ bar
$\nu = 46\ mm^2/s$
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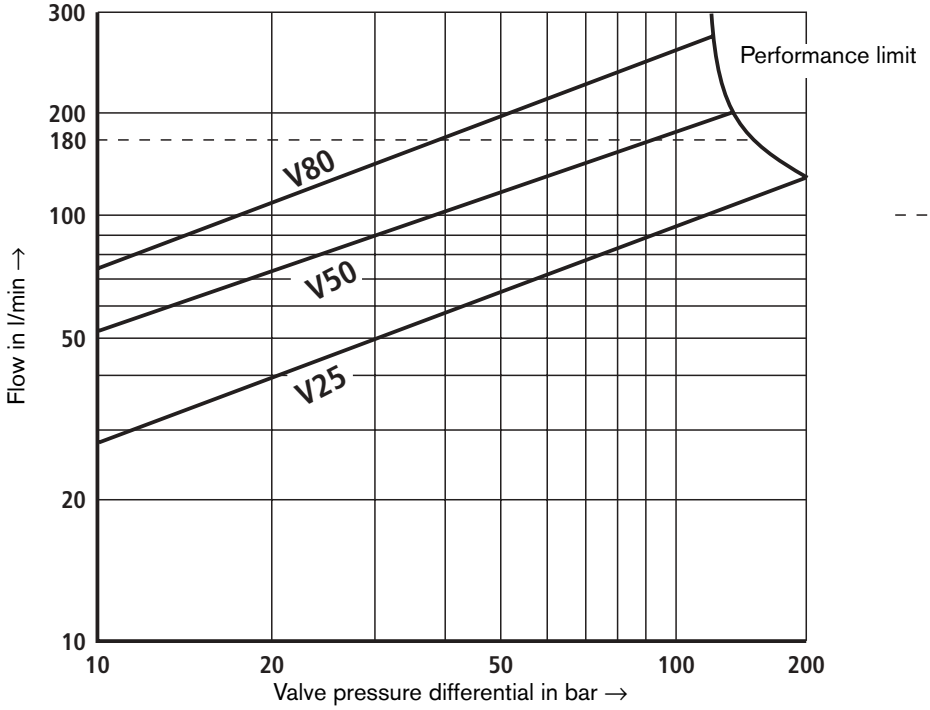
Frequency response characteristic curves



Measured at:
$p_S = 10$ bar
$\nu = 46\ mm^2/s$
$\vartheta = 40\ °C$

– – – – Signal ±10 %
– · – · – Signal ±25 %
——— Signal ± 100 %

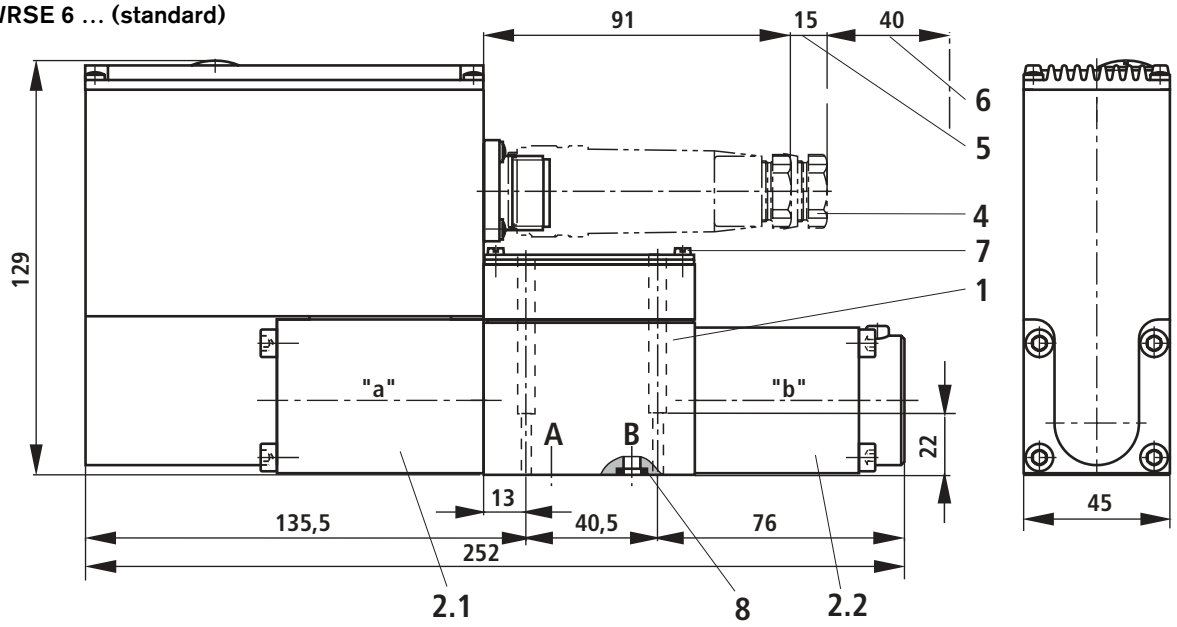
Flow/load function at max. valve aperture (tolerance ±10%)



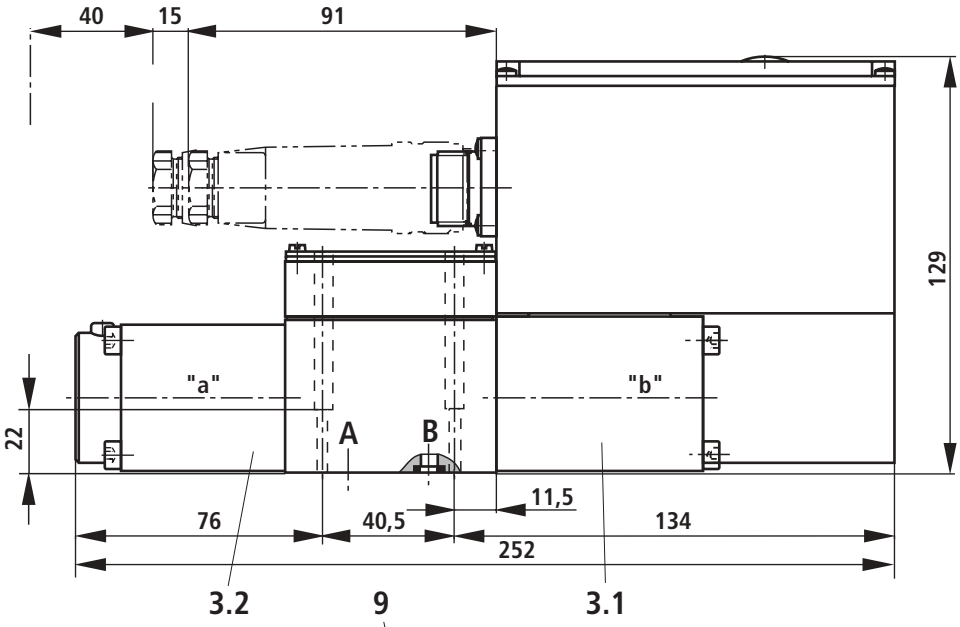
– – – Recommended flow limitation
$q_V = 180$ l/min

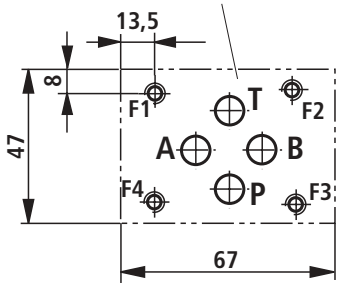
Unit dimensions of size 6 (nominal dimensions in mm)

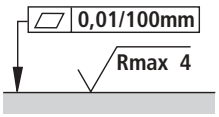
Type 4WRSE 6 … (standard)



Type 4WRSE 6 C…







Required surface quality of mating part

1 Valve housing

2.1 Control solenoid "a" with inductive position transducer

2.2 Control solenoid "b"

3.1 Control solenoid "b" with inductive position transducer

3.2 Control solenoid "a"

4 Cable socket to DIN EN 175201-804 (separate order, see page 5)

5 Space required to remove cable socket

6 Additional space required for bending radius of connecting cable

7 Nameplate

8 R-ring 9.81 x 1.5 x 1.78 (ports P, A, B, T)

9 Machined valve mounting face, position of ports to DIN 24340 form A6 and ISO 4401-03-02-0-94 without locating bore

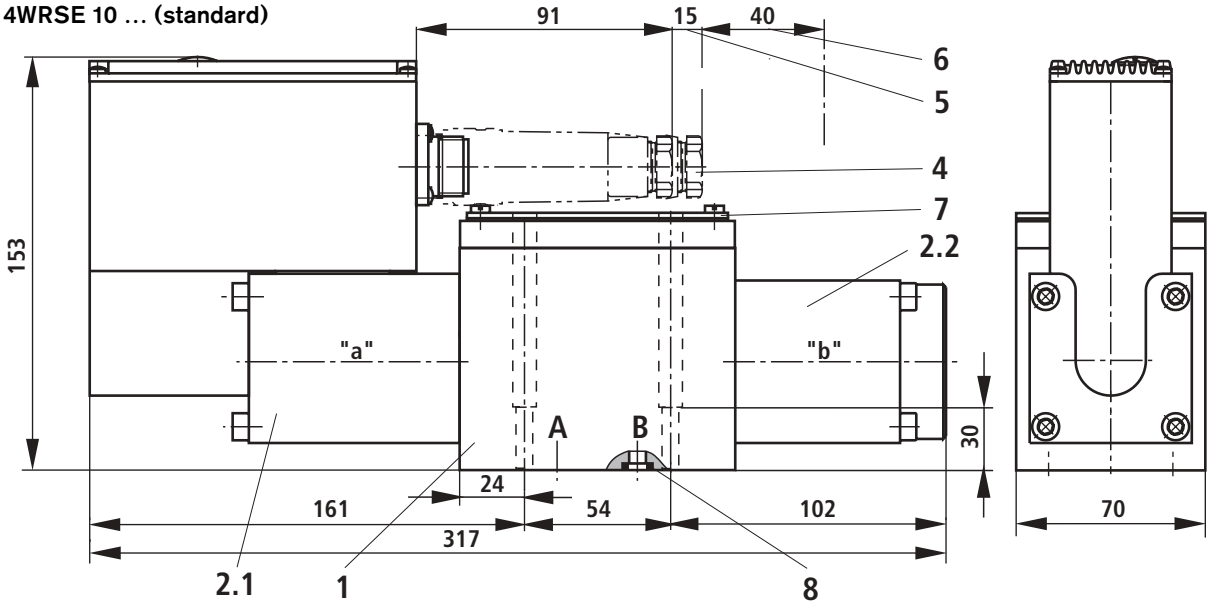
Subplates to data sheet RE 45052 and valve fixing screws must be ordered separately.

Subplates: G 341/01 (G1/4)
G 342/01 (G3/8)
G 502/01 (G1/2)

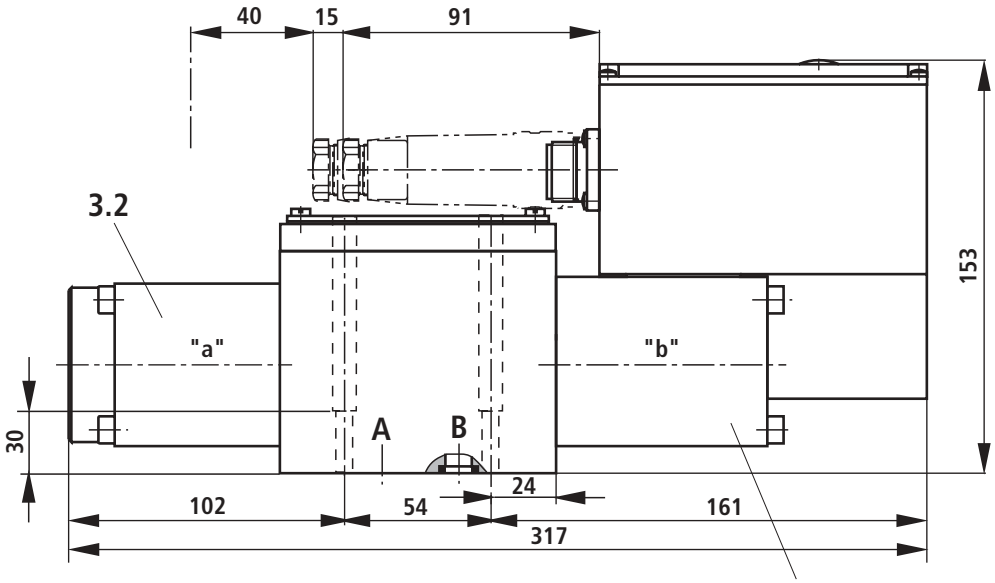
4 hexagon socket head cap screws
ISO 4762 – M5x30-10.9-flZn-240h-L
(friction coefficient total = 0.09 to 0.14)
Tightening torque M_T = 7 Nm ± 10%
material no. R913000316 (separate order)

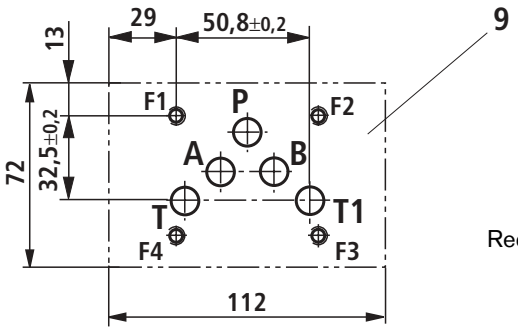
Unit dimensions of size 10 (nominal dimensions in mm)

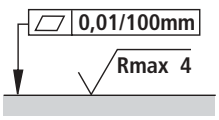
Type 4WRSE 10 … (standard)



Type 4WRSE 10 C…







Required surface quality of mating part

1 Valve housing

2.1 Control solenoid "a" with inductive position transducer

2.2 Control solenoid "b"

3.1 Control solenoid "b" with inductive position transducer

3.2 Control solenoid "a"

4 Cable socket to DIN EN 175201-804 (separate order, see page 5)

5 Space required to remove cable socket

6 Additional space required for bending radius of connecting cable

7 Nameplate

8 R-ring 13.0 x 1.6 x 2.0 (ports A, B, P, T)

9 Machined valve mounting face, position of ports to DIN 24340 form A10 and ISO 4401-05-04-0-94

Subplates to data sheet RE 45054 and valve fixing screws must be ordered separately.

Subplates: G 66/01 (G3/8)
G 67/01 (G1/2)
G 534/01 (G3/4)

4 hexagon socket head cap screws
ISO 4762 – M6x40-10.9-flZn-240h-L
(friction coefficient total = 0.09 to 0.14)
Tightening torque M_T = 12.5 Nm ± 10%
material no. R913000058 (separate order)

Notes

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