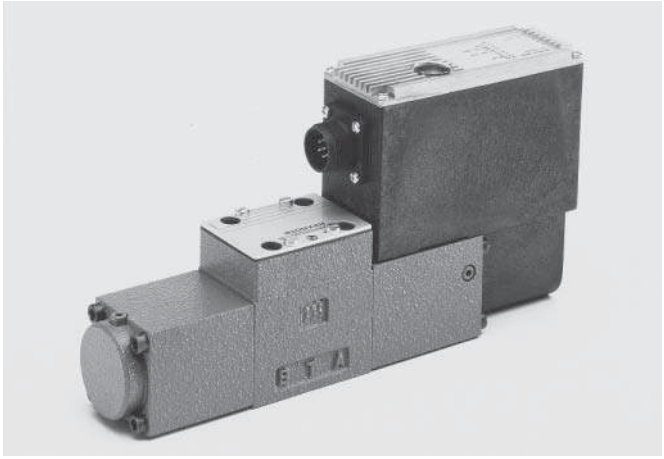
RE 29 069/02.03

Replaces: 12.99

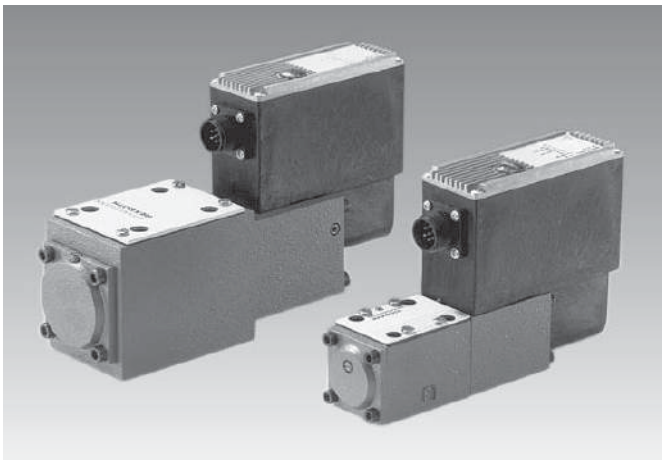
4/3 and 4/4 high response directional control valves, direct operated, with electrical position feedback Type 4WRSEH

Nominal sizes 6 and 10
Series 3X
Maximum operating pressure 315 bar
Maximum flow 80 L/min (NS 6)
Maximum flow 180 L/min (NS 10)



H/A 5276/95

Type 4WRSEH 6 **V**…D-3X/… (4/3 high response directional control valve)



H/A 5544/96

Types 4WRSEH 10 **C.B**…D-3X/… and 4WRSEH 6 **C.B**…D-3X/… (4/4 high response directional control valve)

Overview of contents

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Features	1
Ordering details	2
Symbols	3
Function, section	3 and 4
Technical data	5
Electrical connections, plug-in connector	6
Integrated control electronics	7
Characteristic curves	8 to 13
Unit dimensions	14 and 17

Features

- Direct operated high response directional control valve for the control of the size and direction of a flow
- Valve spool and bush are of servo quality
- Suitable for closed loop, position, speed and pressure control
- Operated via high response solenoids
- With fail-safe position for the 4/4 high response directional control valve
- Electrical position feedback
- High response sensitivity and low hysteresis
- Integrated control electronics with interface A1 or F1
- For subplate mounting:
  Porting pattern to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H
  Subplates to catalogue sheets RE 45 052 and RE 45 054 (separate order), see pages 14 to 17

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Ordering details

4WRS	E	H						–3X	/G24	K0	/	V	*

With **integrated** control electronics **= E**

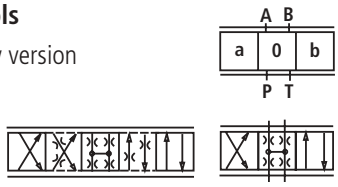
Control spool/bush **= H**

Nominal size 6 **= 6**

Nominal size 10 **= 10**

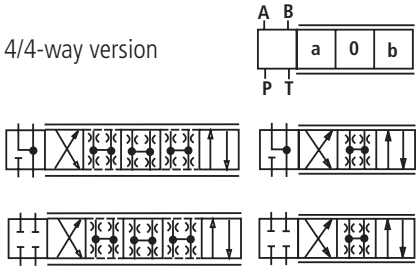
Symbols

4/3-way version



= V

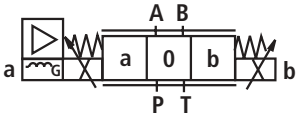
4/4-way version



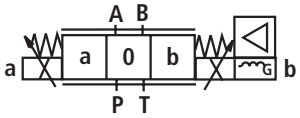
= C3

= C4

Inductive position transducer location with spool symbol „V"

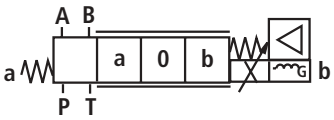


(Standard) **= No code**

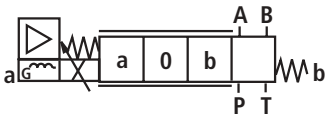


= C

Inductive position transducer location with spool symbols „C3" and „C4"



(Standard) **= B**



= No code

Further details in clear text

V = FKM seals, suitable for mineral oils (HL, HLP) to DIN 51 524 and phosphate ester (HFD-R)

Control electronics interface

A1 = Command value input ± 10 V

F1 = Command value input 4 to 20 mA

Electrical connections

K0 = With component plug to E DIN 43 563-AM6
Without plug-in connector, Plug-in connector – separate order, see page 6

Control electronics power supply

G24 = + 24 V DC

3X = Series 30 to 39
(30 to 39: unchanged installation and connection dimensions)

Spool overlap [4]

E = 0...0.5% negative

D = 0...0.5% positive

Flow characteristics

L = Linear

P = Inflected characteristic curve 40 %

Nominal flow at a 70 bar pressure differential

Nominal size 6

04 = [3] 4 L/min

12 = 12 L/min

24 = 24 L/min

40 = [2] 40 L/min

50 = [1] 50 L/min

Nominal size 10

50 = 50 L/min

100 = 100 L/min

[1] Only with „V" in conjunction with flow characteristic „L"

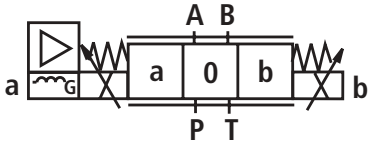
[2] Only with „C" and „V" in conjunction with flow characteristic „P"

[3] Only in conjunction with flow characteristic „L"

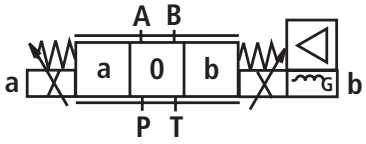
[4] The spool overlap in % relates to the nominal stroke of the control spool. We recommend, for closed loop applications, the D overlap. Further spool overlaps on request!

Symbols

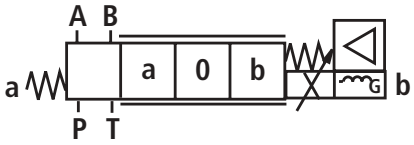
Type 4WRSEH.V…-3X…



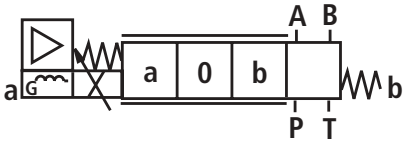
Type 4WRSEH.V**C**…-3X/…



Type 4WRSEH.C.**B**…-3X/…



Type 4WRSEH.C…-3X/…



Function, section

The 4/3 and 4/4 high response directional control valves are designed as direct operated units of subplate mounting design. They are operated by high response solenoids. The solenoids are controlled via the integrated control electronics.

Design:

The valve basically comprises of:

- Housing (1) with mounting surface
- Control spool (2) in bush (3) with compression springs (4 and 5)
- Solenoids (6 and 7)
- Position transducer (8)
- Integrated control electronics (9)
- Zero point adjustment accessible (10) via Pg9

Functional description:
4/3-way version

- With solenoids (6 and 7), de-energised the control spool (2) is held in its mechanical centre position by the compression springs (4 and 5)
- Direct operation of the control spool (2) by the energisation of one of the high response solenoids

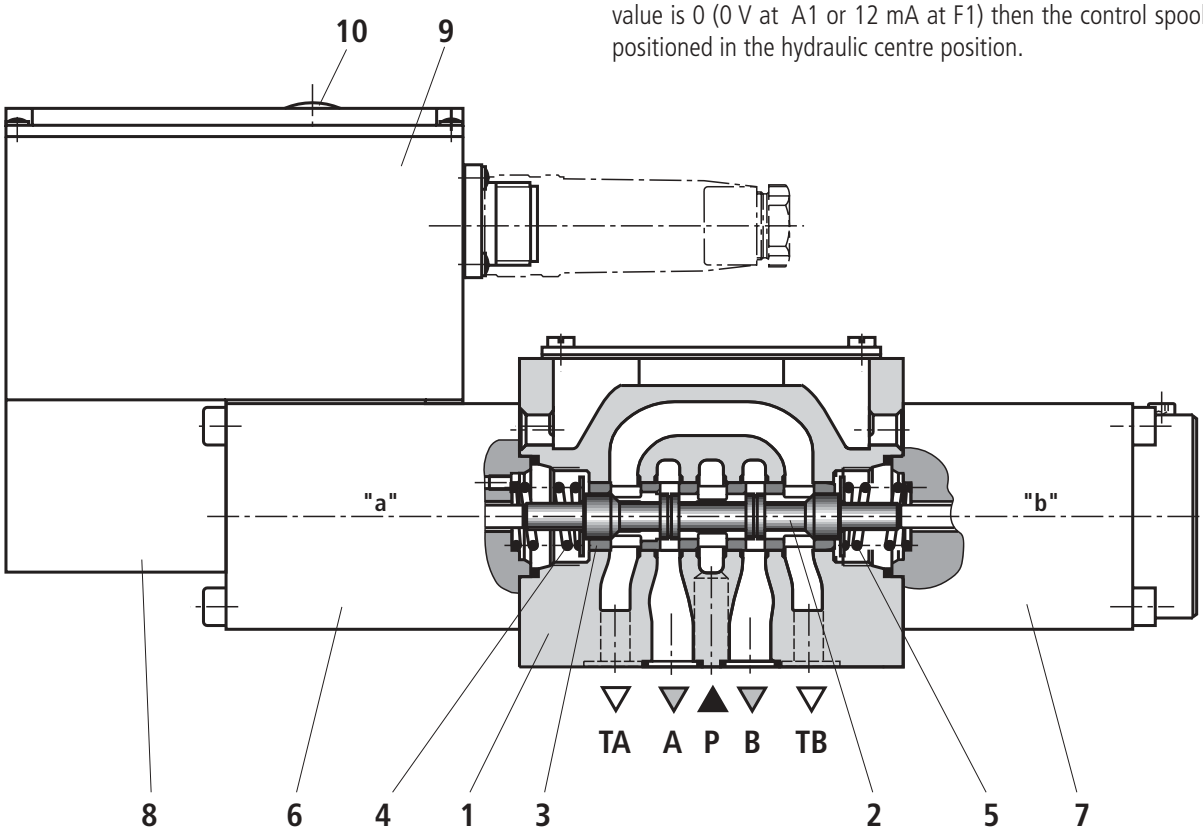
  E.g. control of solenoid "b" (7)

  → Moves the control spool (2) to the left in proportion to the electrical input signal

  → Connection from P to A and B to T via orifice type cross-sections with linear or inflected flow characteristics
- By de-energising the solenoid (7) → control spool (2) is returned to its centre position via the compression spring (4)

In the de-energised condition the control spool (2) is held in a mechanical centre position via the control springs. This does not relate to the hydraulic centre position!

By closing the electrical valve closed loop circuit and the command value is 0 (0 V at A1 or 12 mA at F1) then the control spool (2) is positioned in the hydraulic centre position.



Type 4WRSEH 10 V…–3X/…

Function, section

4/4-way version

The function of these valves is basically the same as the 4/3-way version. However, when the solenoid is de-energised the control spool is moved into a fail-safe position via a compression spring.

The 4/4 high response directional control valves are designed as direct operated units of subplate mounting design. They are operated by high response solenoids. The solenoids are controlled via the integrated control electronics.

Design:

The valve basically comprises of:

- Housing (1) with mounting surface
- Control spool (2) in bush (3) with compression springs (4)
- Solenoid (5) and cover (6)
- Position transducer (7)
- Integrated control electronics (8)
- Zero point adjustment accessible (9) via the Pg9

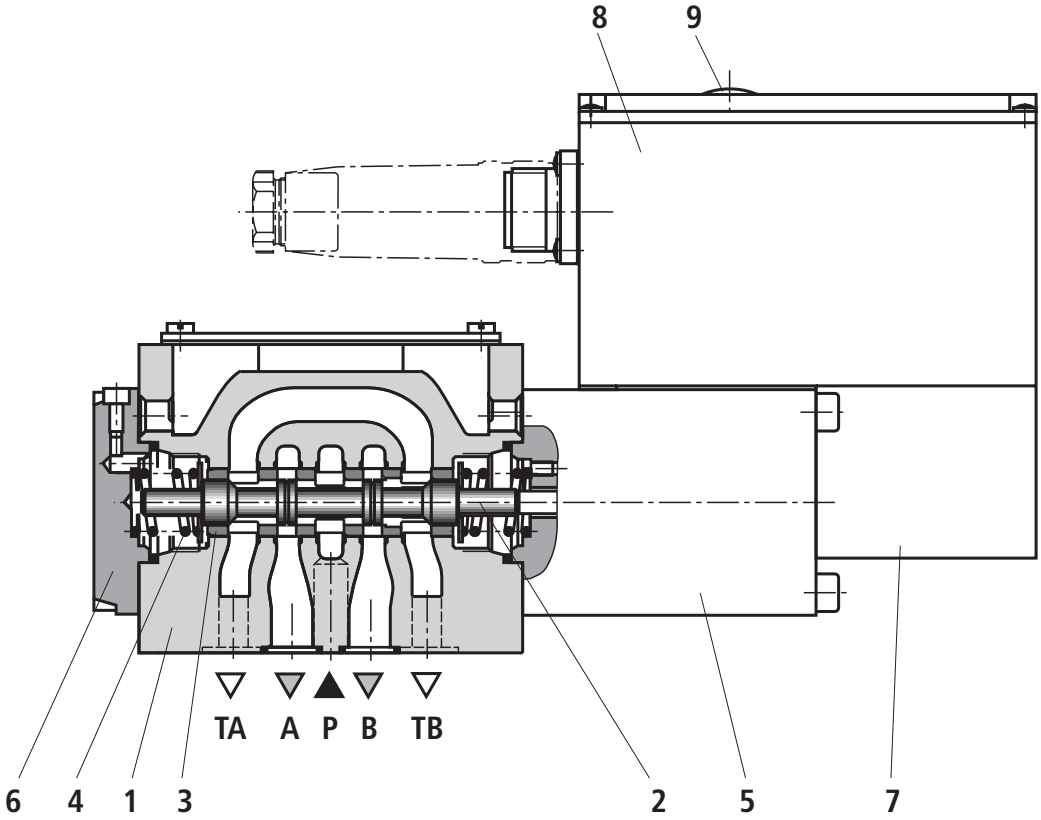
Functional description:

- With the solenoid (5) de-energised, a fail-safe position for the control spool (2) via compression spring (4) results
- Direct operation of the control spool (2) by the energisation of the high response solenoid (5)

  E.g. control of the solenoid

  → Moves the control spool (2) in proportion to the electrical input signal

  → Connection from P to A and B to T via orifice type cross-sections with linear or inflected flow characteristics
- By de-energising the solenoid (5) → the control spool (2) is moved back into the fail-safe condition via the compression spring (4)



Type 4WRSEH 10 VC…–3X/…

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

General			**NS 6**	**NS 10**
Installation			Optional, preferably horizontal	
Storage temperature range		°C	– 20 to + 80	
Ambient temperature range		°C	– 20 to + 50	
Weight	Valve with 1 solenoid	kg	2.3	6.0
	Valve with 2 solenoids	kg	3.0	7.3

Hydraulic (measured at p = 100 bar, ν = 46 mm²/s and ϑ = 40 °C)

Operating pressure	Ports A, B, P	bar	up to 315				up to 315	
	Port T	bar	up to 315				up to 210	
Application limits C3, C4	Nominal flow	L/min	04	12	24	40	50	100
[1] The details for C4 are	Application limit Δp with symbol C3	bar	315	315	315	160	250	150
only preliminary details!	Application limit Δp with symbol C4 [1]	bar	315	315	200	100	150	100
Nominal flow $q_{V\,nom}$ ± 10 % at Δp = 70 bar		L/min	4				50	
Δp = valve pressure differential							12	100
			24				–	
			50 (with V spool with flow „L“); 40 (with C and V spools with flow characteristic „P“)				–	
Max. permissble flow		L/min	80				180	
Pressure fluid			Mineral oil (HL, HLP) to DIN 51 524 and phosphate ester (HFD-R), further pressure fluids on request					
Degree of contamination			Maximum permissible degree of pressure fluid contamination to NAS 1638				A filter with a minimum retention rate of $\beta_x \geq 75$ is recommended	
			Class 7				x = 10	
Pressure fluid temperature range		°C	– 20 to + 80					
Viscosity range		mm²/s	20 to 380, preferably 30 to 46					
Hysteresis		%	< 0.05					
Reversal span		%	< 0.03					
Response sensitivity		%	< 0.03					

Electrical

Valve protection to DIN 40 050			IP 65	
Voltage type			DC	
Signal type			analogue	
Zero point alignment		%	≤ 1	
Zero point displacement with changes to:			**NS 6**	**NS 10**
	Pressure fluid temperature	%/10 K	< 0.15	< 0.1
	Operating pressure	%/100 bar	< 0.05	< 0.05
Electrical connection			With component plug to E DIN 43 563 AM6	
[2] separate order, see page 6			Plug-in connector to E DIN 43 563-BF6-3/Pg11 [2]	
Control electronics			VT 13070 (integrated into the valve, see page 7)	

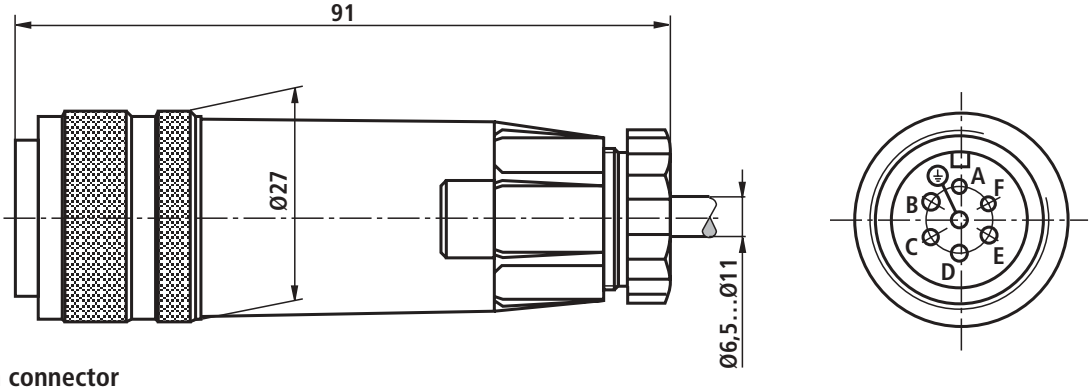
Note: For details regarding the **environmental simulation test** covering EMC (electro-magnetic compatibility), climate and mechanical loading see RE 29 069-U (declaration regarding environmental compatibility).

Electrical connections, plug-in connector

Plug-in connector

Plug-in connector to E DIN 43 563-BF6-3/Pg11
Separate order under material No. **00021267** (plastic version)

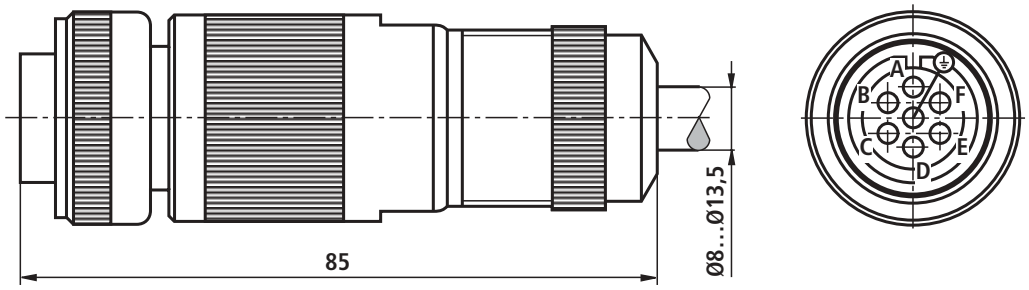
For pin allocation see block circuit diagram on page 7



Plug-in connector

Plug-in connector to E DIN 43 563-BF6-3-Pg13.5
Separate order under material No. **000223890** (metal version)

For pin allocation see block circuit diagram on page 7



Component plug allocation

	Contact	Signal
Supply voltage	A	24 VDC (u(t) = 19.4 V to 35 V); I_{max} = 2 A (NS 6) I_{max} = 2.8 A (NS 10); impulse load= 4 A
	B	0 V
Ref. (actual value)	C	Ref. potential for actual value (contact F); A1: R_e > 50 kΩ F1: R_e < 10 Ω
Differential amplifier input	D	A1: ± 10 V command value, R_e > 50 kΩ or F1: 4...20 mA, R_e > 100 Ω
(command value)	E	0 V ref. potentional
Measurement output (act. value)	F	± 10 V actual value (limiting load 2 mA); or F1: 4...20 mA, max. load impedance 500 Ω
	PE	Connected with cooling body and valve housing

Actual value: Interface A1: A positive signal at F and the reference potential at C results in a flow from P to A.
Note for A1: Connect pin C on the control side (star form) with ⊥.
Interface F1: 12...20 mA results in a flow from P to A.

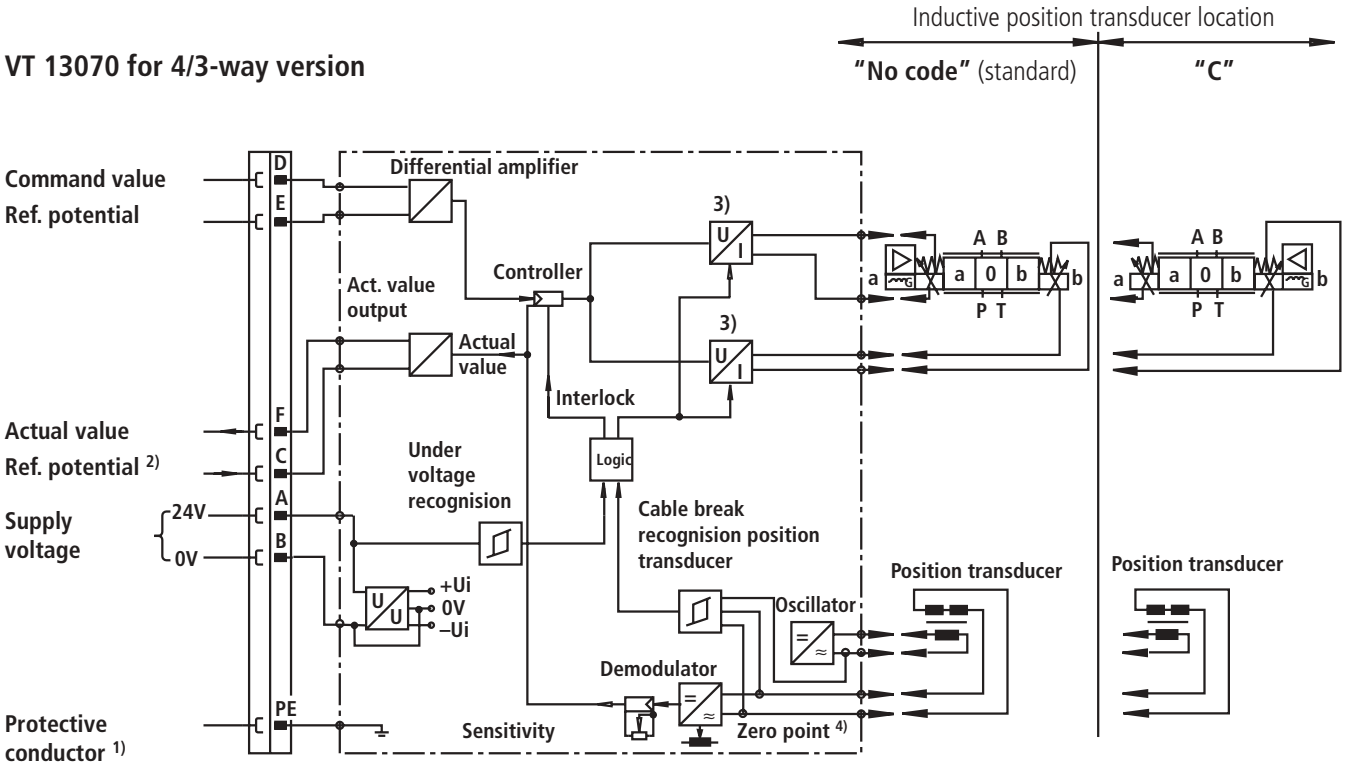
Command value: A positive command value at D (interface A1) or 12...20 mA (interface F1) and the reference potential at E results in a flow from P to A and B to T.
A negative command value at D (interface A1) or 12...4 mA (interface F1) and the reference potential at E results in a flow from P to B and A to T.

Connection cable: Recommended: – 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
Outside diameter 6.5 to 11 mm
Only connect the screen to ⊥ on the supply side.

Block circuit diagram / connection allocation for the integrated control electronics

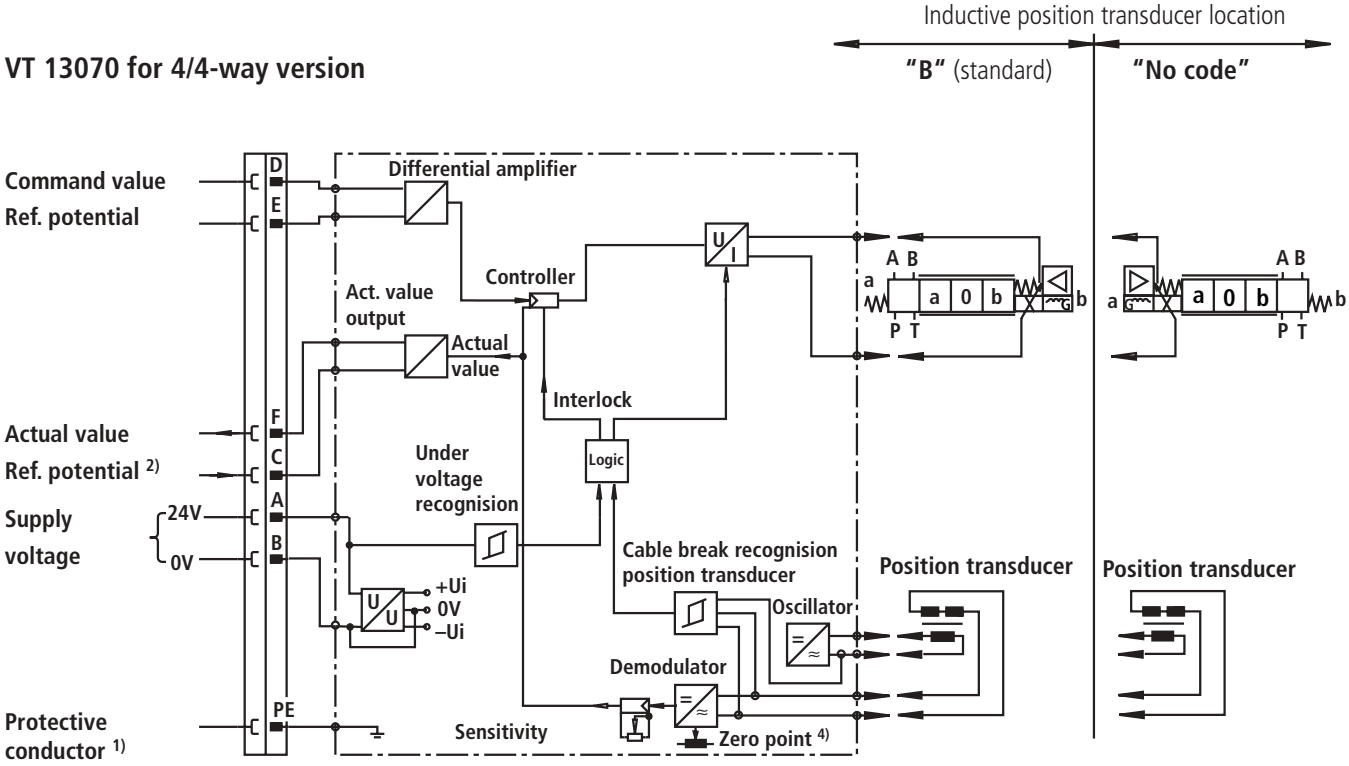
Interface	Integrated control electronics	Valve

VT 13070 for 4/3-way version



Interface	Integrated control electronics	Valve

VT 13070 for 4/4-way version



1) Connection PE is connected with the cooling body and the valve housing

2) **Note for A1:** Connect pin C on the control side to ⊥

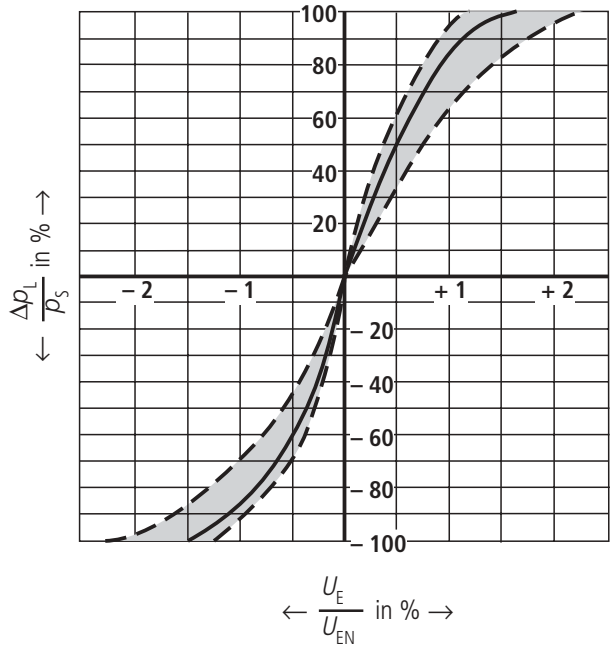
3) Output stage, current controller

4) Zero point externally adjustable

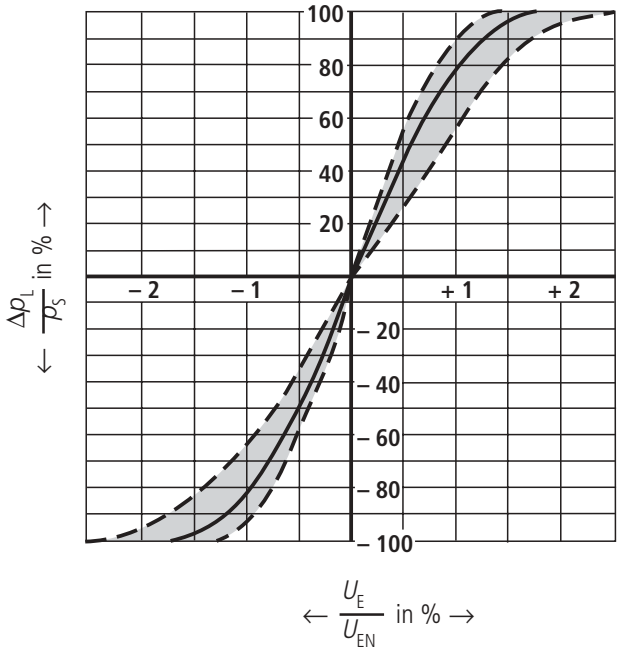
Note: Electrical signal (e.g. actual value) taken via valve electronics must not be used to switch off the machine safety functions!
(This is in accordance with the regulations to the European standard "Safety requirements of fluid technology systems and components – hydraulics", EN 982!)

Pressure-signal-characteristic curve $p_S = 100$ bar

NS 6 Type 4WRSEH 6 … L.-3X/…

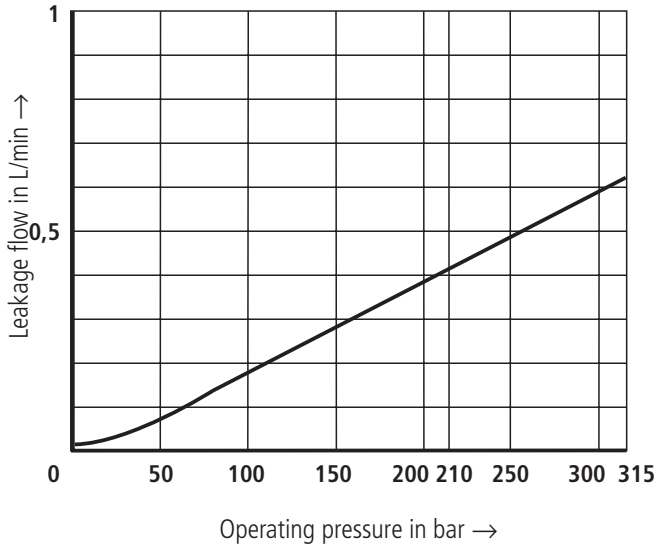


NS 10 Type 4WRSEH 10 … L.-3X/…

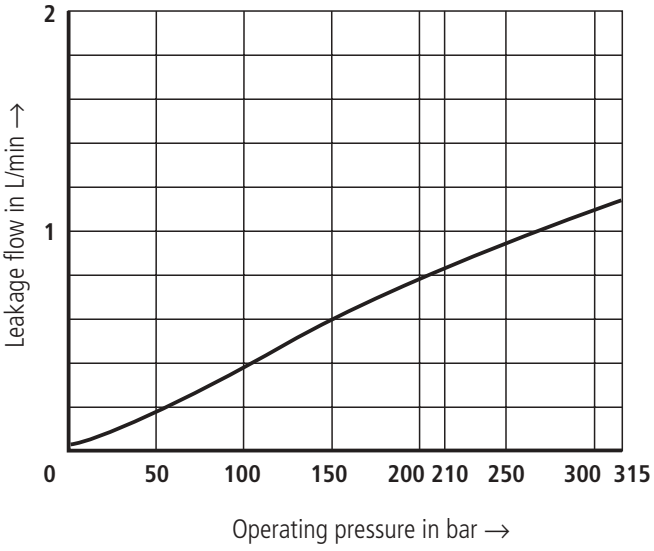


Leakage flow (typical)

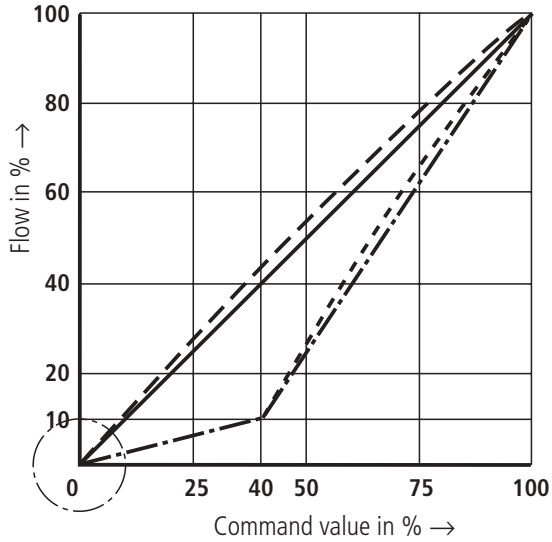
NS 6 Type 4WRSEH 6 V50 L.-3X/…



NS 10 Type 4WRSEH 10 V100 L.-3X/…



NS 6

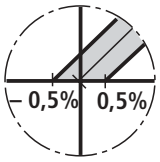


$q_{V\,nom}$ **= 4, 12, 24 L/min** flow characteristic L

$q_{V\,nom}$ **= 40, 50 L/min** flow characteristic L

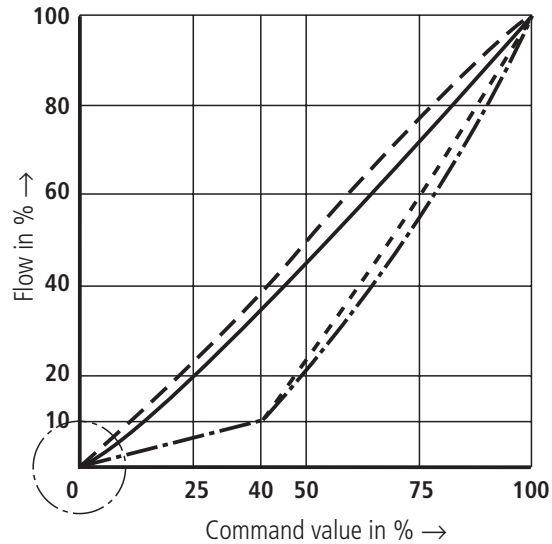
$q_{V\,nom}$ **= 4, 12, 24 L/min** flow characteristic P

$q_{V\,nom}$ **= 40, 50 L/min** flow characteristic P



Zero travel dependent on series spread 0 % … 0.5 % for overlap „D"
Zero travel dependent on series spread – 0.5 % … 0 % for overlap „E"

NS 10

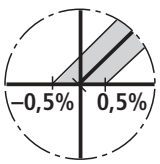


$q_{V\,nom}$ **= 50 L/min** flow characteristic L

$q_{V\,nom}$ **= 100 L/min** flow characteristic L

$q_{V\,nom}$ **= 50 L/min** flow characteristic P

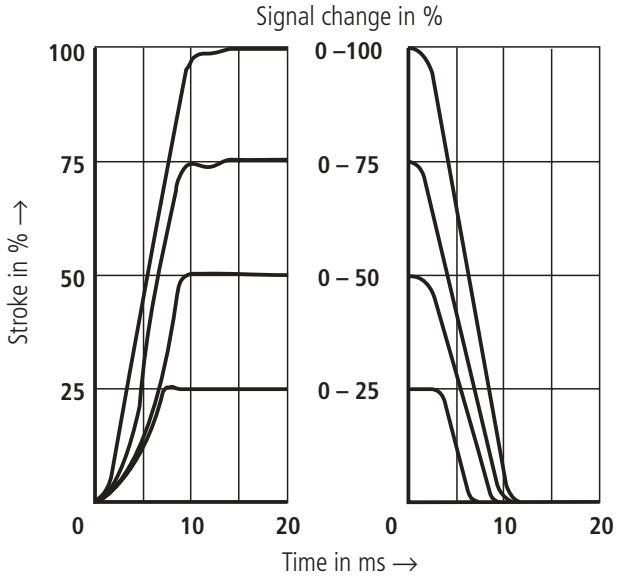
$q_{V\,nom}$ **= 100 L/min** flow characteristic P



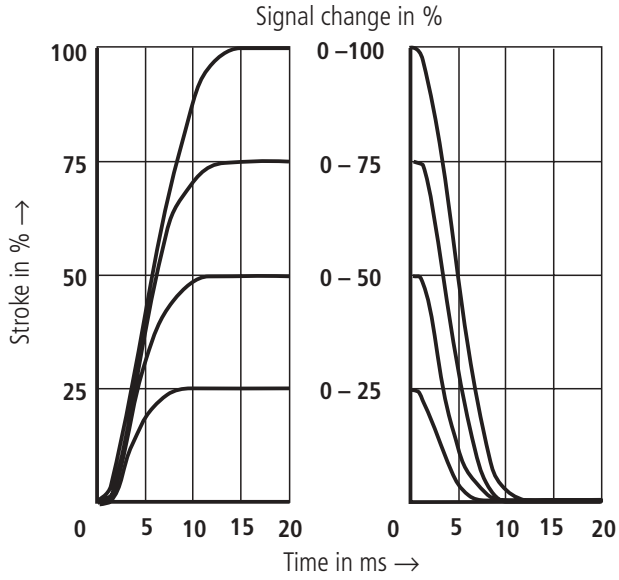
Zero travel dependent on series spread 0 % … 0.5 % for overlap „D"
Zero travel dependent on series spread – 0.5 % … 0 % for overlap „E"

Transient function with a jump form of electrical input signal

4/3-way version

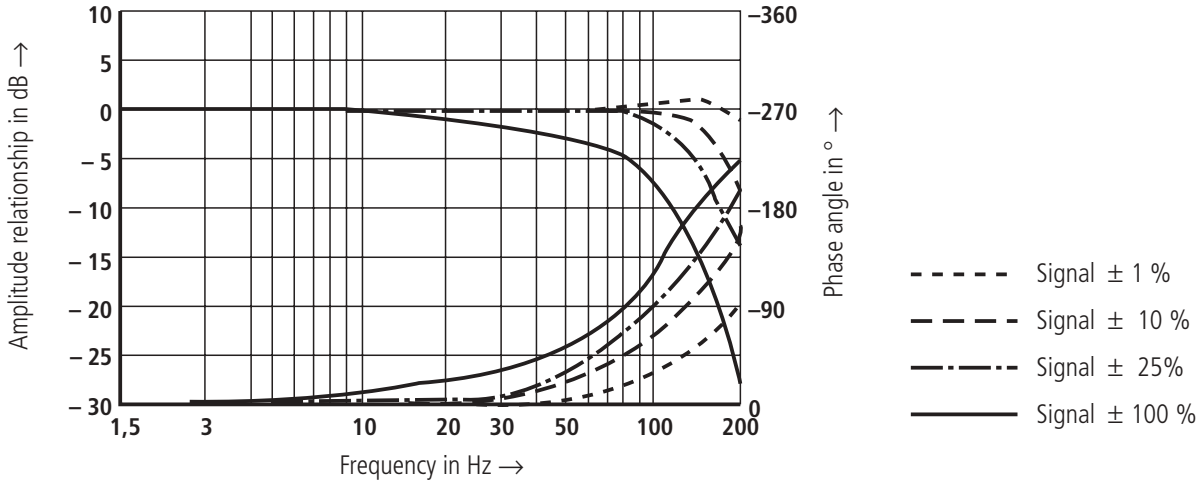


4/4-way version

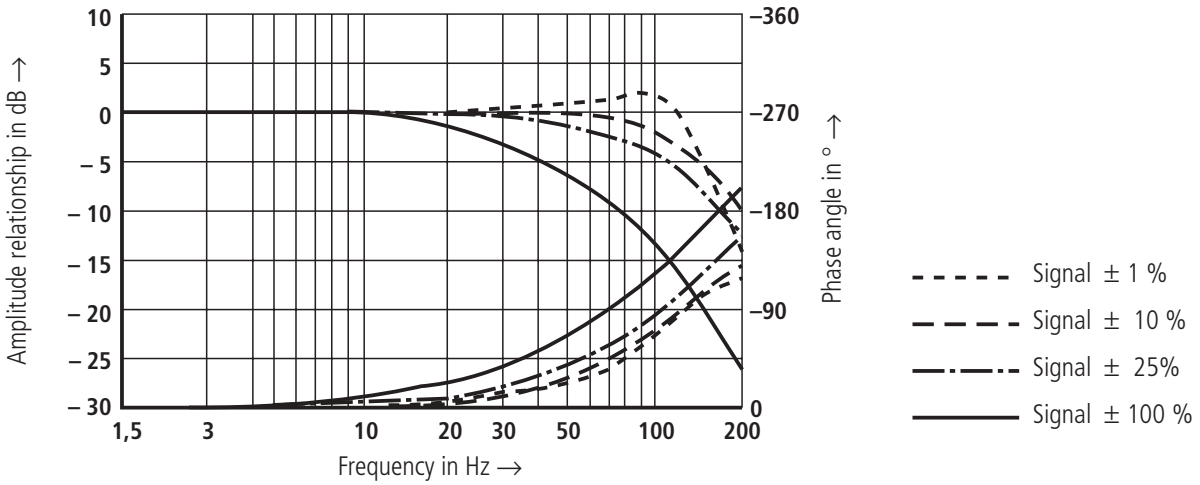


Frequency response characteristic curves

4/3-way version

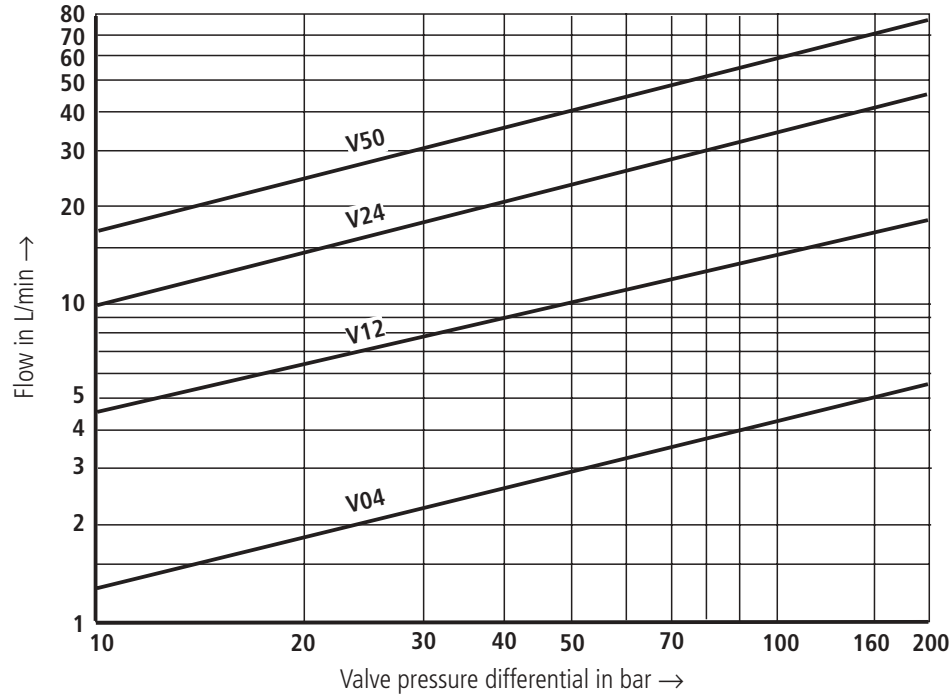


4/4-way version

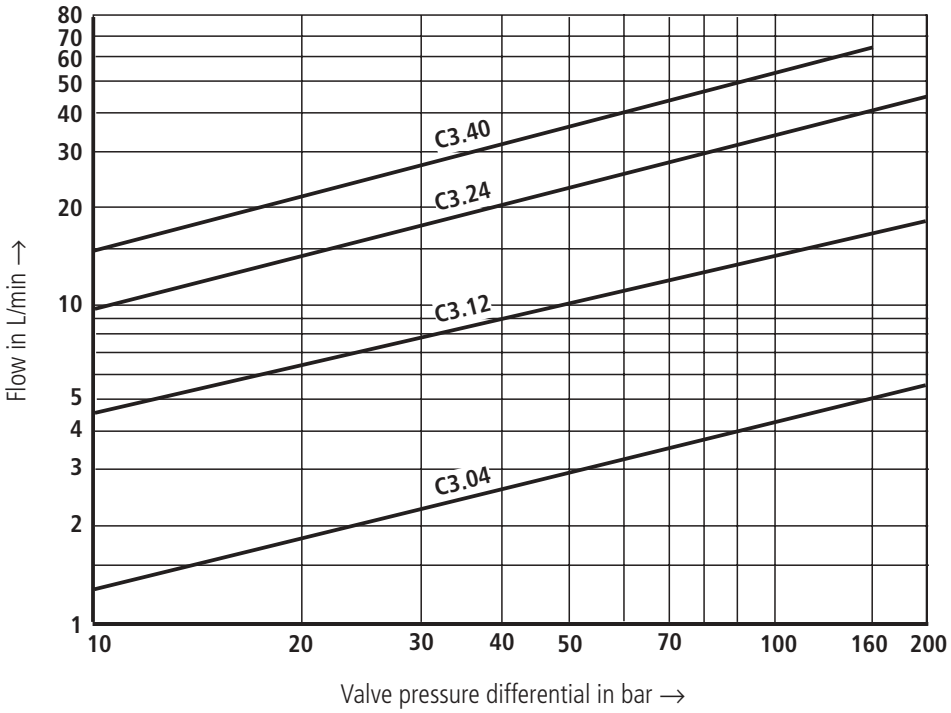


Flow-load function at the max. valve opening (tolerance ± 10%)

4/3-way version

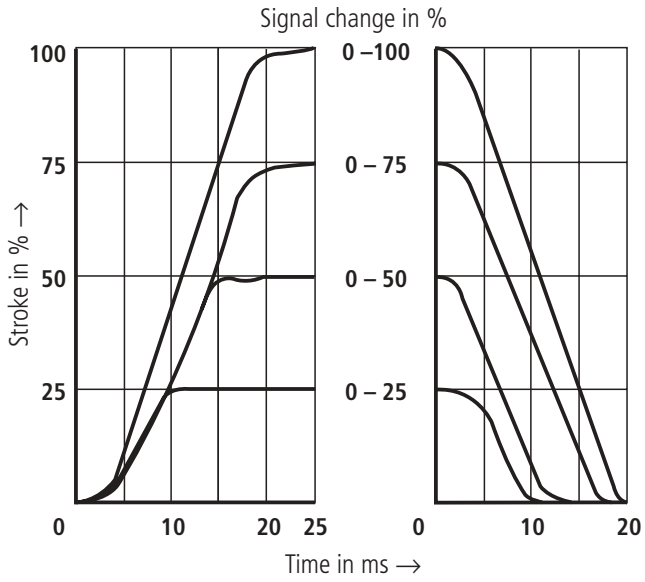


4/4-way version

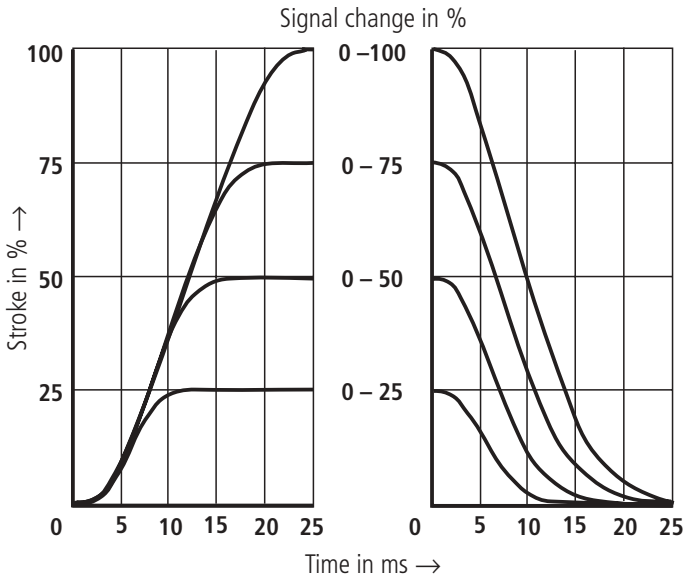


Transient function with a jump form of electrical input signal

4/3-way version

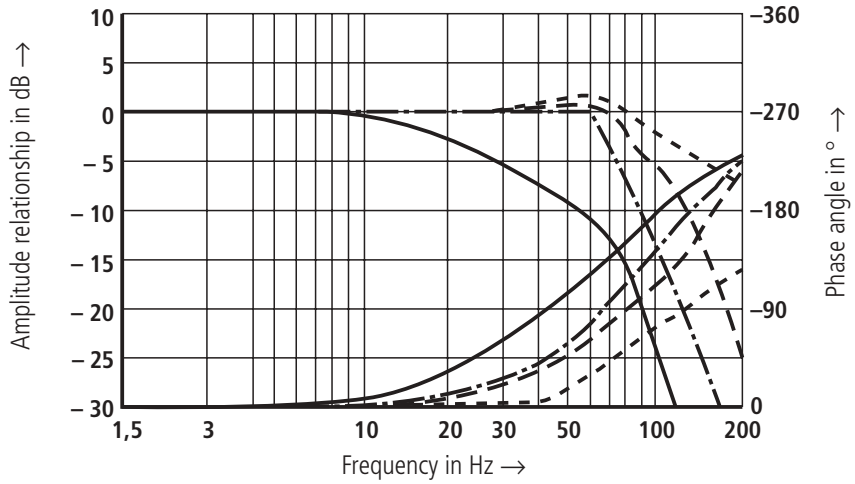


4/4-way version

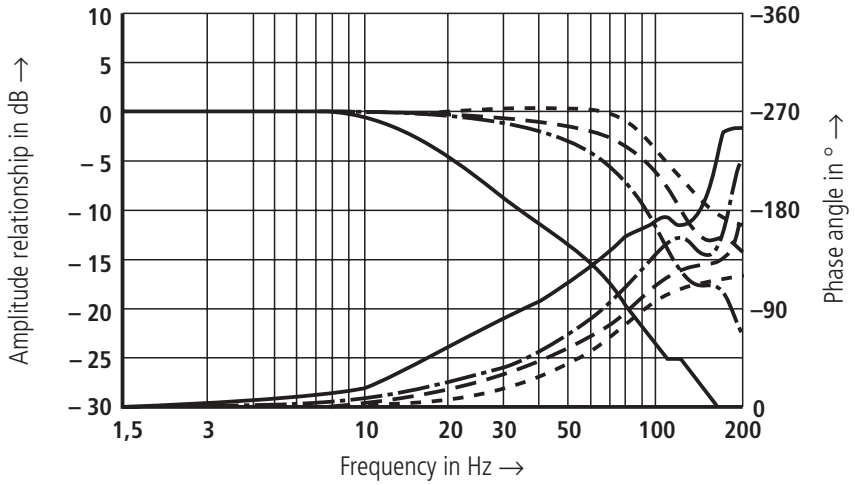


Frequency response characteristic curves

4/3-way version

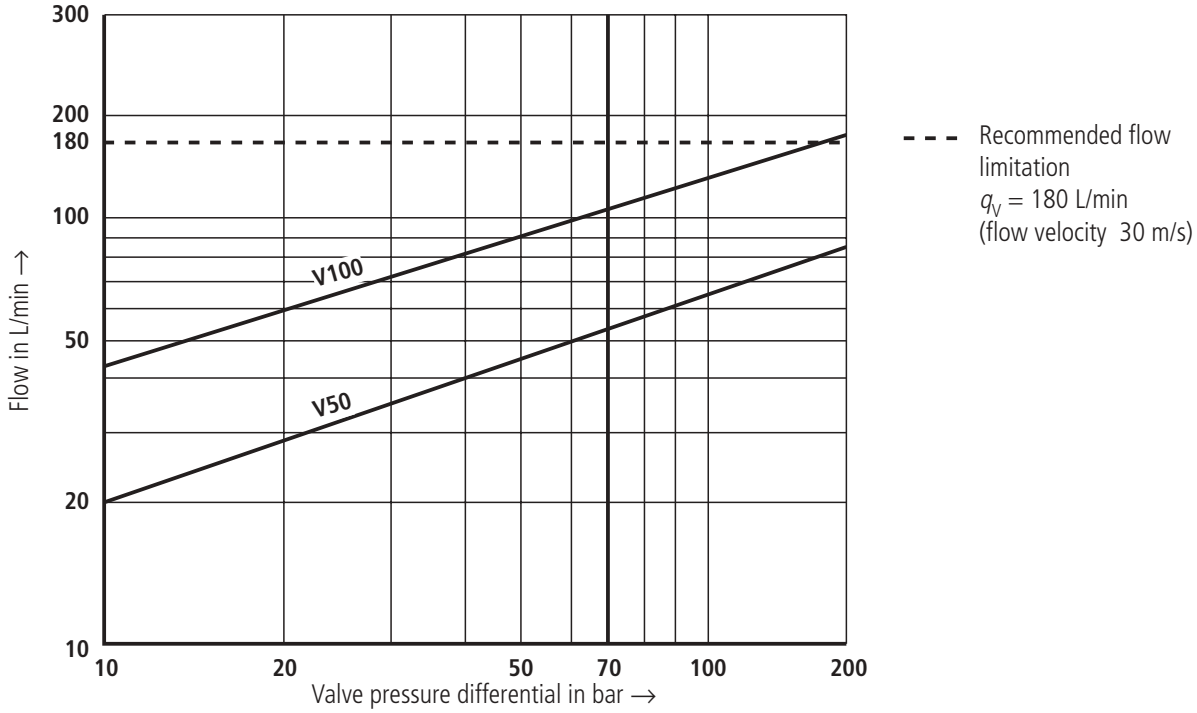


4/4-way version

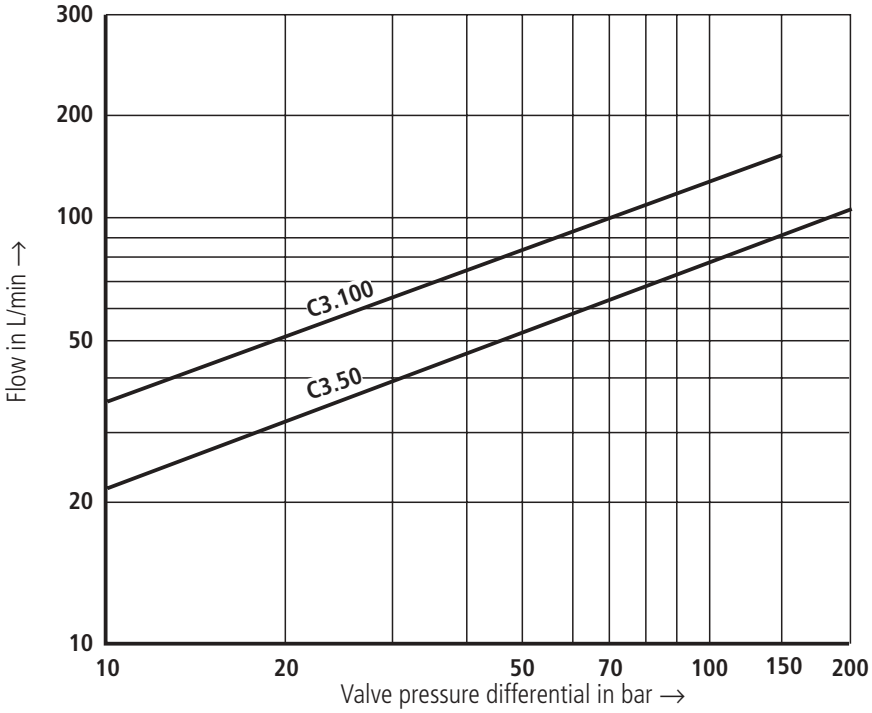


Flow-load function at the max. valve opening (tolerance ± 10%)

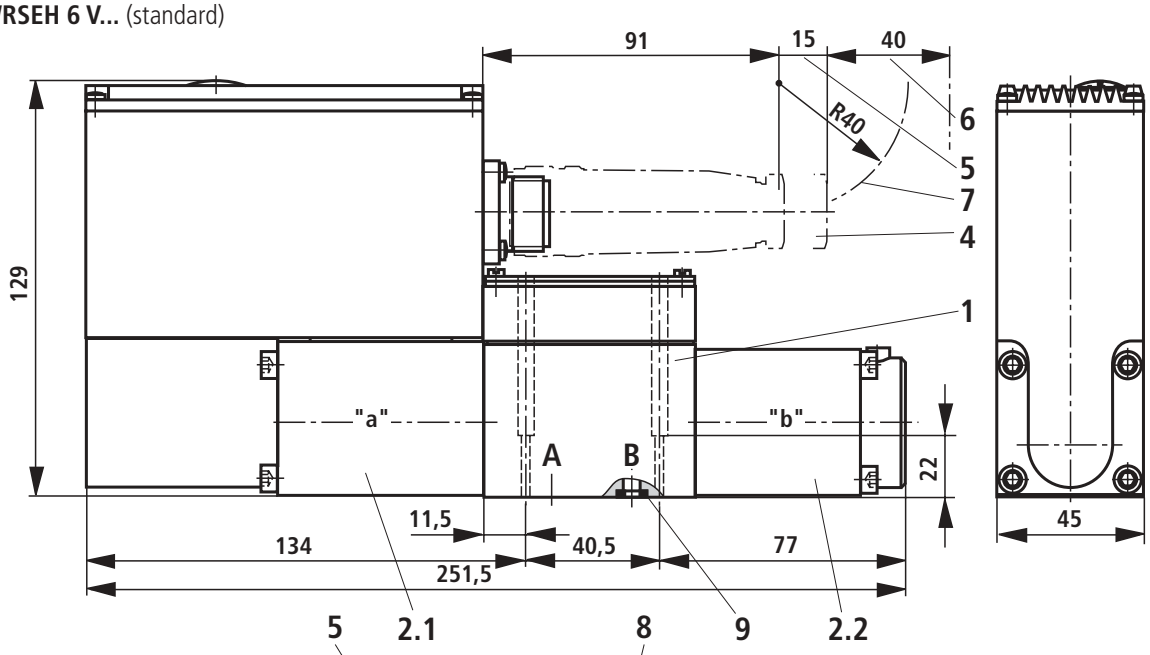
4/3-way version



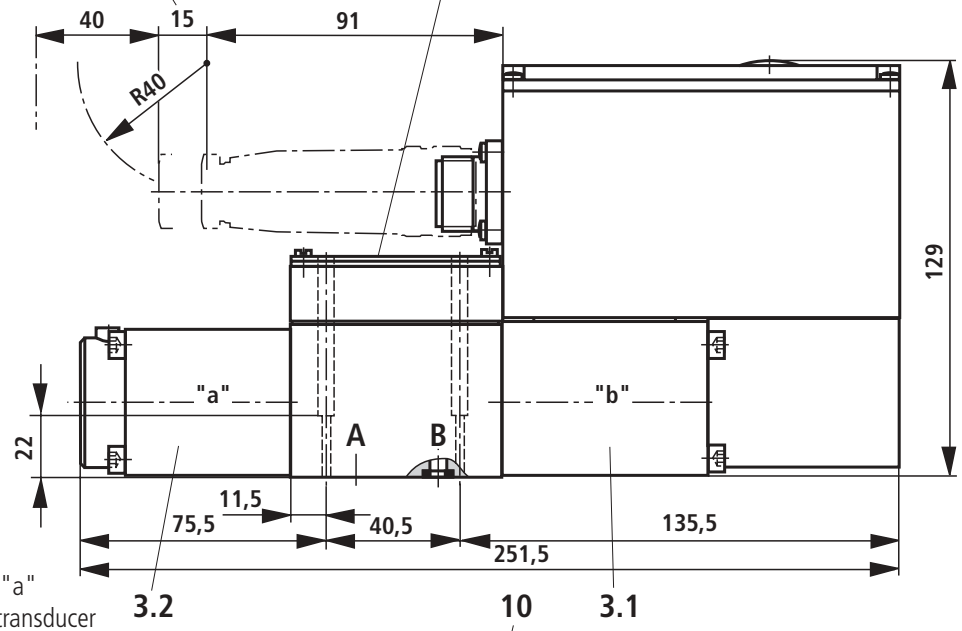
4/4-way version

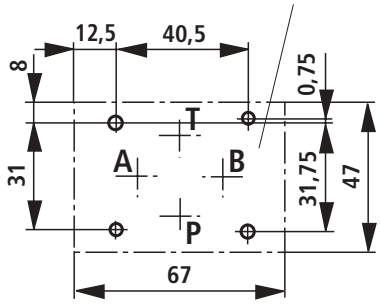


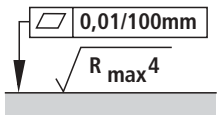
Type 4WRSEH 6 V... (standard)



Type 4WRSEH 6 VC..







Required surface finish of mating piece

1 Valve housing

2.1 High response solenoid "a" with inductive position transducer

2.2 High response solenoid "b"

3.1 High response solenoid "b" with inductive position transducer

3.2 High response solenoid "a"

4 Plug-in connector to E DIN 43 563 BF6-3/Pg11 (separate order, see page 6)

5 Space required to remove the plug-in connector

6 Space requed for the cable bend radius when removing the plug-in connector

7 Cable bend radius

8 Name plate

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

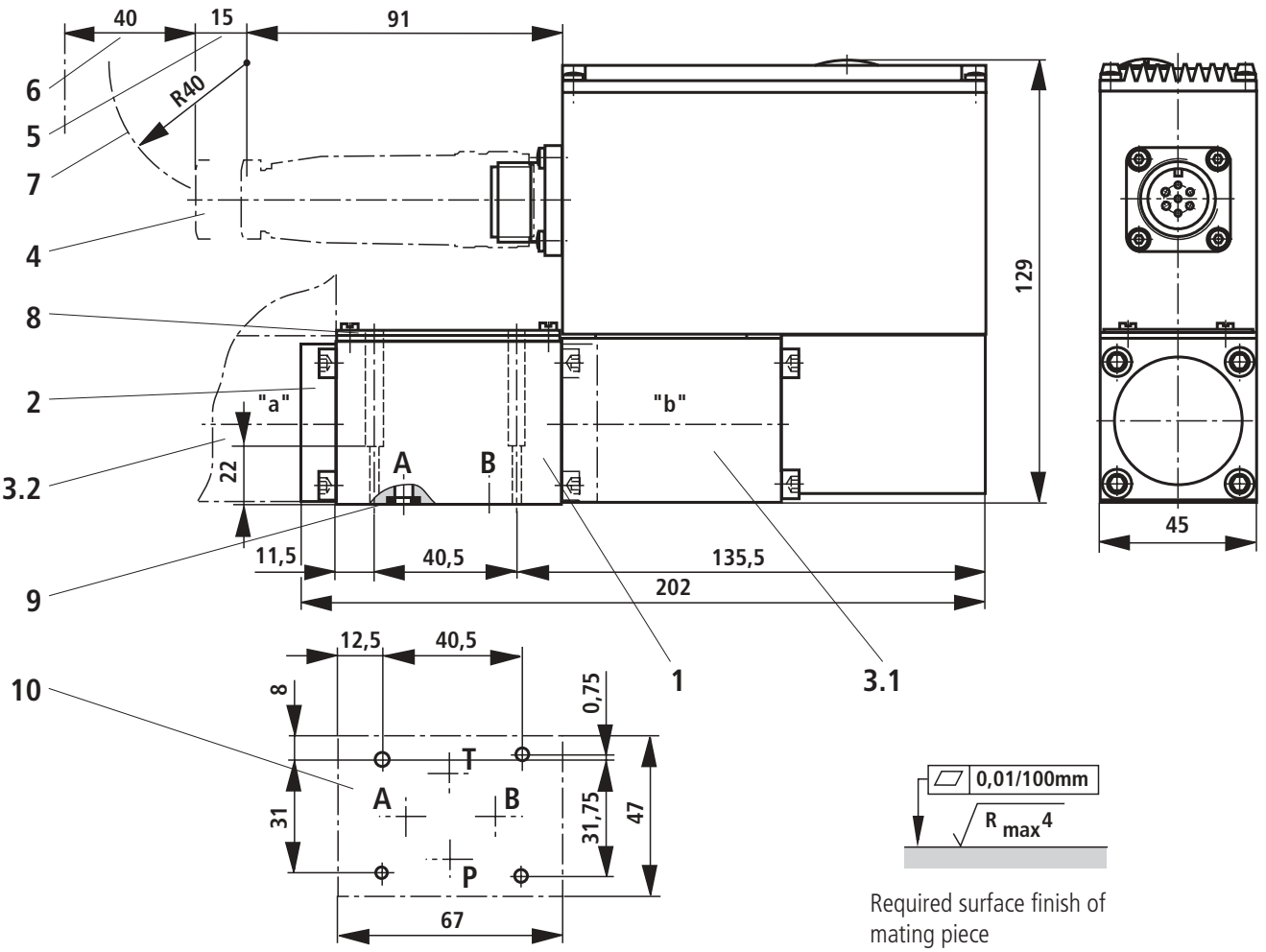
10 Machined valve mounting surface, position of ports to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H

Subplates to catalogue sheet RE 45 052 and valve fixing screws must be ordered separately.

Subplates: G 341/01 (G 1/4)
G 342/01 (G 3/8)
G 502/01 (G 1/2)

Valve fixing screws:
4 off M5 x 30 DIN 912-10.9; M_A = 7.1 Nm

Type 4WRSEH 6 C.B...



Required surface finish of mating piece

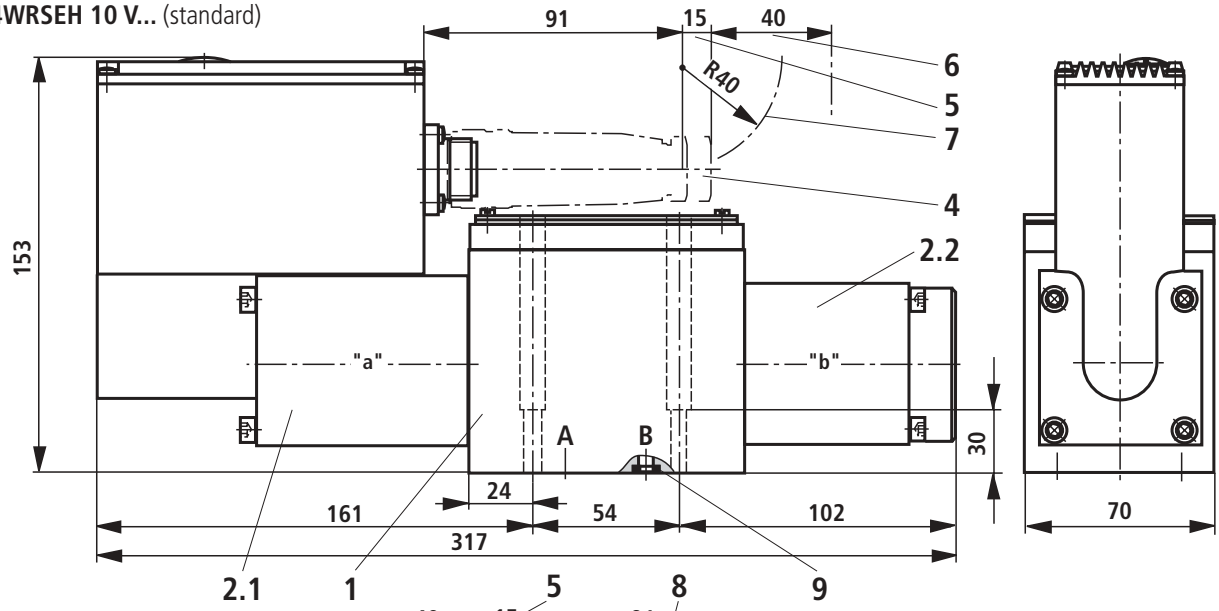
1 Valve housing
2 Cover
3.1 High response solenoid „b“ with inductive position transducer
3.2 High response solenoid „a“ with inductive position transducer
4 Plug-in connector to E DIN 43 563 BF6-3/Pg11 (separate order, see page 6)
5 Space required to remove the plug-in connector
6 Space required for the cable bend radius when removing the plug-in connector
7 Cable bend radius
8 Name plate
9 R-ring 9.81 x 1.5 x 1.78 (ports A, B, P, T)
10 Machined valve mounting surface, position of ports to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H

Subplates to catalogue sheet RE 45 052 and valve fixing screws must be ordered separately.

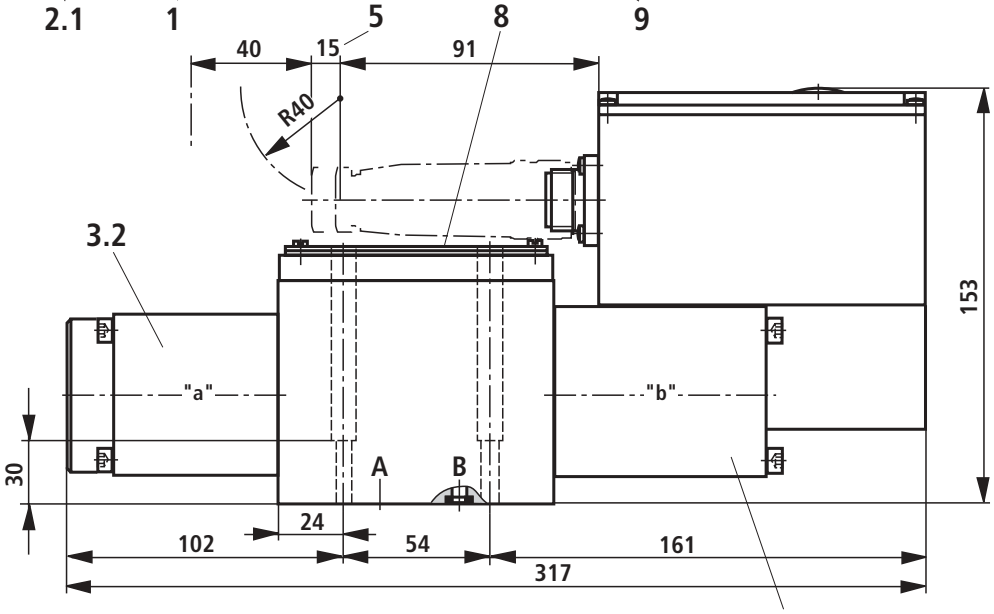
Subplates: G 341/01 (G 1/4)
G 342/01 (G 3/8)
G 502/01 (G 1/2)

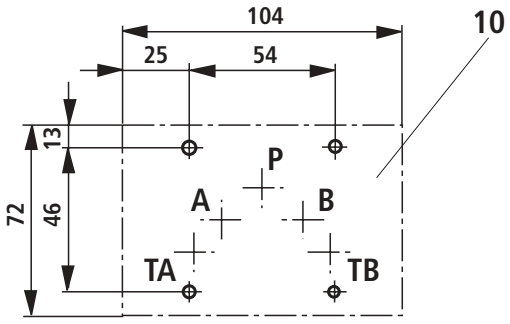
Valve fixing screws:
4 off M5 x 30 DIN 912-10.9; M_A = 7.1 Nm

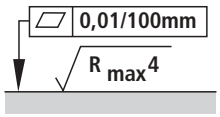
Type 4WRSEH 10 V... (standard)



Type 4WRSEH 10 .VC..







Required surface finish of mating piece

1 Valve housing

2.1 High response solenoid "a" with inductive position transducer

2.2 High response solenoid "b"

3.1 High response solenoid "b" with inductive position transducer

3.2 High response solenoid "a"

4 Plug-in connector to E DIN 43 563-BF6-3/Pg11 (separate order, see page 6)

5 Space required to remove the plug-in connector

6 Space required for the cable bend radius when removing the plug-in connector

7 Cable bend radius

8 Name plate

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

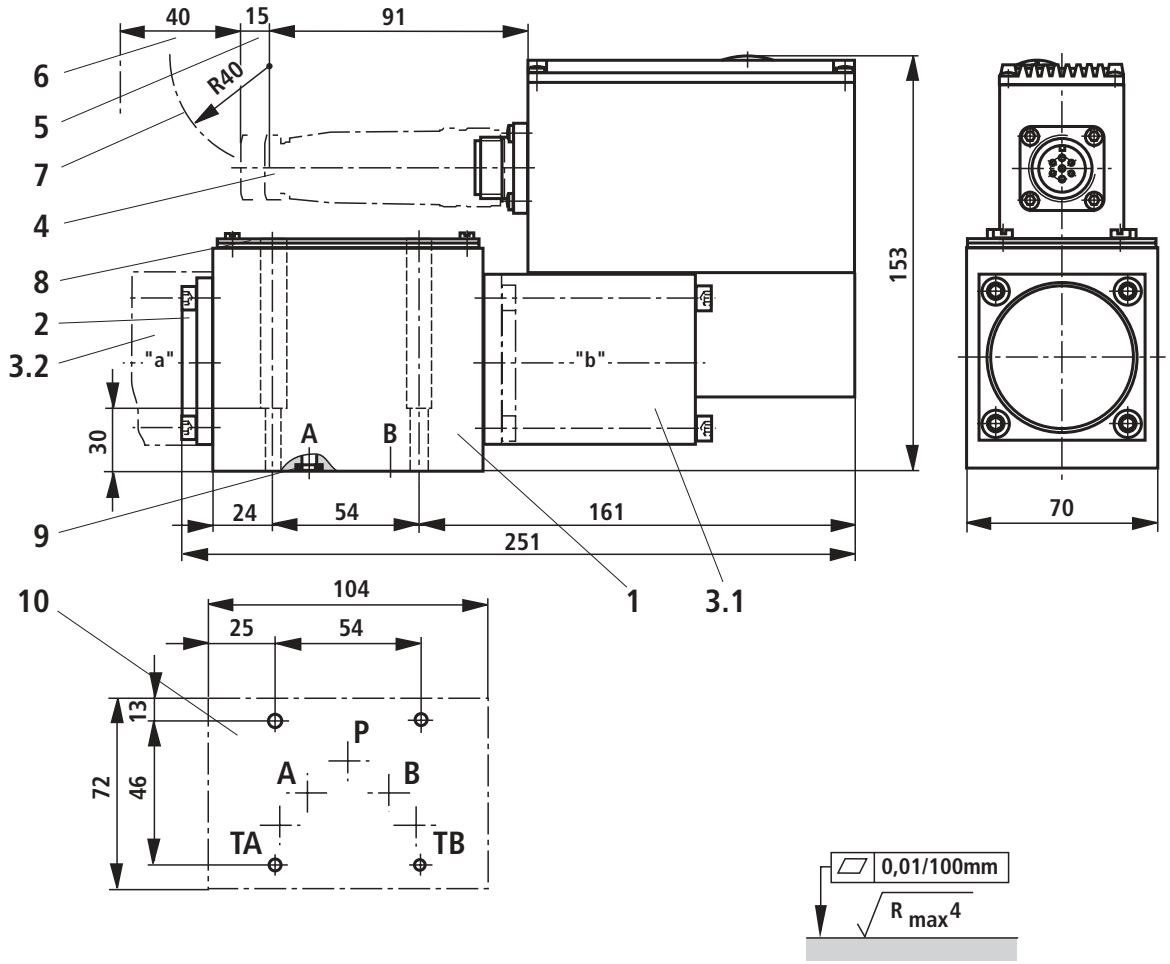
10 Machined valve mounting surface, position of ports to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H

Subplates to catalogue sheet RE 45 054 and valve fixing screws must be ordered separately.

Subplates: G 66/01 (G 3/8); G 67/01 (G 1/2)
G 534/01 (G 3/4)

Valve fixing screws:
4 off M6 x 40 DIN 912-10.9; M_A = 12.2 Nm

Type 4WRSEH 10 C.B...



Required surface finish of mating piece

1 Valve housing
2 Cover
3.1 High response solenoid „b“ with inductive position transducer
3.2 High response solenoid „a“ with inductive position transducer
4 Plug-in connector to E DIN 43 563-BF6-3/Pg11 (separate order, see page 6)
5 Space required to remove the plug-in connector
6 Space required for the cable bend radius when removing the plug-in connector
7 Cable bend radius
8 Name plate
9 R-ring 13.0 x 1.6 x 2.0 (ports A, B, P, T)
10 Machined valve mounting surface, position of ports to DIN 24 340 form A, ISO 4401 and CETOP-RP 121 H

Subplates to catalogue sheet RE 45 054 and valve fixing screws must be ordered separately.

Subplates: G 66/01 (G 3/8); G 67/01 (G 1/2)
G 534/01 (G 3/4)

Valve fixing screws:
4 off M6 x 40 DIN 912-10.9; M_A = 12.2 Nm

Notes

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The details stated do not release you from the responsibility for carrying out your own assessment and verification. It must be remembered that our products are subject to a natural process of wear and ageing.

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