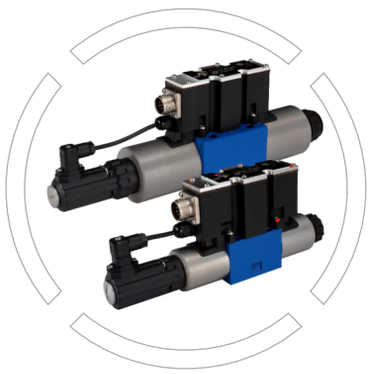
4WREE Type

Direct-acting 4/2 and 4/3 Proportional Directional valves with electrical position feedback with/without integrated amplifier
Size: 6 and 10
Component series: 2X
Maximum operating pressure: 315 bar
Maximum flow: 80 l/min (size NG6),
180 l/min (size NG10)



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Features

- Direct-acting proportional directional valve, used to control the flow rate and direction on switching.
- The solenoid is installed with a central thread, the solenoid coil can be replaced
- Spool spring centered/offset
- Electrical position feedback
- Bottom plate installation confirms to ISO4401
- For 4WRE type: without integrated amplifier, optional amplifier: MTRPD2-6-30 for size NG6 / MTRPD2-10-30 for size NG10 (Sold separately)
- For 4WREE type: with integrated amplifier/electronics

Ordering code

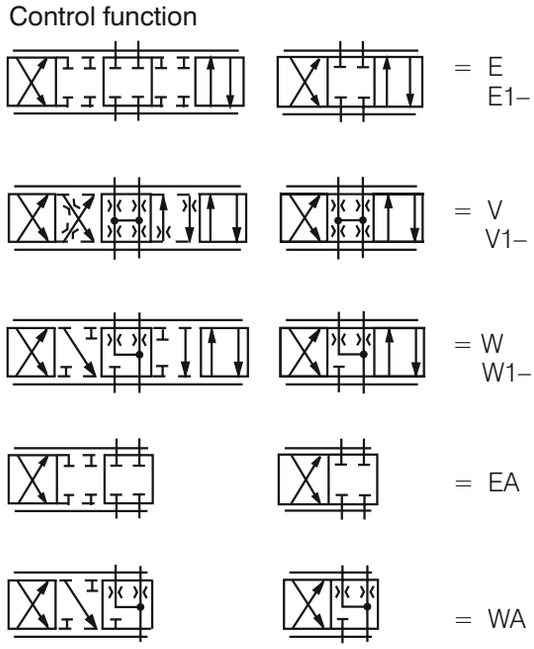
4WRE	E	6	E	08	-	2X	/	G24	K31	/	F1	V	*

4WRE: 4 way direct acting proportional directional control valve with position feedback

E: Without integrated amplifier = No code; With integrated amplifier = E

6: Size NG6 = 6; Size NG10 = 10

Control function



= E, E1–

= V, V1–

= W, W1–

= EA

= WA

With symbol E1-, V1- and W1-:
P→A: q_{vmax} B→T: qv/2
P→B: qv/2 A→T: q_{vmax}
Notice:
In the zero position, spools W and WA have a connection from A to T and B to T with approx. 3 % of the relevant nominal cross-section.

08: Flow rate(when valve pressure difference Δp=10bar)

For Size 6
4 = 4 l/min
8 = 8 l/min
16 = 16 l/min
32 = 32 l/min

For Size 10
25 = 25 l/min
50 = 50 l/min
75 = 75 l/min

2X = Product Series (20 to 29 installation size is same)

G24 = Supply voltage 24V DC power supply

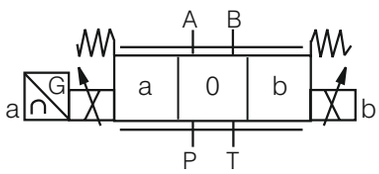
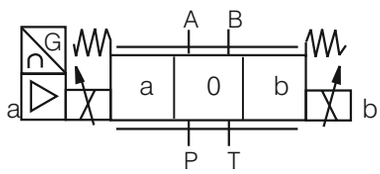
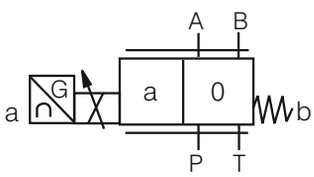
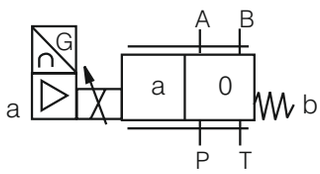
K31 = Electrical connection
Type 4WRE:
Without mating connector with connector according to DIN EN 175301-803
Mating connector separate order
Type 4WREE:
Without mating connector, with connector according to DIN EN 175201-804
Mating connector – separate order

F1: A1 = Command value ±10 V; F1 = Command value 4 to 20 mA; no code = Type 4WRE

V: Seal Material
M = NBR
V = FKM

*: Further information in plain text

Symbols

Without Integrated Control Electronics	With Integrated Control Electronics
Type 4WRE..2X/.. 4/3 Proportional directional valve 	Type 4WREE..2X/.. 4/3 Proportional directional valve 
Type 4WRE..A-2X/.. 4/2 Proportional directional valve 	Type 4WREE..A-2X/.. 4/2 Proportional directional valve 

Structure Principle

- The valve is a direct acting proportional directional valve with a plate connection. The proportional solenoid with a detachable coil is installed on the valve through the centering screw adjustment. Integrated amplifier or external amplifier is used to drive the electric magnet.

Composition of the valve:

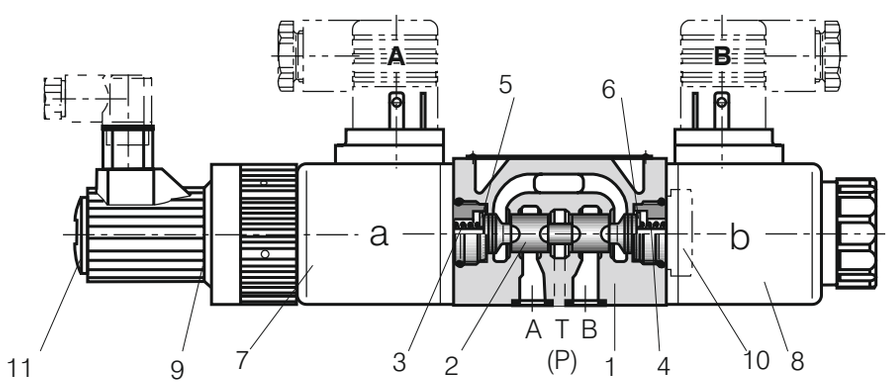
- Valve with mounting surface (1)
- Control spool (2),
- Compression spring (3, 4)
- Spring terminal (5, 6)
- Electromagnetic coil (7, 8)
- Position sensor (9)
- Optional integrated amplifier (13)
- Zero adjustment protective cap (12)

Working principle:

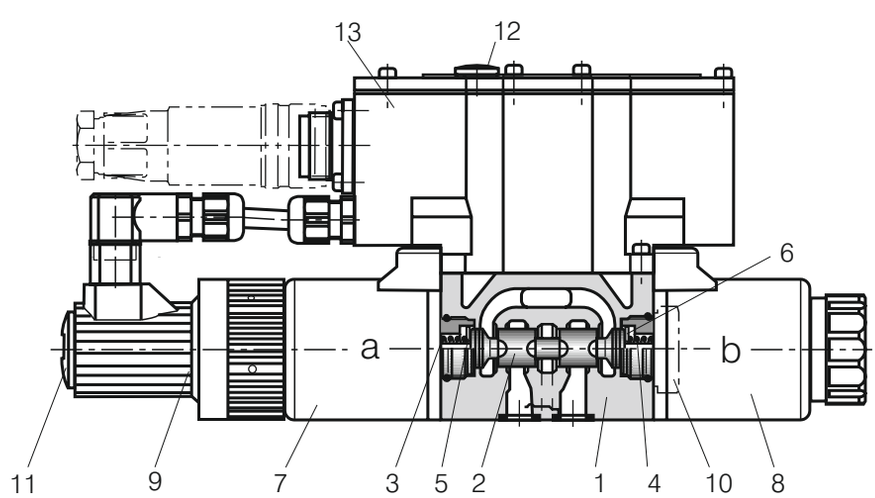
When the coils (7, 8) are de-energized, the control spool (2) is held in the center by the compression springs (3, 4) position, the spool starts to move when the solenoid is energized. For example: the solenoid “b” (8) is energized, and the control spool moves to the left in proportion to the input electrical signal. At this time P is connected to A and B is connected to T.

When the solenoid “b” (8) is de-energized, the control spool (2) returns to the center position through the compression spring (3): in the case of power failure, the valve core (2) is maintained in the mechanical center position by the coil reset spring. Pay attention to “V” type valve, The center position of the core is not the hydraulic center position, the spool will be in the center position only when the power is off.

4WRE6…-2X/…



4WRE10…-2X/…



Two-position four-way valve:

The function of this type of valve is similar as that of a three-position valve, but the two-position four way valve has coil on one side, and the other end user an end cap to replace the b side coil.

The return line of the proportional valve cannot be emptied. In order to ensure working conditions, a check valve with an opening pressure of about 2 bar can be installed on the return line of the valve if necessary.

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

General

Sizes			6	10
Weight	Type 4WRE	kg	2.2	6.3
	Type 4WREE	kg	2.4	6.5
Installation position			Any, preferably horizontal	
Ambient Temperature range	Type 4WRE	°C	–20 to +70	
	Type 4WREE	°C	–20 to +50	
Storage Temperature range		°C	–20 to +80	

Hydraulic parameters (46# hydraulic oil, oil temperature=40°C+5°C, Ps=100bar)

Max Operating pressure	Port A, B, P	bar	315	
	Port T	bar	210	
Rated flow $q_{V\,rated}$ with Δp = 10 bar		l/min	4, 8, 16, 32	25, 50, 75
Recommended maximum flow		l/min	80	180
Hydraulic fluid temperature range		°C	–20 to +80 (preferably +40 to +50)	
Viscosity range		mm²/s	20 to 380 (preferably 30 to 46)	
Range of Oil cleanliness			ISO4406:1999 20/18/15	
Hysteresis		%	≤0.1	
Return difference		%	≤0.05	
Response sensitivity		%	≤0.05	
Zero shift upon change of hydraulic fluid temperature and operating pressure		%/10K	≤0.15	
		%/100bar	≤0.1	

Electrical parameters

Nominal Voltage		(V)	Direct Current 24V	
Control signal for 4WREE	Voltage signal input A1	(V)	±10	
	Current signal input F1	(mA)	4~20	
Maximum current of a single electromagnet		(A)	2.5	
Coil Resistance	Measured value at 20°C	Ω	2.7	3.7
	Maximum operating temperature measurement	Ω	4.05	5.5
Electrical connections	4WRE		Sockets conforming to DIN EN 175301-803	
	4WREE		Seven-pin sockets in accordance with DIN EN 175201-804	
Duty cycle		%	100	
Max. coil temperature		°C	150	
Protection level			IP65	

Integrated Amplifier

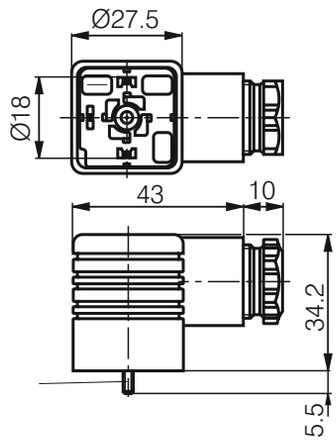
4WRE6			MTRPD2-6-30 (Need to order separately)
4WRE10			MTRPD2-10-30(Need to order separately)
4WREE6			4WREE6-2X/A1(F1)-30
4WREE10			4WREE10-2X/A1(F1)-30
Supply Voltage	Nominal voltage	(VDC)	24
	lower limit value	(V)	19.4
	upper limit value	(V)	35
Amplifier power consumption	Maximum current	(A)	<2
	Impulse current	(A)	3

Flow rate under other pressure differentials $q_x = q_{V\,nom} \cdot \sqrt{\frac{\Delta Px}{35}}$

Electrical Connection

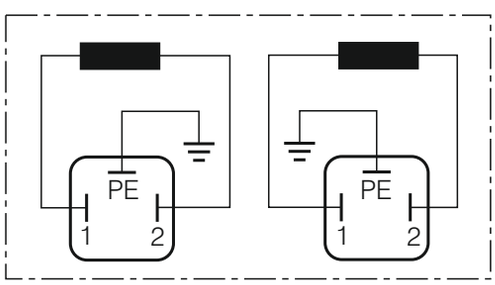
Used for type 4WRE (without collector-type ethernet): plug conforming to DIN EN 175301-803 (order separtely)

Solenoid “A”, Grey
Order separately L order number T018110742
Electromagnetic iron “B”, Black
Order separately, order number: T018110741

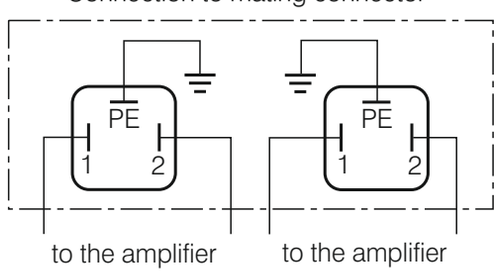


M3 screw, torque 0.5Nm

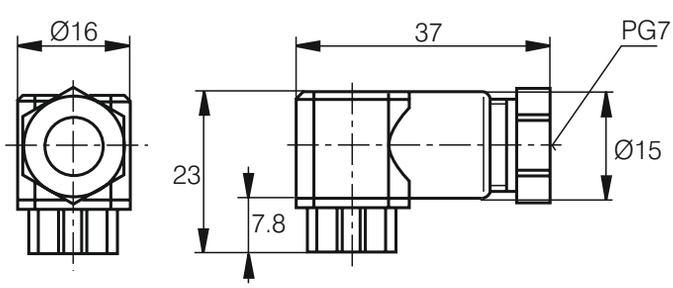
Connection to connector



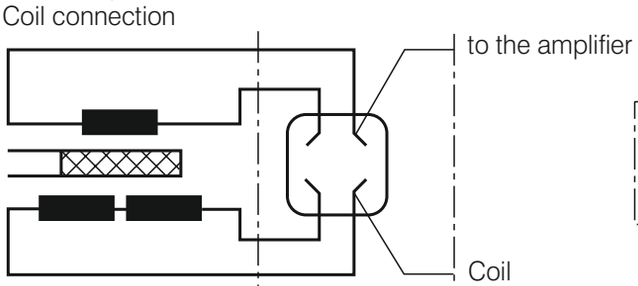
Connection to mating connector



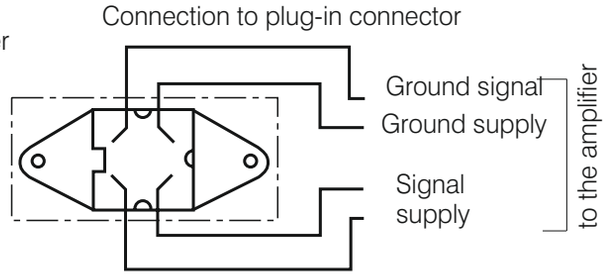
Connector of LVDT Position sensor



Inductive position transducer
Coil connection



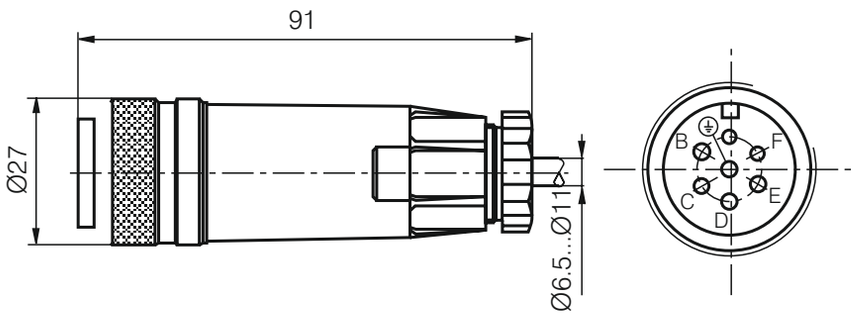
Connection to plug-in connector



- LVDT sensor interface: 4-pin Pe7-G4W1F (delivered with the valve)
- Connection cable: LiYCY 4x0.25mm is recommended less than 50 meters

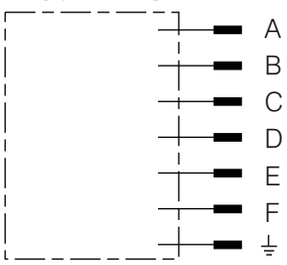
Electrical connection, mating connectors

- For type 4WREE (with integrated amplifier): seven-pin plug in accordance with DIN EN 175201-804 (order separately)



Plastic nut structure
Order separately, order number : T019050092
Metal nut structure
Order separately, order number: T019050091

Plug pin assignment



Device connector allocation	Contacts	Signal with A1 interface	Signal with F1 interface
Supply voltage	A	24 VDC (u(t) = 19.4 to 35 V); I_{max} = 2 A	
	B	0V	
Reference potential actual value	C	Reference contact F; R_e > 50 kΩ	Reference contact F; R_e > 10 kΩ
Differential amplifier input	D	±10 V command value; R_e > 50 kΩ	4 to 20 mA command value; R_e > 100 kΩ
	E	Reference potential command value	
Measuring output (actual value)	F	±10 V actual value (limit load 5 mA)	4 to 20 mA actual value, load resistance max. 300 Ω
	PE	Connected to cooling element and valve housing	

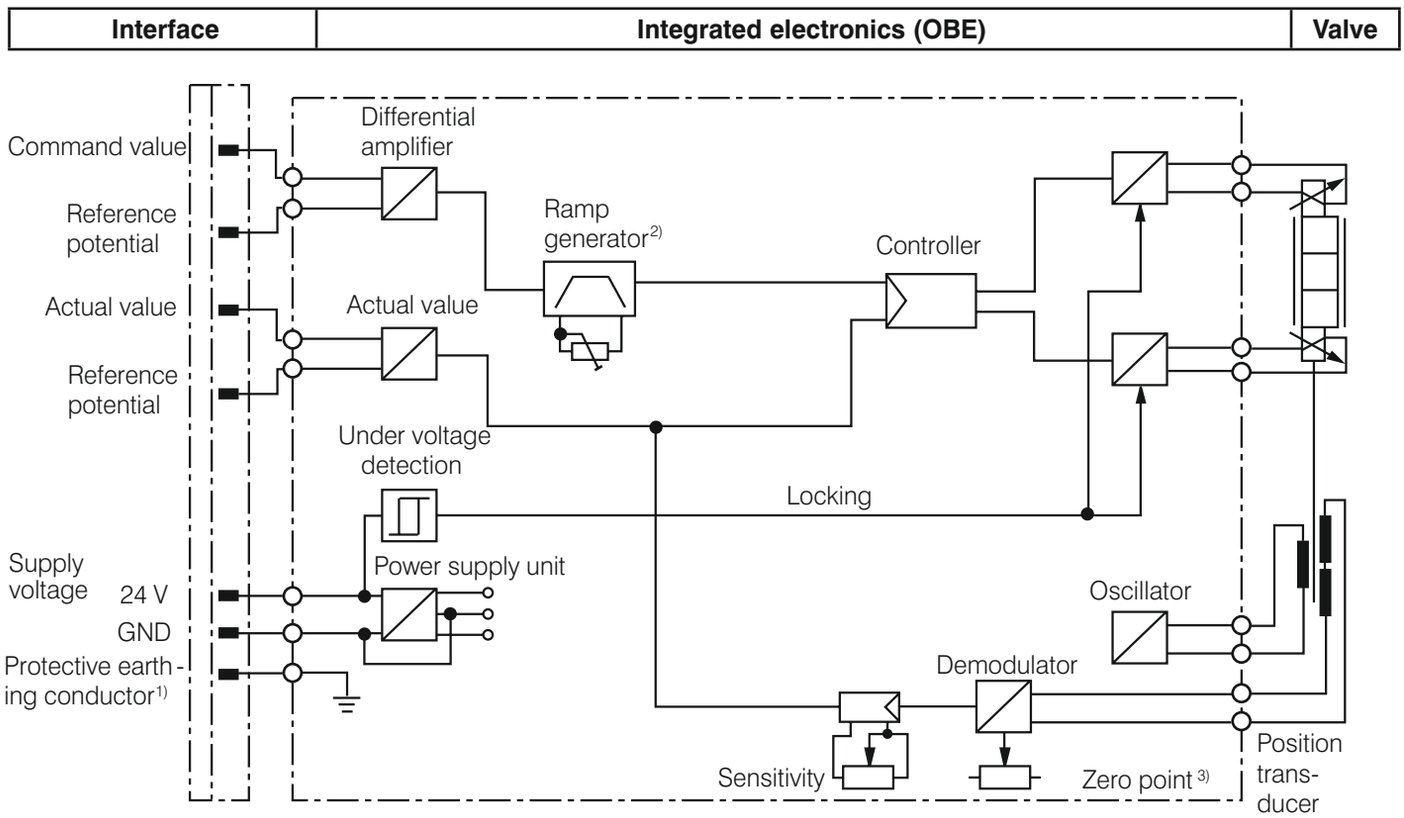
Command value:
A positive command value (or 12 to 20 mA) at D and the reference potential at E results in a flow from P to A and B to T. A negative command value (or 4 to 12 mA) at D and the reference potential at E results in a flow from P to B and A to T. For a valve with one solenoid on side a (e.g spool variants EA and WA) a positive command value (or 4...20mA) at D and the reference potential at E results in a flow from P to B and A to T.

Actual value:
A positive actual value (or 12 to 20mA) at F and the reference potential at C results in a flow from P to A.

Connection Cable:
Recommended up to 25m cable length type LiYCY 7x0.75mm²
Recommended up to 50m cable length type LiYCY 7x1.0mm²

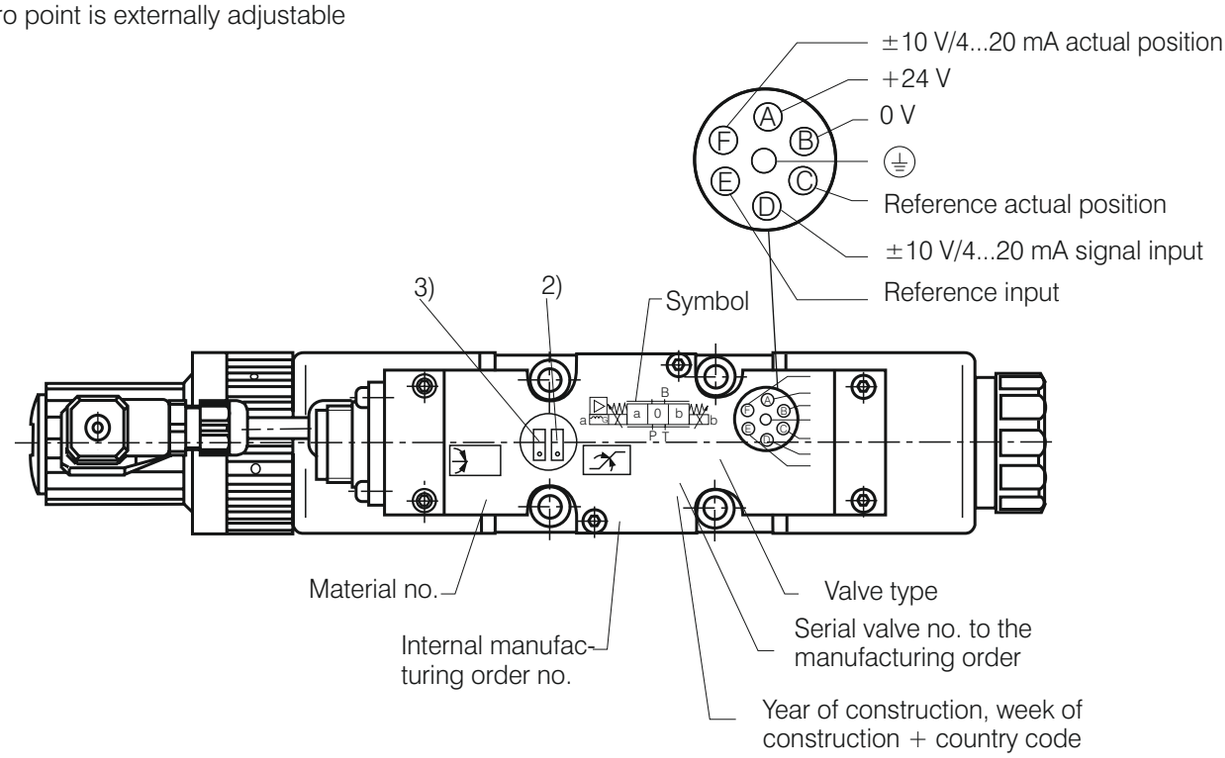
Outside diameter 6.5mm to 11mm
Only connect screen to PE on the supply side.

Block Diagram/ Pin Assignment for OBE Valve



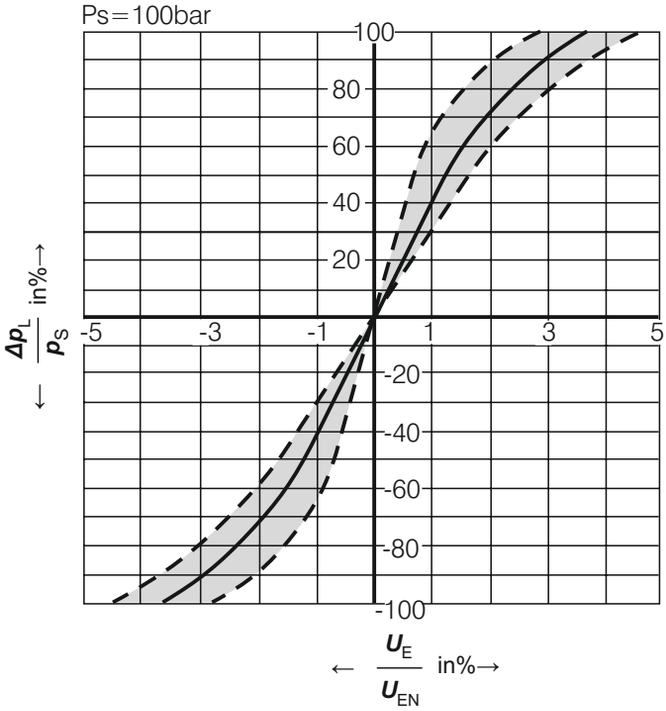
Note: Electrical signals processed by control electronics (e.g. actual value) must not be use for switching off safety relevant machine functions!

1) Connection PE is connected to the cooling body and the valve housing;
2) Ramp is externally adjustable from 0 to 2.5s; for T_{up} and T_{down}
3) Zero point is externally adjustable

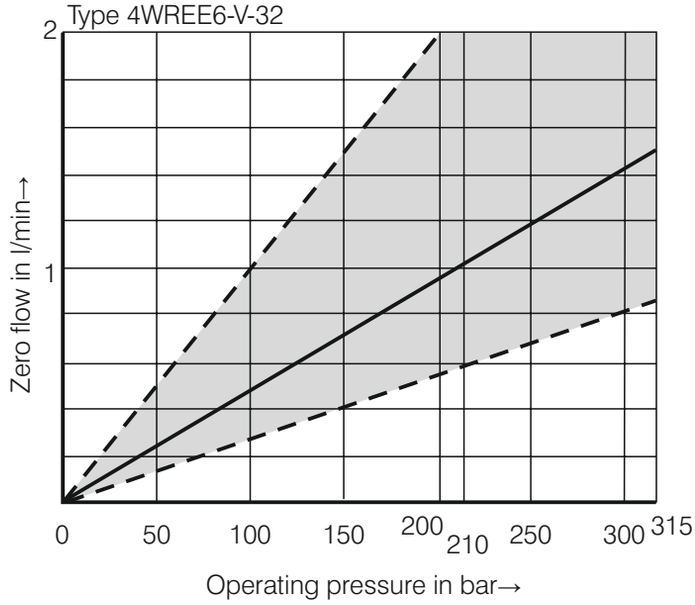


Characteristic curves: Type 4WREE (P=100bar, v=36x10^{-6} m²/s, t=50°C) Size NG6

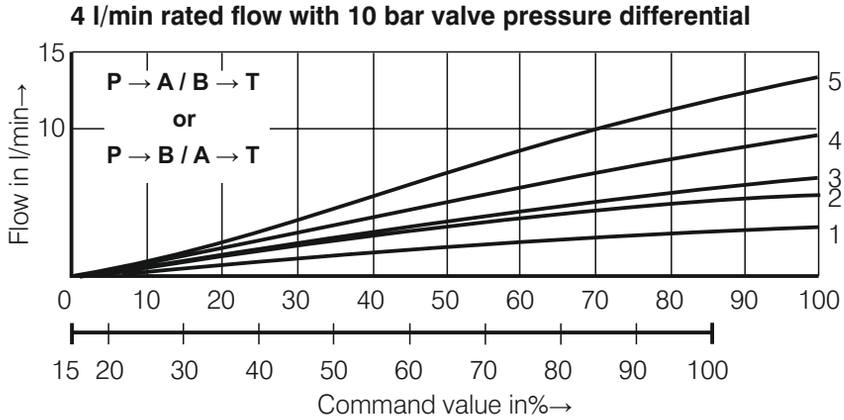
Pressure signal characteristic curve (V spool), Ps=100bar



Leakage flow (with the spool in the central position) Type 4WREE6-V-32



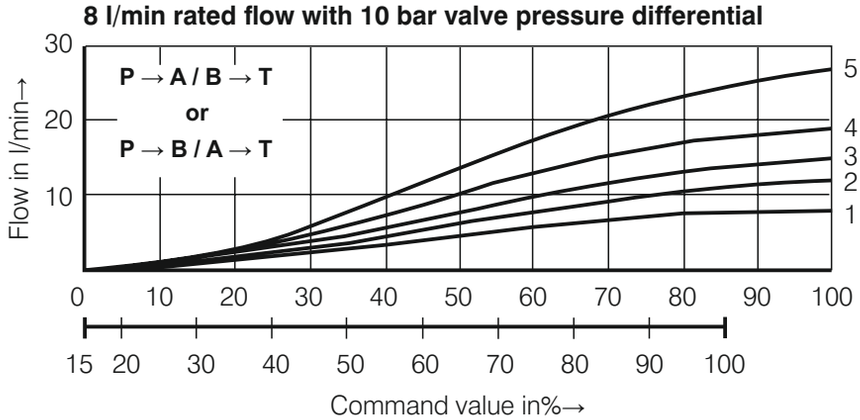
4 l/min rated flow with 10 bar valve pressure differential



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

Control spool V
Control spool E- and W

8 l/min rated flow with 10 bar valve pressure differential

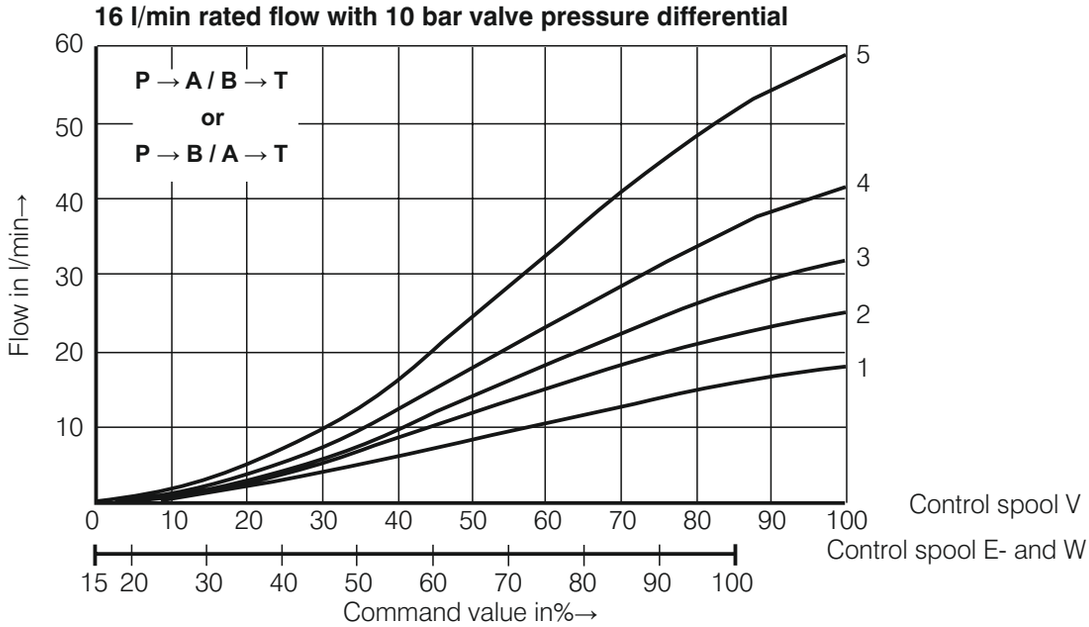


1 Δp = 10 bar constant
2 Δp = 20 bar constant
3 Δp = 30 bar constant
4 Δp = 50 bar constant
5 Δp = 100 bar constant

Control spool V
Control spool E- and W

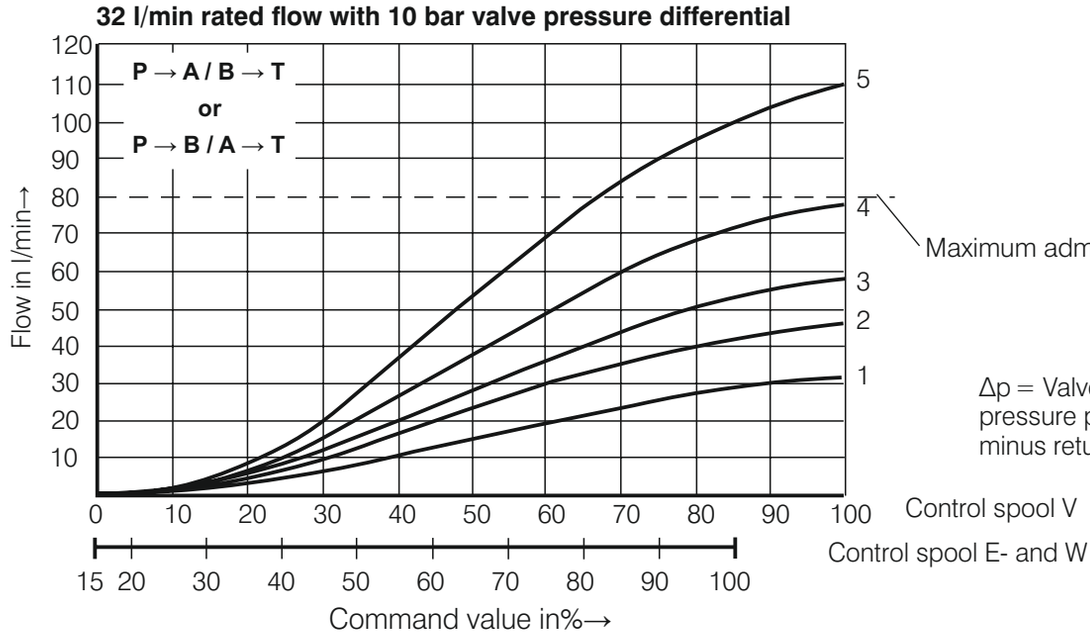
Characteristic curves: Type 4WREE (P=100bar, v=36x10^{-6} m^2/s, t=50°C) Size NG6

16 l/min rated flow with 10 bar valve pressure differential



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

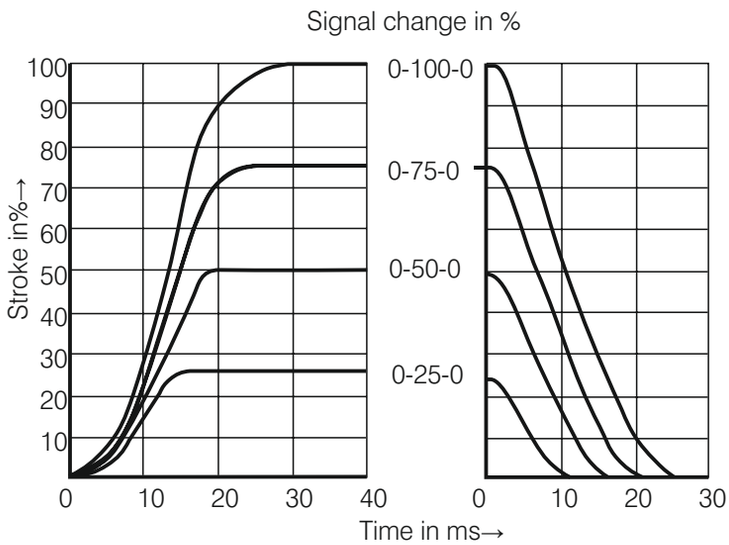
32 l/min rated flow with 10 bar valve pressure differential



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

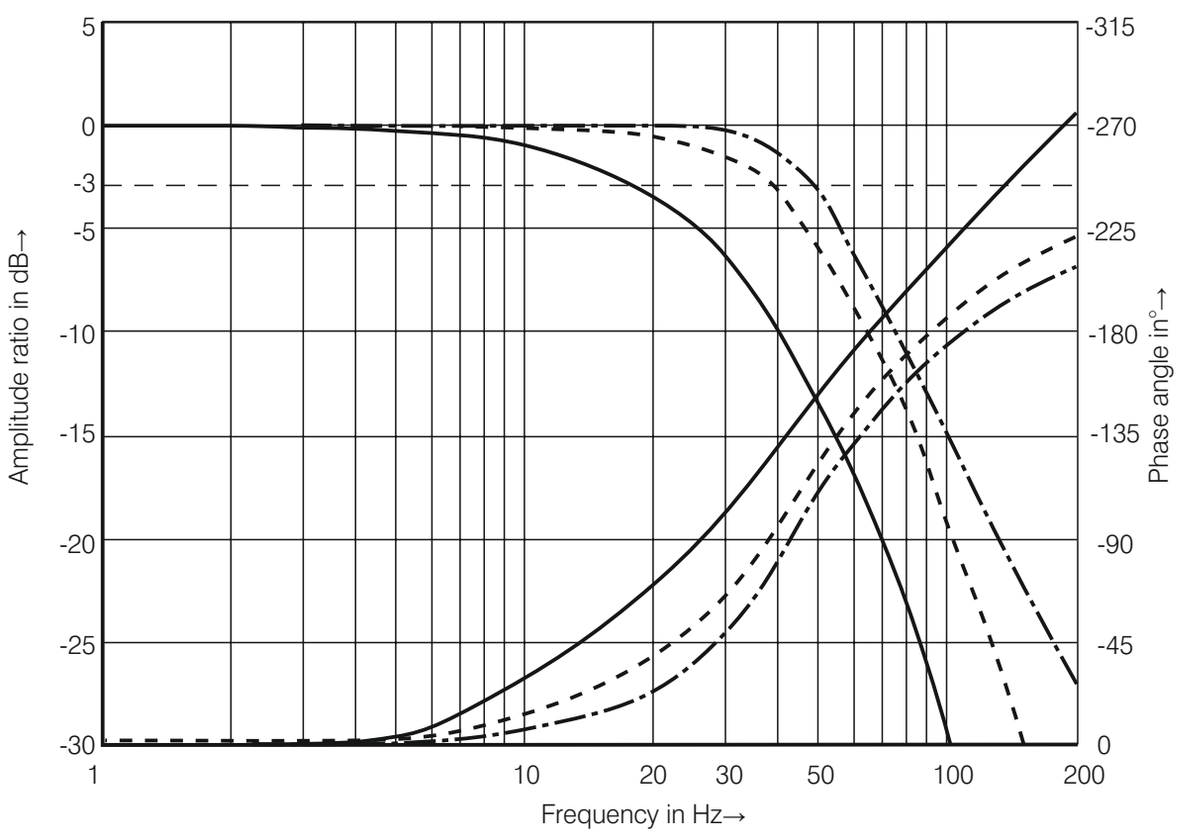
Δp = Valve pressure differential (inlet pressure p_P minus load pressure p_L minus return flow pressure p_T)

Transient function with a stepped form of electrical input signal for type 4WREE
(P=100bar, v=36x10⁻⁶ m²/s, t=50°C) **Size NG6**



Frequency response Characteristic curves for type 4WREE
(P=100bar, v=36x10⁻⁶ m²/s, t=50°C) **Size NG6**

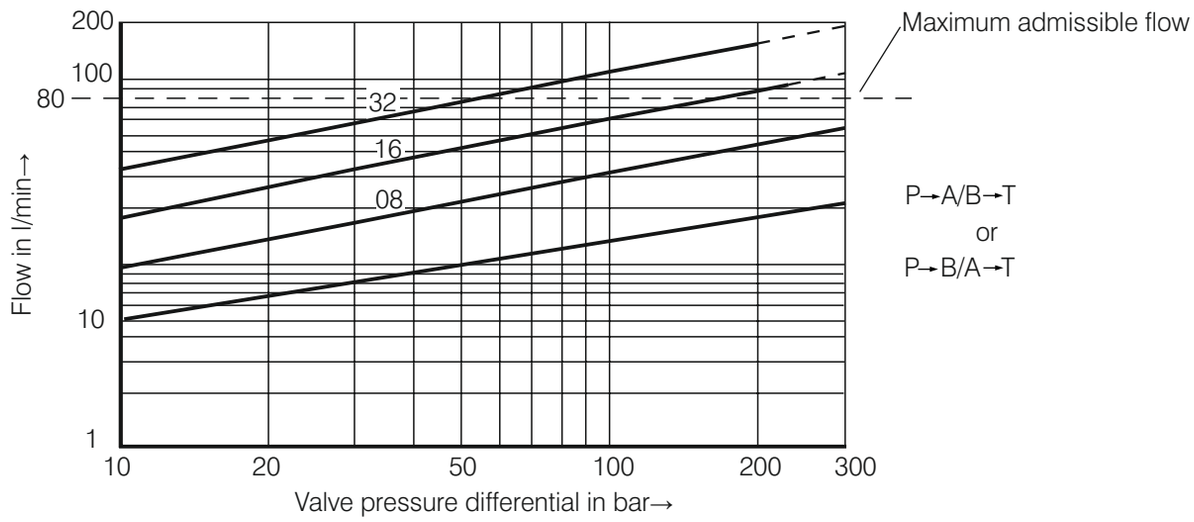
4/3 valve version
Control spool V



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

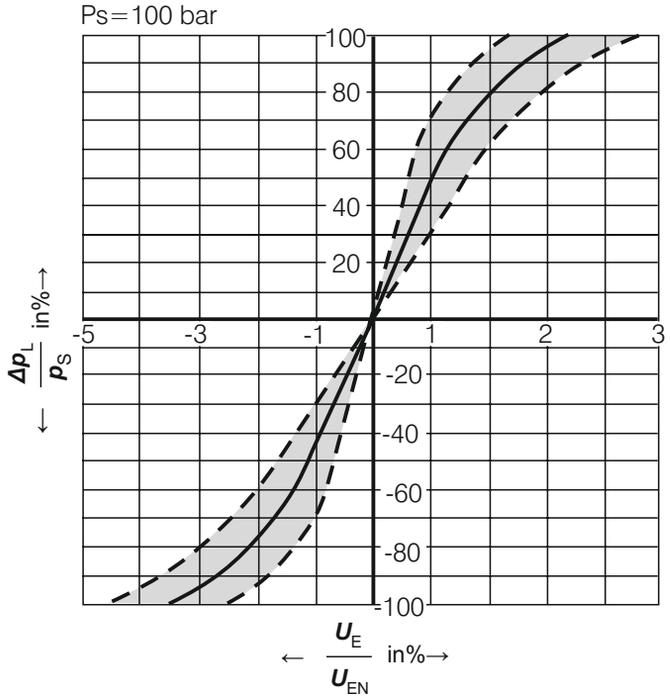
Characteristic curves for type 4WREE (P=100bar, v=36x10^{-6} m²/s, t=50°C) Size NG6

Flow load function at maximum valve opening
Rated flow 4, 8, 16 and 32 l/min
Control spool “V”

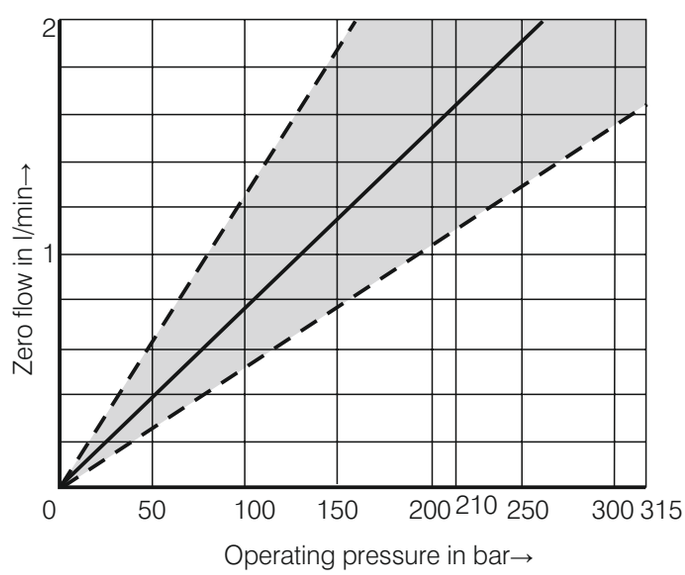


Characteristic curves: Type 4WREE (P=100bar, v=36x10^{-6} m²/s, t=50°C) Size NG10

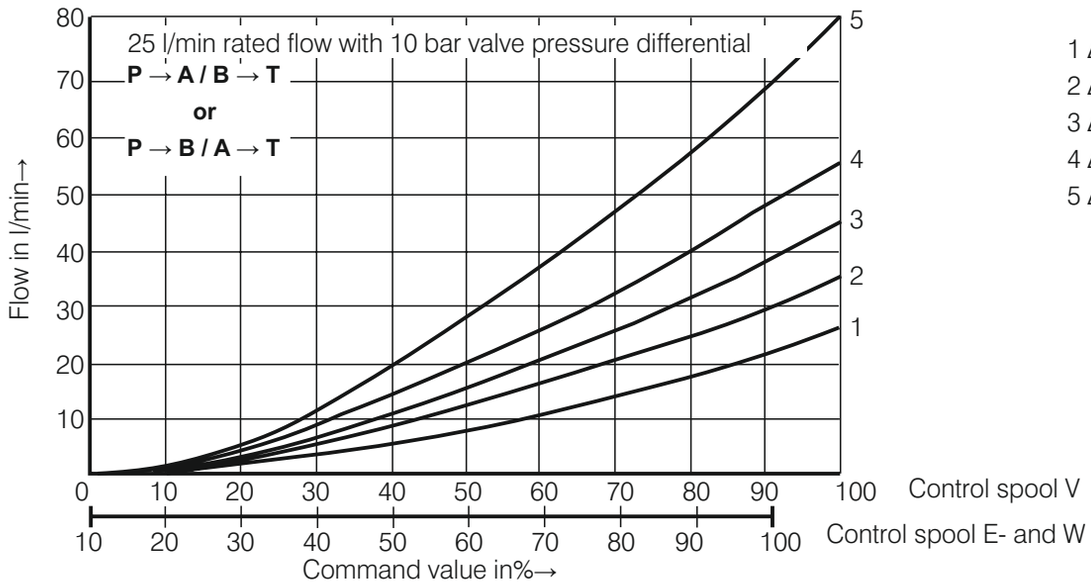
Pressure signal characteristic curve V-spool,
Ps=100 bar



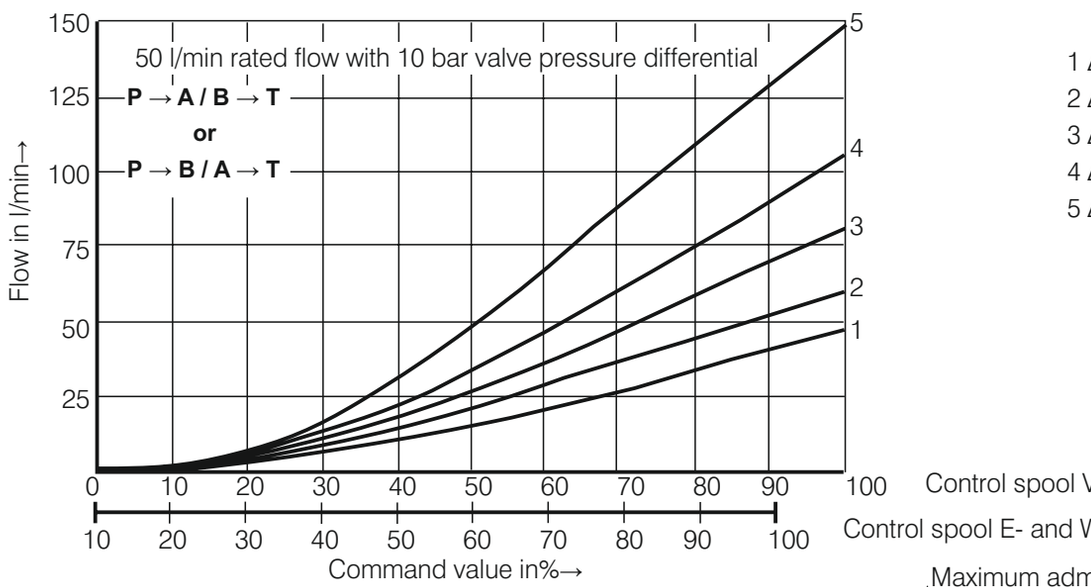
Type 4WREE 10 V75



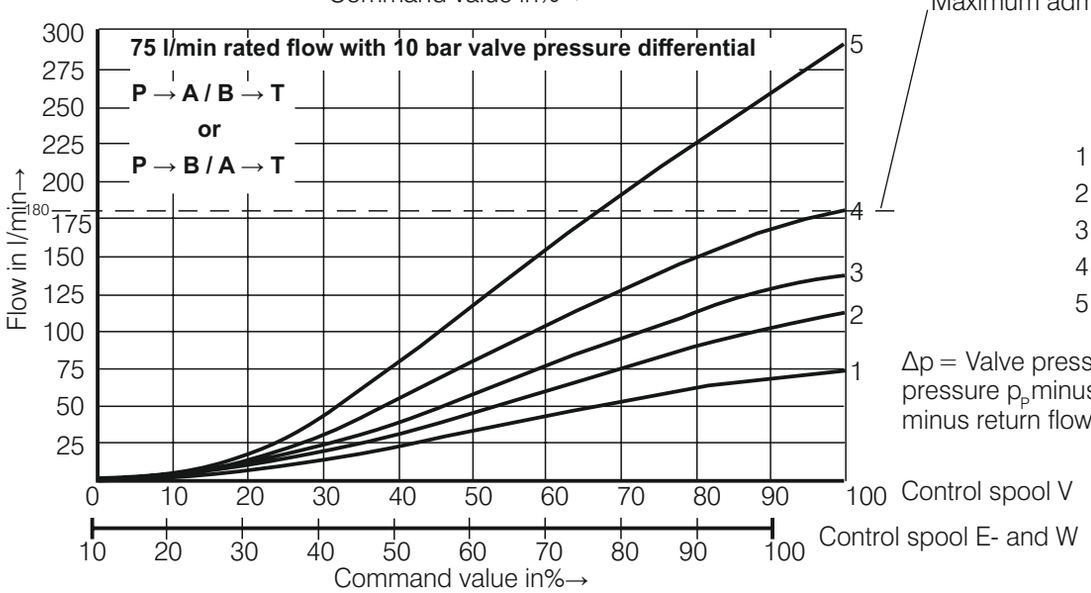
Characteristic curves: Type 4WREE (P=100bar, v=36x10^{-6} m^2/s, t=50°C) Size NG10



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



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

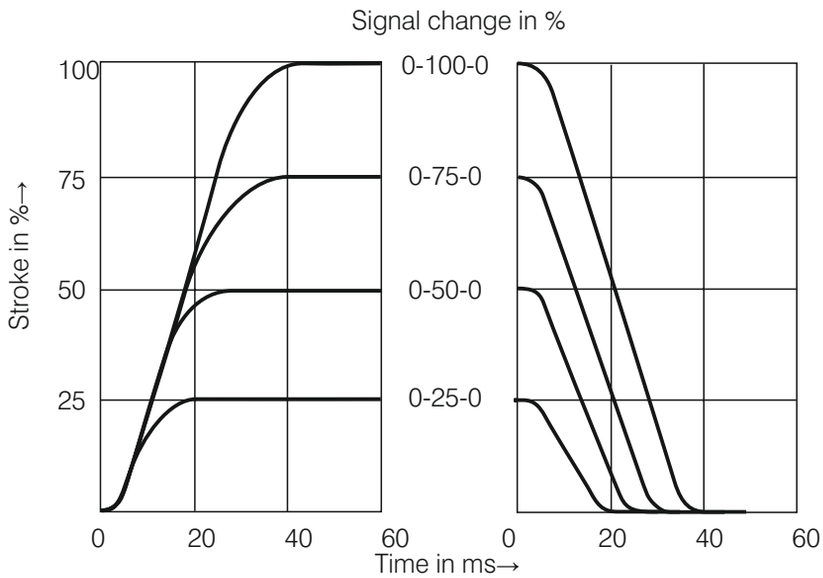


1 Δp = 10 bar constant
2 Δp = 20 bar constant
3 Δp = 30 bar constant
4 Δp = 50 bar constant
5 Δp = 100 bar constant

Δp = Valve pressure differential (inlet pressure p_P minus load pressure p_L minus return flow pressure p_T)

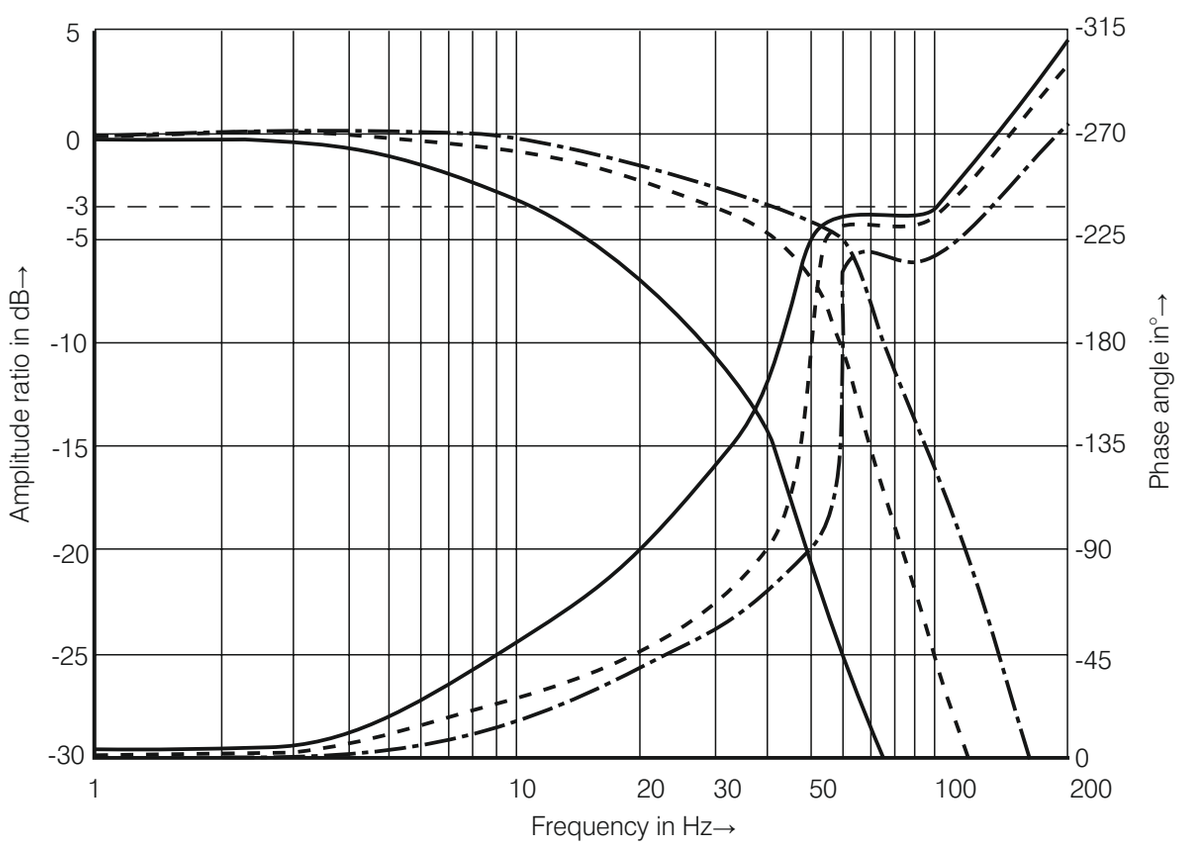
Transient function with a stepped form of electrical input signal for type 4WREE
(P=100bar, v=36x10⁻⁶ m²/s, t=50°C) **Size NG10**

4/3 valve version
Control spool E



Frequency response Characteristic curves for type 4WREE
(P=100bar, v=36x10⁻⁶ m²/s, t=50°C) **Size NG10**

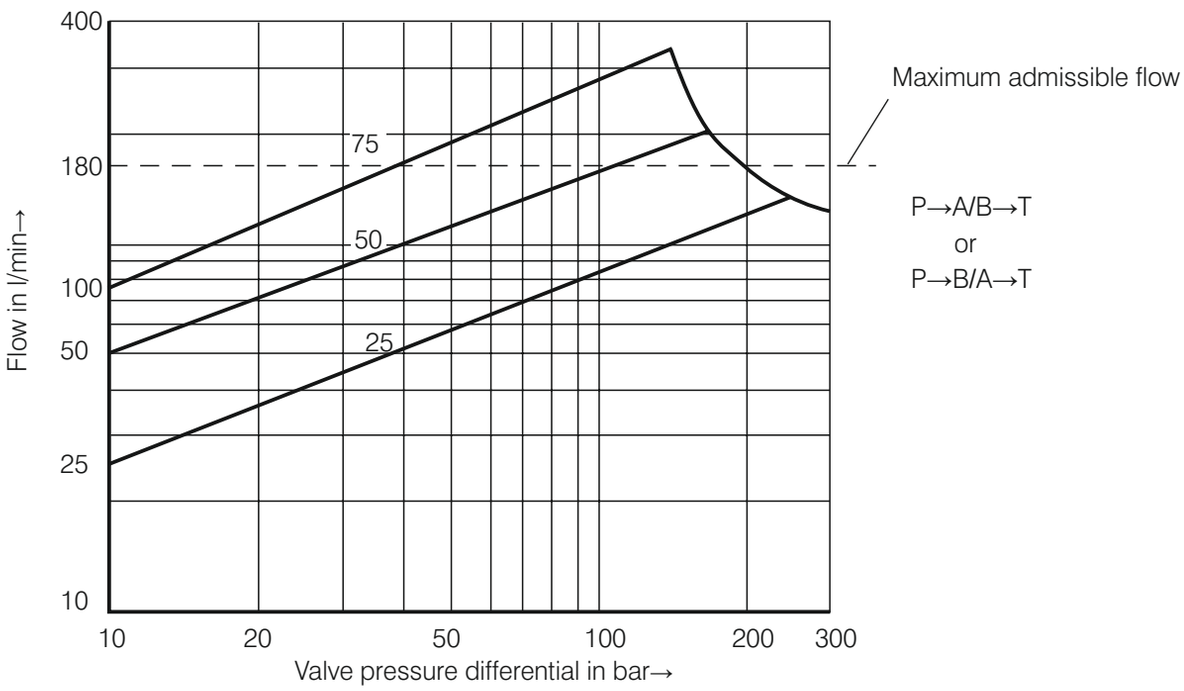
4/3 valve version
Control spool V



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

Characteristic curves for type 4WREE (P=100bar, v=36x10^{-6} m^2/s, t=50°C) Size NG10

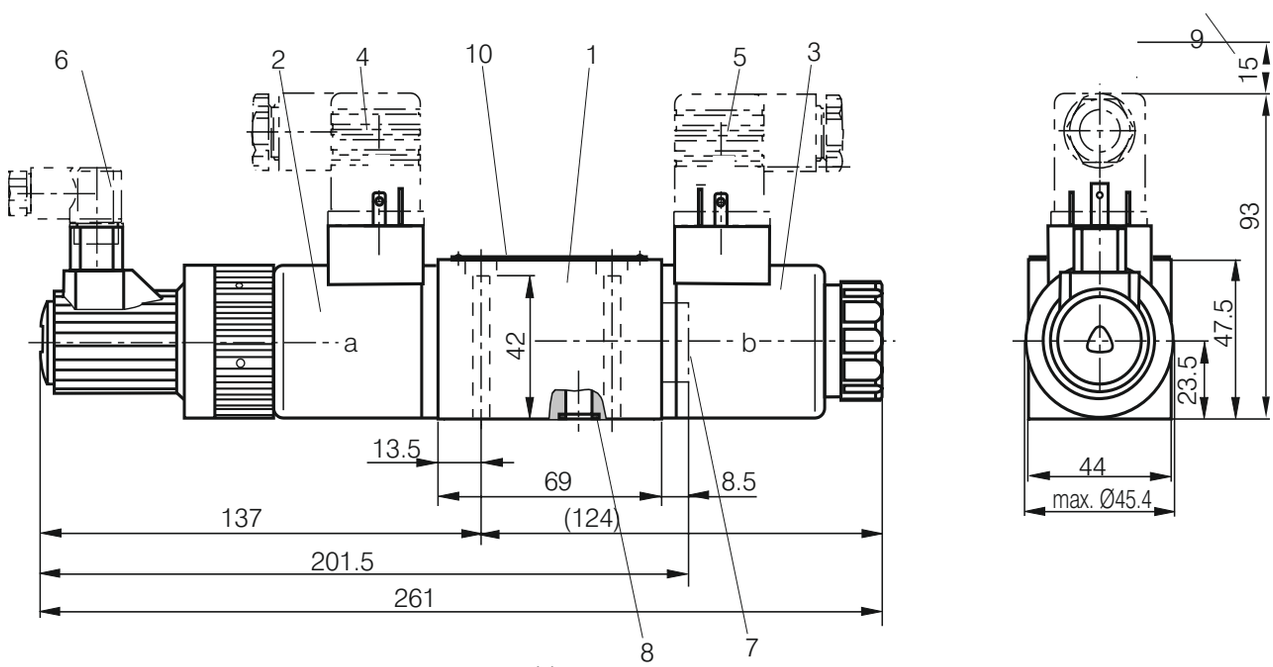
Load function with maximum valve opening
Rated flow 25, 50 and 75 l/min
Control spool V

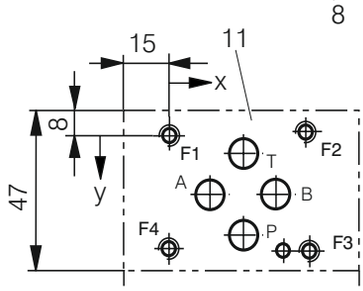


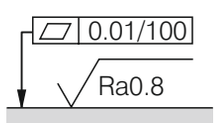
Observe the maximum admissible flow of 180 l/min

Unit Dimensions Size NG6 (Dimensions in mm)

4WRE6







Mounting Surface requirement

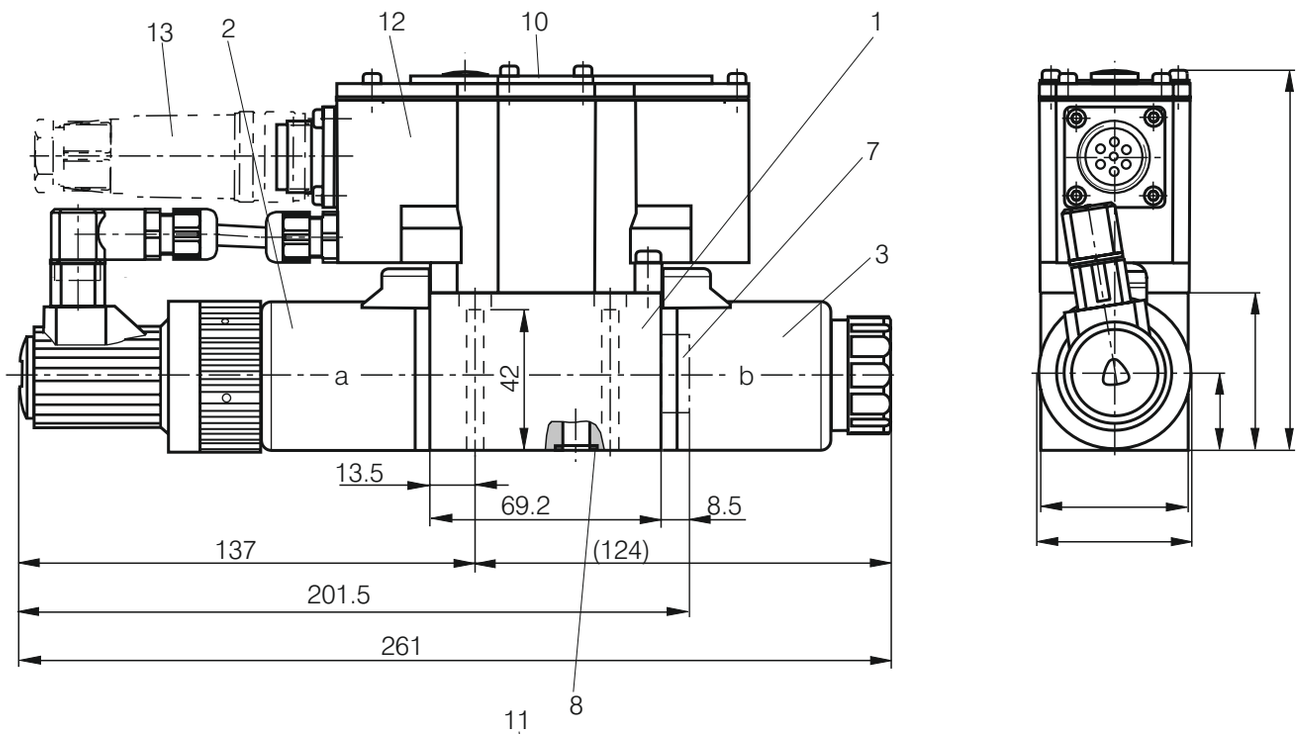
Unit	P	A	T	B	F1	F2	F3	F4	G
Thread	Ø7.5 max	Ø7.5 max	Ø7.5 max	Ø7.5 max	M5	M5	M5	M5	Ø4
x	21.5	12.7	21.5	30.2	0	40.5	40.5	0	33
y	25.9	15.5	5.1	15.5	0	-0.75	31.75	31	31.75

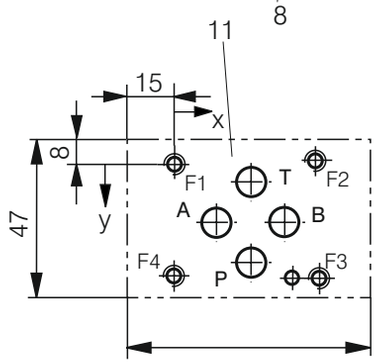
1. Valve body
2. Proportional coil “a” with inductive position transducer
3. Proportional coil “b”
4. Plug connector “A”
5. Plug connector “B”
6. Displacement sensor plug
7. The plug of the valve with a coil (two-position valve, the function is EA or WA)
8. O-ring 12x2 (for port P, A, B, TA, TB)
9. Space required to remove the plug-in connector
10. Nameplate
11. Hydraulic valve mounting surface, in line with ISO 4401 oil port connection position and standard tolerance

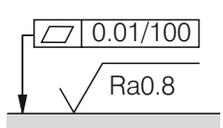
Valve fixing screws: 4-M5x50(GB/T70.1)M_A = 8.9Nm

Unit Dimensions Size NG6 (Dimensions in mm)

4WREE6







Mounting Surface requirement

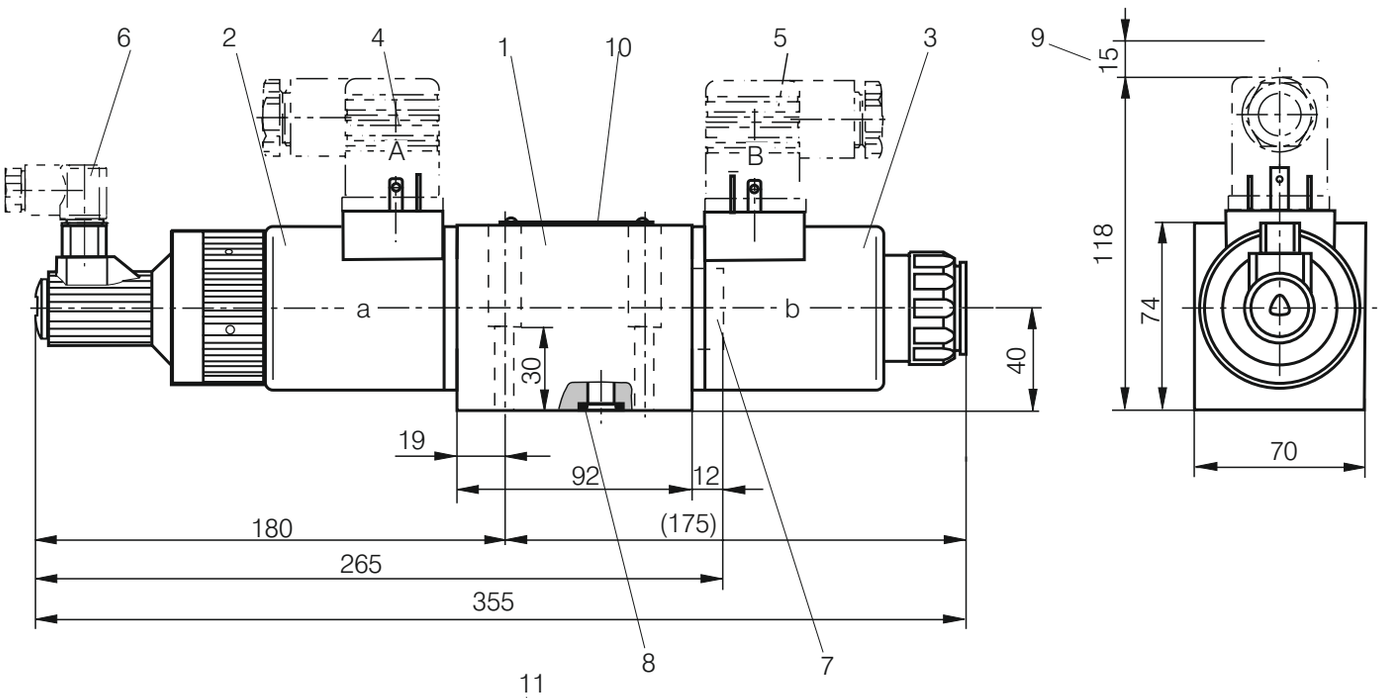
Unit	P	A	T	B	F1	F2	F3	F4	G
Thread	Ø7.5 max	Ø7.5 max	Ø7.5 max	Ø7.5 max	M5	M5	M5	M5	Ø4
x	21.5	12.7	21.5	30.2	0	40.5	40.5	0	33
y	25.9	15.5	5.1	15.5	0	-0.75	31.75	31	31.75

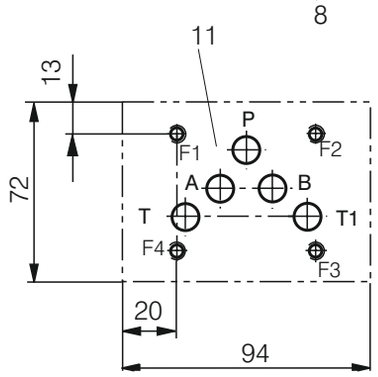
1. Valve body
2. Proportional coil “a” with inductive position transducer
3. Proportional coil “b”
7. The plug of the valve with a coil (two-position valve, the function is EA or WA)
8. O-ring 12x2 (for port P, A, B, TA, TB)
10. Nameplate
11. Hydraulic valve mounting surface, in line with ISO 4401 oil port connection position and standard tolerance
12. Integrated amplifier/electronics
13. Plug in accordance with DIN EN 175201-804 (need to be ordered separately)

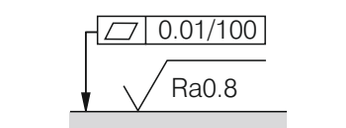
Valve fixing screws: 4-M5x50(GB/T70.1)M_A = 8.9Nm

Unit Dimensions Size NG10 (Dimensions in mm)

4WRE10







Mounting Surface requirement

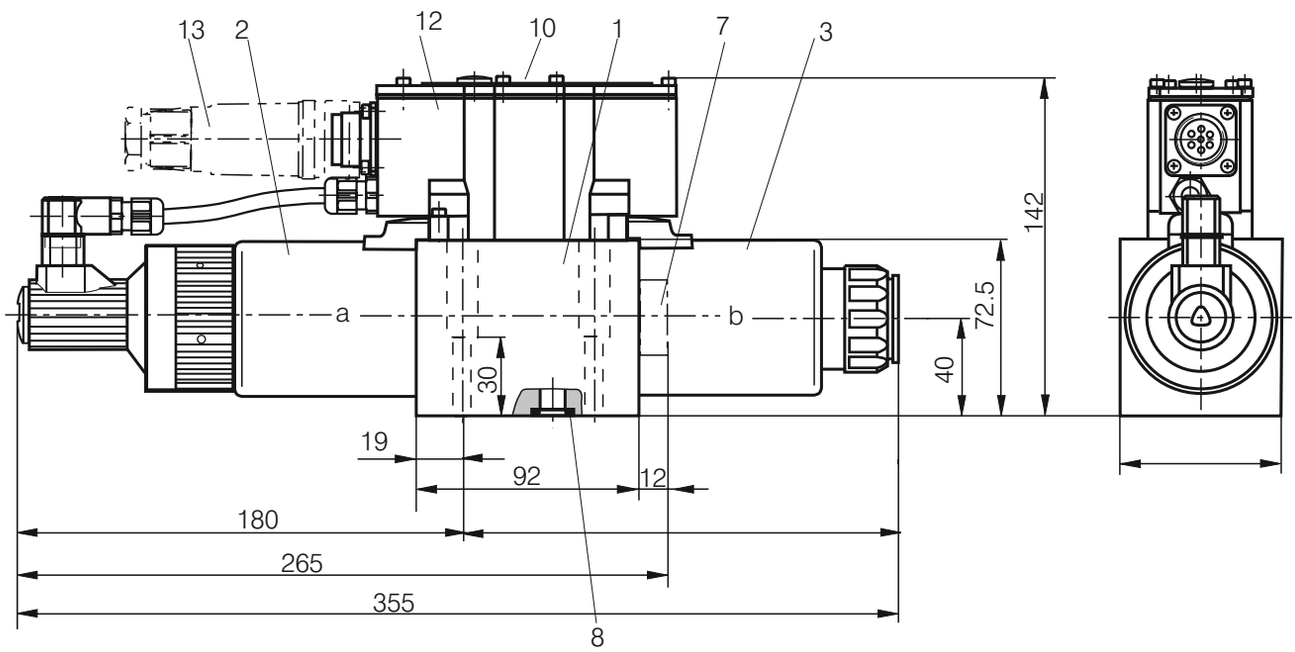
Unit	P	A	T	T1	B	F1	F2	F3	F4
Thread	Ø11.2 max	Ø11.2 max	Ø11.2 max	Ø11.2 max	Ø11.2 max	M6	M6	M6	M6
x	27	16.7	3.2	50.8	37.3	0	54	54	0
y	6.3	21.4	32.5	32.5	21.4	0	0	46	46

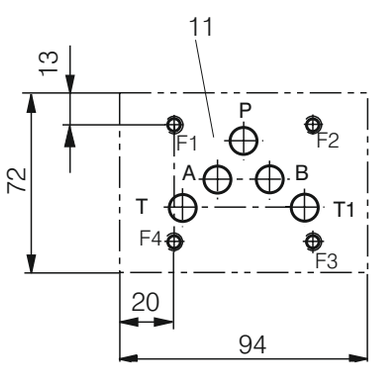
1. Valve body
2. Proportional coil “a” with inductive position transducer
3. Proportional coil “b”
4. Plug-in connector “A”
5. Plug-in connector “B”
6. Displacement sensor plug
7. Plug with a coil (two-digit pavilion, the function is a or WA)
8. O-ring 12x2 (for port P, A, B, TA, TB)
9. Space required to remove the plug connector
10. Nameplate
11. Hydraulic valve mounting surface, in line with ISO 4401 oil port connection position and standard tolerance

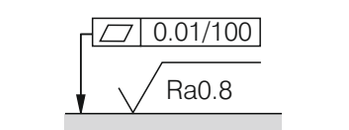
Valve fixing screws: 4-M6x40(GB/T70.1)M_A = 15.5Nm

Unit Dimensions Size NG10 (Dimensions in mm)

4WREE10







Mounting Surface requirement

Unit	P	A	T	T1	B	F1	F2	F3	F4
Thread	Ø11.2 max	Ø11.2 max	Ø11.2 max	Ø11.2 max	Ø11.2 max	M6	M6	M6	M6
x	27	16.7	3.2	50.8	37.3	0	54	54	0
y	6.3	21.4	32.5	32.5	21.4	0	0	46	46

1. Valve body
2. Proportional coil “a” with inductive position transducer
3. Proportional coil “b”
7. Plug with a wire loop (two-position valve, the function is EA or A)
8. O-ring 12x2 (for port P, A, B, TA, TB)
10. Nameplate
11. Hydraulic valve mounting surface, in line with ISO 4401 oil port connection position and standard tolerance
12. Integrated amplifier/electronics
13. Plug in accordance with DIN EN 175201-804 (needs to order separately)

Valve fixing screws: 4-M6x40(GB/T70.1)M_A = 15.5Nm

The specified data is for product description purposes only and may not be deemed to be guaranteed unless expressly confirmed in the contract.

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