

4WRE(E)

**4/2 and 4/3 proportional directional valves,
directly controlled, with
electrical position feedback
without/with integrated electronics**

Nominal sizes 6 and 10

Series 2X

Maximum operating pressure 315 bar

Maximum flow 80 L/min (NS 6)

Maximum flow 180 L/min (NS 10)



Overview of contents

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Features

- 1 - Direct actuated proportional valve for controlling the direction and volume of a flow
- 1 - Actuation by means of proportional solenoids with central thread and removable coil
- 2 - Spring centred control spool
- 3 - For subplate mounting: Porting pattern to ISO
- 4 - 4401-03-02-0-05/ISO 4401-05-04-0-05
- 5 - Integrated control electronics, interface A1 or F1 for type 4WREE
- 7 - Control electronics for type WRE: Electrical amplifier RT-MRPD2-6-30 (NS 6) or RT-MRPD2-10-30 (NS 10) in modular format(separate order)
- 13

Ordering details

4WRE	E	6	E	08	-	2X	/	G24	K31	/	F1	V	*
01	02	03	04	05		06		07	08		09	10	11

01	4WRE	Four-port direct-actuated proportional direction control valve with electrical position feedback
02	No code	Without integrated control electronics
	E	With integrated control electronics
03	6	Nominal size 6
	10	Nominal size 10

Symbols

04	E	E, E1-, W, W1-, EA, WA; See hydraulic symbol table for details
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Nominal flow at a valve pressure differential $\Delta p = 10$ bar

05	04	4 L/min	NS 6
	08	8 L/min	
	16	16 L/min	
	32	32 L/min	
	25	25 L/min	NS 10
	50	50 L/min	
	75	75 L/min	

06	2X	Series 20 to 29 (20 to 29: unchanged installation and connection dimensions)
07	G24	Supply voltage 24 VDC

4WRE	E	6	E	08	-	2X	/	G24	K31	/	F1	V	*
01	02	03	04	05		06		07	08		09	10	11

Electrical connections

08	K4	Sockets conforming to DIN EN 175301-803 (plugs need to be ordered separately), see page 5	4WRE
	K31	7 pin sockets conforming to DIN EN 175201-804 (plugs need to be ordered separately), see page 5	4WREE

Command value of amplifier

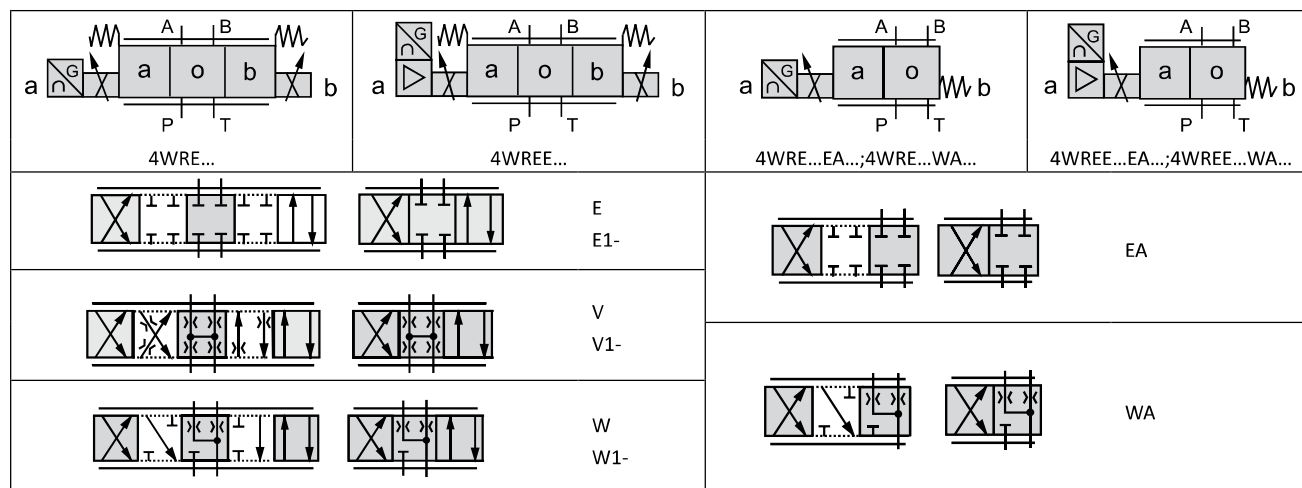
09	No. cade	ReboTech RT-MRPD2-6-30(NS 6) or RT-MRPD2-10-30(NS 10) modular amplifier is recommended (to be purchased separately)	4WRA
	A1	command value input ± 10 V	4WRAE
	F1	command value input 4 to 20 mA	

Sealing material

10	M	NBR seals
	V	FKM seals

11	KS	External control of mold locking, application of injection molding machine, please contact us for details
	KE	With enable of external mold locking control, application of injection molding machine, please contact us for details

Symbols



E1- and W1- spools:

$P \rightarrow A$ q_{Vnom} $B \rightarrow T$ $q_{Vnom} / 2$

$P \rightarrow B$ $q_{Vnom} / 2$ $A \rightarrow T$ q_{Vnom}

Note:

With spools W and WA, in the neutral position, there is a connection from A to T and B to T with approx. 3 % of the relevant nominal cross-section.

Function, section

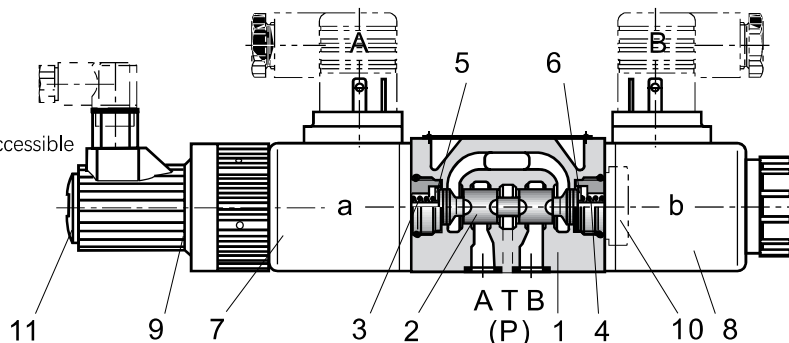
The 4/2 and 4/3 proportional directional valves are directly controlled components of subplate mounting design. They are operated by proportional solenoids with central thread and removable coil. The solenoids are optionally controlled by either external control electronics (type WRE) or by integrated control electronics (type WREE).

Design:

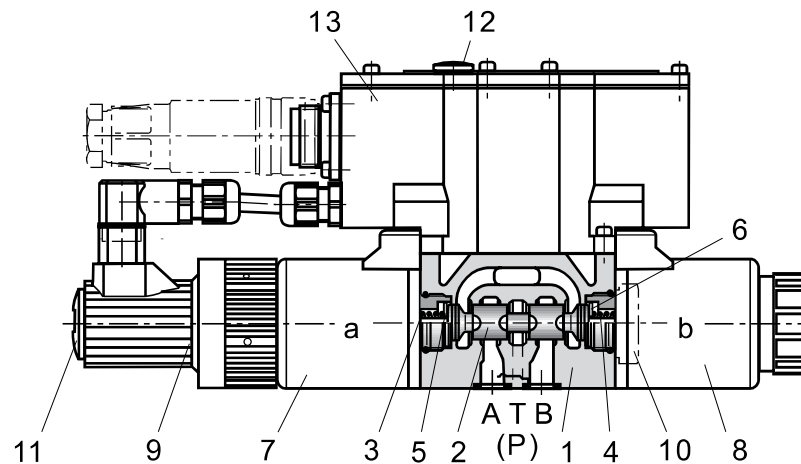
The valve basically consists of:

- Housing (1) with mounting face
- Control spool (2) with compression springs (3 and 4)
- Spring seat (5 and 6)
- Solenoids (7 and 8) with central thread
- Position transducer (9)
- Optional integrated control electronics (13)
- The mechanical zero point adjustment (11) is accessible via the Pg 13.5.
- the electrical zero point adjustment is accessible via the Pg 7 (12) (type 4WREE)

4WRE6...-2X/...



4WREE10...-2X/...



De-energised, solenoid (8), the control spool (2) is returned to the central position via the compression spring (3). In the de-energised condition the spool (2) is held in a mechanical central position by the solenoid return springs. This, for the spool, symbol "V", does not relate to the hydraulic central position! When the electrical valve closed loop control circuit is closed then the spool is positioned in the hydraulic central position.

Valve with 2 switching positions: (type 4WRE...A...):

The function of this valve version is basically the same as that of the valve with 3 switching positions. However, The 2 switching position valves are only fitted with solenoid "a" (7). A plug (10) is fitted in place on the 2nd proportional solenoid.

Note:

The internal leakage of the hydraulic valve is inevitable, and the leakage will increase with the use of the hydraulic valve.

Note:

Draining of the tank line is to be avoided. With the appropriate installation conditions, a back pressure valve is to be installed (back pressure approx. 2 bar).

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

General

NS		6	10
Installation		Optional, preferably horizontal	
Storage temperature range	°C	-20 to +80	
Ambient temperature range	4WRE	°C	-20 to +70
	4WREE	°C	-20 to +50
Weight	4WRE	Kg	2.2
	4WREE	Kg	2.4

Hydraulic (measured at p = 100 bar, with HLP46 at 40 °C ± 5 °C)

Maximum operating pressure	Ports A, B, P	bar	315
	Port T	bar	210
Nominal flow q_{Vnom} at $\Delta p = 10 \text{ bar}$ ¹⁾	L/min	4	25
		8	50
		16	75
		32	
Max. permissible flow	L/min	80	180
Pressure fluid temperature range	°C	- 20 to + 80 (preferably + 40 to + 50)	
Viscosity range	mm ² /s	20 to 380 (preferably 30 to 46)	
Degree of contamination		ISO4406: 1999 20/18/15	
Hysteresis	%	≤ 0.1	
Reversal error	%	≤ 0.05	
Response sensitivity	%	≤ 0.05	
Zero drift (the zero position changes according to the temperature and pressure of the pressure fluid)	%/10K	≤ 0.15	
	%/100bar	≤ 0.1	

Electrical, solenoid

Voltage type		VDC
Command value	Voltage controlled A1	V
For 4WREE	Current controlled F1	mA
Max. current per solenoid	A	2.5
Solenoid coil resistance	Cold value at 20 °C	Ω
	Max. warm value	Ω
Electrical connection	4WRE	Sockets conforming to DIN EN 175301-803
	4WREE	7 pin socket conforming to DIN EN 175201-804
Duty	%	100
Max. coil temperature	°C	150
Valve protection to EN 60529		IP65

Electrical, control electronics

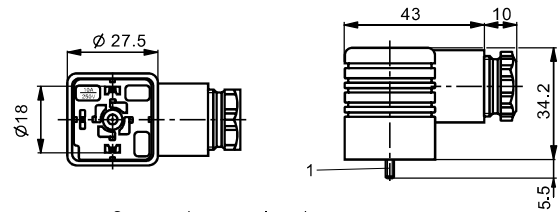
4WRE6	Digital	RT-MRPD2-6-30 (order separately)
4WRE10	Digital	RT-MRPD2-10-30 (order separately)
4WREE6	Digital	RT-4WREE6-2X-40//A1(F1)
4WREE10	Digital	RT-4WREE10-2X-40//A1(F1)
Supply voltage	Nominal voltage	VDC
	Lower limiting value	V
	Upper limiting value	V
Power consumption of the amplifier	Max. power current	A
	Max. power impulse current	A

¹⁾ Flow under other $\Delta p_x : q_x = q_{Vnom} \cdot \sqrt{\frac{\Delta p_x}{5}}$

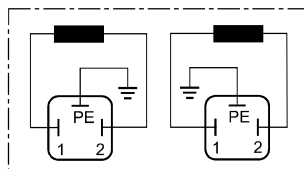
Electrical connection, plug-in connectors

For type 4WRE(without integrated control electronics): connector conforming to DIN EN 175301-803 (Need to order separately)

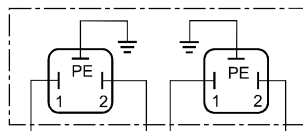
Solenoid a, colour grey
 Separate order under material no. HP18110742
 Solenoid b, colour black
 Separate order under material no. HP18110741
 Fixing screw: M3,torque 0,5 Nm



Connection on component plug

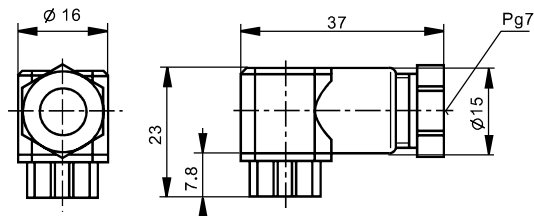


Connection on plug-in connector

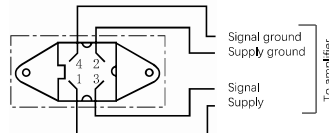


To amplifier To amplifier

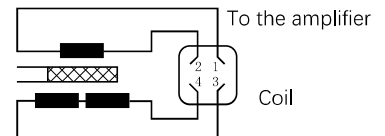
Inductive position transducer (LVDT)



Connections on the plug connector

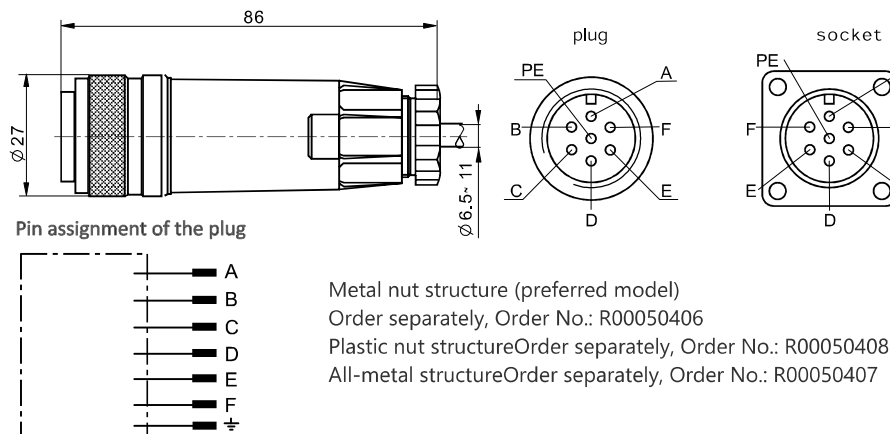


Internal coil connections



Plug-in connector 4-pin Pg7-G4W1F(Delivery with valve); Recommended: Up to 50 m cable length type LiYCY 4 x 0.25 mm²

For type 4WREE(with integrated control electronics): connector conforming to DIN EN 175201-804 (Need to order separately)



Pin assignment of the plug

Metal nut structure (preferred model)
 Order separately, Order No.: R00050406
 Plastic nut structure Order separately, Order No.: R00050408
 All-metal structure Order separately, Order No.: R00050407

Electrical connection with a 7 - pin plug

Design	Slot	Allocation interface A1	Allocation interface F1	Allocation interface C2	Allocation interface A5	Allocation interface F5	Allocation interface C6
Supply power+	A	24VDC (21~40VDC)				GND,enable the reference potential	
Supply power -	B	GND					
	C	Feedback value reference point				(Enable input 24VDC enable ≥ 11VDC, disable ≤ 5VDC)	
Command input+	D	±10V com. value: R _e > 50kΩ	4~20mA com. value: R _e < 250Ω	4~20mA com. value: R _e < 250Ω	±10V com. value: R _e > 50kΩ	4~20mA com. value: R _e < 250Ω	±10V com. value: R _e < 250Ω
Command input-	E	Input command				Reference potential	
Position feedback	F	Actual value: ±10 V Maximum load: 5 mA	Actual value: 4~20mA Maximum load;300Ω	Actual value: 4~20mA Maximum load;300Ω	Actual value: ±10 V Maximum load: 5 mA	Actual value: 4~20mA Maximum load;300Ω	Actual value; 4~ 20mA Maximum load;300Ω
	PE	Connected with cooling body and valve housing					

Command value:

- A positive command value 0-to +10 (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 0-to +10 (or 12 to 4 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 1 solenoid on side "a" (e.g. spool variants EA and WA) a positive command value 0-to +10(or 4 to 20 mA) at D and the reference potential at E results in a flow from P to B and A to T.

Actual value:

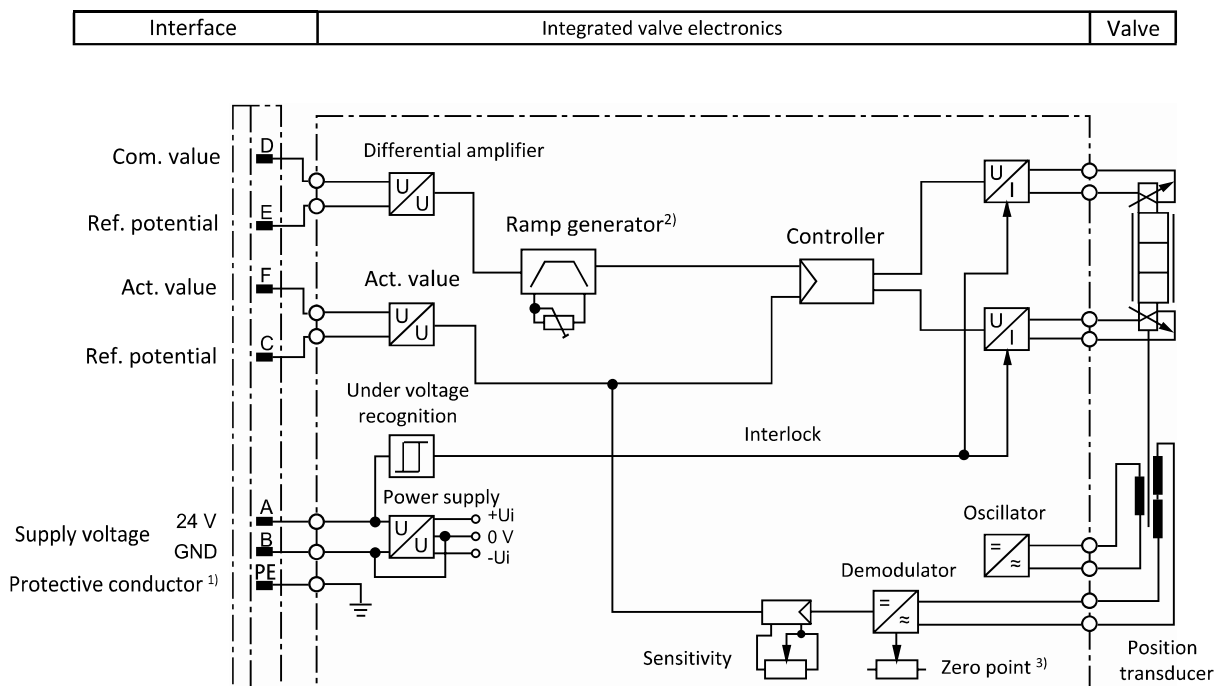
- A positive actual value (or 12 to 20 mA) at F and the reference potential at C results in a flow from P to A, and B to T, actual value -10 to 0 (or 4 to 12 mA) result in flow from P to B and A to T.
- For a valve with 1 solenoid on side "a" (e.g. spool variants EA and WA) a positive command value (or 4 to 20 mA) at F and the reference potential at C results in a flow from P to B and A to T.

Connection cable:

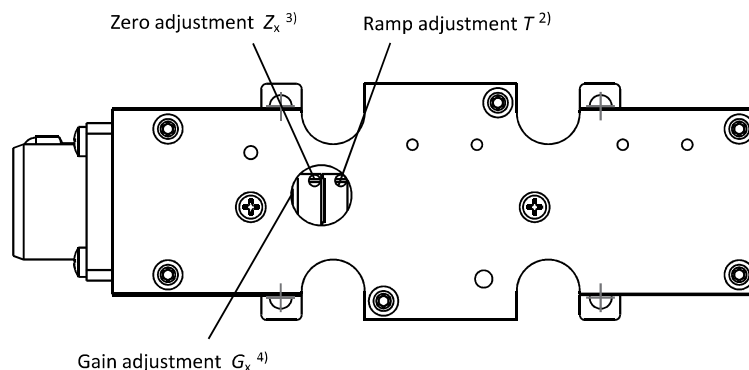
- Connection cable: Recommendation: up to 25 m cable length type LiYCY 7 x 0,75 mm²; up to 50 m cable length type LiYCY 7 x 1,0 mm²
- External diameter 6,5 to 11 mm
- Connect screen to PE only on the supply side.

Note: Slots C and F must not be connected!

Block circuit diagram/terminal allocation of the integrated control electronics (4WREE)



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



1) PE is connected to the cooling body and the valve housing, protective conductor screwed to the valve housing and cover

2) Ramp can be externally adjusted from 0 to 5 s via the knob "T"

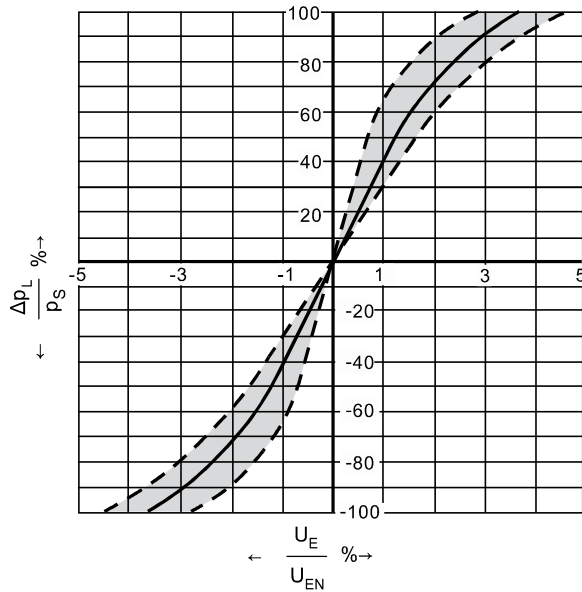
3) Zero point is externally adjustable via the knob "Z_x"

4) The gain adjustment "G_x" has been adjusted when it leaves the factory, if you really need to adjust it, please consult us!

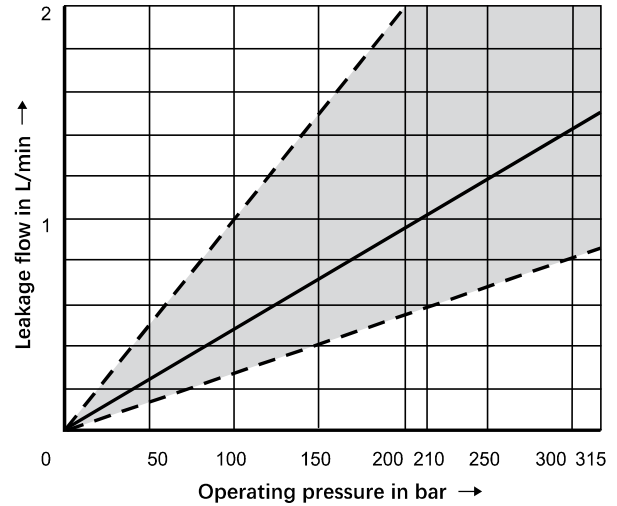
Characteristic curves NS6 (HLP46 at 40 °C ± 5 °C)

4WRE(E)6

Pressure-signal-characteristic curves (V spool), $p_s = 100$ bar

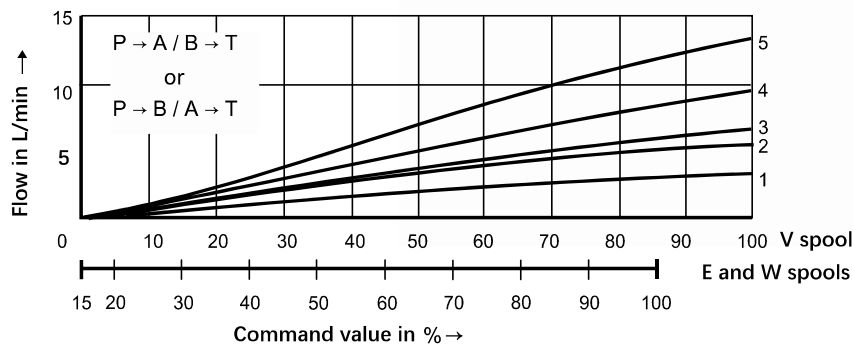


Leakage flow (with the spool in the central position) (4WRE(E) 6 V32)



Flow characteristic curves, $P_p = 100$ bar

4 L/min nominal flow at a 10 bar valve pressure differential



- 1 $\Delta p = 10$ bar constant
- 2 $\Delta p = 20$ bar constant
- 3 $\Delta p = 30$ bar constant
- 4 $\Delta p = 50$ bar constant
- 5 $\Delta p = 100$ bar constant

$$\Delta p = P_p - P_L - P_T$$

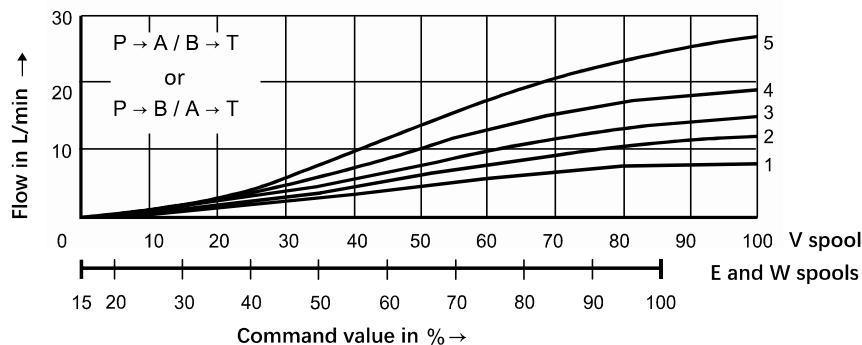
Δp : valve pressure differential

P_p : inlet pressure

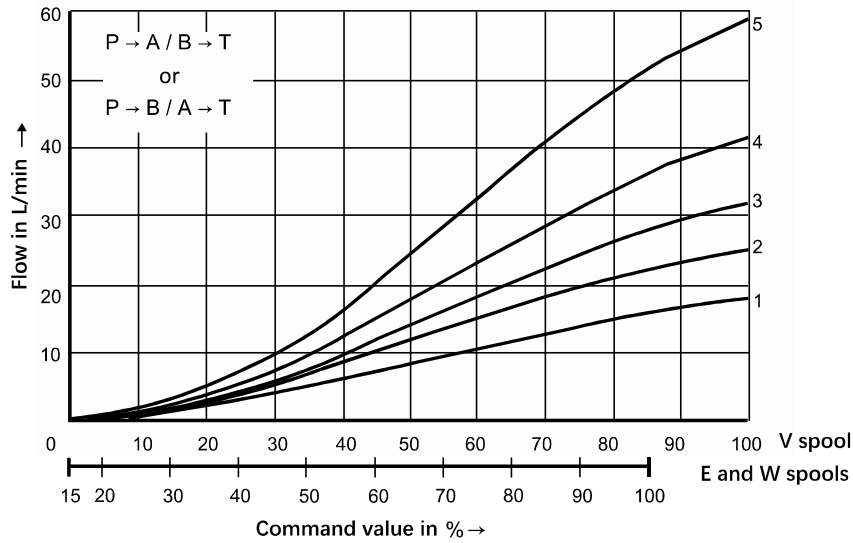
P_L : load pressure

P_T : return pressure

8 L/min nominal flow at a 10 bar valve pressure differential



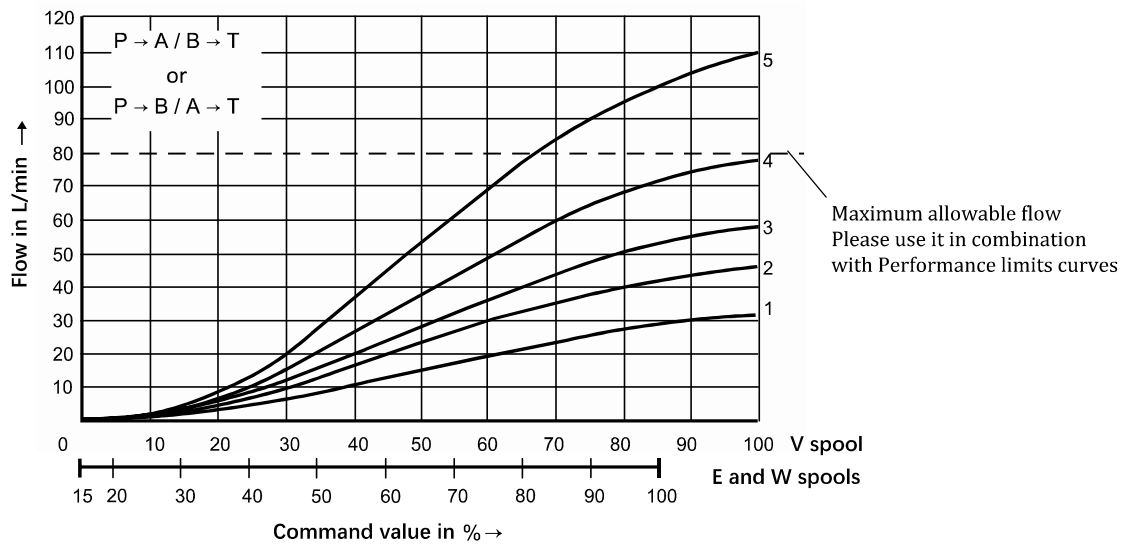
16 L/min nominal flow at a 10 bar valve pressure differential



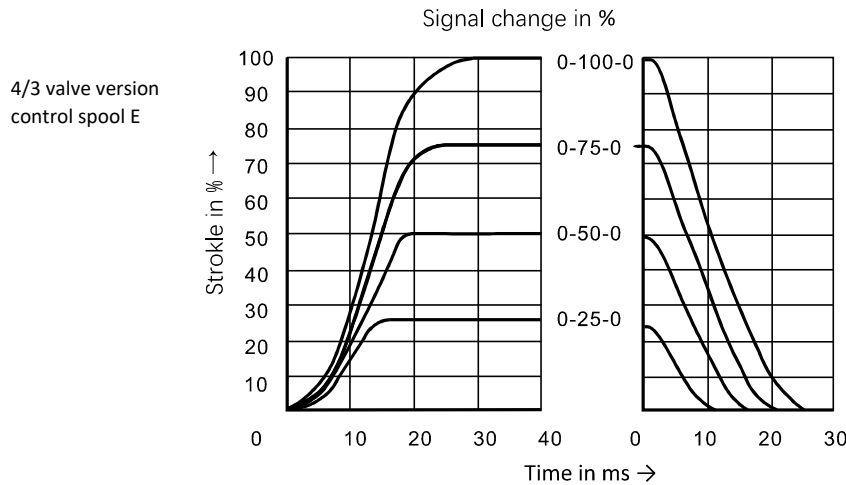
- 1 $\Delta p = 10$ bar constant
- 2 $\Delta p = 20$ bar constant
- 3 $\Delta p = 30$ bar constant
- 4 $\Delta p = 50$ bar constant
- 5 $\Delta p = 100$ bar constant

$\Delta p = P_p - P_L - P_T$
 Δp : valve pressure differential
 P_p : inlet pressure
 P_L : load pressure
 P_T : return pressure

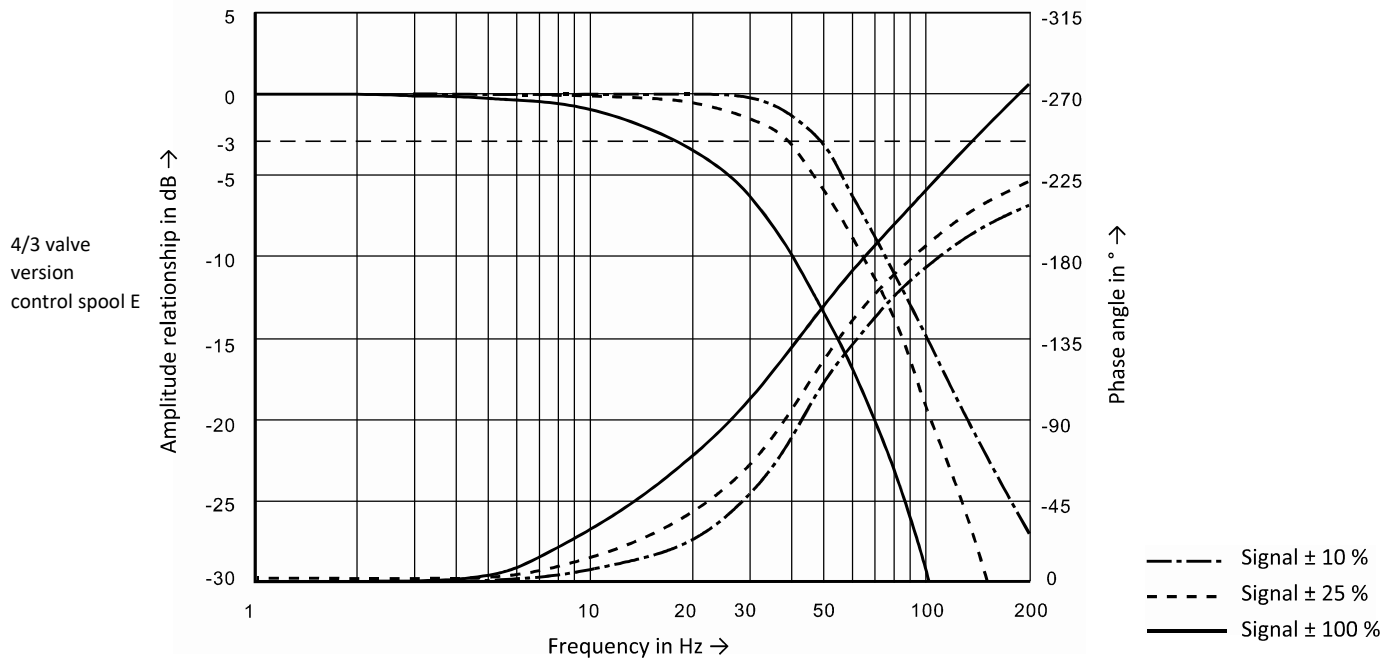
32 L/min nominal flow at a 10 bar valve pressure differential



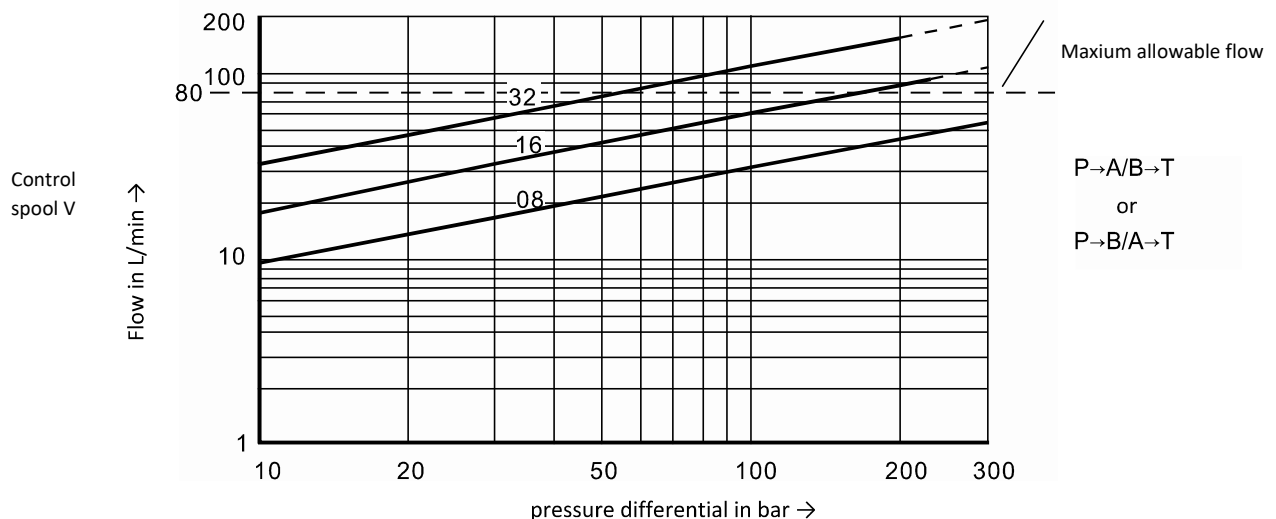
Transient function with a stepped form of electrical input signal for type 4WREE6



Frequency response characteristic curves for type 4WREE6



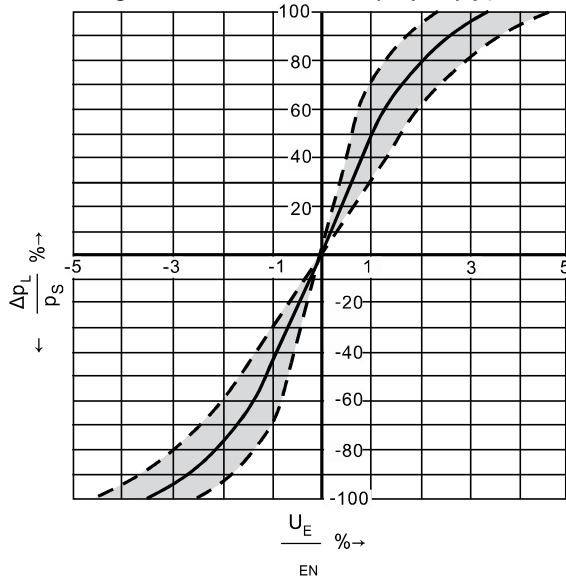
Performance limits curves nominal 8/16/32 L/min



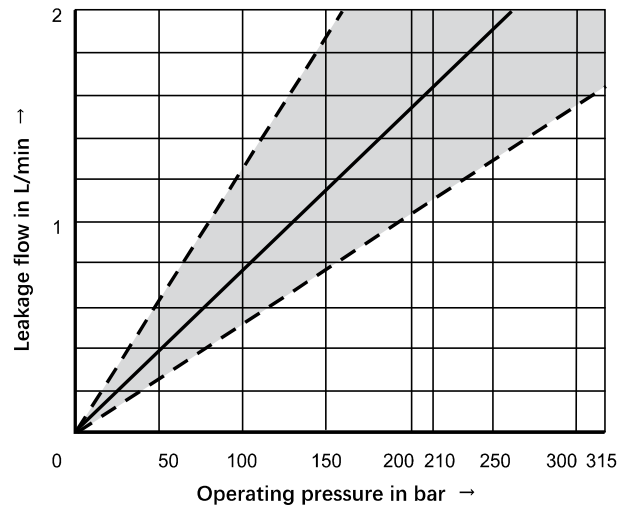
Characteristic curves NS10 (HLP46 at 40 °C ± 5 °C)

4WRE(E)10

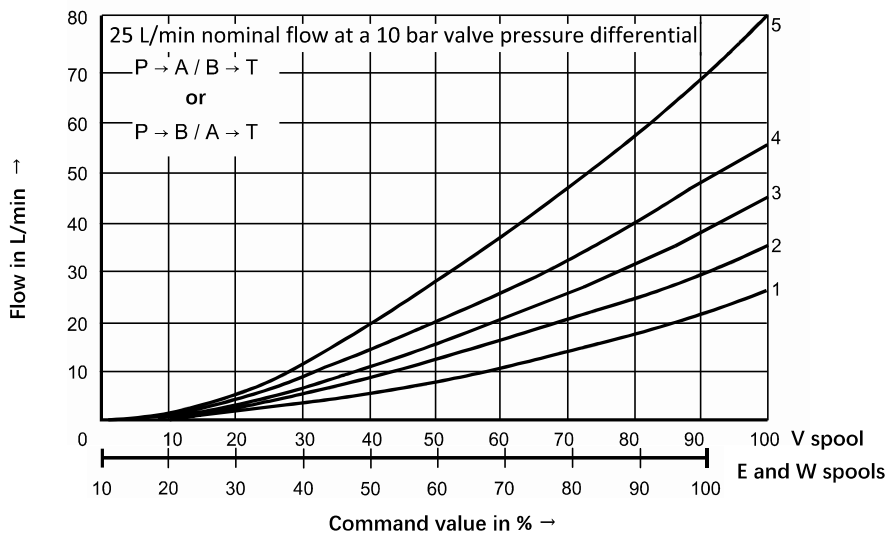
Pressure-signal-characteristic curves (V spool), $p_s = 100$ bar



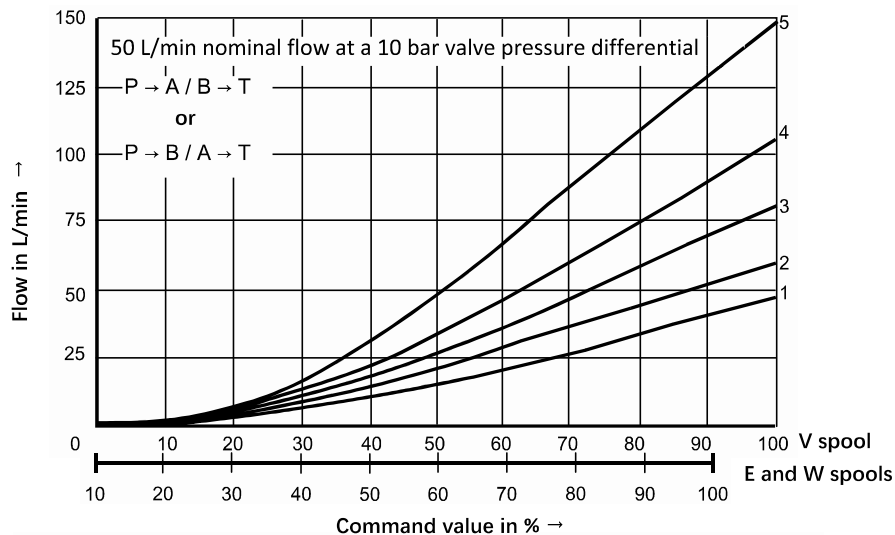
Leakage flow (with the spool in the central position) (4WRE(E) 10 V75)



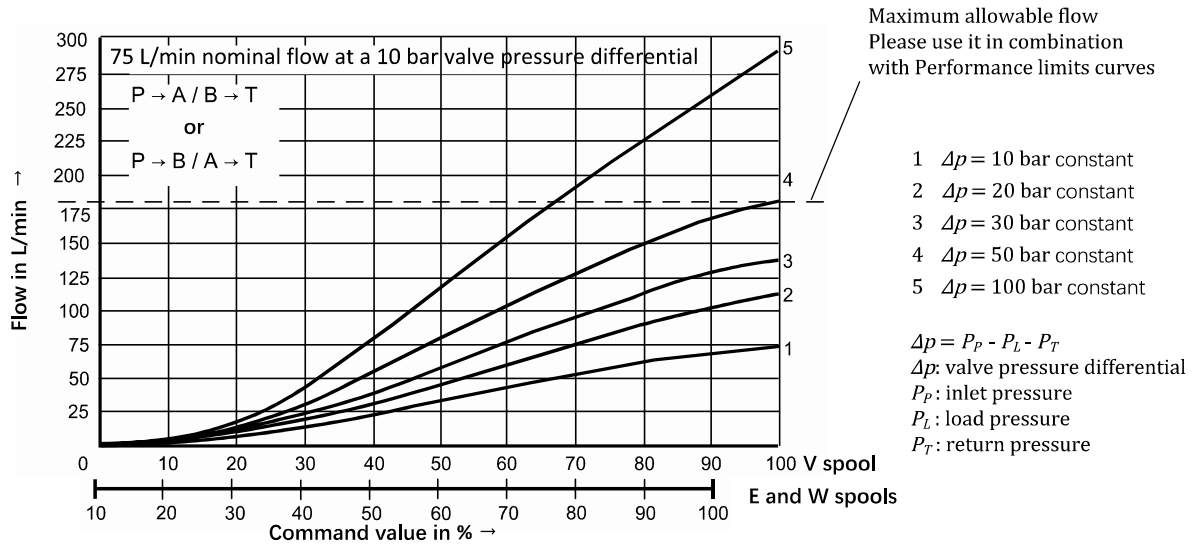
Flow characteristic curves, $P_p = 100$ bar



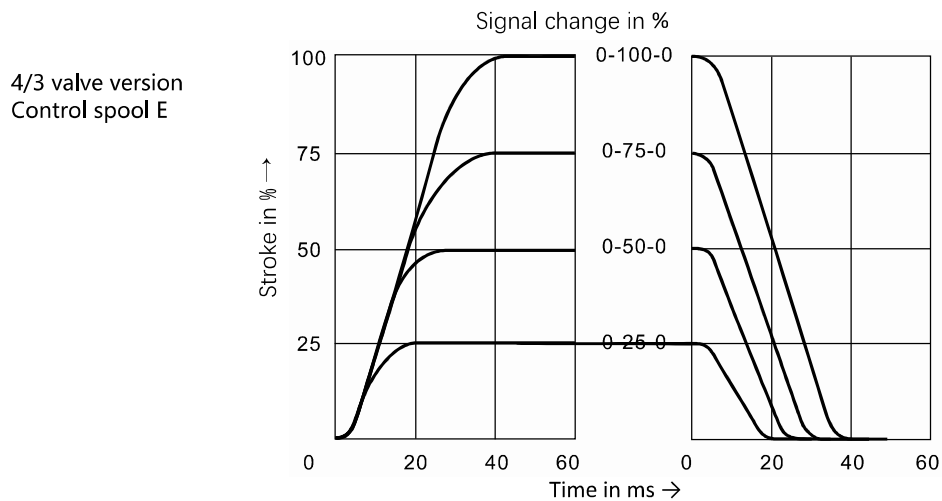
- 1 $\Delta p = 10$ bar constant
- 2 $\Delta p = 20$ bar constant
- 3 $\Delta p = 30$ bar constant
- 4 $\Delta p = 50$ bar constant
- 5 $\Delta p = 100$ bar constant



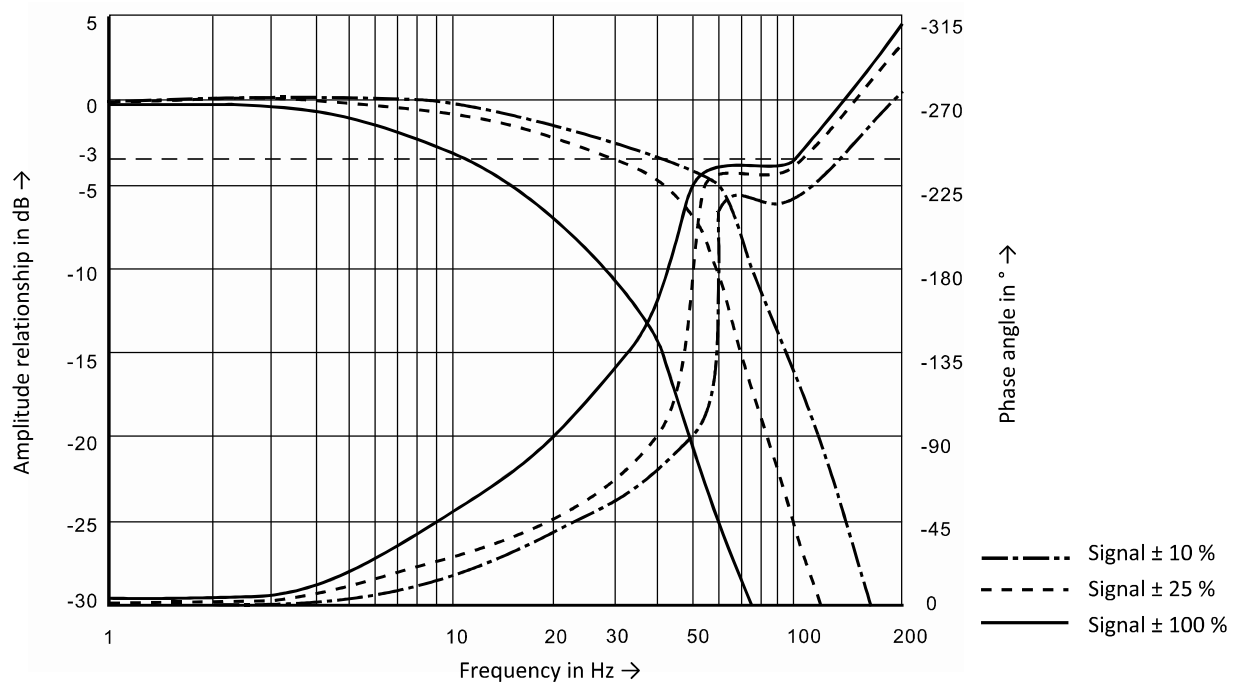
$\Delta p = P_p - P_L - P_r$
 Δp : valve pressure differential
 P_p : inlet pressure
 P_L : load pressure
 P_r : return pressure



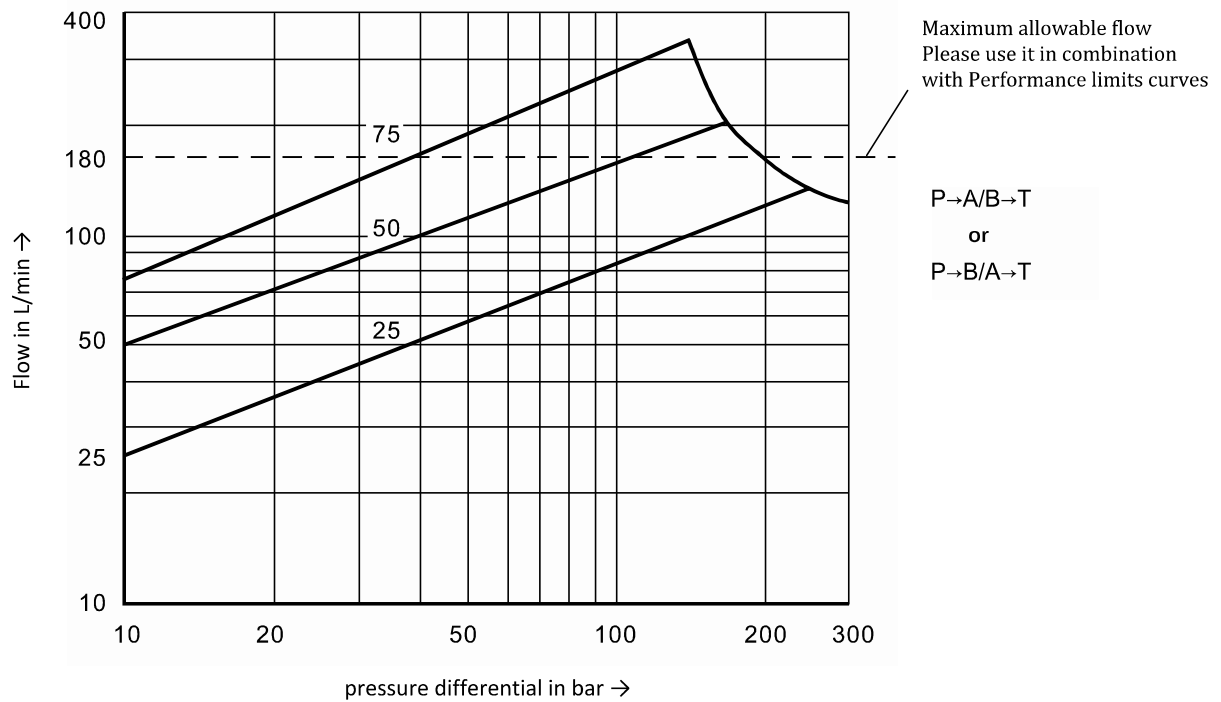
Transient function with a stepped form of electrical input signal for type 4WREE10



Frequency response characteristic curves for type 4WREE10

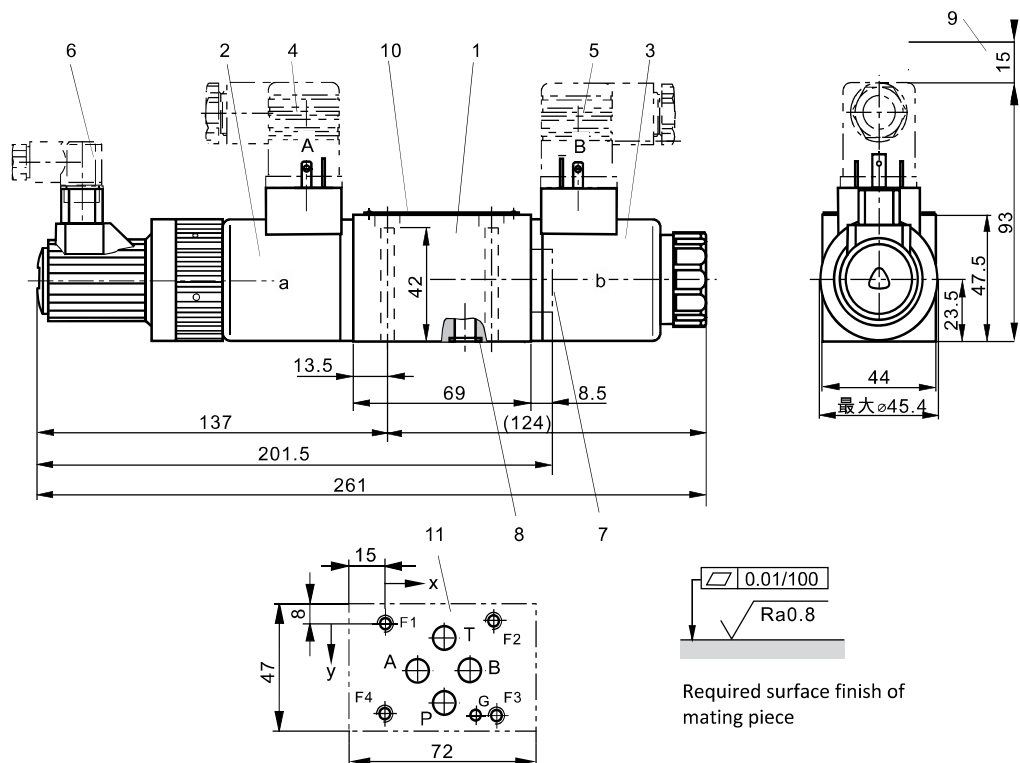


Performance limits curves nominal 25/50/75 L/min



Unit dimensions (Dimensions in mm)

4WRE6



Dimensions in mm	P	A	T	B	F1	F2	F3	F4	G
Diameter/thread	7.5 max	7.5 max	7.5 max	7.5 max	M5	M5	M5	M5	4
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 housing
- 2 Proportional solenoid "a" with inductive position transducer
- 3 Proportional solenoid "b"
- 4 Plug-in connector "A", colour grey
- 5 Plug-in connector "B", colour black
- 6 Plug-in connector for inductive position transducer
- 7 Plug for valves with one solenoid
(2 switched positions, versions **EA** or **WA**)
- 8 R-ring 9.81 x 1.5 x 1.78 (ports A, B, P, T)

- 9 Space required to remove plug-in connector
- 10 Name plate
- 11 Mounting surface, in accordance with ISO4401-03-02-0-05 oil port connection position and standard tolerances

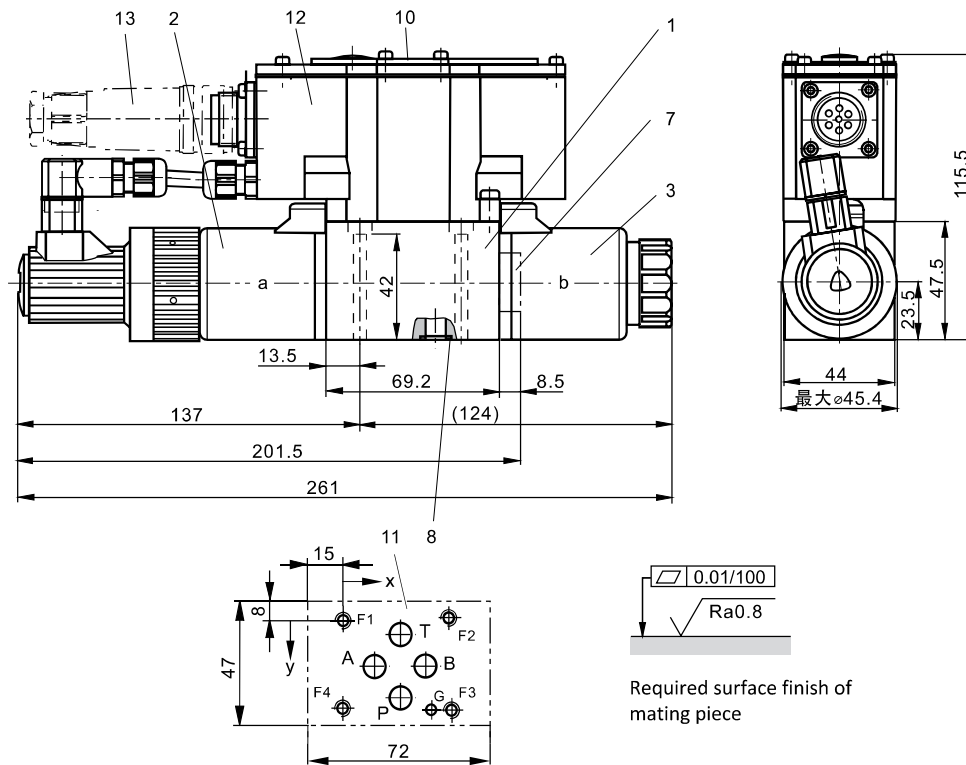
Diameters of the ports P, A, B and T are 7.5 mm

Fixing screws: 4 GB/T 70.1 - M5 x 50 10.9

Torque: 8.9 Nm $\pm$ 10 %

Unit dimensions (Dimensions in mm)

4WREE6



Dimensions in mm	P	A	T	B	F1	F2	F3	F4	G
Diameter/thread	7.5 max	7.5 max	7.5 max	7.5 max	M5	M5	M5	M5	4
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 housing
- 2 Proportional solenoid "a" with inductive position transducer
- 3 Proportional solenoid "b"
- 7 Plug for valves with one solenoid
(2 switched positions, versions **EA** or **WA**)
- 8 R-ring 9.81 x 1.5 x 1.78 (ports A, B, P, T)
- 10 Name plate
- 12 Integrated control electronics
- 13 Plug-in connector to DIN EN 175201-804(separate order)

- 11 Mounting surface, in accordance with ISO4401-03-02-0-05 oil port connection position and standard tolerances

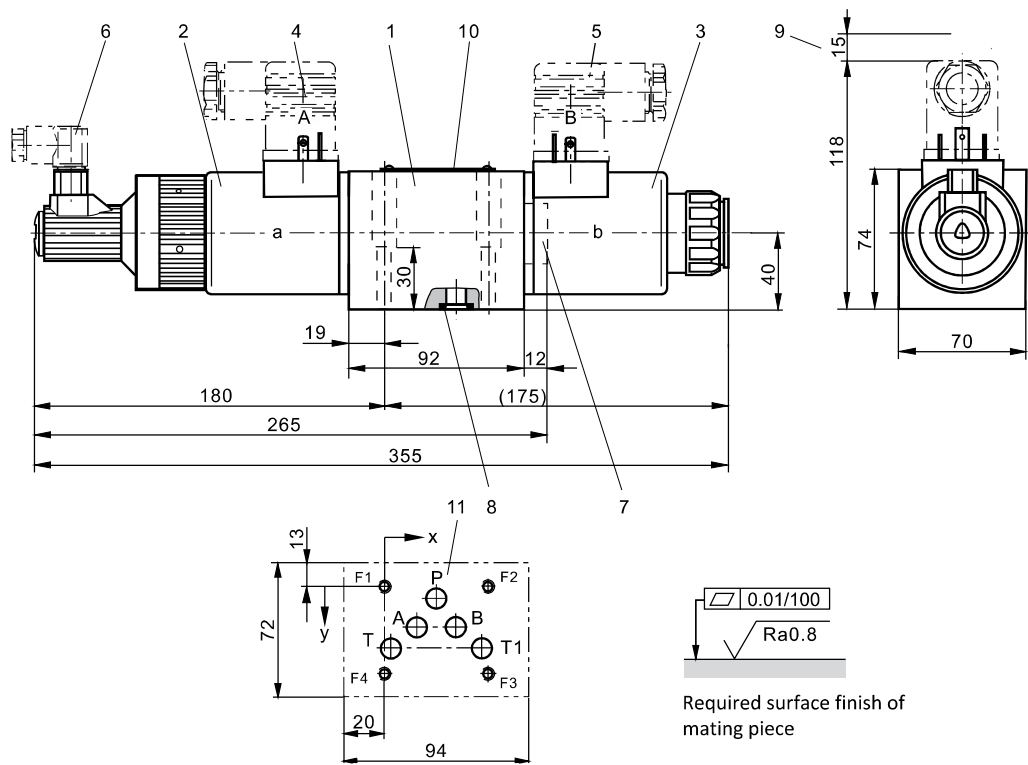
Diameters of the ports P, A, B and T are 7.5 mm

Fixing screws: 4 GB/T 70.1 - M5 x 50 10.9

Torque: 8.9 Nm ± 10 %

Unit dimensions (Dimensions in mm)

4WRE10



Dimensions in mm	P	A	T	(T1)	B	F1	F2	F3	F4
Diameter/thread	11.2 max	11.2 max	11.2 max	11.2 max	11.2 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 housing
- 2 Proportional solenoid "a" with inductive position transducer
- 3 Proportional solenoid "b"
- 4 Plug-in connector "A", colour grey
- 5 Plug-in connector "B", colour black
- 6 Plug-in connector for inductive position transducer
- 7 Plug for valves with one solenoid
(2 switched positions, versions **EA** or **WA**)
- 8 R-ring 13.0 x 1.6 x 2.0 (ports A, B, P, T)

- 9 Space required to remove plug-in connector
- 10 Name plate
- 11 Mounting surface, in accordance with ISO4401-05-04-0-05
oil port connection position and standard tolerances

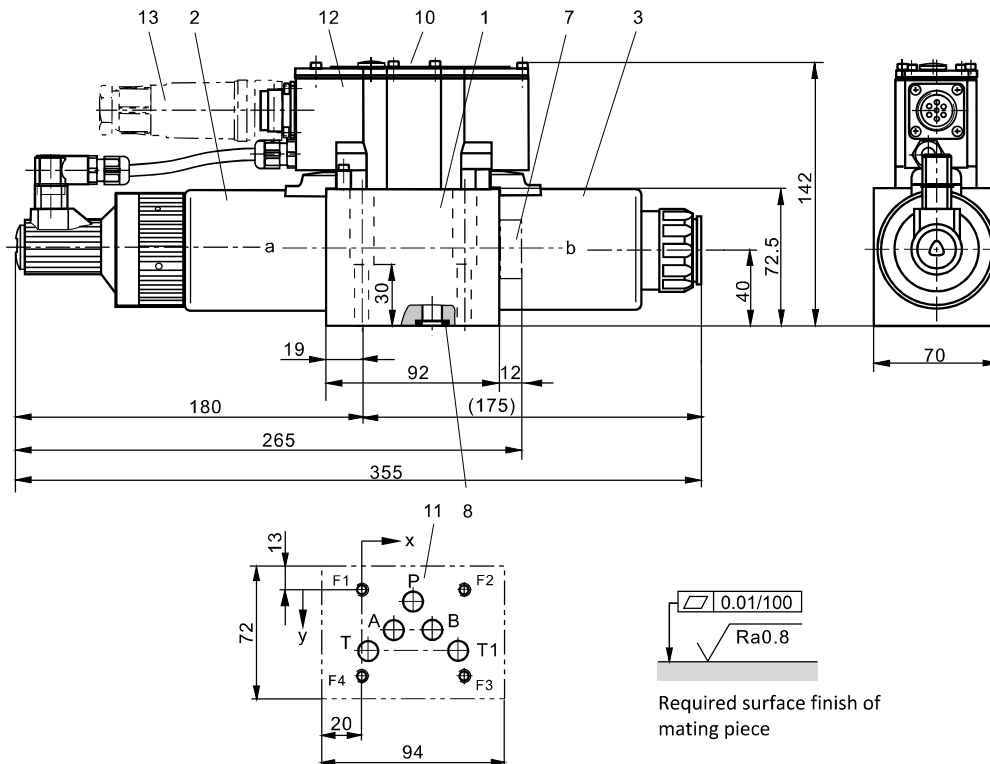
Diameters of the ports P, A, B and T are 11.2 mm

Fixing screws: 4 GB/T 70.1 - M6 x 40 10.9

Torque: 15.5 Nm $\pm$ 10 %

Unit dimensions (Dimensions in mm)

4WREE10



Dimensions in mm	P	A	T	(T1)	B	F1	F2	F3	F4
Diameter/thread	11.2 max	11.2 max	11.2 max	11.2 max	11.2 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 housing
- 2 Proportional solenoid "a" with inductive position transducer
- 3 Proportional solenoid "b"
- 7 Plug for valves with one solenoid
(2 switched positions, versions **EA** or **WA**)
- 8 R-ring 13.0 x 1.6 x 2.0 (ports A, B, P, T)
- 10 Name plate
- 11 Mounting surface, in accordance with ISO4401-05-04-0-05
oil port connection position and standard tolerances
- 12 Integrated control electronics
- 13 Plug-in connector to DIN EN 175201-804(separate order)

Fixing screws: 4 GB/T 70.1 - M6 x 40 10.9

Torque: 15.5 Nm $\pm$ 10 %