

**RE 29 061/02.03**

Replaces: 09.00

**4/2 and 4/3 proportional directional valves  
direct operated, with electrical position  
feedback****Types 4WRE and 4WREE**

Nominal sizes 6 and 10

Series 2X

Maximum operating pressure 315 bar

Maximum flow 80 L/min (NS 6)

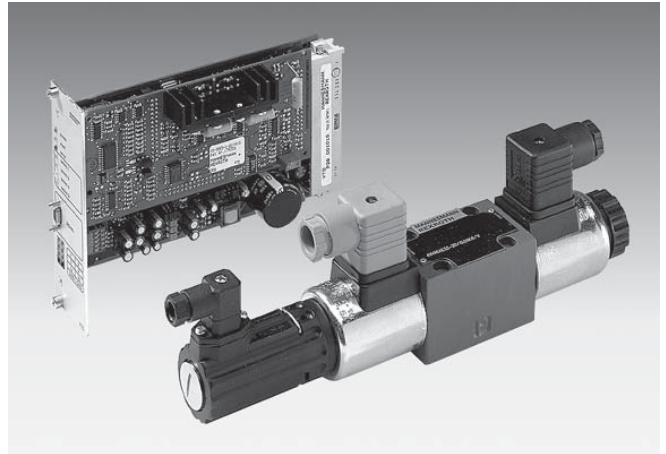
Maximum flow 180 L/min (NS 10)

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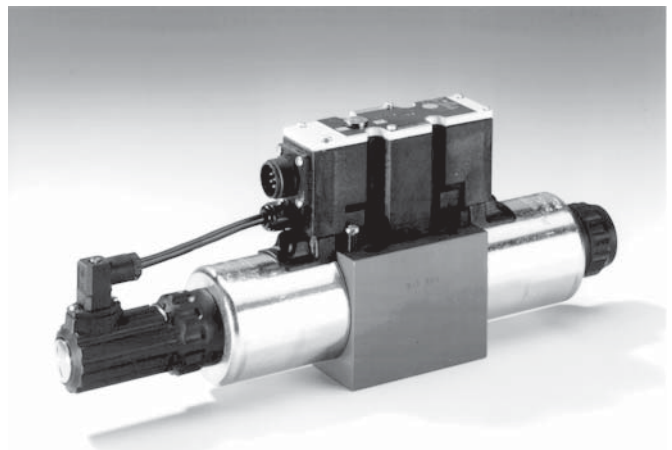
**Features**

- Direct operated proportional directional valve for the control of the direction and magnitude of a flow
- Operation is by proportional solenoids with a central thread and removable coil
- Electrical position feedback
- 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 (NS 6) and RE 45 054 (NS 10) separate order, see pages 16 and 17
- Spring centred control spool
- Type 4WREE, integrated valve electronics with interface A1 or F1
- Control electronics for types 4WRE and 4WRE..A.. (see page 6)
  - Digital amplifier VT-VRPD-2-1X/V0/0 in Eurocard format, (separate order)
  - Analogue amplifier VT-VRPA2-.-1X in Eurocard format, (separate order)
  - Analogue amplifier VT-MRPA2-.-1X (modular amplifier) (separate order)



H/A/D 5881/97

Type 4WRE 6 ...-2X/G24K4/V with plug-in connectors and associated control electronics (separate order)



H/A/D 5732/97

Type 4WREE 10 ...-2X/G24K31/A1V with integrated control electronics



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**Preferred types** (readily available)

**NS 6**

Material No.	Type WRE
R900933478	4WRE 6 E08-2X/G24K4/V
R900954092	4WRE 6 E16-2X/G24K4/V
R900926366	4WRE 6 E32-2X/G24K4/V
R900954093	4WRE 6 E1-16-2X/G24K4/V
R900954094	4WRE 6 E1-32-2X/G24K4/V
R900941264	4WRE 6 W08-2X/G24K4/V
R900944121	4WRE 6 W16-2X/G24K4/V
R900933480	4WRE 6 W32-2X/G24K4/V
R900954095	4WRE 6 W1-16-2X/G24K4/V
R900954096	4WRE 6 W1-32-2X/G24K4/V
R900954097	4WRE 6 V08-2X/G24K4/V
R900954098	4WRE 6 V16-2X/G24K4/V
R900954099	4WRE 6 V32-2X/G24K4/V

Material No.	Type WREE
R900912156	4WREE 6 E08-2X/G24K31/A1V
R900920567	4WREE 6 E16-2X/G24K31/A1V
R900907114	4WREE 6 E32-2X/G24K31/A1V
R900915686	4WREE 6 E1-16-2X/G24K31/A1V
R900928553	4WREE 6 E1-32-2X/G24K31/A1V
R900923000	4WREE 6 W08-2X/G24K31/A1V
R900925657	4WREE 6 W16-2X/G24K31/A1V
R900911004	4WREE 6 W32-2X/G24K31/A1V
R900939627	4WREE 6 W1-16-2X/G24K31/A1V
R900913359	4WREE 6 W1-32-2X/G24K31/A1V
R900909367	4WREE 6 V08-2X/G24K31/A1V
R900907440	4WREE 6 V16-2X/G24K31/A1V
R900911681	4WREE 6 V32-2X/G24K31/A1V

**NS 10**

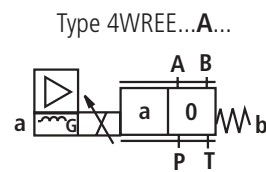
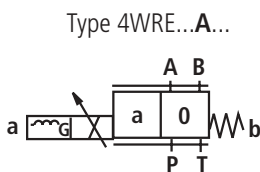
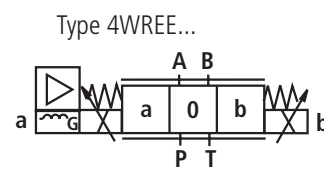
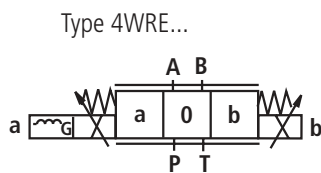
Material No.	Type WRE
R900954100	4WRE 10 E25-2X/G24K4/V
R900954101	4WRE 10 E50-2X/G24K4/V
R900954102	4WRE 10 E75-2X/G24K4/V
R900954103	4WRE 10 E1-50-2X/G24K4/V
R900954104	4WRE 10 E1-75-2X/G24K4/V
R900954105	4WRE 10 W25-2X/G24K4/V
R900954106	4WRE 10 W50-2X/G24K4/V
R900954107	4WRE 10 W75-2X/G24K4/V
R900954113	4WRE 10 W1-50-2X/G24K4/V
R900954114	4WRE 10 W1-75-2X/G24K4/V
R900954115	4WRE 10 V25-2X/G24K4/V
R900954116	4WRE 10 V50-2X/G24K4/V
R900954117	4WRE 10 V75-2X/G24K4/V

Material No.	Type WREE
R900933073	4WREE 10 E25-2X/G24K31/A1V
R900927231	4WREE 10 E50-2X/G24K31/A1V
R900927230	4WREE 10 E75-2X/G24K31/A1V
R900933076	4WREE 10 E1-50-2X/G24K31/A1V
R900927232	4WREE 10 E1-75-2X/G24K31/A1V
R900933074	4WREE 10 W25-2X/G24K31/A1V
R900931371	4WREE 10 W50-2X/G24K31/A1V
R900927233	4WREE 10 W75-2X/G24K31/A1V
R900933077	4WREE 10 W1-50-2X/G24K31/A1V
R900927234	4WREE 10 W1-75-2X/G24K31/A1V
R900933075	4WREE 10 V25-2X/G24K31/A1V
R900927235	4WREE 10 V50-2X/G24K31/A1V
R900924607	4WREE 10 V75-2X/G24K31/A1V

Further preferred types and standard components can be found in the EPS (Standard Price List).

**Symbols**



## Function, section

The 4/2 and 4/3 proportional directional valves are direct operated 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:

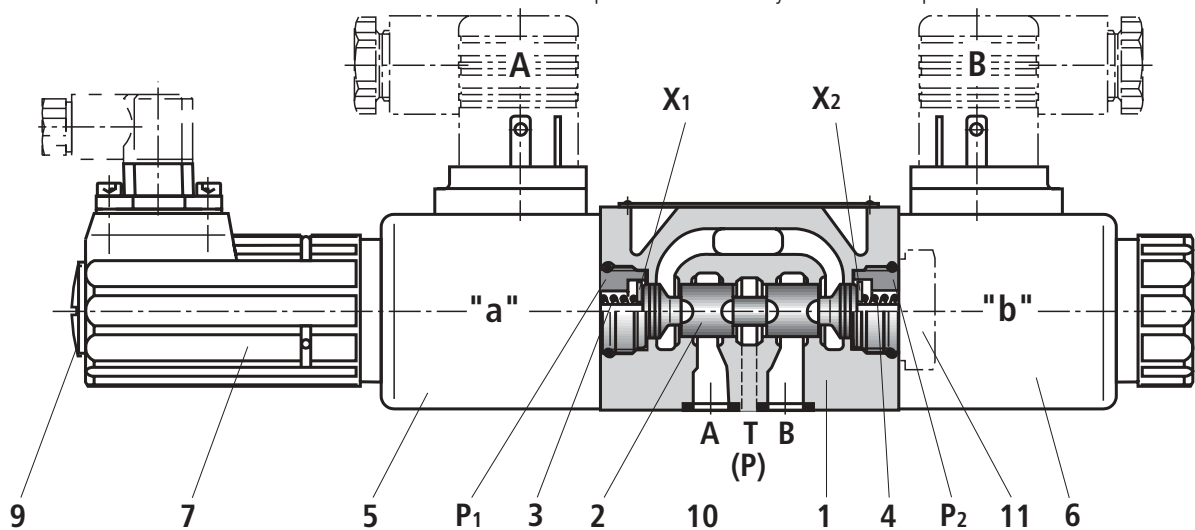
The valve basically consists of:

- Housing (1) with mounting face
- Control spool (2) with compression springs (3 and 4) and spring plates ( $X_1$  and  $X_2$ )
- Solenoids (5 and 6) and pole tube ( $P_1$  and  $P_2$ ) with central thread
- Position transducer (7)
- Optional integrated control electronics (8)
- The mechanical zero point adjustment (9) is accessible via the Pg13.5 and the electrical zero point is accessible via the Pg 7 (10) (type 4WREE)

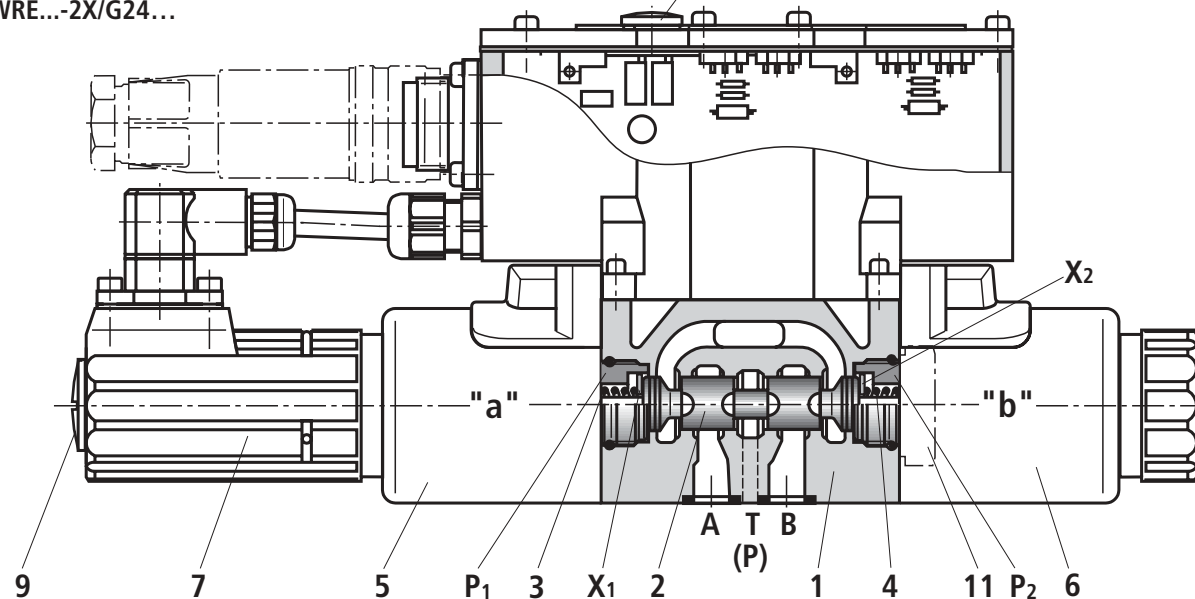
### Functional description:

- With the solenoids (5 and 6), de-energised, the control spool (2) is held in the central position by the compression springs (3 and 4) between the spring plates ( $X_1$  and  $X_2$ )
- Direct operation of the control spool (2) by energising one of the proportional solenoids, e.g. control of solenoid "b" (6)
  - Movement of 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 like cross-sections with progressive flow characteristics
- De-energising of solenoid (6)
  - 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 centre position by the solenoid return springs. This, for the spool symbol "V", does not relate to the hydraulic centre position! When the electrical valve closed loop control circuit is closed then the spool is positioned in the hydraulic centre position.



Type 4WRE...-2X/G24...



Type 4WREE...-2X/G24...

### 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 switched positions. The 2 switched position valves are however, **only fitted with solenoid "a"** (5). A plug (11) is fitted in place on the 2nd proportional solenoid.

### Note for type 4WRE...-2X/G24...:

Draining of the tank line is to be prevented. Taking the installation conditions into account a back pressure valve is to be fitted (back pressure approx. 2 bar).

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

General		NS 6	NS 10
Installation		Optional, preferably horizontal	
Storage temperature range		°C – 20 to + 80	
Ambient	4WRE	°C – 20 to + 70	
temperature range	4WREE	°C – 20 to + 50	
Weight	4WRE	kg	2.2
	4WREE	kg	2.4
			6.3
			6.5

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

Operating pressure	Ports A, B, P	bar	Up to 315	
	Port T	bar	Up to 210	
Nominal flow $q_{V, nom}$ at $\Delta p = 10 \text{ bar}$		L/min	8	25
			16	50
			32	75
Max. permissible flow		L/min	80	180
Pressure fluid		Mineral oil (HL, HLP) to DIN 51 524, other pressure fluids on request		
Pressure fluid temperature range		°C – 20 to + 80, preferably + 40 to + 50		
Viscosity range		mm <sup>2</sup> /s 20 to 380, preferably 30 to 46		
ISO code cleanliness class		Maximum permissible degree of contamination of the pressure fluid is to ISO 4406 (C) 20/18/15 <sup>1)</sup>		
Hysteresis		% ≤ 0.1		
Reversal span		% ≤ 0.05		
Response sensitivity		% ≤ 0.05		
Zero point displacement with changes to the pressure fluid temperature and operating temperature		%/10 K	0.15	
		%/100 bar	0.1	

**Electrical**

Voltage type		DC		
Command value signal for 4WREE	Voltage input "A1"	V	± 10 (see page 8)	
	Current input "F1"	mA	4 to 20 (see page 8)	
Solenoid coil resistance	Cold value at 20 °C	Ω	2.7	3.7
	Max. warm value	Ω	4.05	5.55
Duty		% 100		
Max. coil temperature <sup>2)</sup>		°C Up to 150		
Electrical connection	WRE	With component plug to DIN EN 175 301-803 and ISO 4400		
		Plug-in connector to DIN EN 175 301-803 and ISO 4400 <sup>3)</sup>		
	WREE	With component plug to DIN EN 175 201-804		
		Plug-in connector to DIN EN 175 201-804 <sup>3)</sup>		
Valve protection to DIN 40 050		IP 65 with mounted and fixed plug-in connector		

<sup>1)</sup> The cleanliness class stated for the components must be adhered too in hydraulic systems. Effective filtration prevents faults from occurring and at the same time increases the component service life. For the selection of filters see catalogue sheets: RE 50070, RE 50 076 and RE 50 081.

<sup>2)</sup> Due to the occurring surface temperature of the solenoid coils, the European Standards EN 563 and EN 982 must be taken into account!

<sup>3)</sup> Separate order

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

### Control electronics

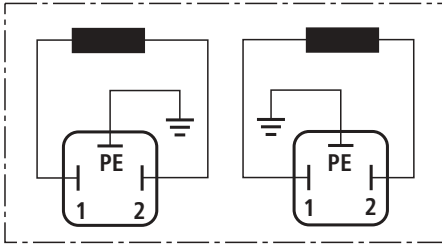
For 4WRE			
Amplifier in Eurocard format (separate order)	Digital		VT-VRPD-2-1X/V0/0 to catalogue sheet RE 30 125
	Analogue	for NS 6	VT-VRPA2-1-1X/V0... to catalogue sheet RE 30 119
		for NS 10	VT-VRPA2-2-1X/V0... to catalogue sheet RE 30 119
Modular amplifier	Analogue	for NS 6	VT-MRPA2-1 to catalogue sheet RE 30 219
		for NS 10	VT-MRPA2-2 to catalogue sheet RE 30 219
For 4WREE			
			Integrated in the valve, see pages 9 and 10
	Analogue command value module		VT-SWMA-1-1X/... to catalogue sheet RE 29 902
	Analogue command value module		VT-SWMKA-1-1X/... to catalogue sheet RE 29 903
	Analogue command value card		VT-SWKA-1-1X/... to catalogue sheet RE 30 255
	Digital command value card		VT-SWKD-1-1X/... to catalogue sheet RE 30 121
Supply voltage	Nominal voltage	VDC	24
	Lower limiting value	V	19.4
	Upper limiting value	V	35
Amplifier power consumption	$I_{\max}$	A	< 2
	Impulse current	A	3



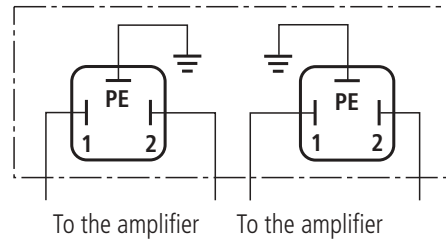
**Note:** For details regarding the **environmental simulation test** covering EMC (electro-magnetic compatibility), climate and mechanical loading see RE 29 061-U (declaration regarding environmental compatibility).

## Electrical connections

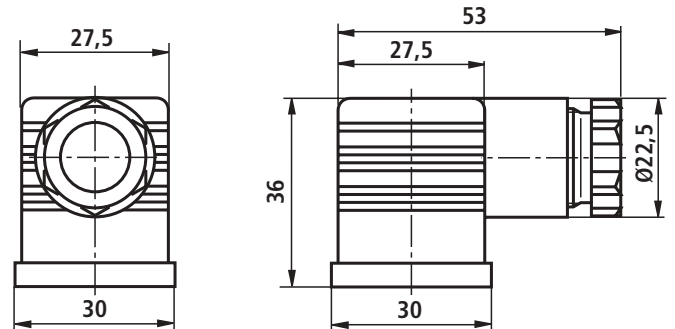
**Type 4WRE** (for external control electronics)  
Connections on the component plug



Connections on the plug-in connector

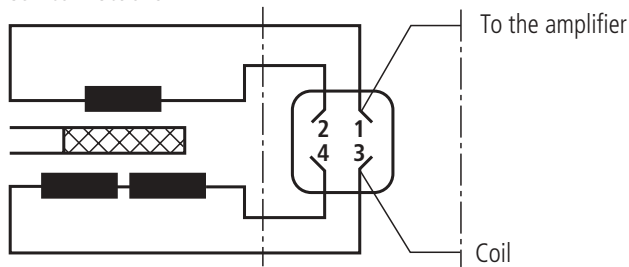


Plug-in connector CECc 75301-803-A002FA-H3008-G  
to DIN EN 175 301-803 and ISO 4400  
Solenoid **a**, colour grey  
Separate order under Material No. **R900074683**  
Solenoid **b**, colour black  
Separate order under Material No. **R900074684**

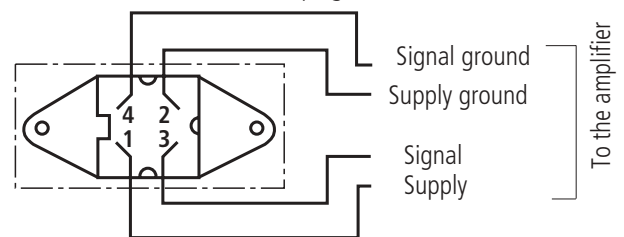


### Inductive position transducer

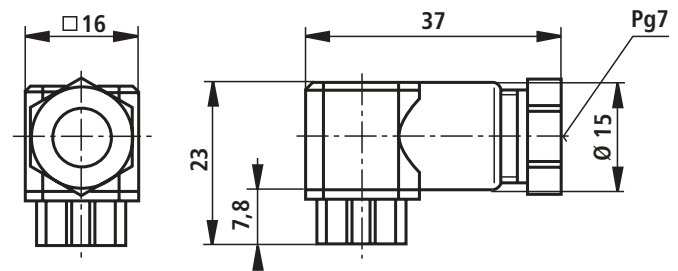
Coil connections



Connections on the plug connector



Plug-in connector 4-pin Pg7-G4W1F  
Separate order under Material No. **R900023126**  
Connection cable:  
Recommended: Up to 50 m cable length type LiYCY 4 x 0.25 mm<sup>2</sup>  
Only connect screen to PE on the supply side.



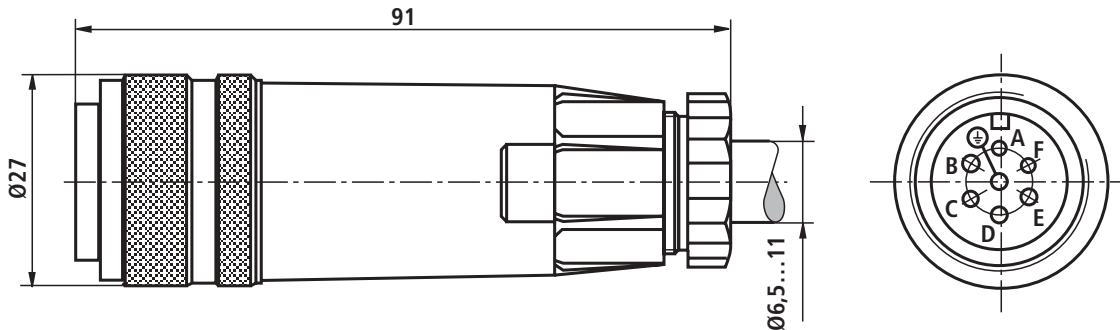
## Integrated control electronics for type 4WREE

### Plug-in connector

Plug-in connector to DIN EN 175 201-804

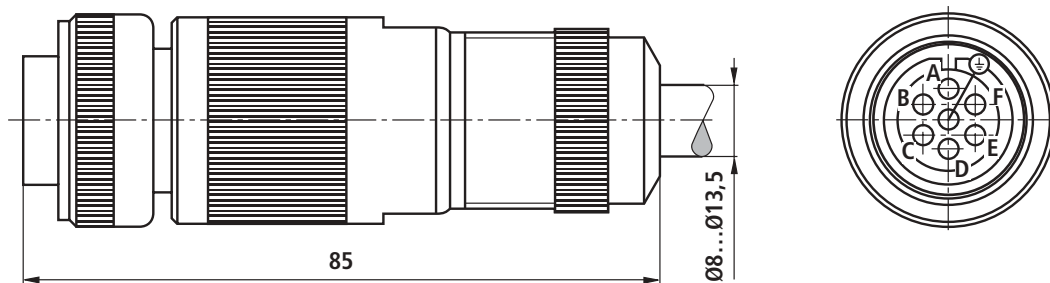
Separate order under Material No. **R900021267** (plastic version), for pin allocations see below (see block circuit diagram on page 9)

Angled form – separate order under Material No. **R900217845**



Plug-in connector to DIN EN 175 201-804

Separate order under Material No. **R900223890** (metal version)



### Component plug allocation

	Contact	Interface A1 allocation	Interface F1 allocation
Supply voltage	A	24 VDC ( $u(t) = 19.4 \text{ V to } 35 \text{ V}$ ); $I_{\text{max}} = 2 \text{ A}$	
	B	0 V	
Ref. potential actual value	C	Ref. contact F; $R_e > 50 \text{ k}\Omega$	Ref. contact F; $R_e < 10 \Omega$
Differential amplifier input	D	$\pm 10 \text{ V}$ command value; $R_e > 50 \text{ k}\Omega$ ;	4...20 mA command value; $R_e > 100 \Omega$
	E	Ref. potential command value	
Measurement output (actual valve)	F	$\pm 10 \text{ V}$ actual value, (limiting load 5 mA)	4...20 mA actual value, Load resistance max. 300 $\Omega$
	PE	Connected with cooling body and valve housing	

**Command valve:** A positive command valve 0 to +10 V (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 V (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 V (or 4 ... 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 valve 0 to +10 V (or 12 to 20 mA) at F and the reference potential at C results in a flow from P to A.

**Connection cable:** Recommended: – Up to 25 m cable length type LiYCY 7 x 0.75 mm<sup>2</sup>  
– Up to 50 m cable length type LiYCY 7 x 1.0 mm<sup>2</sup>

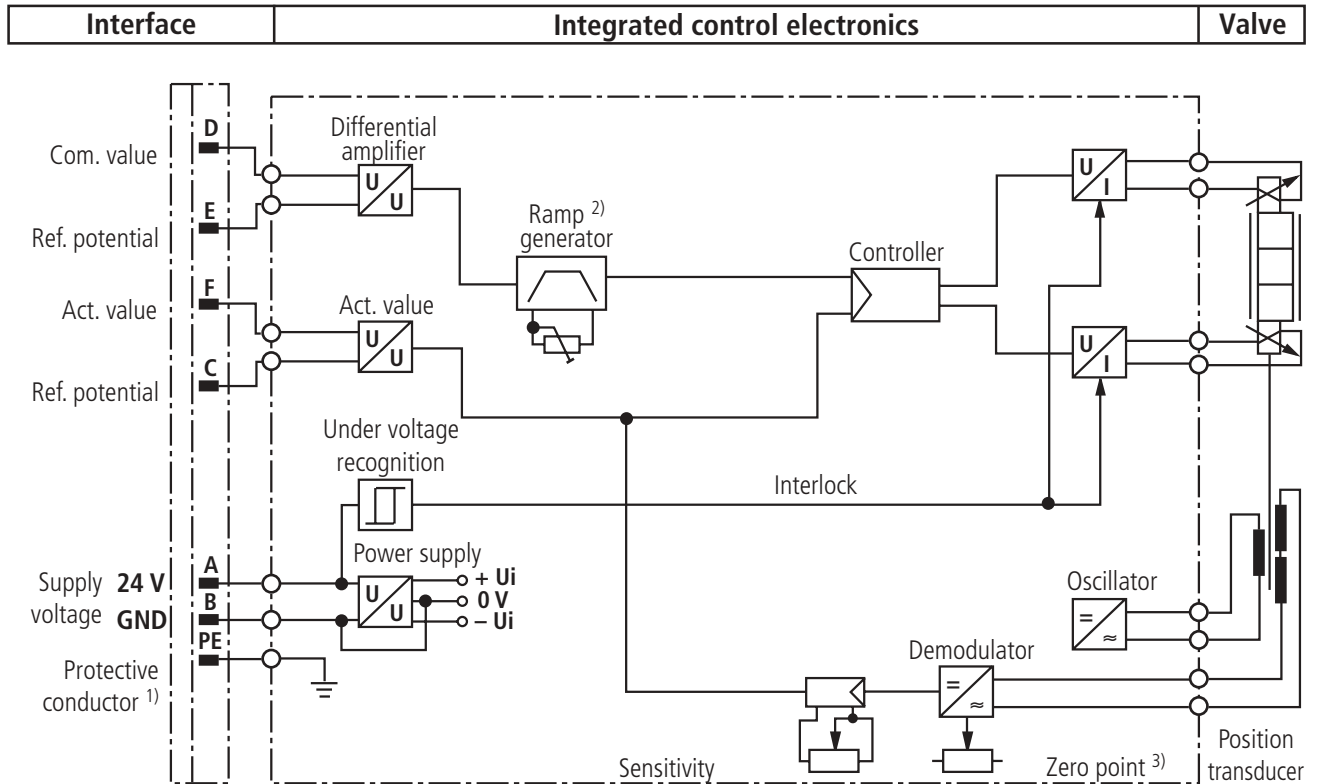
For outside diameter see plug-in connector sketch

Only connect screen to PE on the supply line.



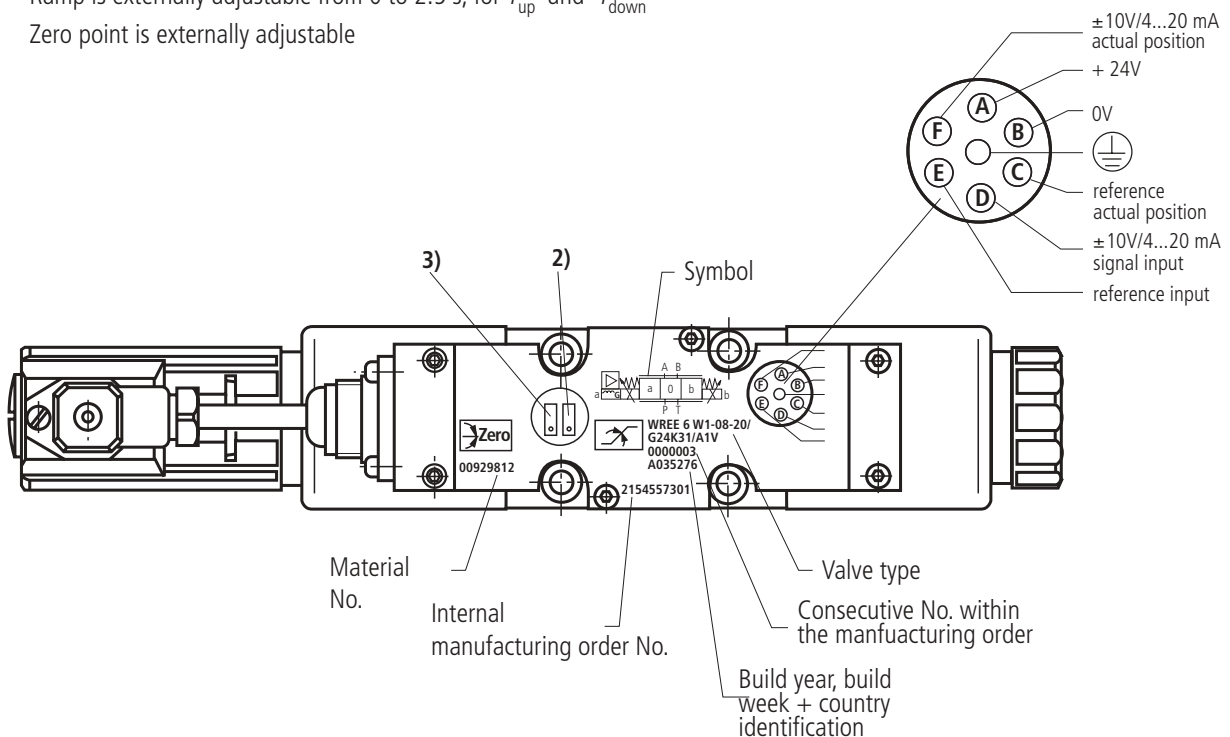
# Integrated control electronics for type 4WREE

## Block circuit diagram/connection allocation for the integrated valve electronics



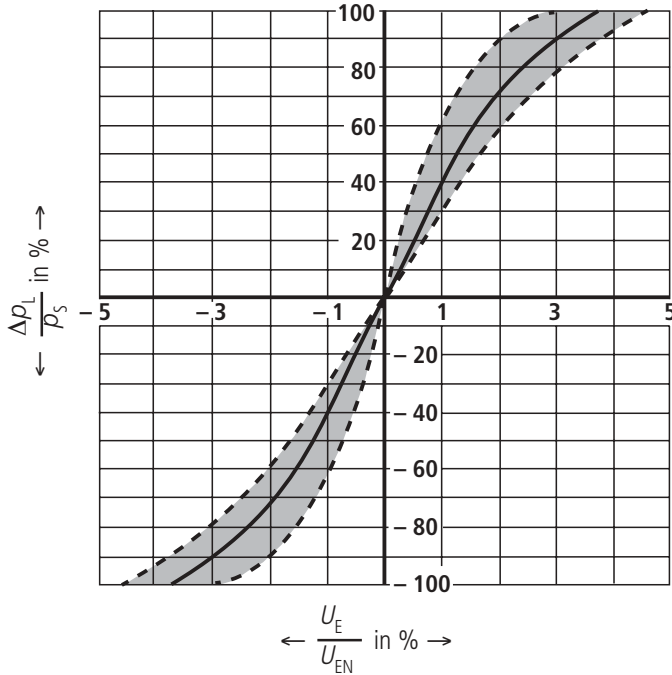
**Note:** Electrical signals processed by control electronics (e.g. actual value) must not be used for switching off safety relevant machine functions!  
 (Also see the European Standard "Safety requirements of fluid power systems and components – hydraulics", EN 982!)

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

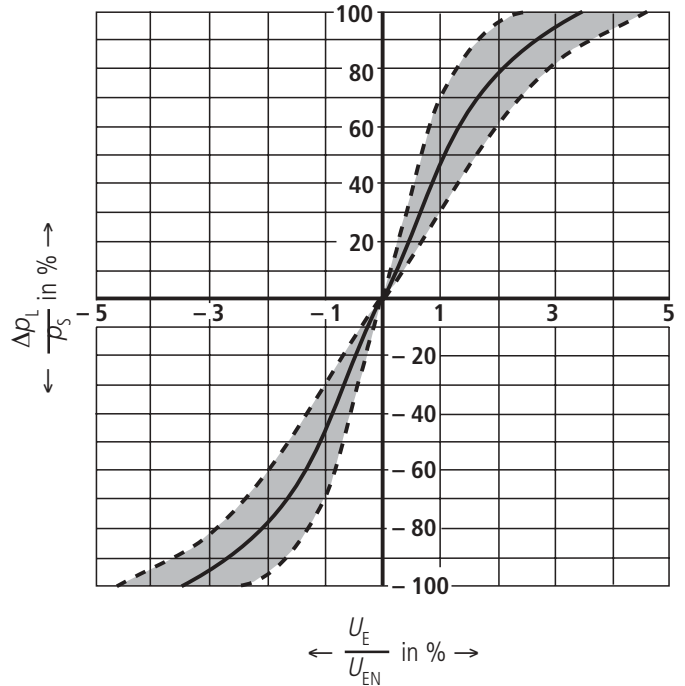


Pressure-signal-characteristic curves (V spool),  $p_s = 100\text{ bar}$

NS 6

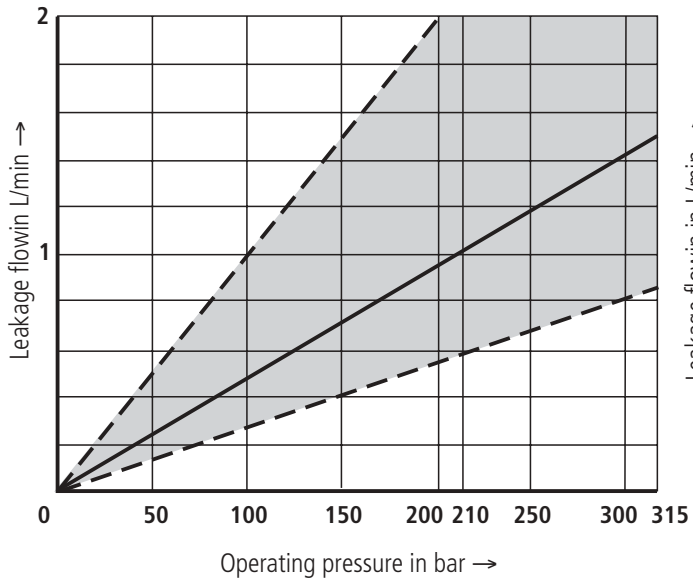


NS 10

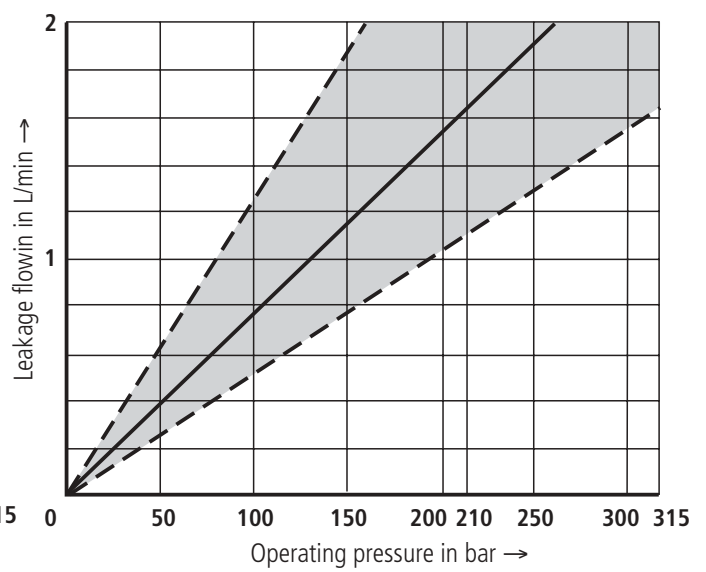


Leakage flow (with the spool in the central position)

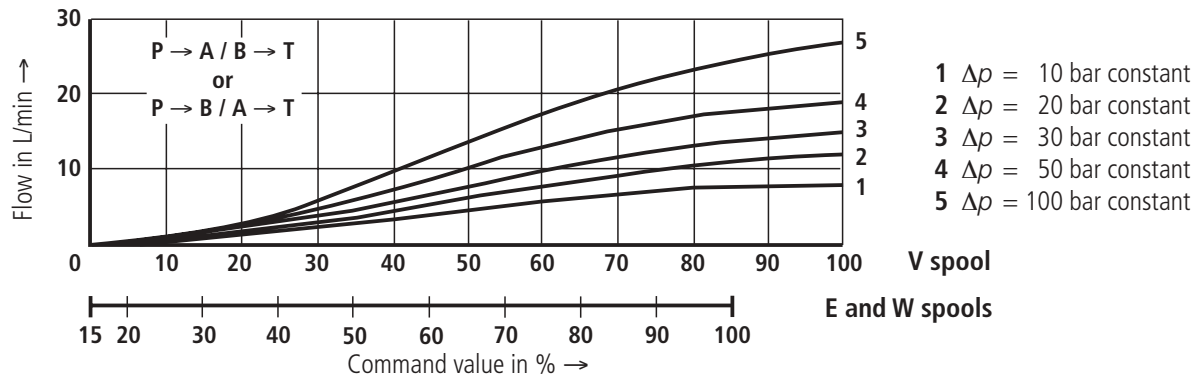
Type 4WREE 6 V32



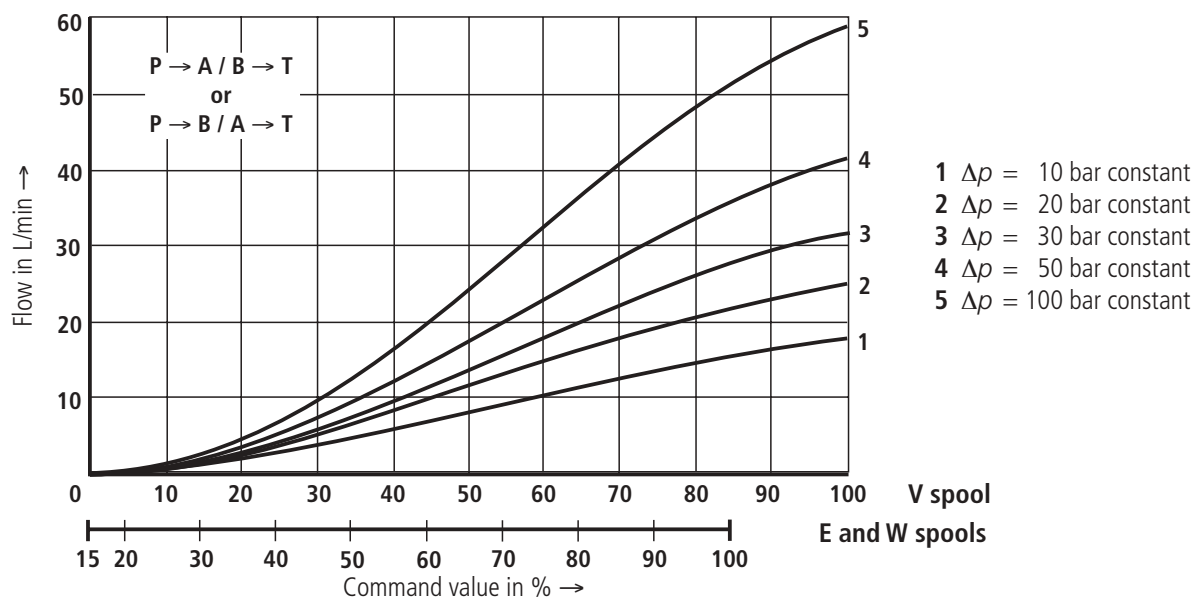
Type 4WREE 10 V75



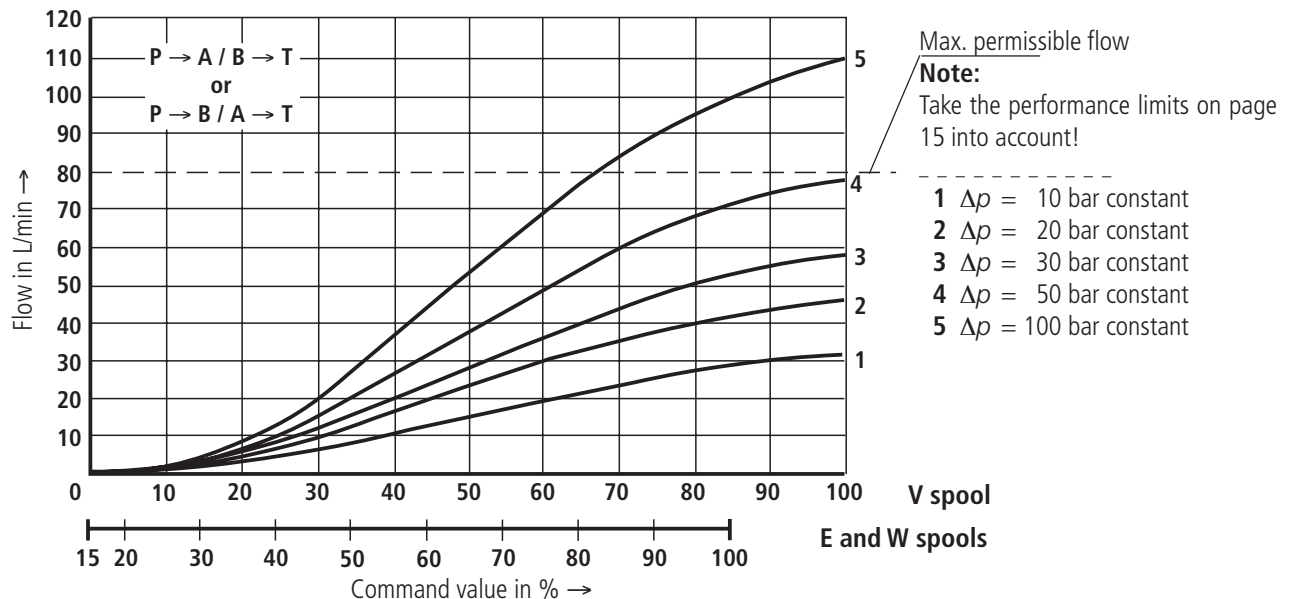
8 L/min nominal flow at a 10 bar valve pressure differential



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

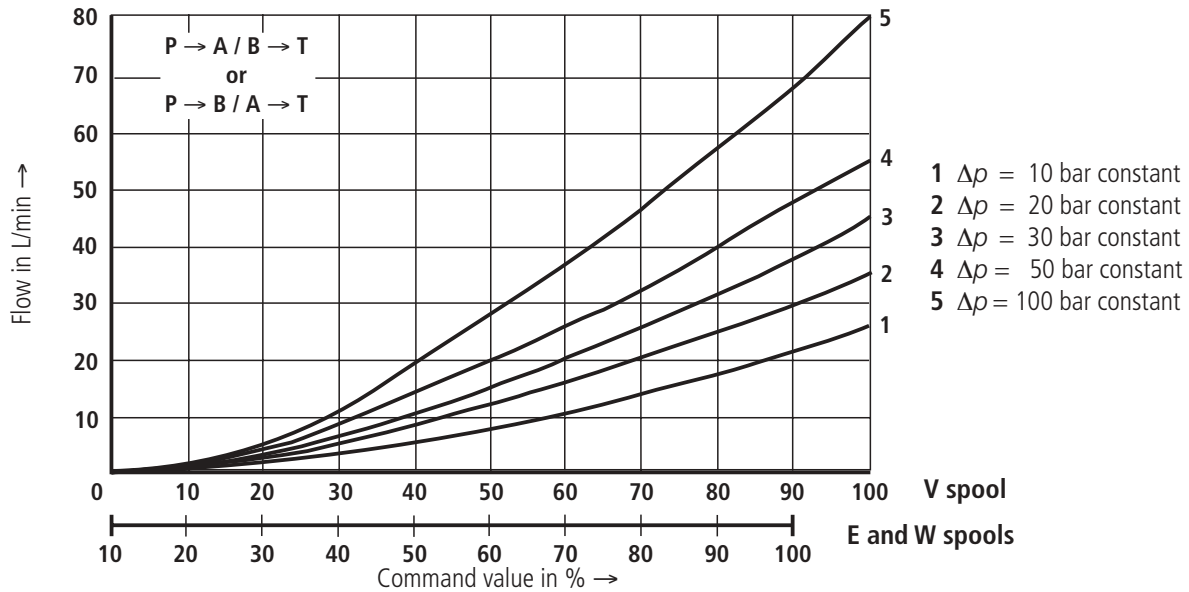


32 L/min nominal flow at a 10 bar valve pressure differential

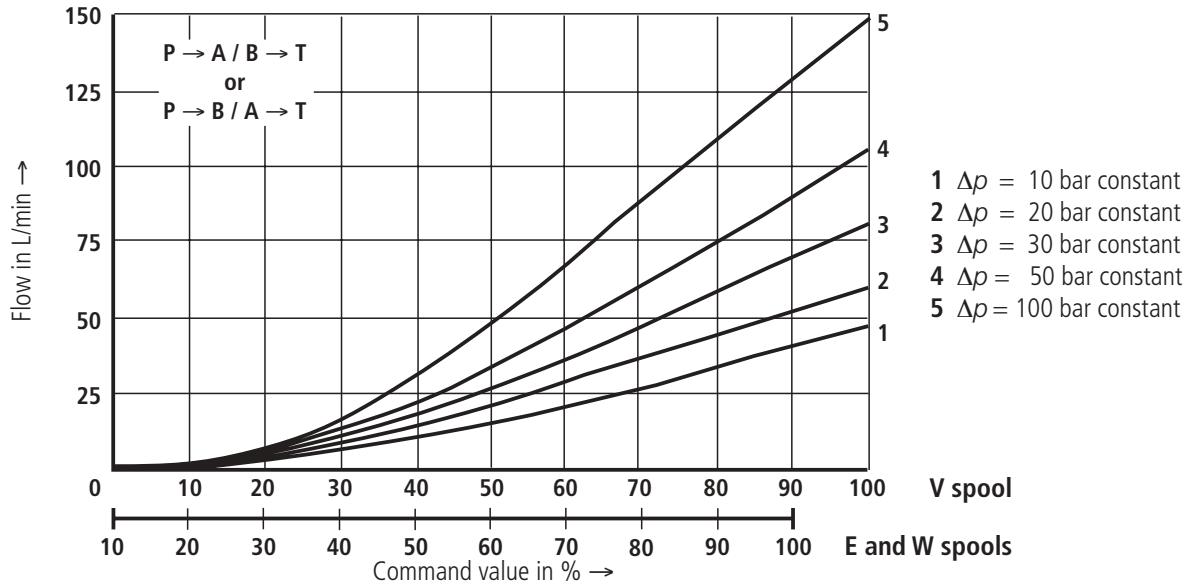


$\Delta p =$  Valve pressure differential (inlet pressure  $p_p$  minus load pressure  $p_L$  minus return pressure  $p_T$ )

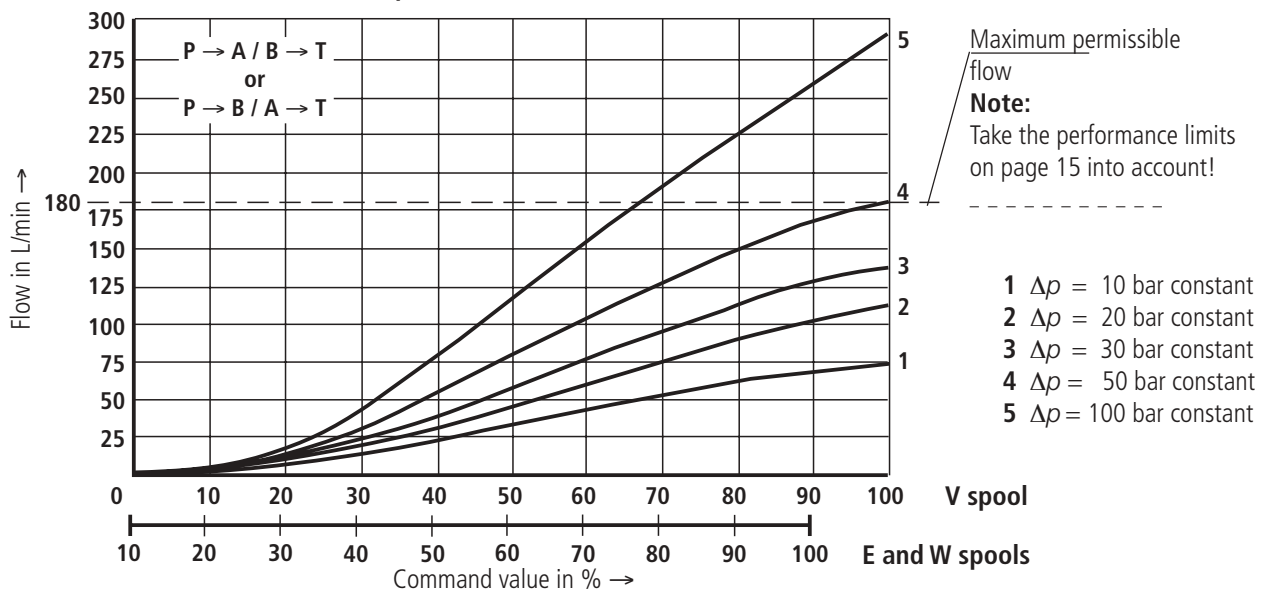
25 L/min nominal flow at a 10 bar valve pressure differential



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



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

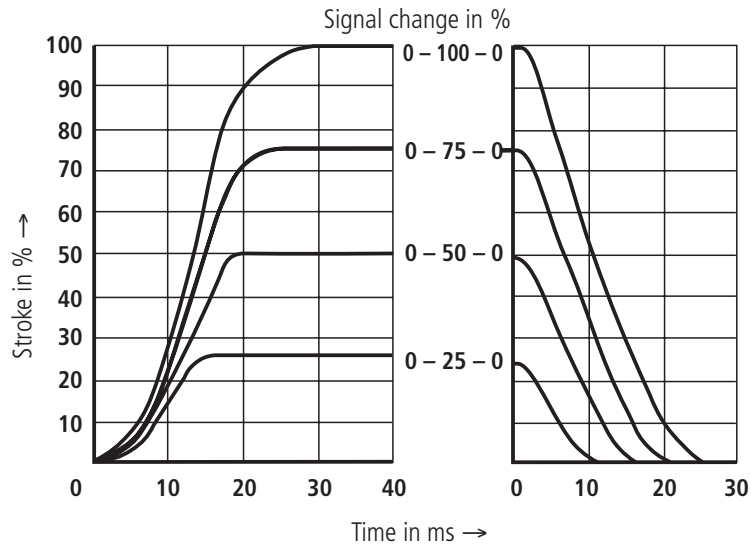


$\Delta p =$  Valve pressure differential (inlet pressure  $p_p$  minus load pressure  $p_L$  minus return pressure  $p_r$ )

(measured with HLP46,  $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$ ,  $p_s = 10\text{ bar}$ )

4/3 valve version

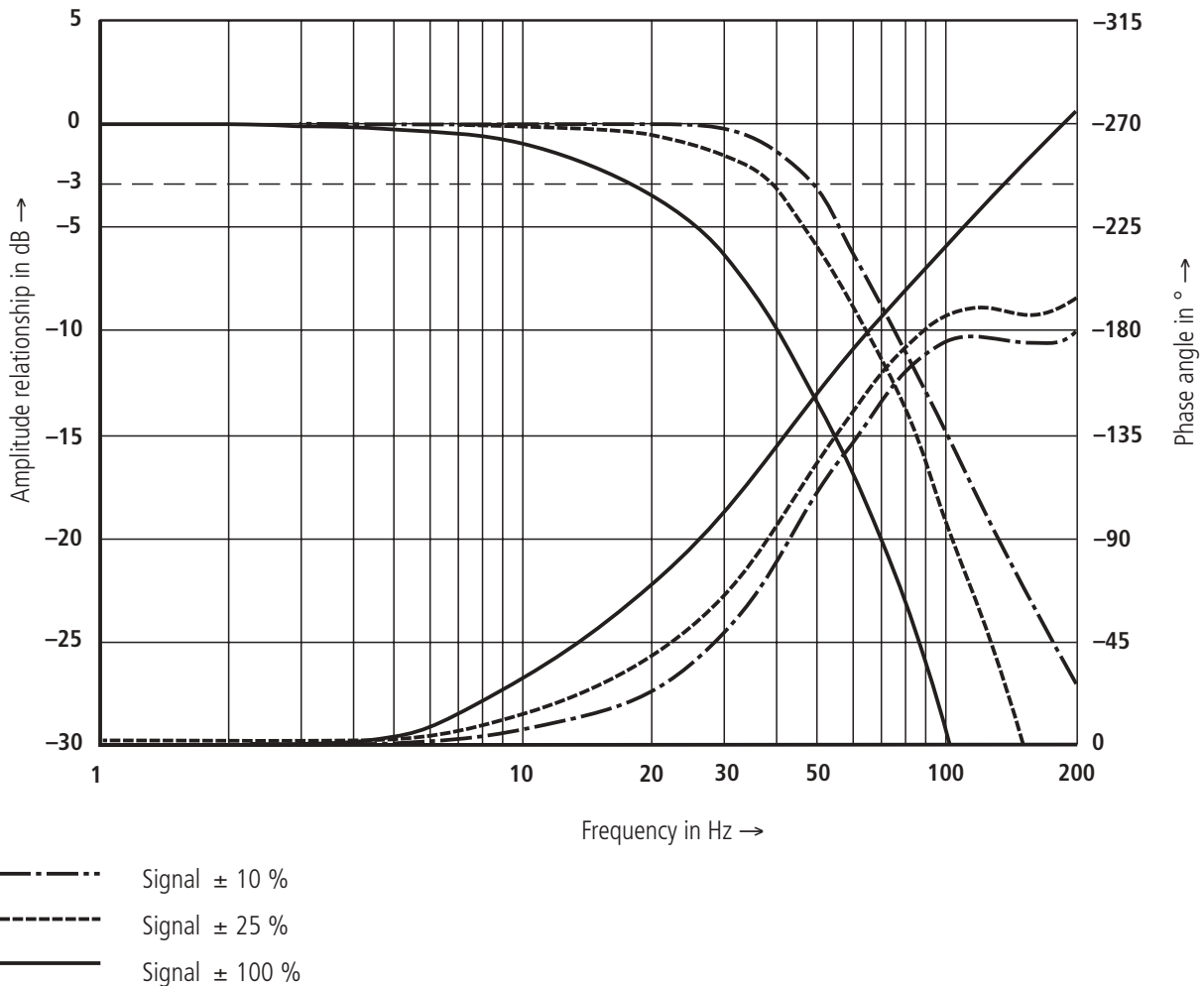
Spool symbol „E”



Frequency response characteristic curves for type 4WREE (measured with HLP46,  $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$ ,  $p_s = 10\text{ bar}$ )

4/3 valve version

Spool symbol „V”

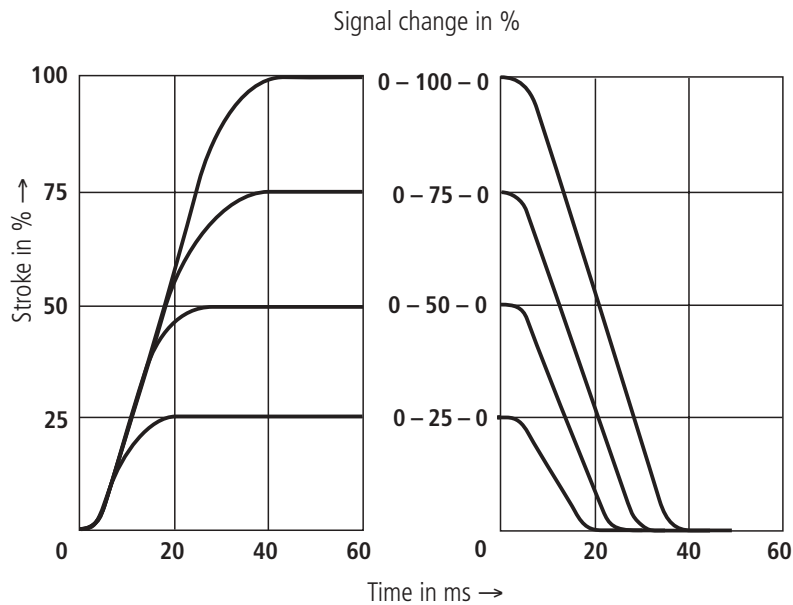


# Transient function with a stepped form of electrical input signal for type 4WREE

NS 10

(measured with HLP46,  $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$ ,  $p_s = 10\text{ bar}$ )

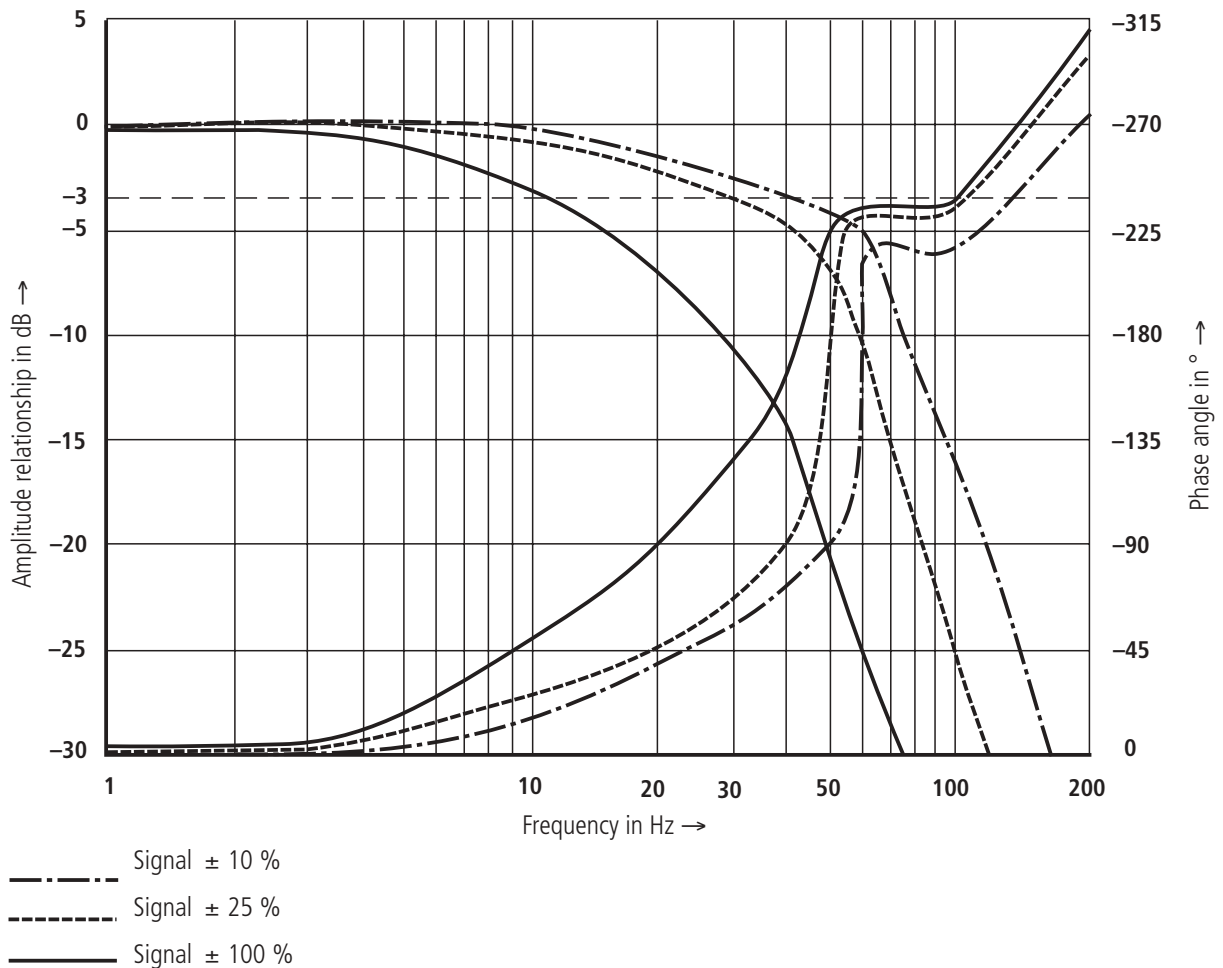
4/3 valve version  
Spool symbol „E”



# Frequency response characteristic curves for type 4WREE (measured with HLP46, $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$ , $p_s = 10\text{ bar}$ )

NS 10

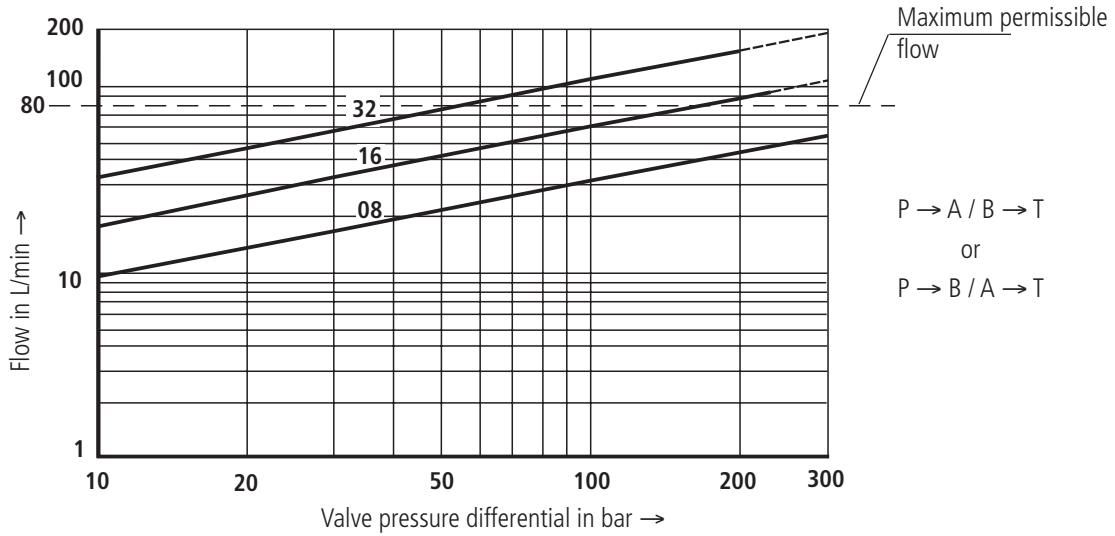
4/3 Valve version  
spool symbol „V”



Load function with maximum valve opening

Nominal flows 8 L/min, 16 L/min, 32 L/min

Spool symbol „V”

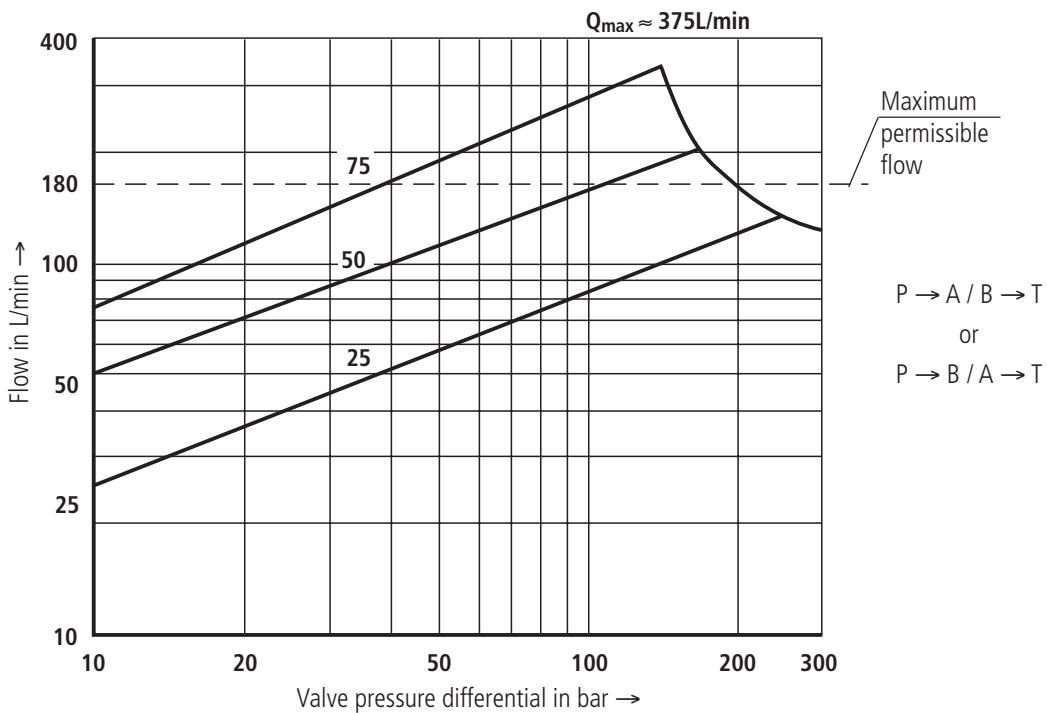


Take the maximum permissible flow of 80 L/min into account!

Load function with maximum valve opening

Nominal flows 25 L/min, 50 L/min, 75 L/min

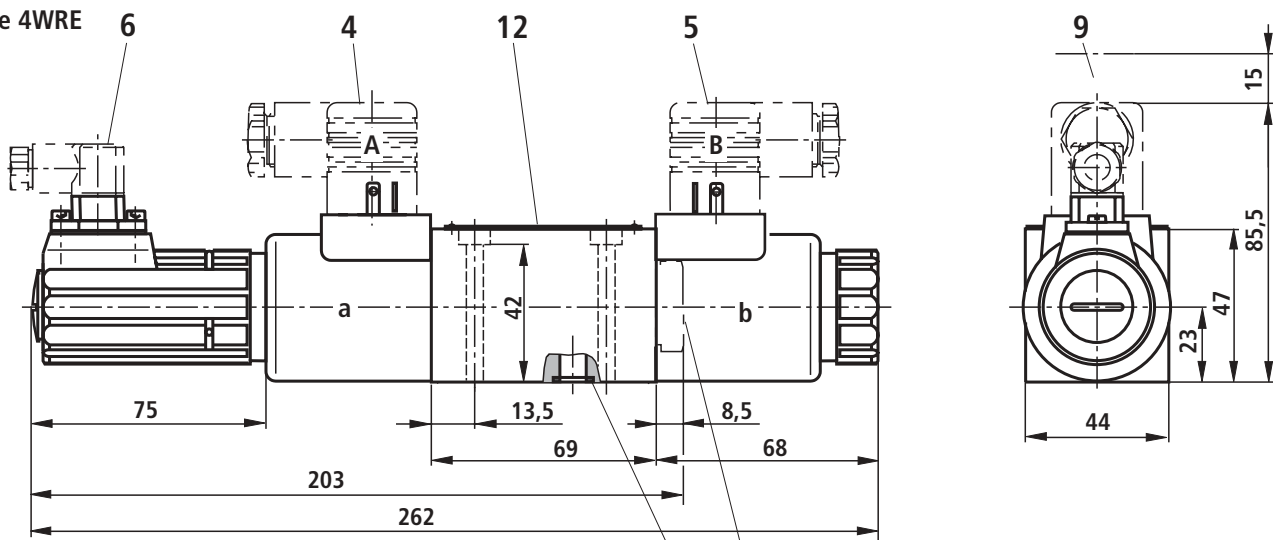
Spool symbol „V”



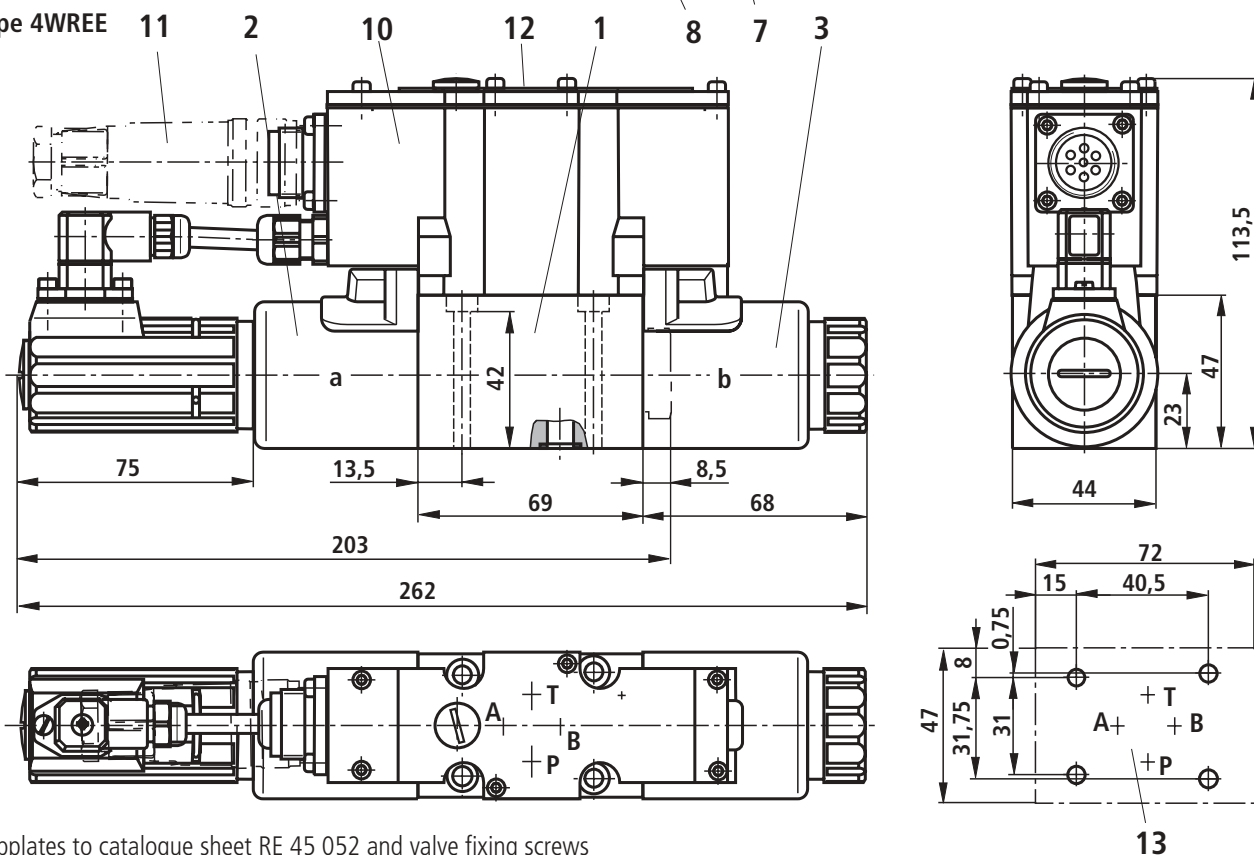
Take the maximum permissible flow of 180 L/min into account!

## Unit dimensions: NS 6 (dimensions in mm)

### Type 4WRE



### Type 4WREE



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

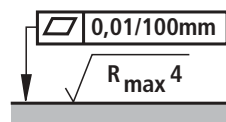
**Subplates:**  
 G341/01 (G1/4)  
 G342/01 (G3/8)  
 G502/01 (G1/2)

### Valve fixing screws:

4 off M5 x 50 DIN 912-10.9;  $M_A = 8.9 \text{ Nm}$

- 1 Valve housing
- 2 Proportional solenoid "a" with inductive position transducer
- 3 Proportional solenoid "b"
- 4 Plug-in connector "A", colour grey; to DIN EN 175 301-803 separate order, see page 7
- 5 Plug-in connector "B", colour black; to DIN EN 175 301-803 separate order, see page 7
- 6 Plug-in connector for position transducer; separate order, see page 7

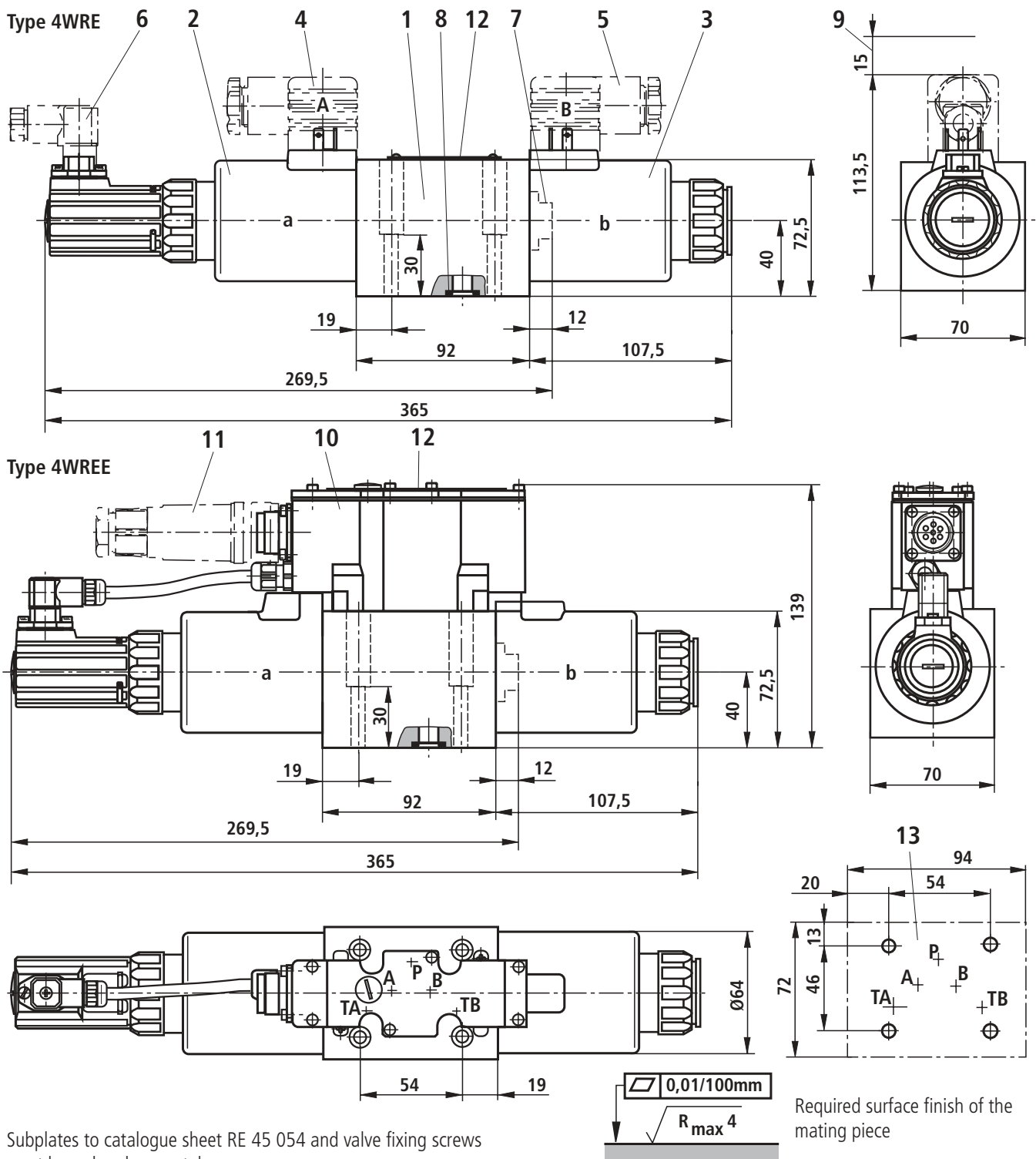
- 7 Plug for valves with one solenoid (2-switching positions), versions **EA** or **WA**
- 8 R-ring 9.81 x 1.5 x 1.78 (ports A, B, P, T)
- 9 Space required to remove the plug-in connector
- 10 Integrated control electronics
- 11 Plug-in connector to DIN EN 175 201-804 (separate order, see page 8)
- 12 Name plate
- 13 Machined valve mounting surface and location of the connections to DIN 24 340 form A, ISO 4401 and CETOP-RP121H



Required surface finish of the mating piece



**Unit dimensions: NS 10** (dimensions in mm)



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

**Subplates:**  
 G66/01 (G3/8)  
 G67/01 (G1/2)  
 G534/01 (G3/4)

**Valve fixing screws:**

4 off M6 x 40 DIN 912-10.9;  $M_A = 15.5 \text{ Nm}$

- 1 Valve housing
- 2 Proportional solenoid "a" with inductive position transducer
- 3 Proportional solenoid "b"
- 4 Plug-in connector "A", colour grey to DIN EN 175 301-803 separate order, see page 7
- 5 Plug-in connector "B", colour black to DIN EN 175 301-803 separate order, see page 7

6 Plug-in connector for inductive position transducer; separate order, see page 7

7 Plug for valves with one solenoid (2-switching positions), versions **EA** or **WA**

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

9 Space required to remove the plug-in connector

10 Integrated control electronics

11 Plug-in connector to DIN EN 175 201-804; separate order, see page 8

12 Name plate

13 Machined valve mounting surface and location of the connections to DIN 24 340 form A, ISO 4401 and CETOP-RP121H

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