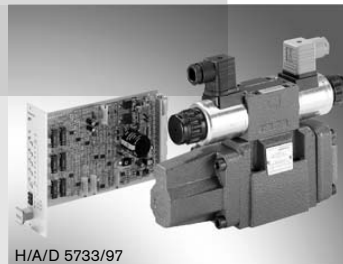


# 4/2, 4/3 and 5/2, 5/3 proportional directional valves, pilot operated, without electrical position feedback

**RE 29115/10.05**  
Replaces: 04.05

1/24

**Types .WRZ..., .WRZE... and .WRH...**Sizes 10 to 52  
Component series 7X  
Maximum operating pressure 350 bar  
Maximum flow 2800 l/min

H/A/D 5733/97

Type 4WRZ 10...-7X/...K4/...  
with cable sockets and associated  
control electronics (separate order)

H/A/D 5738/97

Type 4WRZE 10...-7X/...K31/...  
with integrated electronics (OBE)

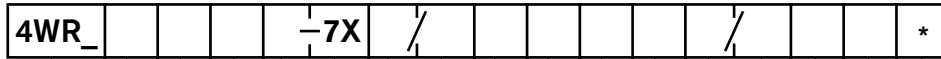
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## Features

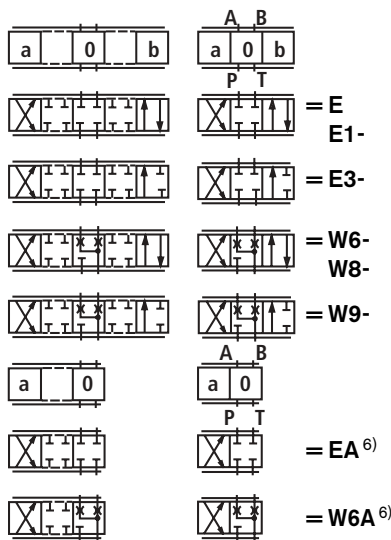
- Pilot operated 2-stage proportional directional valves with integrated electronics (OBE) on type 4WRZE
- Control the direction and magnitude of a flow
- Operation by proportional solenoids with central thread and detachable coil
- For subplate mounting:
  - Porting pattern to ISO 4401
  - Subplates according to data sheets RE 45054 to RE 45060 (separate order), see pages 16 to 21
- Manual override, optional
- Spring-centred control spool
- Control electronics
  - .WRZE...
    - integrated electronics (OBE) with voltage input or current input (A1 resp. F1)
  - .WRZ..., (separate order)
    - digital or analogue amplifier in Eurocard format
    - analogue module amplifier

**Ordering code for 4WRZ and 4WRH; sizes 10 to 32, subplate mounting; size 52, flange connection**



Hydraulic operation = H  
 Electro-hydraulic operation = Z  
**For WRZ only:**  
 For external electronics = No code  
 With integrated electronics = E  
 Size 10 = 10  
 Size 16 = 16  
 Size 25 = 25  
 Size 32 = 32  
 Size 52 = 52

**Symbols**



With symbols E1- and W8-:  
 P to A:  $q_{Vmax}$  B to T:  $q_{V/2}$   
 P to B:  $q_{V/2}$  A to T:  $q_{Vmax}$   
 With symbols E3- and W9-:  
 P to A:  $q_{Vmax}$  B to T: closed  
 P to B:  $q_{V/2}$  A to T:  $q_{Vmax}$   
 (Regenerative circuit, base of spool at port A)  
**Note:** With spools W6-, W8-, W9-, W6A in spool position "0", there is a connection from A to T and B to T with less than 2% of the relevant nominal cross-section.

1) Not for 4WRH and 4WRZ without pilot valve  
 2) For version "J"→"N" instead of "N9"  
 3) For details on seawater-resistant version, see RE 29115-M  
 4) For version "J" = seawater-resistant, "K31" only  
 5) Suitable for mineral oils (HL, HLP) to DIN 51524  
 6) not for 4WRH

Further details in clear text

M<sup>1)</sup> = NBR seals  
 V = FKM seals

No code = Without pressure reducing valve

D3<sup>1)</sup> = With pressure reducing valve ZDR 6 DP0-4X/40YM-W80 (fixed setting)

**Electronic interface**  
 A1 or F1 with 4WRZE

**for 4WRZE:**

A1 = Command value input ± 10 V

F1 = Command value input 4 to 20 mA

No code = for WRZ and WRH

**Electrical connection**

**for WRZ:**

K4<sup>1, 4)</sup> = Without cable socket with component plug to DIN EN 175301-803

Cable socket – separate order, see page 10

**for WRZE:**

K31<sup>1, 4)</sup> = Without cable socket with component plug to DIN EN 175201-804

Cable socket – separate order see page 10

**Pilot oil supply and drain**

No code = External pilot oil supply, external pilot oil drain

E = Internal pilot oil supply, external pilot oil drain

ET = Internal pilot oil supply, internal pilot oil drain

T = External pilot oil supply, internal pilot oil drain

(for size 52 and type 4WRH, only "no code" possible)

No code = Without special type of protection  
 J<sup>3)</sup> = Seawater-resistant

NO code = Without manual override

N9<sup>1, 2)</sup> = With concealed manual override

**Supply voltage of electronics**

G24<sup>1)</sup> = 24V DC (standard version)

6E<sup>1)</sup> = Pilot valve size 6, proportional solenoid with detachable coil

No code = For subplate mounting  
 F = For flange connection (size 52 only)

7X = Component series 70 to 79: unchanged installation and connection dimensions

**Nominal flow in l/min at valve pressure differential  $\Delta p = 10$  bar**

25 =	50 =	85 =	for size 10
	100 =	150 =	for size 16
	220 =	325 =	for size 25
	360 =	520 =	for size 32
		1000 =	for size 52

**Special electrical protection on enquiry!**

### Ordering code for 5WRZ 52 and 5WRH 52; subplate mounting

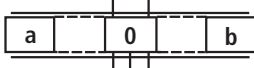
	<b>5WR_</b>	<b>52</b>	<b>1000</b>	<b>-7X/</b>							<b>*</b>
--	-------------	-----------	-------------	-------------	--	--	--	--	--	--	----------

Hydraulic operation = H  
Electrohydraulic operation = Z

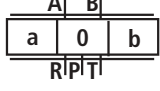
**For WRZ only:**  
For external electronics = No code  
With integrated electronics = E

Size 52 = 52

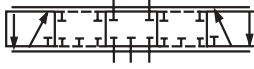
**Symbols**




a 0 b

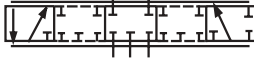



A B  
a 0 b  
R P T



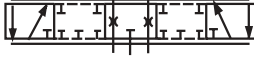



= E  
E1-



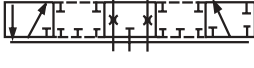



= E3-






= W6-  
W8-

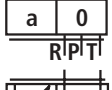




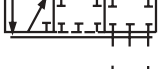
= W9-




a 0





A B  
a 0  
R P T





= EA <sup>6)</sup>





= W6A <sup>6)</sup>

Further details in clear text

M <sup>5)</sup> = NBR seals  
V = FKM seals

**No code** = Without pressure reducing valve  
D3 <sup>1)</sup> = With pressure reducing valve ZDR 6 DP0-4X/40YM-W80 (fixed setting)

**Electronics interface**  
A1 or F1 for 4WRZE  
**For 4WRZE:**  
A1 = Command value input ± 10 V  
F1 = Command value input 4 to 20 mA  
**No code** = **For WRZ and WRH**

**Electrical connection**  
**for WRZ:**  
K4 <sup>1, 4)</sup> = Without cable socket  
With component plug to DIN EN 175301-803  
Cable socket – separate order, see page 10  
**for WRZE:**  
K31 <sup>1, 4)</sup> = Without cable socket  
With component plug to DIN EN 175201-804  
Cable socket – separate order, see page 10

**No code** = Without special type of protection  
J <sup>3)</sup> = Seawater-resistant

**No code** = Without manual override  
N9 <sup>1, 2)</sup> = With concealed manual override

**Supply voltage of control electronics**  
G24 <sup>1)</sup> = 24V DC

**Pilot valve size 6**  
6E <sup>1)</sup> = Proportional solenoid with detachable coil

7X = Component series 70 to 79: unchanged installation and connection dimensions

**Nominal flow at valve pressure differential Δp = 10 bar**  
1000 = 1000 l/min

With symbols E1- and W8-:  
P to A: q<sub>v</sub> = 1000 l/min    B to T: q<sub>v</sub> = 500 l/min  
P to B: q<sub>v</sub> = 500 l/min    A to R: q<sub>v</sub> = 1000 l/min

With symbols E3- and W9-:  
P to A: q<sub>v</sub> = 1000 l/min    B to T: closed  
P to B: q<sub>v</sub> = 500 l/min    A to R: q<sub>v</sub> = 1000 l/min  
(Regenerative circuit, spool base at port A)

**Note:**

- Pilot oil supply and drain only possible externally
- With spools W6-, W8-, W9-, W6A in their spool position "0", there is a connection from A to T and B to T with less than 2% of the relevant nominal cross-section.

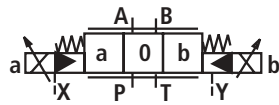
1) Not for 5WRH and 5WRZ without pilot valve  
2) For version "J" → "N" instead of "N9"  
3) For details on the seawater-resistant version, see RE 29115-M  
4) With version "J" = seawater-resistant, "K31" only  
5) Suitable for mineral oils (HL, HLP) to DIN 51524  
6) not for 5WRH

**Special electrical protection on enquiry!**

## Symbols (simplified)

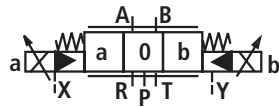
### With electrohydraulic operation and for external electronics

Type 4WRZ...-7X./... and  
Type 4WRZ 52...-7XF/...



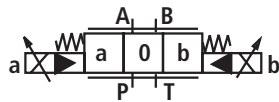
X = external  
Y = external

Type 5WRZ 52-7X./...



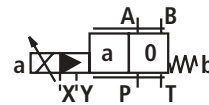
X = external  
Y = external

Type 4WRZ...-7X./...ET...

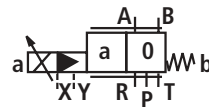


X = internal  
Y = internal

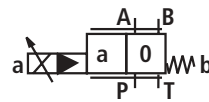
Type 4WRZ...A-7X./... and  
Type 4WRZ 52 A...-7XF/...



Type 5WRZ 52 A-7X./...

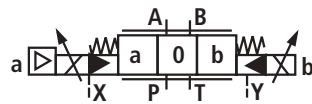


Type 4WRZ.A...-7X./...ET...



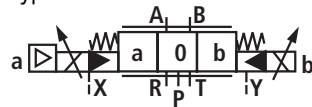
### With electrohydraulic operation and for integrated electronics

Type 4WRZE...-7X./... and  
Type 4WRZE 52...-7XF/...



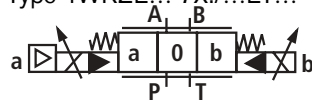
X = external  
Y = external

Type 5WRZE 52-7X./...



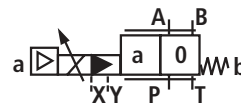
X = external  
Y = external

Type 4WRZE...-7X./...ET...

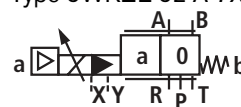


X = internal  
Y = internal

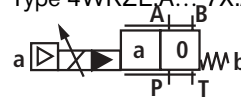
Type 4WRZE...A-7X./... and  
Type 4WRZE 52 A...-7XF/...



Type 5WRZE 52 A-7X./...

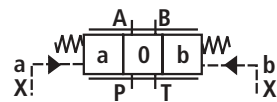


Type 4WRZE.A...-7X./...ET...



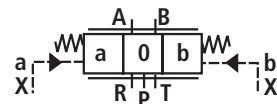
### With hydraulic operation

Type 4WRH...-7X./... and  
Type 4WRH 52...-7XF/...



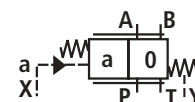
X = external  
Y = external

Type 5WRH 52...-7X.

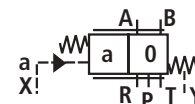


X = external  
Y = external

Type 4WRH...A...-7X./... and  
Type 4WRH 52...-7XF/...



Type 5WRH 52 A...-7X./...



## Function, section

### Pilot valve type 3DREP 6...

The pilot valve is a proportional solenoid operated 3-way pressure reducing valve. It is used to convert an electrical input signal into a proportional pressure output signal and is used on all 4WRZ... and 5WRZ... valves.

The proportional solenoids are controllable DC wet pin solenoids with central thread and detachable coil. The solenoid is optionally controlled by external electronics (type .WRZ...) or integrated electronics (type .WRZE...).

### Design:

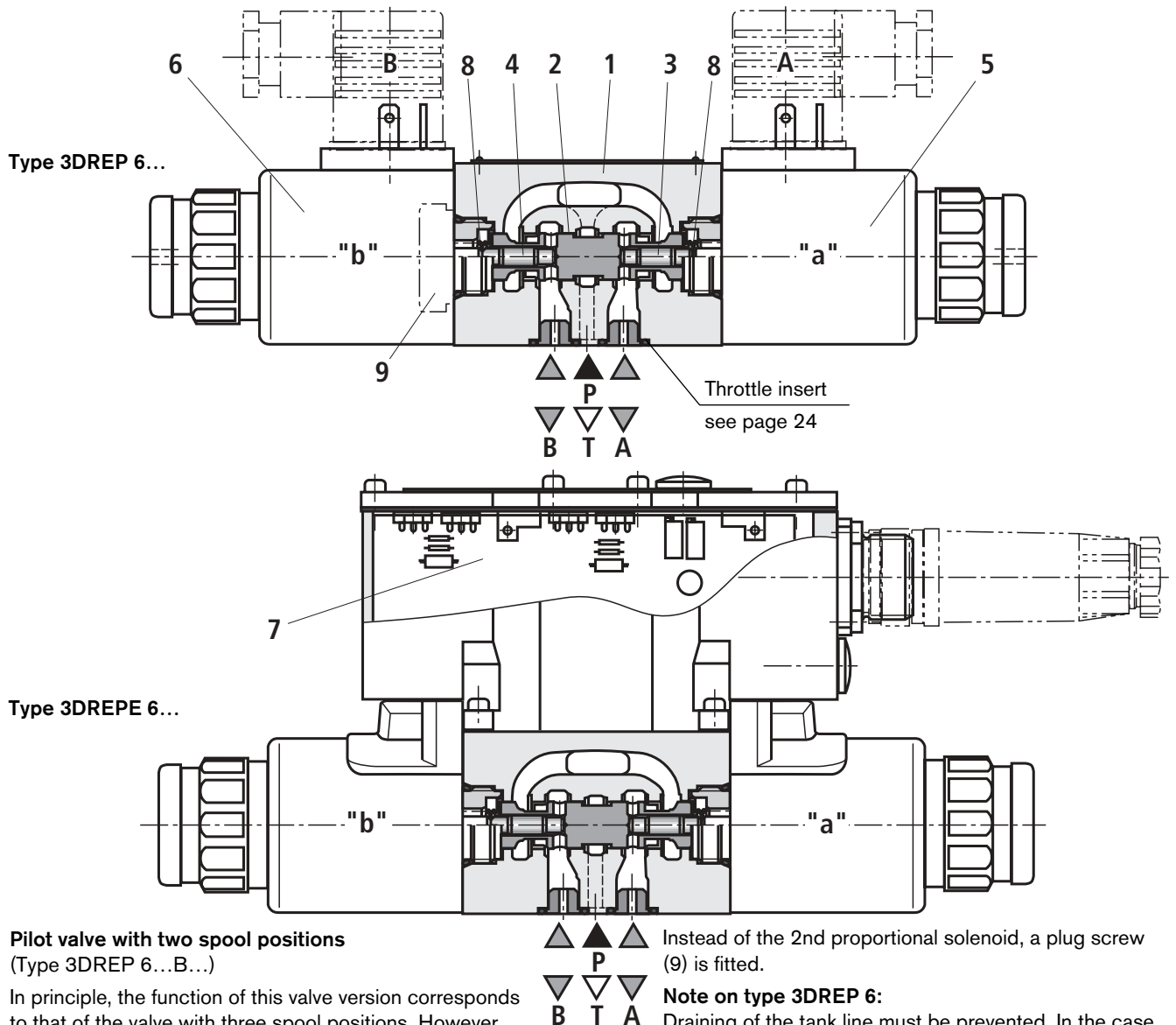
The valve basically consists of:

- Housing (1)
- Control spool (2) with pressure measuring spools (3 and 4)
- Solenoids (5 and 6) with central thread
- Optionally with integrated electronics (7)

### Function:

- When the solenoids (5 and 6) are in the de-energised condition, the control spool (2) is held by compression springs (8) in the central position
- Direct operation of the control spool (2) by energising a proportional solenoid, e.g. energisation of solenoid "a" (5)
  - Pressure measuring spool (3) and control spool (2) are shifted to the left in proportion to the electrical input signal
  - Connection from P to B and A to T via orifice-like cross-sections with progressive flow characteristics
- De-energisation of the solenoid (5)
  - Control spool (2) is returned to the central position by the compression spring (8)

In the central position, ports A and B are open to T, i.e. the hydraulic fluid can flow to the tank without any restrictions.



### Pilot valve with two spool positions (Type 3DREP 6...B...)

In principle, the function of this valve version corresponds to that of the valve with three spool positions. However, this 2-position valve is provided with solenoid "a" (5) only.

Instead of the 2nd proportional solenoid, a plug screw (9) is fitted.

### Note on type 3DREP 6:

Draining of the tank line must be prevented. In the case of a corresponding installation situation, a pre-load valve is to be installed (pre-load pressure approx. 2 bar).

## Function, section

### Pilot operated proportional directional valves types 4WRZ... and 5WRZ.52...

Valves of type 4WRZ... are pilot operated 4-way directional valves with operation by proportional solenoids. They control the direction and magnitude of a flow.

Valves of type 5WRZ... are valves with an additional port "R" (size 52 only).

#### Design:

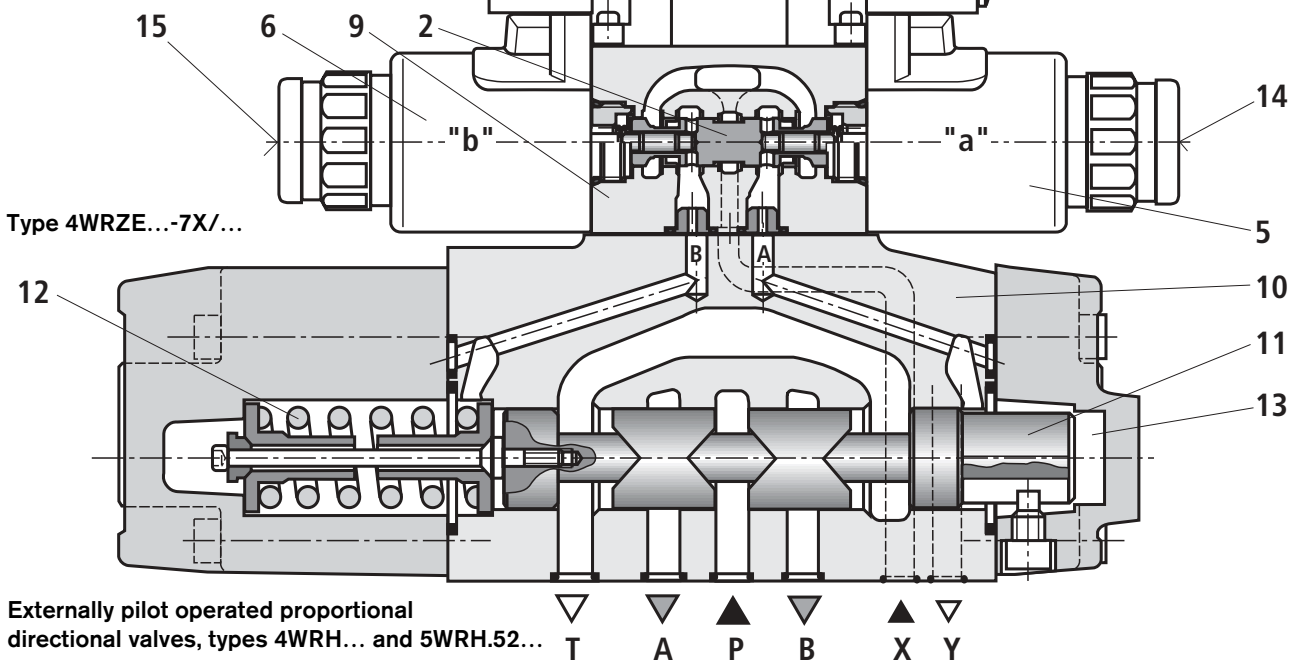
The valves basically consist of:

- A pilot valve (9) with proportional solenoids (5 and 6)
- A main valve (10) with main spool (11) and centring spring (12)

#### Function:

- When the solenoids (5 and 6) are de-energised, the main spool (11) is held by centring springs (12) in the central position
- Operation of the main spool (11) via the pilot valve (9) – the main spool is moved proportionally, e.g. by energising solenoid "b" (6)

→ The control spool (2) is shifted to the right, pilot oil is fed via the pilot valve (9) into the pressure chamber (13) and moves the main spool (11) in proportion to the electrical input signal



### Externally pilot operated proportional directional valves, types 4WRH... and 5WRH.52...

Valves of type .WRH... are pilot operated proportional directional valves for the external operation by means of pressure control valves.

#### Design:

The valves basically consist of:

- A main valve (10) with main spool (11) and centring spring (12)
- An interconnecting plate (16)

#### Function:

- Interconnecting plate (16) connects pilot port A with port T(Y) and pilot port B with P(X)

The pilot pressure in the main valve must not exceed 25 bar (16 bar for size 52)!

→ Connection from P to A and B to T via orifice-like cross-sections with progressive flow characteristics

- Pilot oil supply to the pilot valve internally via port P or externally via port X

- De-energisation of the solenoid (6)

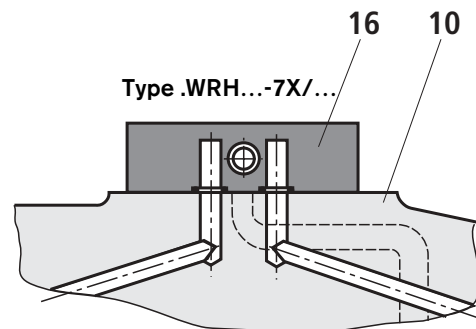
→ The control spool (2) and main spool (11) are returned to the central position

- Depending on the spool position, flow from P to A and B to T (R) or P to B and A to T (R).

With the help of an optional manual override (14 and 15) the control spool (2) can be moved without requiring the energisation of the solenoid.

#### ⚠ Caution!

The unintended actuation of the manual override can lead to uncontrolled machine movements!



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

Valve type				.WRZ	.WRZE
Installation orientation				Optional, preferably horizontal (commissioning notes according to RE 07800)	
Storage temperature range				- 20 to + 80 °C	
Ambient temperature range				- 20 to + 70	- 20 to + 50
Weight	- Subplate mounting	Size 10	kg	7.8	8.0
		Size 16	kg	13.4	13.6
		Size 25	kg	18.2	18.4
		Size 32	kg	42.2	42.2
		Size 52	kg	79.5	79.7
	- Flange connection	Size 52	kg	77.5	77.7

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

Size		Size	10	16	25	32	52
Operating pressure	- Pilot valve	External pilot oil supply	30 to 100				20 to 100
		Internal pilot oil supply					-
		bar	100 to 315 with "D3" only	100 to 350 with "D3" only			
	- Main valve	bar	up to 315	up to 350	up to 350	up to 350	up to 350
Return flow pressure	- Port T (port R) (external pilot oil drain)	bar	up to 315	up to 250	up to 250	up to 150	up to 250
	- Port T (internal pilot oil drain)	bar	up to 30	up to 30	up to 30	up to 30	-
	- Port Y	bar	up to 30	up to 30	up to 30	up to 30	up to 30
Flow of the main valve		l/min	up to 170	up to 460	up to 870	up to 1600	up to 2800
Pilot oil flow in port X and Y with a stepped input signal 0 → 100 %		l/min	3.5	5.5	7	15.9	7
Pilot oil volume for switching process 0 → 100 %		cm <sup>3</sup>	1.7	4.6	10	26.5	54.3
Hydraulic fluid		Mineral oil (HL, HLP) to DIN 51524 Further fluids on enquiry!					
Hydraulic 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)				
Max. permissible degree of contamination of the hydraulic fluid							
Cleanliness class to ISO 4406 (c)	- Pilot valve	Class 18/16/13 <sup>1)</sup>					
	- Main valve	Class 20/18/15 <sup>1)</sup>					
Hysteresis		%	≤ 6				

<sup>1)</sup> The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, increases the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086 and RE 50088.

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

Valve type		.WRZ <sup>1)</sup>	.WRZE	
Type of protection of the valve to EN 60529		IP65 with cable socket mounted and locked		
Type of voltage		DC		
Command value overlap	%	15		
Max. current	A	1.5	2.5	
Solenoid coil resistance	– Cold value at 20 °C	Ω	4.8	2
	– Max. hot value	Ω	7.2	3
Duty cycle	%	100		
Max. coil temperature <sup>3)</sup>	°C	150		
Electrical connection	– WRZ	With component plug to DIN EN 175301-803		
		Cable socket to DIN EN 175301-803 <sup>2)</sup>		
	– WRZE	With component plug to DIN EN 175201-804		
		Cable socket to DIN EN 175201-804 <sup>2)</sup>		

**Control electronics**

<b>Integrated</b> electronics (OBE) for type .WRZE	Integrated in the valve, see pages 9 and 10			
Current consumption	$I_{\max}$	A	–	1,8
	– Power pulse current	A	–	3
Command value signal	– Voltage input "A1"	V	–	± 10
	– Current input "F1"	mA	–	4 to 20
Suitable for type WRZE				
Analogue command value card <sup>2)</sup>	VT-SWKA-1-1X/... according to data sheet RE 30255			
Digital command value card <sup>2)</sup>	VT-HACD-1-1X/... according to data sheet RE 30143			
Analogue command value modules <sup>2)</sup>	VT-SWMA-1-1X/... according to data sheet RE 29902			
	VT-SWMKA-1-1X/... according to data sheet RE 29903			
<b>External</b> electronics for type WRZ				
Analogue amplifier in Euro-card format <sup>2)</sup>	– With 1 ramp time	VT- VSPA2-1-2X/V0/T1, according to data sheet RE 30110		
	– With 5 ramp times	VT- VSPA2-1-2X/V0/T5, according to data sheet RE 30110		
Digital amplifier in Euro-card format <sup>2)</sup>	VT-VSPD-1-2X/..., acc. to data sheet RE 30523 - middle of 2006			
Analogue amplifiers of modular design <sup>2)</sup>	VT 11118-1X/..., according to data sheet RE 30218			

<sup>1)</sup> With control electronics by Bosch Rexroth

<sup>2)</sup> Separate order

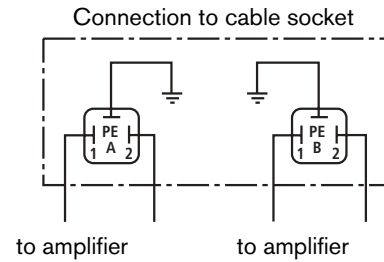
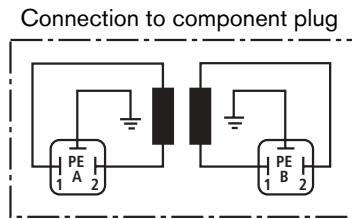
<sup>3)</sup> Due to the surface temperatures occurring on solenoid coils, the European standards EN 563 and EN 982 must be observed!

**Note:** For details regarding **environment simulation testing** in the fields of EMC (electromagnetic compatibility), climate and mechanical stress, see RE 29115-U (declaration on environmental compatibility).



## Electrical connection, cable sockets (nominal dimensions in mm)

For type **.WRZ...** (for external electronics – not for version "J" = seawater-resistant)



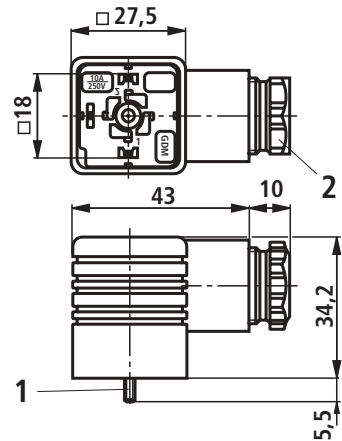
Cable socket to DIN EN 175301-803

Solenoid **a**, colour: grey

Separate order under material no. **R901017010**

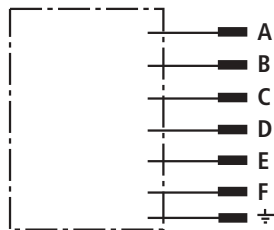
Solenoid **b**, colour: black

Separate order under material no. **R901017011**



1 Fixing screw M3  
Tightening torque  $M_T = 0.5 \text{ Nm}$

Pin assignment for version "J" = seawater-resistant



Contact	Connection to
A	Solenoid A
B	Solenoid B
C	Solenoid A
D	Solenoid B
E	n.c.
F	n.c.
PE	Valve body

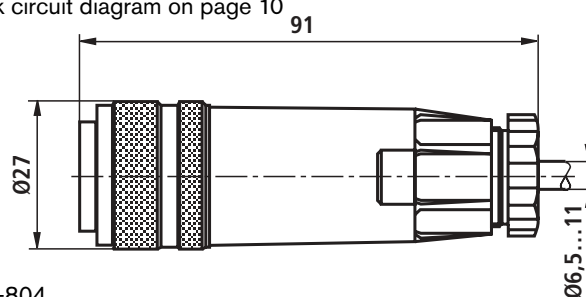
External electronics

For type **.WRZE...** (with integrated electronics (OBE) and for version "J" = seawater-resistant)

Cable socket to DIN EN 175201-804

Separate order under material no. **R900021267** (version made of plastic)

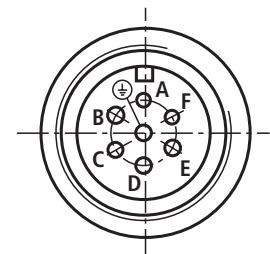
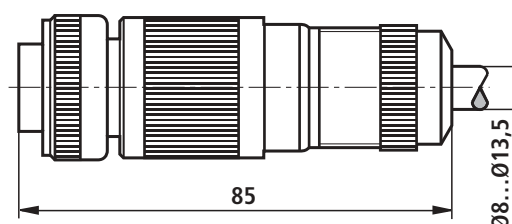
For the pin assignment, see block circuit diagram on page 10



Cable socket to DIN EN 175201-804

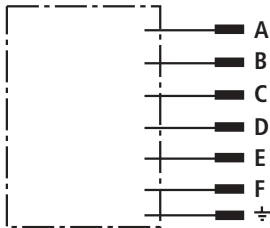
Separate order under material no. **R900223890** (metal version)

For the pin assignment, see block circuit diagram on page 10



## Integrated electronics (OBE) for type WRZE

### Pin assignment of component plug



**Integrated electronics**  
(see below)

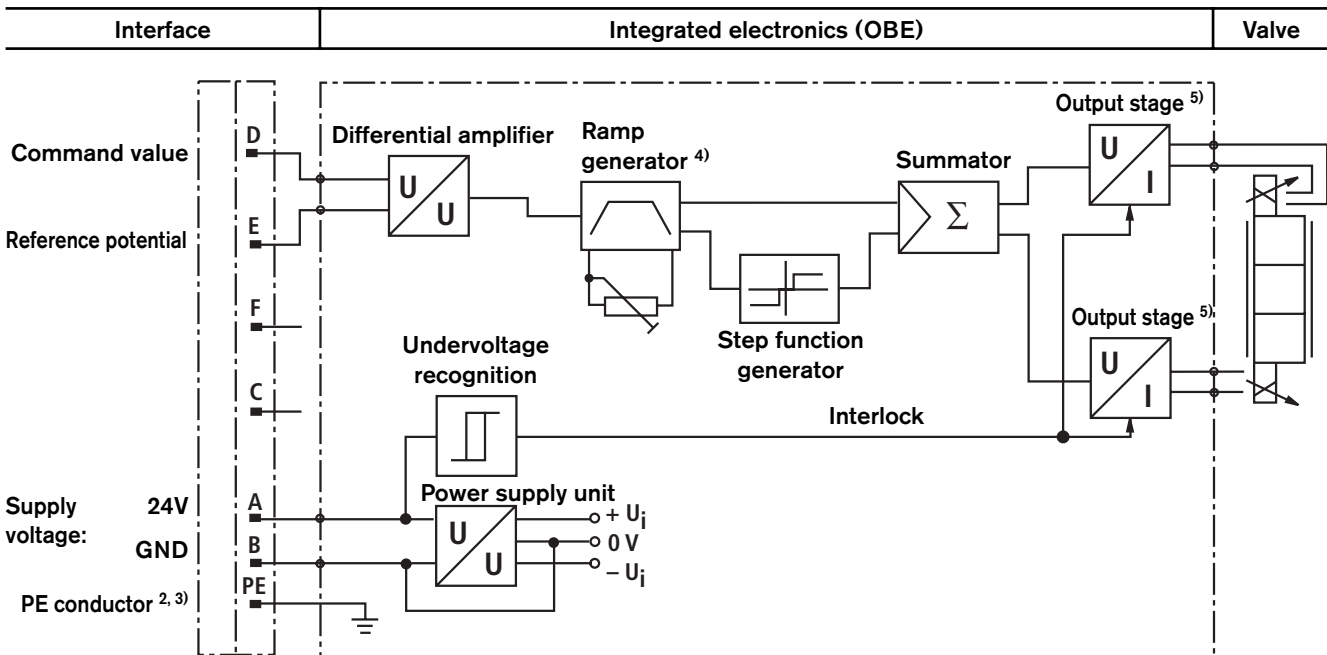
	Contact	Signal
Supply voltage	A	24 VDC (19 to 35 VDC)
	B	
	C	Cannot be used <sup>1)</sup>
Differential amplifier input	D	Command value ( $\pm 10$ V / 4 to 20 mA)
	E	
	F	Cannot be used <sup>1)</sup>
PE conductor	$\oplus$	PE

**Command value:** Positive command value (0 to 10 V or 12 to 20 mA) at D and reference potential at E causes a flow from P to A and B to T.  
 Negative command value (0 to -10 V or 12 to 4 mA) at D and reference potential at E causes a flow from P to B and A to T.  
 For valves with 1 solenoid on the "a" side (spool variants **EA** and **W6A**) reference potential at E and positive command value at D (0 to 10 V or 4 to 20 mA) causes a flow from P to B and A to T.

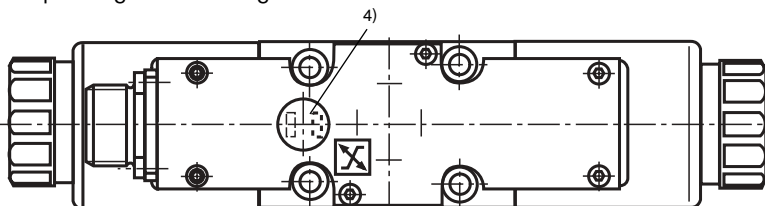
**Connecting cable:** Recommendation:  
 - up to 25 m cable length: Type LiYCY 5 x 0.75 mm<sup>2</sup>  
 - up to 50 m cable length: Type LiYCY 5 x 1.0 mm<sup>2</sup>  
 Outer diameter 6.5 to 11 mm or 8 to 13.5 mm, respectively  
 Connect shield to PE on the supply side only.

<sup>1)</sup> Slots C and F must not be connected!

### Block circuit diagram / pin assignment of integrated electronics

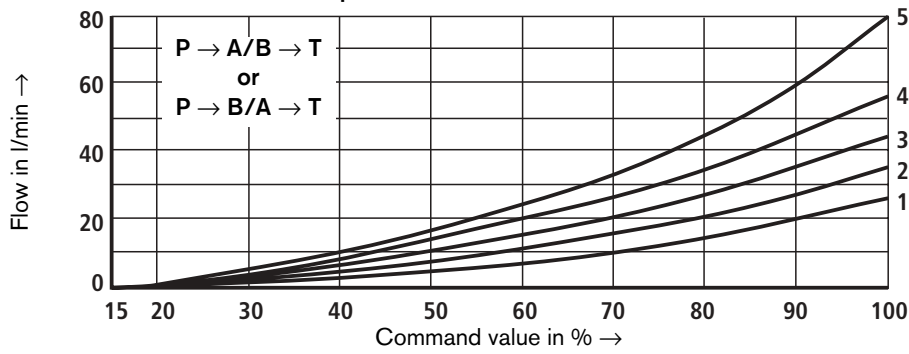


- <sup>2)</sup> Connection PE is to be connected to the heat sink and valve housing
- <sup>3)</sup> PE conductor to be screwed onto the valve housing and cover
- <sup>4)</sup> The ramp can be adjusted externally from 0 to 2.5 s; identical for  $T_{up}$  and  $T_{down}$
- <sup>5)</sup> Output stages current-regulated



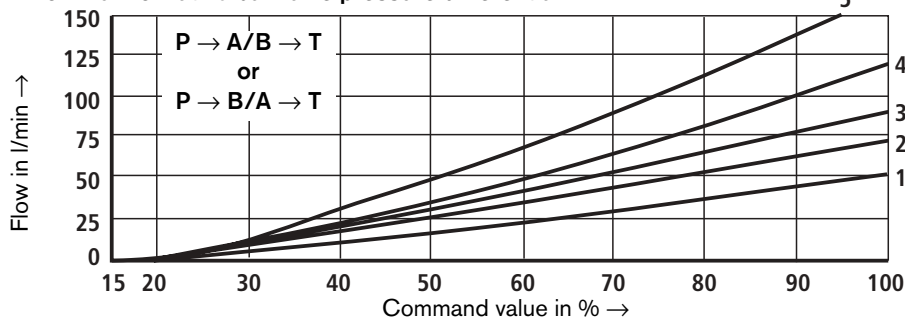
**Characteristic curves** (measured with spools "E, W6-, EA, W6A" and HLP46,  $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$  and  $p = 100\text{ bar}$ ) **Size 10**

**25 l/min nominal flow at 10 bar valve pressure differential**



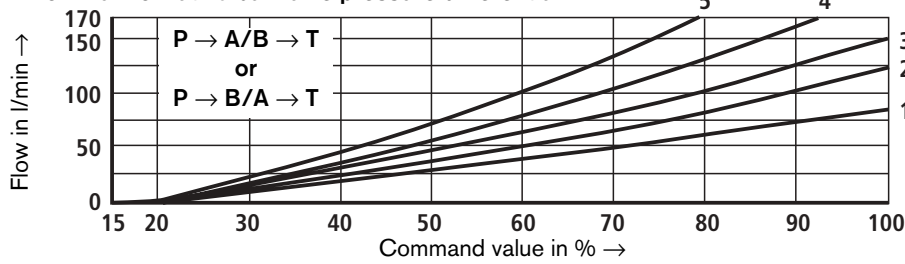
- 1  $\Delta p = 10\text{ bar constant}$
- 2  $\Delta p = 20\text{ bar constant}$
- 3  $\Delta p = 30\text{ bar constant}$
- 4  $\Delta p = 50\text{ bar constant}$
- 5  $\Delta p = 100\text{ bar constant}$

**50 l/min nominal flow at 10 bar valve pressure differential**



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

**85 l/min nominal flow at 10 bar valve pressure differential**

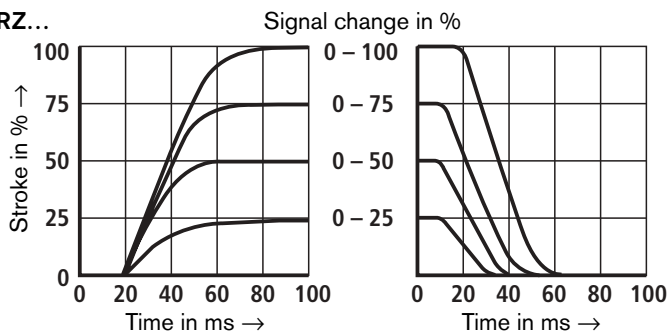


- 1  $\Delta p = 10\text{ bar constant}$
- 2  $\Delta p = 20\text{ bar constant}$
- 3  $\Delta p = 30\text{ bar constant}$
- 4  $\Delta p = 50\text{ bar constant}$
- 5  $\Delta p = 100\text{ bar constant}$

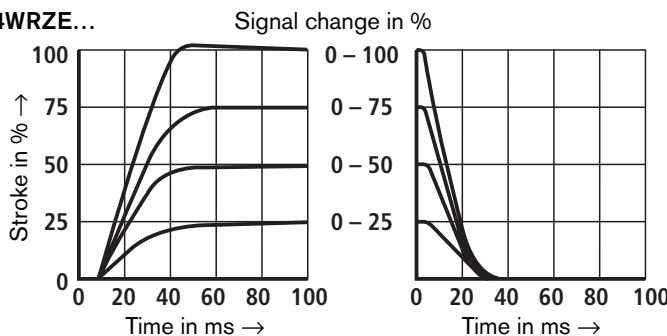
$\Delta p$  = valve pressure differential to DIN 24311 (inlet pressure  $p_P$  minus load pressure  $p_L$  minus return flow pressure  $p_T$ )

**Transient functions with stepped electrical input signals, measured at  $p_{St} = 50\text{ bar}$**

**Type 4WRZ...**

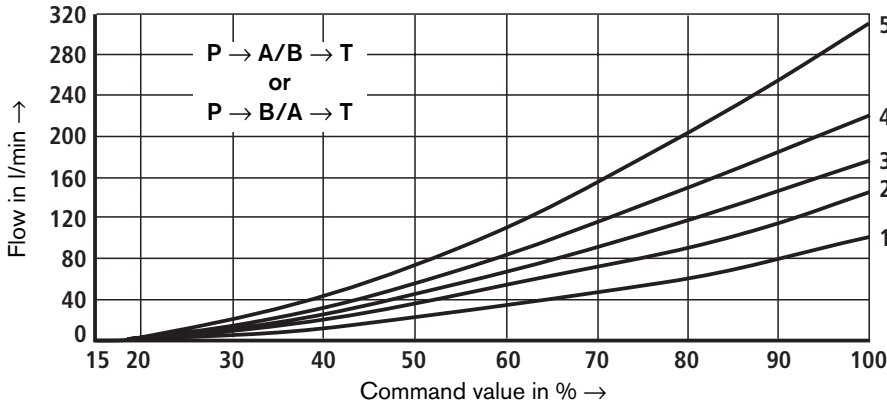


**Type 4WRZE...**



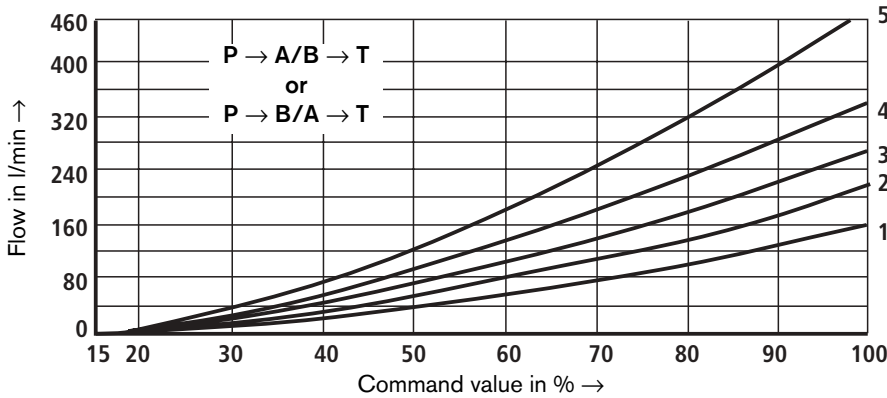
**Characteristic curves** (measured with spools "E, W6-, EA, W6A" and HLP46,  $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$  and  $p = 100\text{ bar}$ ) **Size 16**

**100 l/min nominal flow at 10 bar valve pressure differential**



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

**150 l/min nominal flow at 10 bar valve pressure differential**

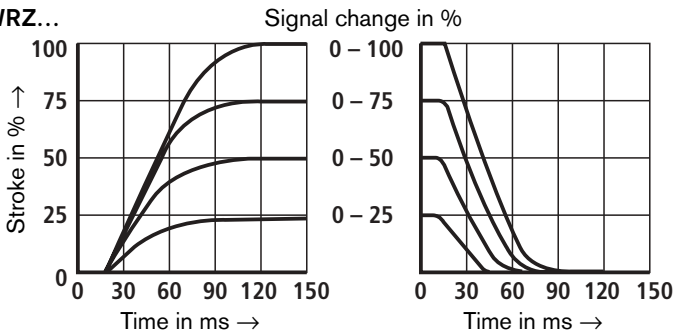


- 1  $\Delta p = 10\text{ bar constant}$
- 2  $\Delta p = 20\text{ bar constant}$
- 3  $\Delta p = 30\text{ bar constant}$
- 4  $\Delta p = 50\text{ bar constant}$
- 5  $\Delta p = 100\text{ bar constant}$

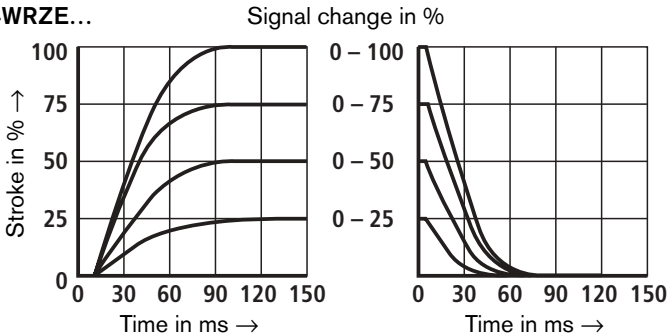
$\Delta p$  = valve pressure differential to DIN 24311 (inlet pressure  $p_p$  minus load pressure  $p_L$  minus return flow pressure  $p_T$ )

**Transient functions with stepped electrical input signals, measured at  $p_{St} = 50\text{ bar}$**

**Type 4WRZ...**

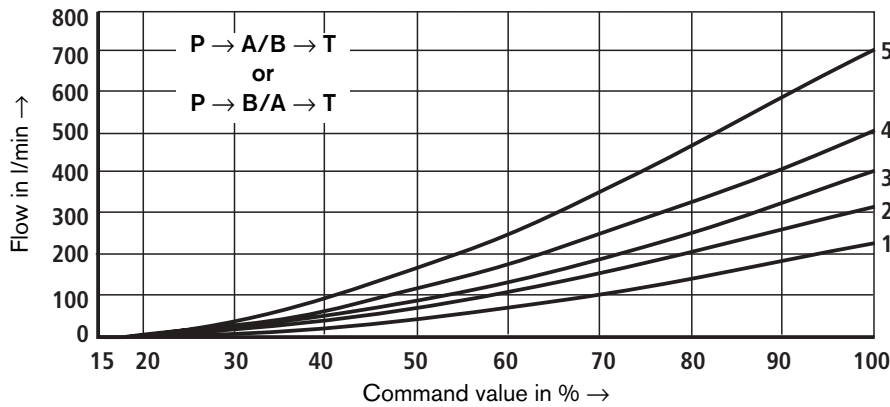


**Type 4WRZE...**



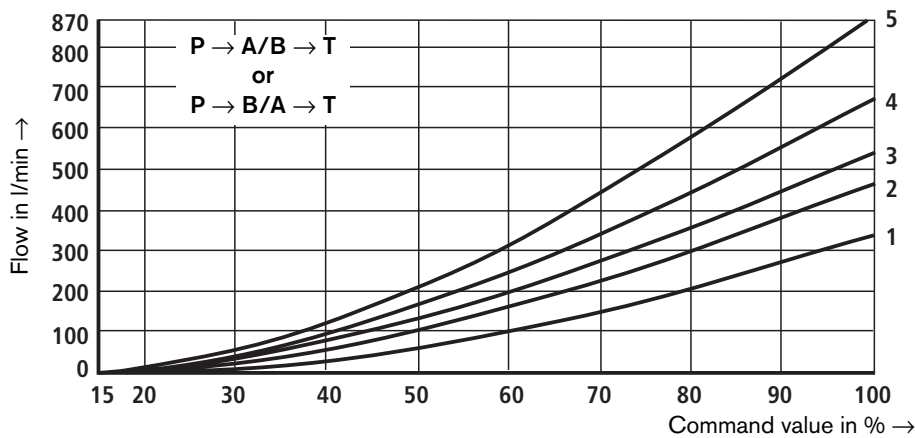
**Characteristic curves** (measured with spools "E, W6-, EA, W6A" and HLP46,  $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$  and  $p = 100\text{ bar}$ ) **Size 25**

**220 l/min nominal flow at 10 bar valve pressure differential**



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

**325 l/min nominal flow at 10 bar valve pressure differential**

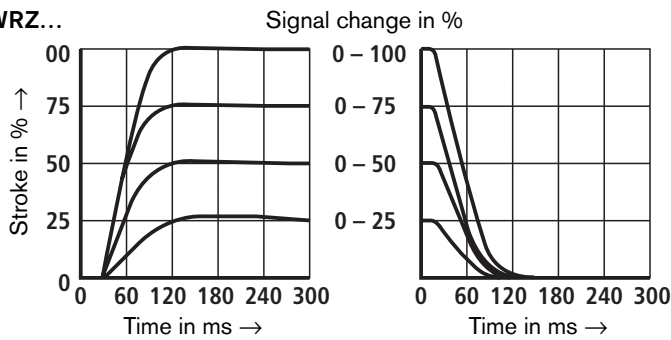


- 1  $\Delta p = 10\text{ bar constant}$
- 2  $\Delta p = 20\text{ bar constant}$
- 3  $\Delta p = 30\text{ bar constant}$
- 4  $\Delta p = 50\text{ bar constant}$
- 5  $\Delta p = 100\text{ bar constant}$

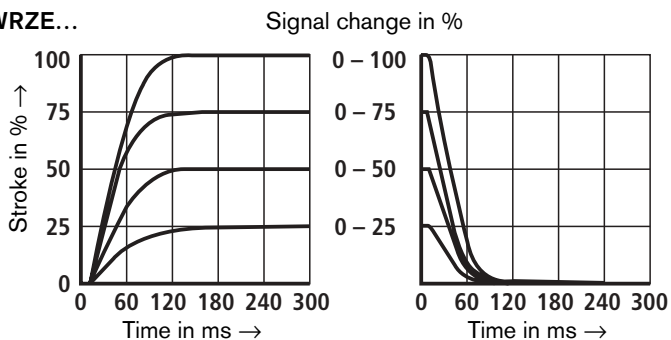
$\Delta p$  = valve pressure differential to DIN 24311 (inlet pressure  $p_p$  minus load pressure  $p_L$  minus return flow pressure  $p_T$ )

**Transient functions with stepped electrical input signals, measured at  $p_{St} = 50\text{ bar}$**

**Type 4WRZ...**

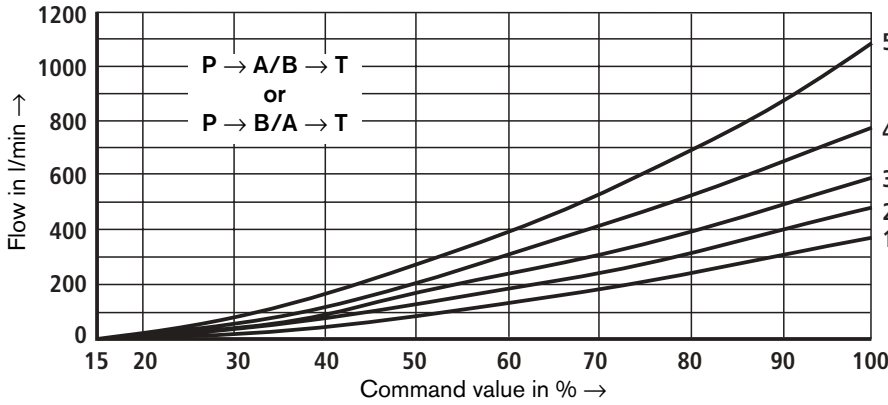


**Type 4WRZE...**



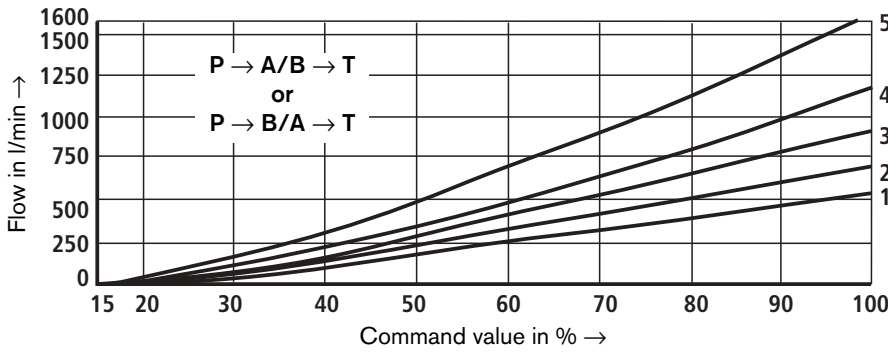
**Characteristic curves** (measured with spools "E, W6-, EA, W6A" and HLP46,  $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$  and  $p = 100\text{ bar}$ ) **Size 32**

**360 l/min nominal flow at 10 bar valve pressure differential**



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

**520 l/min nominal flow at 10 bar valve pressure differential**

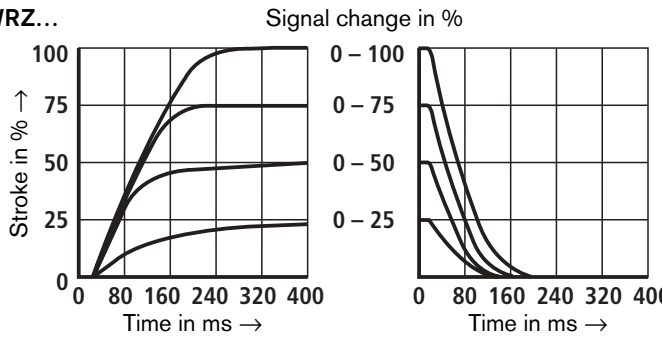


- 1  $\Delta p = 10\text{ bar constant}$
- 2  $\Delta p = 20\text{ bar constant}$
- 3  $\Delta p = 30\text{ bar constant}$
- 4  $\Delta p = 50\text{ bar constant}$
- 5  $\Delta p = 100\text{ bar constant}$

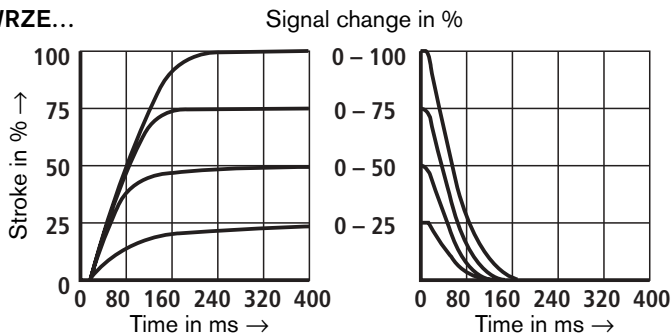
$\Delta p$  = valve pressure differential to DIN 24311 (inlet pressure  $p_p$  minus load pressure  $p_L$  minus return flow pressure  $p_T$ )

**Transient functions with stepped electrical input signals, measured at  $p_{St} = 50\text{ bar}$**

**Type 4WRZ...**

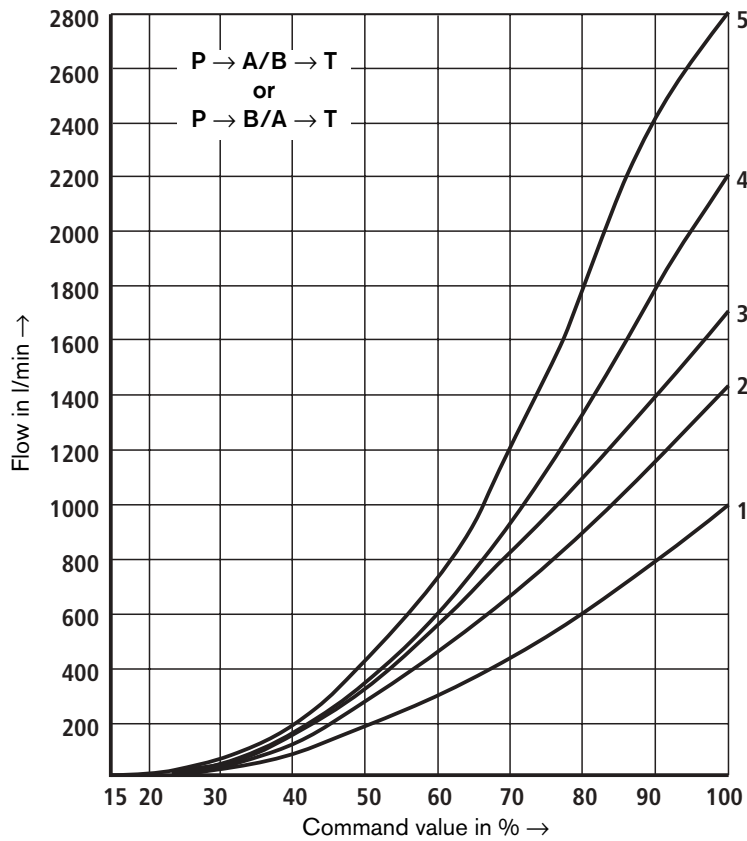


**Type 4WRZE...**



**Characteristic curves** (measured with spools "E, W6-, EA, W6A" and HLP46,  $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$  and  $p = 100\text{ bar}$ ) **Size 52**

1000 l/min nominal flow at 10 bar valve pressure differential

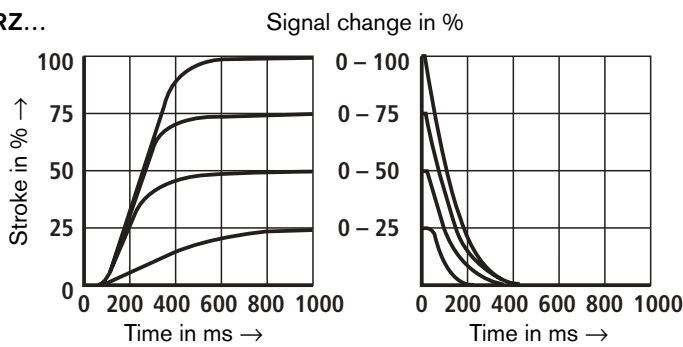


- 1  $\Delta p = 10\text{ bar constant}$
- 2  $\Delta p = 20\text{ bar constant}$
- 3  $\Delta p = 30\text{ bar constant}$
- 4  $\Delta p = 50\text{ bar constant}$
- 5  $\Delta p = 100\text{ bar constant}$

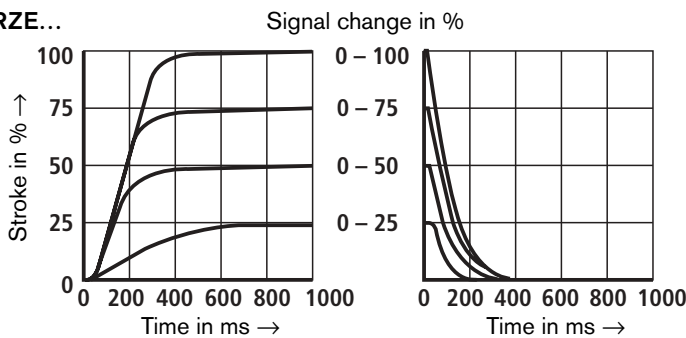
$\Delta p$  = valve pressure differential to DIN 24311 (inlet pressure  $p_p$  minus load pressure  $p_L$  minus return flow pressure  $p_T$ )

**Transient functions with stepped electrical input signals, measured at  $p_{St} = 50\text{ bar}$**

Type .WRZ...

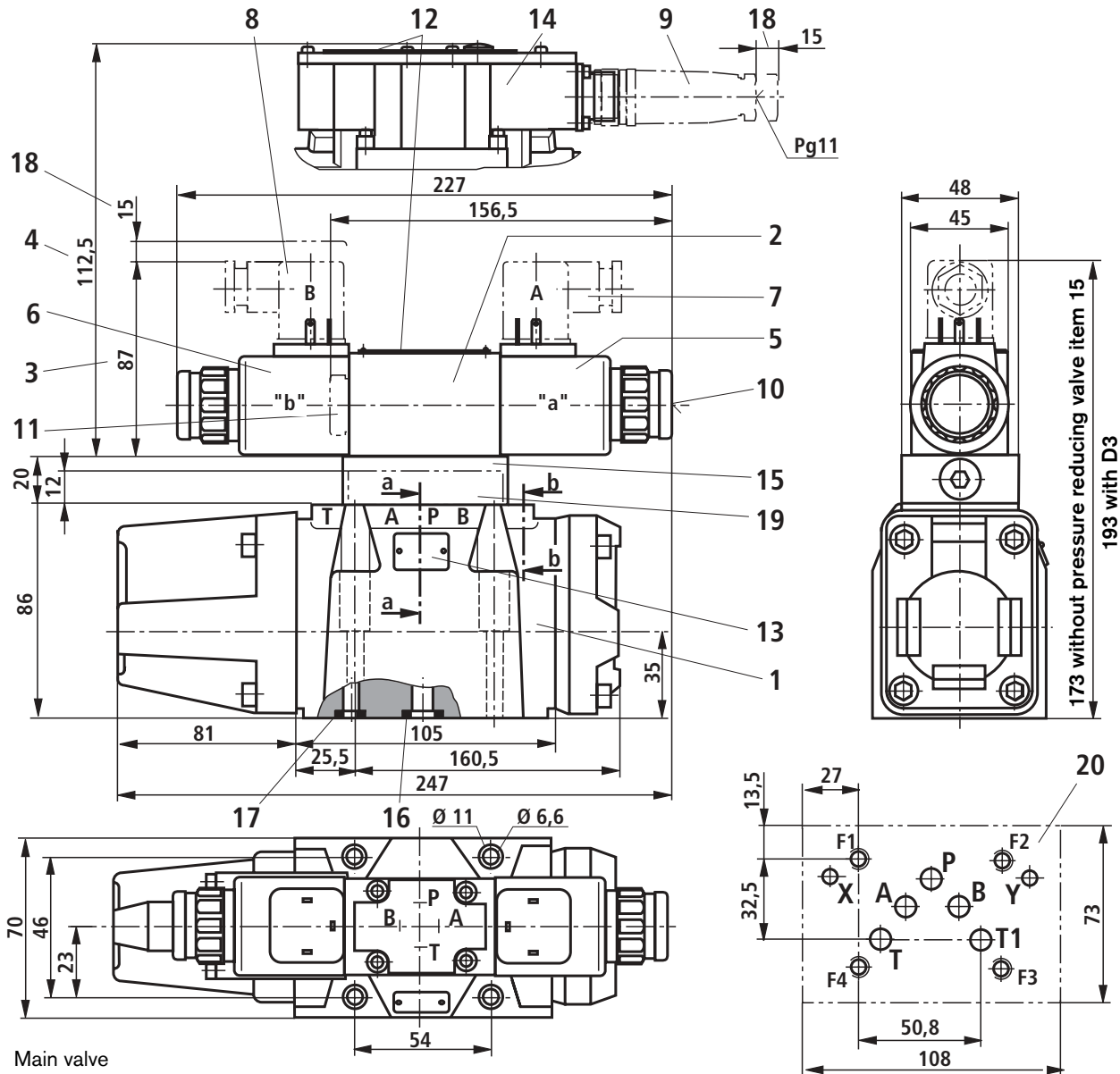


Type .WRZE...



Unit dimensions (nominal dimensions in mm)

Size 10



- 1 Main valve
- 2 Pilot valve
- 3 Dimension for version "4WRZ..." (not seawater-resistant)
- 4 Dimension for version "4WRZE..."
- 5 Proportional solenoid "a"
- 6 Proportional solenoid "b"
- 7 Cable socket "A", separate order, see page 9
- 8 Cable socket "B", separate order, see page 9
- 9 Cable socket, separate order, see page 9
- 10 Concealed manual override "N9"
- 11 Cover for valves with one solenoid
- 12 Nameplate for pilot valve
- 13 Nameplate for main valve
- 14 Integrated electronics (OBE)
- 15 Pressure reducing valve "D3"
- 16 Identical seal rings for ports A, B, P, T and T1
- 17 Identical seal rings for ports X and Y
- 18 Space required to remove cable socket
- 19 Interconnection plate (type 4WRH...)

$\square$  0,01/100mm For section details, see page 22.  
 $\sqrt{\text{Rzmax 4}}$  Required surface finish of the valve mounting surface

Tolerances to: – General tolerances ISO 2768-mK

20 Machined mounting face, position of ports to ISO 4401-05-05-0-94, ports X and Y deviating from the standard as required:  
 – Ports A, B, T, T1 and P  $\varnothing$ 11 mm.

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

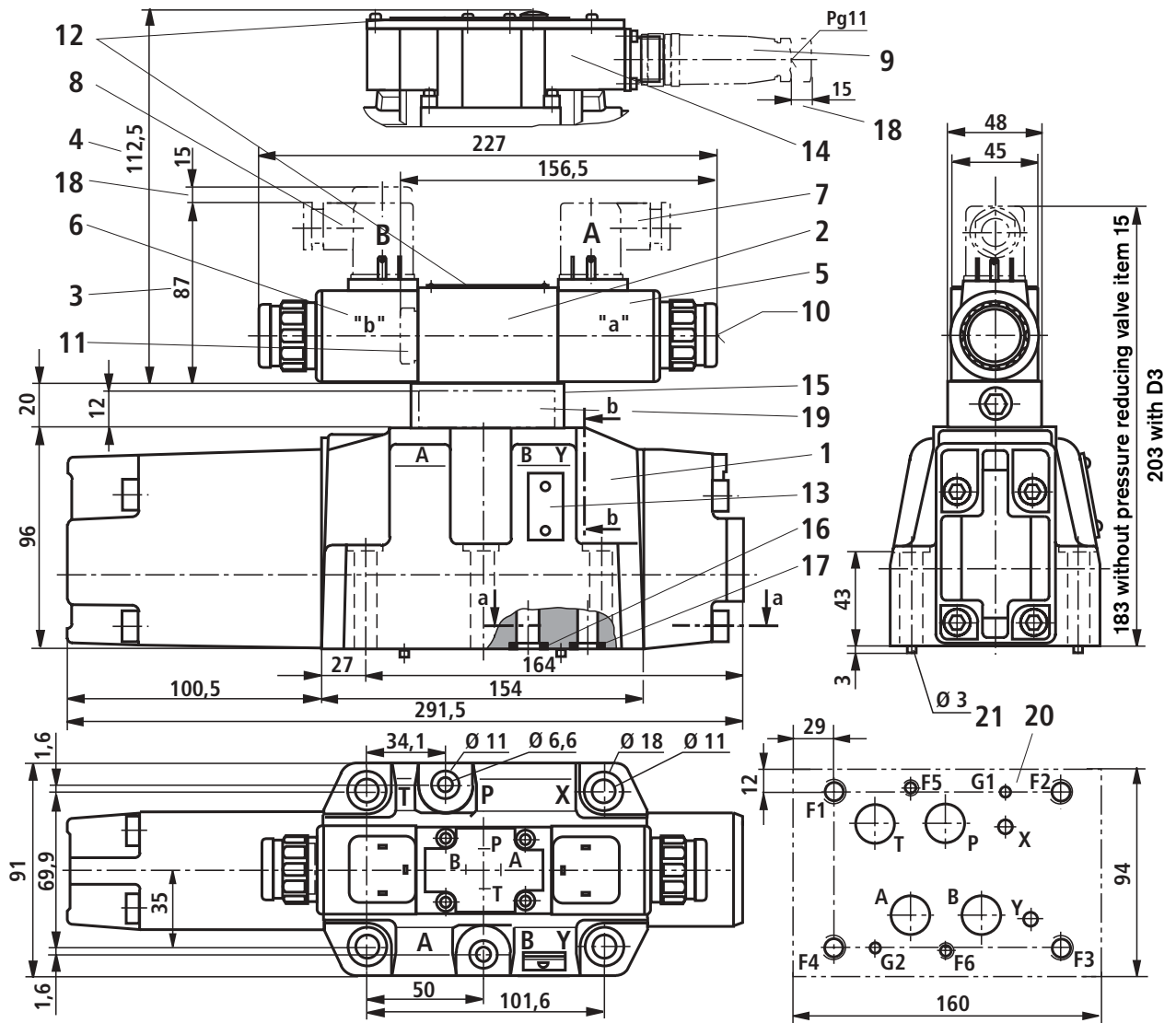
Subplates: G 534/01 (G 3/4) without ports X, Y, T1  
 G 535/01 (G 3/4) with ports X, Y  
 G 536/01 (G 1) with ports X, Y

Valve fixing screws, see page 23

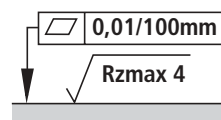


## Unit dimensions (nominal dimensions in mm)

Size 16



- 1 Main valve
- 2 Pilot valve
- 3 Dimension for version "4WRZ..." (not seawater-resistant)
- 4 Dimension for version "4WRZE..."
- 5 Proportional solenoid "a"
- 6 Proportional solenoid "b"
- 7 Cable socket "A", separate order, see page 9
- 8 Cable socket "B", separate order, see page 9
- 9 Cable socket, separate order, see page 9
- 10 Concealed manual override "N9"
- 11 Cover for valves with one solenoid
- 12 Nameplate for pilot valve
- 13 Nameplate for main valve
- 14 Integrated electronics (OBE)
- 15 Pressure reducing valve "D3"
- 16 Identical seal rings for ports A, B, P and T
- 17 Identical seal rings for ports X and Y
- 18 Space required to remove cable socket
- 19 Interconnection plate (type 4WRH...)



For section details, see page 22.

Required surface finish of the valve mounting surface

Tolerances to: – General tolerances ISO 2768-mK

20 Machined mounting face, position of ports to ISO 4401-07-06-0-94, ports X and Y deviating from the standard as required: Ports A, B, P, T Ø20 mm.

21 Locating pin

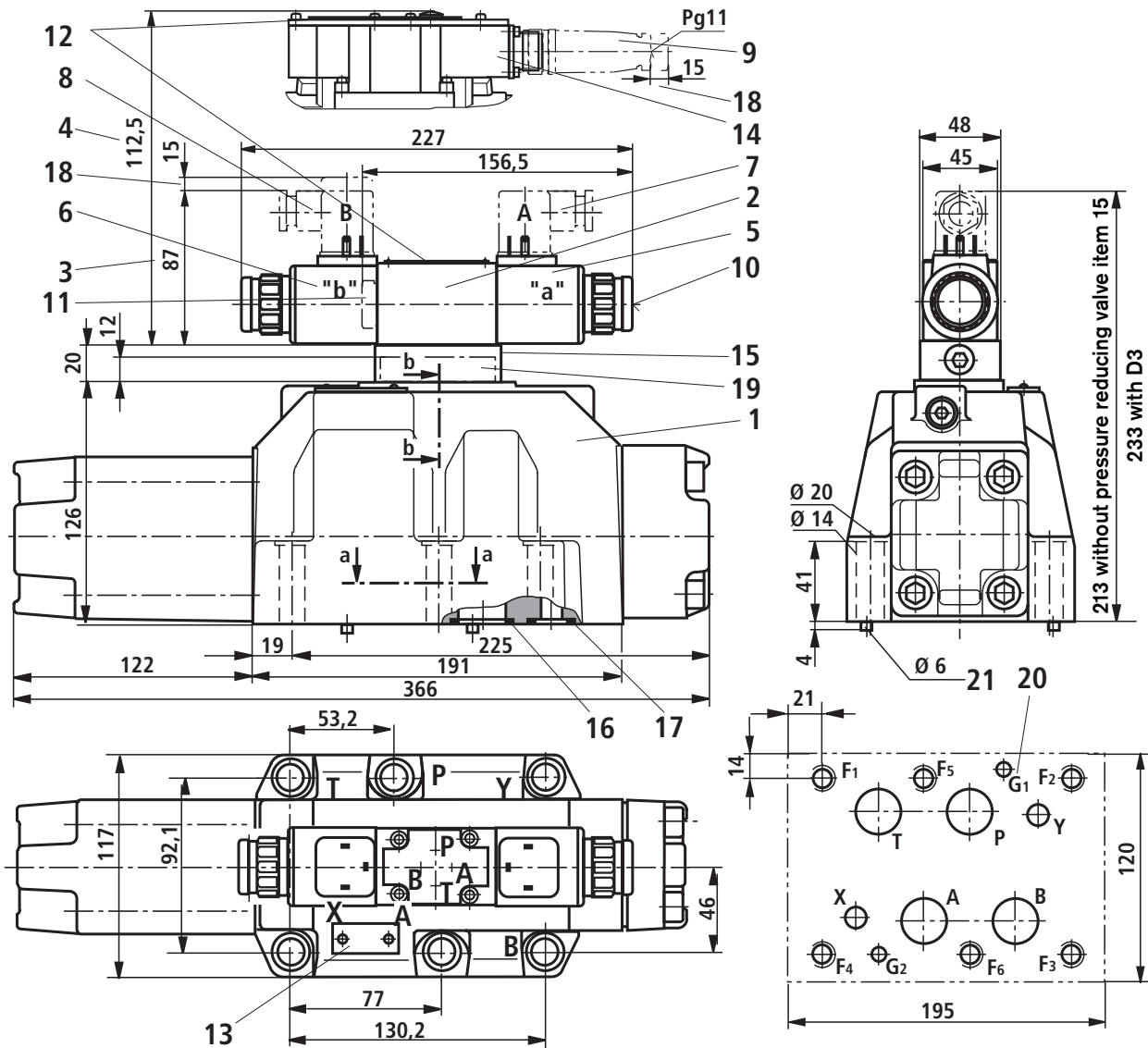
Subplates according to data sheet RE 45056 and valve fixing screws must be ordered separately.

**Subplates:** G 172/01 (G 3/4) G 172/02 (M27 x 2)  
G 174/01 (G 1)  
G 174/02 (M33 x 2) G 174/08 (flange)

**Valve fixing screws**, see page 23

Unit dimensions (nominal dimensions in mm)

Size 25



- 1 Main valve
- 2 Pilot valve
- 3 Dimension for version "4WRZ..." (not seawater-resistant)
- 4 Dimension for version "4WRZE..."
- 5 Proportional solenoid "a"
- 6 Proportional solenoid "b"
- 7 Cable socket "A", separate order, see page 9
- 8 Cable socket "B", separate order, see page 9
- 9 Cable socket, separate order, see page 9
- 10 Concealed manual override "N9"
- 11 Cover for valves with one solenoid
- 12 Nameplate for pilot valve
- 13 Nameplate for main valve
- 14 Integrated electronics (OBE)
- 15 Pressure reducing valve "D3"
- 16 Identical seal rings for ports A, B, P and T
- 17 Identical seal rings for ports X and Y
- 18 Space required to remove cable socket
- 19 Interconnection plate (type 4WRH...)

0,01/100mm For section details, see page 22.

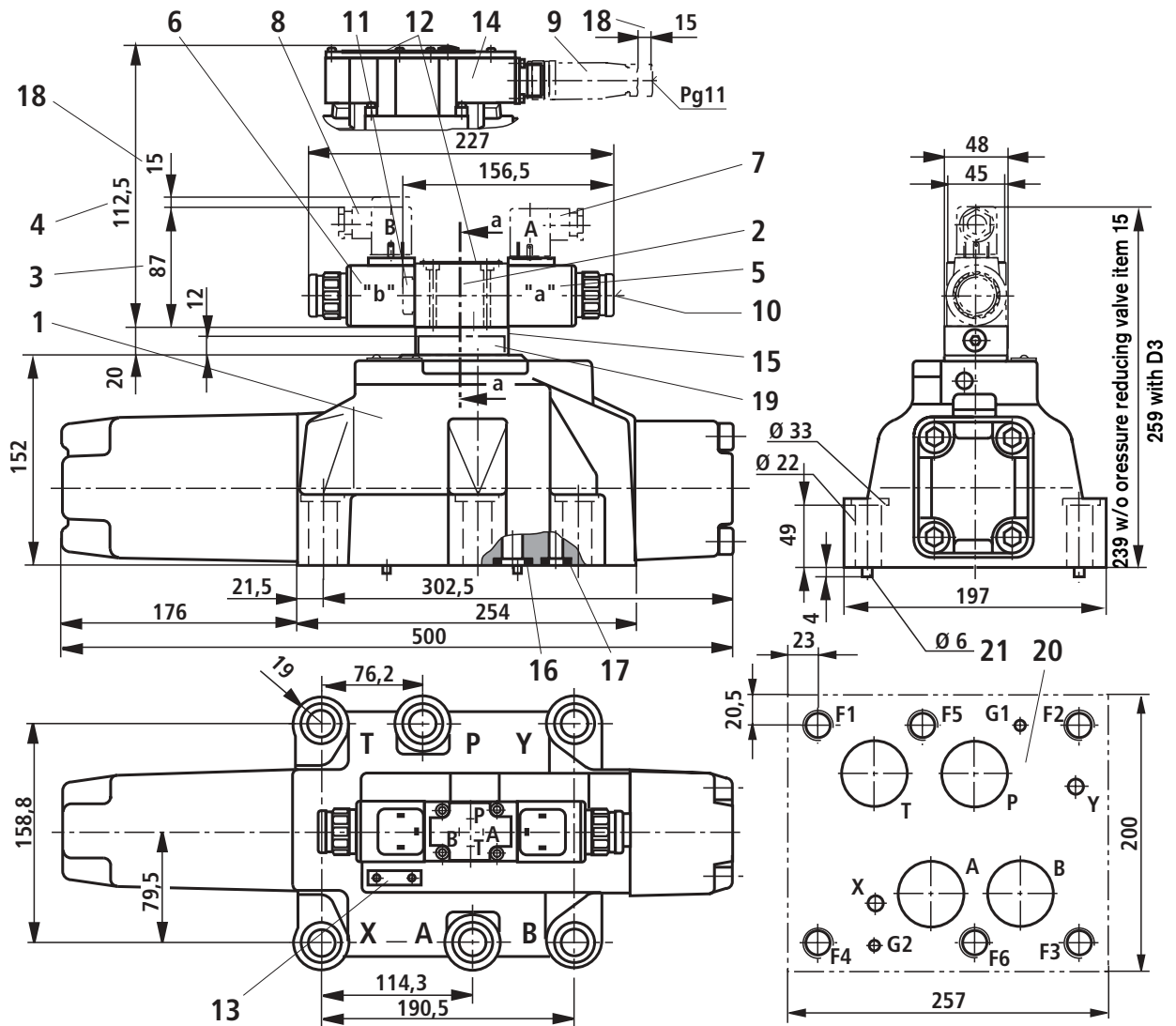
Rzmax 4 Required surface finish of the valve mounting surface

**Tolerances to:** – General tolerances ISO 2768-mK

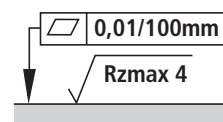
- 20 Machined mounting face, position of ports to ISO 4401-08-07-0-94, ports X and Y as required deviating from the standard:
    - Ports A, B and T Ø25 mm
    - Port P Ø24 mm
  - 21 Locating pin
- Subplates according to data sheet RE 45058 and valve fixing screws must be ordered separately.
- Subplates:** G 151/01 (G 1)  
 G 154/01 (G 1 1/4); G 154/08 (flange)  
 G 156/01 (G 1 1/2)
- Valve fixing screws,** see page 23

## Unit dimensions (nominal dimensions in mm)

Size 32



- 1 Main valve
- 2 Pilot valve
- 3 Dimension for version "4WRZ..." (not seawater-resistant)
- 4 Dimension for version "4WRZE..."
- 5 Proportional solenoid "a"
- 6 Proportional solenoid "b"
- 7 Cable socket "A", separate order, see page 9
- 8 Cable socket "B", separate order, see page 9
- 9 Cable socket, separate order, see page 9
- 10 Concealed manual override "N9"
- 11 Cover for valves with one solenoid
- 12 Nameplate for pilot valve
- 13 Nameplate for main valve
- 14 Integrated electronics (OBE)
- 15 Pressure reducing valve "D3"
- 16 Identical seal rings for ports A, B, P and T
- 17 Identical seal rings for ports X and Y
- 18 Space required to remove cable socket
- 19 Interconnection plate (type 4WRH...)



For section details, see page 22.

Required surface finish of the valve mounting surface

Tolerances to: – General tolerances ISO 2768-mK

- 20 Machined mounting face, position of ports to ISO 4401-10-08-0-94, ports X and Y as required deviating from standard:
  - Ports A, B, T and P  $\varnothing 38$  mm.
- 21 Locating pin

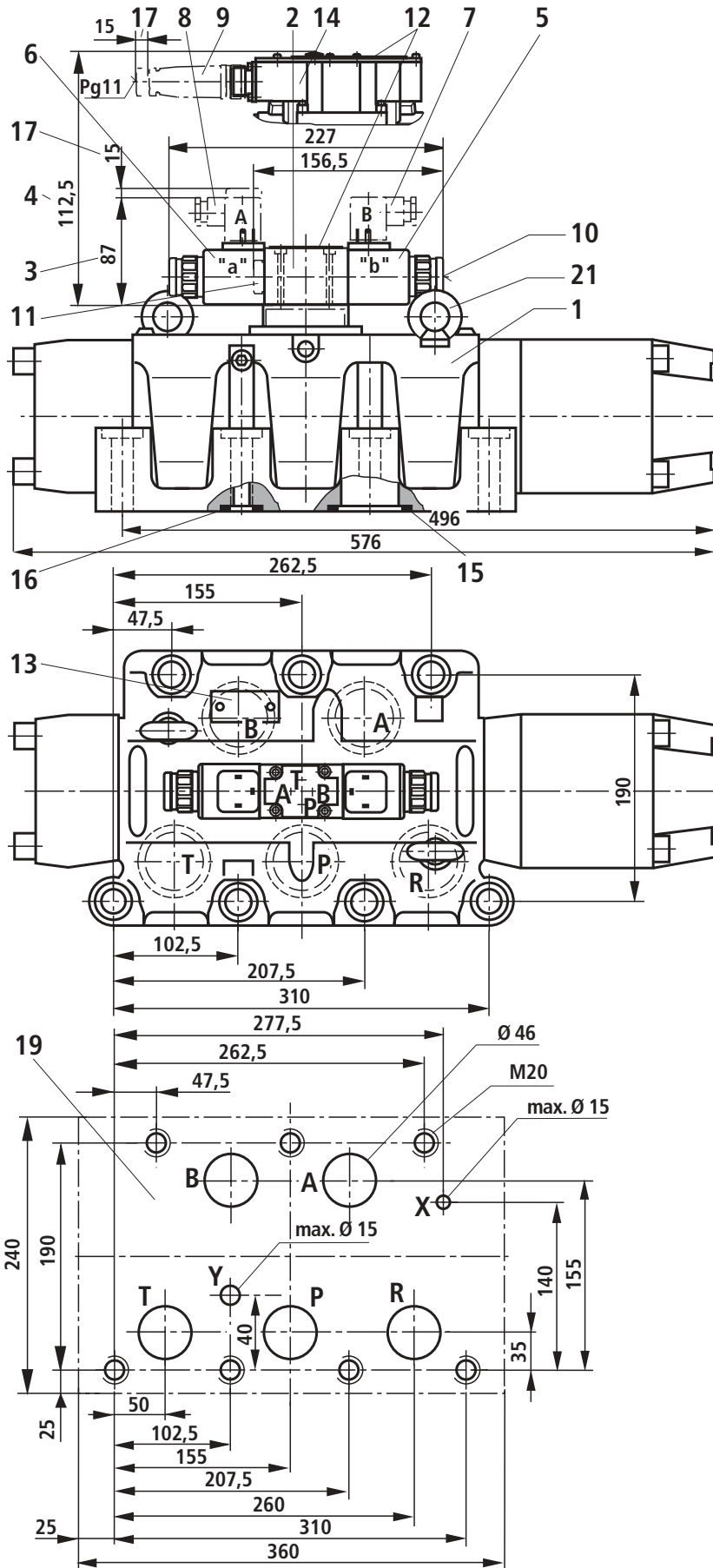
Subplates according to data sheet RE 45060 and valve fixing screws must be ordered separately.

**Subplates:** G 157/01 (G 1 1/2) G 158/10 (flange)  
G 157/02 (M48 x 2)

Valve fixing screws, see page 23

Unit dimensions: Subplate mounting (nominal dimensions in mm)

Size 52

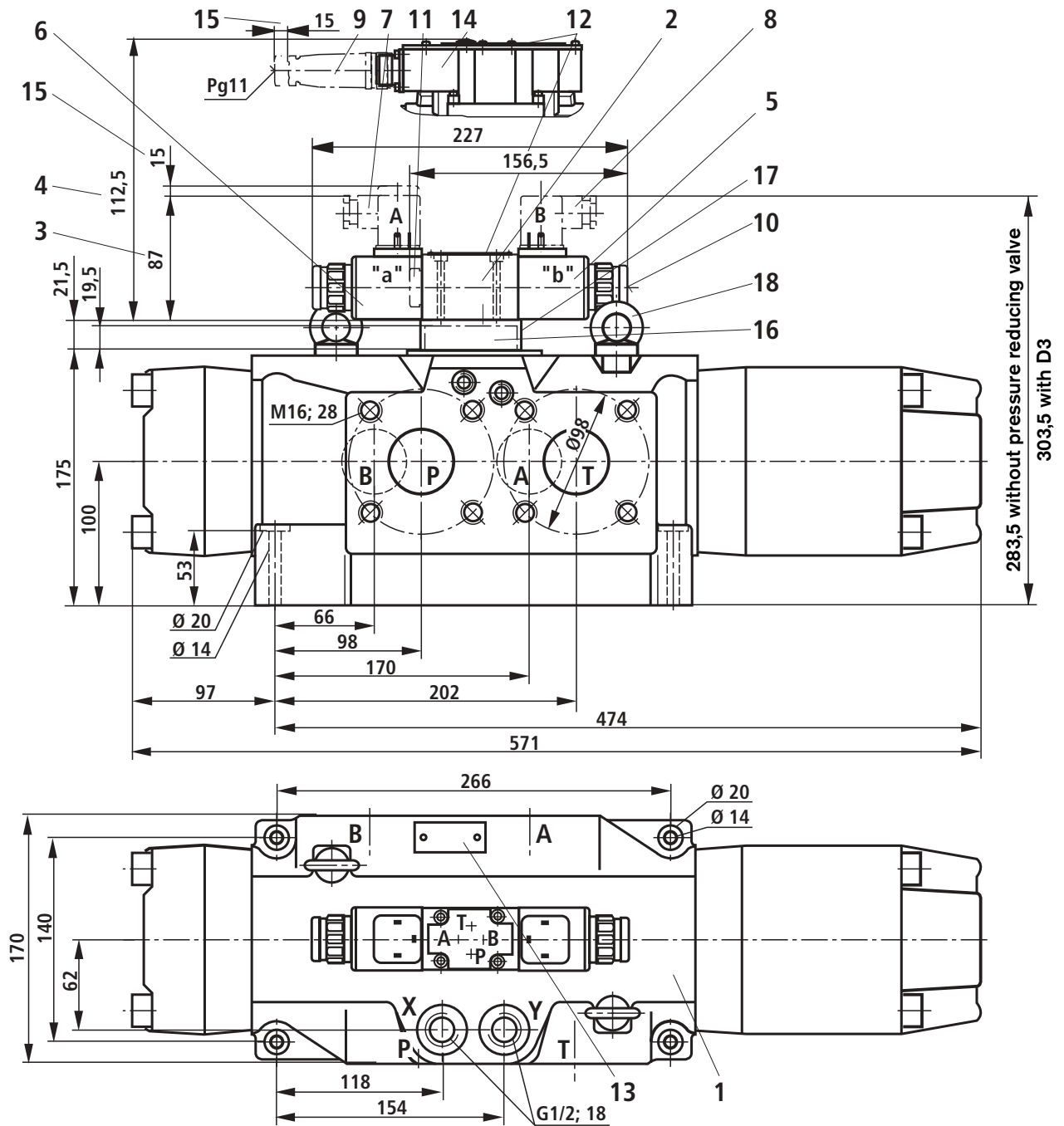


0,01/100mm  
Rzmax 4  
Required surface finish of the valve mounting surface

- 1 Main valve
  - 2 Pilot valve
  - 3 Dimension for version "4WRZ..." (not seawater-resistant)
  - 4 Dimension for version "4WRZE..."
  - 5 Proportional solenoid "a"
  - 6 Proportional solenoid "b"
  - 7 Cable socket "A"<sup>1)</sup>
  - 8 Cable socket "B"<sup>1)</sup>
  - 9 Cable socket<sup>1)</sup>  
<sup>1)</sup> separate order, see page 9
  - 10 Concealed manual override "N9"
  - 11 Cover for valves with one solenoid
  - 12 Nameplate for pilot valve
  - 13 Nameplate for main valve
  - 14 Integrated electronics (OBE)
  - 15 Identical seal rings for ports A, B, P, T and R
  - 16 Identical seal rings for ports X, Y and L
  - 17 Space required to remove cable socket
  - 18 Interconnection plate (type 4WRH...)
  - 19 Machined mounting face, position of ports, ports X and Y as required
  - 20 Adapter plate
  - 21 Lifting eye
- Valve fixing screws, see page 23

## Unit dimensions: Flange connection (nominal dimensions in mm)

Size 52



- 1 Main valve
- 2 Pilot valve
- 3 Dimension for version "4WRZ..." (**not** seawater-resistant)
- 4 Dimension for version "4WRZE..."
- 5 Proportional solenoid "a"
- 6 Proportional solenoid "b"
- 7 Cable socket "A", separate order, see page 9
- 8 Cable socket "B", separate order, see page 9
- 9 Cable socket, separate order, see page 9
- 10 Concealed manual override "N9"
- 11 Cover for valves with one solenoid

- 12 Nameplate for pilot valve
- 13 Nameplate for main valve
- 14 Integrated electronics (OBE)
- 15 Space required to remove cable socket
- 16 Interconnection plate (type 4WRH...)
- 17 Adapter plate
- 18 Lifting eye

Connecting flanges according to data sheet RE 45501 and valve fixing screws must be ordered separately.

**Valve fixing screws**, see page 23

## Pilot oil supply

**Type 4WRZ...-.../... and Type 4WRH...-.../...** External pilot oil supply  
External pilot oil supply

With this version, the pilot oil is supplied from a separate pilot circuit (external).

The pilot oil drain is not directed into the T-channel of the main valve, but fed separately to the tank via port Y (external).

**Type 4WRZ...-.../...E...** Internal pilot oil supply  
External pilot oil drain

With this version, the pilot oil is supplied from the P-channel of the main valve (internal).

The pilot oil drain is not directed into the T-channel of the main valve, but fed separately to the tank via port Y (external). Port X must be plugged on the subplate.

**Type 4WRZ...-.../...ET...** Internal pilot oil supply  
Internal pilot oil drain

With this version, the pilot oil is supplied from the P-channel of the main valve (internal).

The pilot oil drain is fed directly into the T-channel of the main valve (internal).

Ports X and Y must be plugged on the subplate .

**Type 4WRZ...-.../...T...** External pilot oil supply  
Internal pilot oil drain

With this version, the pilot oil is supplied from a separate pilot circuit (external).

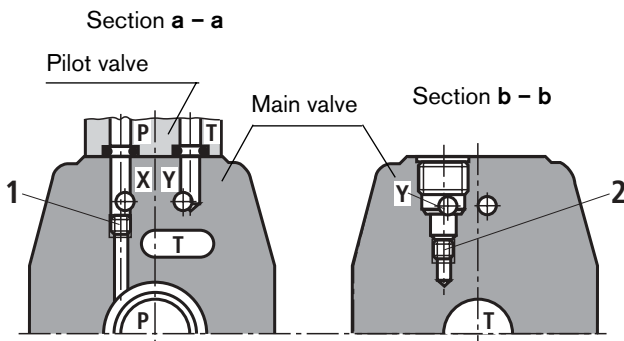
The pilot oil drain is fed directly into the T-channel of the main valve (internal).

Port Y must be plugged on the subplate

Items 1 and 2: Plug screw M6 DIN 906-8.8 SW 3

### Size 10

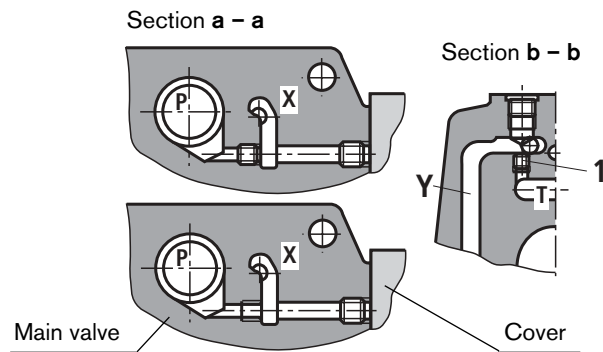
For section location, see page 16



Pilot oil supply (Section a - a)	external: 1	closed
	internal: 1	open
Pilot oil drain (Section b - b)	external: 2	closed
	internal: 2	open

### Size 16

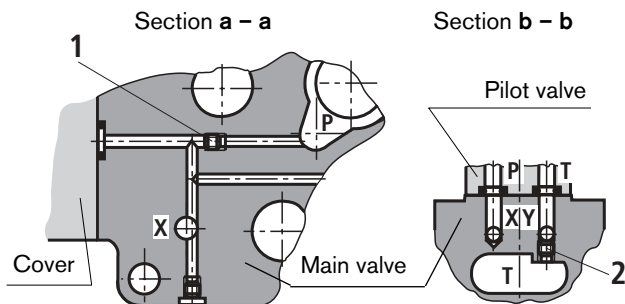
For section location, see page 17



Pilot oil supply (Section a - a)	external: P	closed
	internal: P	open
Pilot oil drain (Section b - b)	external: 1	closed
	internal: 1	open

### Size 25

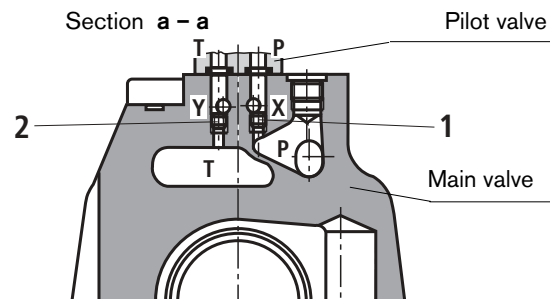
For section location, see page 18



Pilot oil supply (Section a - a)	external: 1	closed
	internal: 1	open
Pilot oil drain (Section b - b)	external: 2	closed
	internal: 2	open

### Size 32

For section location, see page 19



Pilot oil supply	external: 1	closed
	internal: 1	open
Pilot oil drain	external: 2	closed
	internal: 2	open

## Valve fixing screws (separate order)

The following valve fixing screws are recommended:

### 4WRZ10

#### 4 S.H.C.S. ISO 4762 – M6 x 45 -10.9-fIZn-240h-L

(friction value  $\mu_{\text{total}} = 0.09$  to  $0.14$ )

Tightening torque  $M_A = 13.5 \text{ Nm} \pm 10\%$

Material No. **R913000258**

or

#### 4 S.H.C.S. ISO 4762 – M6 x 45 -10.9

(friction value  $\mu_{\text{total}} = 0.12$  to  $0.17$ )

Tightening torque  $M_A = 15.5 \text{ Nm} \pm 10\%$

### 4WRZ16

#### 2 S.H.C.S. ISO 4762 – M6 x 60 -10.9-fIZn-240h-L

(friction value  $\mu_{\text{total}} = 0.09$  to  $0.14$ )

Tightening torque  $M_A = 12.2 \text{ Nm} \pm 10\%$

Material No. **R913000115**

#### 4 S.H.C.S. ISO 4762 – M10 x 60 -10.9-fIZn-240h-L

(friction value  $\mu_{\text{total}} = 0.09$  to  $0.14$ )

Tightening torque  $M_A = 58 \text{ Nm} \pm 20\%$

Material No. **R913000116**

or

#### 2 S.H.C.S. ISO 4762 – M6 x 60 -10.9

(friction value  $\mu_{\text{total}} = 0.12$  to  $0.17$ )

Tightening torque  $M_A = 15.5 \text{ Nm} \pm 10\%$

#### 4 S.H.C.S. ISO 4762 – M10 x 60 -10.9

(friction value  $\mu_{\text{total}} = 0.12$  to  $0.17$ )

Tightening torque  $M_A = 75 \text{ Nm} \pm 20\%$

### 4WRZ25

#### 6 S.H.C.S. ISO 4762 – M12 x 60 -10.9-fIZn-240h-L

(friction value  $\mu_{\text{total}} = 0.09$  to  $0.14$ )

Tightening torque  $M_A = 100 \text{ Nm} \pm 20\%$

Material No. **R913000121**

or

#### 6 S.H.C.S. ISO 4762 – M12 x 60 -10.9

(friction value  $\mu_{\text{total}} = 0.12$  to  $0.17$ )

Tightening torque  $M_A = 130 \text{ Nm} \pm 20\%$

### 4WRZ32

#### 6 S.H.C.S. ISO 4762 – M20 x 80 -10.9-fIZn-240h-L

(friction value  $\mu_{\text{total}} = 0.09$  to  $0.14$ )

Tightening torque  $M_A = 340 \text{ Nm} \pm 20\%$

Material No. **R901035246**

or

#### 6 S.H.C.S. ISO 4762 – M20 x 80 -10.9

(friction value  $\mu_{\text{total}} = 0.12$  to  $0.17$ )

Tightening torque  $M_A = 430 \text{ Nm} \pm 20\%$

### 5WRZ52

for steel mounting faces:

#### 7 S.H.C.S. ISO 4762 – M20 x 90 -10.9-fIZn-240h-L

(friction value  $\mu_{\text{total}} = 0.09$  to  $0.14$ )

Tightening torque  $M_A = 465 \text{ Nm} \pm 20\%$

Material No. **R913000397**

for cast iron mounting faces:

#### 7 S.H.C.S. ISO 4762 – M20 x 100 -10.9-fIZn-240h-L

(friction value  $\mu_{\text{total}} = 0.09$  to  $0.14$ )

Tightening torque  $M_A = 465 \text{ Nm} \pm 20\%$

Material No. **R913000386**

or

for steel mounting faces:

#### 7 S.H.C.S. ISO 4762 – M20 x 90 -10.9

(friction value  $\mu_{\text{total}} = 0.12$  to  $0.17$ )

Tightening torque  $M_A = 610 \text{ Nm} \pm 20\%$

for cast iron mounting faces:

#### 7 S.H.C.S. ISO 4762 – M20 x 100 -10.9

(friction value  $\mu_{\text{total}} = 0.12$  to  $0.17$ )

Tightening torque  $M_A = 610 \text{ Nm} \pm 20\%$

### 4WRZ52

#### 4 S.H.C.S. ISO 4762 – M12 x 70 -10.9-fIZn-240h-L

(friction value  $\mu_{\text{total}} = 0.09$  to  $0.14$ )

Tightening torque  $M_A = 100 \text{ Nm} \pm 20\%$

or

#### 4 S.H.C.S. ISO 4762 – M12 x 70 -10.9

(friction value  $\mu_{\text{total}} = 0.12$  to  $0.17$ )

Tightening torque  $M_A = 130 \text{ Nm} \pm 20\%$

## Throttle insert

When using a proportional directional valve of type 4WRZ..., install the following throttle inserts in channels A and B of the pilot valve:

Size	10	16	25	32	52
Ø in mm	1.8	2.0	2.8	–	–
Material no.	<b>R900158510</b>	<b>R900158547</b>	<b>R900157948</b>	–	–

## Notes

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