

RE 29 115/02.02

Replaces: 04.00

**4/2, 4/3 and 5/2, 5/3 proportional
directional valves, pilot operated,
without electrical position feedback
Types .WRZ..., .WRZE... und .WRH...**

Nominal sizes 10, 16, 25, 32, 52

Series 7X

Maximum operating pressure 350 bar

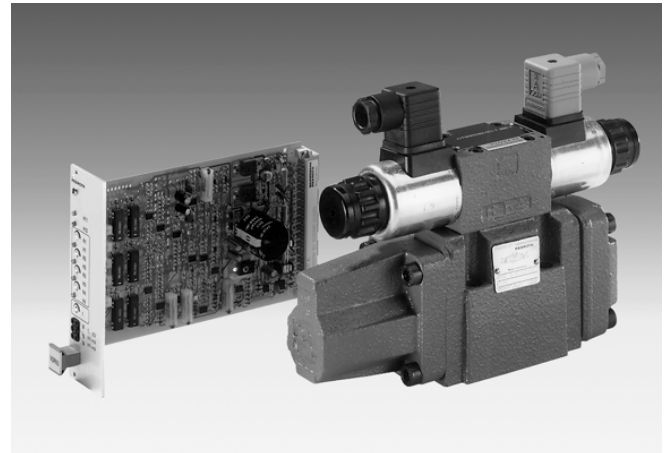
Maximum flow 2800 L/min

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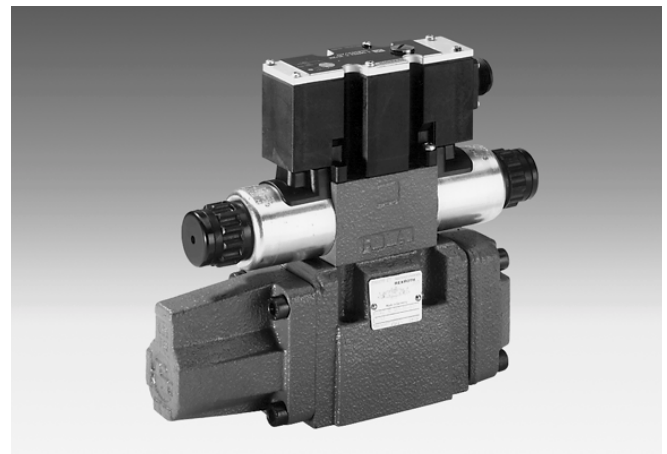
Features

- Pilot operated 2-stage proportional directional valve for the control of direction and rate of flow
- Proportional solenoid operation, with central thread and removable coil
- For subplate mounting:
Porting pattern to DIN 24 340 part 2 form A, ISO 4401 and CETOP-RP121H (4WRZ..., NS 10 to 32)
Porting pattern to DIN 24 340 part 2 form B (5WRZ..., NS 52)
Subplates to catalogue sheets RE 45 054 to RE 45 060 (separate order), see pages 17 to 21
- Hand override, optional
- Spring centred control spool
- Type WRZE with integrated control electronics, interface A1 or F1
- External control electronics for type WRZ:
 - Analogue amplifier type VT-VSPA2-50-1X/... in Euro-card format (separate order), see page 9
 - Digital amplifier type VT-VSPD-1-1X/... in Eurocard format (separate order), see page 9
 - Analogue amplifier types VT 11 118 and VT 11 011 of modular design (separate order), see page 9



H/A/D 5733/97

Typ 4WRZ 10...-7X/6EG24N9...K4.../M with plug-in connector and associated control electronics (separate order)



H/A/D 5738/97

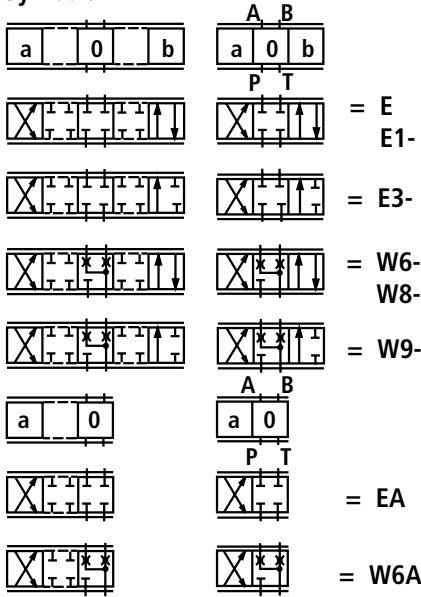
Typ 4WRZE 10...-7X/6EG24N9...K31.../M with integrated control electronics

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Ordering details for 4WRZ and 4WRH; NS 10 to 32 subplate mounting; NS 52 flange connections

4WR _				-7X	/				/			*
<p>Hydraulic operation = H</p> <p>Electro-hydraulic operation = Z</p> <p>Only for WRZ: for external electronics = No code</p> <p>With integrated electronics = E</p> <p>Nominal size 10 = 10</p> <p>Nominal size 16 = 16</p> <p>Nominal size 25 = 25</p> <p>Nominal size 32 = 32</p> <p>Nominal size 52 = 52</p> <p>Symbols</p> <p> = E1-</p> <p>= E3-</p> <p>= W6-W8-</p> <p>= W9-</p> <p>= EA</p> <p>= W6A</p> <p>With symbols E1- and W8-: P to A: $q_{V\max}$ B to T: $q_v/2$ P to B: $q_v/2$ A to T: $q_{V\max}$</p> <p>With symbols E3- and W9-: P to A: $q_{V\max}$ B to T: closed P to B: $q_v/2$ A to T: $q_{V\max}$</p> <p>(Regenerative circuit, base of spool at port A)</p> <p>Note: With spools W6-, W8-, W9-, W6A in their switched position "0", there is a connection from A to T and B to T with an opening of less than 2% of the relevant cross-section.</p>										<p>Further details in clear text</p> <p>M = ¹⁾ NBR seals</p> <p>V = FKM seals</p> <p>No code = Without pressure reducing valve</p> <p>D3 = ²⁾ With pressure reducing valve ZDR 6 DPO-4X/40YM-W80 (fixed setting)</p> <p>No code = For WRH and WRZ for 4WRZE:</p> <p>A1 = Com. value input ± 10 V</p> <p>F1 = Com. value input 4 to 20 mA</p> <p>Electrical connection only for WRZ:</p> <p>K4 = ^{2, 4)} Without plug-in connector with component plug to DIN EN 175 301-803 Plug-in connector – separate order, see page 10</p> <p>For WRZE:</p> <p>K31 = ^{2, 4)} Without plug-in connector with component plug to E DIN 43 563-AM6-3 Plug-in connector – separate order, see page 10</p> <p>Pilot oil supply and drain</p> <p>No code = External pilot oil supply, external pilot oil drain</p> <p>E = Internal pilot oil supply, external pilot oil drain</p> <p>ET = Internal pilot oil supply, internal pilot oil drain</p> <p>T = External pilot oil supply, internal pilot oil drain (for NS 52 and type 4WRH only possible without code)</p> <p>No code = Without special protection</p> <p>J = ⁵⁾ Sea water resistant</p> <p>No code = Without hand override</p> <p>N9 = ^{2, 3)} With protected hand override</p> <p>Electronic control supply voltage</p> <p>G24 = ²⁾ 24V DC (standard version)</p> <p>6E = ²⁾ Proportional solenoid with removable coil</p> <p>No code = For subplate mounting</p> <p>F = For flange mounting (only NS 52)</p> <p>7X = Series 70 to 79 (70 to 79: unchanged installation and connection dimensions)</p> <p>Nominal flow in L/m with a valve pressure differential $\Delta p = 10\text{ bar}$</p>		
25 =	50 =	85 =										For nominal size 10
	100 =	150 =										For nominal size 16
	220 =	325 =										For nominal size 25
	360 =	520 =										For nominal size 32
		1000 =										For nominal size 52

Ordering details for 5WRZ 52 and 5WRH 52; subplate mounting

5WR	_	52	1000-7X	/				/			*
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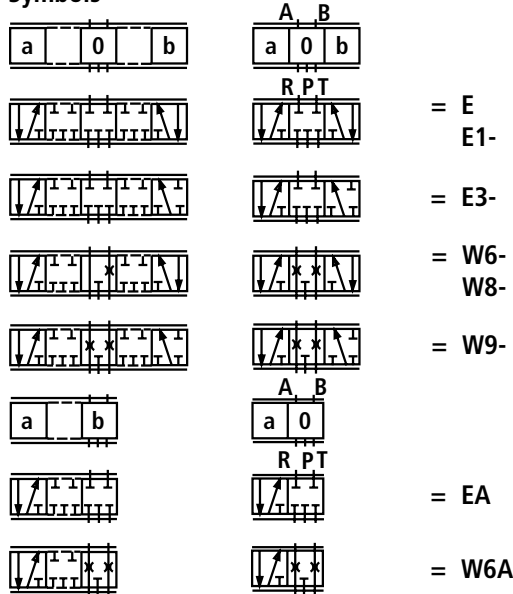
Hydraulic operation = H
Electro-hydraulic operation = Z

Only for WRZ:

For external control electronics = No code
With integrated control electronics = E

Nominal size 52 = 52

Symbols



With symbols E1- and W8-:

P to A: $q_v = 1000$ L/min B to T: $q_v = 500$ L/min
P to B: $q_v = 500$ L/min A to R: $q_v = 1000$ L/min

With symbols E3- and W9-:

P to A: $q_v = 1000$ L/min B to T: closed
P to B: $q_v = 500$ L/min A to R: $q_v = 1000$ L/min

(Regenerative circuit, base of spool at port A)

Note:

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

Further details in clear text

M = ¹⁾ NBR seals
V = FKM seals

No code = Without pressure reducing valve
D3 = ²⁾ With pressure reducing valve ZDR 6 DPO-4X/40YM-W80 (fixed setting)

No code = For WRZ and WRH For 4WRZE:

A1 = Com. value input ± 10 V

F1 = Com. value input 4 to 20 mA

Electrical connections only for WRZ:

K4 = ^{2, 4)} Without plug-in connector with component plug to DIN EN 175 301-803

Plug-in connector – separate order, see page 10

For WRZE:

K31 = ^{2, 4)} Without plug-in connector with component plug to E DIN 43 563-AM6-3

Plug-in connector – separate order, see page 10

No code = Without special protection
J = ⁵⁾ Sea water resistant

No code = Without hand override
N9 = ^{2, 3)} With protected hand override

Electronic control supply voltage

G24 = ²⁾ 24V DC

6E = ²⁾ Proportional solenoid with removable coil

7X = Series 70 to 79 (70 to 79: unchanged installation and connection dimensions)

Nominal flow with a valve pressure differential $\Delta p = 10$ bar

1000 = 1000 L/min

- ¹⁾ Suitable for mineral oil (HL, HLP) to DIN 51 524
- ²⁾ Omitted for 5WRH and 5WRZ without pilot valve
- ³⁾ With version "J" \rightarrow "N" instead of "N9"
- ⁴⁾ With version "J" = sea water resistant **only** "K31"
- ⁵⁾ For details regarding the sea water resistance see RE 29 115-M

Special electrical protection on request!

Preferred types

NS 10

Material No.	Type
00954563	4WRZE 10 E1-25-7X/6EG24ETK31/A1D3M
00954564	4WRZE 10 E1-50-7X/6EG24ETK31/A1D3M
00954565	4WRZE 10 E1-85-7X/6EG24ETK31/A1D3M
00954566	4WRZE 10 E25-7X/6EG24ETK31/A1D3M
00954567	4WRZE 10 E50-7X/6EG24ETK4/A1D3M
00954568	4WRZE 10 E85-7X/6EG24ETK31/A1D3M
00954602	4WRZE 10 E85-7X/6EG24ETK31/A1M
00954603	4WRZE 10 EA50-7X/6EG24EK31/A1D3M
00954605	4WRZE 10 EA85-7X/6EG24ETK31/A1D3M
00954647	4WRZE 10 W8-50-7X/6EG24ETK31/A1D3M
00954648	4WRZE 10 W8-85-7X/6EG24ETK31/A1D3M
00954649	4WRZE 10 W6-50-7X/6EG24ETK31/A1D3M
00954650	4WRZE 10 W6-85-7X/6EG24ETK31/A1D3M
00954651	4WRZE 10 W6-85-7X/6EG24K31/A1D3M

NS 16

Material No.	Type
00954655	4WRZE 16 E1-100-7X/6EG24ETK31/A1D3M
00954656	4WRZE 16 E1-150-7X/6EG24ETK31/A1D3M
00954657	4WRZE 16 E100-7X/6EG24ETK31/A1D3M
00954658	4WRZE 16 E100-7X/6EG24N9K31/A1M
00954659	4WRZE 16 E150-7X/6EG24ETK31/A1D3M
00954660	4WRZE 16 E150-7X/6EG24K31/A1D3M
00954661	4WRZE 16 EA150-7X/6EG24ETK31/A1M
00954662	4WRZE 16 W8-100-7X/6EG24K31/A1D3M
00954663	4WRZE 16 W8-150-7X/6EG24ETK31/A1D3M
00954664	4WRZE 16 W6-100-7X/6EG24ETK31/A1D3M
00954665	4WRZE 16 W6-150-7X/6EG24K31/A1M
00954666	4WRZE 16 W6-150-7X/6EG24ETK31/A1D3M

NS 25

Material No.	Type
00954668	4WRZE 25 E1-220-7X/6EG24ETK31/A1D3M
00954669	4WRZE 25 E1-325-7X/6EG24ETK31/A1D3M
00954670	4WRZE 25 E220-7X/6EG24ETK31/A1D3M
00954671	4WRZE 25 E220-7X/6EG24K31/A1M
00954672	4WRZE 25 E325-7X/6EG24ETK31/A1D3M
00954673	4WRZE 25 E325-7X/6EG24K31/A1D3M
00954674	4WRZE 25 EA325-7X/6EG24ETK31/A1M
00954675	4WRZE 25 W8-220-7X/6EG24K31/A1D3M
00954678	4WRZE 25 W8-325-7X/6EG24ETK31/A1D3M
00954679	4WRZE 25 W6-220-7X/6EG24ETK31/A1D3M
00954680	4WRZE 25 W6-325-7X/6EG24K31/A1M
00954681	4WRZE 25 W6-325-7X/6EG24ETK31/A1D3M

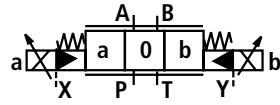
NS 32

Material No.	Type
00954692	4WRZE 32 E1-360-7X/6EG24ETK31/A1D3M
00954694	4WRZE 32 E1-520-7X/6EG24ETK31/A1D3M
00954695	4WRZE 32 E360-7X/6EG24ETK31/A1D3M
00954696	4WRZE 32 E360-7X/6EG24K31/A1M
00954697	4WRZE 32 E520-7X/6EG24ETK31/A1D3M
00954698	4WRZE 32 E520-7X/6EG24K31/A1D3M
00954699	4WRZE 32 EA520-7X/6EG24ETK31/A1M
00954700	4WRZE 32 W8-360-7X/6EG24K31/A1D3M
00954701	4WRZE 32 W8-520-7X/6EG24ETK31/A1D3M
00954702	4WRZE 32 W6-360-7X/6EG24ETK31/A1D3M
00954703	4WRZE 32 W6-520-7X/6EG24K31/A1M
00954704	4WRZE 32 W6-520-7X/6EG24ETK31/A1D3M

Symbols (simplified)

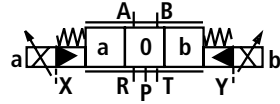
With electro-hydraulic operation and for external control electronics

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



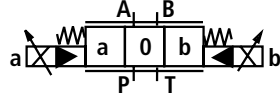
X = external
Y = external

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



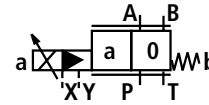
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Y = external

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

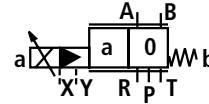


X = internal
Y = internal

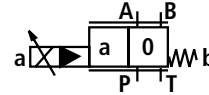
Type 4WRZ...A-7X./... and
Type 4WRZ 52 A...-7XF/...



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

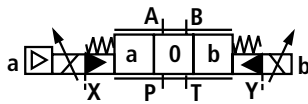


Type 4WRZ.A...-7X./...ET...



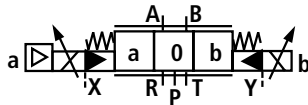
With electro-hydraulic operation and for integrated control electronics

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



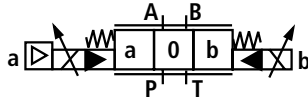
X = external
Y = external

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



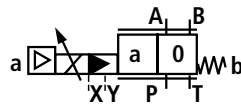
X = external
Y = external

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

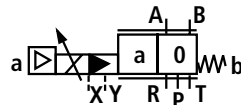


X = internal
Y = internal

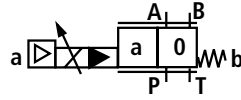
Type 4WRZE...A-7X./... and
Type 4WRZE 52 A...-7XF/...



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

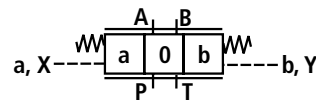


Type 4WRZE.A...-7X./...ET...



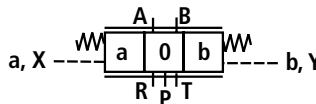
With hydraulic operation

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



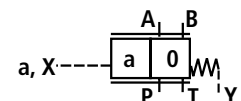
X = external
Y = external

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

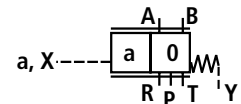


X = external
Y = external

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 removable coil. The solenoid is optionally controlled by external control electronics (type .WRZ) or via integrated control electronics (type .WRZE).

Design:

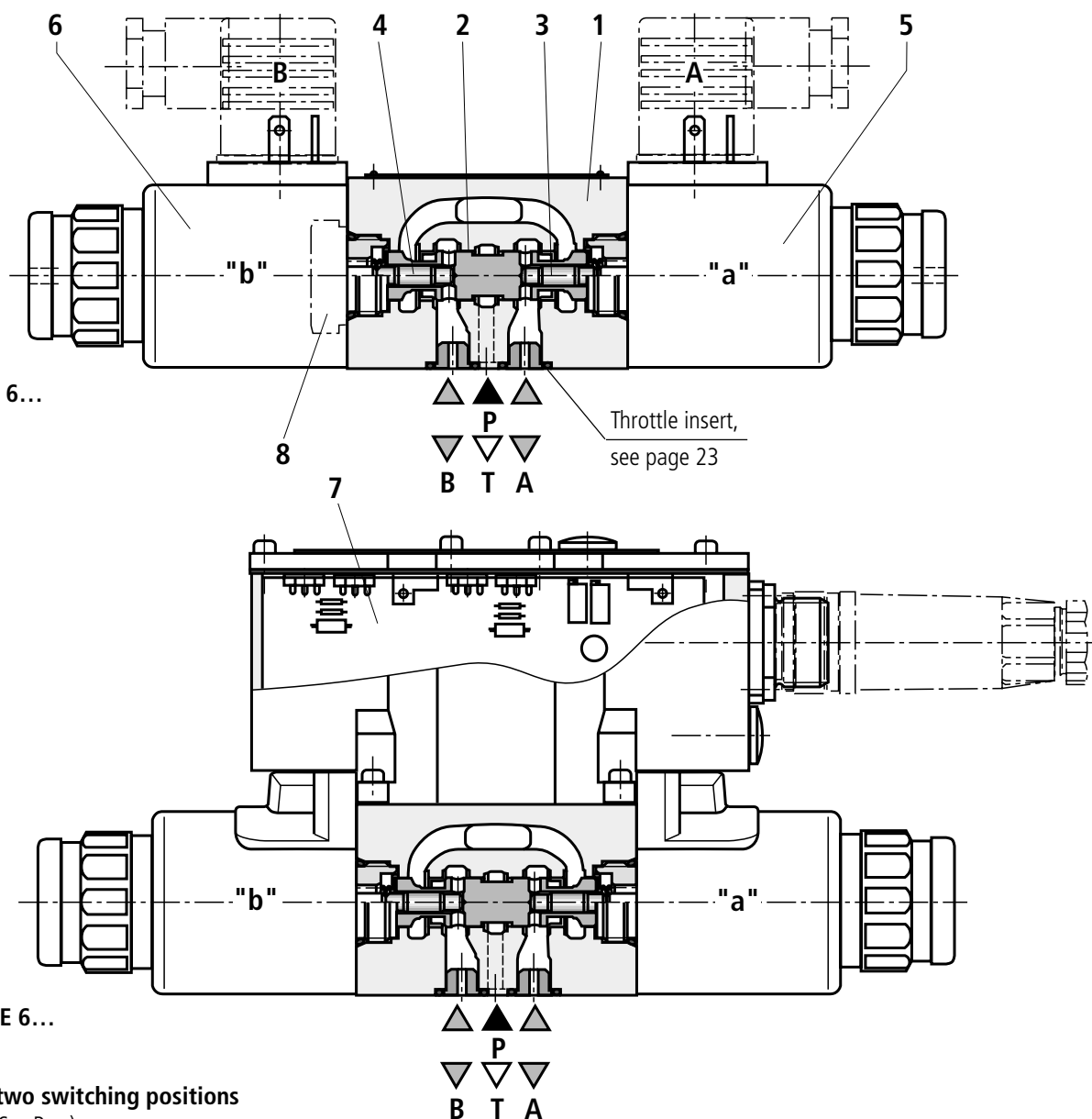
The valve basically comprises of:

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

Functional description:

- With the solenoids (5 and 6) in the de-energised condition the control spool (2) is held in the centre position by springs
- Direct operation of the control spool (2) by energising one of the proportional solenoids, e.g. solenoid "a" energised (5)
 - Movement of the pressure measuring spool (3) and control spool (2) to the left in proportion to the electrical input signal
 - The connection from P to B and A to T is via orifice type cross-sections with progressive flow characteristics
- De-energisation of the solenoid (5)
 - The control spool (2) is returned to the centre position via the springs

In the centre position ports A and B are open to T, therefore the pressure fluid can flow unhindered to the reservoir.



Type 3DREP 6...

Type 3DREPE 6...

Valve with two switching positions

(type 3DREP 6...B...)

The function of this version of the valve is basically the same as that of the valve with three switching positions. The 2 position valves are however only fitted with solenoid "a" (5). A plug (8) is fitted in place of the 2nd proportional solenoid.

Note for type 3DREP 6:

Draining of the tank line is to be prevented. With appropriate installation conditions a suitable back pressure valve is to be fitted (back pressure approx. 2 bar).

Function, section

Pilot operated proportional directional valve

Types 4WRZ... and 5WRZ...

The type 4WRZ... valves are pilot operated 4-way valves that are operated via proportional solenoids. They control the direction and rate of a flow.

The type 5WRZ... valves have an additional „R” connection.

Design:

The valve basically comprises of:

- Pilot valve (9) with proportional solenoids (5 and 6)
- Main valve (10) with main spool (11) and centering spring (12)

Functional description:

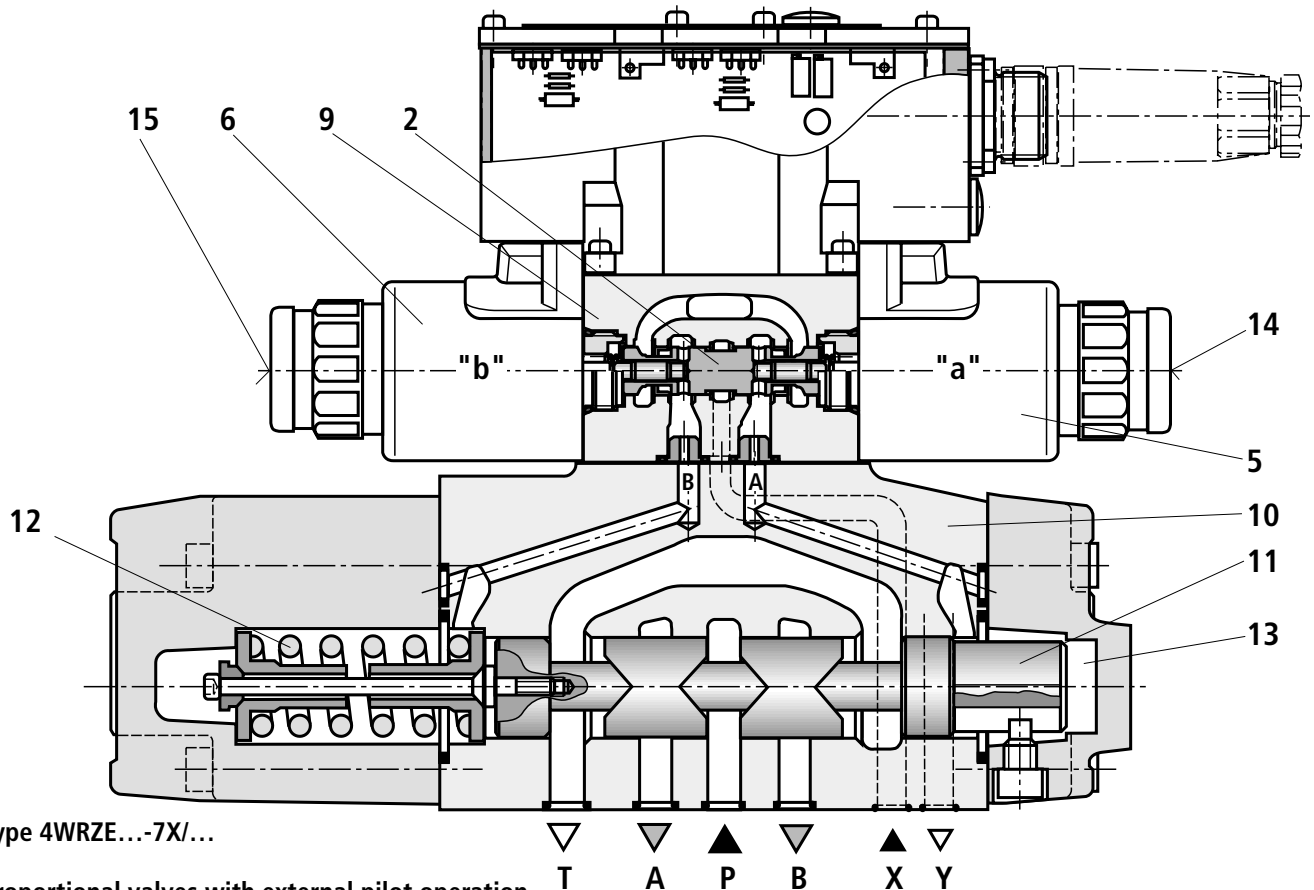
- With the solenoids (5 and 6) in the de-energised condition the control spool (11) is held in the centre position by the centering springs (12)
- The main spool (11) is operated via the pilot valve (9) – the main spool is moved proportionally, e.g. energisation of solenoid "b" (6)

- Movement of the main spool (2) to the right, pilot oil flows via the pilot valve (9) into the pressure chamber (13) and moves the main spool (11) in proportion to the electrical input signal
- The connection from P to A and B to T is via orifice type cross-sections with progressive flow characteristics
- The pilot oil supply to the pilot valve is internal via port P or external via port X
- De-energisation of the solenoid (6)
 - The control spool (2) and pilot spool (11) are moved back into their centre positions
- Flow which is dependent on the switched position is either from P to A and B to T (R) or P to B and A to T (R).

An optional hand override (14 and 15), makes it possible to move the pilot spool (2) without energising the solenoids.

⚠ Attention!

Unintended use of the hand override can lead to uncontrolled machine movements!



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

Proportional valves with external pilot operation

Types 4WRH... and 5WRH...

The type .WRH... valves are pilot operated proportional directional valves for external operation via pressure control valves.

Design:

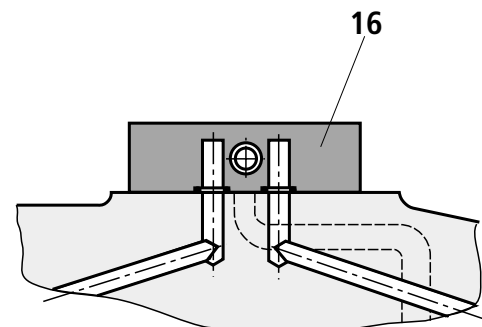
The valve basically comprises of:

- Main valve (10) with main spool (11) and centering spring (12)
- Inter-connecting plate (16)

Functional description:

- The inter-connecting plate (16) connects the pilot connection A with connection T(Y) and pilot connection B with P(X)

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



Type .WRH...-7X/...

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

General

Valve type				WRZ	WRZE
Installation				Optional, preferably horizontal (for commissioning guidelines see RE 07 800)	
Storage temperature	°C			– 20 to + 80 °C	
Ambient temperature range	°C			– 20 to + 70	– 20 to + 50
Weights for version .WRZ... (for .WRZE... additionally 0.2 kg)	Subplate mounting	NS 10	kg	7.8	
		NS 16	kg	13.4	
		NS 25	kg	18.2	
		NS 32	kg	42.2	
	Flange connections	NS 52	kg	77.5	

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

Nominal size	NS	10	16	25	32	52	
Operating pressure – Pilot valve,	Pilot oil supply external	bar	30 to 100				20 to 100
	Pilot oil supply internal	bar	100 to 315 only with "D3"	100 to 350 only with "D3"			
– Main valve		bar	Up to 315	Up to 350	Up to 350	Up to 350	Up to 350
Return line	Port T (port R) (pilot oil drain external)	bar	Up to 315	Up to 250	Up to 250	Up to 150	Up to 250
	Port T (pilot oil drain internal)	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
Pilot oil volume for spool movement 0 → 100 %		cm ³	1.7	4.6	10	26.5	54.3
Pilot oil flow at ports X and Y for a stepped form of input signal 0 → 100 %		L/min	3.5	5.5	7	15.9	7
Flow through main valve		L/min	Up to 170	Up to 460	Up to 870	Up to 1600	Up to 2800
Pressure fluid			Mineral oil (HL, HLP) to DIN 51 524 further pressure fluids on request!				
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			Maximum permissible degree of contamination of the pressure fluid is to NAS 1638			A filter with a minimum retention rate of $\beta_x \geq 75$ is recommended	
	Pilot valve		Class 7			x = 5	
	Main valve		Class 9			x = 15	
Hysteresis		%	≤ 6				

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

Electrical

Valve type		WRZ ¹⁾	WRZE	
Protection		IP65 with mounted and fixed plug-in connector		
Voltage type		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. warm value	Ω	7.2	3
Duty	%	100		
Coil temperature ³⁾	°C	Up to 150		
Electrical connections	WRZ	With component plug to DIN EN 175 301-803		
		Plug-in connector to DIN EN 175 301-803 ²⁾		
	WRZE	With component plug to E DIN 43 563-AM6-3		
		Plug-in connector E DIN 43 563-BF6-3/Pg11 ²⁾		

Control electronics

Integrated control electronics for type WRZE			Integrated in the valve, see pages 10 and 11	
Current consumption	I_{\max}	A	–	1,8
	Impulse 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 ²⁾			VT-SWKA-1-1X/... to catalogue sheet RE 30 255	
			VT-SWKD-1-1X/... to catalogue sheet RE 30 121	
Analogue command value module ²⁾			VT-SWMA-1-1X/... to catalogue sheet RE 29 902	
			VT-SWMKA-1-1X/... to catalogue sheet RE 29 903	
External control electronics for type WRZ				
Analogue amplifier In Eurocard format ²⁾	– With 1 ramp time		VT- VSPA2-50-1X/T1, to catalogue sheet RE 30 113	
	– With 5 ramp times		VT- VSPA2-50-1X/T5, to catalogue sheet RE 30 113	
Digital amplifier in Eurocard format ²⁾			VT-VSPD-1-1X/..., to catalogue sheet RE 30 123	
Analogue amplifier of modular design ²⁾			VT 11 118-1X/..., to catalogue sheet RE 30 218	
			VT 11 011-1X/..., to catalogue sheet RE 29 737	

¹⁾ With Bosch Rexroth control electronics

²⁾ Separate order

³⁾ Due to the occurring surface temperature of the solenoid coils, the European Standards EN 563 and EN 982 must be taken into account!

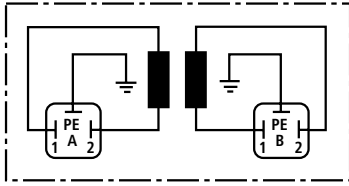
Note: For details regarding the **environmental simulation test** covering EMC (electro-magnetic compatibility), climate and mechanical loading see RE 29 115-U (declaration regarding environmental compatibility).

Electrical connections, plug-in connectors

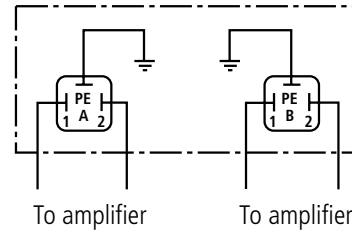
(Dimensions in mm)

For **type .WRZ...** (**for** external control electronics – **not** for version "J" = sea water resistant)

Connection at component plug



Connection at plug-in connector



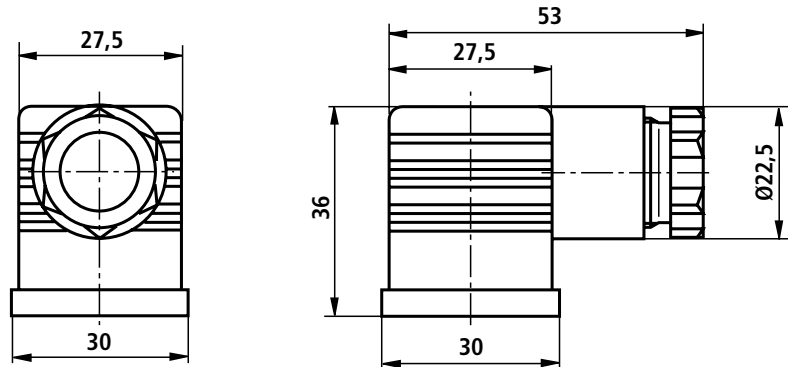
Plug-in connector to DIN EN 175 301-803

Solenoid **a**, colour grey

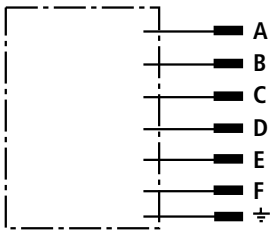
Separate order under Material No. **00074683**

Solenoid **b**, colour black

Separate order under Material No. **00074684**



Plug allocation for version "J" = sea water resistant



External control electronics

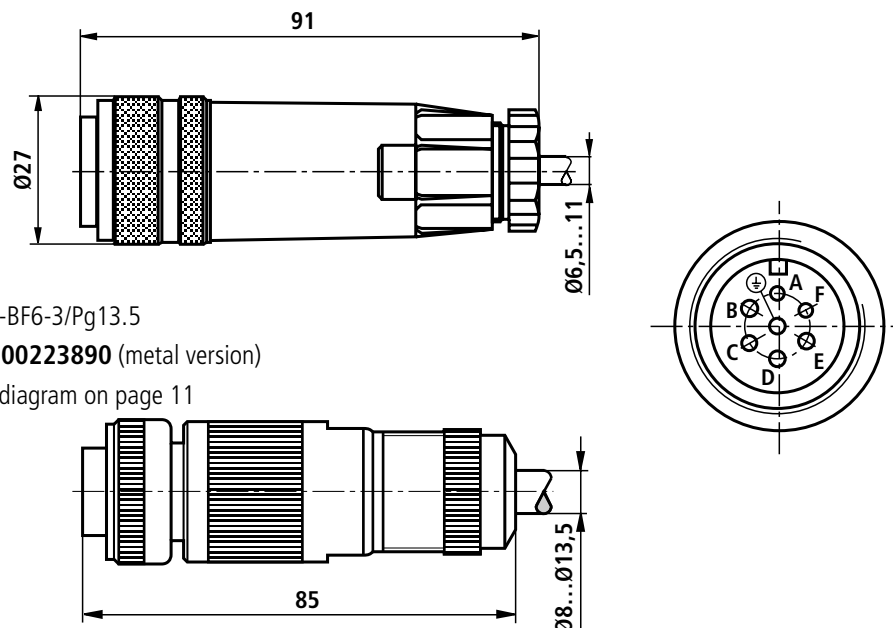
Slot alloc.	Connect with
A	Solenoid A
B	Solenoid B
C	Solenoid A
D	Solenoid B
E	n.a.
F	n.a.
PE	Valve housing

For **type .WRZE...** (**with** integrated control electronics and for version "J" = sea water resistant)

Plug-in connector to E DIN 43 563-BF6-3/Pg11

Separate order under Material No. **00021267** (plastic version)

For pin allocation see block circuit diagram on page 11



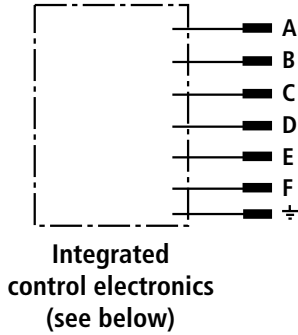
Plug-in connector to E DIN 43 563-BF6-3/Pg13.5

Separate order under Material No. **00223890** (metal version)

For pin allocation see block circuit diagram on page 11

Integrated control electronics for type WRZE

Component plug pin allocation



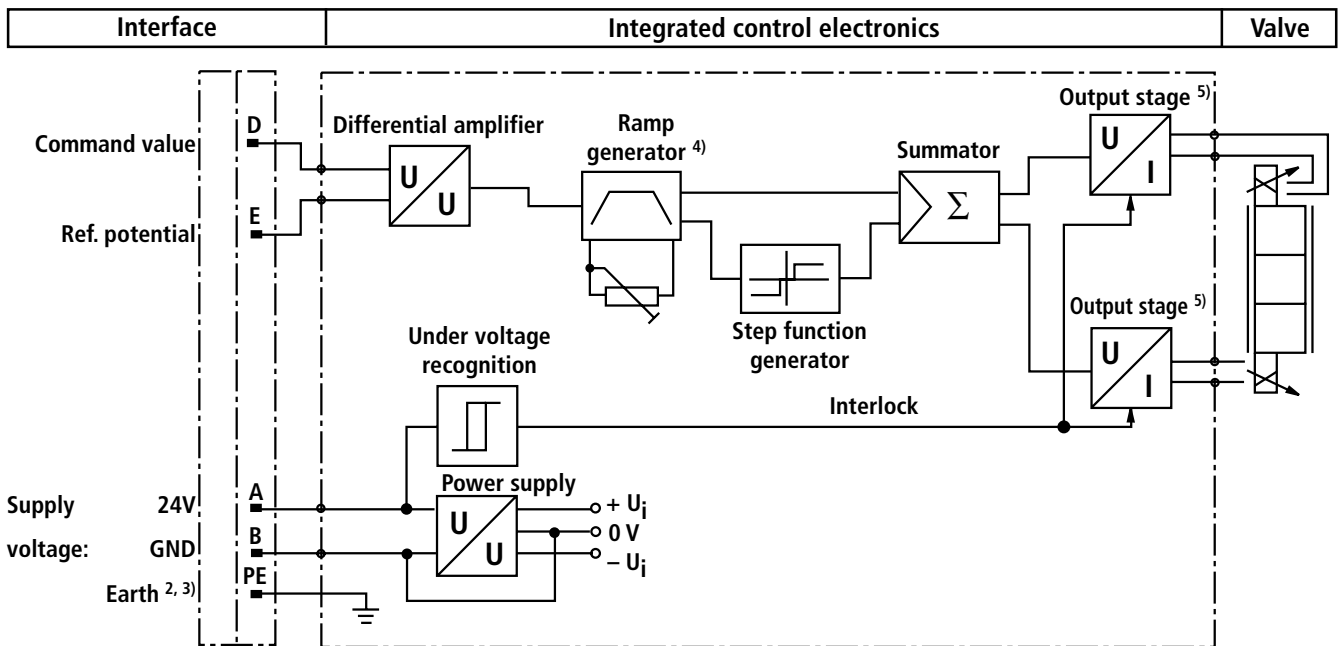
	Slot alloc.	Signal
Power supply	A	24 VDC (19 to 35 VDC)
	B	GND
	C	n.a. ¹⁾
Differential amplifier input	D	Com. value ($\pm 10\text{ V} / 4\text{ to }20\text{ mA}$)
	E	Ref. potential
	F	n.a. ¹⁾

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

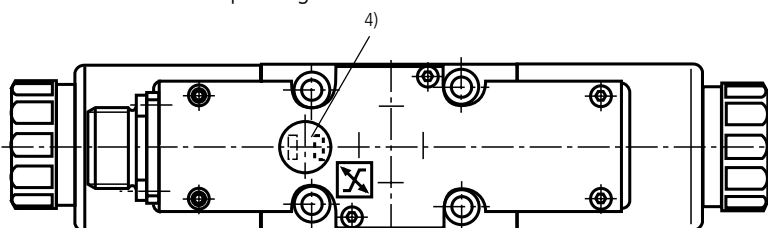
Connection cable: Recommended: – Up to 25 m cable length, type LiYCY 5 x 0.75 mm²
 – Up to 50 m cable length, type LiYCY 5 x 1.0 mm²
 Outside diameter 6.5 to 11 mm or 8 to 13.5 mm
 Only attach screen to PE on the supply side.

¹⁾ Slots C and F must not be connected!

Block circuit diagram / connection allocation for the integrated electronics



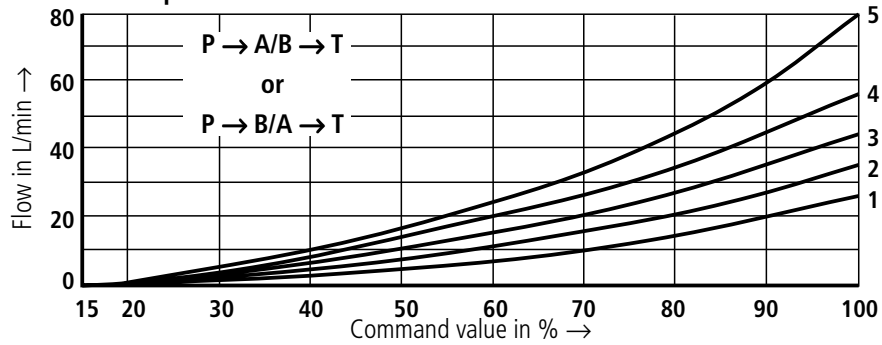
- 2) Connection PE is connected to cooling body and valve housing
- 3) Earth is screwed to valve housing and cover
- 4) Ramps can be externally adjusted from 0 to 2.5 s T_{up} and T_{down}
- 5) Current controlled output stages



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

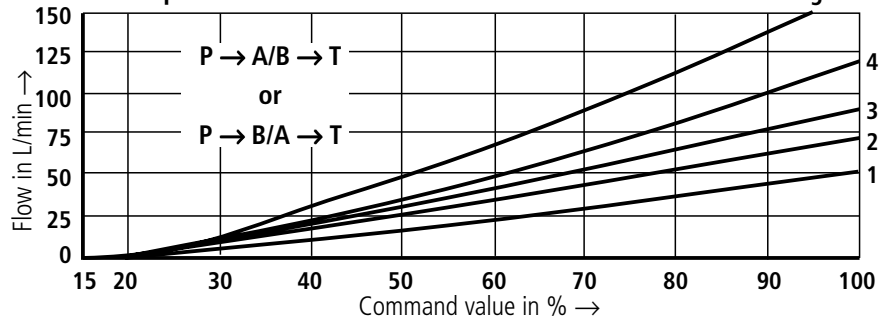
25 L/min nominal flow with a 10 bar valve pressure differential

- 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



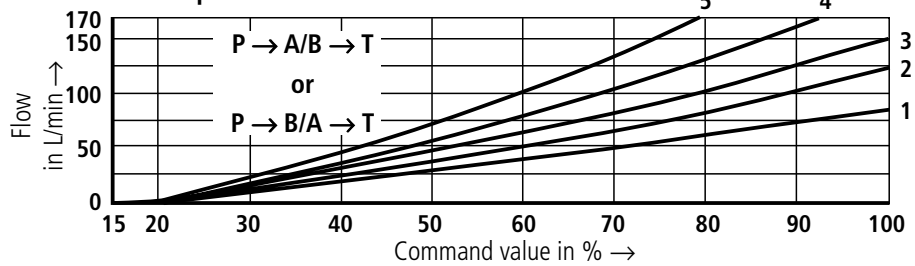
50 L/min nominal flow with a 10 bar valve pressure differential

- 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 with a 10 bar valve pressure differential

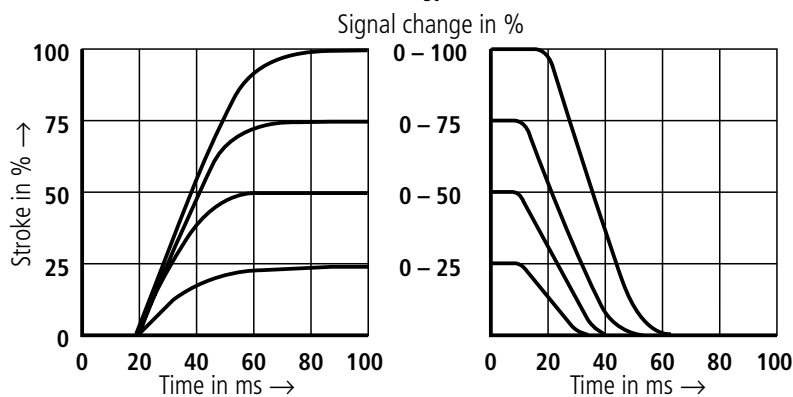
- 1 $\Delta p = 10\text{ bar}$ constant
- 2 $\Delta p = 20\text{ bar}$ constant
- 3 $\Delta p = 30\text{ bar}$ constant
- 4 $\Delta p = 50\text{ bar}$ constant
- 5 $\Delta p = 100\text{ bar}$ constant



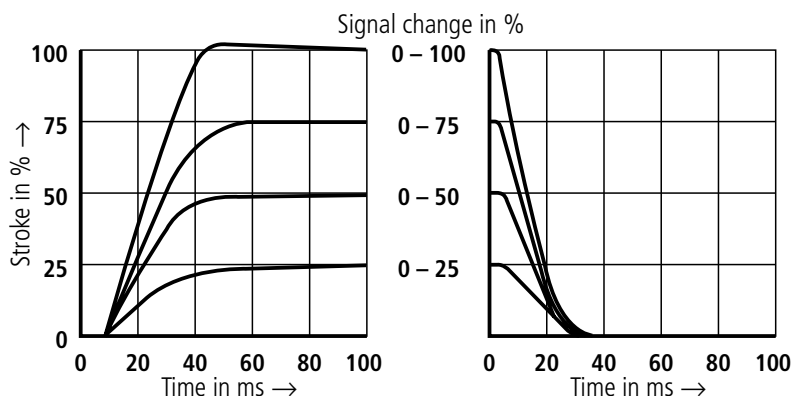
$\Delta p =$ valve pressure differential to DIN 24 311 (input pressure p_p minus load pressure p_l minus return line pressure p_r)

Transient function with a stepped form of electrical input signal $p_{St} = 50\text{ bar}$

Type 4WRZ...



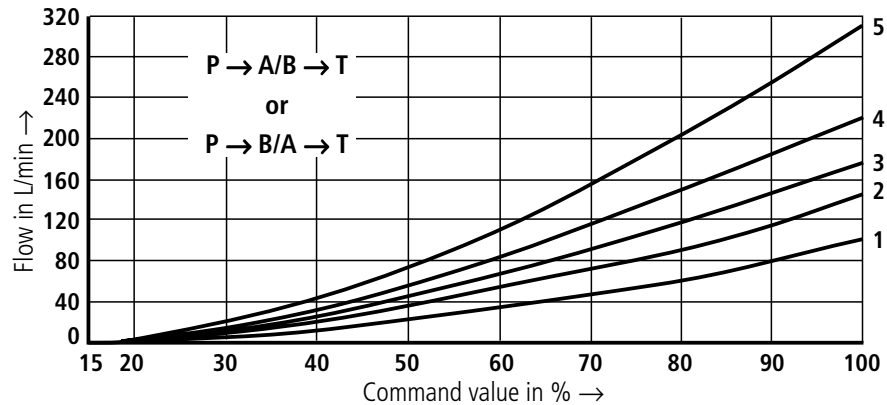
Type 4WRZE...



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

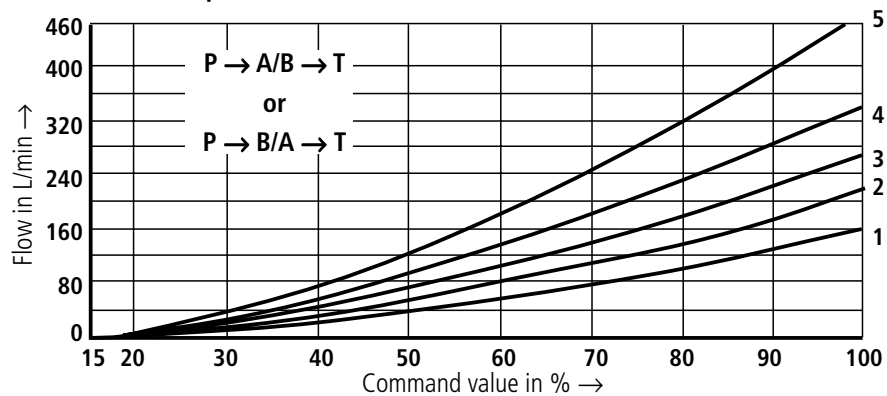
100 L/min nominal flow with a 10 bar valve pressure differential

- 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 with a 10 bar valve pressure differential

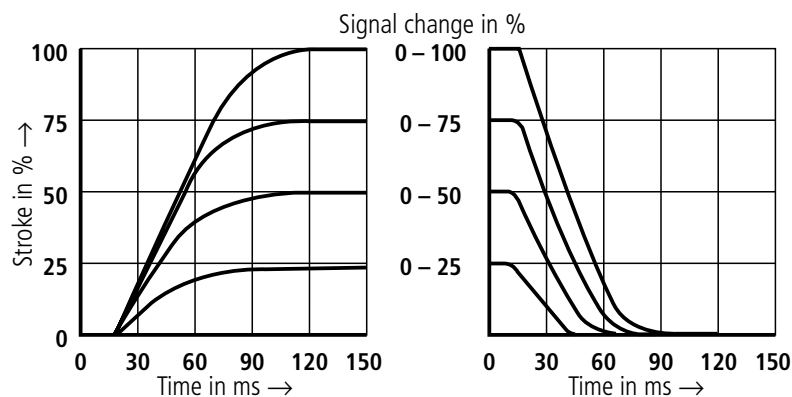
- 1 $\Delta p = 10\text{ bar}$ constant
- 2 $\Delta p = 20\text{ bar}$ constant
- 3 $\Delta p = 30\text{ bar}$ constant
- 4 $\Delta p = 50\text{ bar}$ constant
- 5 $\Delta p = 100\text{ bar}$ constant



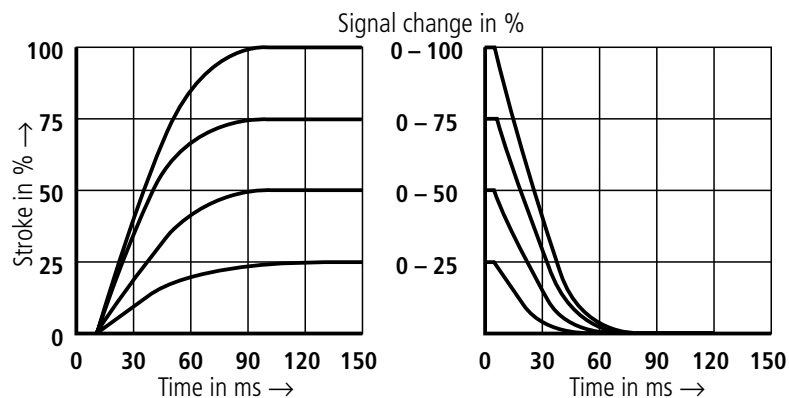
$\Delta p =$ valve pressure differential to DIN 24 311 (input pressure p_p minus load pressure p_L minus return line pressure p_r)

Transient function with a stepped form of electrical input signal $p_{st} = 50\text{ bar}$

Type 4WRZ...



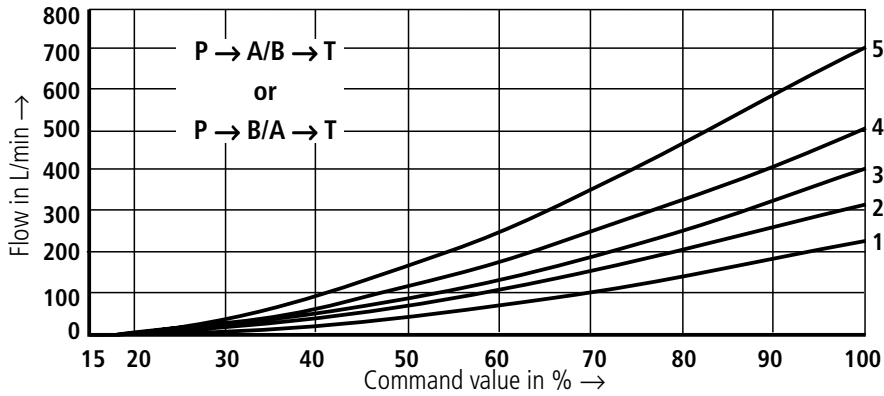
Type 4WRZE...



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

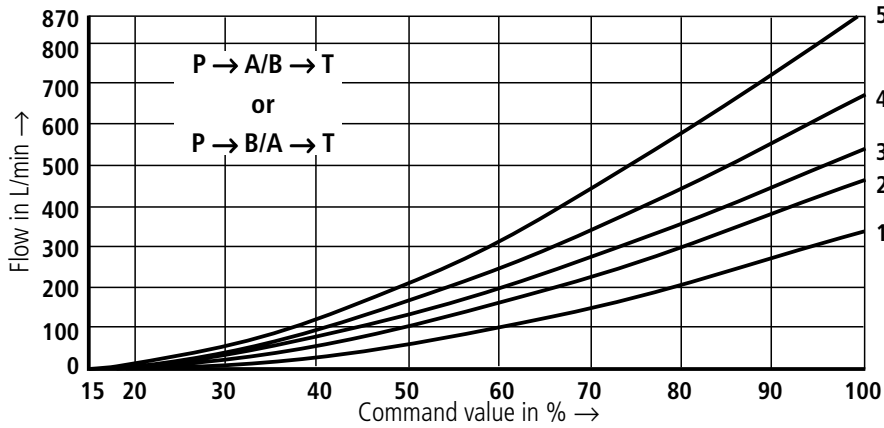
220 L/min nominal flow with a 10 bar valve pressure differential

- 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 with a 10 bar valve pressure differential

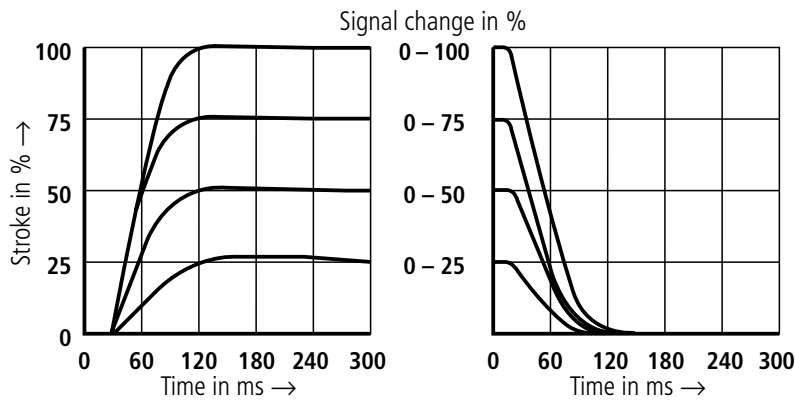
- 1 $\Delta p = 10\text{ bar}$ constant
- 2 $\Delta p = 20\text{ bar}$ constant
- 3 $\Delta p = 30\text{ bar}$ constant
- 4 $\Delta p = 50\text{ bar}$ constant
- 5 $\Delta p = 100\text{ bar}$ constant



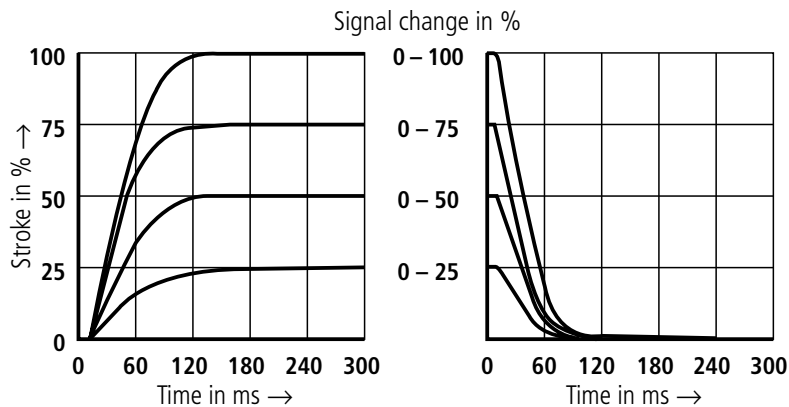
Δp = valve pressure differential to DIN 24 311 (input pressure p_p minus load pressure p_L minus return line pressure p_r)

Transient function with a stepped form of electrical input signal, measured at $p_{st} = 50\text{ bar}$

Type 4WRZ...



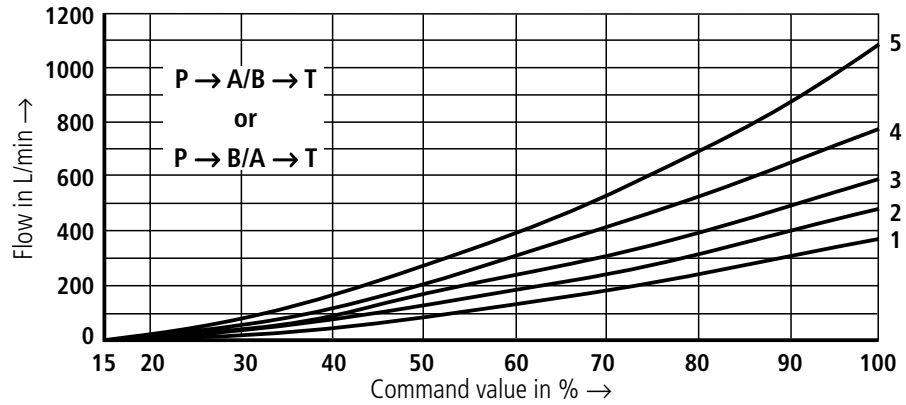
Type 4WRZE...



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

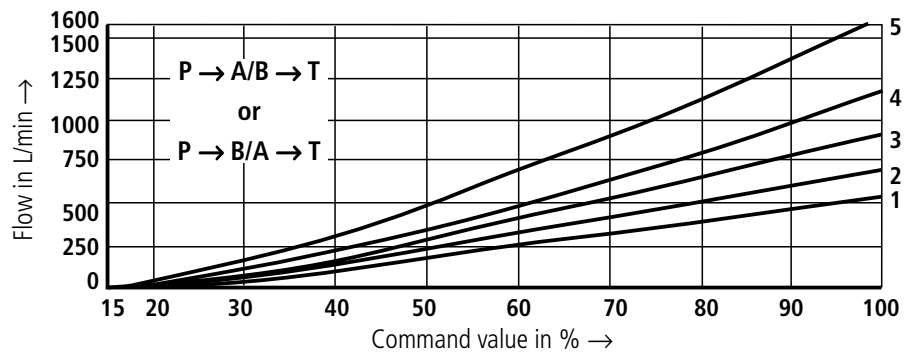
360 L/min nominal flow with a 10 bar valve pressure differential

- 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 with a 10 bar valve pressure differential

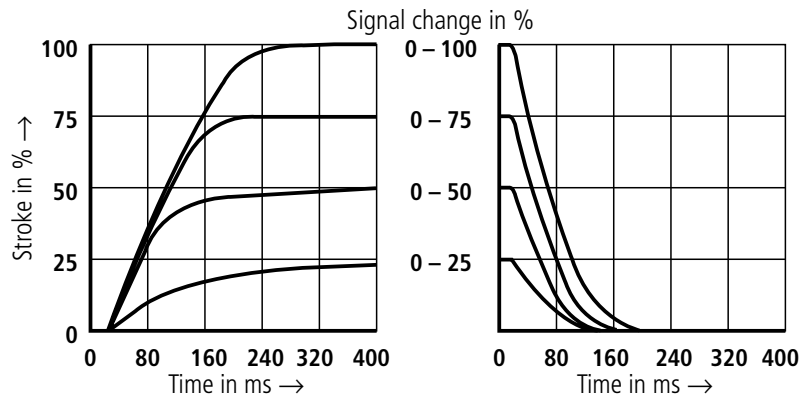
- 1 $\Delta p = 10\text{ bar}$ constant
- 2 $\Delta p = 20\text{ bar}$ constant
- 3 $\Delta p = 30\text{ bar}$ constant
- 4 $\Delta p = 50\text{ bar}$ constant
- 5 $\Delta p = 100\text{ bar}$ constant



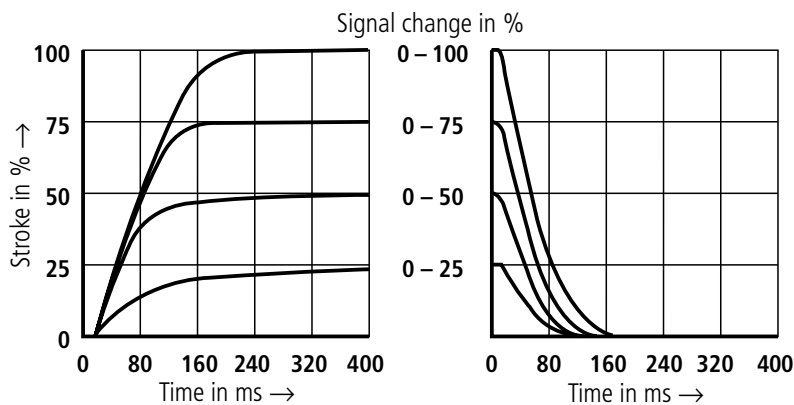
$\Delta p =$ valve pressure differential to DIN 24 311 (input pressure p_p minus load pressure p_L minus return line pressure p_r)

Transient function with a stepped form of electrical input signal, measured at $p_{St} = 50\text{ bar}$

Type 4WRZ...



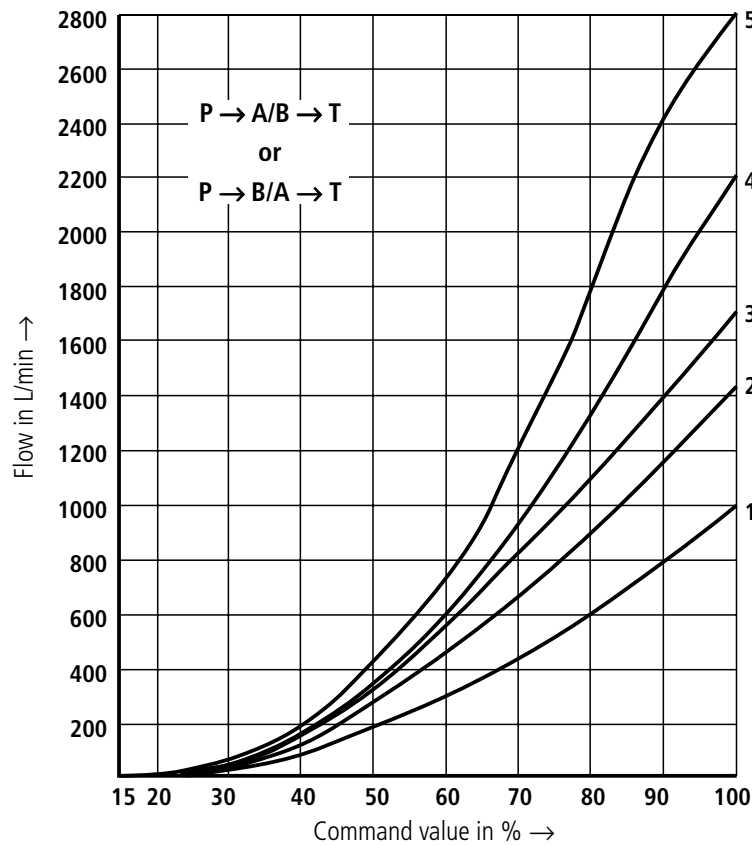
Type 4WRZE...



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

1000 L/min nominal flow with a 10 bar valve pressure differential

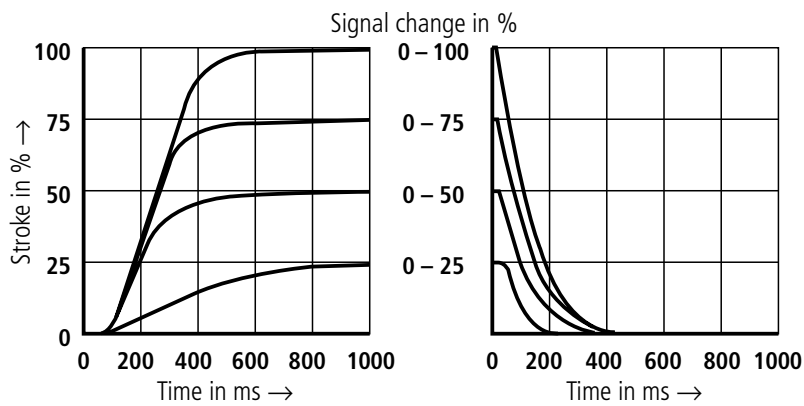
- 1 $\Delta p = 10\text{ bar}$ constant
- 2 $\Delta p = 20\text{ bar}$ constant
- 3 $\Delta p = 30\text{ bar}$ constant
- 4 $\Delta p = 50\text{ bar}$ constant
- 5 $\Delta p = 100\text{ bar}$ constant



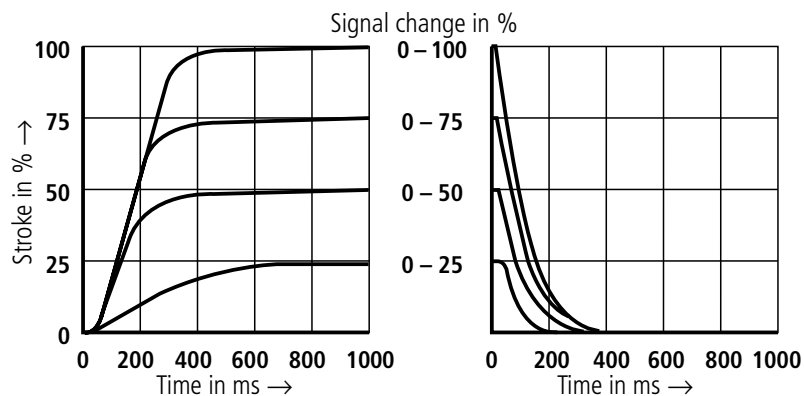
Δp = valve pressure differential to DIN 24 311 (input pressure p_p minus load pressure p_L minus return line pressure p_r)

Transient function with a stepped form of electrical input signal, measured at $p_{St} = 50\text{ bar}$

Type .WRZ...

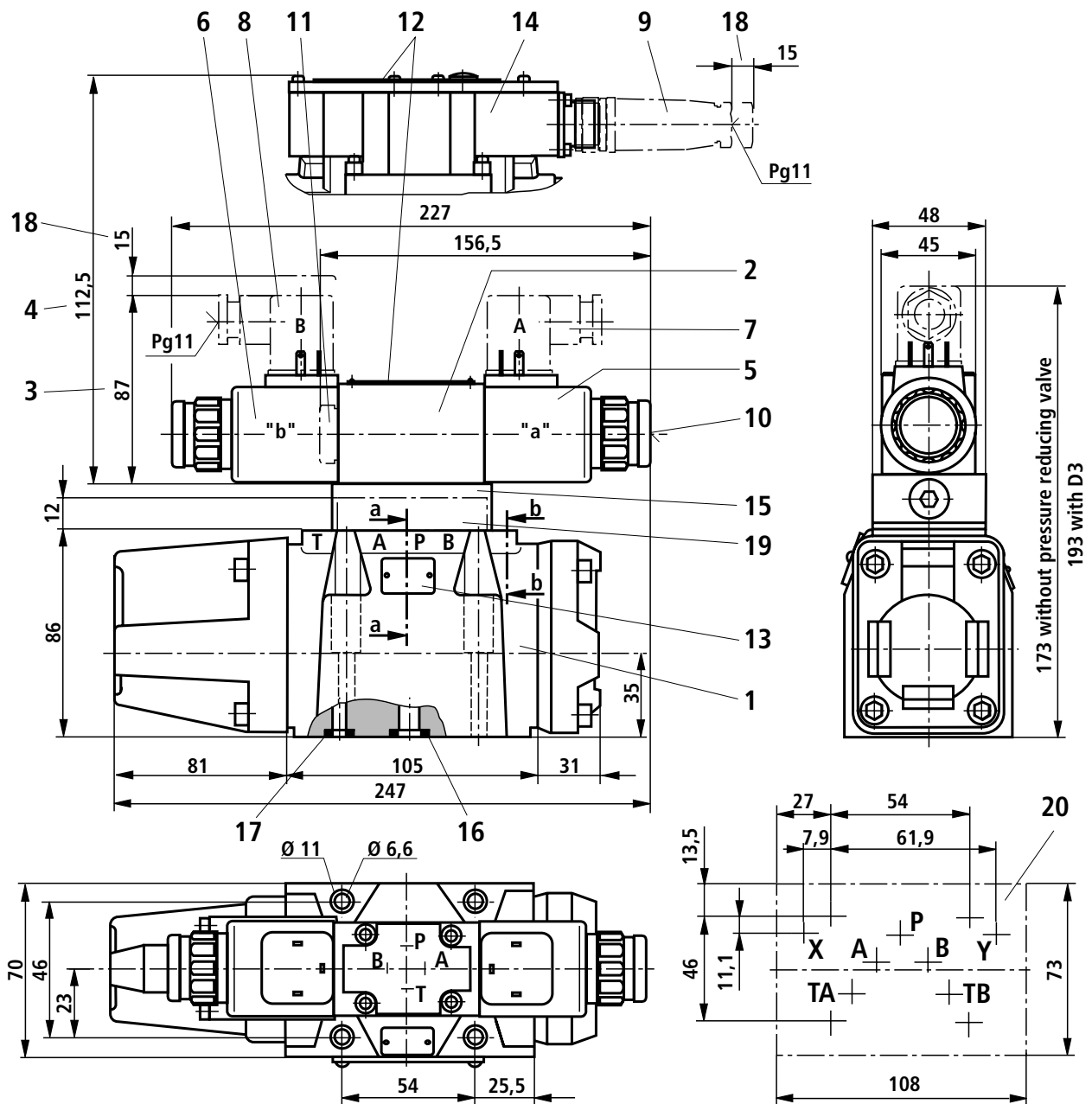


Type .WRZE...



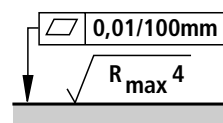
Unit dimensions:

(Dimensions in mm) **NS 10**



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

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



Required surface finish of mating piece

For section details see page 23.

Valve fixing screws:

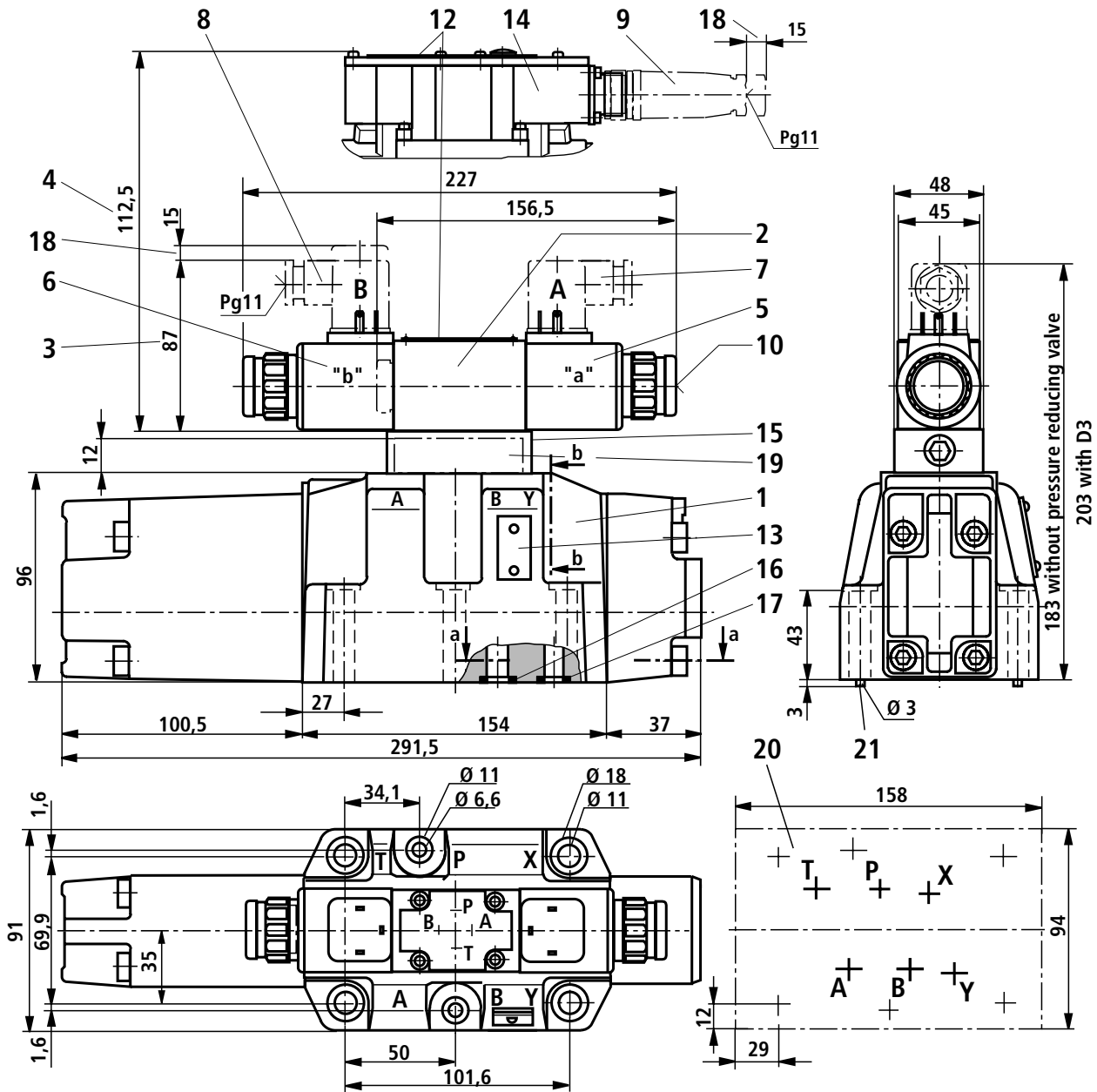
4 off M6 x 45 DIN 912-10.9; $M_A = 15.5 \text{ Nm}$

- 1 Main valve
- 2 Pilot valve
- 3 Dim. for version „4WRZ...“ (**not** sea water resistant)
- 4 Dim. for version „4WRZE...“
- 5 Proportional solenoid „a“
- 6 Proportional solenoid „b“
- 7 Plug-in connector „A“, separate order, see page 10
- 8 Plug-in connector „B“, separate order, see page 10
- 9 Plug-in connector to E-DIN 43 563, separate order, see page 10
- 10 Protected hand override „N9“

- 11 Cover for valve with one solenoid
- 12 Name plate for pilot valve
- 13 Name plate for main valve
- 14 Integrated control electronics
- 15 Pressure reducing valve
- 16 R-ring 13 x 1.6 x 2; ports A, B, P, T
- 17 R-ring 11.18 x 1.6 x 1.78; ports X, Y
- 18 Space required to remove plug-in connector
- 19 Inter-connecting plate (type 4WRH...)
- 20 Machined valve mounting face, connection locations to DIN 24 340 form A, ISO 4401 and CETOP-RP121H (X, Y as required)

Unit dimensions:

(Dimensions in mm) NS 16



Subplates to catalogue sheet RE 45 056 and valve fixing screws must be ordered separately.

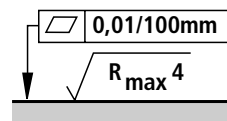
- Subplates:**
- | | |
|--------------------|--------------------|
| G 172/01 (G 3/4) | G 172/02 (M27 x 2) |
| G 174/01 (G 1) | |
| G 174/02 (M33 x 2) | G 174/08 (flange) |

Valve fixing screws:

2 off M6 x 60 DIN 912-10.9; $M_A = 15.5 \text{ Nm}$
 4 off M10 x 60 DIN 912-10.9; $M_A = 75 \text{ Nm}$

- 1 Main valve
- 2 Pilot valve
- 3 Dim. for version „4WRZ...“ (not sea water resistant)
- 4 Dim. for version „4WRZE...“
- 5 Proportional solenoid „a“
- 6 Proportional solenoid „b“
- 7 Plug-in connector „A“, separate order, see page 10
- 8 Plug-in connector „B“, separate order, see page 10
- 9 Plug-in connector to E-DIN 43 563, separate order, see page 10

- 10 Protected hand override „N9“
- 11 Cover for valve with one solenoid
- 12 Name plate for pilot valve
- 13 Name plate for main valve
- 14 Intergrated control electronics
- 15 Pressure reducing valve
- 16 R-ring 22.53 x 2.3 x 2.62; ports A, B, P, T
- 17 R-ring 10 x 2 x 2; ports X, Y
- 18 Space required to remove plug-in connector
- 19 Inter-connecting plate (type 4WRH...)
- 20 Machined valve mounting face, connection locations to DIN 24 340 form A, ISO 4401 and CETOP-RP121H
- 21 Locating pin



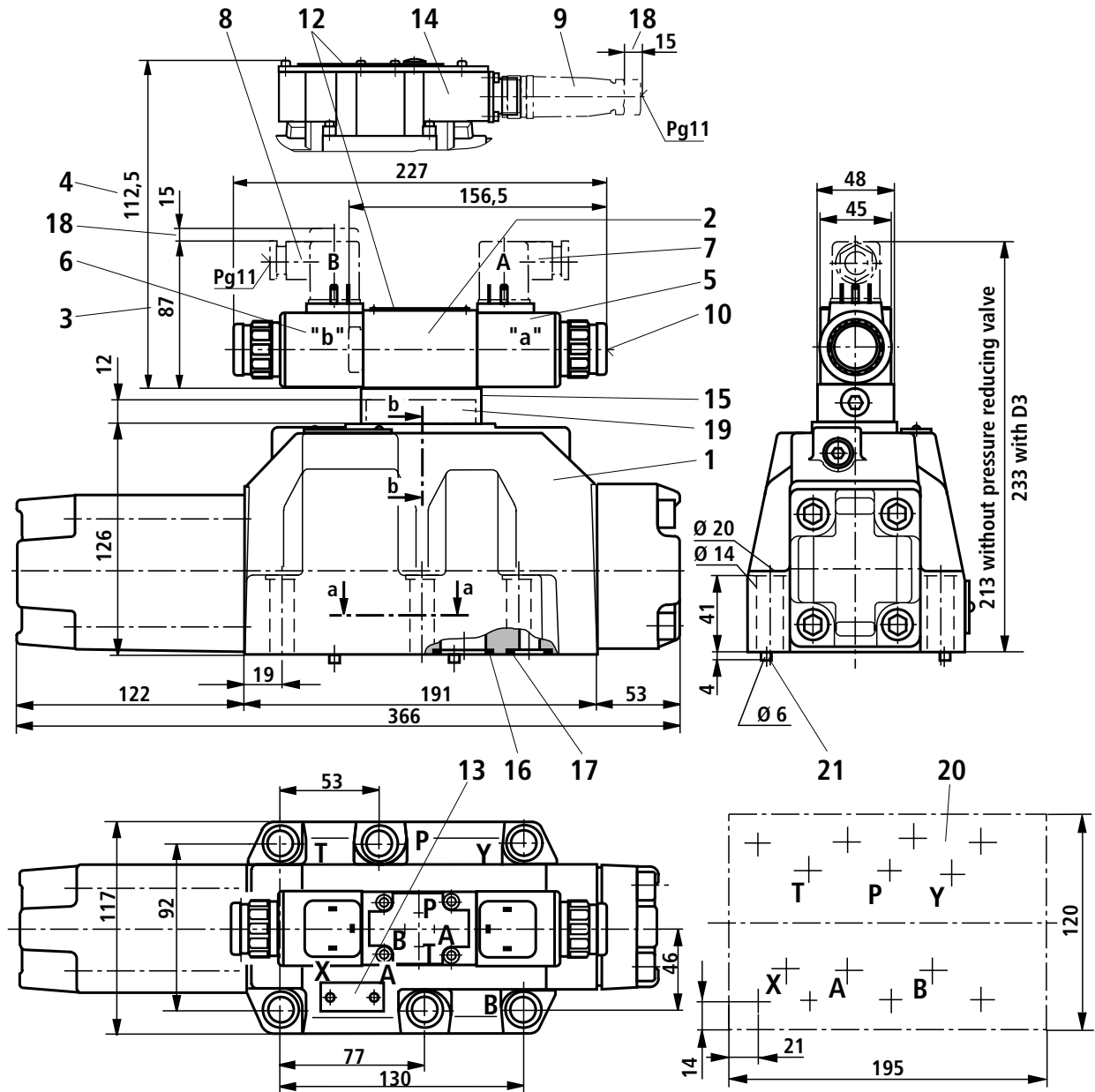
Required surface finish of mating piece

For section details see page 23.

Unit dimensions:

(Dimensions in mm)

NS 25



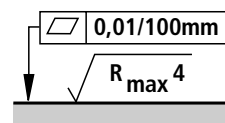
Subplates to catalogue sheet RE 45 058 and valve fixing screws must be ordered separately.

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:

6 off M12 x 60 DIN 912-10.9; $M_A = 130 \text{ Nm}$

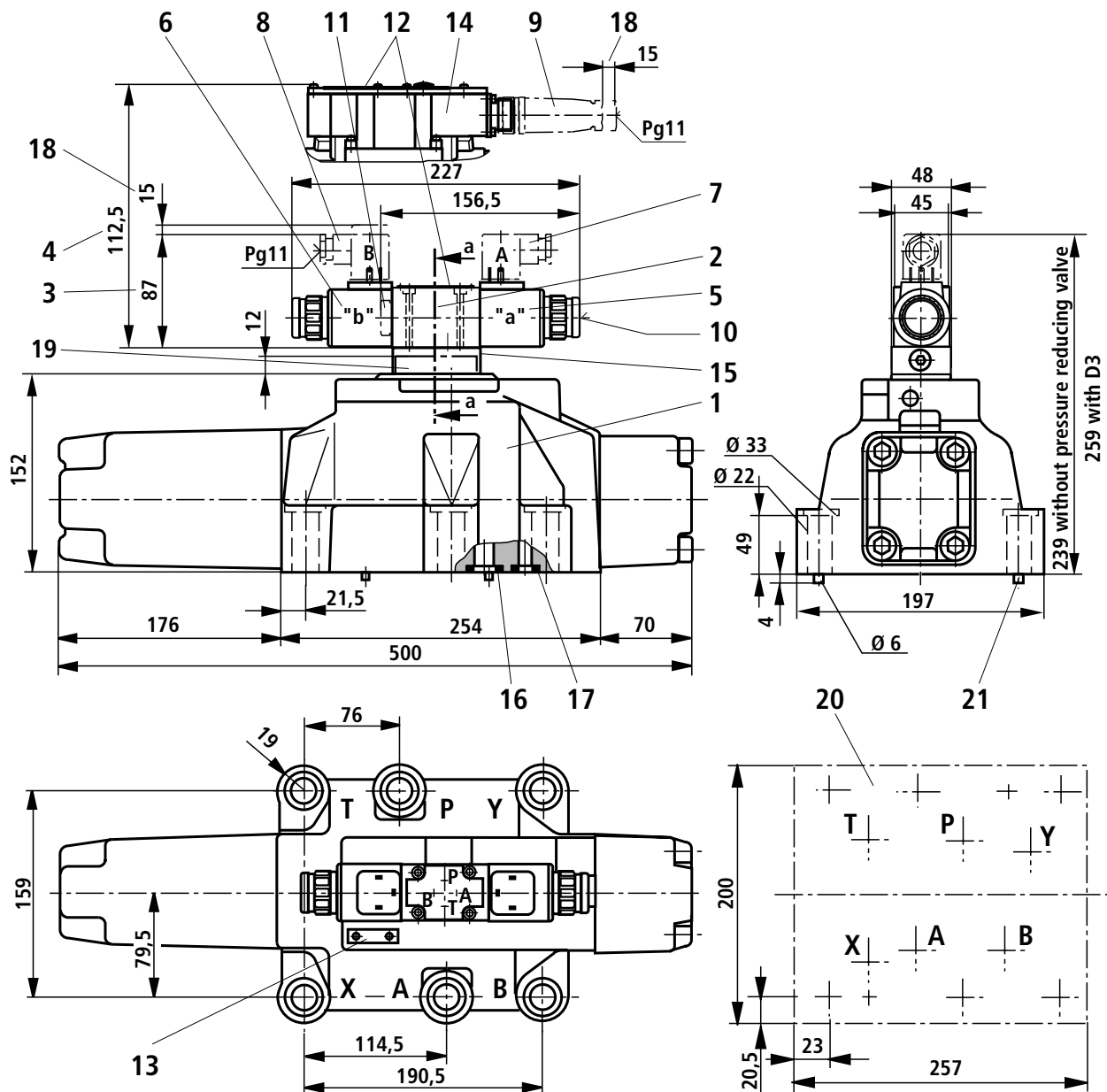
- 1 Main valve
- 2 Pilot valve
- 3 Dim. for version „4WRZ...“ (**not** sea water resistant)
- 4 Dim. for version „4WRZE...“
- 5 Proportional solenoid „a“
- 6 Proportional solenoid „b“
- 7 Plug-in connector „A“, separate order, see page 10
- 8 Plug-in connector „B“, separate order, see page 10
- 9 Plug-in connector to E-DIN 43 563, separate order, see page 10



Required surface finish of mating piece

For section details see page 23.

- 10 Protected hand override „N9“
- 11 Cover for valve with one solenoid
- 12 Name plate for pilot valve
- 13 Name plate for main valve
- 14 Integrated control electronics
- 15 Pressure reducing valve
- 16 R-ring 27.8 x 2.6 x 3; ports A, B, P, T
- 17 R-ring 19 x 3 x 3; ports X, Y
- 18 Space required to remove plug-in connector
- 19 Inter-connecting plate (type 4WRH...)
- 20 Machined valve mounting face, connection locations to DIN 24 340 form A, ISO 4401 and CETOP-RP121H
- 21 Locating pin

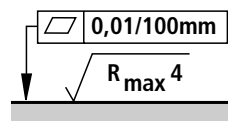


Subplates to catalogue sheet RE 45 060 and valve fixing screws must be ordered separately.

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

Valve fixing screws:

6 off M20 x 80 DIN 912-10.9; $M_A = 430$ Nm

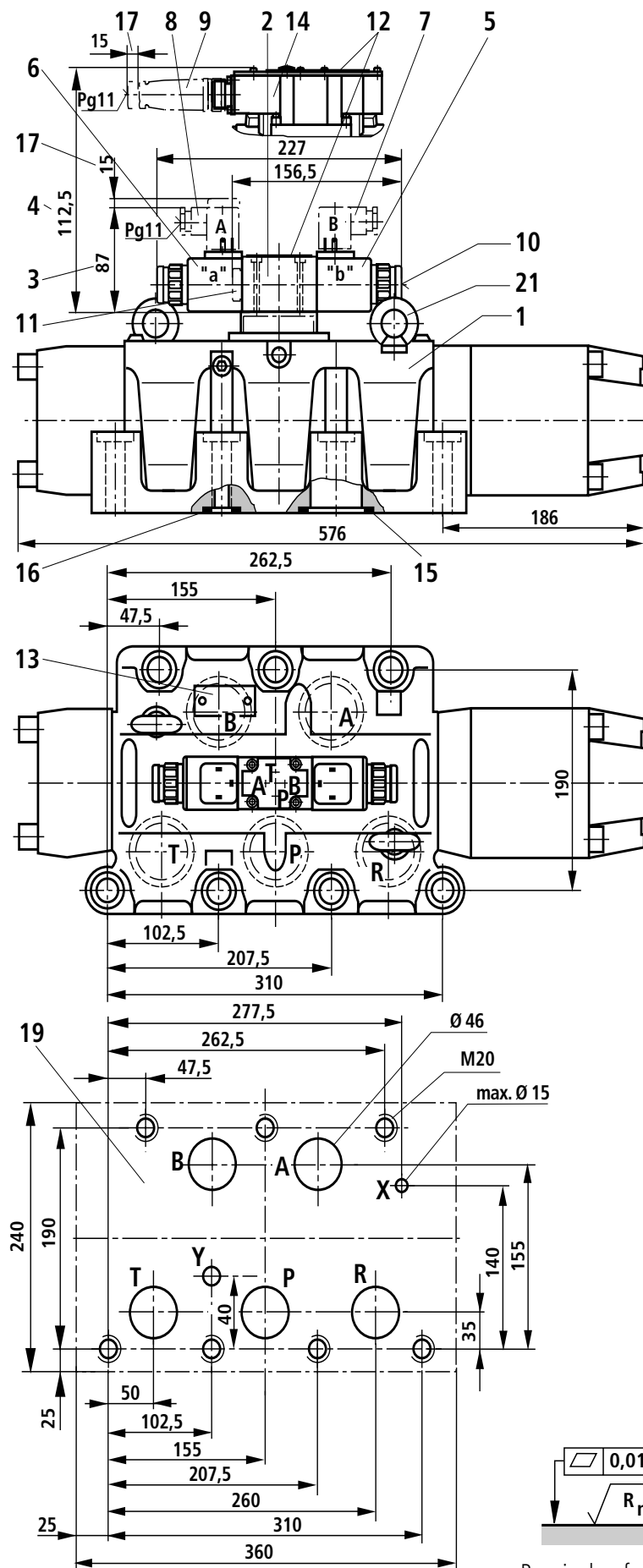


Required surface finish of mating piece

For section details see page 23.

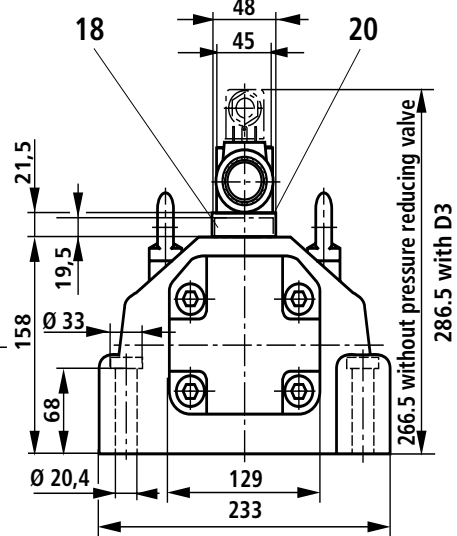
- 1 Main valve
- 2 Pilot valve
- 3 Dim. for version „4WRZ...“ (not sea water resistant)
- 4 Dim. for version „4WRZE...“
- 5 Proportional solenoid „a“
- 6 Proportional solenoid „b“
- 7 Plug-in connector „A“, separate order, see page 10
- 8 Plug-in connector „B“, separate order, see page 10
- 9 Plug-in connector to E-DIN 43 563, separate order, see page 10

- 10 Protected hand override „N9“
- 11 Cover for valve with one solenoid
- 12 Name plate for pilot valve
- 13 Name plate for main valve
- 14 Integrated control electronics
- 15 Pressure reducing valve
- 16 R-ring 42.5 x 3 x 3; ports A, B, P, T
- 17 R-ring 19 x 3 x 3; ports X, Y
- 18 Space required to remove plug-in connector
- 19 Inter-connecting plate (type 4WRH...)
- 20 Machined valve mounting face, connection locations to DIN 24 340 form A, ISO 4401 and CETOP-RP121H
- 21 Locating pin



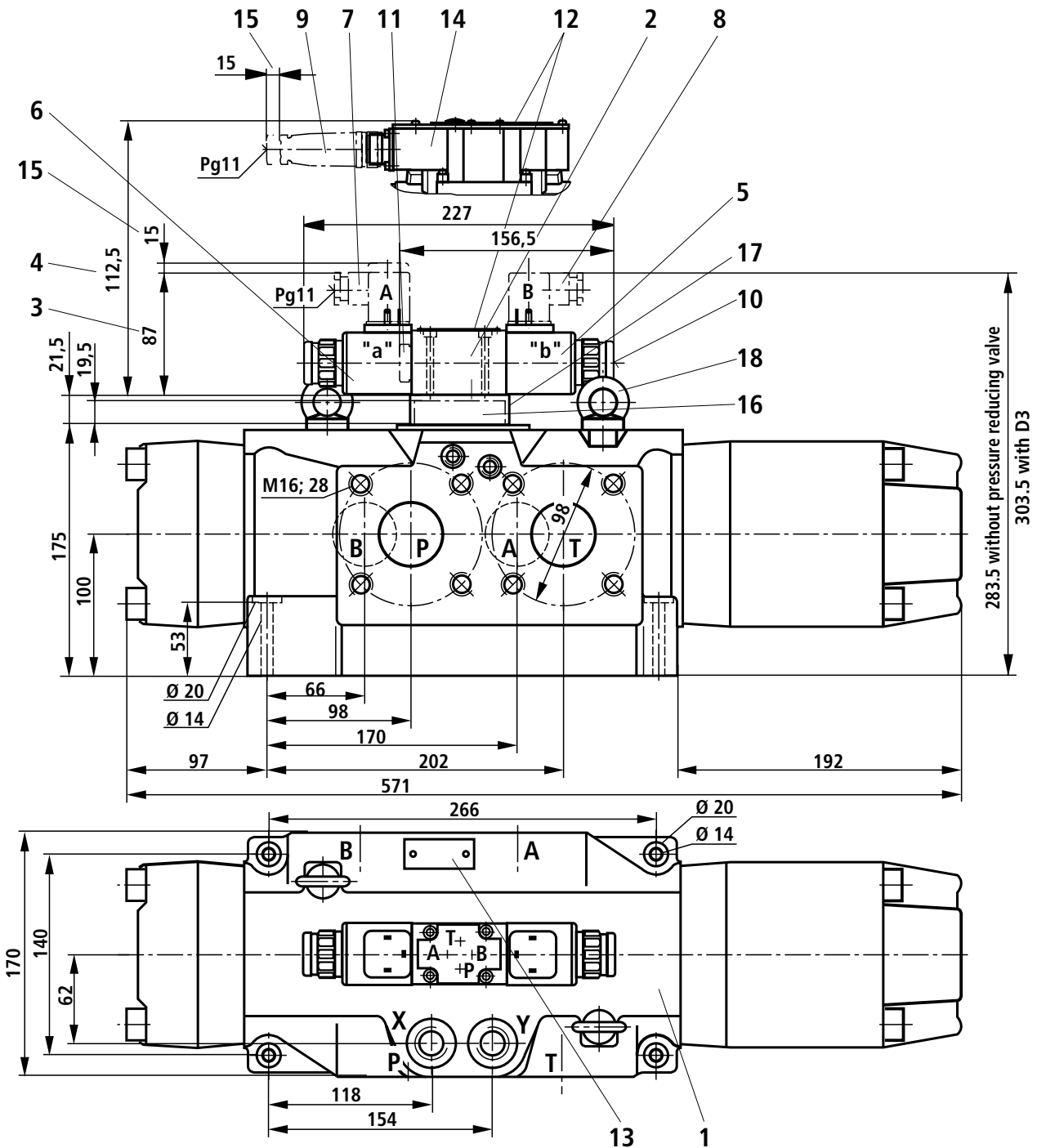
Valve fixing screws

(7 off; length is dependent on the material of the adjoining part)
M20 x 90 DIN 912-10.9; $M_A = 610$ Nm (for steel) or
M20 x 100 DIN 912-10.9; $M_A = 610$ Nm (for cast iron)
must be ordered separately.



- 1 Main valve
- 2 Pilot valve
- 3 Dim. for version „4WRZ...“
(not sea water resistant)
- 4 Dim. for version „4WRZE...“
- 5 Proportional solenoid „a“
- 6 Proportional solenoid „b“
- 7 Plug-in connector „A“,
separate order, see page 10
- 8 Plug-in connector „B“,
separate order, see page 10
- 9 Plug-in connector to E DIN 43 563,
separate order, see page 10
- 10 Protected hand override „N9“
- 11 Cover for valve with one
solenoid
- 12 Name plate for pilot valve
- 13 Name plate for main valve
- 14 Integrated control electronics
- 15 R-ring 54.5 x 3.53 x 3.53;
ports A, B, P, T, R
- 16 R-ring 18.64 x 3.53 x 3.53;
ports X, Y, L
- 17 Space required to remove plug-in
connector
- 18 Inter-connecting plate (type 4WRH...)
- 19 Machined valve mounting face,
connection locations to DIN 24 340
form B, ISO 4401 and CETOP-RP121H
- 20 Adaptor plate
- 21 Lifting eye

Required surface finish of
mating piece



Subplates to catalogue sheet RE 45 501 and **valve fixing screws**

4 off M12 x 70 DIN 912-10.9; $M_A = 130 \text{ Nm}$ must be ordered separately.

- 1 Main valve
- 2 Pilot valve
- 3 Dim. for version „4WRZ...“ (not sea water resistant)
- 4 Dim. for version „4WRZE...“
- 5 Proportional solenoid „a“
- 6 Proportional solenoid „b“
- 7 Plug-in connector „A“, separate order, see page 10
- 8 Plug-in connector „B“, separate order, see page 10

- 9 Plug-in connector to E DIN 43 563, separate order, see page 10
- 10 Protected hand override „N9“
- 11 Cover for valve with one solenoid
- 12 Name plate for pilot valve
- 13 Name plate for main valve
- 14 Integrated control electronics
- 15 Space required to remove plug-in connector
- 16 Inter-connecting plate (type 4WRH...)
- 17 Adaptor plate
- 18 Lifting eye

Pilot oil supply

Type 4WRZ...-.../... and Type 4WRH...-.../...

With this version the pilot oil supply is from a separate control circuit (external).

The pilot oil drain is not via the T line in the main valve, but is routed separately into the tank via port Y (external).

Type 4WRZ...-.../...E...

With this version the pilot oil supply is from the P line in the main valve (internal).

The pilot oil drain is not via the T line in the main valve, but is routed separately into the tank via port Y (external).

Port X has to be plugged on the subplate.

Pilot oil supply external Pilot oil drain external

Type 4WRZ...-.../...ET...

On this version the pilot oil supply is from the P line in the main valve (internal).

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

Ports X and Y have to be plugged on the subplate.

Type 4WRZ...-.../...T...

On this version the pilot oil supply is from a separated control circuit (external).

Pilot oil drains directly into the T line in the main valve (internal).
Port Y has to be plugged on the subplate.

Pilot oil supply internal Pilot oil drain internal

Pilot oil supply external Pilot oil drain internal

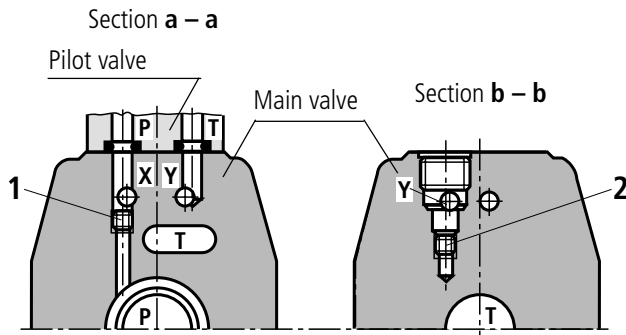
Positions **1** and **2**: Plug M6 DIN 906-8.8 3A/F

NS 10

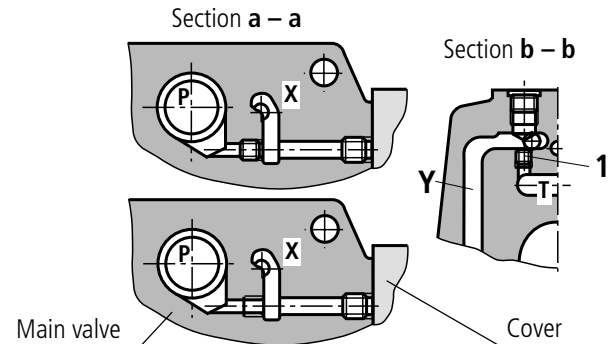
For section location see page 17

NS 16

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



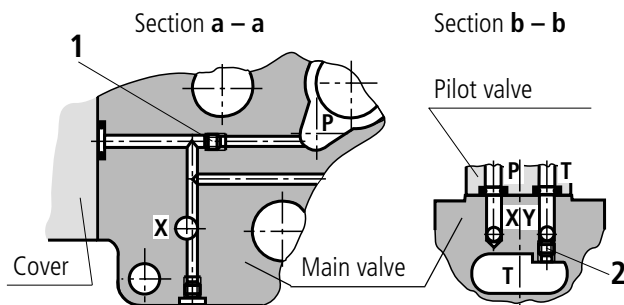
Pilot oil supply (section a – a)	external: P closed	internal: P open
Pilot oil drain (section b – b)	external: 1 closed	internal: 1 open

NS 25

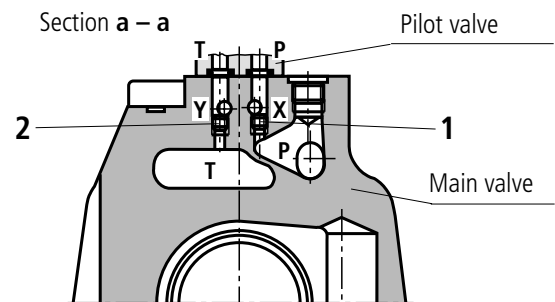
For section location see page 19

NS 32

For section location see page 20



Pilot oil supply (section a – a)	external: 1 closed	internal: 1 open
Pilot oil drain (section b – b)	external: 2 closed	internal: 2 open



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

Plug-in throttle valves

When using a proportional directional valve type 4WRZ... the following plug-in throttle inserts should be used in lines A and B of the pilot valve:

NS	10	16	25	32	52
Ø in mm	1.8	2.0	2.8	–	–
Material No.	00158510	00158547	00157948	–	–

Notes

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