MANNESMANN REXROTH

Pilot Operated Pressure Relief Valves with 2 or 3 Pressure Ratings Type DB 3U, Series 5X

Sizes 10, 25, 32 | **Up to 350 bar** | **Up to 650 L/min**

RE 25 826/01.92

Replaces: 25 825

Special features:

- Subplate mounting
  Mounting to DIN 24 340 form E,
  Connection plates to data sheet RE 45 064
  (separate order)
- Threaded connection
- Manifold mounting
- 4 adjustment elements:
  - Rotary knob,
  - Screw with internal hexagon and protective cap,
  - Lockable rotary knob with scale,
  - Rotary knob with scale
- Solenoid operated control via mounted directional valve

K 4918-3

Type DB 3U10E–25X/..6AG24NZ4V

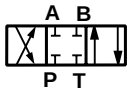
Ordering Code

DB | | 3U | | | | | 5X/ | | | | | | | | | * |

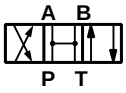
Pilot operated valve (complete) = **No Code**

Pilot operated valve:
without main spool assembly = **C**
(Size **not** stated)
with main spool assembly = **C**
(State size 10 or 30)

Size	Manifold mounted "–"	Threaded connection "G"
	Ordering Code	
10	**= 10**	**= 10** (1/2" BSP)
16		**= 15** (3/4" BSP)
25	**= 20**	**= 20** (1" BSP)
25		**= 25** (1" BSP 1/4)
32	**= 30**	**= 30** (1" BSP 1/2)



= **E**



= **H**

= **D**

For manifold mounting = **–**
For threaded connection = **G**

Adjustment device: Rotating knob = **1**
Socket screw and protective cap = **2**
(always at max. pressure rating)
Lockable rotating knob with scale = **3** [1])
Rotating knob with scale = **7**

Series 50 to 59 = **5X**
(50 to 59, externally interchangeable)

Pressure setting up to 50 bar = **50**
Pressure setting up to 100 bar = **100**
Pressure setting up to 200 bar = **200**
Pressure setting up to 315 bar = **315**
Pressure setting up to 350 bar = **350** [2])

Pilot oil supply: Leakage line = **–**
Ordering code = **X**
to symbols = **Y**
on page 3 = **XY**

Further details in clear text

No Code = NBR seals, suitable for use with oils (HL, HLP) to DIN 51 524
V = Viton seals, sutable for use with phosphate ester (HFD-R)

Electrical connection
Z4 = Plug-in connector DIN 43 650
Z5 = Large plug-in connector
[3]) **Z5L =** Large plug-in connector with light

No Code = **Without** emergency op.
N = **With** emergency operation
N9 = **With** protected emergency op.

G 24 = 24 V DC
W220R = DC solenoid with built-in rectifier for AC
220 V frequency independent (only for voltages ≥ 110 V and connector Z5)
W220-50 = AC solenoid 220 V-50Hz

6A = **With** standard directional valve
[2]) **6B =** **With** high performance directional valve
(only at pressure setting of up to 350 bar)
Directional valves **with** solenoids protected from explosions on enquiry

No Code = Standard model
U = Valve for minimum cracking pressure (**not** in model without main spool)
Model "U" **not** suitable for cross-line relief

[1]) H key with order no. 008 158 is supplied.

[2]) For the 350 bar model the directional valve must be ordered as a high performance valve "6B".

[3]) For further electrical connections see data sheet RE 08 000.

Functional description, section

Pilot operated pressure relief valves, type DB 3U have 2 or 3 independently adjustable operating pressures.
They basically comprise main valve (1) with main spool (3) and three pilot valves (2), (13.1), (13.2) with pressure setting elements (15), (16.1) and (16.2). Operation is carried out electrically by means of the mounted directional valve.
Depending on the dir. valve model there are differences in:

0 Pressure ratings	a Valve type	Spool pos. (dir. valve) b					
		Adjustment (Item)	Pressure	Adjustment (Item)	Pressure	Adjustment (Item)	Pressure
3	DB 3U.**E**	15	p_{max}	15	p_{max}	15	p_{max}
				16.1	p_A	16.2	p_B
2 + zero press. bypass	DB 3U.**H**	Zero pressure bypass		15	p_{max}	15	p_{max}
				16.1	p_A	16.2	p_B
2	DB 3U.**D**			15	p_{max}	15	p_{max}
				16.1	p_A	16.2	p_B

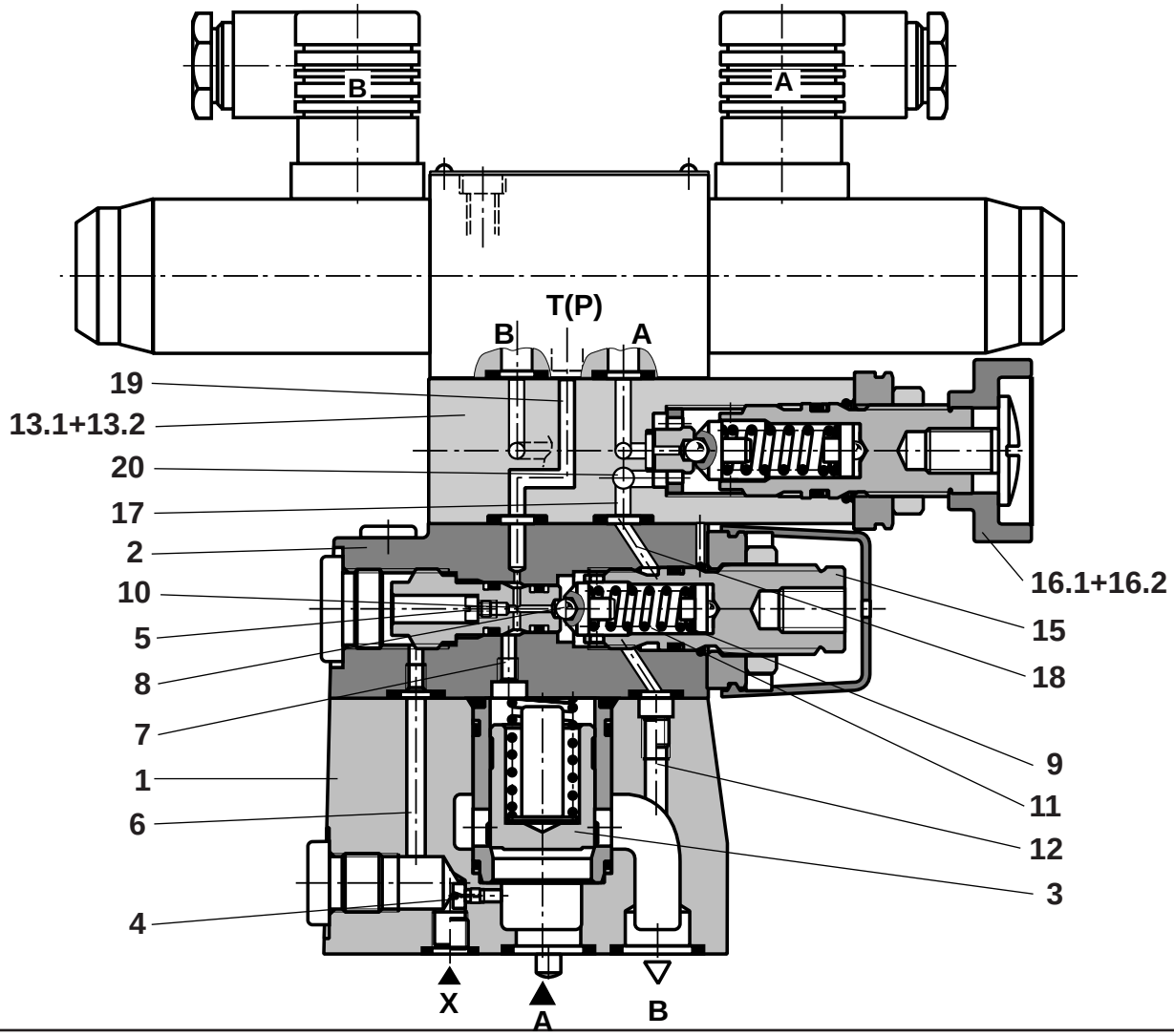
Warning!
Always set maximum operating pressure at adjustment (15).

Basic principle:
The system pressure present in channel A acts on main spool (3). At the same time, via control lines (6) and (7) fitted with orifices (4) and (5), pressure is present on the spring loaded side of main spool (3) and ball (8) of pilot valve (2). This pilot valve (2) is independent of the position of the directional valve and is continuously pressurised by the system pressure. If the pressure increases in channel A due to the value set at spring (9), ball (8) opens against spring (9). The fluid on the spring loaded side of main spool (3) now flows via control line (7), orifice (10) and ball (8) into spring chamber (11) and from there on to the tank via control line (12). Dependent on orifices (4) and (5) a pressure drop is created at main spool (3), so that the connection from channel A to channel B is opened and fluid flows away whilst maintaining the set operating pressure.

Type DB 3U.E (3 pressure ratings)
Both pilot valves (13.1) and (13.2) remain at zero pressure when the directional valve is at rest.
By operating the directional valve the connection to one of the pilot valves (13.1) or (13.2) is opened via control line (19). The rest of the action is identical to the basic principle. Pilot oil return from the spring chambers is internal via control lines (17), (18) and (12) or external via control line (20) to tank.

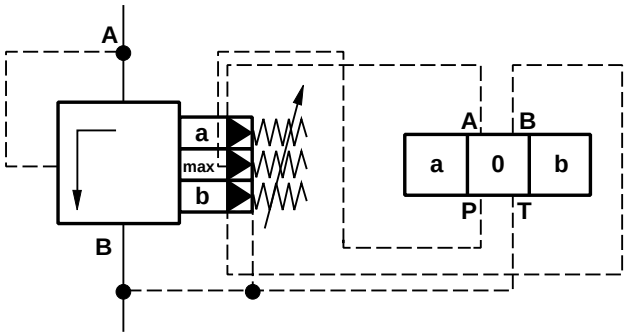
Type DB 3U.H (2 pressure ratings and zero pressure bypass)
The pilot valve is controlled by means of a directional valve with H control spool, which only allows 2 pressure ratings at the pilot valve and enables free flow in the neutral position. Pressure relief is only possible by means of pilot valves (13.1) and (13.2).

Type DB 3U.D (2 pressure ratings)
The pilot valve is controlled by a directional valve with D spool. Pressure relief is only possible by means of pilot valves (13.1) and (13.2).

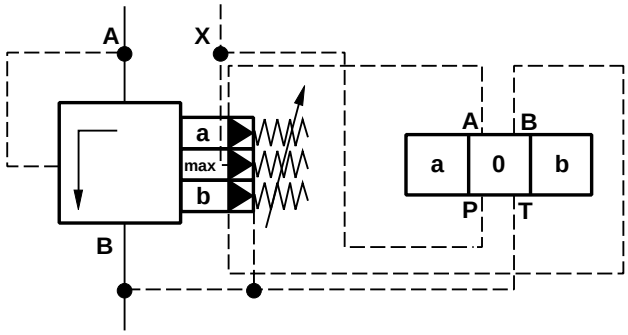


Symbols

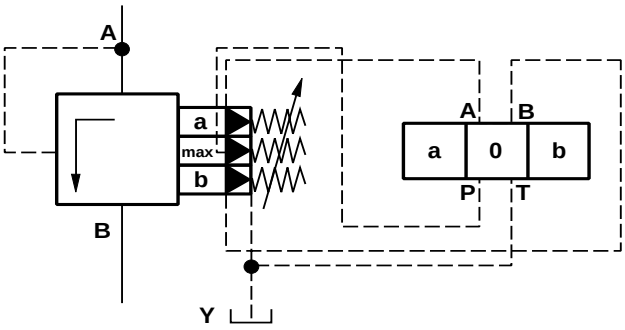
Model "–" (drain case port)



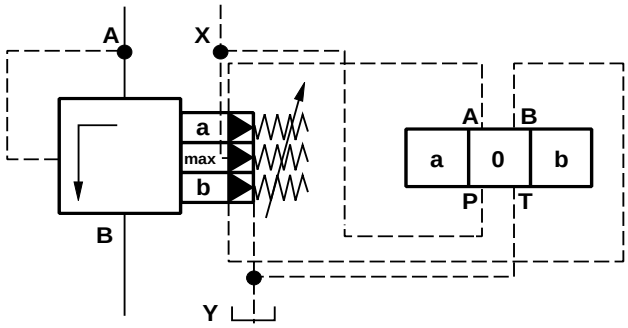
Model "X"



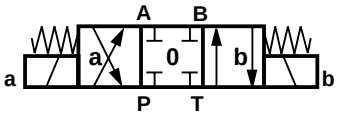
Model "Y"



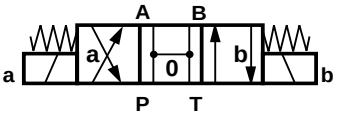
Model "XY"



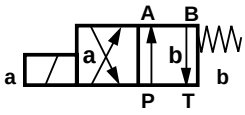
E - control spool



H - control spool



D - control spool



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

General

Installation position			Any				
Weight			DB 3U 10	DB 3U 15	DB 3U 20	DB 3U 25	DB 3U 30
– Subplate mounting	DB 3U	kg	4,6		5,5		6,4
	DBC 3U	kg	2,0				
	DBC 3U 10 or 30	kg	2,3				
–Threaded connection	DB 3U. G..	kg	7,3	7,2	7,1	7,0	6,8
Size of directional valve			See data sheet RE 23 177				

Hydraulic

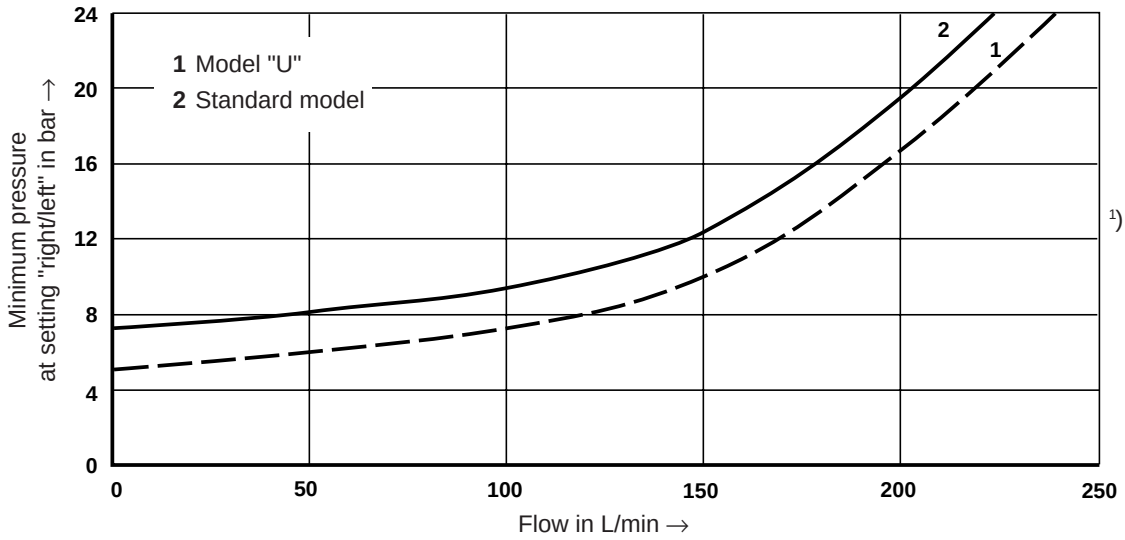
Operating pressure, ports A, B, X		bar	Up tp 350				
Opposing pressure, port Y							
DB 3U.6A…	(standard directional valve)	bar	Up to 160 for DC and up to 100 for AC solenoids				
DB 3U.6B…	(high performance dir. valve)	bar	Up to 160 for DC and AC solenoids				
DB 3U...	(extra solenoid)	bar	Up to 60 for DC solenoids; (electrical data on enquiry)				
Setting pressure	min.	bar	Q dependent (see operating curves on page 4)				
	max.	bar	Up to 50, up to 100, up to 200, up to 315, up to 350				
Max. flow			DB 3U 10	DB 3U 15	DB 3U 20	DB 3U 25	DB 3U 30
	– subplate mounting	L/min	250		500		650
	– threaded connection	L/min	250	500	500	500	650
Fluid			Mineral oils (HL, HLP) to DIN 51 524; phosphate ester (HFD-R)				
Fluid temperature range		°C	– 30 to + 80 (with NBR seals)				
			– 20 to + 80 (with Viton seals)				
Viscosity range		mm^2/s	10 to 800				
Fluid cleanliness			Maximum permissible degree of contamination of fluid to NAS 1638 Class 9. We therefore recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.				

Operating Curves (measured at v = 41 mm^2/s and t = 50 °C)

The operating curves were measured with an **external, zero pressure pilot oil return**.
With internal pilot oil return the input pressure is increased by the output pressure present at port B.

Minimum setting pressure and bypass pressure dependent on flow [1])

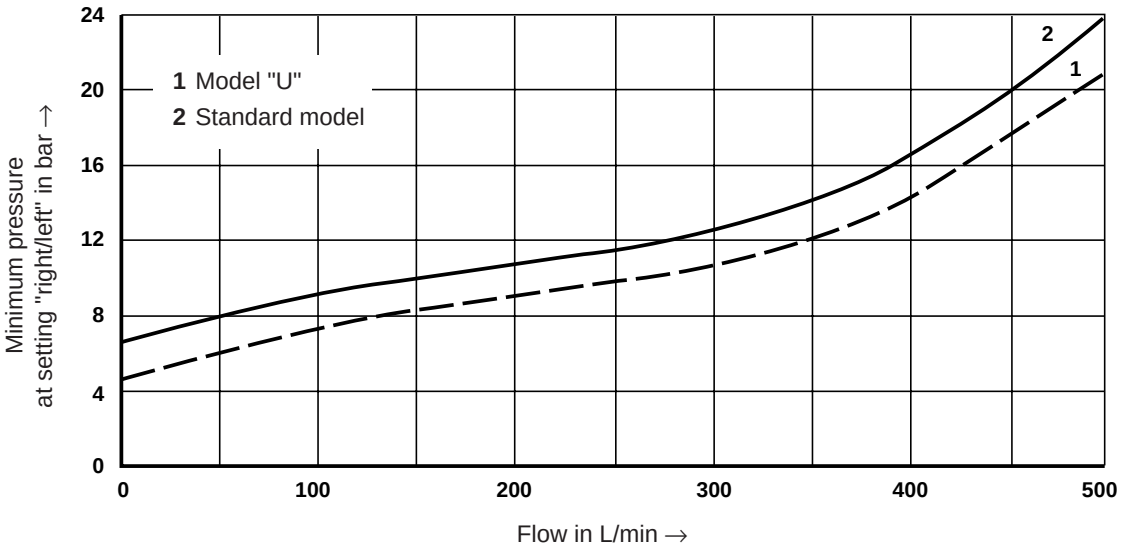
Size 10



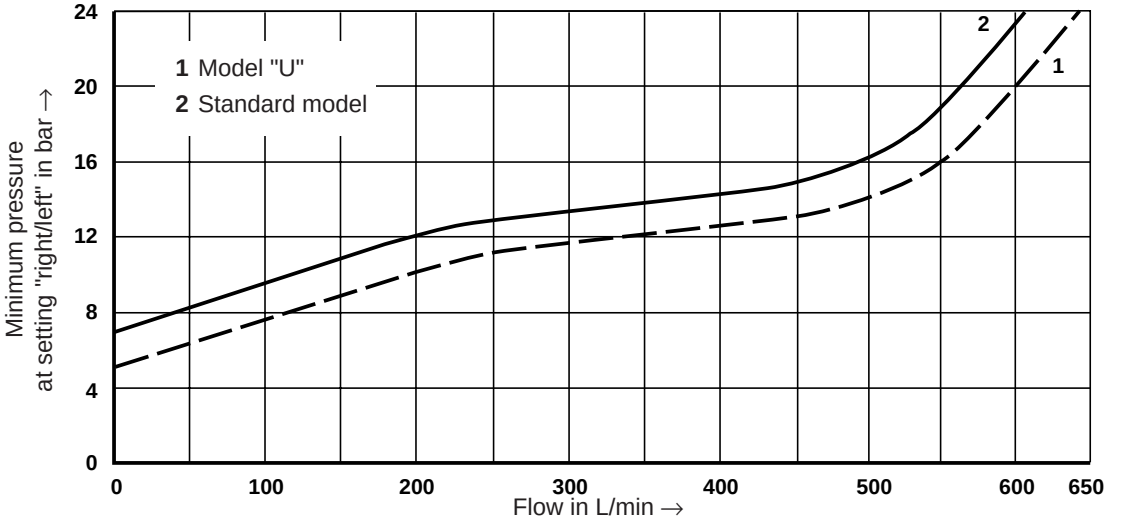
The bypass pressure or minimum adjustment pressure at the "centre" adjustment is about 2 bar lower!

[1]) The operating curves are valid for output pressure p_B = 0 within complete flow range.

Size 25



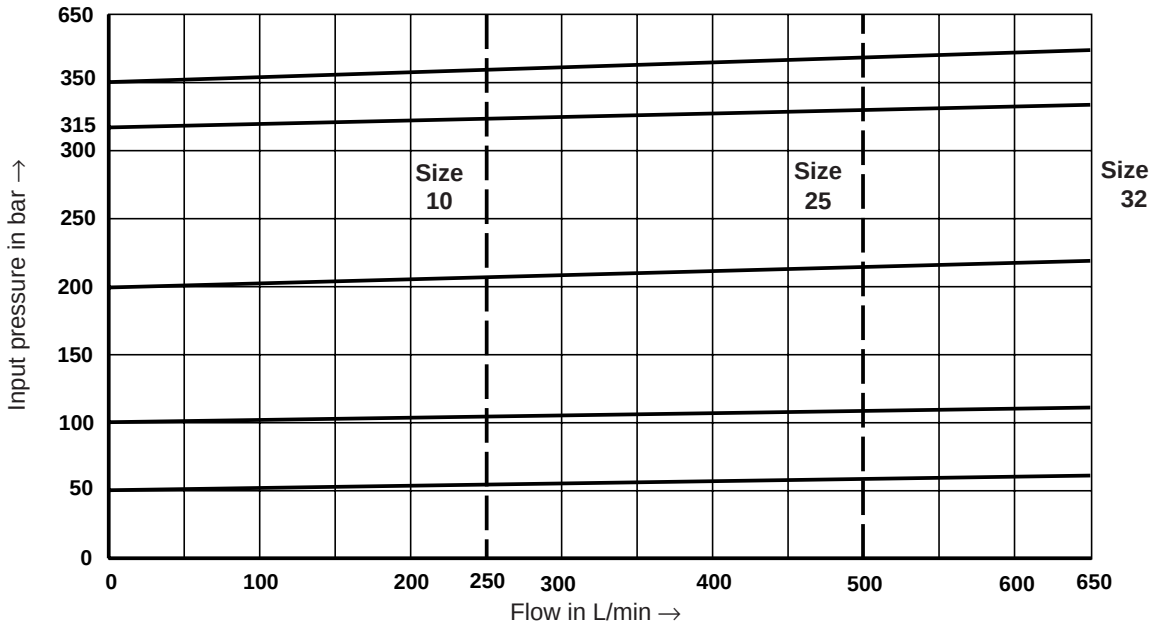
SIze 32



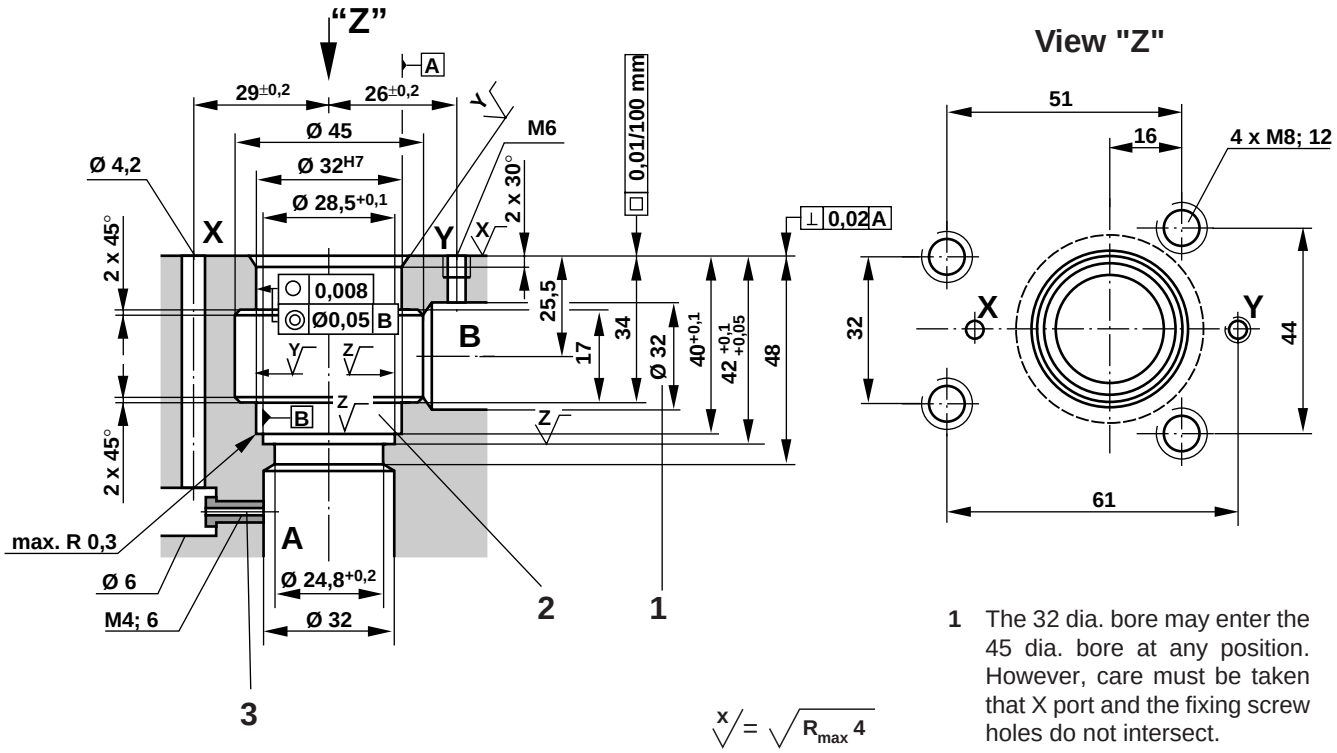
Operating Curves (measured at v = 41 mm²/s and t = 50°C)

The operating curves were measured with an **external, zero pressure pilot oil return**.
With internal pilot oil return the input pressure is increased by the output pressure present at port B.

Input pressure dependent on flow



Unit dimensions: Drilling for manifold mounting (Dimensions in mm)



$$\sqrt{x} = \sqrt{R_{max}\ 4}$$

$$\sqrt{y} = \sqrt{R_z\ 8}$$

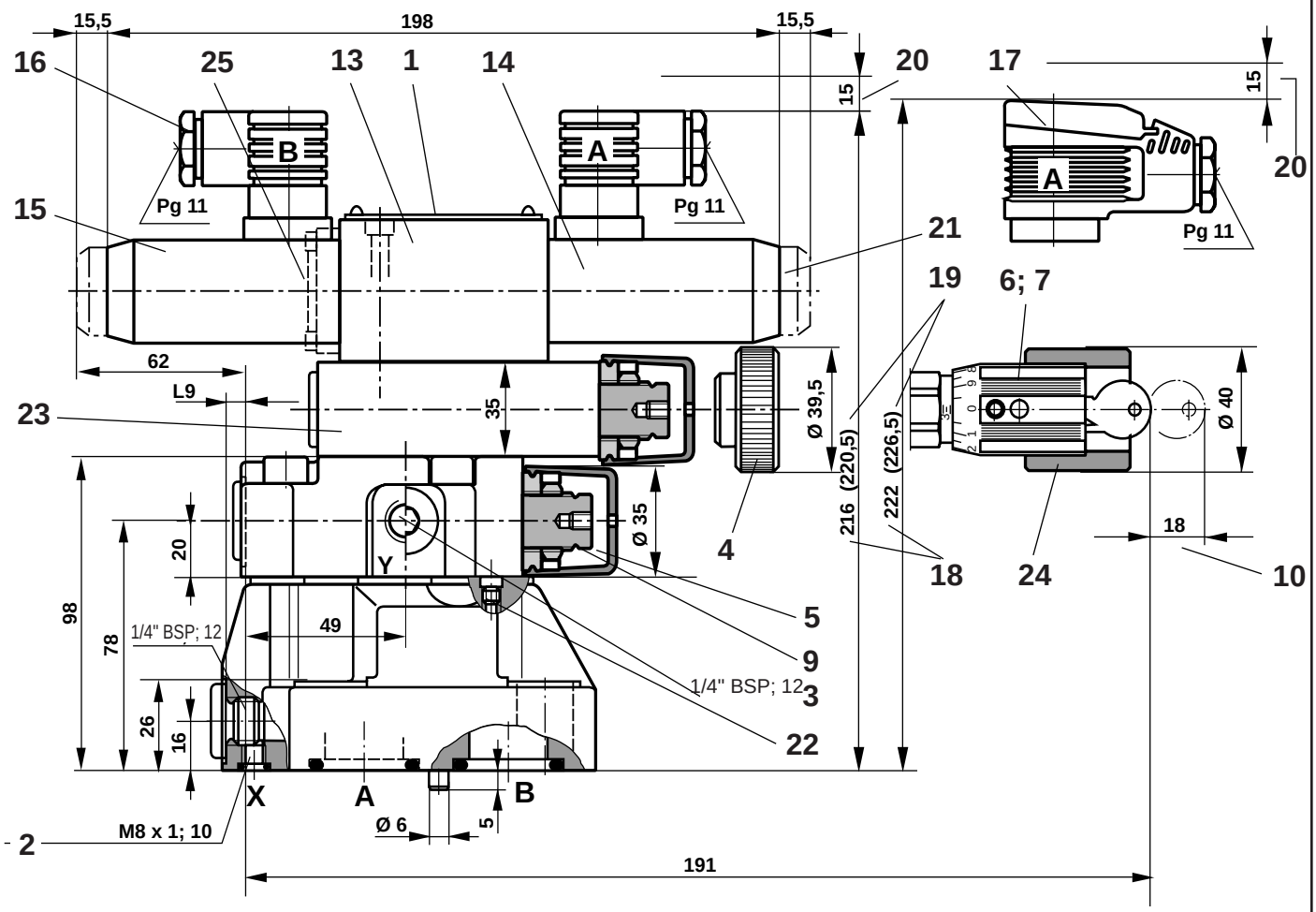
$$\sqrt{z} = \sqrt{R_z\ 16}$$

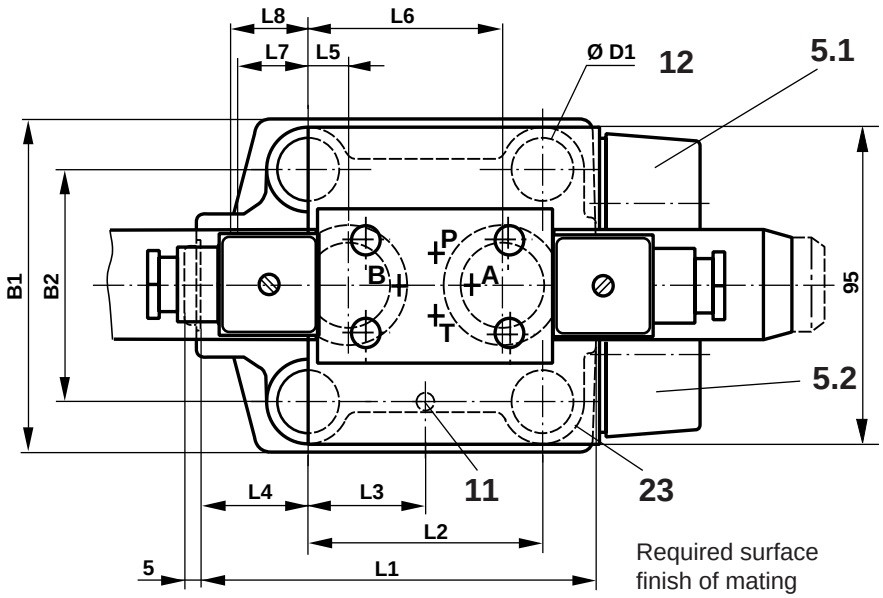
1 The 32 dia. bore may enter the 45 dia. bore at any position. However, care must be taken that X port and the fixing screw holes do not intersect.

2 Back-up ring and O ring must be fitted into the main bore before assembling the main spool.

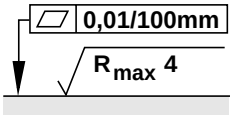
3 Orifices must be ordered separately.

Unit dimensions: subplate mounting (Dimensions in mm)





Required surface finish of mating piece



Connection plates to data sheet RE 45 064 and valve fixing screws must be ordered separately.

Connection plates for:

DB 3U 10
G 545/01 (3/8" BSP)
G546/01 (1/2" BSP)

DB 3U 20
G 408/01 (3/4" BSP)
G 409/01 (1" BSP)

DB 3U 30
G 410/01 (1 1/4" BSP)
G 411/01 (1 1/2" BSP)

Valve fixing screws for:

DB 3U 10:
4 off M12 x 50 DIN 912–10.9; tightening torque = 130 Nm

DB 3U 20:
4 off M16 x 50 DIN 912–10.9; tightening torque = 310 Nm

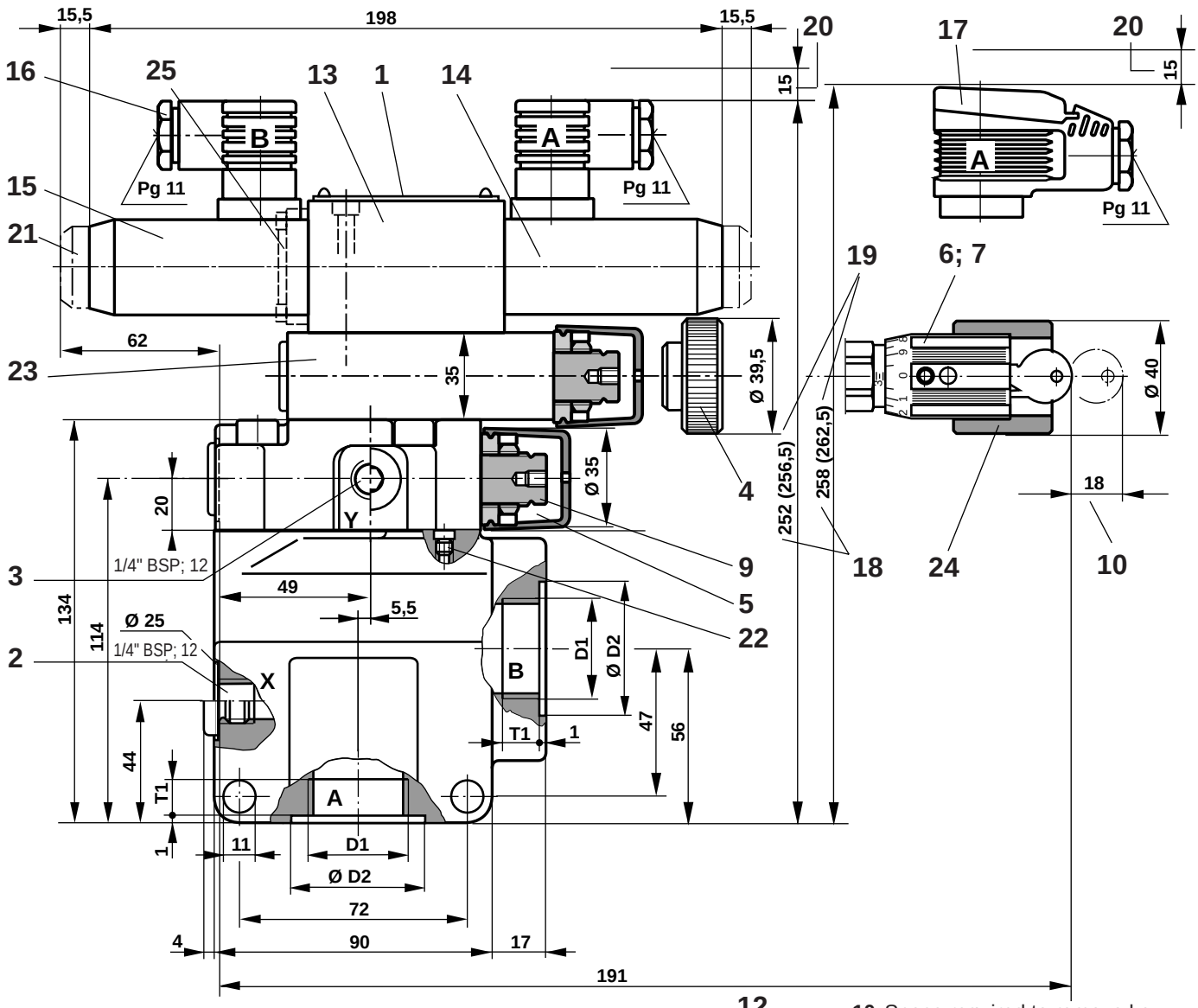
DB 3U 30:
4 off M18 x 50 DIN 912–10.9; tightening torque = 430 Nm

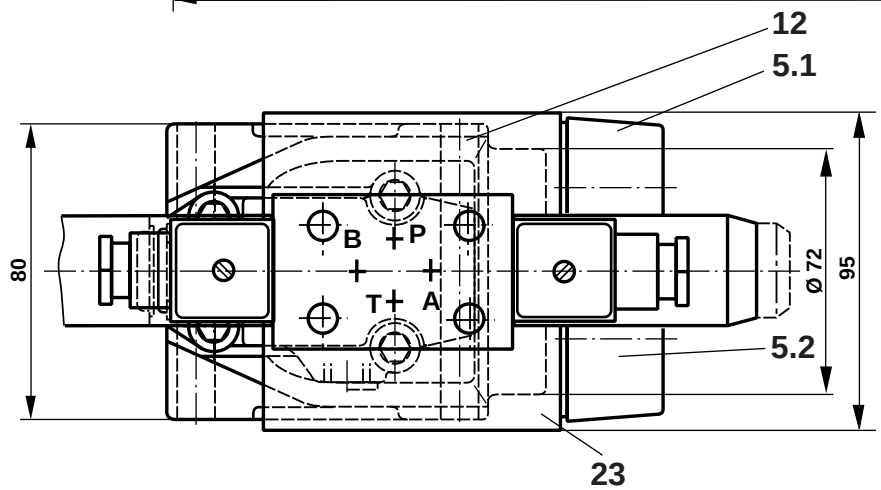
DBC 3U and DBC 3U 10 or 30:
4 off M8 x 40 DIN 912–10.9; tightening torque = 37 Nm

See page 7 for position description

Type	L1	L2	L3	L4	L5	L6	L7	L8	L9	B1	B2	Ø D1	R ring Ports A, B	R ring Port X
DB 3U 10	91	53,8	22,1	27,5	22,1	47,5	0	25,5	2	78	53,8	14	17,56 x 2,4 x 2,62	9,81 x 1,5 x 1,78
DB 3U 20	116	66,7	33,4	33,3	11,1	55,6	23,8	22,8	10,5	100	70	18	28,43 x 3,4 x 3,53	9,81 x 1,5 x 1,78
DB 3U 30	147,5	88,9	44,5	41	12,7	76,2	31,8	20	21	115	82,6	20	34,52 x 3,53 x 3,53	9,81 x 1,5 x 1,78

Unit dimensions: Threaded connection (Dimensions in mm)





Type	D1	ØD2	T1
DB 3U 10.G	1/2" BSP	34	14
DB 3U 15.G	3/4" BSP	42	16
DB 3U 20.G	1" BSP	47	18
DB 3U 25.G	1 1/4" BSP	58	20
DB 3U 30.G	1 1/2" BSP	65	22

Pipe threads to ISO 228/1

1 Nameplate

2 Port X for external pilot oil feed

3 Port Y for external pilot oil return

4 Adjustment element “1”

5 Adjustment element “2”

5.1 Adjustment (solenoid "A")

5.2 Adjustment (solenoid "B")

6 Adjustment element “3”

7 Adjustment element “7”

9 Socket screw 10 A/F

10 Space required to remove key

11 Fixing pin

12 Valve fixing bore

13 Directional valve size 6 (see RE 23 177)

14 Solenoid “a”

15 Solenoid "b"

16 Connector “Z4”

17 Connector “Z5” and “Z5L”

18 Dimension for standard directional valve "6A"

19 Dimension for high performance directional valve "6B"

20 Space required to remove connector

21 Solenoid with emergency operation "N"; optional

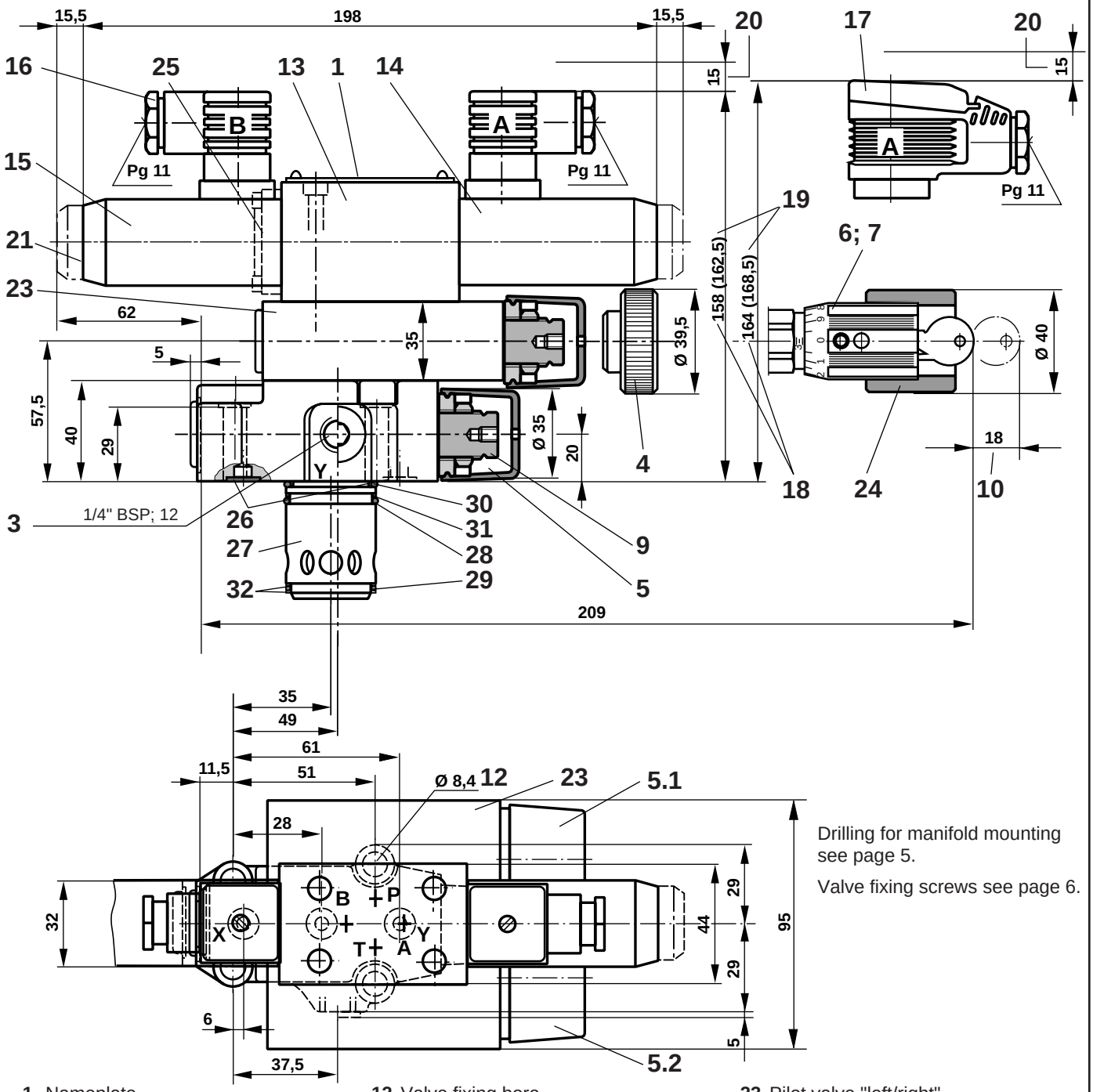
22 Omitted for internal pilot oil return

23 Pilot valve "left/right"

24 Sleeve

25 Directional valve with a solenoid (D control spool)

Unit dimensions: Pilot valve **with** (DBC 3U 10 or 30) or **without** (DBC 3U) main spool (Dimensions in mm)



Drilling for manifold mounting see page 5.

Valve fixing screws see page 6.

1 Nameplate
3 Port Y for external pilot oil return
4 Adjustment element “1”
5 Adjustment element “2”
5.1 Adjustment (solenoid "A")
5.2 Adjustment (solenoid "B")
6 Adjustment element “3”
7 Adjustment element “7”
9 Socket screw 10 A/F
10 Space required to remove key
12 Valve fixing bore
13 Dir. valve size 6 (see RE 23 177)
14 Solenoid “a”
15 Solenoid "b"
16 Connector “Z4”
17 Connectors “Z5” and “Z5L”
18 Dimension for std directional valve "6A"
19 Dimension for high performance directional valve "6B"
20 Space required to remove connector
21 Solenoid with emergency operation "N", optional
23 Pilot valve "left/right"
24 Sleeve
25 Directional valve with a solenoid (D control spool)
26 R ring 9,81 x 1,5 x 1,78
27 Main spool
28 O ring 28,3 x 1,78
29 O ring 27,3 x 2,4
30 O ring 28,24 x 2,62
31 Back-up ring 8–024 29,03 x 1,35
32 Back-up ring 28,4 x 32 x 0,7

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