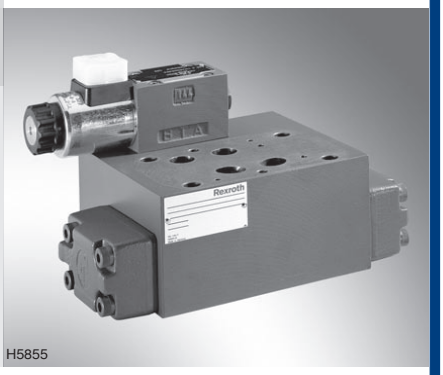
4/2 and 4/3 directional shut-off valves, internally pilot operated, externally pilot operated

RE 24761/08.08 1/14
Replaces: 10.97

Types Z4WEH and Z4WH



H5855

Size 16
Component series 5X
Maximum operating pressure 315 bar
Maximum flow 300 l/min

Table of contents

Features

- Directional spool valve, pilot operated
- 2 types of actuation:
  - Electrohydraulic (type WEH)
  - Hydraulic (type WH)
- Function as shut-off through valve or shut-off/through valve/ short-circuit valve
- Free flow in P and T in every spool position
- Porting pattern to ISO 4401-07-07-0-05
- Wet-pin DC or AC voltage solenoids, optional
- Manual override, optional
- Electrical connection as individual connection, see RE 23178 and RE 08010 (central connection on request)
- Switching time adjustment, optional
- Stroke adjustment on main spool, optional
- Inductive position switch and proximity sensors (contact-less), see RE 24830

Ordering code

Z4		16	–5X/					

Types of actuation
Electrohydraulic **= WEH**
Hydraulic **= WH**

Size 16 **= 16**

Spool symbols, see pages 4 and 5

Component series 50 to 59 **= 5X**
(50 to 59: unchanged installation and connection dimensions)

Pilot valve
High-performance valve (RE 23178) **= 6E** [1]

DC voltage 24 V **= G24** [1]
AC voltage 230 V 50/60 Hz **= W230** [1]
DC voltage 205 V 50/60 Hz **= G205** [1; 2]
For further voltages, frequencies and electrical data, see data sheet RE 23178

Without manual override **= No code**
With manual override **= N** [1]
With concealed manual override (standard) **= N9** [1]

External pilot oil supply, external pilot oil drain **= No code**
Internal pilot oil supply, internal pilot oil drain (standard) **= ET** [3]
External pilot oil supply, internal pilot oil drain **= T**
(with type Z4WH… **only "No code"** possible!)

Without Switching time adjustment **= No code**
Switching time adjustment as meter-in control **= S**
Switching time adjustment as meter-out control **= S2**

[1] Only with electrohydraulic actuation, version "WEH"

[2] For connection to the AC voltage mains, a DC solenoid **must** be used, which is controlled via a rectifier (see table on the right-hand side).

In the case of individual connection, a mating connector with integrated rectifier can be used (separate order, see page 3).

[3] Internal pilot oil **supply**:
- Minimum pilot pressure: Please read page 7!
- To prevent impermissibly high pressure peaks, a **throttle insert "B10"** must be provided in the P port of the pilot valve (see page 6).

[4] Mating connectors, separate order, see page 3.

[5] For version "D3" a throttle insert "B10" must be installed in port P of the pilot valve!

AC voltage mains (permissible voltage tolerance ±10%)	**Nominal voltage of the DC voltage solenoid when operated with AC voltage**	**Ordering code**
110 V - 50/60 Hz 120 V - 60 Hz	96 V	**G96**
230 V - 50/60 Hz	205 V	**G205**

Standard types and components are shown in the EPS (standard price list).

K4							*

Further details in clear text

Seal material
No code = NBR seals
V = FKM seals
(other seals on request)
⚠ Attention!
Observe compatibility of seals with hydraulic fluid used!

No code = **Without** pressure reducing valve
D3 [1; 5] **=** **With** pressure reducing valve (to be used, if pilot pressure > 250 bar)

Throttle insert [1]
No code = Without throttle insert
B08 = Throttle Ø 0.8 mm
B10 = Throttle Ø 1.0 mm

Stroke adjustment
No code = Without stroke adjustment
10 = Stroke adjustment on sides A and B
11 = Stroke adjustment on side A
12 = Stroke adjustment on side B
For further details, see page 13

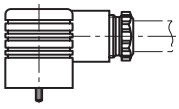
Without slash = No further details
/ = Further details

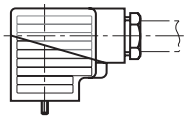
Spool position monitoring
No code = Without position switch
QMAG24 = Monitored spool position “a“
QMBG24 = Monitored spool position “b“
QMABG24 = Monitored spool positions “a“ and “b“
QM0G24 = Monitored rest position (not for valve with 2 spool positions)
For further details, see RE 24830

Electrical connection [1]
K4 [4] **=** Without mating connector, individual connection with component plug to DIN EN 175301-803
For further electrical connections, see RE 23178 and RE 08010

Mating connectors to DIN EN 175301-803

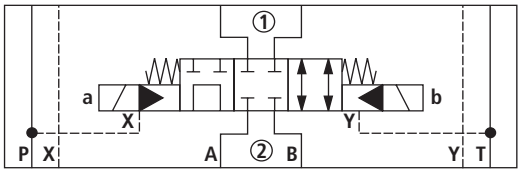
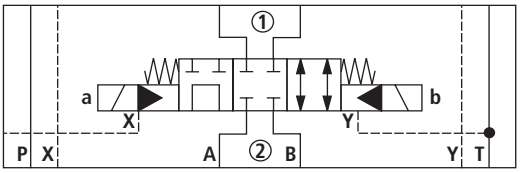
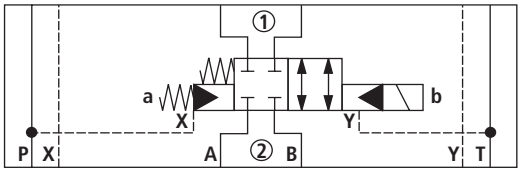
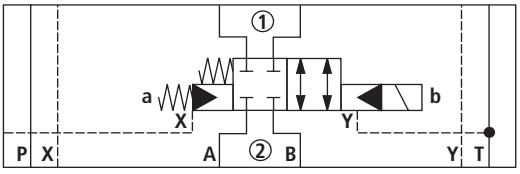
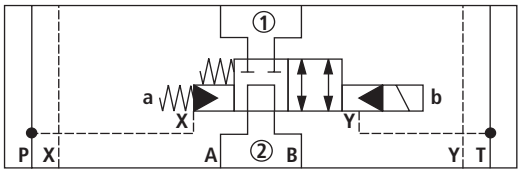
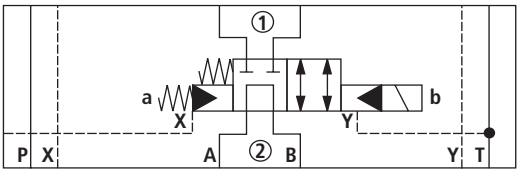
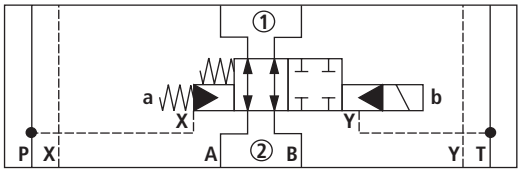
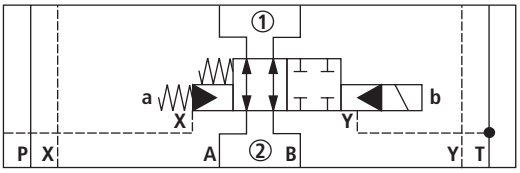
For details and further mating connectors, see RE 08006



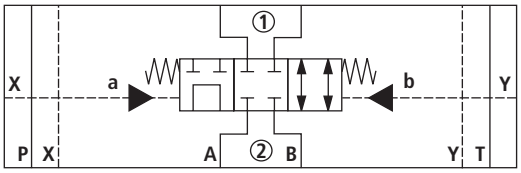
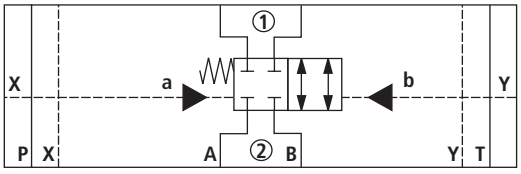
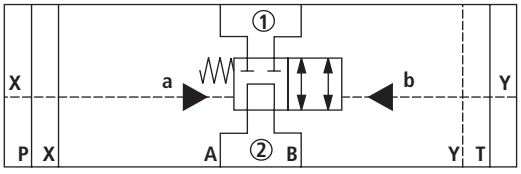
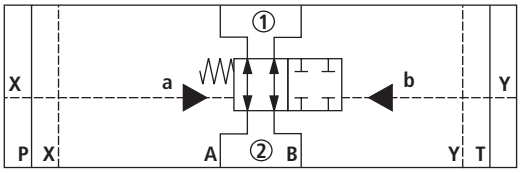


Valve side	Color	Material no. Without circuitry	With indicator lamp 12 … 240 V	With rectifier 12 … 240 V	With indicator lamp and Zener-diode suppressor circuit 24 V
a	Gray	**R901017010**	–	–	–
b	Black	**R901017011**	–	–	–
a/b	Black	–	**R901017022**	**R901017025**	**R901017026**

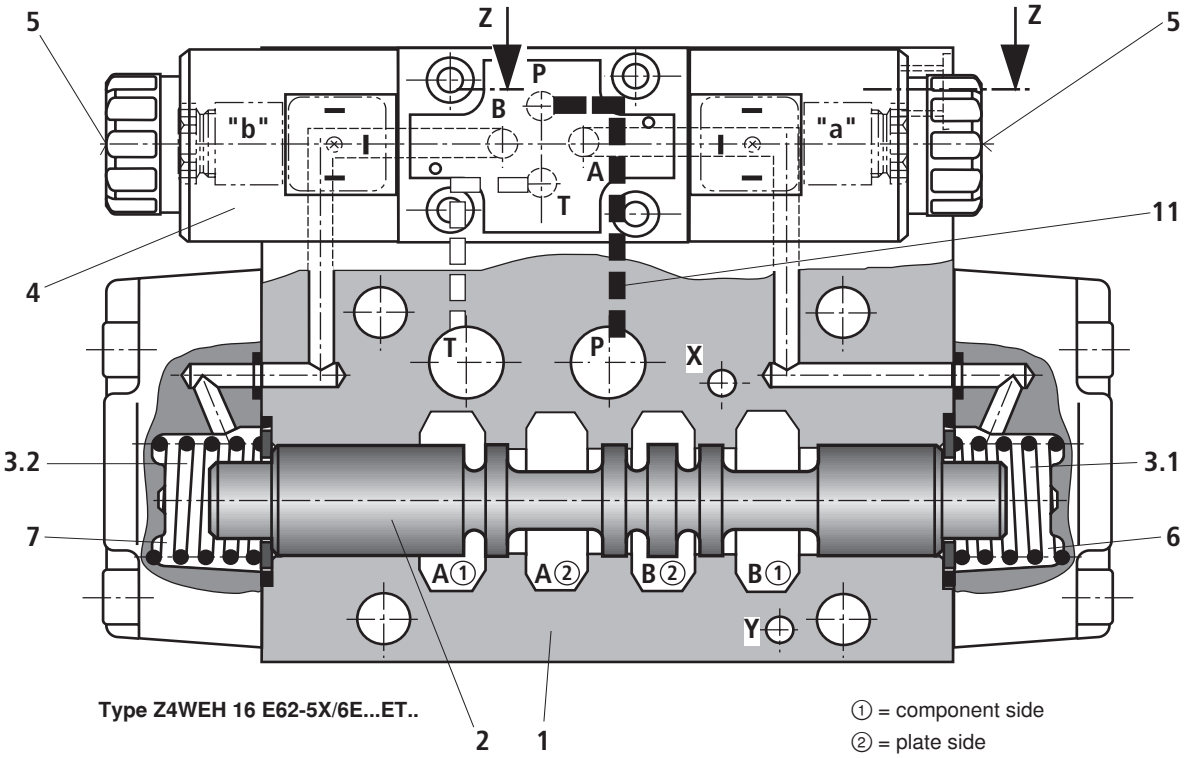
Symbols: Type Z4WEH (① = component side, ② = plate side)

Ordering code	Version "ET"	Version "T"
E62		
E63		
E68		
E51		

Symbols: Type Z4WH (① = component side, ② = plate side)

Ordering code	Version "No code"
E62	
E63	
E68	
E51	

Function, section



Type Z4WEH 16 E62-5X/6E...ET..

① = component side
② = plate side

Valves of type Z4WEH are directional spool valve with electrohydraulic actuation. They control the start and stop of a flow.

These directional valves basically consist of the main valve with housing (1), main control spool (2), one or two return springs (3.1 and 3.2), as well as the pilot valve (4).

Main control spool (2) in the main valve is held by the springs in the zero or initial position. In the initial position, the two spring chambers (6) and (7) are connected pressureless to tank via pilot valve (4). The pilot valve is supplied with pilot oil via pilot channel (11).The pilot oil supply can be provided internally or externally (externally via port X in the sandwich plate, see page 7).

When the pilot valve is operated, e.g. solenoid “a“, the pilot spool (not shown on the drawing) is pushed to the left, and consequently spring chamber (7) is pressurized to pilot pressure. Spring chamber (6) remains pressureless.

The pilot pressure acts on the left side of main control spool (2) and pushes it against spring (3.1). As a result of this, the connections on the component side and on the plate side are opened according to the relevant symbols.

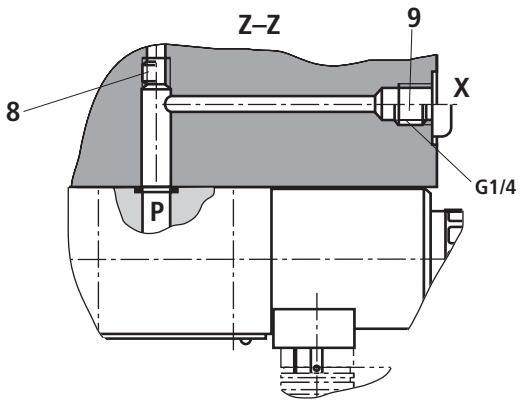
When the solenoid is de-energized, the pilot spool returns to the initial position. Pressure chamber (7) is unloaded to the tank.

The pilot oil is drained from spring chamber (7) internally via pilot valve (4) into channel T (Y).

An optional manual override (5) allows the pilot spool to be moved without energization of the solenoid.

Pilot oil supply (section Z – Z), **see page 7.**

Pilot oil supply



Pilot oil supply

External: **8** closed
9 open

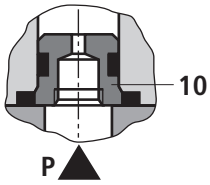
Internal: **8** open
9 closed

Pilot oil port “X“ only possible with Z4WEH 16 ... .

Throttle insert

The use of throttle insert (10) is required, if the pilot oil supply in channel P of the pilot valve is to be limited.

Throttle insert (10) is to be installed in channel P of the pilot valve.



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

General

Weight	– Valve with 1 solenoid	kg	14.1
	– Ventil with 2 solenoids	kg	14.4
	– Valve with hydraulic actuation (type 4WH…)	kg	13.3
	– Switching time adjustment	kg	0.8
	– Pressure reducing valve	kg	0.4
	– Plate for version “T“	kg	0.5
Installation position			Optional
Ambient temperature range		°C	–30 to +50 (NBR seals) –20 to +50 (FKM seals)

Hydraulic

Maximum operating pressure	– Ports A, B, X and Y	bar	315
	– Port P		
	External pilot oil supply	bar	315
	Internal pilot oil supply	bar	250 (without pressure reducing valve) 315 (with pressure reducing valve)
	– Port T (Pilot oil drain only internal)	bar	210 (version “WEH“ with DC solenoid) 160 (version “WEH“ with AC solenoid) 315 (version “WH“)
Minimum pilot pressure		bar	12
Maximum pilot pressure		bar	250
Maximum flow		l/min	300
Pilot volume for operation		cm^3	4.9
Hydraulic fluid [1]			Mineral oil (HL, HLP) to DIN 51524 [2]; fast bio-degradable hydraulic fluids to VDMA 24568 (see also RE 90221); HETG (rape seed oil) [2]; HEPG (polyglycols) [3]; HEES (synthetic esters) [3]; other hydraulic fluids on request
Hydraulic fluid temperature range		°C	–30 to +80 (NBR seals) –20 to +80 (FKM seals)
Viscosity range		mm^2/s	2.8 to 500
Permissible max. degree of contamination of the hydraulic fluid - cleanliness class to ISO 4406 (c)			Class 20/18/15 [4]

[1] The ignition temperature of the process and operating medium used must be higher than the maximum solenoid surface temperature.

[2] Suitable for NBR and FKM seals

[3] Suitable only for FKM seals

[4] The cleanliness classes specified for components must be adhered to in hydraulic systems. Effective filtration prevents malfunction and, at the same time, prolongs the service life of components.

For the selection of filters, see data sheets RE 50070, RE 50076, RE 50081, RE 50086, RE 50087 and RE 50088.

☞ **Notes!**

- The manual override can only be actuated up to a tank pressure of ca. 50 bar. Avoid damage to the bore for the manual override! (Special tool for operation, separate order, Material no. **R900024943**). When the manual override is blocked, operation of the solenoids must be ruled out!
- The simultaneous operation of the solenoids must be ruled out!

Switching times (= making contact on the pilot valve until the control land starts to open in the main valve and change of the pressure value by 5%)

ON – AC voltage (~) and DC voltage (=)

Pilot pressure	bar	70		140		210		250	
Type of voltage		~	=	~	=	~	=	~	=
3-position valve (spring-centered)									
– Version “ET“ (with throttle insert “B10“)	ms	60	85	55	70	45	60	45	55
– Version “ET“ (with pressure reducing valve “D3; 45 bar“)	ms	110	115	55	65	60	55	55	60
– Version “T“	ms	35	50	30	40	20	40	20	40
2-position valve (spring end position)									
– Version “ET“ (with throttle insert “B10“)	ms	80	105	65	85	50	80	50	80
– Version “ET“ (with pressure reducing valve “D3; 45 bar“)	ms	100	125	90	90	75	75	55	80
– Version “T“	ms	30	80	30	80	25	75	25	75

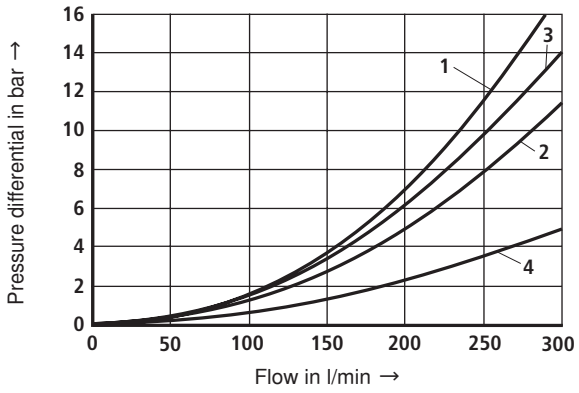
OFF – AC voltage (~) and DC voltage (=)

Pilot pressure	bar	70		140		210		250	
Type of voltage		~	=	~	=	~	=	~	=
3-position valve (spring-centered)									
– Version “ET“ (with throttle insert “B10“)	ms	40	30	40	30	40	30	40	30
– Version “ET“ (with pressure reducing valve “D3; 45 bar“)	ms	40	35	40	35	40	35	40	35
– Version “T“	ms	45	35	45	35	45	35	45	35
2-position valve (spring end position)									
– Version “ET“ (with throttle insert “B10“)	ms	45	30	45	30	45	30	45	30
– Version “ET“ (with pressure reducing valve “D3; 45 bar“)	ms	55	35	55	35	55	35	55	35
– Version “T“	ms	35	35	35	35	35	35	35	35

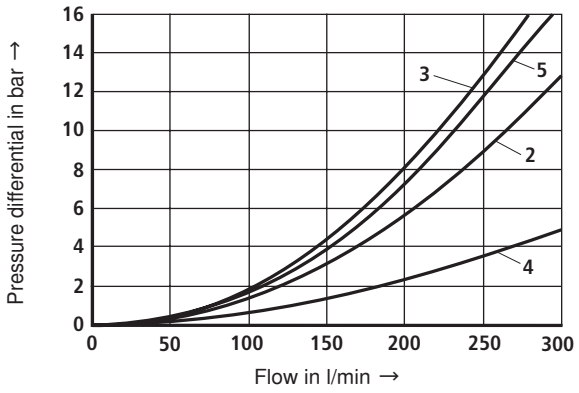
Characteristic curves (measured with HLP46, ϑ_{oil} = 40 °C ±5 °C)

Δp-q_V characteristic curves

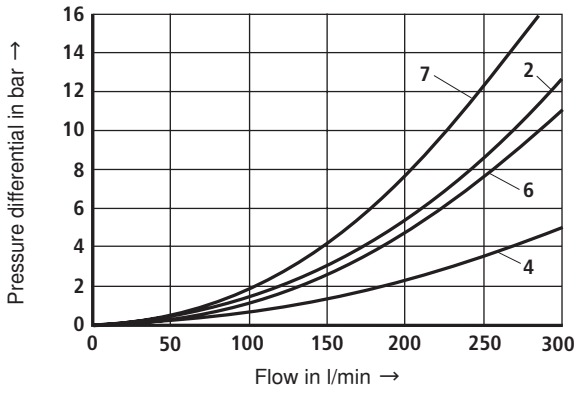
Version "E51"



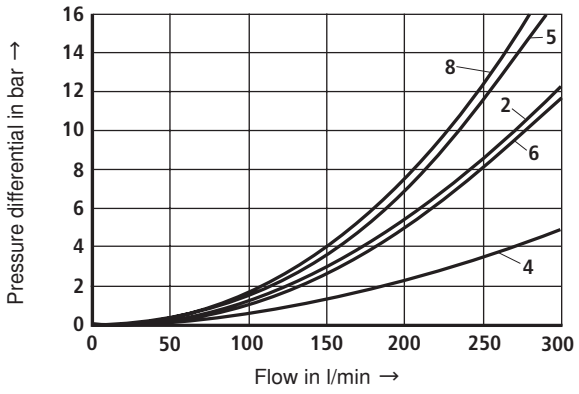
Version "E62"



Version "E63"

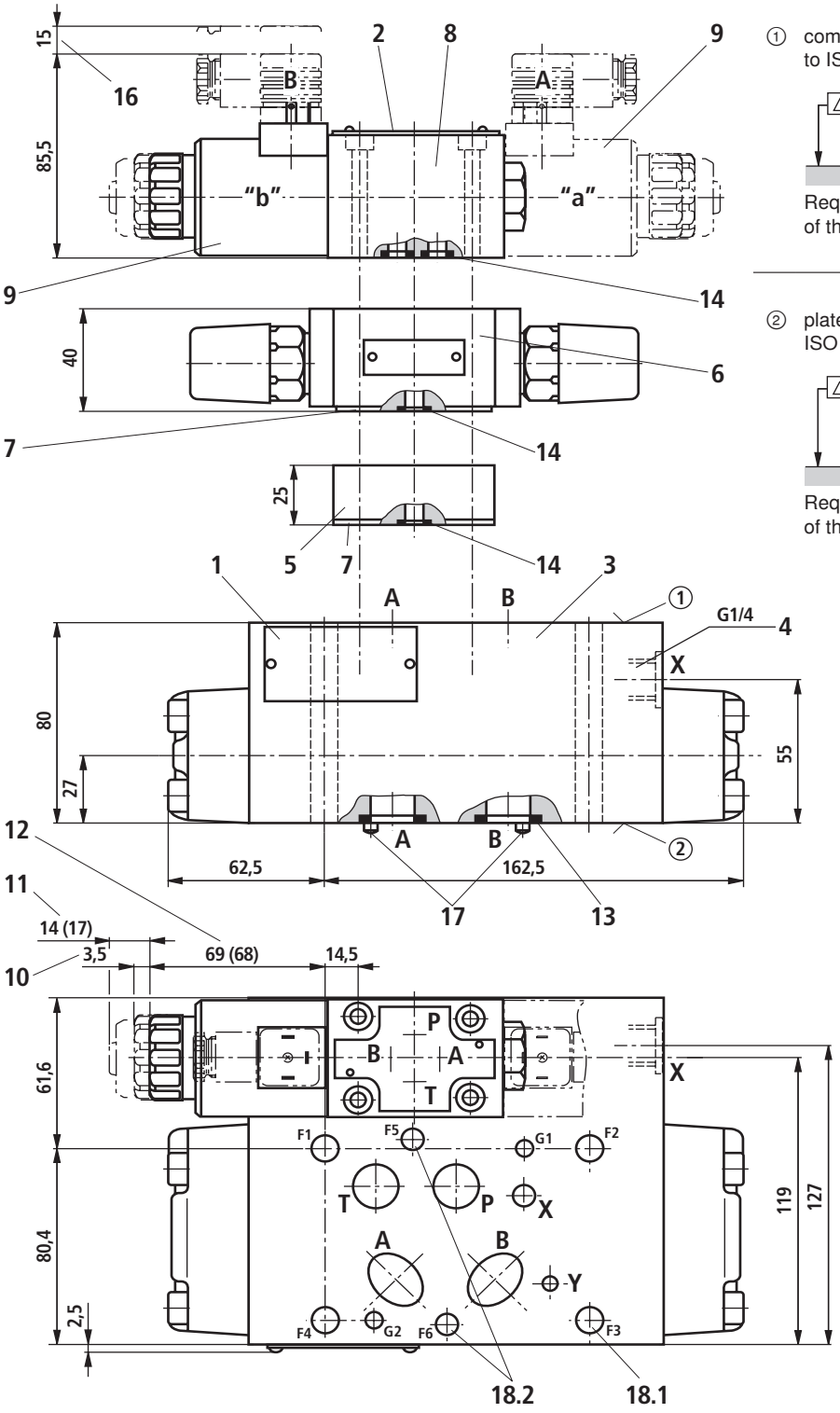


Version "E68"

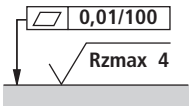


1 A2 → A1
2 B1 → B2
3 A1 → A2; B2 → B1
4 P1 → P2; T1 → T2
5 A2 → B2; A2 → A1
6 A1 → A2
7 A2 → A1; B2 → B1
8 B2 → B1

Unit dimensions: Type Z4WEH16 (dimensions in mm)

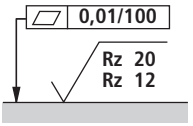


① component side - porting pattern to ISO 4401-07-07-0-05



Required surface quality of the valve mounting face

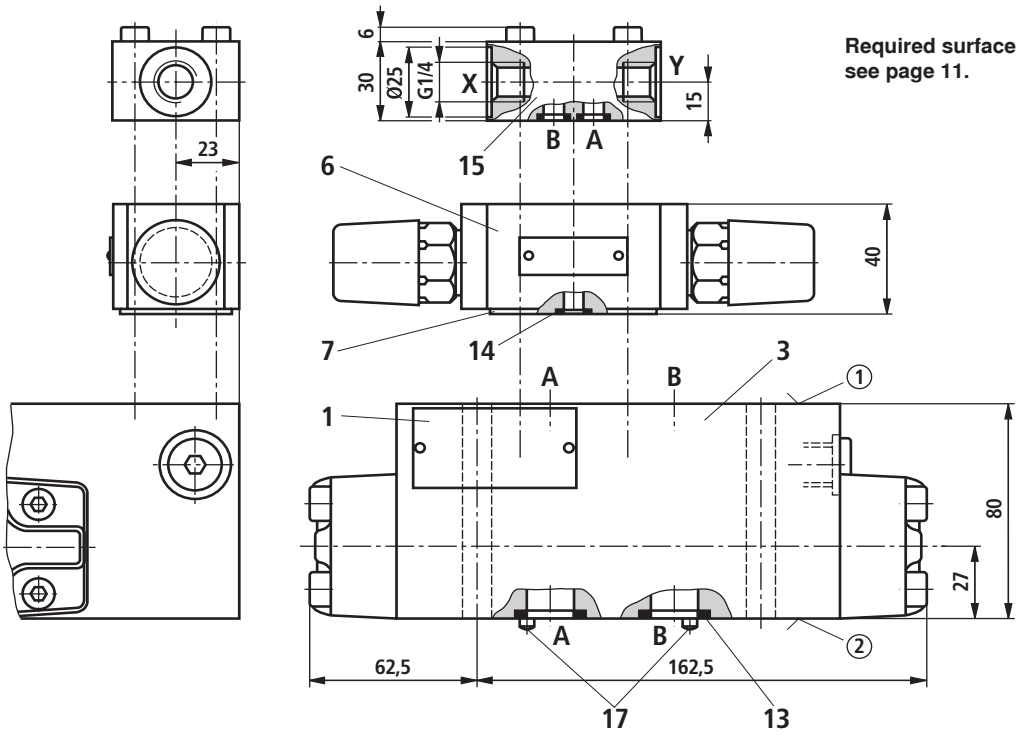
② plate side - porting pattern to ISO 4401-07-07-0-05



Required surface quality of the valve mounting face

For explanations of items, see page 12.

Unit dimensions: Type Z4WH16 (dimensions in mm)



Required surface quality (①, ②), **see page 11.**

1 Nameplate of complete valve

2 Nameplate of pilot valve

3 Main valve

① = component side – porting pattern to ISO 4401-07-07-0-05

② = plate side – porting pattern to ISO 4401-07-07-0-05

4 Port X (G1/4) for external pilot control

5 Pressure reducing valve “D3”
(must be used in the case of pilot pressure above 250 bar; only for version “Z4WEH“)

Material no.:
NBR seals: **R900323180**
FKM seals: **R900323664**

⚠ **Attention!**
If a pressure reducing valve “D3“ is used, a throttle insert “B10“ must be installed in port P of the pilot valve!

6 Switching time adjustment (throttle check valve, see data sheet RE 27506); depending on the installation position, meter-in or meter-out control (illustration: meter-in control)

7 R-ring plate

8 Pilot valve (see data sheet RE 23178)

– Type 4WE 6 **J**.. with symbol E62

– Type 4WE 6 **Y**.. with symbol E51, E63, E68

9 Solenoids “a” and “b” (can be rotated 90°)

10 Dimension for valve without manual override

11 Dimension for valve with manual override “N“; dimensions () for valve with AC solenoid

12 Dimension for valve with concealed manual override “N9“; dimensions () for valve with AC solenoid without manual override

13 Identical seal rings for ports A, B, P, T (main valve)

14 Identical seal rings for ports A, B, P, T

15 Pilot oil subplate

16 Space required to remove mating connector

17 Locating pin

18.1 Valve mounting bores

Valve mounting screws (separate order)

4 hexagon socket head cap screws
ISO 4762 - M10 - 10.9

18.2 Valve mounting bores

Valve mounting screws (separate order)

2 hexagon socket head cap screws
ISO 4762 - M6 - 10.9

☞ **Note!**

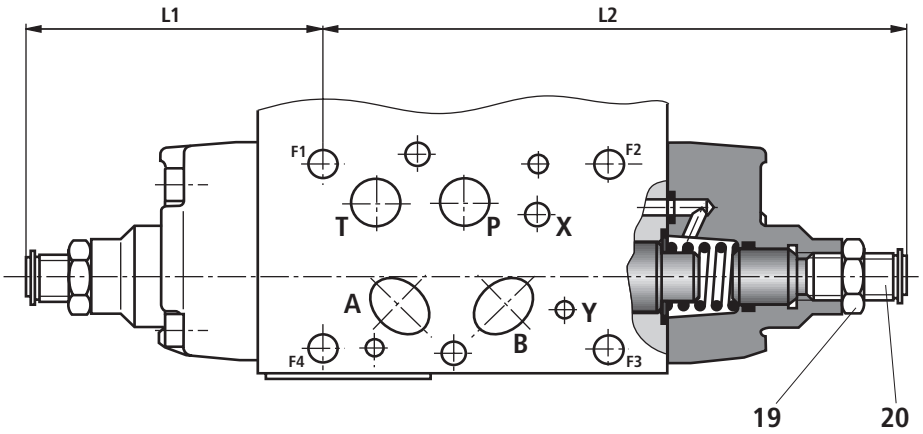
The length and tightening torque of the valve mounting screws must be calculated taking account of the components mounted.

Stroke adjustment, attachment options (dimensions in mm)

Attachment options	Ordering code	L1	L2
Stroke adjustment on sides A and B	**10**	108	208
Stroke adjustment on side A	**11**	108	
Stroke adjustment on side B	**12**		208

The stroke adjustment feature limits the stroke of the main spool. The spool stroke can be reduced by loosening locknut (19) and turning adjustment spindle (20) clockwise. The control chamber must be pressureless during this process.

Stroke 10 mm (1 turn = 1.5 mm stroke)



19 Locknut 24 A/F

20 Adjustment spindle, hexagon socket 6 A/F