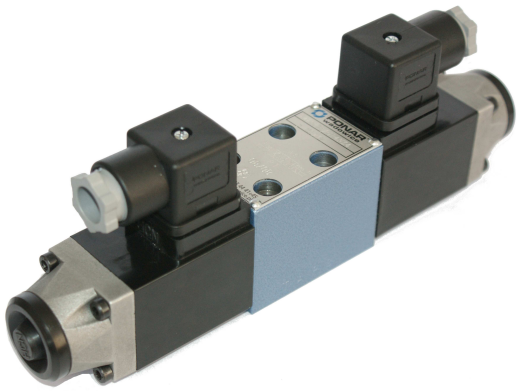
PONAR wadowice	Directional spool valve type WE5 electrically operated			WK 450 187
	NS 5	up to 25 MPa	up to 16 dm³/min	08.2011

DATA SHEET - SERVICE MANUAL

APPLICATION



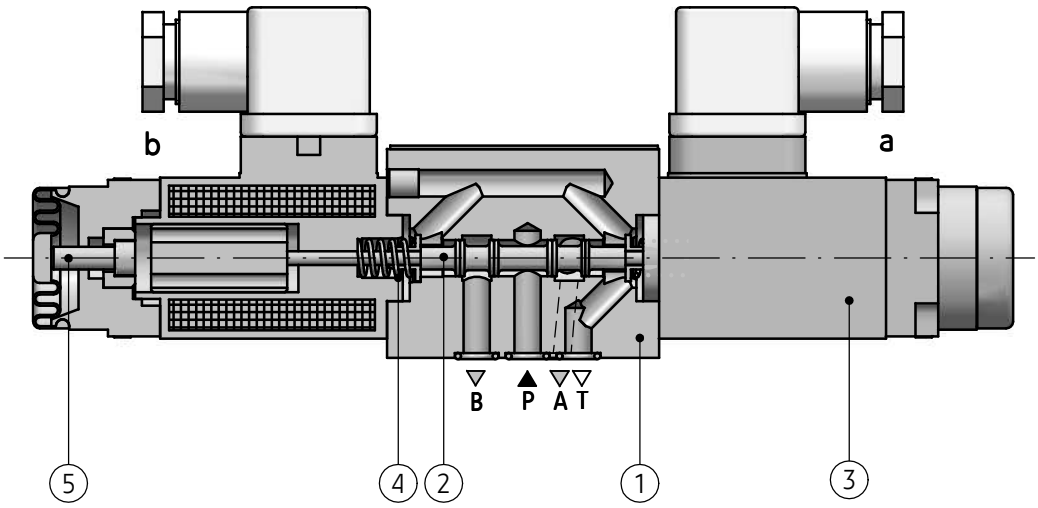
Directional spool valves type **WE5...** electrically operated are intended for change in direction of fluid flow in a hydraulic system and thus it allows to change direction of movement of a receiver - mostly piston rod of a cylinder or hydraulic motor as well to use functions: *on* and *off*. These directional spool valves are used for subplate mounting in any position in a hydraulic system.

Directional spool valve is complied with the regulations of directive **2006/95/WE** for the following voltages:

- **50 – 250 V** for **AC**
- **75 – 250 V** for **DC**

DESCRIPTION OF OPERATION

4 WE5 J - 6X/G24NZ4



Main elements of directional spool valve type **WE6...** are: housing (1), solenoids (3), control spool (2), centering springs (4) and manual overrides (5).

The spool (2) is shifted when it is moved into one of end positions by the force of solenoid (3) affecting it.

The return of the spool into neutral position and centering are secured by the centering springs (4). The shape of the spool (control edge spacing) affects the configuration of connections among the ports: **A**, **B**, **P** and **T**.

In case of emergency, the spool can be shifted manually by means of the override (5) – only for version with manual override.

When the situation is anticipated, directional spool valve must be mounted in the way as to be available.

WE5.../**O...-** 2-position directional spool valve without return springs. The spool is positioned and supported with attached solenoid. There is no neutral position as the spool is not positioned.

WE5...**OF...-** 2-position directional spool valve without return springs with detent. The spool (2) is positioned and supported with detent (6), and its shift results from supplying voltage to one solenoid (3).

TECHNICAL DATA

Hydraulic fluid	mineral oil				
Required filtration	**up to 16 µm**				
Recommended filtration	up to 10 µm				
Nominal fluid viscosity	37 mm ^{2}/s at temperature 55 ^{o}C				
Viscosity range	2,8 up to 380 mm ^{2}/s				
Fluid temperature range (in a tank)	recommended	40 ^{o}C up to 55 ^{o}C			
	max	-20 ^{o}C up to +70 ^{o}C			
Ambient temperature range	- 20 ^{o}C up to +50 ^{o}C				
Maximum operating pressure	**ports P, A, B**	**25 MPa**			
	port T	**6 MPa**			
Flow section in central position schemes on page 3	spool	Q		W	
	flow section	6 % nominal flow		3 % nominal flow	
Supply voltage for solenoids	**DC**			**AC**	
	12V	**24V**	**110V**	**230V - 50Hz**	**110V - 50Hz**
Power requirement	**26 W**			-	
Holding current	-			**46 VA**	
In-rush current	-			**130 VA**	
Duty cycle	continues			continues	
Switching time, on	40 ms			25 ms	
Switching time, off	30 ms			20 ms	
Maximum switching frequency	15000 on/h			7200 on/h	
Insulation	**IP 65**				
Solenoid coil temperature	max 150 ^{o}C				
Weight	1,4 kg				

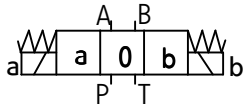
ASSEMBLY AND APPLICATION REQUIREMENTS

1. Only valve working properly and suitably installed may be connected to an electric system. Only skilled workers are allowed to connect and disconnect electric system.
2. Ground connection (⏚) must be connected with protective earth wire (PE ⏚) in supply system according to appropriate instructions.
3. It is forbidden to apply directional spool valve if the supply cable in the gland of plug-in-connector is not properly tightened.
4. It is forbidden to apply directional spool valve if the plug-in-connector is not properly tightened to the solenoid socket and is not secured by screwing bolt tightly.
5. Due to heating solenoid coils, directional spool valves should be placed in order to eliminate the possibility of incidental touch while using, or, they should be equipped with the coil covers (in accordance with the European standards PN - EN ISO 13732-1 and PN - EN 982).

SCHEMES

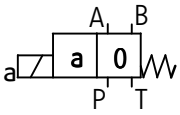
Graphic symbols for 3- position directional spool valves

WE5...-6X/**...**

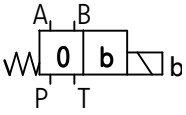


Graphic symbols for 2- position directional spool valves

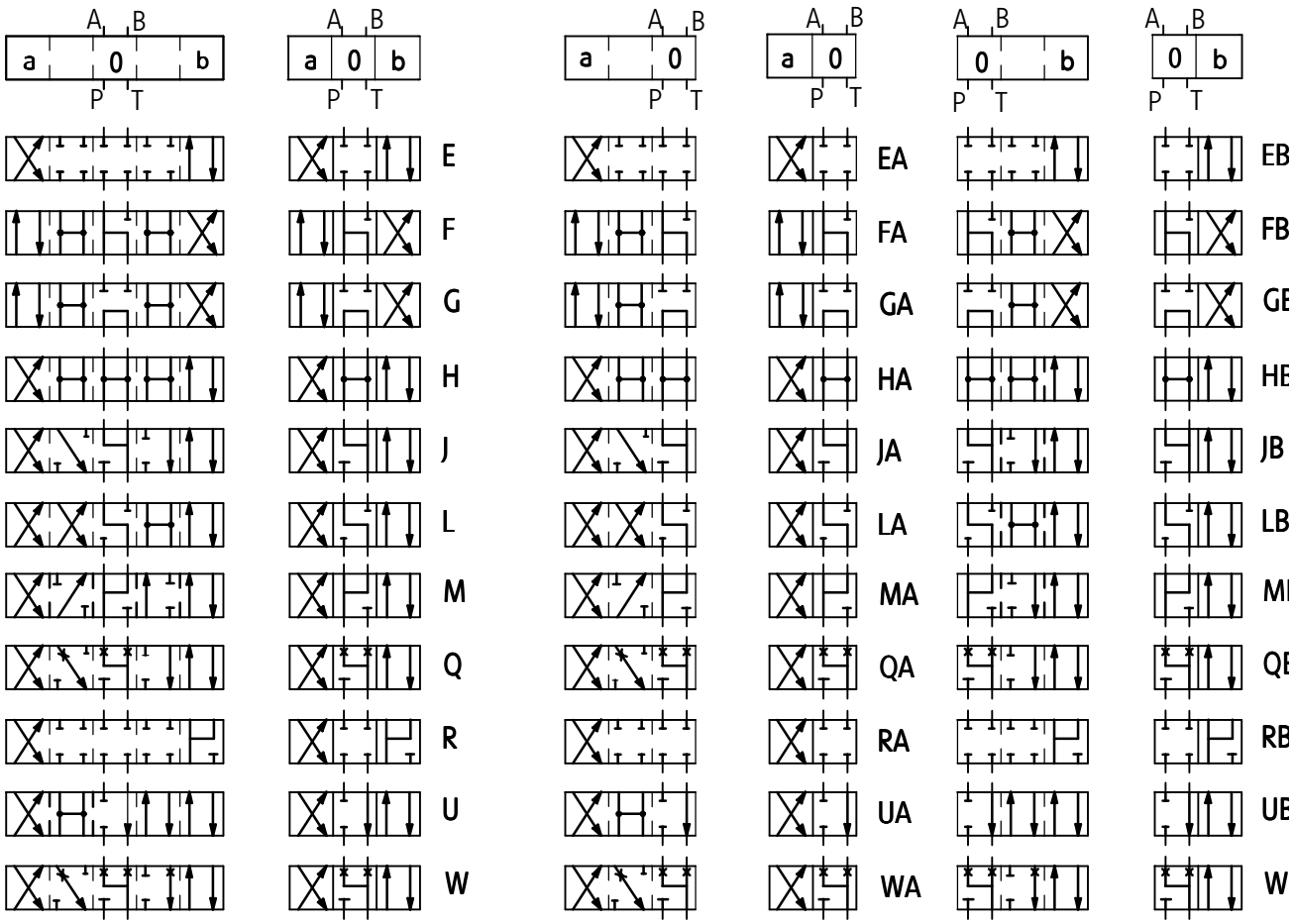
WE5...**A** -6X/**...**



WE5...**B** -6X/**...**



Graphic symbols for spools



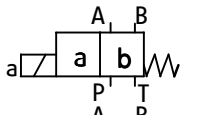
NOTES:

Spool **W** allows to open the flow in central position in 3% of nominal flow
Spool **Q** allows to open the flow in central position in 6% of nominal flow

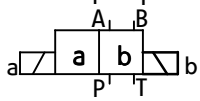
SCHEMES

Graphic symbols for 2- position directional spool valves

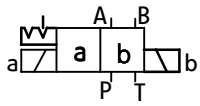
WE5...-6X/**...**



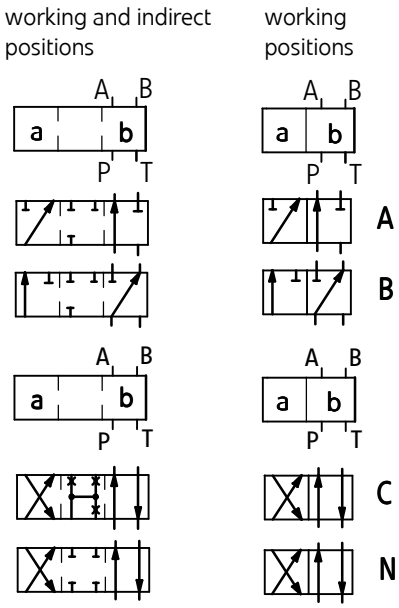
WE5...-6X/**O**...



WE5...-6X/**OF**...



Graphic symbols for spools

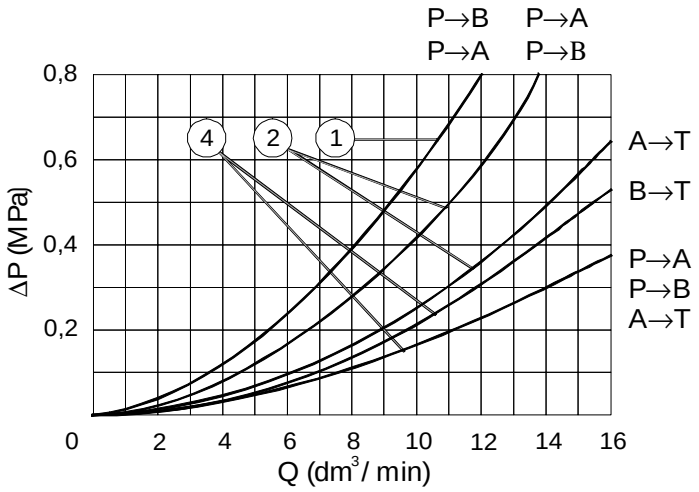


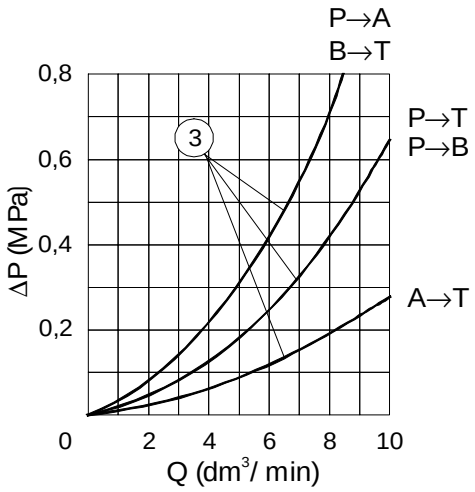
PERFORMANCE CURVES

measured at viscosity ν = 41 mm^2/s and temperature t = 50°C

Flow resistance curves

pressure drop related to flow for directional spool valve type **WE5...** with various spool types:
1 - spool type **B**; 2 - spool type **R**; 3 - spool type **G**; 4 - other spool types

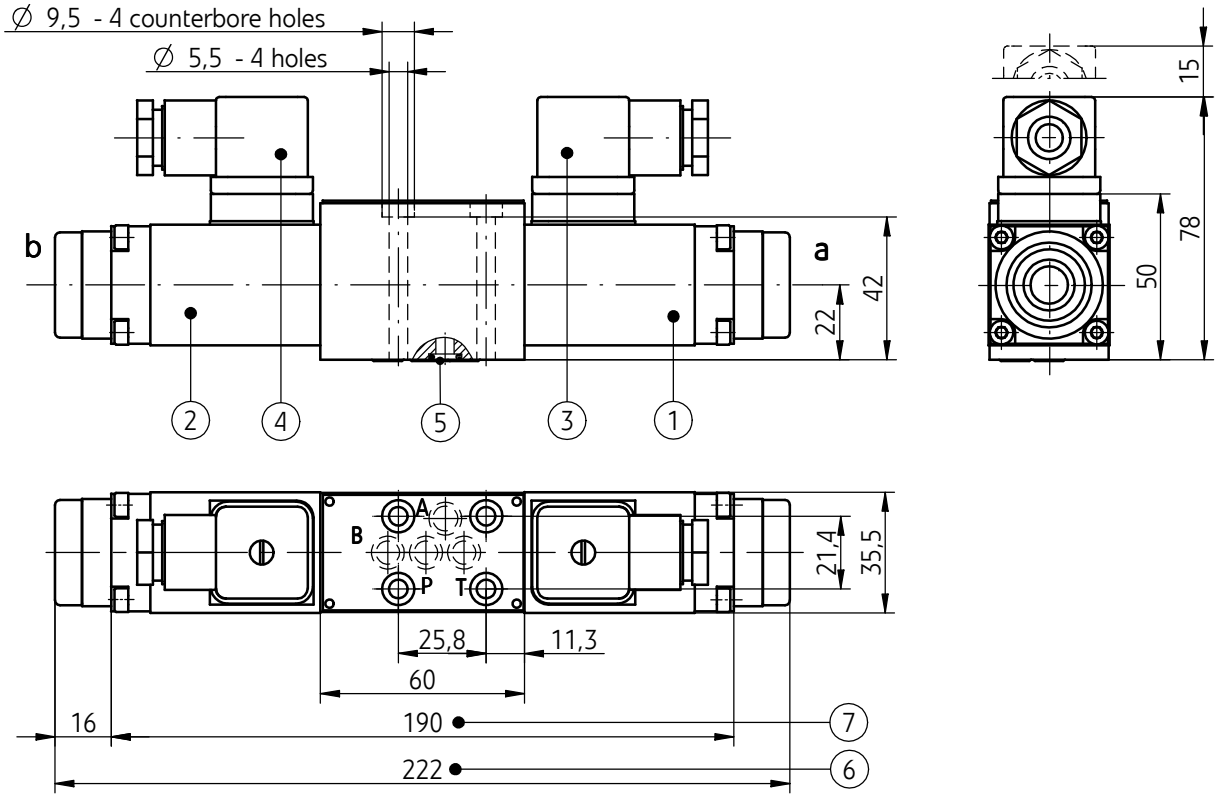


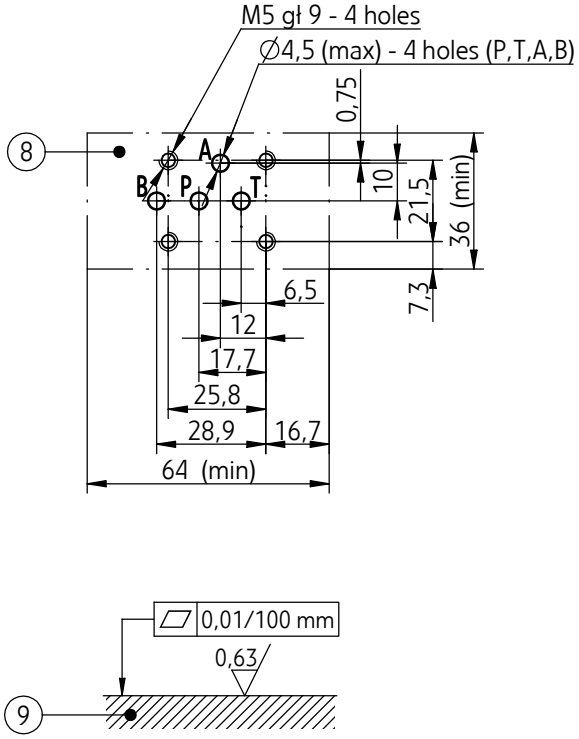


OVERALL AND CONNECTION DIMENSIONS

3-position versions ..WE5...-6X/...

2-position versions ...WE5...-6X/O... ; **...OF...**



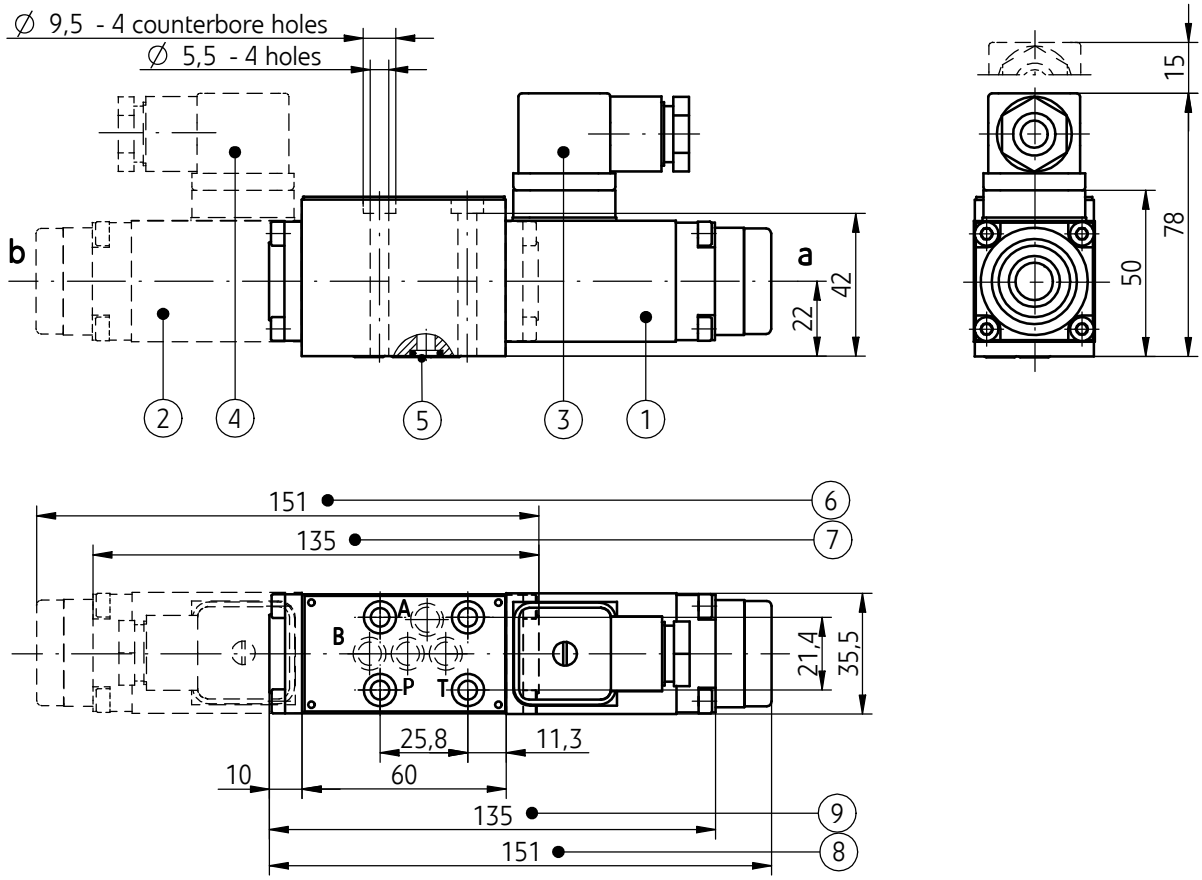


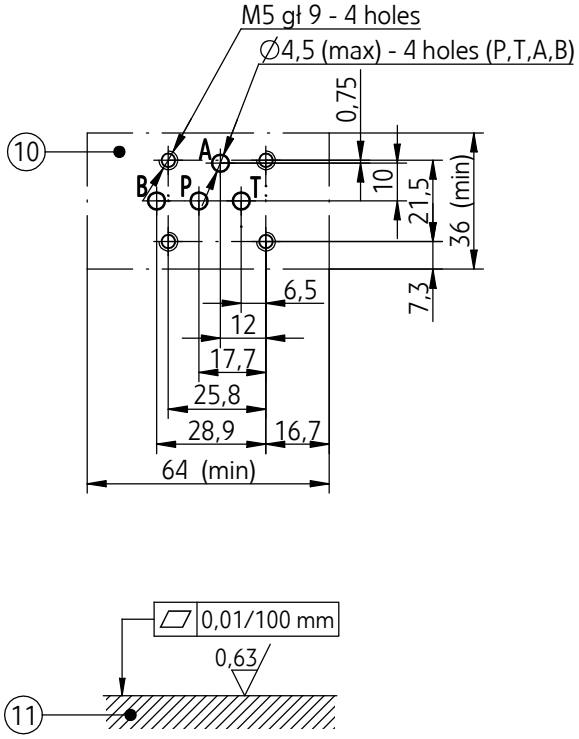
1 - Solenoid **a**
2 - Solenoid **b**
3 - Plug-in-connector **a** - **ISO 4400** (DIN 43650 - A) type
4 - Plug-in-connector **b** - **ISO 4400** (DIN 43650 - A) type
5 - **O-ring 7 x 1,5** - 4 pcs/kit (**P**,**T**,**A**,**B**)
6 - Directional spool valve dimensions with **2 solenoids - a**, **b** **with manual override** :
- **3-position directional spool valve springs centered** (spool schemes: **E**, **F**, **G**, **H**, **J**, **L**, **M**, **Q**, **R**, **U**, **W** - according to page 3)
- **2-position directional spool valve without return springs**
- **2-position directional spool valve without springs and with detent** (spool schemes: **A**, **C**, **N** - according to page 4)

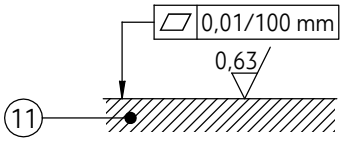
7 - Directional spool valve dimensions like item 6 **without manual override**
8 - Mounting holes configuration of a subplate fixing bolts **M5 x 50 -10.9** in accordance with **PN -EN ISO 4762** - 4 pcs/kit tightening torque **Md = 9 Nm**.
9 - Subplate surface required

OVERALL AND CONNECTION DIMENSIONS

2-position versions ..WE5...-6X/...







1 - Solenoid **a**
2 - Solenoid **b**
3 - Plug-in-connector **a** - **ISO 4400** (DIN 43650 - A) type
4 - Plug-in-connector **b** - **ISO 4400** (DIN 43650 - A) type
5 - **O-ring 7 x 1,5** - 4 pcs/kit (**P**,**T**,**A**,**B**)
6 - Directional spool valve dimensions with **1 solenoid** - **b** **spring positioned with manual override** (spool schemes: **EB**, **FB**, **GB**, **HB**, **JB**, **LB**, **MB**, **QB**, **RB**, **UB**, **WB** - according to page 3)
7 - Directional spool valve dimensions like item 6 **without manual override**
8 - Directional spool valve dimensions with **1 solenoid** - **a** **spring positioned with manual override** (spool schemes:**EA**, **FA**, **GA**, **HA**, **JA**, **LA**, **MA**, **QA**, **RA**, **UA**, **WA** - according to page 3; **A**, **B**, **C**, **N** - according to page 4)
9 - Directional spool valve dimensions like item 8 **without manual override**
10 - Mounting holes configuration of a subplate fixing bolts **M5 x 50 -10.9** in accordance with **PN -EN ISO 4762** - 4 pcs/kit tightening torque **Md = 9 Nm**. .
11 - Subplate surface required

HOW TO ORDER

	WE	5	+	/						★

Number of service ports
3-way - for spools A, B = **3**
4-way - for the other spools = **4**

Nominal size (NS)
NS5 = **5**

Spool type
spool schemes - according to **page 3**, **4**

Series number
(60-69) - connection and installation dimensions unchanged = 6X
series 6.5 (only versions: ...G12N...; ...G24N...) = **6.5**
series 6.2 = 6.2

Spool centering/positioning
spring centering = **no designation**
without springs return = O
without springs return with detent = OF

Control voltage for solenoids
12V DC = G12
24V DC = G24
110V DC = G110
110V AC 50Hz = W110
230V AC 50Hz = W230
(G110, W110, W230: only series 6.2)

Manual override
solenoids without manual override (only series 6.2) = no designation
solenoids with manual override = **N**

Electrical connection
plug-in-connector ISO 4400 (DIN 43650-A) **type without LED** = **Z4**
plug-in-connector ISO 4400 (DIN 43650-A) type with LED = Z4L

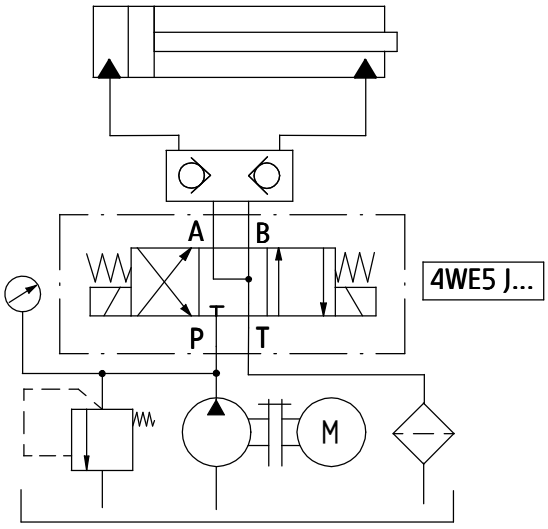
Sealing
NBR (for fluids on mineral oil base) = **no designation**
FKM (for fluids on phosphate ester base) = V

Further requirements in clear text (to be agreed with the manufacturer)

NOTES:

Directional spool valve should be ordered according to the above coding.
The symbols in bold are preferred versions in short delivery time.
Coding example: 4 WE5E - 6.5/G24 NZ4

EXAMPLE OF APPLICATION IN HYDRAULIC SYSTEM



SUBPLATES AND MOUNTING BOLTS

Subplates must be ordered according to the data sheet **WK 450 980**. Subplate symbol:
G 115/01 - threaded connection **G 1/4**

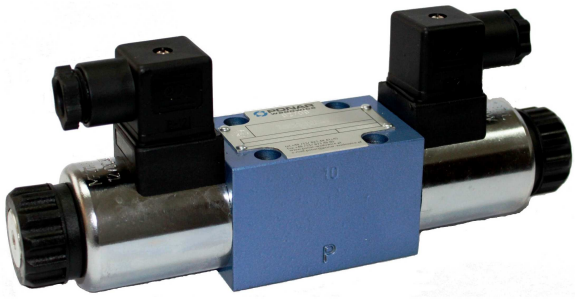
Subplates and bolts fixing directional valve **M5 x 50 - 10,9** in accordance with **PN - EN ISO 4762** - 4 pcs/kit) must be ordered separately.
Tightening torque for bolts: **Md = 9 Nm**

PONAR Wadowice S.A.
ul. Wojska Polskiego 29
34-100 Wadowice
tel. +48 33 488 21 00
fax.+48 33 488 21 03
www.ponar-wadowice.pl

PONAR wadowice	Directional spool valve electrically operated type WE6 series 32			WK 420 970
	NS 6	up to 35 MPa	up to 80 dm³/min	10.2014

DATA SHEET - OPERATION MANUAL

APPLICATION



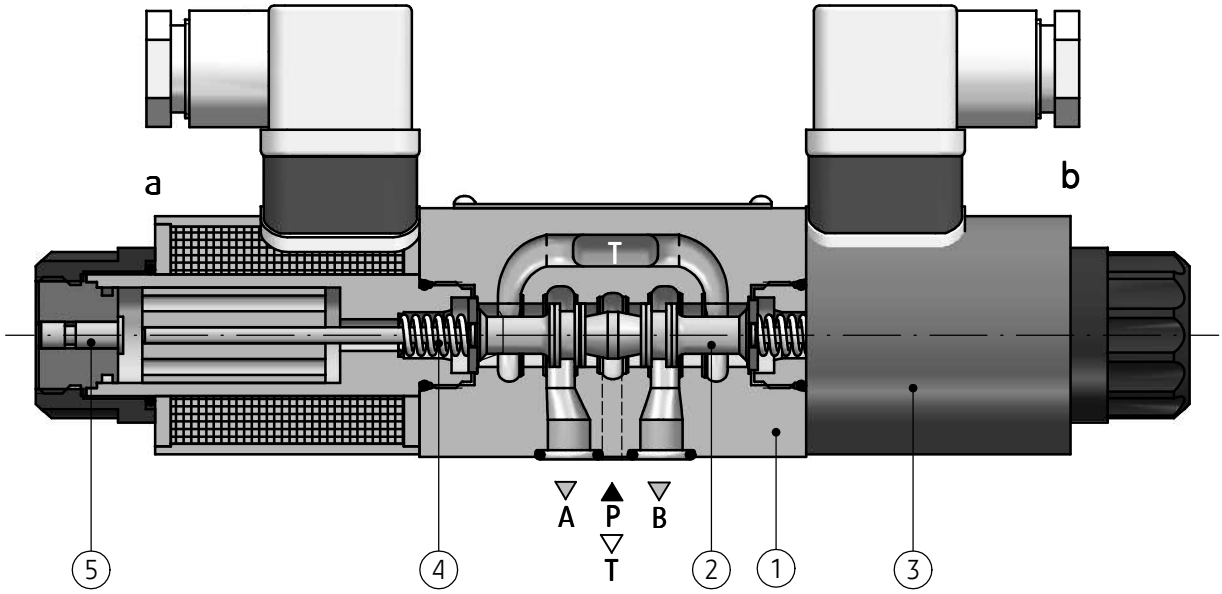
Directional spool valves type **WE6...** electrically operated are intended for change in direction of fluid flow in a hydraulic system and thus it allows to change direction of movement of a receiver - mostly piston rod of a cylinder or hydraulic motor as well to use functions: *on* and *off*. These directional spool valves are used for subplate mounting in any position in a hydraulic system.

Directional spool valve is complied with the regulations of directive **2006/95/WE** for the following voltages:

- **50 – 250 V** for **AC**
- **75 – 250 V** for **DC**

DESCRIPTION OF OPERATION

4WE6 E -32/G24NZ4

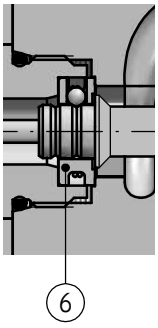


Main elements of directional spool valve type **WE6**... are: housing (1), solenoids (3), control spool (2), centering springs (4) and manual overrides (5). The spool (2) is shifted when it is moved into one of end positions by the force of solenoid (3) affecting it. The return of the spool into neutral position and centering are secured by the centering springs (4). The shape of the spool (control edge spacing) affects the configuration of connections among the ports: **A**, **B**, **P** and **T**. Function of ports:

P - supply port
T - oil return to the tank
A, B - ports for a receiver

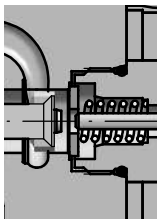
In case of emergency, the spool can be shifted manually by means of the override (5) - only for version with manual override.

When the situation is anticipated, directional spool valve must be mounted in the way as to be available.

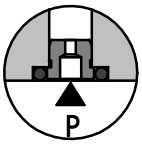


Version WE6.../**OF**...**-** only for spools: **A**, **C**, **D**. 2-position directional spool valve without return springs with detent. The spool (2) is positioned and supported with detent (6), and its shift results from supplying voltage to one solenoid (3).

DESCRIPTION OF OPERATION



Version WE6…/**O…-** only for spools: **A**, **C**, **D**. 2-position directional spool valve without return springs. The spool is positioned and supported with attached solenoid. There is no neutral position as the spool is not positioned.



Version WE6…/…**B**… - directional spool valve designation like that, has throttle insert in port **P**.

TECHNICAL DATA

Hydraulic fluid	mineral oil						
Required fluid cleanliness class	**ISO 4406 class 20/18/15**						
Nominal fluid viscosity	37 mm ^{2}/s at temperature 55 ^{o}C						
Viscosity range	2,8 up to 380 mm ^{2}/s						
Fluid temperature range (in a tank)	recommended	40^{o}C up to 55^{o}C					
	max	-20^{o}C up to +70^{o}C					
Ambient temperature range	- 20^{o}C up to +50^{o}C						
Maximum operating pressure	**ports P, A, B**	**35 MPa**					
	port T	**21 MPa**					
Flow section for spool **W** in central position (schemes on page 4)	3 % nominal flow						
Weight	with 1 solenoid	WE6...- 1,5 kg			WE6...**H**...- 2,8 kg		
	with 2 solenoids	WE6...- 2,1 kg			WE6...**H**...- 3,4 kg		
Supply voltage of solenoids	**DC**			**AC** (plug-in connector with rectifier)			**AC** direct supply
	12V	**24V**	**110V**	**230V-**50Hz	**220V**- 50Hz	**110V**- 50Hz	**230V-** 50Hz
Supply voltage tolerance	±10%						±10%
Power requirement (DC)	30 W						–
Holding power (AC)	–						50 VA
Switch-on power (AC)	–						300 VA
Switching time	ON up to 60 ms						ON up to 40 ms
	OFF up to 40 ms						OFF up to 25 ms
Maximum switching frequency	15000 on/h						12000 on/h
Degree of protection	**IP 65**						
Solenoid coil temperature	max 150 ^{o}C						

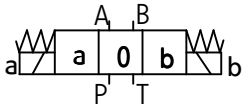
INSTALLATION AND OPERATION REQUIREMENTS

1. Only fully functional and operational valve, properly connected to electrical installation must be used. Connecting or disconnecting the valve to an electrical installation must only be carried out by qualified personnel.
2. Ground connection (⏚) must be connected with protective earth wire (PE ⏚) in supply system according to appropriate instructions.
3. Solenoid plug shall precisely adhere to socket and shall be secured with thread bolt screwed in securely in a place. It is forbidden to operate the valve if the tightness and suitable clamp of cable in the plug gland are not ensured.
4. For the ...W230 - 50... valves, simultaneous joining of two solenoids of the same valve should not be permitted (partial overriding of the valve can overheat and damage the winding coils).
5. During the period of operation must be kept fluid viscosity acc. to requirements defined in this Data Sheet - Operation Manual
6. In order to ensure failure free and safe operation the following must be checked:
   - condition of the electrical connection
   - proper working of the valve
   - cleanliness of the hydraulic fluid
7. Due to heating of electromagnet solenoid coils to high temp., the valve shall be placed in such way to eliminate the risk of accidental contact with solenoid during operation or to apply suitable covers acc. to PN-EN ISO 13732-1 and PN-EN 982
8. In order to ensure tightness of the directional valve block, one should take care of dimension of sealing rings and valve operation parameters given in this Data Sheet - Operation Manual
9. A person that operates the valve must be thoroughly familiar with this Data Sheet - Operation Manual.

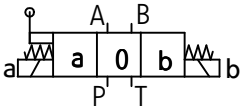
DIAGRAMS

Diagrams for 3-position directional spool valves

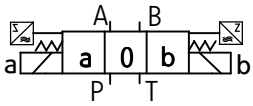
WE6.../**...**



WE6.../**...H**...



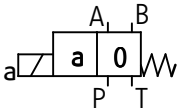
WE6.../**...** - **S**...



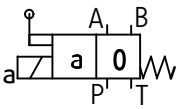
Diagrams for 2-position directional spool valves

versions with positions **a**, **0**

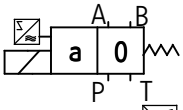
WE6...**A** /**...**



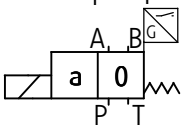
WE6...**A** /**...H**...



WE6...**A** /**...** - **S**...

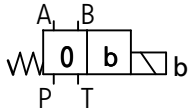


WE6...**A** /**...** - **M**

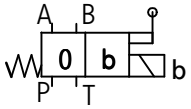


versions with positions **0**, **b**

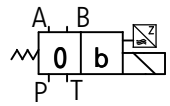
WE6...**B**/**...**



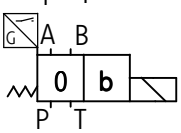
WE6...**B**/**...H**...



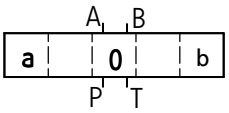
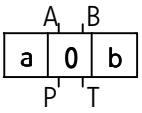
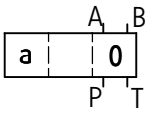
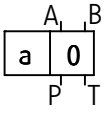
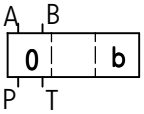
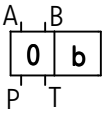
WE6...**B**/**...** - **S**...



WE6...**B**/**...** - **M**



Diagrams for spools

working and indirect positions	working positions		working and indirect positions	working positions		working and indirect positions	working positions	
		**E**			**EA**			**EB**
		F			**FA**			**FB**
		G			**GA**			**GB**
		H			**HA**			**HB**
		J			**JA**			**JB**
		L			**LA**			**LB**
		M			**MA**			**MB**
		P			**PA**			**PB**
		U			**UA**			**UB**
		W			**WA**			**WB**

NOTE:

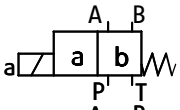
Flow section in central position for spool **W** according to page 2

DIAGRAMS

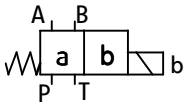
Diagrams for 2-position directional spool valves

versions with positions **a**, **b**

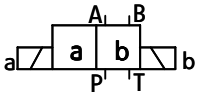
WE6.../**...**



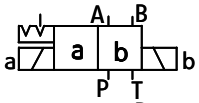
WE6.../**...**



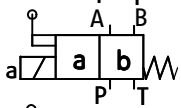
WE6.../**O**...*



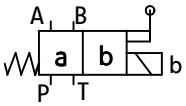
WE6.../**OF**...*



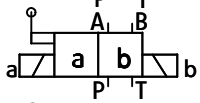
WE6.../**...H**...



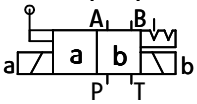
WE6.../**...H...**



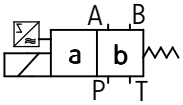
WE6.../**O...H**...*



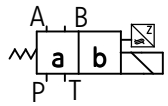
WE6.../**OF...H**...*



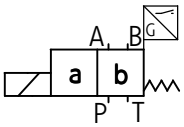
WE6.../**...** - **S**...



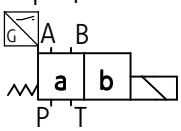
WE6.../**...** - **S**...



WE6.../**...** - **M**



WE6.../**...** - **M**



NOTE:

(*) - versions: WE6.../**O**...;.../**OF**...; .../**O**...**H**...; .../**OF**...**H**...
only with spools - diagram **A**, **C**, **D**

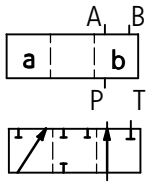
Diagrams for spools

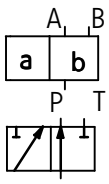
working and indirect positions

working positions

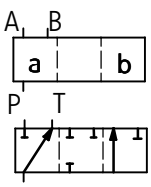
working and indirect positions

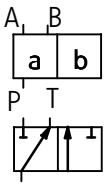
working positions



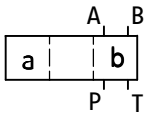


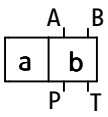
A

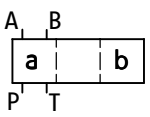


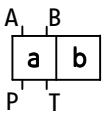


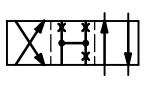
B



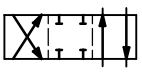




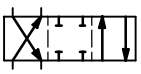




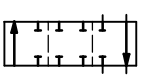
C



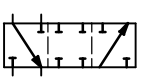
D



Y



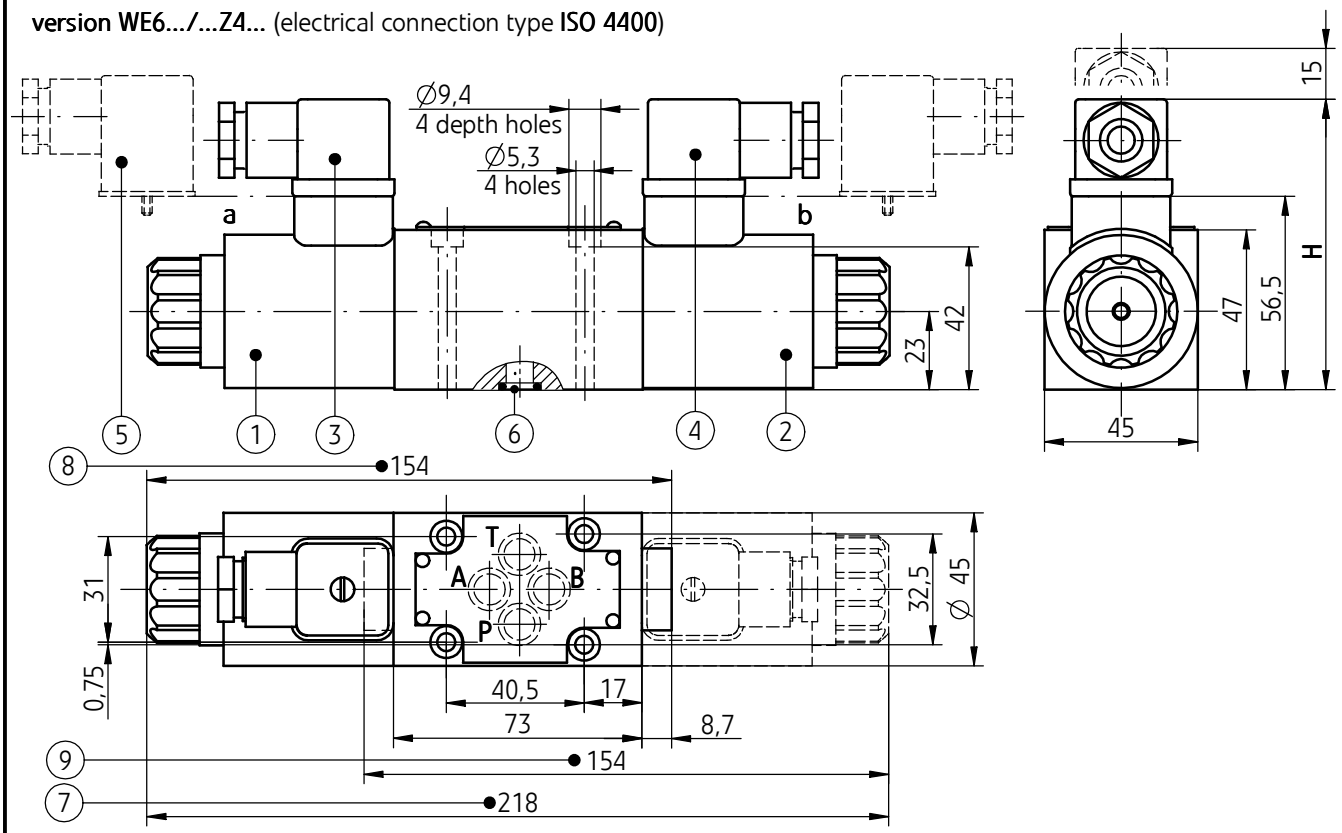
D1



Y1

OVERALL AND CONNECTION DIMENSIONS

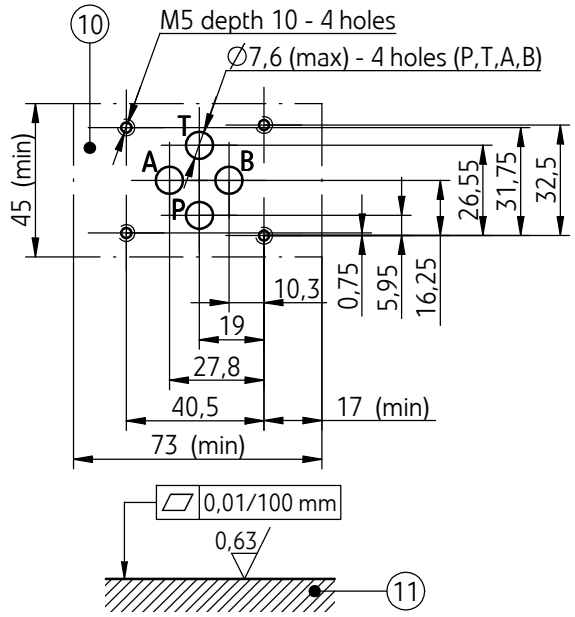
version WE6.../...Z4... (electrical connection type **ISO 4400**)



Option of connection **Z4...**	Control voltage	Dimension **H**
plug-in-connector **ISO 4400** (DIN 43650 - A)	**12V DC**, **24V DC**, **110V DC**	86
plug-in-connector **ISO 4400** (DIN 43650 - A) **with rectifier**	**110V AC**, **220V AC**, **230V AC**	93

NOTES:

- versions WE6... with **DC solenoids with other electrical connectors**, see page 7
- versions with **AC solenoids** with direct supply, see page 8



1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - Plug-in-connector on side **a - ISO 4400** type (DIN 43650 - A)
4 - Plug-in-connector on side **b - ISO 4400** type (DIN 43650 - A)
5 - Plug-in-connector - **ISO 4400** type (DIN 43650 - A) with rectifier
6 - **O-ring 9,2 x 1,8** - 4 pcs/set
7 - Directional spool valve dimension with **2 solenoids** on side **a**, **b**:
- **3-position directional spool valve springs centered** (spool diagrams: **E**, **F**, **G**, **H**, **J**, **L**, **M**, **P**, **U**, **W** - according to page 4
- **2-position directional spool valve without return springs**
- **2-position directional spool valve without springs and with detent**

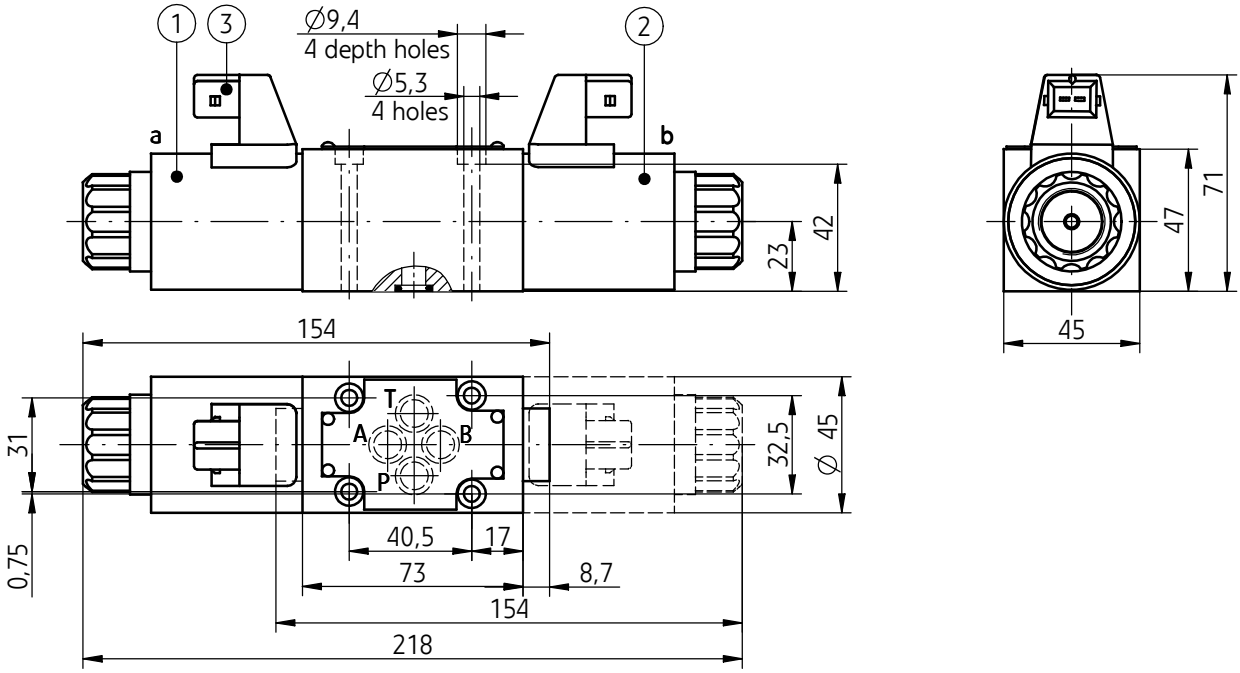
(spool diagrams: **A**, **C**, **D**, **D1** - according to page 5)
8 - Directional spool valve dimension with **1 solenoid -** on side **a**
- **2-position springs centered**

(spool diagrams: **A**, **C**, **D**, **D1**, **EA**, **FA**, **GA**, **HA**, **JA**, **LA**, **MA**, **PA**, **UA**, **WA** - according to pages 4, 5)
9 - Directional spool valve dimension with **1 solenoid -** on side **b**
- **2-position springs centered**

(spool diagrams: **B**, **Y**, **Y1**, **EB**, **FB**, **GB**, **HB**, **JB**, **LB**, **MB**, **PB**, **UB**, **WB** - according to pages 4, 5
10 - Porting pattern for directional spool valve - configuration of connection holes in accordance with the standard **ISO 4401** - identified by **ISO 4401**-03-02-0-94 (nominal size **CETOP 03**)
fixing screws **M5 x 50 - 10.9** in accordance with **PN -EN ISO 4762** - 4 pcs/set; tightening torque **Md = 9 Nm**
11 - Subplate surface required

OVERALL AND CONNECTION DIMENSIONS

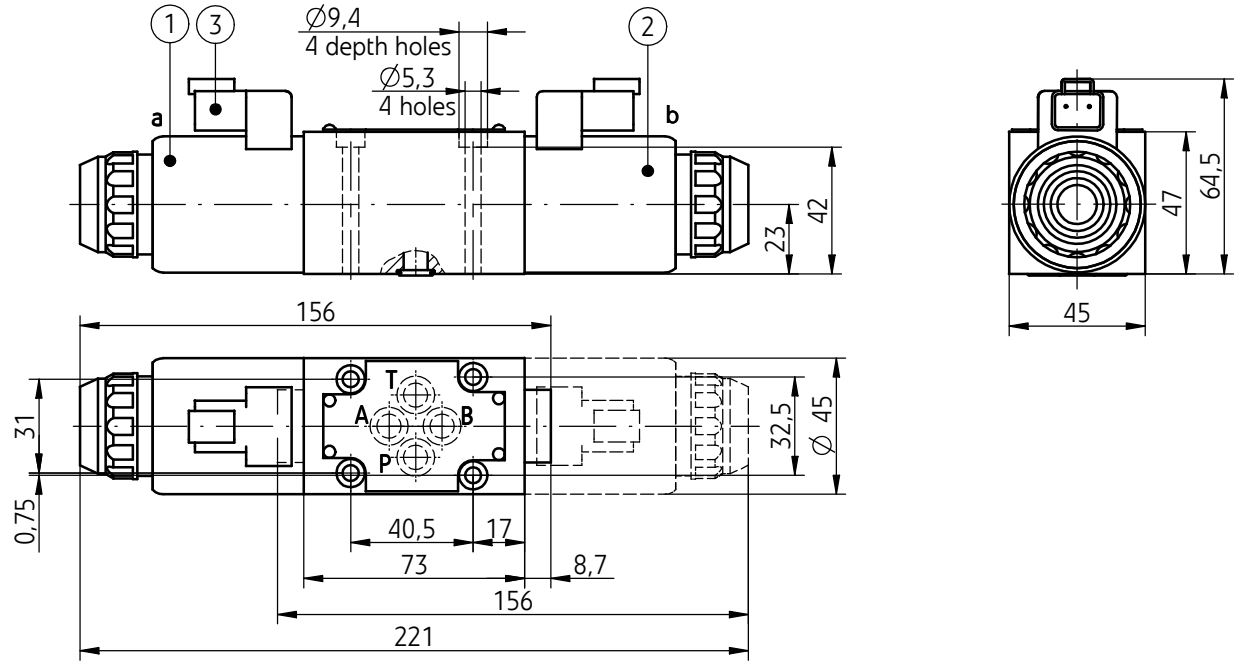
versions: **WE6…/…G12…J…**; **…G24…J…** (electrical connection type **AMP Junior Timer**)



NOTES:
Description of other elements of the valve drawing; porting pattern and requirements of surface state of the subplate - as in version WE6…/…**Z4**…, see page 6

1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - Connector type **AMP Junior Timer male 2-pole** (plug-in-connectors not shown in the drawing must be ordered separately - Data Sheet **WK 499 963**)

version **WE6…/…G24…D…** (electrical connection type **Deutsch**)

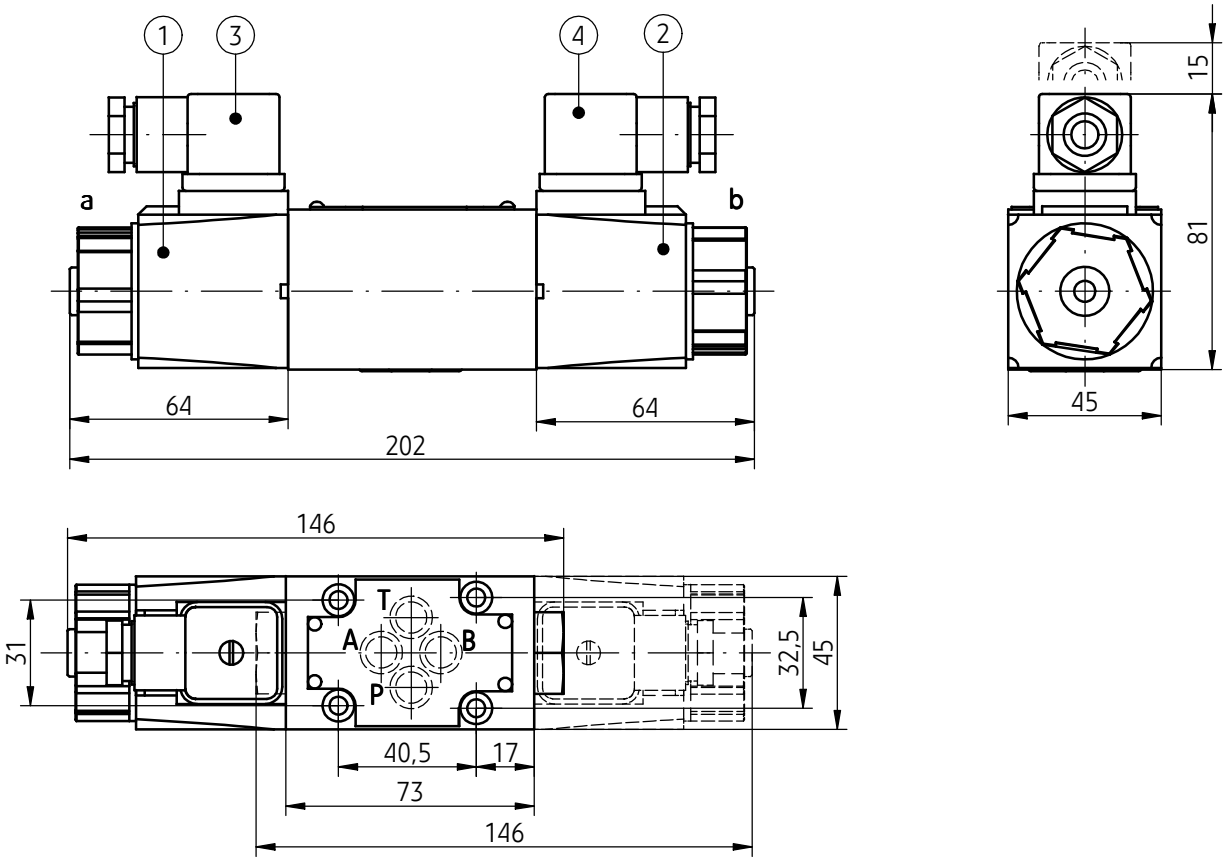


NOTES:
Description of other elements of the valve drawing; porting pattern and requirements of surface state of the subplate - as in version WE6…/…**Z4**…, see page 6

1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - **Deutsch DT04 - 2P** type connector (plug-in connectors **Deutsch DT06 - 2S** type not shown in the drawing must be ordered separately - Data Sheet **WK 499 963**)

OVERALL AND CONNECTION DIMENSIONS

version WE6.../...W230-50...Z4... (AC solenoids; electrical connection type **ISO 4400**)



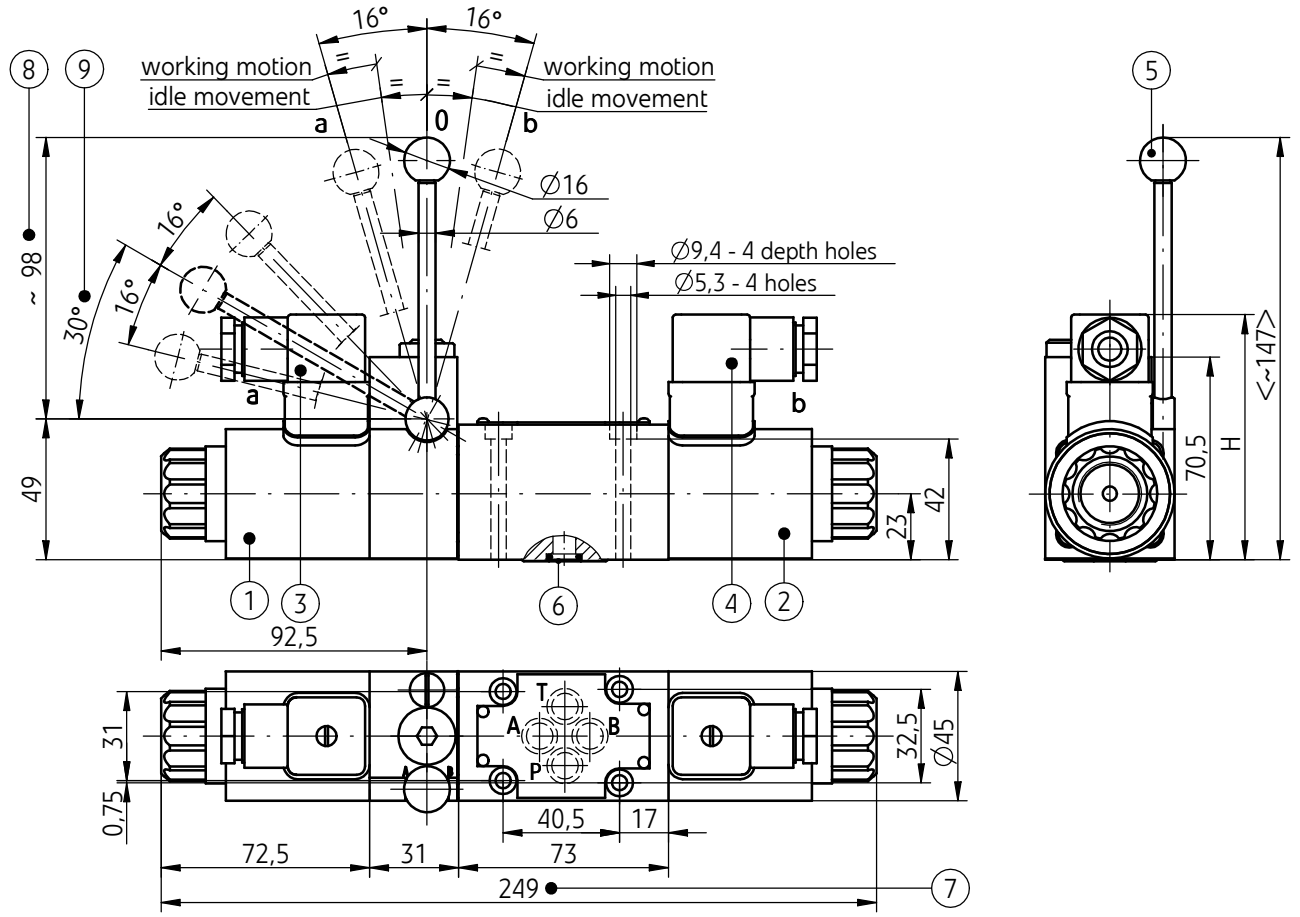
NOTES:

- other dimensions, description of other elements of the valve drawing; porting pattern and requirements of the surface state of the subplate - as in version WE6.../...**Z4**... with DC solenoids, see page 6
- details of the WE6.../...**W230 - 50...H** Z4... version (with a manual control lever) - as in version WE6.../...**H Z4**... with **DC** solenoids, see page 9 - 11

1 - AC solenoid (with direct supply) from the **a** side
2 - AC solenoid (with direct supply) from the **b** side
NOTE:
simultaneous joining of two solenoids of the same valve should not be permitted (partial overriding of the valve can overheat and damage the winding coils)
3 - Plug-in-connector on side **a** - type **ISO 4400** (DIN 43650 - A)
4 - Plug-in-connector on side **b** - type **ISO 4400** (DIN 43650 - A)

OVERALL AND CONNECTION DIMENSIONS

3-position versions WE6.../**...**H Z4...; .../**...**HS Z4...
2-position versions WE6.../O...H Z4...; .../OF... H Z4...
WE 6.../O...HS Z4...; .../OF...HS Z4...



Option of connection **Z4...**	Control voltage	Dimension **H**
plug-in-connector **ISO 4400** (DIN 43650 - A)	**12V DC**, **24V DC**, **110V DC**	86
plug-in-connector **ISO 4400** (DIN 43650 - A) **with rectifier**	**110V AC**, **220V AC**, **230V AC**	93

NOTES:
- versions WE6.../...**H**... with other electrical connections, see page 11
- porting pattern and requirements of surface state of the subplate - as in version WE6.../...**Z4**..., see page 6

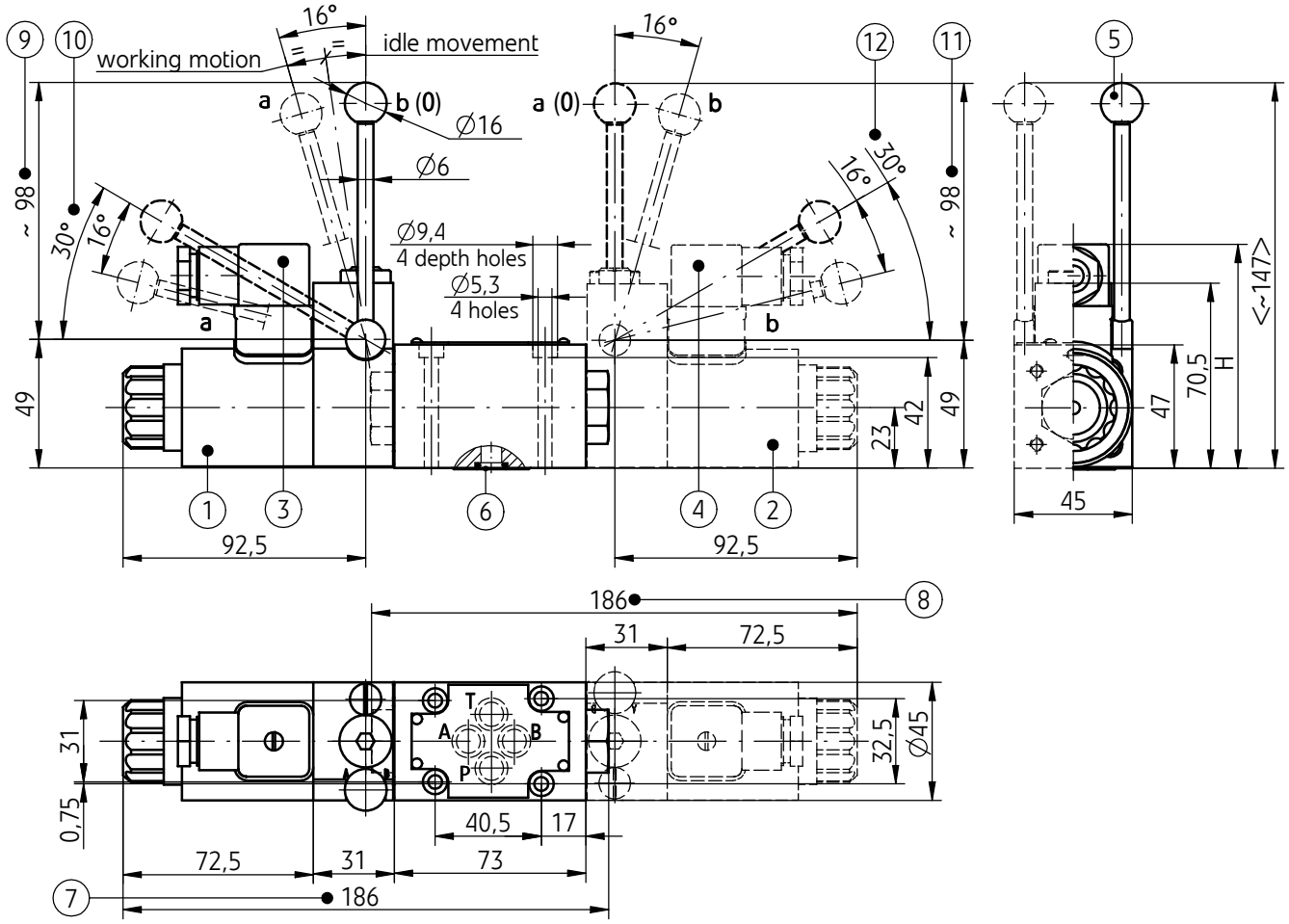
1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - Plug-in-connector on side **a** - type **ISO 4400** (DIN 43650 - A)
4 - Plug-in-connector on side **b** - type **ISO 4400** (DIN 43650 - A)
5 - Manual control lever
6 - O-ring **9,2 x 1,8** - 4 pcs/set
7 - Directional spool valve dimension with 2 solenoids on side **a**, **b**:
- 3-position directional spool valve springs centered versions WE6.../**...H**...; **...HS**... (spool diagrams: **E**, **F**, **G**, **H**, **J**, **L**, **M**, **P**, **U**, **W** - according to page 4
- 2-position directional spool valve without return springs versions WE6.../**O**...**H**...; .../**O**...**HS**...
- 2-position directional spool valve without springs and with detent versions WE6.../**OF**...**H**... .../**OF**...**HS**... (spool diagrams: **A**, **C**, **D** - according to page 5)

8 - Manual control lever positions in versions: WE6.../**...H**... WE6.../**O**...**H**... .../**OF**...**H**...
9 - Manual control lever positions in versions: WE6.../**...HS**... WE6.../**O**...**HS**... .../**OF**...**HS**...

NOTES:
The valve is switched by the manual control lever - item 5, return of the lever to the initial (neutral) state occurs automatically. After switching the valve by using the solenoid, the lever - item 5 remains inactive.

OVERALL AND CONNECTION DIMENSIONS

2-position versions WE6.../...H Z4...; ...HS Z4...



Option of connection **Z4...**	Control voltage	Dimension **H**
plug-in-connector **ISO 4400** (DIN 43650 - A)	**12V DC**, **24V DC**, **110V DC**	86
plug-in-connector **ISO 4400** (DIN 43650 - A) **with rectifier**	**110V AC**, **220V AC**, **230V AC**	93

NOTES:

- versions WE6.../...**H**... with other electrical connections, see page 11
- porting pattern and requirements of surface state of the subplate - as in version WE6.../...**Z4**..., see page 6

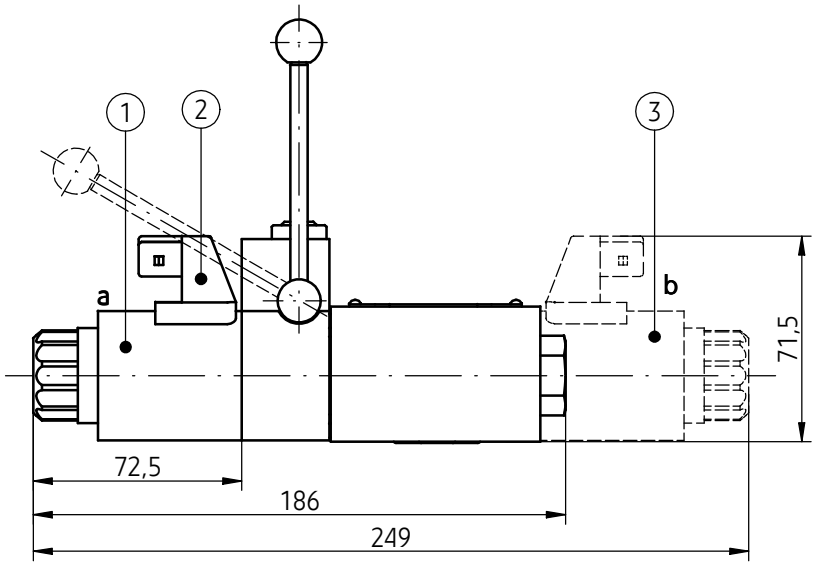
1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - Plug-in-connector on side **a** - type **ISO 4400** (DIN 43650 - A)
4 - Plug-in-connector on side **b** - type **ISO 4400** (DIN 43650 - A)
5 - Manual control lever
6 - O-ring **9,2 x 1,8** - 4 pcs/set
7 - Directional spool valve dimension with **1 solenoid** - on side **a**, **2-position with return spring** (spool diagrams: **A**, **C**, **D**, **D1**, **EA**, **FA**, **GA**, **HA**, **JA**, **LA**, **MA**, **PA**, **UA**, **WA** - according to pages 4, 5)
8 - Directional spool valve dimension with **1 solenoid** - on side **b**, **2-position with return spring** (spool diagrams: **B**, **Y**, **Y1**, **EB**, **FB**, **GB**, **HB**, **JB**, **LB**, **MB**, **PB**, **UB**, **WB** - according to pages 4, 5
9 - Manual control lever positions in versions: WE6.../...**H**... with **1 solenoid** - on side **a**
10 - Manual control lever positions in versions: WE6.../...**HS**... with **1 solenoid** - on side **a**
11 - Manual control lever positions in versions: WE6.../...**H**... with **1 solenoid** - on side **b**
12 - Manual control lever positions in versions: WE6.../...**HS**... with **1 solenoid** - on side **b**

NOTES:

The valve is switched by the manual control lever - item 5, return of the lever to the initial (neutral) state occurs automatically. After switching the valve by using the solenoid, the lever - item 5 remains inactive.

OVERALL AND CONNECTION DIMENSIONS

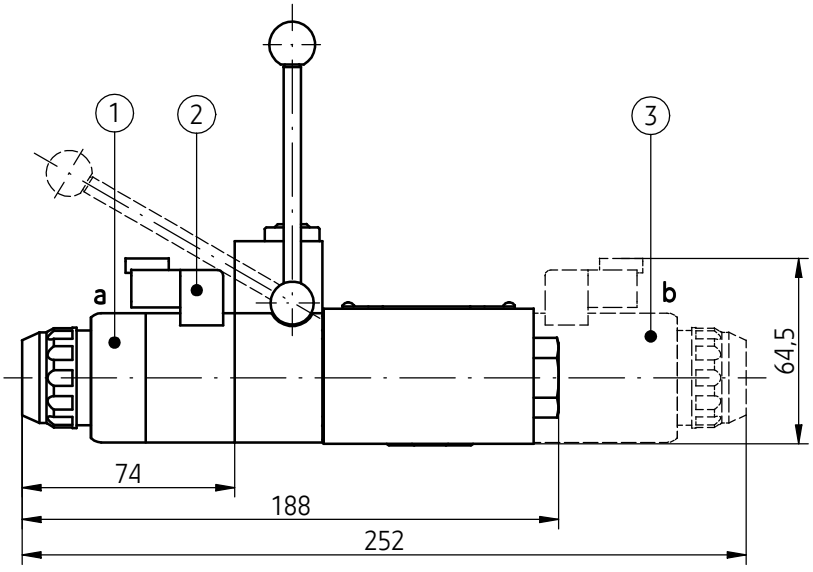
versions: **WE6.../...H...G12...J...**; **... H... G24...J...** (electrical connection type **AMP Junior Timer**)



NOTE:
Other dimensions, description of elements of the valve drawing, porting pattern and requirements of surface state of the subplate - as in version WE6.../...**H**...**Z4**..., see page 7

1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - **2-poles male AMP Junior Timer** type connector (plug-in connectors not shown in the drawing must be ordered separately - Data Sheet **WK 499 963**)

version WE6.../...H...G24...D... (electrical connection type **Deutsch**)



NOTE:
Other dimensions, description of elements of the valve drawing, porting pattern and requirements of surface state of the subplate - as in version WE6.../...**H**...**Z4**..., see page 7

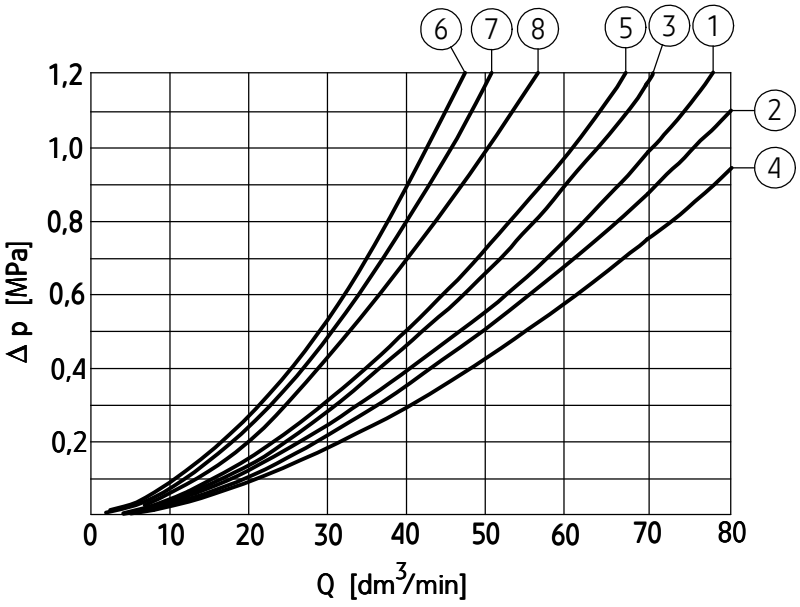
1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - **Deutsch DT04 - 2P** type connector (plug-in connectors **Deutsch DT06 - 2S** type not shown in the drawing must be ordered separately - Data Sheet **WK 499 963**)

PERFORMANCE CURVES

measured at viscosity ν = 41 mm^2/s and temperature t = 50°C

Flow resistance curves

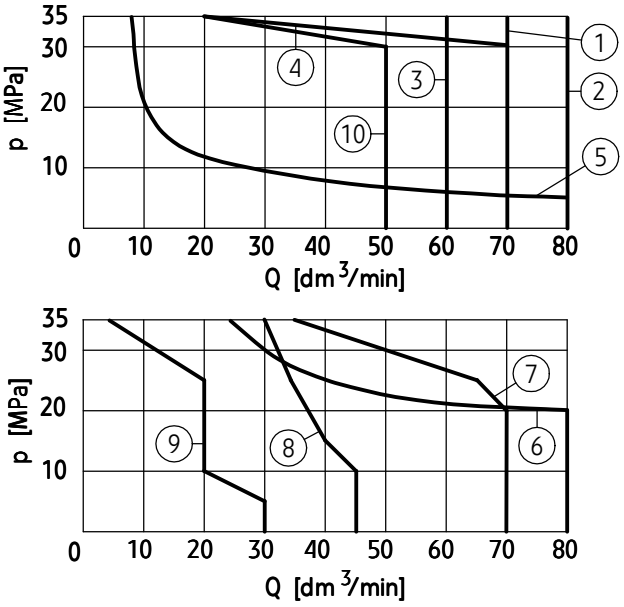
characteristic curves $\Delta p(Q)$ for directional spool valve type **WE6...** for various spool types



spool symbol	performance diagram number			
shifted positions diagrams according to pages 4, 5	flow direction			
	P → A	P → B	A → T	B → T
A, B	3	3	-	-
C	1	1	3	1
D, Y	5	5	3	3
E	3	3	1	1
F	2	3	3	5
G	7	7	6	6
H	2	4	2	2
J	1	1	2	1
L, W	1	1	2	2
M	2	4	3	3
P	2	3	3	5
U	3	1	3	3
D1	5	-	-	5
Y1	-	5	5	-
central position diagram according to page 4	flow direction			
	P → A P → B	P → T	A → T B → T	B → A
G	-	8	-	-

Operating limits

characteristic curves **p-Q** for directional spool valve type **WE6...** with **DC solenoids** for various spool types



spool symbol diagrams according to pages 4, 5	performance diagram number
E	1
H, M, L, U, C/OF, D/OF	2
C/O, D/O	3
C, D, Y	4
A, B	5
A/O	6
J	7
G	8
F, P	9
D1, Y1	10

NOTES:

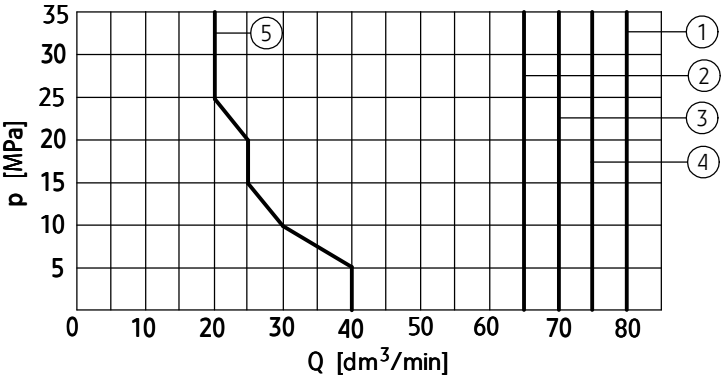
Above operating limits are related to symmetrical flow through all ports i.e. if the oil flows from port **P** to port **A**, then the same flow rate is from port **B** to port **T** (applied to directional control valves with 4 service ports). Degree of asymmetry affects adversely the parameters.

PERFORMANCE CURVES

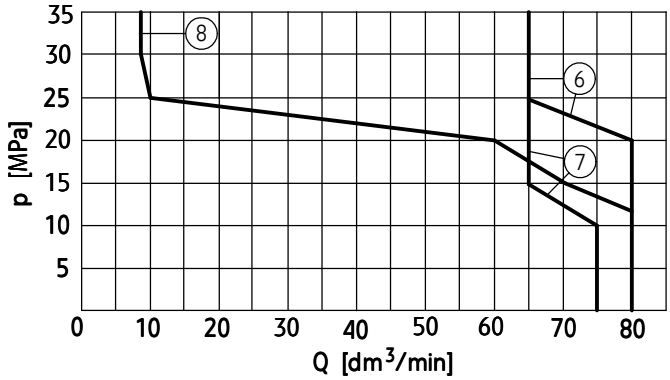
measured at viscosity $\nu = 41\ mm^2/s$ and temperature $t = 50^{\circ}C$

Operating limits

characteristic curves **p-Q** for directional spool valve type **WE6...** with **AC solenoids with direct supply** for various spool types



spool symbol diagrams according to pages 4, 5	performance diagram number
C, D, H, D/O, C/OF, D/OF	1
W	2
E	3
L	4
G	5
J	6
M	7
A	8



NOTES:

Above operating limits are related to symmetrical flow through all ports i.e. if the oil flows from port **P** to port **A**, then the same flow rate is from port **B** to port **T** (applied to directional control valves with 4 service ports). Degree of asymmetry affects adversely the parameters.

ACCESSORIES

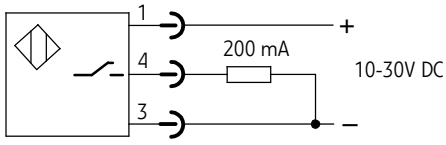
Spool position switch type S

Additional technical data

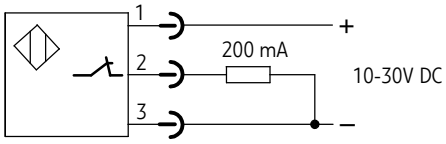
Inductive switch type S		
Versions	PNP inductive proximity switches normally closed - NC normally opened - NO	
Range of supply voltage for switch	10 - 30V DC	
Max load current	200 mA	
Connection type of switch	switch with M12x1 external thread; male connection; 4 contacts (pins)	
Degree of protection	IP 65	
Weight	directional valve with 1 solenoid and 1 switch	2,1 kg
	directional valve with 2 solenoids and 1 switch	2,7 kg
	directional valve with 2 solenoids and 2 switches	3,3 kg

Diagrams of electrical connection of inductive switch type S

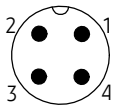
normally open (NO) - type S1



normally closed (NC) - typ S2



contact allocation (pins of switch connector)

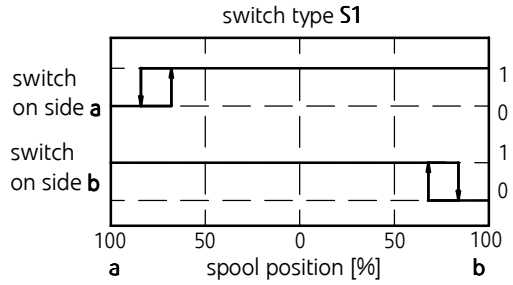


Diagrams for directional control valves and initial positions of switches

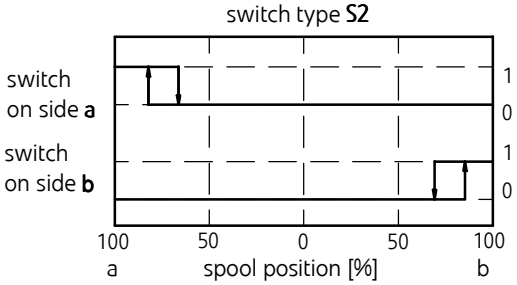
initial position of inductive switch type S depending on the spool position 0 - off neutral state on output coctact (NO - contact 4; NC - contact 2) 1 - on state on uotput contact (NO - contact 4; NC - contact 2)	diagram for directional control valve
3-position directional control valve	

position monitored a and b

switch type S1

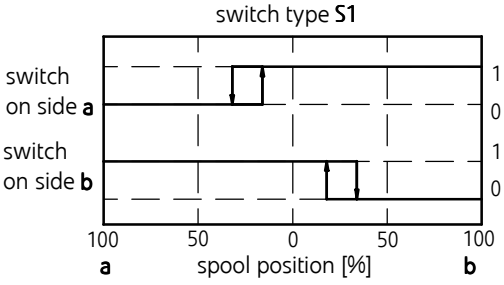


switch type S2

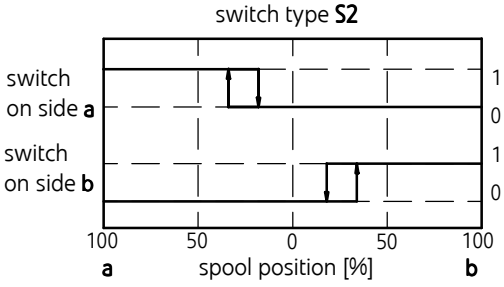


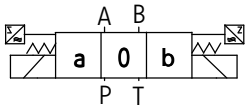
position monitored 0

switch type S1



switch type S2





ACCESSORIES

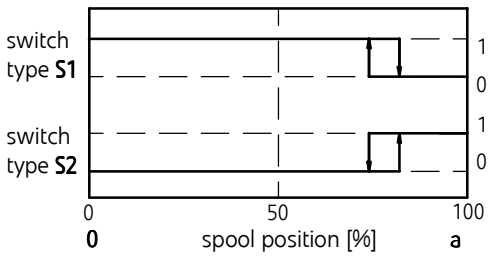
Spool position switch type S

initial position of inductive switch depending on the spool position

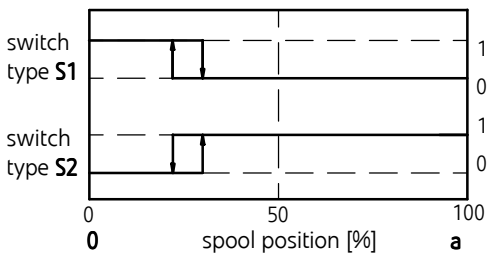
diagram for directional control valve

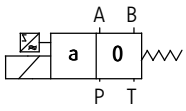
2-position versions WE6...**A**... (positions: **a**, **0**)
solenoid and switch on side a

position monitored **a**



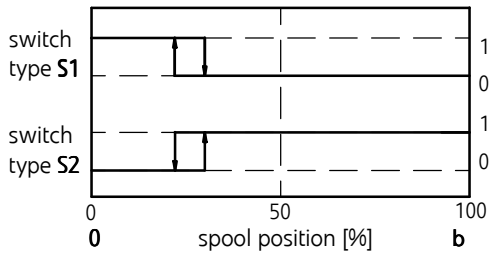
position monitored **0**



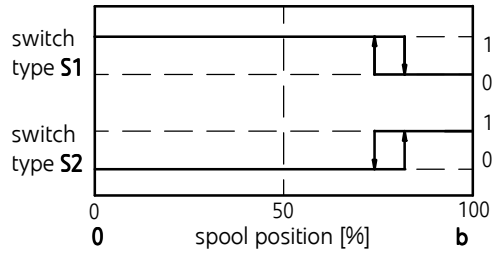


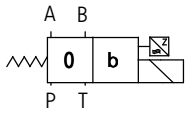
2-position versions WE6...**B**... (positions: **0**, **b**)
solenoid and switch on side b

position monitored **0**



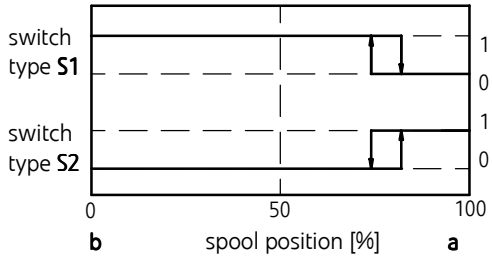
position monitored **b**



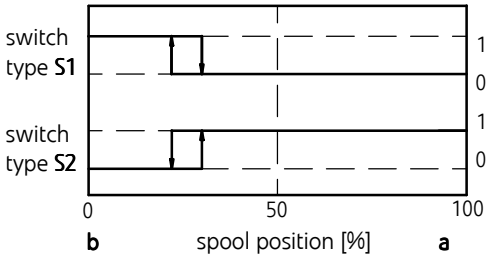


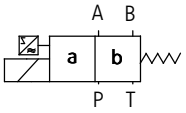
2-position versions WE6**A**...; ...**C**...; ...**D**...; .../**O**...; .../**OF**...
switch on side a

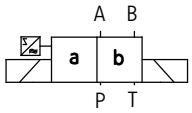
position monitored **a**

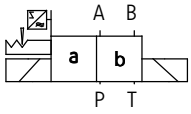


position monitored **b**



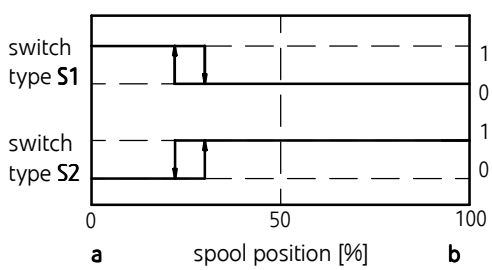




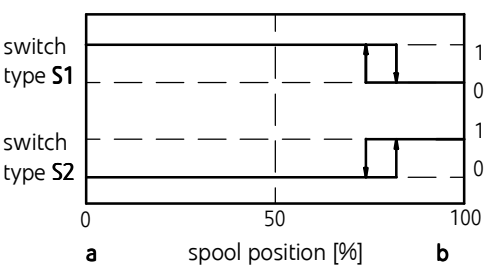


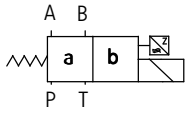
2-position versions WE6**B**...; ...**Y**...
switch on side b

position monitored **a**



position monitored **b**



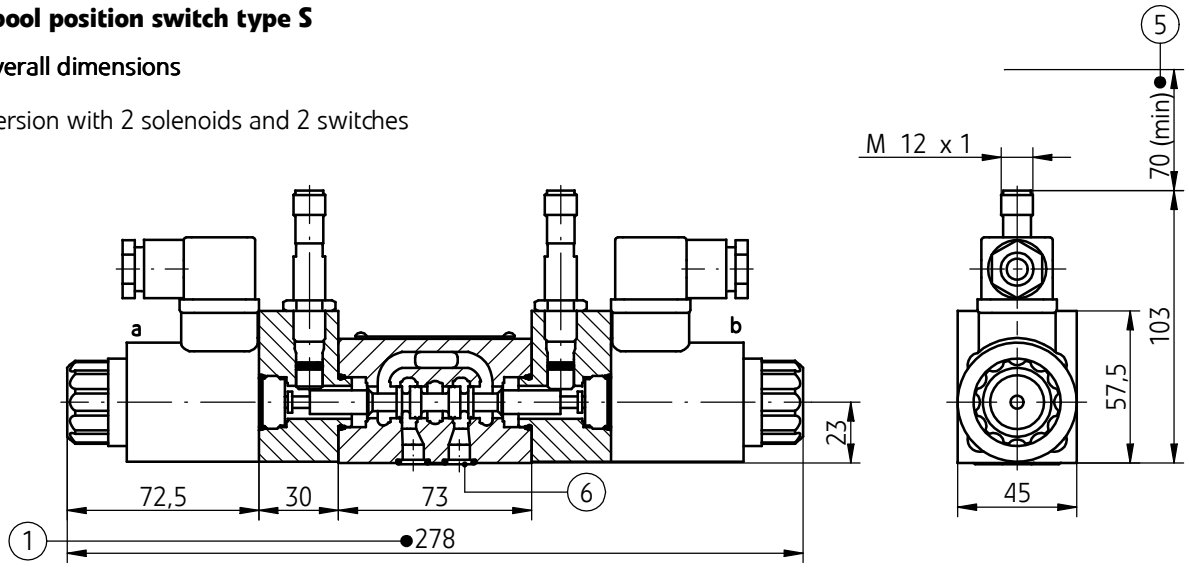


ACCESSORIES

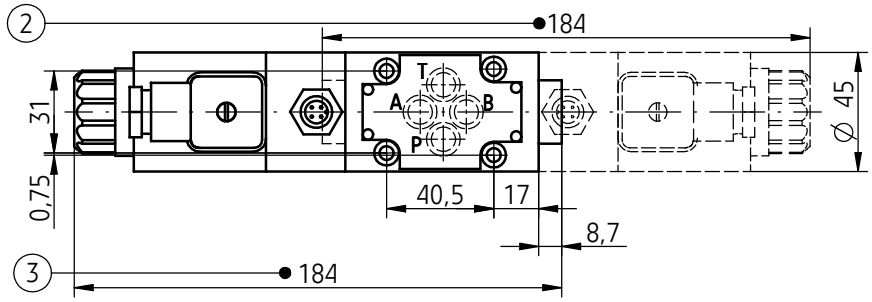
Spool position switch type S

Overall dimensions

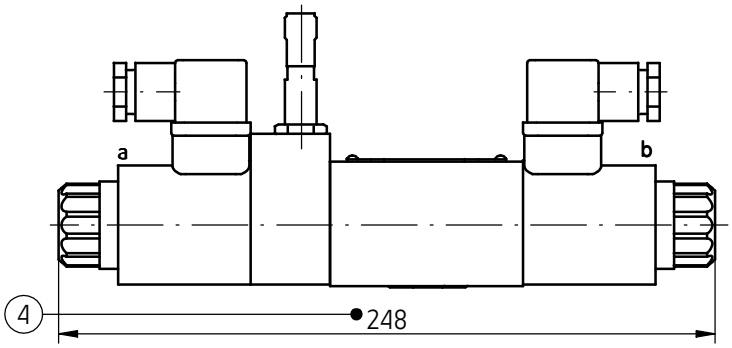
version with 2 solenoids and 2 switches



version with 1 solenoid and 1 switch



version with 2 solenoids and 1 switch



Requirements of surface state of the subplate - according to page 6

NOTES:

Directional control valve with spool position switch is adjusted. Any adjustments may be made only by the manufacturer.

In case of a faulty switch or valve complete directional control valve must be changed.

1 - Dimension of directional control valve with **2 solenoids** - on side **a**, **b** and **2 position switches**
- **3-position**, **springs centered**

versions WE6.../**...S1**...; ...**S2**... (spool diagrams: **E**, **F**, **G**, **H**, **J**, **L**, **M**, **P**, **U**, **W** - on page 4)

2 - Dimension of directional control valve with **1 solenoid -** on side **a** and **1 position switch**
- **2-position**, **with return spring**

versions WE6.../**...S1**...; ...**S2**... (spool diagrams: **A**, **C**, **D**, **D1**, **EA**, **FA**, **GA**, **HA**, **JA**, **LA**, **MA**, **PA**, **UA**, **WA** - on pages 4, 5)

3 - Dimension of directional control valve with **1 solenoid -** on side **b** and **1 position switch**
- **2-position**, **with return spring**

versions WE6.../**...S1**... ...**S2**... (spool diagrams: **B**, **Y**, **Y1**, **EB**, **FB**, **GB**, **HB**, **JB**, **LB**, **MB**, **PB**, **UB**, **WB** - on pages 4, 5)

4 - Dimension of directional control valve with **2 solenoids -** on side **a**, **b** and **1 position switch** on side **a**
- **2-position**, **without spring return**

versions WE6.../**O**...**S1**...; ...**S2**...
- **2-position**, **without spring return**, **with detent**

versions WE6.../**OF**...**S1**...; ...**S2**...
(spool diagrams: **A**, **C**, **D**, **D1** - on page 5)

5 - Distance for mounting plug-in-connector and cable of switch (plug-in-connectors not showed in the drawing must be ordered separately according to data sheet **WK 499 963**)

6 - **O - ring 9,2 x 1,8** - 4pcs/set (**P**, **T**, **A**, **B**)

ACCESSORIES

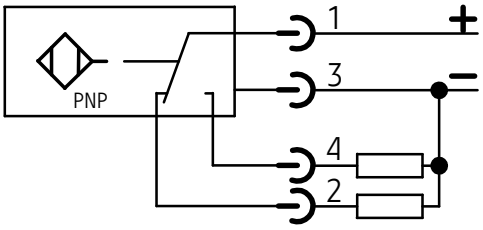
Spool position switch type M

(only for 2-position versions with return spring)

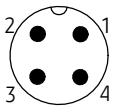
Additional technical data

Inductive switch type M	
	czujnik z 2 alternatywnymi wyjściami typu PNP: normally closed - contact 2 normally open - contact 4
Range of supply voltage for switch	20 - 32 VDC
Max load current	400 mA
Connection type of switch	switch with M12 x 1 external thread; 4 contacts (pins)
Degree of protection	IP 65
Weight (directional valve with switch)	1,8 kg

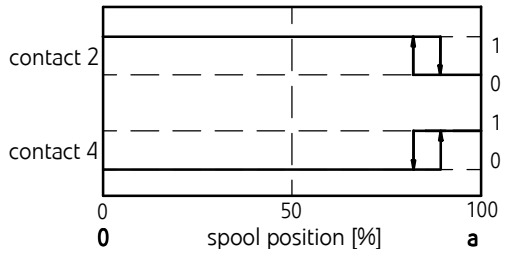
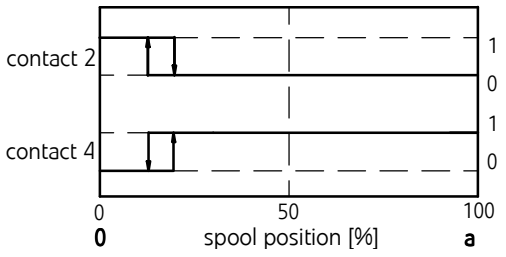
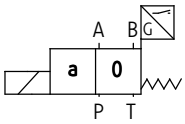
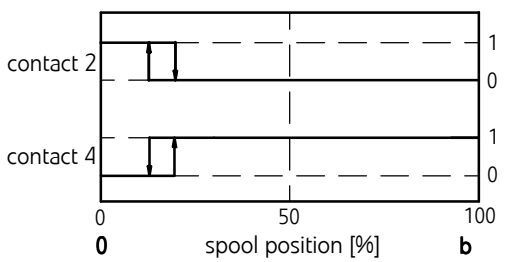
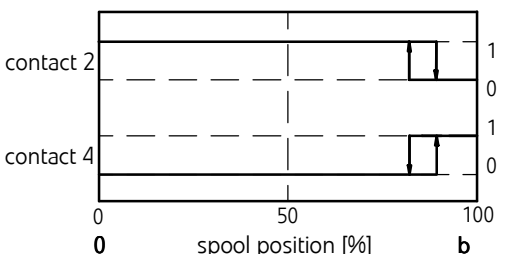
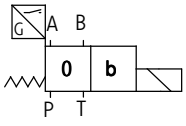
Diagram of electrical connection of inductive switch type M



contact allocation (pins of switch connector)



Diagrams for directional control valves and initial positions of switches

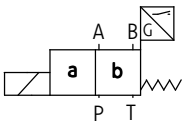
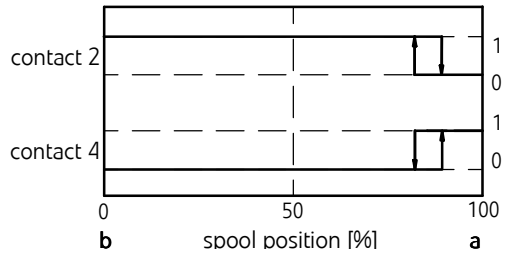
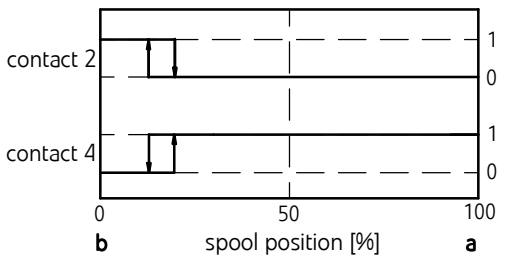
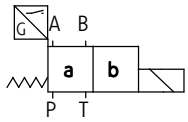
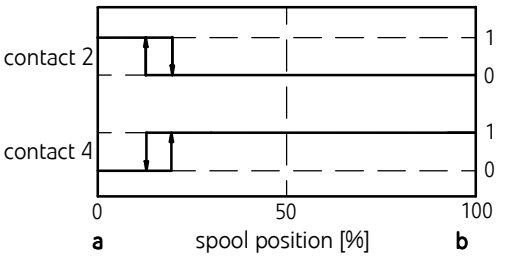
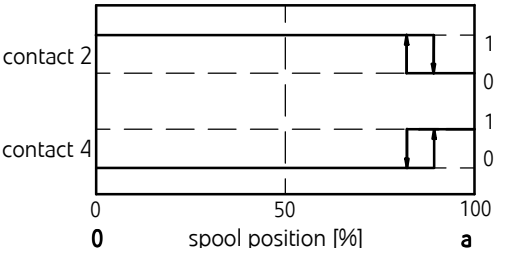
initial position of inductive switch type M depending on the spool position 0 - off neutral state on output coctact 1 - on state on uotput contact	diagram for directional control valve
2-position versions WE6...**A**... (positions: **a**, **0**) **solenoid on side a and switch on side b**	
position monitored **a**  	position monitored **0**  	
2-position versions WE6...**B**... (positions: **0**, **b**) **solenoid on side b and switch on side a**	
position monitored **0**  	position monitored **b**  	

ACCESSORIES

Spool position switch type M

(only for 2-position versions with return spring)

Diagrams for directional control valves and initial positions of switches

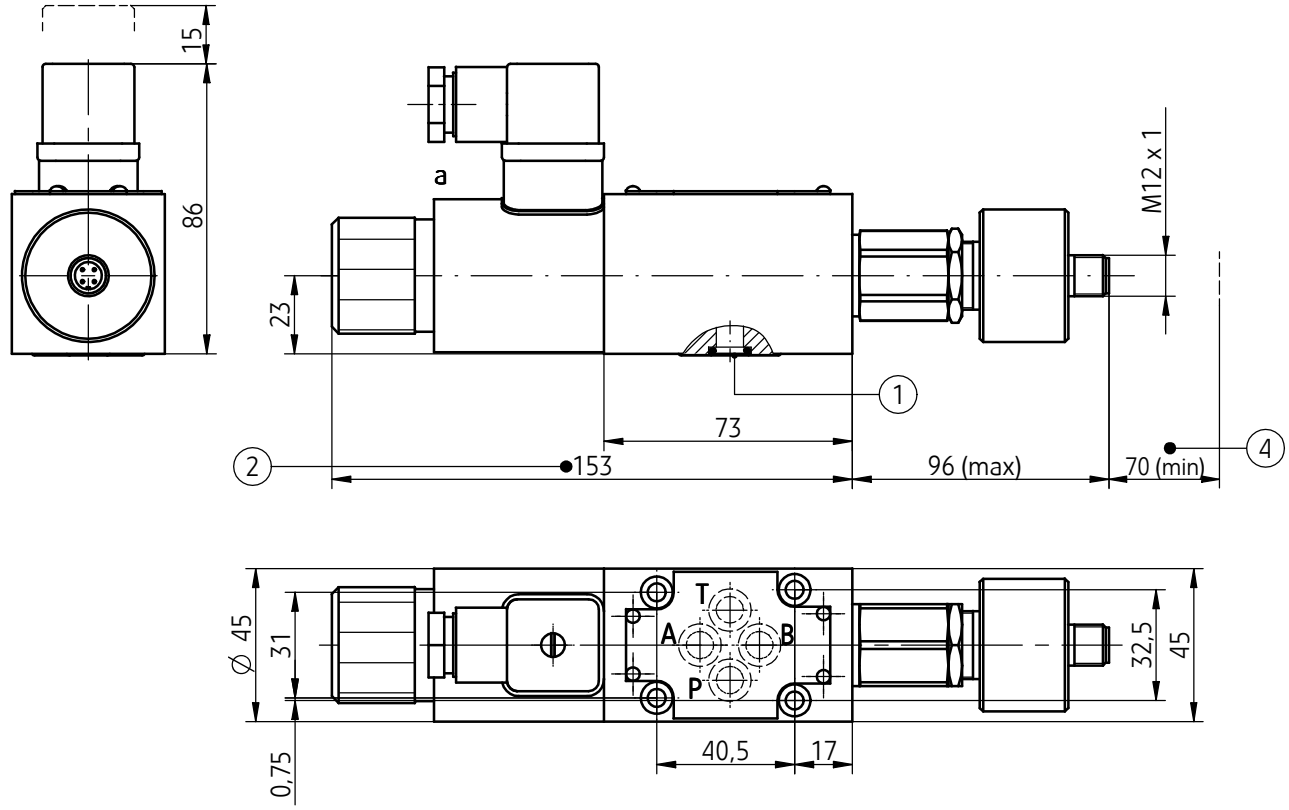
<table>
<tr><td colspan="2">initial position of inductive switch type M depending on the spool position
0 - off neutral state on output coctact
1 - on state on uotput contact</td><td>diagram for directional control valve</td></tr>
<tr><td colspan="2">2-position versions WE6A...; ...C...; ...D...; ...D1...
switch on side b</td><td rowspan="2"> 
</td></tr>
<tr><td>position monitored a
 
</td><td>position monitored b
 
</td></tr>
<tr><td colspan="2">2-position versions WE6B...; ...Y...; ...Y1...
switch on side a</td><td rowspan="2"> 
</td></tr>
<tr><td>position monitored a
 
</td><td>position monitored b
 
</td></tr>
</table>

ACCESSORIES

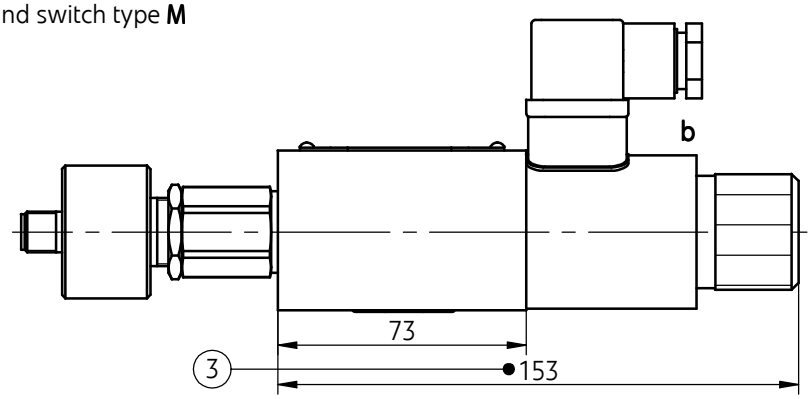
Spool position switch type M

Overall dimensions

version with solenoid on side **a** and switch type **M**



version with solenoid on side **b** and switch type **M**



Requirements of surface state of the subplate - according to page 6

NOTES:

Directional control valve with spool position switch is adjusted. Any adjustments may be made only by the manufacturer.

In case of a faulty switch or valve complete directional control valve must be changed.

1 - **O-ring 9,2 x 1,8** - 4 pcs/set (**P**,**T**, **A**, **B**)

2 - Dimension of directional control valve **2-position**, **with return spring** with **1 solenoid** - on side **a** and switch type **M** (spool diagrams: **A**, **C**, **D**, **D1**, **EA**, **FA**, **GA**, **HA**, **JA**, **LA**, **MA**, **PA**, **UA**, **WA** - on page 4, 5)

3 - Dimension of directional control valve **2-position**, **with return spring** with **1 solenoid** - on side **b** and switch type **M** (spool diagrams: **B**, **Y**, **Y1**, **EB**, **FB**, **GB**, **HB**, **JB**, **LB**, **MB**, **PB**, **UB**, **WB** - on page 4, 5)

4 - Distance for mounting plug-in-connector and cable of switch (plug-in-connectors not showed in the drawing must be ordered separately according to data sheet **WK 499 963**)

HOW TO ORDER

	WE	6		/					

Number of service ports
3-way - only for spools **A**, **B** = **3**
4-way - for the other spools = **4**

Nominal size (NS)
NS6 = **6**

Spool symbol
spool diagrams - according to **page 4**, **5**

Series number
(30-39) - connection and installation dimensions unchanged = 3X
series 32 = **32**

Spool positioning
spring centering = **no designation**
without springs return (only fo spools **A**, **C**, **D**) = O
without springs return with detent(only fo spools **A**, **C**, **D**) = OF

Control voltage for solenoids
12V DC = G12
24V DC = **G24**
110V DC = G110
110V AC 50Hz (plug-in-connector with rectifier) = W110R
220V AC 50Hz (plug-in-connector with rectifier) = W220R
230V AC 50Hz (plug-in-connector with rectifier) = **W230R**
230V AC 50 Hz (direct supply with AC current) = W230-50

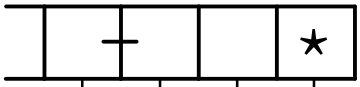
Manual override
solenoids with manual override = **N**
solenoids without manual override (only for version with inductive switch type M) = no designation

Manual lever control
no manual control lever = **no designation**
with a manual control lever psitioned vertically = H
with a manual control lever psitioned at an angle = HS

Electrical connection
plug-in-connector type ISO 4400 (DIN 43650 - A) **without LED** = **Z4**
plug-in-connector type ISO 4400 with LED = Z4L
withoput plug-in-connector, with 2-poles male **AMP Junior Timer** type connector (exists for ...**G12**... and ...**G24**... options only) = J
withoput plug-in-connector, with **DEUTSCH** type connector (exists for ...**G24**... option only) = D

Throttle insert (in port **P**)
without throttle insert = **no designation**
throttle insert ϕ 0,8 = B 08
throttle insert ϕ 1,0 = B 10
throttle insert ϕ 1,2 = B 12

HOW TO ORDER



Further requirements in clear text
(to be agreed with the manufacturer)

Monitored position of the spool

monitored position **0** - **zero** *(3- position and 2- position versions with positions (**a**, **0**) or (**0**, **b**))*	= 0
monitored position **a** *(2- position versions with positions (**a**, **0**) or (**a**, **b**))*	= A
monitored position **b** *(2- position versions with positions (**0**, **b**) or (**a**, **b**)*	= B
monitored position **a** and **b** *(3- position versions)*	= AB

Spool position switch

spool position switch type **S1**	= S1
spool position switch type **S2**	= S2
spool position switch type M (only for 2-positions versions with return spring)	**=** M

NOTES:
Optional version with a spool position switch and a manual control lever (options ...**H**...; ...**HS**...) available after consultation with the manufacturer.

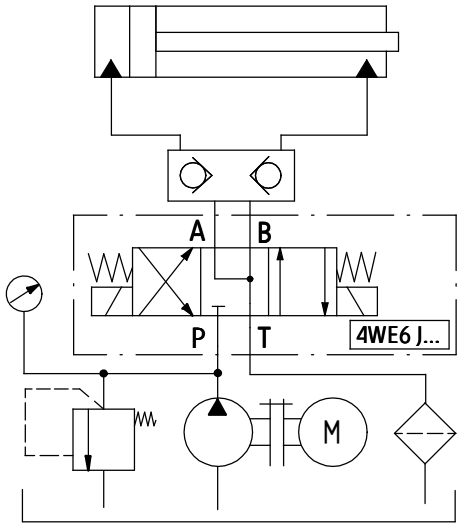
Sealing

NBR (for fluids on mineral oil base)	= **no designation**
FKM (for fluids on phosphate ester base)	= V

NOTES:

Directional spool valve should be ordered according to the above coding.
The symbols in bold are preferred versions in short delivery time.
Coding example: 4WE6 E - 32/G24 N Z4 B08 S1 - AB

EXAMPLE OF APPLICATION IN HYDRAULIC SYSTEM



SUBPLATES AND FIXING SCREWS

Subplates must be ordered according to catalogue sheet **WK 496 480**. Subplate symbols:
G 341/01 - threaded connections G 1/4
G 342/01 - threaded connections **G 3/8**
G 502/01 - threaded connections G 1/2
G 341/02 - threaded connections M14 x 1,5
G 342/02 - threaded connections M16 x 1,5

Subplates and screws fixing directional valve **M5 x 50 - 10,9** in accordance with **PN - EN ISO 4762** - 4 pcs/set) must be ordered separately.
Tightening torque **Md = 9 Nm**
The subplate symbol in bold is the preferred version available in short delivery time.

PONAR Wadowice S.A.
ul. Wojska Polskiego 29
34-100 Wadowice
tel. +48 33 488 21 00
fax.+48 33 488 21 03
www.ponar-wadowice.pl

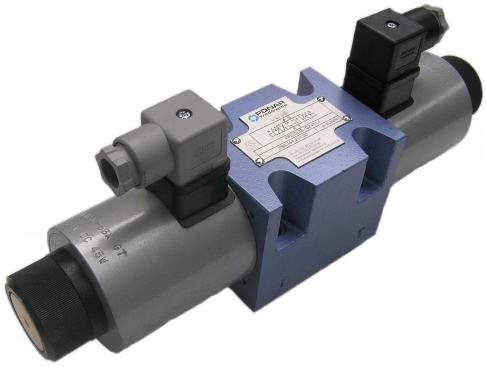
PONAR wadowice	Directional spool valve type WE10 electrically operated			WK 427 700
	NS 10	up to 35 MPa	up to 160 dm³/min	05.2017

DATA SHEET - OPERATION MANUAL

APPLICATION

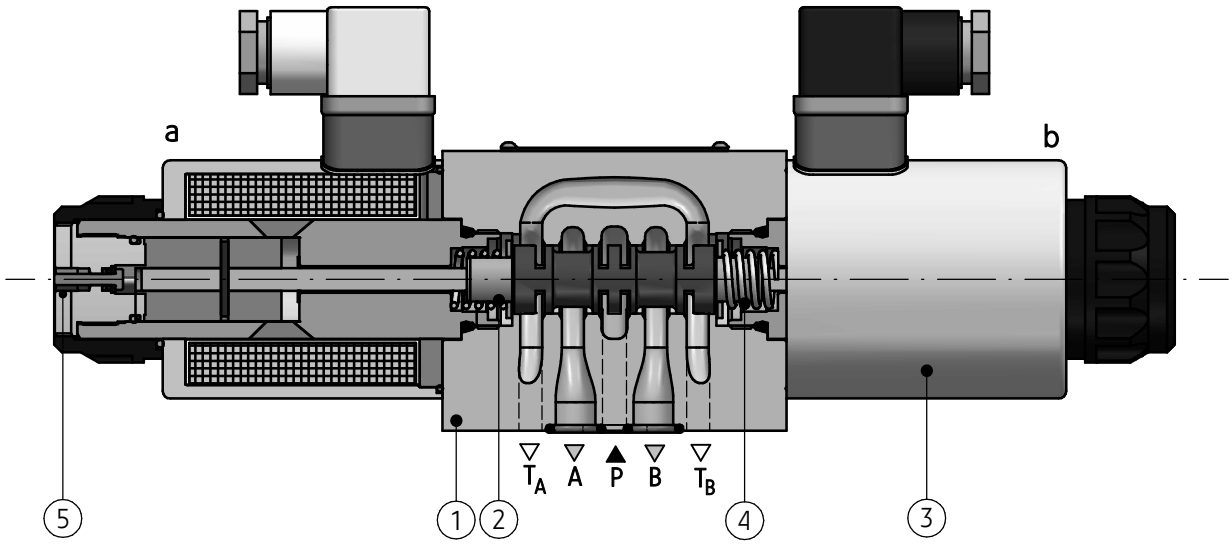
Directional spool valves type **WE10**... electrically operated are intended for change in direction of fluid flow in a hydraulic system and thus it allows to change direction of movement of a receiver - mostly piston rod of a cylinder or hydraulic motor as well to use functions: *on* and *off*. These directional spool valves are used for subplate mounting in any position in a hydraulic system.

The product is compliant with the regulations of directive 2014/35/UE.



DESCRIPTION OF OPERATION

4WE10G - 62/G24NZ4

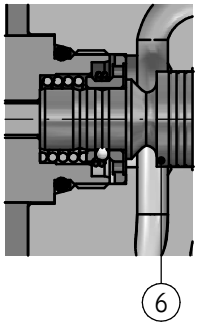


Main elements of directional spool valve type **WE10**... are: housing (1), solenoids (3), control spool (2), centering springs (4) and manual overrides (5). The spool (2) is shifted when it is moved into one of end positions by the force of solenoid (3) affecting it. The return of the spool into neutral position and centering are secured by the centering springs (4). The shape of the spool (control edge spacing) affects the configuration of connections among the ports: **A**, **B**, **P** and **T**. Function of ports:

P - supply port
T - oil return to the tank
A, B - ports for a receiver

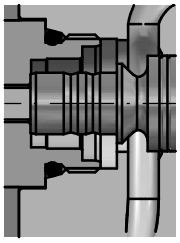
In case of emergency, the spool can be shifted manually by means of the override (5) - only for version with manual override.

When the situation is anticipated, directional spool valve must be mounted in the way as to be available.

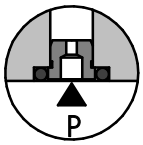


Version WE10.../**OF**...- only for spools: **A**, **C**, **D**, **EA**, **GA**, **HA**, **JA**, **EB**, **GB**, **HB**, **JB**. 2-position directional spool valve without return springs with detent. The spool (2) is positioned and supported with detent (6), and its shift results from supplying voltage to one solenoid (3).

DESCRIPTION OF OPERATION



Version WE10…/**O**…- only for spools: **A**, **C**, **D**. **EA**, **GA**, **HA**, **JA**, **EB**, **GB**, **HB**, **JB**.
2-position directional spool valve without return springs. The spool is positioned and supported with attached solenoid. There is no neutral position as the spool is not positioned.



Version WE10…/…**B**… - directional spool valve designation like that, has throttle insert in port **P**.

TECHNICAL DATA

Hydraulic fluid	mineral oil					
Required fluid cleanliness class	**ISO 4406 class 20/18/15**					
Nominal fluid viscosity	37 mm ^{2}/s at temperature 55 ^{o}C					
Viscosity range	2,8 up to 380 mm ^{2}/s					
Fluid temperature range (in a tank)	recommended	40^{o}C up to 55^{o}C				
	max	-20^{o}C up to +70^{o}C				
Ambient temperature range	- 20^{o}C up to +50^{o}C					
Maximum operating pressure	**ports P, A, B**	**35 MPa**				
	port T	**21 MPa**				
Flow section in central position diagrams on page 4	spool symbol	**Q**	**W**	**V**		
	flow direction	**A → T** **B → T**	**A → T** **B → T**	**A → T** **B → T**	**P → A** **P → B**	
	flow section	5,5 mm^2	2,5 mm^2	11 mm^2	10 mm^2	
Weight	with 1 solenoid	WE10...- 4,6 kg		WE10...**H**...- 7,1 kg		
	with 2 solenoids	WE10...- 6,2 kg		WE10...**H**...- 8,7 kg		
Supply voltage of solenoids	**DC**		**AC** (plug-in connector with rectifier)			**AC** direct supply
	12V	**24V**	**110V**	**230V**-50Hz	**220V**- 50Hz	**110V**- 50Hz	**230V**- 50Hz
Supply voltage tolerance	±10%					±10%
Power requirement (DC)	45 W					
Holding power (AC)	–					110 VA
Switch-on power (AC)	–					460 VA
Switching time	ON up to 60 ms					ON up to 45 ms
	OFF up to 40 ms					OFF up to 30 ms
Maximum switching frequency	15000 on/h					12000 on/h
Degree of protection	**IP 65**					
Solenoid coil temperature	max 150 ^{o}C					

INSTALLATION AND OPERATION REQUIREMENTS

1. Only fully functional and operational valve, properly connected to electrical installation must be used. Connecting or disconnecting the valve to an electrical installation must only be carried out by qualified personnel.
2. Ground connection (⏚) must be connected with protective earth wire (PE ⏚) in supply system according to appropriate instructions.
3. Solenoid plug shall precisely adhere to socket and shall be secured with thread bolt screwed in securely in a place. It is forbidden to operate the valve if the tightness and suitable clamp of cable in the plug gland are not ensured.
4. For the …W230 - 50… versions, simultaneous joining of two solenoids of the same valve should not be permitted (partial overriding of the valve can overheat and damage the winding coils).
5. During the period of operation must be kept fluid viscosity acc. to requirements defined in this Data Sheet - Operation Manual
6. In order to ensure failure free and safe operation the following must be checked:
   - condition of the electrical connection
   - proper working of the valve
   - cleanliness of the hydraulic fluid
7. Due to heating of solenoid coils to high temp., the valve shall be placed in such way to eliminate the risk of accidental contact with solenoid during operation or to apply suitable covers acc. to European standards: PN - EN ISO 13732 - 1 and PN - EN 4413.
8. In order to provide proper tightness of the valve connection to the hydraulic system, one should keep the dimensions of the sealing rings, tightening torques values and valve operation parameters, specified in this Data Sheet - Operation Manual.
9. Valve with spool position sensor is adjusted at factory and it is not allowed to change its settings. In case of any damages of the sensor or valve one must change complete valve. Inductive sensors cannot be joined in series.
10. A person that operates the valve must be thoroughly familiar with this Data Sheet - Operation Manual.

DIAGRAMS

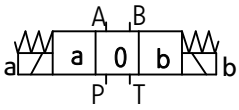
Diagrams for 3-position directional spool valves

Diagrams for 2-position directional spool valves

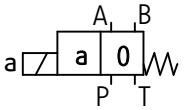
versions with positions a, 0

versions with positions 0, b

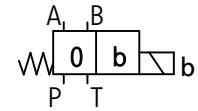
WE10.../...



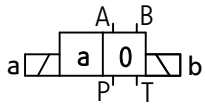
WE10...A /...



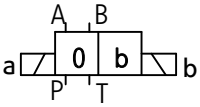
WE10...B/...



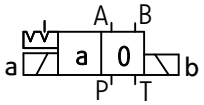
WE10...A/O...*



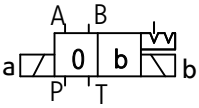
WE10...B/O...*



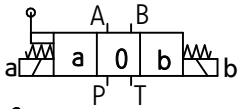
WE10...A/OF...*



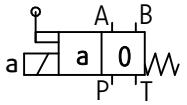
WE10...B/OF...*



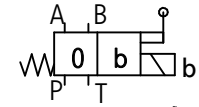
WE10.../...H...



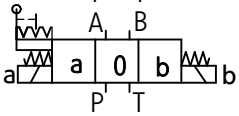
WE10...A/...H...



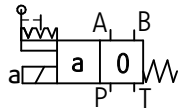
WE10...B/...H...



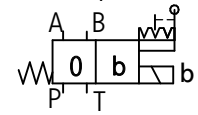
WE10.../...HF...



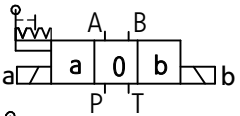
WE10...A/...HF...



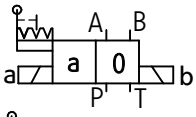
WE10...B/...HF...



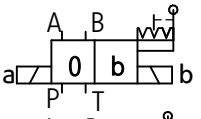
WE10.../O...HF...



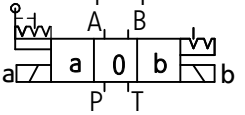
WE10...A/O...HF...*



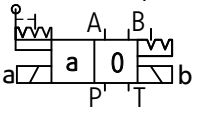
WE10...B/O...HF...*



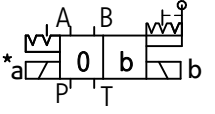
WE10.../OF...HF...



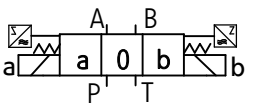
WE10...A/OF...HF...*



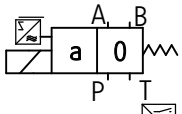
WE10...B/OF...HF...*



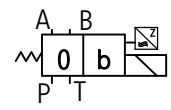
WE10.../... - S...



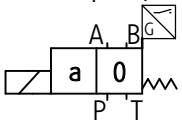
WE10...A/... - S...



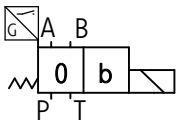
WE10...B/... - S...



WE10...A /... - M



WE10...B/... - M

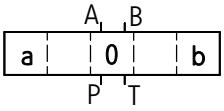
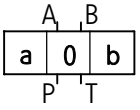
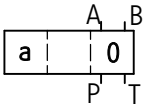
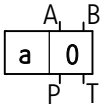
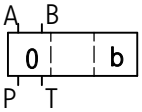
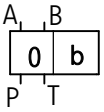
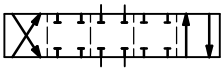
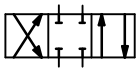
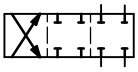
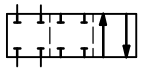
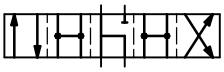
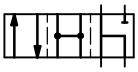
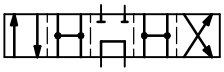
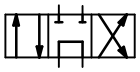
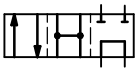
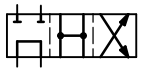
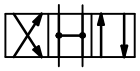
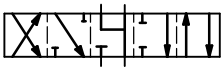
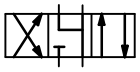
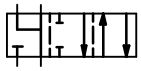
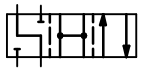
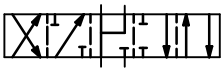
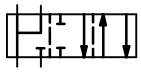
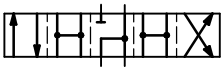
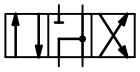
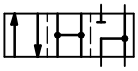
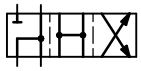
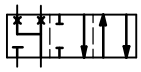
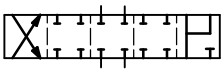
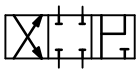
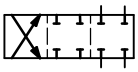
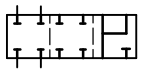
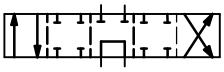
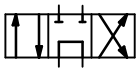
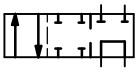
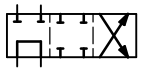
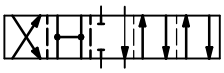
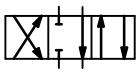
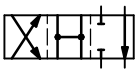
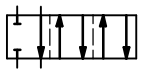
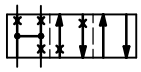
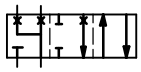


NOTE:

(*) - versions available only with spools - diagrams: E, G, H, J, E, G, H, J - acc. to page 4.

DIAGRAMS

Diagrams for spools

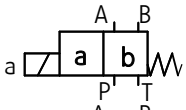
working and indirect positions	working positions	working and indirect positions	working positions	working and indirect positions	working positions
					
	 E		 EA		 EB
	 F		 FA		 FB
	 G		 GA		 GB
	 H		 HA		 HB
	 J		 JA		 JB
	 L		 LA		 LB
	 M		 MA		 MB
	 P		 PA		 PB
	 Q*		 QA*		 QB*
	 R		 RA		 RB
	 T		 TA		 TB
	 U		 UA		 UB
	 V*		 VA*		 VB*
	 W*		 WA*		 WB*

NOTE:
(*) - flow section in initial position for spools: **Q**, **V**, **W** - according to page 2.

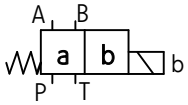
DIAGRAMS

Diagrams for 2-position directional spool valves
versions with positions **a**, **b**

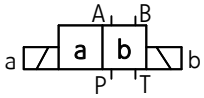
WE10.../**...**



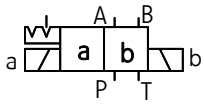
WE10.../**...**



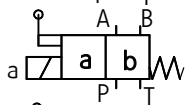
WE10.../**O**...*



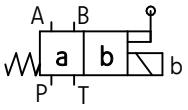
WE10.../**OF**...*



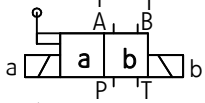
WE10.../**...H**...



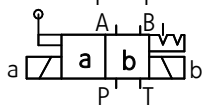
WE10.../**...H**...



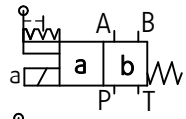
WE10.../**O...H**...*



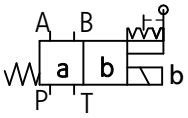
WE10.../**OF...H**...*



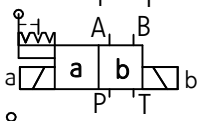
WE10.../**...HF**...



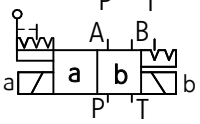
WE10.../**...HF**...



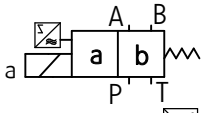
WE10.../**O...HF**...*



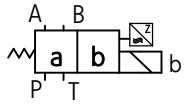
WE10.../**OF...HF**...*



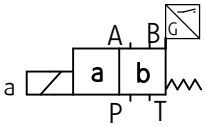
WE10.../**...**- S...



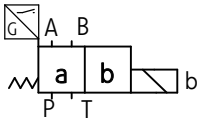
WE10.../**...**- S...



WE10.../**...**- M...



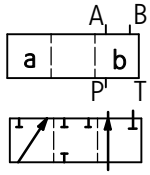
WE10.../**...**- M...



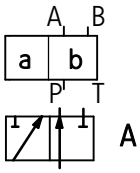
NOTE:
(*) - versions available only with spools - diagrams: **A**, **C**, **D**

Diagrams for spools

working and indirect positions

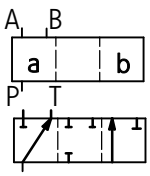


working positions

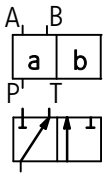


A

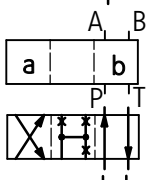
working and indirect positions

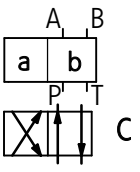


working positions

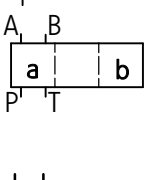


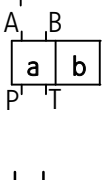
B

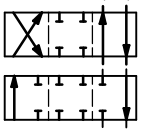




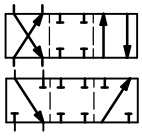
C



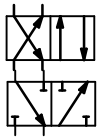




D



Y

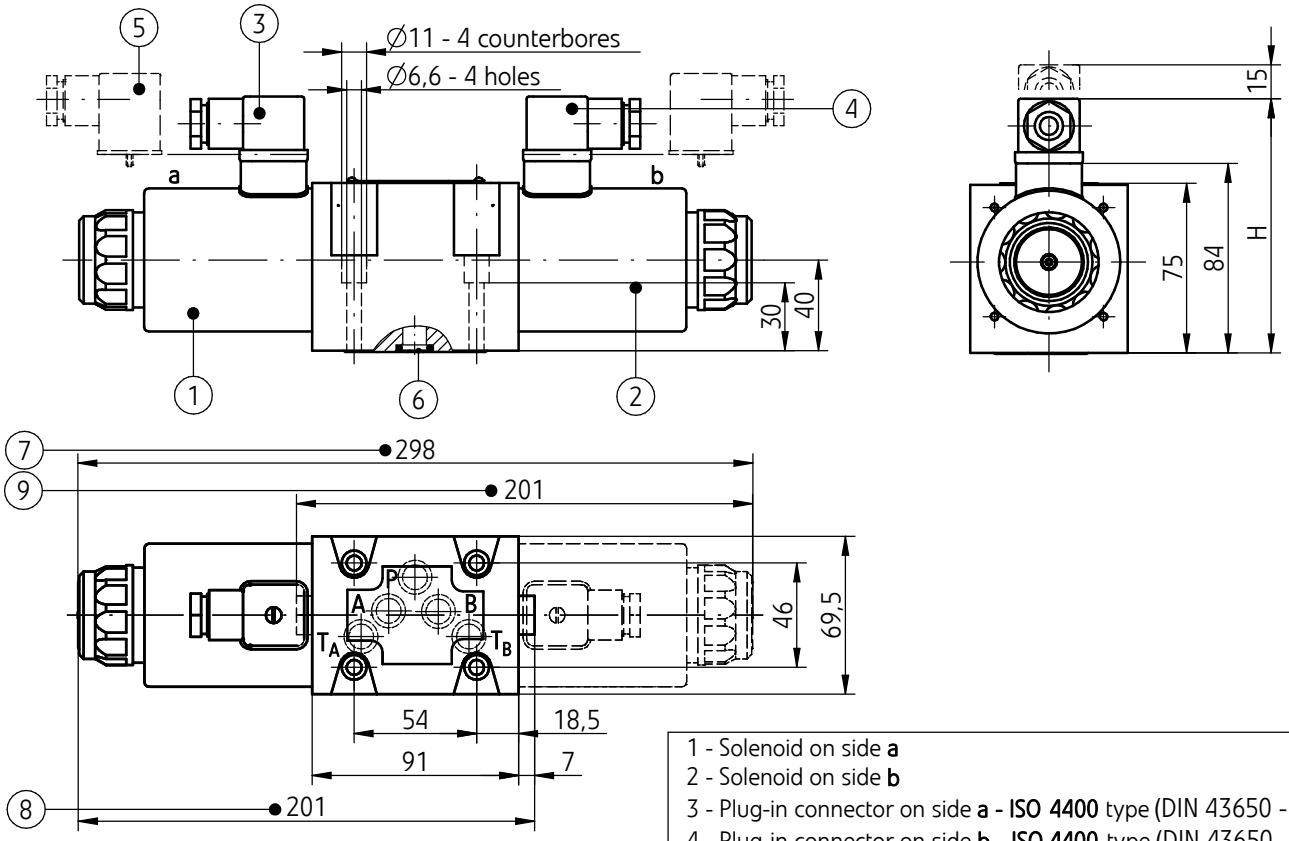


D1

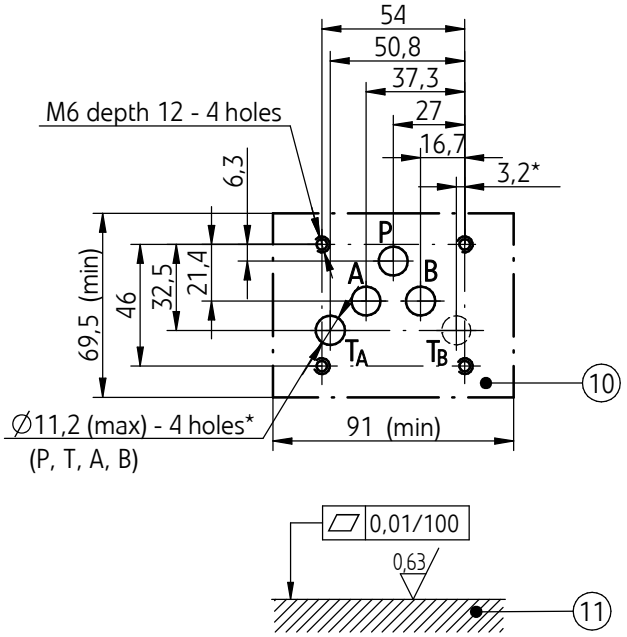
Y1

OVERALL AND CONNECTION DIMENSIONS

version WE10.../...Z4... (electrical connection type ISO 4400)



Option of electrical connection ...Z4... (ISO 4400)		H
plug-in connector ISO 4400 (DIN 43650 - A)	control voltage (DC) 12V, 24V, 110V	112
plug-in connector ISO 4400 (DIN 43650 - A) with rectifier	control voltage (AC) 110V, 220V, 230V	119



1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - Plug-in connector on side **a - ISO 4400** type (DIN 43650 - A)
4 - Plug-in connector on side **b - ISO 4400** type (DIN 43650 - A)
5 - Plug-in connector - **ISO 4400** type (DIN 43650 - A) with rectifier
6 - **O-ring 12,42 x 1,78** - 5 pcs/set (P, T_A, T_B, A, B)
7 - Directional spool valve dimension with **2 solenoids** on side **a**, **b**:
- **3-position directional spool valve springs centered** (spool diagrams: **E**, **F**, **G**, **H**, **J**, **L**, **M**, **P**, **Q**, **R**, **T**, **U**, **V**, **W** - according to page 4
- **2-position directional spool valve without return springs**
- **2-position directional spool valve without springs and with detent** (versions WE10 .../**O**...; .../**OF**...; spool diagrams: **A**, **C**, **D**, **EA**, **GA**, **HA**, **JA**, **EB**, **GB**, **HB**, **JB** - according to pages 4, 5)

8 - Directional spool valve dimension with **1 solenoid -** on side **a**
- **2-position springs centered** (spool diagrams: **A**, **C**, **D**, **D1**, **EA**, **FA**, **GA**, **HA**, **JA**, **LA**, **MA**, **PA**, **QA**, **RA**, **TA**, **UA**, **VA**, **WA** - according to pages 4, 5)

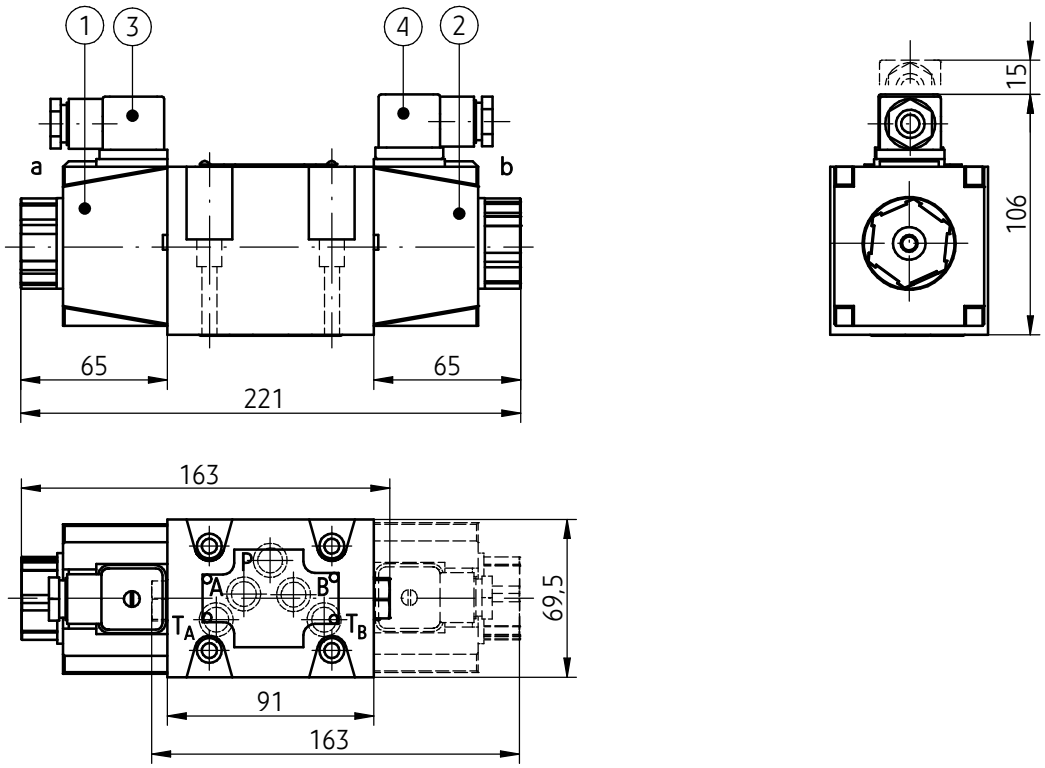
9 - Directional spool valve dimension with **1 solenoid -** on side **b**
- **2-position springs centered** (spool diagrams: **B**, **Y**, **Y1**, **EB**, **FB**, **GB**,**HB**, **JB**, **LB**, **MB**, **PB**, **QB**, **RB**, **TB**, **UB**, **VB**, **WB** - according to pages 4, 5

10 - Porting pattern for directional spool valve - configuration of connection holes in accordance with the standard **ISO 4401*** - designation **ISO 4401-05**-04-0-94 (CETOP 05)
(*) - connection with 1 hole **T** from the side of the hole **A** or **B** is enough - holes T_A and T_B are connected with the port in the housing of directional spool valve;
fixing screws **M6 x 40 - 10.9** - in accordance with **PN-EN ISO 4762** - 4 pcs/set; must be ordered separately; tightening torque **Md = 15 Nm.**

11 - Subplate surface required

OVERALL AND CONNECTION DIMENSIONS

version WE10.../...W230-50...Z4... (AC solenoids; electrical connection type **ISO 4400**)



NOTES:

- other dimensions, description of other elements of the valve drawing; porting pattern and requirements of the surface state of the subplate - as in version WE10.../...**Z4**... with DC solenoids, see page 6
- details for version WE10.../...**W230-50**...**H** Z4... (with manual control lever) as in versions WE10.../...**H**...Z4... with DC solenoids, see page 8 - 11

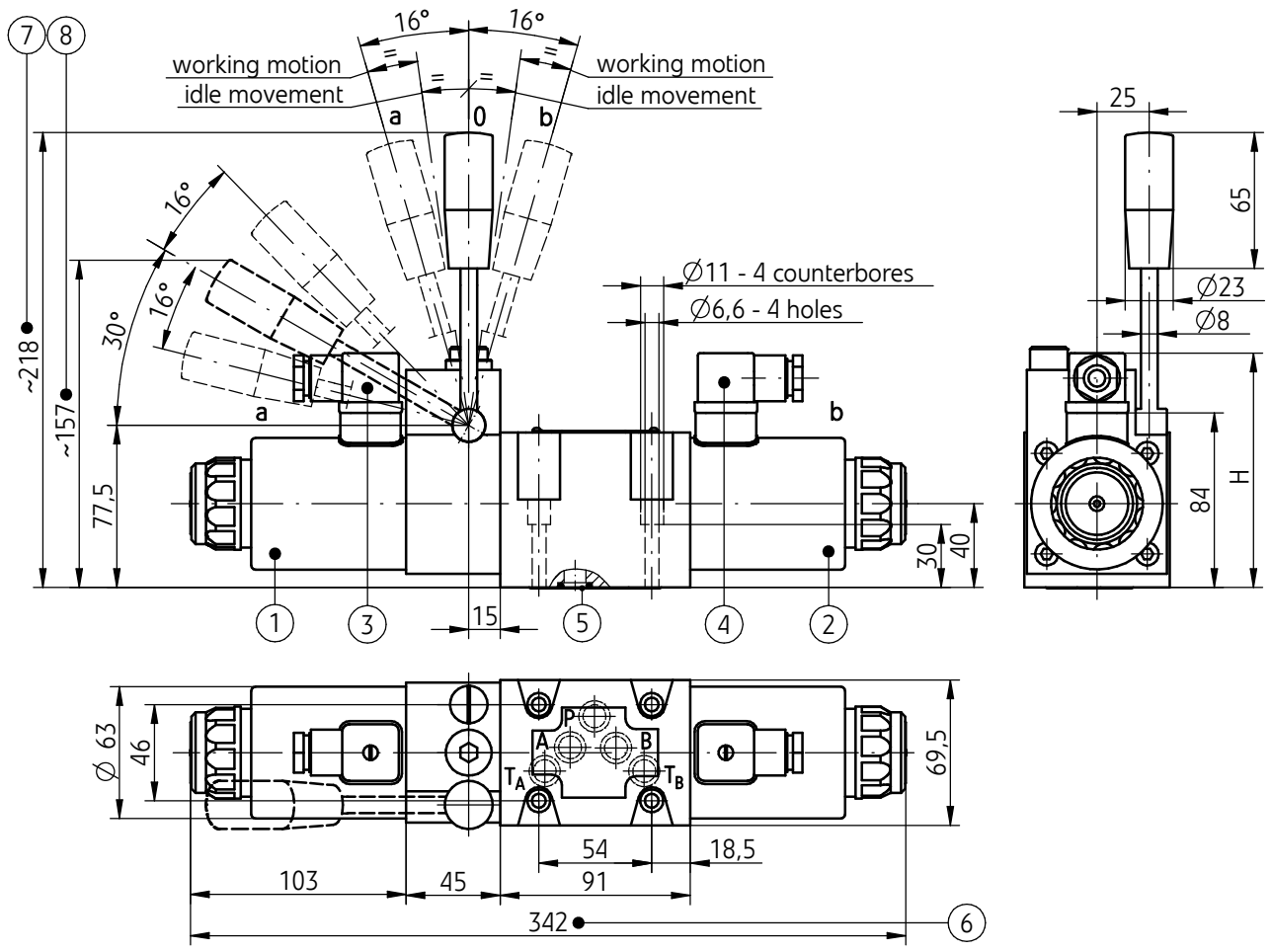
1 - **AC** solenoid (with direct supply) from the **a** side
2 - **AC** solenoid (with direct supply) from the **b** side
3 - Plug-in connector on side **a** - type **ISO 4400** (DIN 43650 - A)
4 - Plug-in connector on side **b** - type **ISO 4400** (DIN 43650 - A)

NOTE:

simultaneous joining of two solenoids of the same valve should not be permitted (partial overriding of the valve can overheat and damage the winding coils)

OVERALL AND CONNECTION DIMENSIONS

3-position versions WE10.../**...**H Z4...; .../**...**HS Z4...
2-position versions WE10.../O...H Z4...; .../OF... H Z4...
WE 10.../O...HS Z4...; .../OF...HS Z4...



Option of electrical connection ...Z4... (ISO 4400)		H
plug-in connector **ISO 4400** (DIN 43650 - A)	control voltage (**DC**) **12V**, **24V**, **110V**	112
plug-in connector **ISO 4400** (DIN 43650 - A) **with rectifier**	control voltage (**AC**) **110V**, **220V, 230V**	119

NOTES:
Porting pattern and requirements of the surface state of the subplate - as in version WE10.../...**Z4**... see page 6

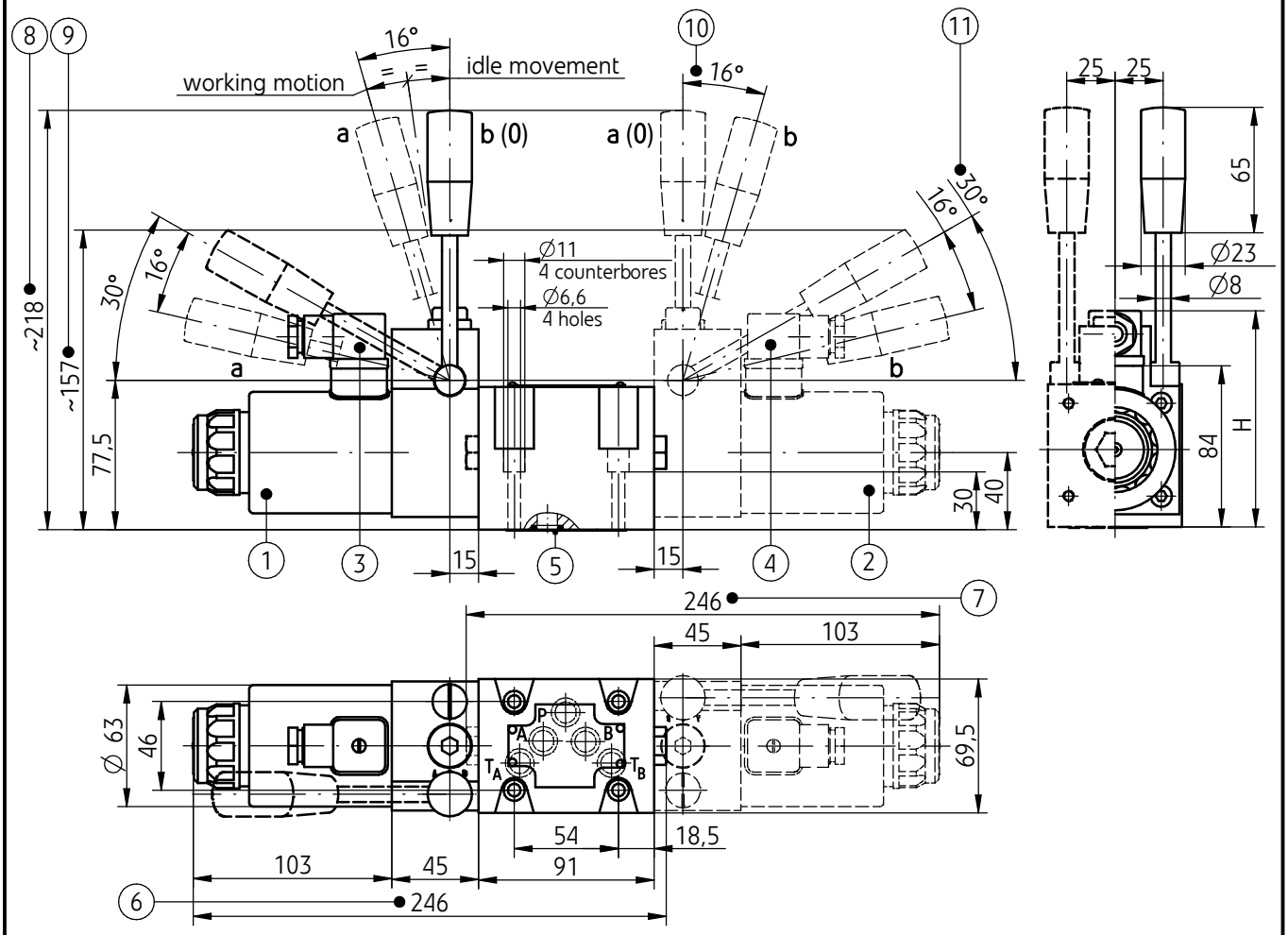
NOTES:
- the valve is switched by the manual control lever, return of the lever to the initial (neutral) state occurs automatically
- after switching the valve by using the solenoid, the lever remains inactive.

1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - Plug-in connector on side **a** - type **ISO 4400** (DIN 43650 - A)
4 - Plug-in connector on side **b** - type **ISO 4400** (DIN 43650 - A)
5 - **O-ring 12,42 x 1,78** - 5 pcs/set (**P**, T_A, T_B, **A**, **B**)
6 - Directional spool valve dimension with **2 solenoids** on side **a**, **b**:
- **3-position directional spool valve springs centered** versions WE10.../**...H**...; **...HS**... (spool diagrams: **E**, **F**, **G**, **H**, **J**, **L**, **M**, **P**, **Q**, **R**, **T**, **U**, **V**, **W** - acc. to page 4)
- **2-position directional spool valve without returns springs -** versions WE10.../**O**...**H**...; .../**O**...**HS**... (spool diagrams: **A**, **C**, **D**, **EA**, **GA**, **HA**, **JA**, **EB**, **GB**, **HB**, **JB** acc. to pages 5, 6)
- **2-position directional spool valve without springs and with detent** - versions WE10.../**OF**...**H**...; .../**OF**...**HS**... (spool diagrams: **A**, **C**, **D**, **EA**, **GA**, **HA**, **JA**, **EB**, **GB**, **HB**, **JB** acc. to pages 5, 6)

7 - Manual control lever positions in versions: WE10.../**...H**...; WE10.../**O**...**H**...; .../**OF**...**H**...
8 - Manual control lever positions in versions: WE10.../**...HS**...; WE10.../**O**...**HS**...; .../**OF**...**HS**...

OVERALL AND CONNECTION DIMENSIONS

2-position versions WE10.../...H Z4...; ...HS Z4...



Option of electrical connection ...Z4... (ISO 4400)		H
plug-in connector **ISO 4400** (DIN 43650 - A)	control voltage (**DC**) **12V**, **24V**, **110V**	112
plug-in connector **ISO 4400** (DIN 43650 - A) **with rectifier**	control voltage (**AC**) **110V**, **220V**, **230V**	119

NOTES:

Porting pattern and requirements of the surface state of the subplate - as in version WE10.../...**Z4**... see page 6

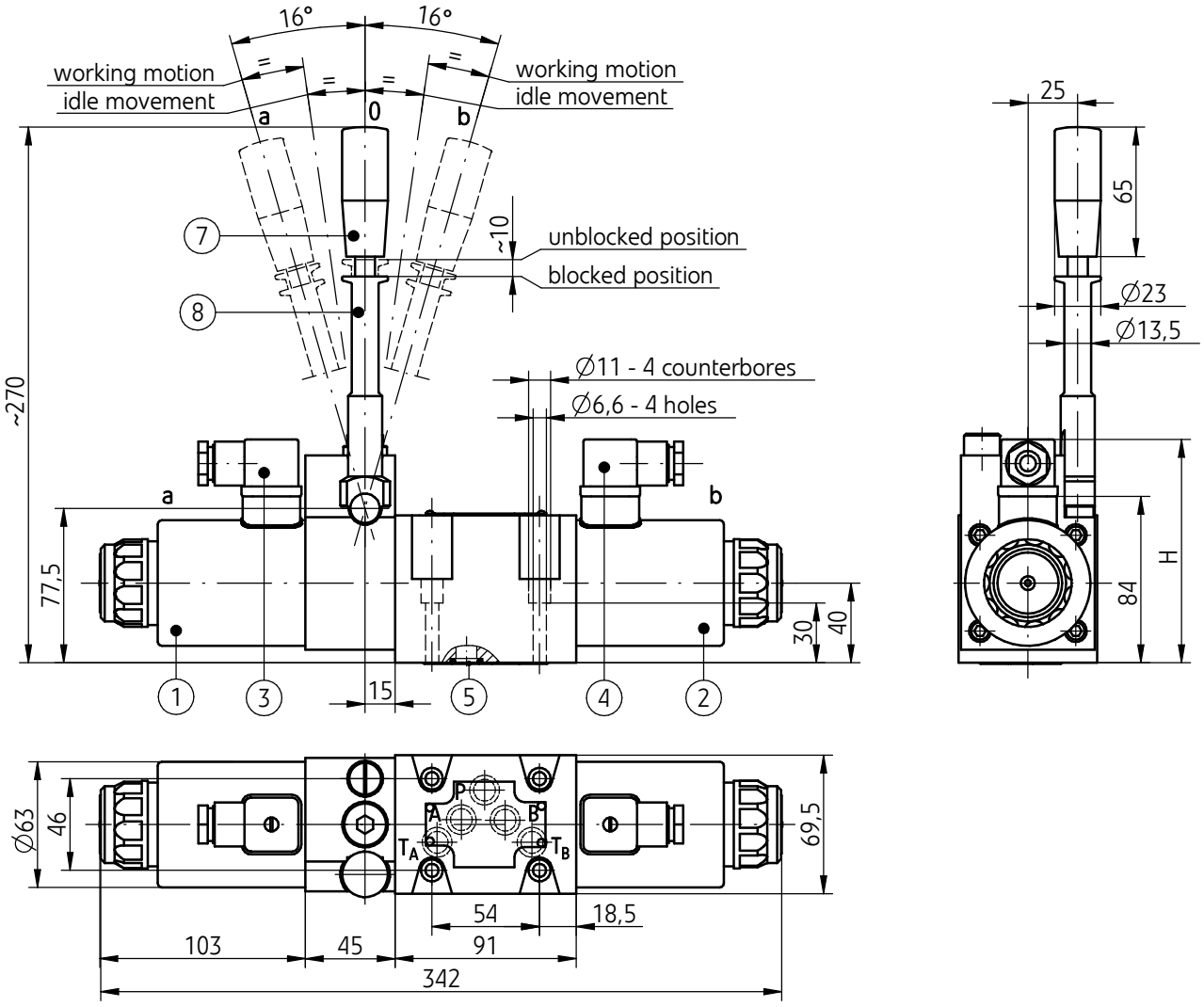
NOTES:

- the valve is switched by the manual control lever, return of the lever to the initial (neutral) state occurs automatically
- after switching the valve by using the solenoid, the lever remains inactive.

1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - Plug-in connector on side **a** - type **ISO 4400** (DIN 43650 - A)
4 - Plug-in connector on side **b** - type **ISO 4400** (DIN 43650 - A)
5 - **O-ring 12,42 x 1,78** - 5 pcs/set (**P**,T_A,T_B,**A**, **B**)
6 - Directional spool valve dimension with **1 solenoid** - on side **a**, **2-position with return spring** - versions WE10.../**...H**...; **...HS**... (spool diagrams: **A**, **C**, **D**, **D1**, **EA**, **FA**, **GA**, **HA**, **JA**, **LA**, **MA**, **PA**, **QA**, **RA**, **TA**, **UA**, **VA**, **WA** - acc. to pages 4, 5)
7 - Directional spool valve dimension with **1 solenoid** - on side **b**, **2-position with return spring -** versions WE10.../**...H**...; **...HS**... (spool diagrams: **B**, **Y**, **Y1**, **EB**, **FB**, **GB**, **HB**, **JB**, **LB**, **MB**, **PB**, **QB**, **RB**, **TB**, **UB**, **VB**, **WB** - acc. to pages 4, 5
8 - Manual control lever positions in versions: WE10.../...**H**... with **1 solenoid** - on side **a**
9 - Manual control lever positions in versions: WE10.../...**HS**... with **1 solenoid** - on side **a**
10 - Manual control lever positions in versions: WE10.../...**H**... with **1 solenoid** - on side **b**
11 - Manual control lever positions in versions: WE10.../...**HS**... with **1 solenoid** - on side **b**

OVERALL AND CONNECTION DIMENSIONS

3-position versions WE10.../...HF Z4...



Option of electrical connection ...Z4... (ISO 4400)		H
plug-in connector **ISO 4400** (DIN 43650 - A)	control voltage (**DC**) **12V**, **24V**, **110V**	112
plug-in connector **ISO 4400** (DIN 43650 - A) **with rectifier**	control voltage (**AC**) **110V**, **220V**, **230V**	119

NOTES:

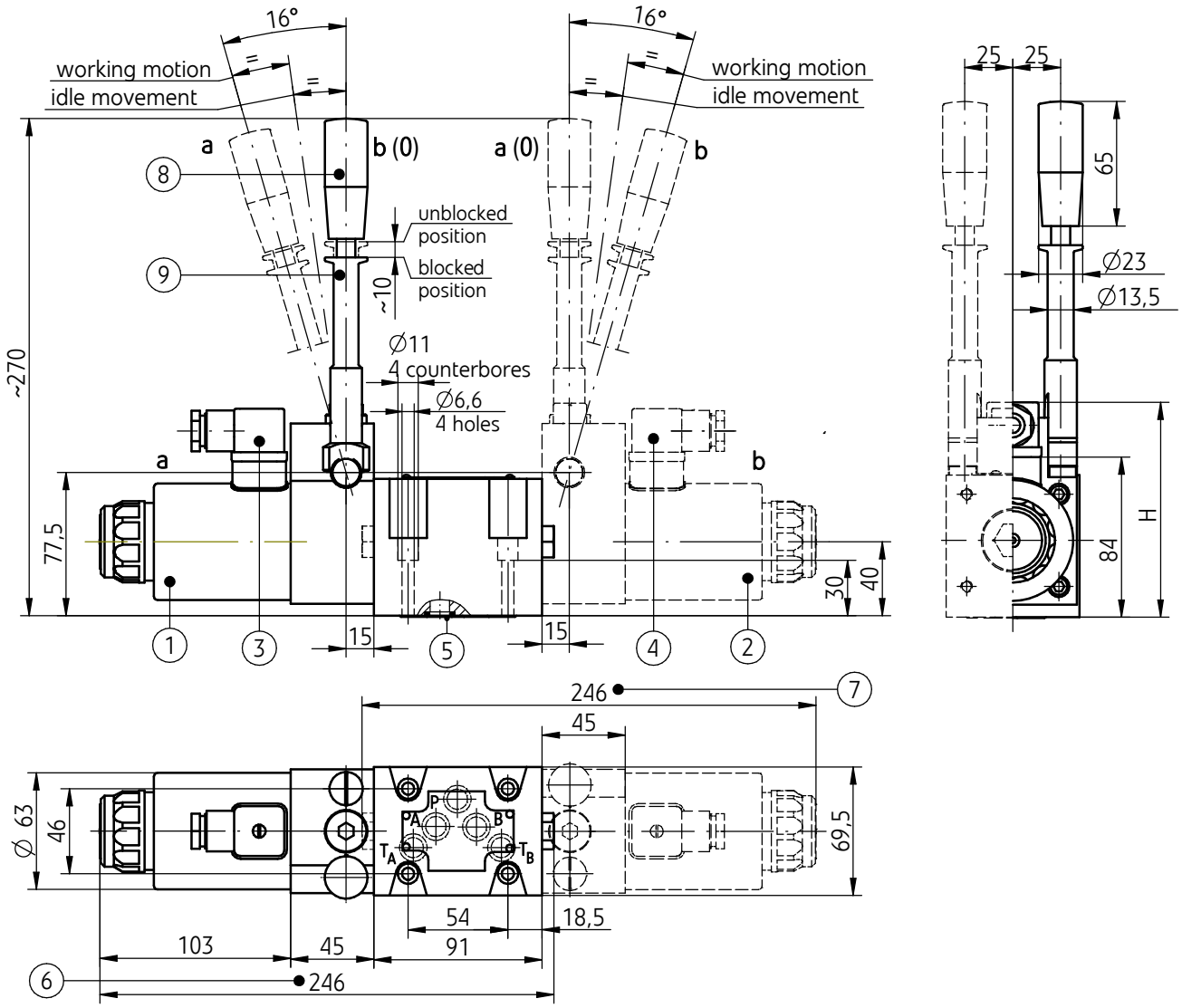
- Porting pattern and requirements of the surface state of the subplate - as in version WE10.../...**Z4**... see page 6.
- The valve is switched by the manual control lever (7), return of the lever to the initial (neutral) state occurs automatically. In order for the lever (7) to remain in switched position, one should move the block sleeve (8) downwards to a halt. After switching the valve by the electromagnet, the lever (7) is not active.

1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - Plug-in connector on side **a** - type **ISO 4400** (DIN 43650 - A)
4 - Plug-in connector on side **b** - type **ISO 4400** (DIN 43650 - A)
5 - **O-ring 12,42 x 1,78** - 5 pcs/set (**P**, T_A, T_B, **A**, **B**)
6 - Directional spool valve dimension with **2 solenoids** on side **a**, **b**:
- **3-position directional spool valve springs centered** version WE10.../**...HF**... (spool diagrams: **E**, **F**, **G**, **H**, **J**, **L**, **M**, **P**, **Q**, **R**, **T**, **U**, **V**, **W** - acc. to page 4)
- **2-position directional spool valve without return springs -** version WE10.../**O**...**HF**... (spool diagrams: **A**, **C**, **D**, **EA**, **GA**, **HA**, **JA**, **EB**, **GB**, **HB**, **JB** acc. to pages 5, 6)
- **2-position directional spool valve without springs and with detent** - version WE10.../**OF**...**HF**... (spool diagrams: **A**, **C**, **D**, **EA**, **GA**, **HA**, **JA**, **EB**, **GB**, **HB**, **JB** acc. to pages 5, 6)

7 - Manual control lever
8 - Manual control lever block sleeve

OVERALL AND CONNECTION DIMENSIONS

2-position versions WE10.../...HF Z4...



Option of electrical connection ...Z4... (ISO 4400)		H
plug-in connector **ISO 4400** (DIN 43650 - A)	control voltage (**DC**) **12V**, **24V**, **110V**	112
plug-in connector **ISO 4400** (DIN 43650 - A) **with rectifier**	control voltage (**AC**) **110V**, **220V**, **230V**	119

NOTES:

- Porting pattern and requirements of the surface state of the subplate - as in version WE10.../...**Z4**... see page 6.
- The valve is switched by the manual control lever (7), return of the lever to the initial (neutral) state occurs automatically. In order for the lever (7) to remain in switched position, one should move the block sleeve (8) downwards to a halt. After switching the valve by the electromagnet, the lever (7) is not active.

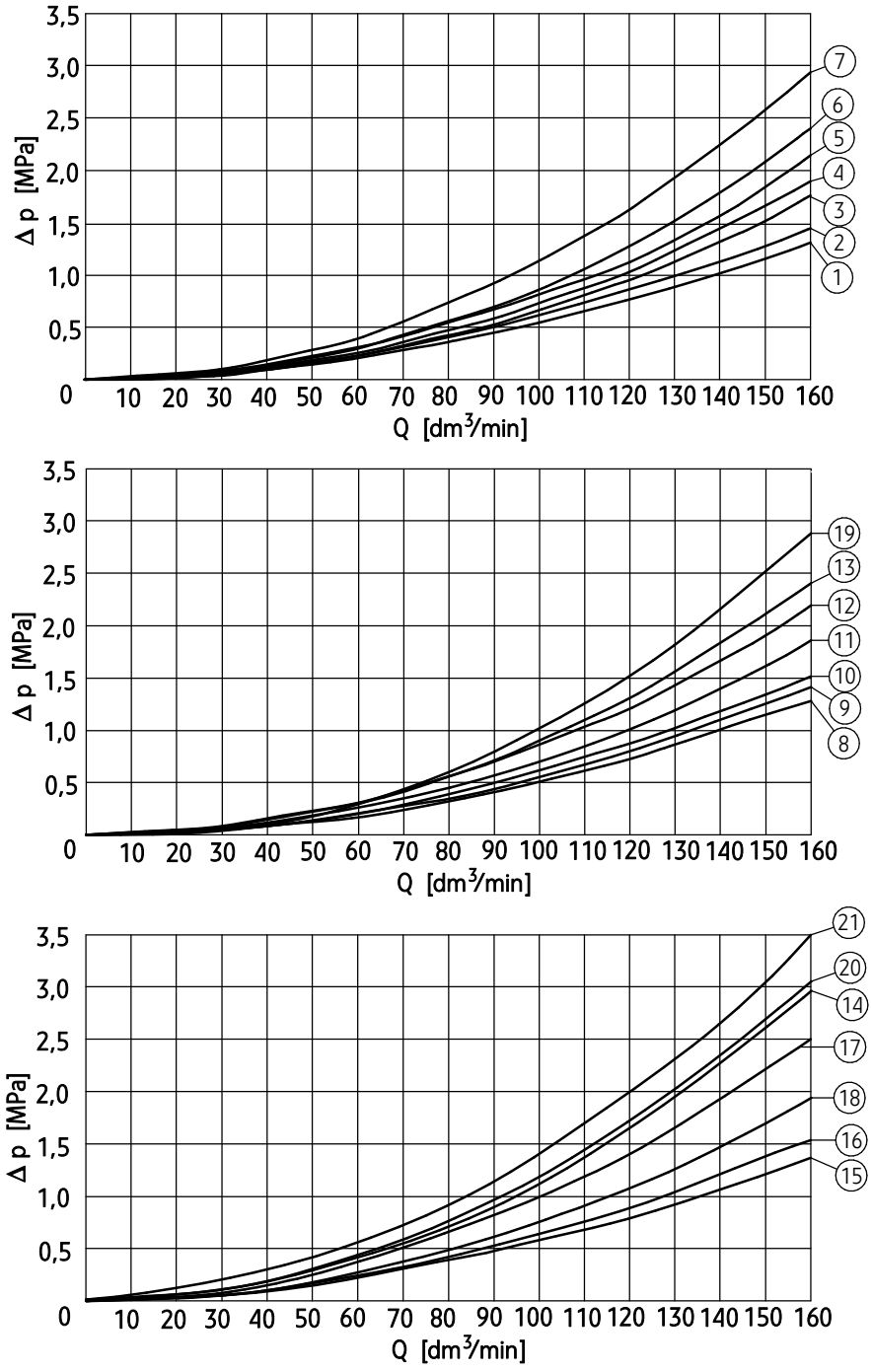
1 - Solenoid on side **a**
2 - Solenoid on side **b**
3 - Plug-in connector on side **a** - type **ISO 4400** (DIN 43650 - A)
4 - Plug-in connector on side **b** - type **ISO 4400** (DIN 43650 - A)
5 - **O-ring 12,42 x 1,78** - 5 pcs/set (**P**, **T_A**, **T_B**, **A**, **B**)
6 - Directional spool valve dimension with **1 solenoid** on side **a**; **2-position spring positioned** version WE10...**A**/...**HF**... (spool diagrams: **A**, **C**, **D**, **D1**, **EA**, **FA**, **GA**, **HA**, **JA**, **LA**, **MA**, **PA**, **QA**, **RA**, **TA**, **UA**, **VA**, **WA** acc. to pages 4, 5)
7 - Directional spool valve dimension with **1 solenoid** on side **b**; **2-position spring positioned** version WE10...**B**/...**HF**... (spool diagrams: **B**, **Y**, **Y1**, **EB**, **FB**, **GB**, **HB**, **JB**, **LB**, **MB**, **PB**, **QB**, **RB**, **TB**, **UB**, **VB**, **WB** acc. to pages 4, 5)
7 - Manual control lever
8 - Manual control lever block sleeve

PERFORMANCE CURVES

measured at viscosity ν = 41 mm^2/s and temperature t = 50°C

Flow resistance curves

characteristic curves Δp (Q) for directional spool valve type WE10... for various spool types



spool symbol	characteristic curve number			
diagrams acc. to pages 4, 5	flow direction			
	P → A	P → B	A → T	B → T
A	6	6	–	–
B	12	12	–	–
C	12	12	8	8
D	5	5	16	16
Y	9	9	7	7
E	3	3	8	8
F	11	12	6	7
G	14	14	12	12
H	3	3	2	2
J	3	3	12	12
L	13	13	12	12
M	4	4	1	1
P	12	11	7	6
Q	13	13	1	6
R	14	16	8	–
T	2	2	10	10
U, V	13	13	10	10
W	13	13	1	15
D1	2	–	–	2
Y1	–	2	2	–

spool symbol	characteristic curve number					
initial position (0) diagrams acc. to page 4	flow direction					
	P → A	P → B	P → T	A → T	B → T	B → A
F	7	–	20	20	–	–
P	–	7	21	–	19	–
G, T	–	–	17	–	–	–
H	–	–	18	–	–	–

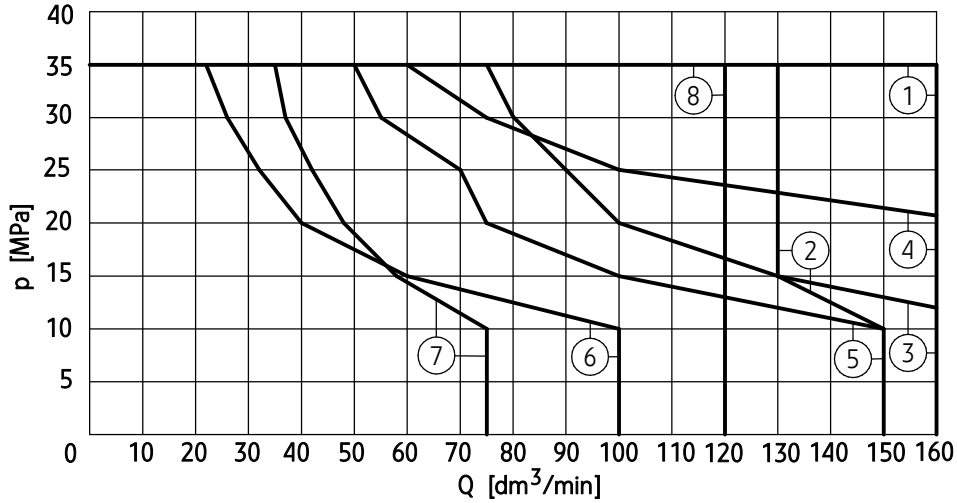
spool symbol	characteristic curve number					
shifted position b diagram acc. to page 4	flow direction					
	P → A	P → B	P → T	A → T	B → T	B → A
R	–	–	–	–	–	20

PERFORMANCE CURVES

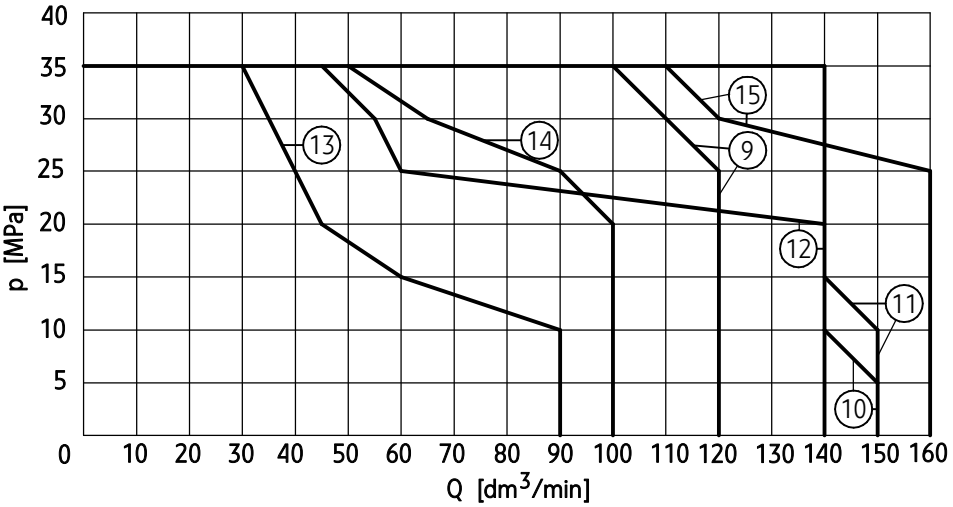
measured at viscosity ν = 41 mm^2/s and temperature t = 50°C

Operating limits curves

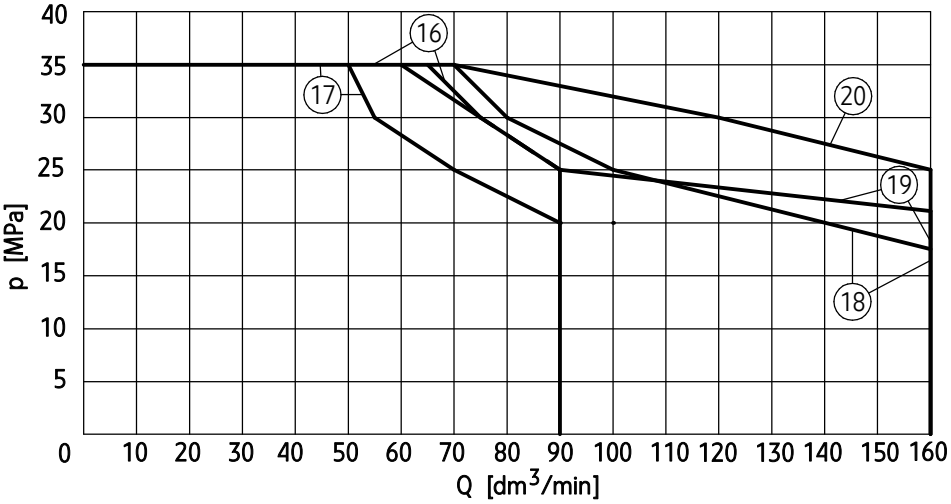
characteristic curves **p-Q** for directional spool valve type **WE10**... with **DC solenoids** for various spool types



spool symbol diagrams acc. to pages 4, 5	characteristic curve number
E, H, EA/O, EB/O,	1
M, EA/OF, EB/OF	2
G	3
Q, W	4
F, P	5
A	6
B	7
V, JA/O, JB/O, JA/OF, JB/OF	8



spool symbol diagrams acc. to pages 4, 5	characteristic curve number
C	9
D	10
Y	11
U	12
T	13
L	14
HA/O, HB/O, HA/OF, HB/OF	15



spool symbol diagrams acc. to pages 4, 5	characteristic curve number
D1	16
Y1	17
R	18
J	19
GA/O, GB/O, GA/OF, GB/OF	20

NOTES:

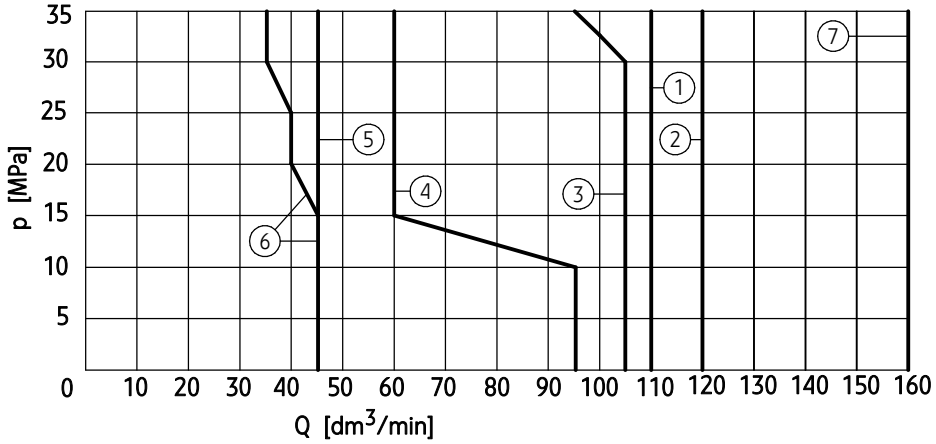
Above operating limits are related to symmetrical flow through all ports i.e. if the oil flows from port **P** to port **A**, then the same flow rate is from port **B** to port **T** (applied to directional control valves with 4 service ports). Degree of asymmetry affects adversely the parameters.

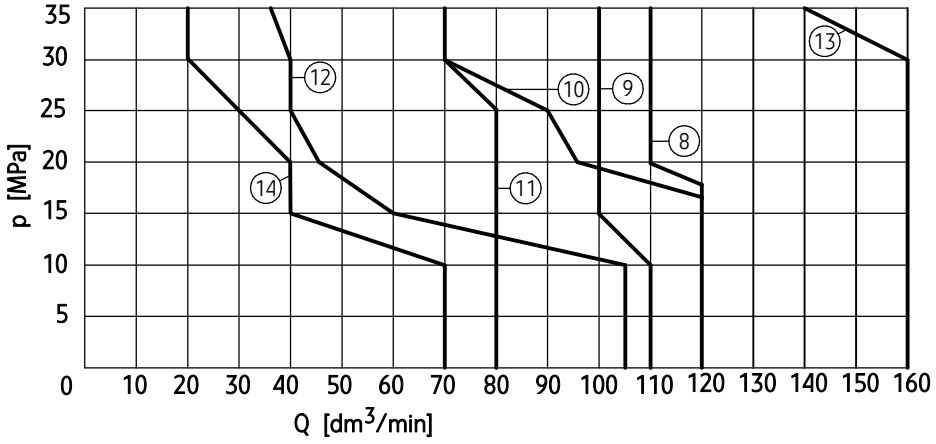
PERFORMANCE CURVES

measured at viscosity ν = 41 mm^2/s and temperature t = 50°C

Operating limits curves

characteristic curves **p-Q** for directional spool valve type **WE10**... with **AC solenoids with direct supply** for various spool types





spool symbol diagrams acc. to pages 4, 5	characteristic curve number
E, W	1
D	2
L	3
H	4
V	5
P	6
JA/O, JB/O, JA/OF, JB/OF, EA/O, EB/O, EA/OF, EB/OF, HA/O, HA/OF	7
C, Y	8
M, Q	9
J	10
U	11
G	12
HA/OF, HB/OF	13
GA/O, GB/O, GA/OF, GB/OF	14

NOTES:

Above operating limits are related to symmetrical flow through all ports i.e. if the oil flows from port **P** to port **A**, then the same flow rate is from port **B** to port **T** (applied to directional control valves with 4 service ports). Degree of asymmetry affects adversely the parameters.

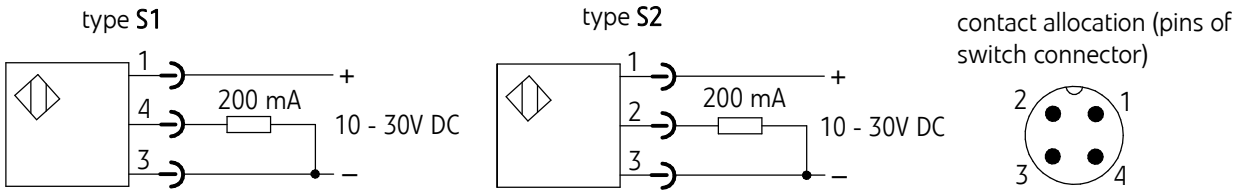
ACCESSORIES

Spool position switch type S

Additional technical specification

Inductive switch type S	
Version	PNP inductive proximity switch
Range of supply voltage for switch	10 - 30V DC
Max load current	200 mA
Connection type of switch	switch with M12 x1 external thread; male connection; 4 contacts (pins)
Degree of protection	IP 65
Weight	
with 1 solenoid and 1 switch	5,6 kg
with 2 solenoids and 1 switch	7,2 kg
with 2 solenoids and 2 switches	8,5 kg

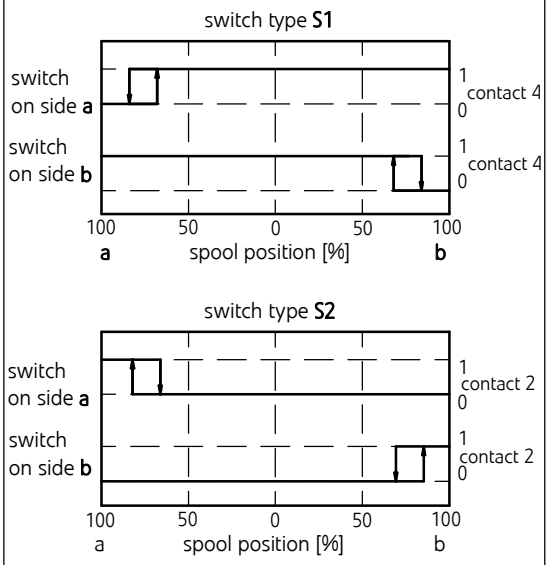
Diagram of electrical connection of inductive switch type S



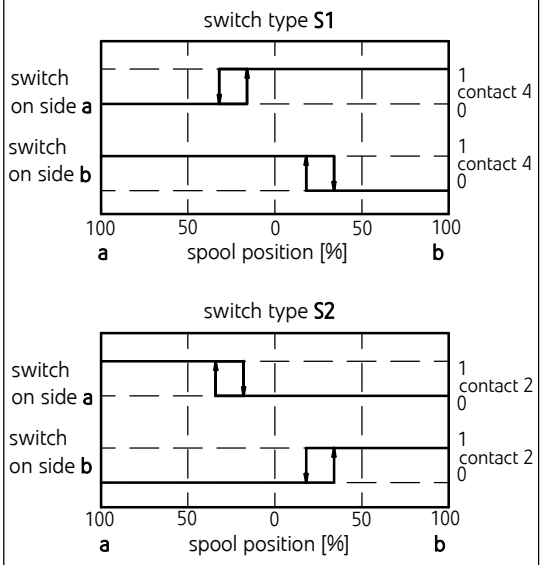
Diagrams for directional control valves and initial positions of switches

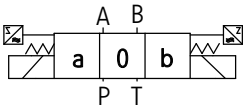
Initial position of inductive switch type S depending on the spool position 0 - off neutral state on output coctact 1 - on state on output contact	Diagram for directional control valve
3-position directional control valve	

position monitored a and b



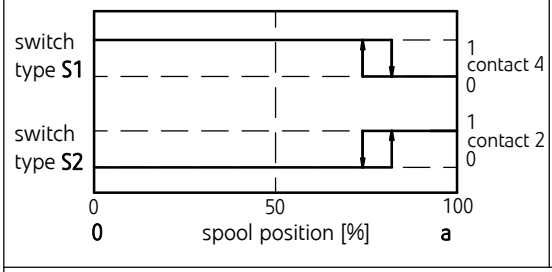
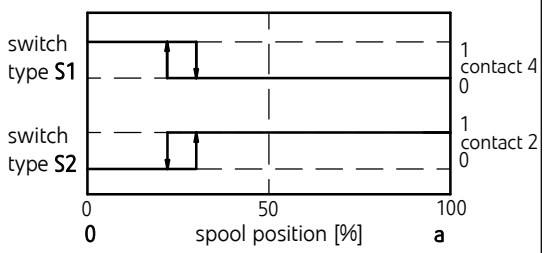
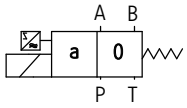
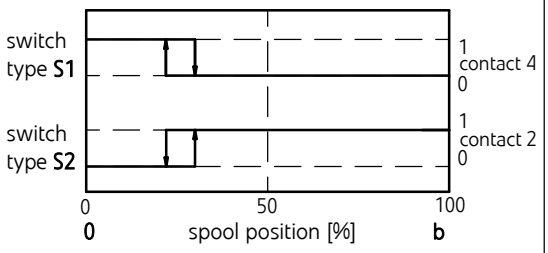
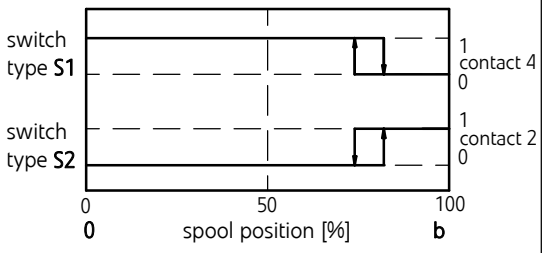
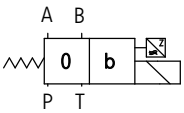
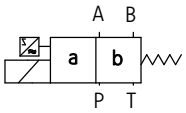
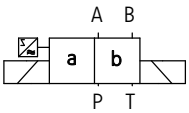
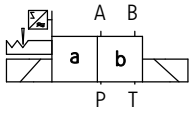
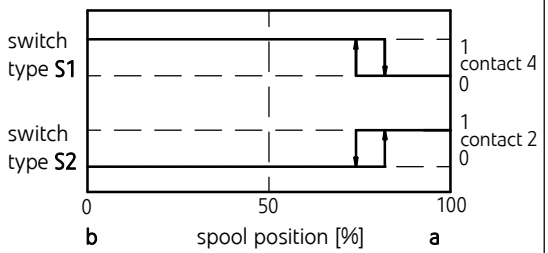
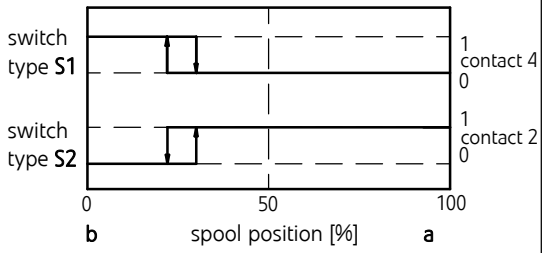
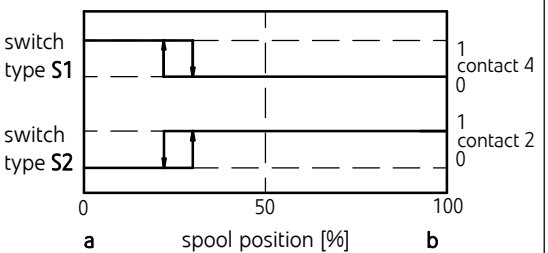
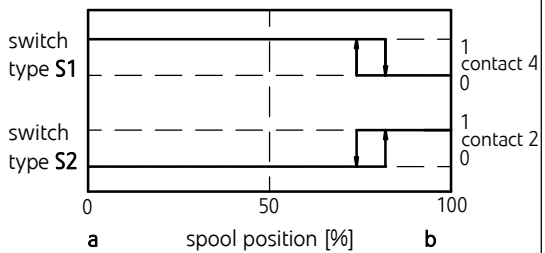
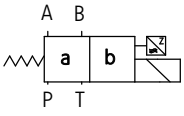
position monitored 0





ACCESSORIES

Spool position switch type S

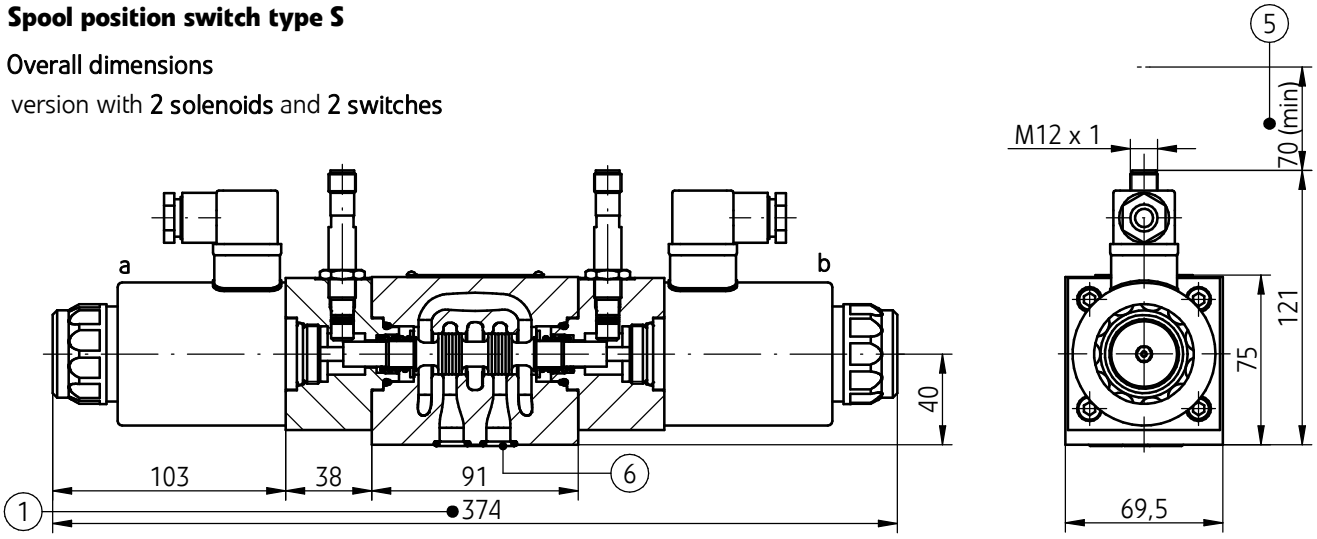
Initial position of inductive switch depending on the spool position	Diagram for directional control valve
2-position versions WE10...**A**... (positions: **a**, **0**) **solenoid and switch on side a**	
position monitored **a**  position monitored **0** 	
2-position versions WE10...**B**... (positions: **0**, **b**) **solenoid and switch on side b**	
position monitored **0**  position monitored **b** 	
2-position versions WE10**A**...; ...**C**...; ...**D**...; .../**O**...; .../**OF**... **switch on side a**	  
position monitored **a**  position monitored **b** 	
2-position versions WE10**B**...; ...**Y**... **switch on side b**	
position monitored **a**  position monitored **b** 	

ACCESSORIES

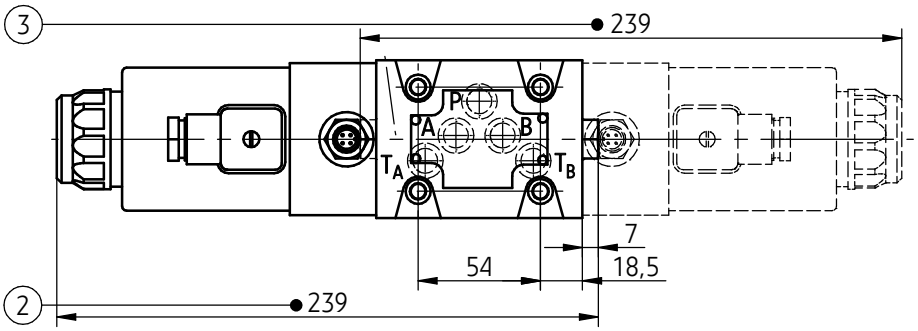
Spool position switch type S

Overall dimensions

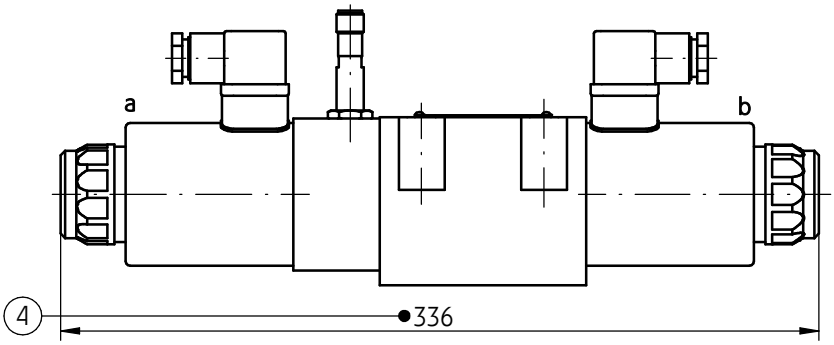
version with **2 solenoids** and **2 switches**



version with **1 solenoid** and **1 switch**



version with **2 solenoids** and **1 switch**



NOTES:
Directional control valve with spool position switch is adjusted. Any adjustments may be made only by the manufacturer.
In case of a faulty switch or valve complete directional control valve must be changed.

NOTE: subplate surface required according to page 6

1 - Dimension of directional control valve with **2 solenoids** - on side **a**, **b** and **2 position switches**
- **3-position, springs centered**
versions WE10.../**...S1**...; ...**S2**... (spool diagrams: **E**, **F**, **G**, **H**, **J**, **L**, **M**, **P**, **Q**, **R**, **T**, **U**, **V**, **W** - acc. to page 4)

2 - Dimension of directional control valve with **1 solenoid** - on side **a** and **1 position switch**
- **2-position, with return spring**
versions WE10.../**...S1**...; ...**S2**... (spool diagrams: **A**, **C**, **D**, **EA**, **FA**, **GA**, **HA**, **JA**, **LA**, **MA**, **PA**, **QA**, **RA**, **TA**, **UA**, **VA**, **WA** - according to pages 4, 5)

3 - Dimension of directional control valve with **1 solenoid** - on side **b** and **1 position switch**
- **2-position, with return spring**
versions WE10.../**...S1**... ...**S2**... (spool diagrams: **B**, **Y**, **EB**, **FB**, **GB**, **HB**, **JB**, **LB**, **MB**, **PB**, **QB**, **RB**,**TB**, **UB**, **VB**, **WB** - according to pages 4, 5)

4 - Dimension of directional control valve with **2 solenoids** - on side **a**, **b** and **1 position switch** on side **a**
- **2-position, without spring return**
versions WE10.../**O**...**S1**...; ...**S2**...
- **2-position, without spring return, with detent**
versions WE10.../**OF**...**S1**...; ...**S2**...
(spool diagrams: **A**, **C**, **D** - according to page 5)

5 - Distance for mounting plug-in-connector and cable of switch (plug-in-connectors not showed in the drawing must be ordered separately according to data sheet **WK 499 963**)

6 - **O-ring 12,42 x 1,78** - 5 pcs/set (**P**, T_A, T_B, **A**, **B**)

ACCESSORIES

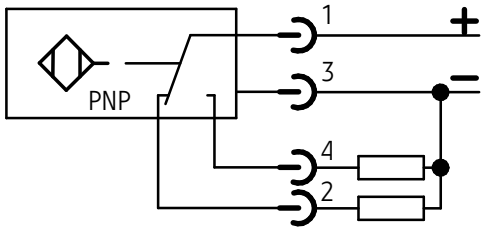
Spool position switch type M

(only for 2-position versions with return spring)

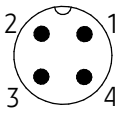
Additional technical data

Inductive switch type M	
	switch with 2 alternative output type PNP
Range of supply voltage for switch	24 VDC $^{+20\%}_{-10\%}$
Max load current	400 mA
Connection type of switch	switch with M12 x 1 external thread; 4 contacts (pins)
Degree of protection	IP 65
Weight (directional valve with switch)	4,6 kg
WARNING: M type inductive sensors must not be connected serially	

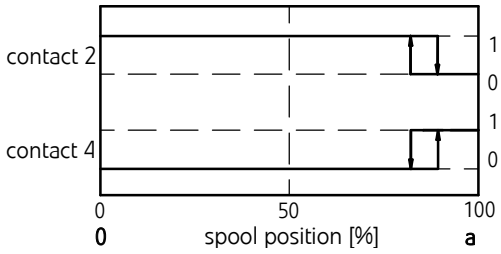
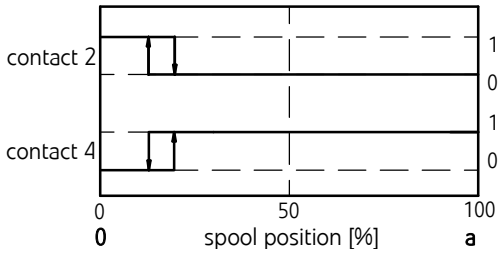
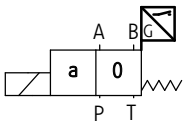
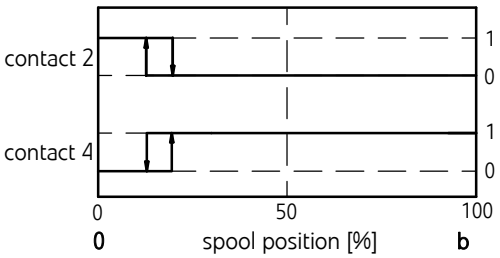
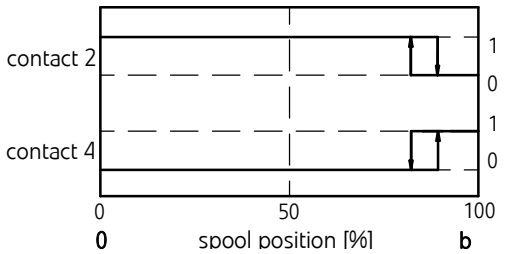
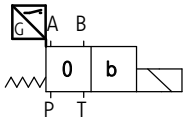
Diagram of electrical connection of inductive switch type M



contact allocation (pins of switch connector)



Diagrams for directional control valves and initial positions of switches

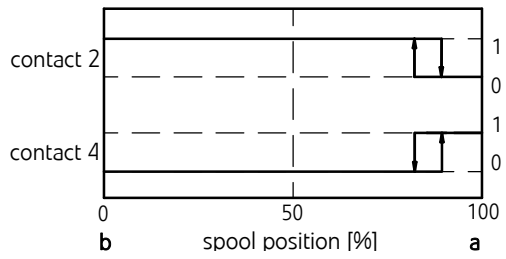
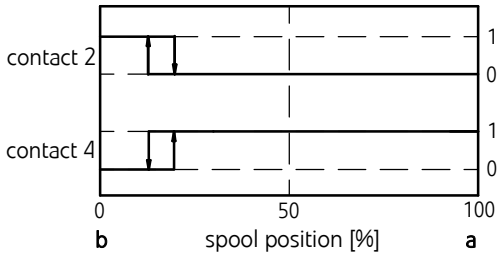
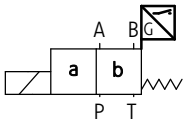
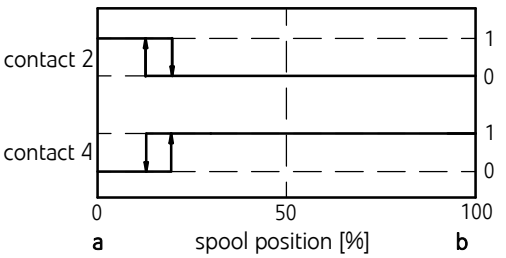
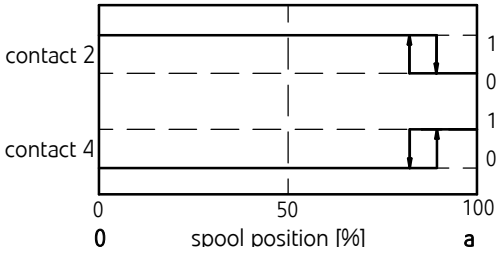
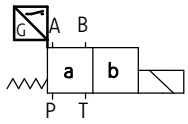
Initial position of inductive switch type M depending on the spool position 0 - off neutral state on output coctact 1 - on state on output contact	Diagram for directional control valve
2-position versions WE10...A... (positions: a, 0) solenoid on side a and switch on side b	
position monitored a  position monitored 0  	
2-position versions WE10...B... (positions: 0, b) solenoid on side b and switch on side a	
position monitored 0  position monitored b  	

ACCESSORIES

Spool position switch type M

(only for 2-position versions with return spring)

Graphic symbols for directional control valves and initial positions of switches

Initial position of inductive switch type M depending on the spool position 0 - off neutral state on output coctact 1 - on state on output contact		Diagram for directional control valve
2-position versions WE10**A**...; ...**C**...; ...**D**...; ...**D1**... switch on side **b**		
position monitored **a** 	position monitored **b** 	
2-position versions WE10**B**...; ...**Y**...; ...**Y1**... switch on side **a**		
position monitored **a** 	position monitored **b** 	

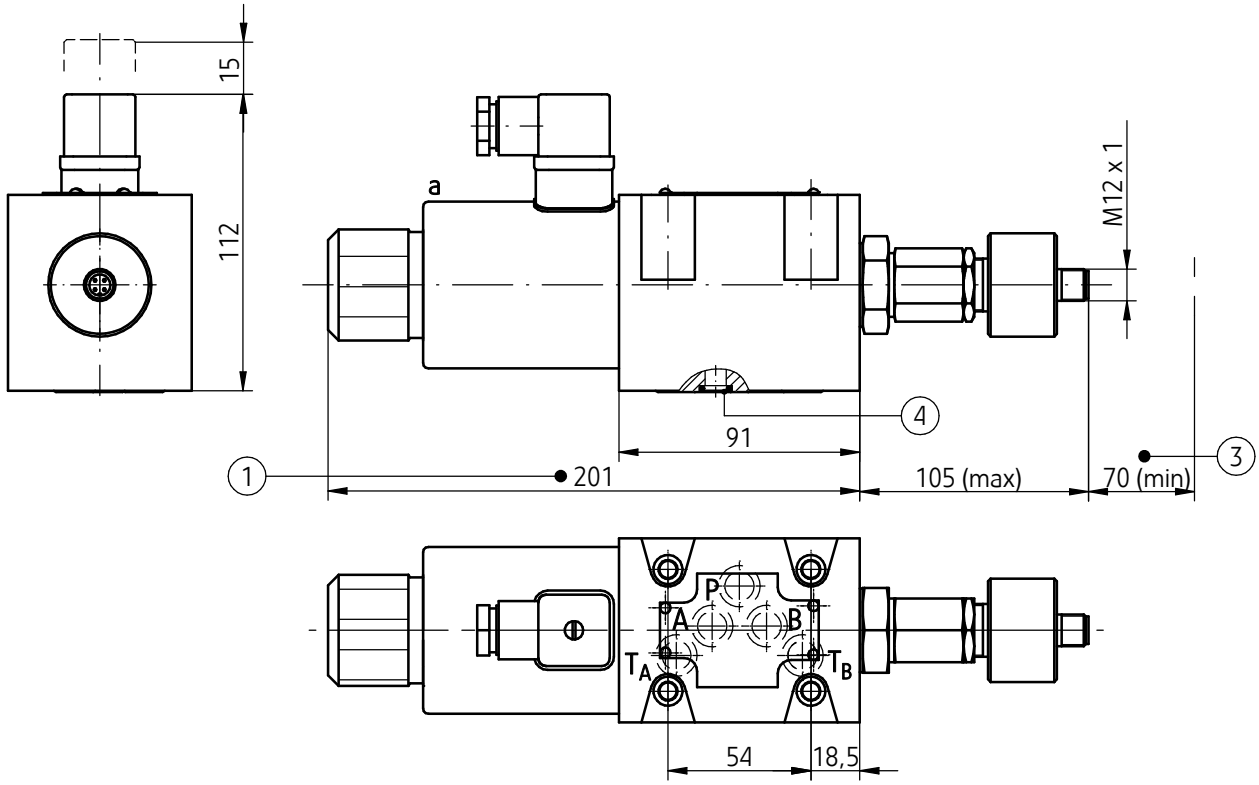
ACCESSORIES

Spool position switch type M

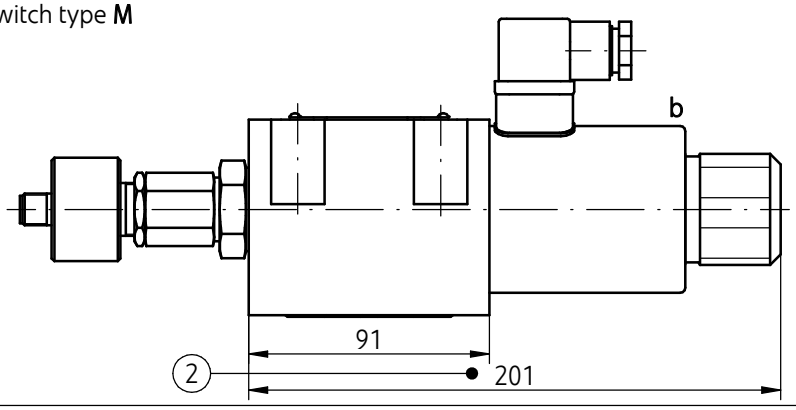
(only for 2-position versions with return spring)

Overall dimensions

version with **solenoid on side a** and switch type **M**



version with **solenoid on side b** and switch type **M**



NOTE: subplate surface required according to page 6

NOTES:

Directional control valve with spool position switch is adjusted. Any adjustments may be made only by the manufacturer.
In case of a faulty switch or valve complete directional control valve must be changed.

1 - Dimension of directional control valve with **1 solenoid** - on side **a** and switch type **M**
- **2-position, with return spring** (spool diagrams: **A**, **C**, **D**, **D1**, **EA**, **FA**, **GA**, **HA**, **JA**, **LA**, **MA**, **PA**, **QA**, **RA**, **TA**, **UA**, **VA**, **WA** - according to pages 4, 5)

2 - Dimension of directional control valve with **1 solenoid** - on side **b** and switch type **M**
- **2-position, with return spring** (spool diagrams: **B**, **Y**, **Y1**, **EB**, **FB**, **GB**,**HB**, **JB**, **LB**, **MB**, **PB**, **QB**, **RB**, **TB**, **UB**, **VB**, **WB** - according to pages 4, 5)

3 - Distance for mounting plug-in connector and cable of switch (plug-in connectors not showed in the drawing must be ordered separately according to data sheet **WK 499 963**)

4 - **O-ring 12,42 x 1,78** - 5 pcs/set (**P**,T_A , T_B , **A**, **B**)

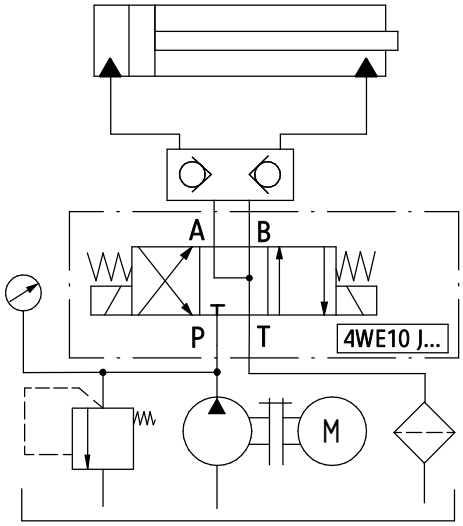
SUBPLATES AND FIXING SCREWS

Subplates must be ordered according to data sheet **WK 496 520**. Subplate symbols:
G 66/01 - threaded connections G 3/8
G 67/01 - threaded connections **G 1/2**
G 89/01 - threaded connections G 1/4
G 67/02 - threaded connections M22 x 1,5
G 534/01 - threaded connections G 3/4

NOTE:
Subplate symbol in bold is the preferred version available in short delivery time.

Subplates and fixing screws **M6 x 40 - 10,9** - acc. to **PN - EN ISO 4762** - 4 pcs/set must be ordered separately.
Tightening torque **Md = 15 Nm**.

EXAMPLE OF APPLICATION IN HYDRAULIC SYSTEM



HOW TO ORDER

	WE	10		–	/						

Number of service ports
3-way - only for spools A, B = **3**
4-way - for the other spools = **4**

Nominal size (NS)
NS10 = **10**

Spool symbol
spool diagrams - according to pages **4, 5**

Series number
(60-69) - connection and installation dimensions unchanged = 6X
series 62 = **62**

Spool positioning
spring centering = **no designation**
without springs return
(only fo spools A, C, D, EA, GA, HA, JA, EB, GB, HB, JB) = O
without springs return with detent
(only for spools A, C, D, EA, GA, HA, JA, EB, GB, HB, JB) = OF

Control voltage for solenoids
12V DC = G12
24V DC = **G24**
110V DC = G110
110V AC 50Hz (plug-in-connector with rectifier) = W110R
220V AC 50Hz (plug-in-connector with rectifier) = W220R
230V AC 50Hz (plug-in-connector with rectifier) = **W230R**
230V AC 50 Hz (direct supply with AC current) = W230-50

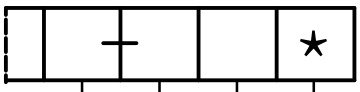
Manual override
solenoids with manual override = **N**
solenoids without manual override (only for version with inductive switch type M) = no designation

Manual lever control
no manual control lever = **no designation**
with a manual control lever positioned vertically = H
with a manual control lever positioned vertically z blokadą = HF
with a manual control lever positioned at an angle = HS

Electrical connection
plug-in-connector type ISO 4400 (DIN 43650 - A) **without LED** = **Z4**
plug-in-connector type ISO 4400 (DIN 43650 - A) with LED = Z4L

Throttle insert (in port P)
without throttle insert = **no designation**
throttle insert ϕ 0,8 = B 08
throttle insert ϕ 1,0 = B 10
throttle insert ϕ 1,2 = B 12
throttle insert ϕ 3,0 = B 30

HOW TO ORDER



Further requirements in clear text
(to be agreed with the manufacturer)

Monitored position of the spool

monitored position **0** - **zero** *(3- position and 2- position versions with positions (**a**, **0**) or (**0**, **b**))*	= 0
monitored position **a** *(2- position versions with positions (**a**, **0**) or (**a**, **b**))*	= A
monitored position **b** *(2- position versions with positions (**0**, **b**) or (**a**, **b**)*	= B
monitored position **a** and **b** *(3- position versions)*	= AB

Spool position switch

spool position switch type **S1**	= S1
spool position switch type **S2**	= S2
spool position switch type **M** (only for 2-positions versions with return spring)	= M

NOTES:
Optional version with a spool position switch and a manual control lever (options: ...**H**...; ...**HS**...; ...**HF**...) available after consultation with the manufacturer.

Sealing

NBR (for fluids on mineral oil base)	= **no designation**
FKM (for fluids on phosphate ester base)	= V

NOTES:

Directional spool valve should be ordered according to the above coding.
The symbols in bold are preferred versions in short delivery time.
Coding example: 4WE10 E - 62/G24 N Z4 B08 - S1AB

PONAR Wadowice S.A.
ul. Wojska Polskiego 29
34-100 Wadowice
tel. +48 33 488 21 00
fax.+48 33 488 21 03
www.ponar-wadowice.pl