HYDAC INTERNATIONAL

4/2 and 4/3 directional spool valve pilot operated
4WEH 10 to 32

DESCRIPTION

HYDAC 4/2 and 4/3 directional valves of the 4WEH series are pilot operated spool valves, which control start, stop and direction of a volume flow.

The pilot valve operates by oil-immersed solenoid. During this process, the solenoid pushes the pilot valve's control spool into the respective position.
By actuating the solenoid, the pilot flow rate is controlled, so the piston of the the main stage moves whereby the the desired flow paths can be switched.

A wide variety of spool types and options for opening control are available in this valve series.

FEATURES

- Pilot operated, solenoid-operated directional valve
- Electro-hydraulic operation via pilot valve NG 06
- Flows from 150 to 1000
- The pilot supply or drain can be internal or external, which can be achieved by changing the plugs
- Easy interchangeability via standardised to ISO 4401

CONTENT

MODEL CODE

4WEH E 10 D S01 – 24 D G /V /M1 /D

Type
Solenoid-operated directional valve with 4 main ports,
hydraulically operated, pilot operated

Control type
E = external pilot supply and drain
EI = external pilot supply, internal pilot drain
I = internal pilot supply and drain
IE = internal pilot supply, external pilot drain
(preload tank line: pressure between pilot and drain must be more than minimum pilot pressure)

Nominal size (NG)
10, 16, 25, 32

Symbols [1]
starting on page 3

Series
S01 = standard interface see “Dimensions” starting on page 9
S02 = ISO 4401-05-05-0-05 (NG10 only)

Rated voltage of the solenoid coil [1]
12 = 12 VDC
24 = 24 VDC
96 = 96 VDC*
205 = 205 VDC*
110 = 110 VAC*
230 = 230 VAC*
* only in combination with the electrical connection G

Type of voltage
D = DC voltage
A = AC voltage (only in combination with electrical connection G)

Electrical connection (for details see page 13)
G = device connector, DIN EN 175301-803 A
L = single leads
N = device connector, Deutsch
O = device connector, M12
U = device connector, Junior Timer

Sealing material
V = FKM (standard)
N = NBR

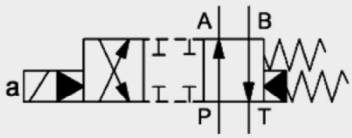
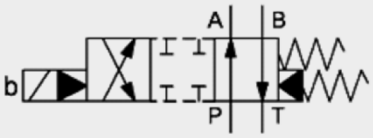
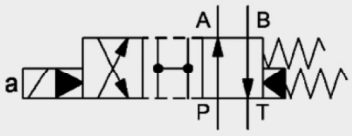
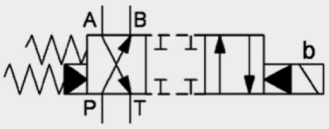
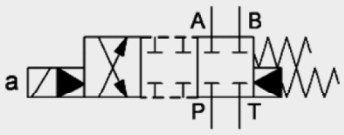
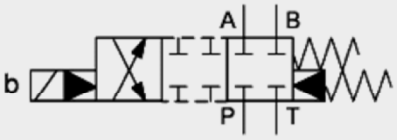
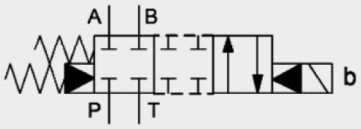
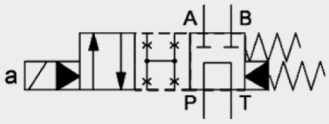
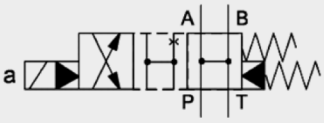
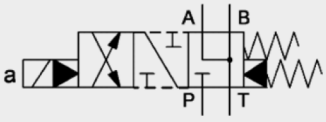
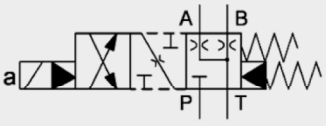
Manual override
Not specified = with concealed manual override (standard)
/M… = see page 13

Options
Not specified = without option (standard)
G = with check valve, 5 bar (NG16 and NG25 only)
D = with pressure reducing valve type ZW-DM06, fixed setting to 30 bar
SZ = Switching time setting as meter-in control (Needle valve type ZW-SDR06…ZAB)
SA = Switching time setting as meter-out control (Needle valve type ZW-SDR06…AAB)
/YXX = orifice insert: Y = port P, A, B, T
XX = diameter (e.g. 12 = 1,2 mm)

[1] other models on request

SPOOL TYPES / SYMBOLS

4/2 DIRECTIONAL SPOOL VALVES

Type	Symbol with intermediate position	
	NG 10 and NG 16	NG 25 and NG 32
D		
C		
Y		
EA		
EB		
GA		
HA		
JA		
QA		

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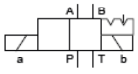
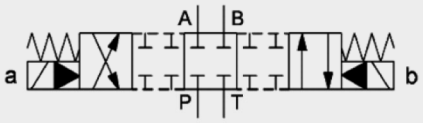
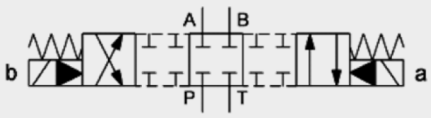
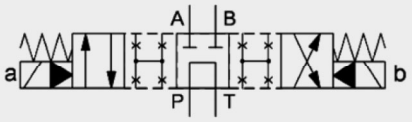
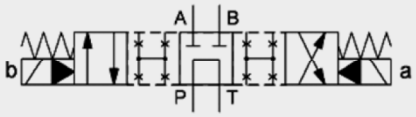
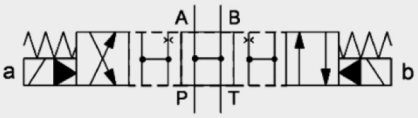
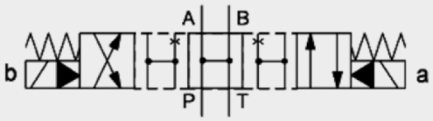
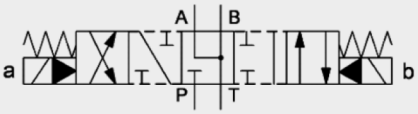
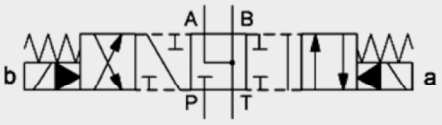
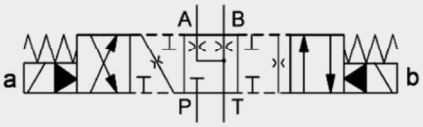
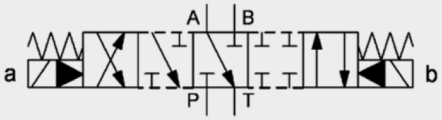


KOLBENTYPEN / SYMBOLE

4/3 DIRECTIONAL SPOOL VALVES

Type	Symbol with intermediate position	
	NG 10 and NG 16	NG 25 and NG 32
E		
G		
H		
J		
Q		
L		

OVERVIEW PILOT VALVE + MAIN STAGE

Symbol complete valve 4WEH	Symbol main stage 4WH	Symbol pilot valve 4WE	
		NG10 and NG16	NG25 and NG32
E	E	J	
C	C	D	Y
D	D	D	Y
EA	E	JA	JB
H	H	J	
L	L	J	
Y	Y	Y	D
EB	E	JB	JA
G	G	J	
GA	G	JA	JB
HA	H	JA	JB
J	J	J	
JA	J	JA	JB
Q	Q	J	
QA	Q	JA	JB
AQ	QA	JA	
D-OF	D	D-OF	
DT	DT	D	Y

TECHNICAL DATA [1]

General specifications

		Nominal size			
		10	16	25	32
$MTTF_d$:		Acc. to EN ISO 13849-2:2013 chart C1 & C2			
Ambient temperatures range:	[°C]	-20 to +50			
Installation position:		No orientation restrictions			
Weight main stage:	[kg]	5,0	6,6	15	48,0
Weight Pilot:	[kg]	1,5 with one solenoid; 2,0 with two solenoids			
Material:		Valve casing:			Bast iron
		Pole tube			Steel
		Coil casing:			Steel
		Name plate:			Aluminium
Surface coating:		Valve casing:			Phosphate plated
		Pole tube			Zn-coating
		Coil casing:			Zn-Ni-coating

Hydraulic specifications

		Nominal size			
		10	16	25	32
Operating pressure port A, B, P:	[bar]	p_{max} = 320	p_{max} = 350		
		Port T, internal leak port:			p_{max} = 210
		Port T, external leak port:			p_{max} = 210
Control pressure:	[bar]	p_{min} = 5 to 12 [3]			p_{min} = 6 to 12 [3]
		p_{max} = 210			p_{max} = 280
Max. flow:	[l/min]	150	300	600	1000
Operating fluid:		Hydraulic oil to DIN 51524 part 1, 2 and 3			
Media operating temp. range:	[°C]	-20 to +80			
Viscosity range:	[mm²/s]	10 – 400			
Permitted contamination level of operating luid:		class 20/18/15 to ISO 4406			
Sealing material:		NBR, FKM (standard)			

Electrical specifications

		Nominal size			
		10	16	25	32
Switching-time energized:	[ms]	50	60	70	100
Switching-time de-energized:	[ms]	40	45	50	60
Type of voltage and rated voltage:	[V]	DC: 12, 24, 96, 205			
		AC: 110, 230			
Voltage tolerance:	[%]	±10			
Nominal power:	[W]	30			
Duty cycle:	[%]	100			
Max. surface temperature of the coil:	[°C]	150			
Protection class according to DIN EN 60529:		with electrical connection “G“		IP65 [2]	
		with electrical connection “L“		IP65 [2]	
		with electrical connection “N“		IP65 / IP67 [2]	
		with electrical connection “O“		IP65 [2]	
		with electrical connection “U“		IP65 [2]	

[1] see „Conditions and Instructions for Valves“ in brochure 53.000

[2] if installed correctly

[3] Pilot pressure depends on rate of delivery flow. The minimal pilot pressure is sufficient only for low rates of delivery flow. If the rate of delivery flow increases, it is necessary to increase the pilot pressure up to the specified maximum value

FUNCTION

He valves of the 4WEH series are hydraulic pilot operated directional spool valves, which can control start, stop and direction of a volume flow. They essentially consist of a pilot valve NG6 (1) and a main stage (2).

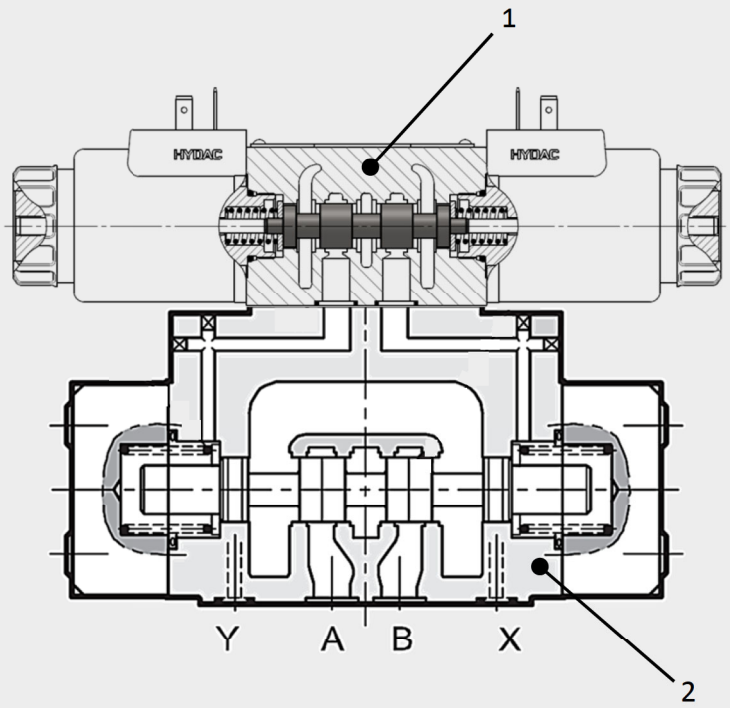
The fluid power supply of the valve is provided centrally via standard porting pattern. Without pilot oil, the main control spool is centered in its middle position by the springs. The actuation of the main control spool is caused by the pilot valve. The control pressure is dependent on the flow rate. The minimal control pressure of 5 bar is only sufficient for low flow rates. Pilot pressure has to be increased up to 12 bar by increasing flow rates. Pressure loading on one of the two front sides of the main control spool with pilot pressure causes the desired switching position, whereby the required ports will be linked.
The spring, which is across from the pressurised control piston surface, causes the resetting of the piston into zero or initial position by relieving of pressure.

If the control is external, port X and Y take the oil supply or the relief of the pilot circuit to the tank level.
Port Y is used for pilot oil drain and is usually discharged into the tank without pressure (leak port).

The standard interface differ in the respective nominal sizes and are not compatible.

SECTION VIEW

Example 4WEH10



Control types – Pilot oil supply and pilot oil drain

If the valve is used as a hydraulic actuated valve, the pilot oil supply and pilot oil drain will occur externally via port X and Y.

There are four possible control types. This can be seen in the model code.

The valve will be factory-set configured and delivered corresponding to the model code. The threaded plugs are glued. Subsequent modification is not recommended.

Version „E“
Pilot supply is external from a separate fluid power supply via port X.
The pilot drain is also external via port Y.

Version „EI“
Pilot supply is external from a separate fluid power supply via port X.
The pilot drain is internal via port T.

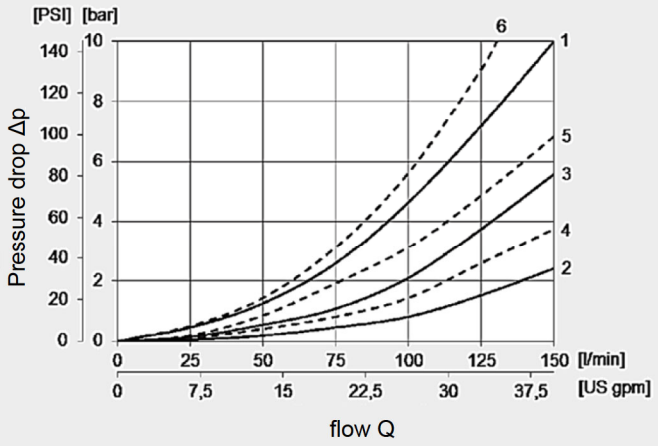
Version „IE“
Pilot supply is internal via port P.
The pilot drain is external via port Y.
Hint: Preload tank line - Pressure between pilot and drain must be more than minimum pilot pressure

Version „I“
Pilot supply is internal via port P.
The pilot drain is internal via port T.
Hint: NG10 and NG32: Not for symbol G and H.
NG16 and NG25: Symbol G and H only with option G.

PERFORMANCE NG10

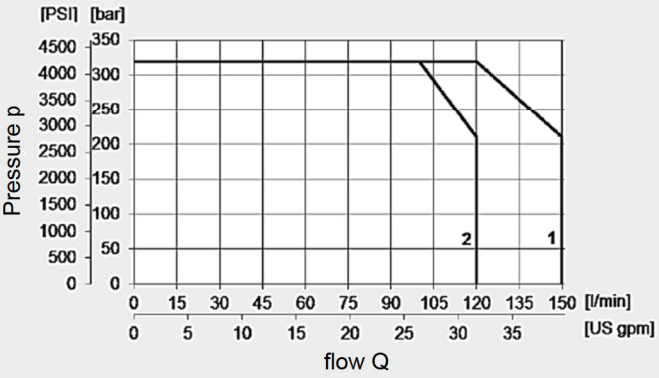
Pressure drop

measured at v = 36 mm²/s, T = 50 °C



Performance limits

measured at v = 36 mm²/s, T = 50 °C



Performance assigment to the associated spools

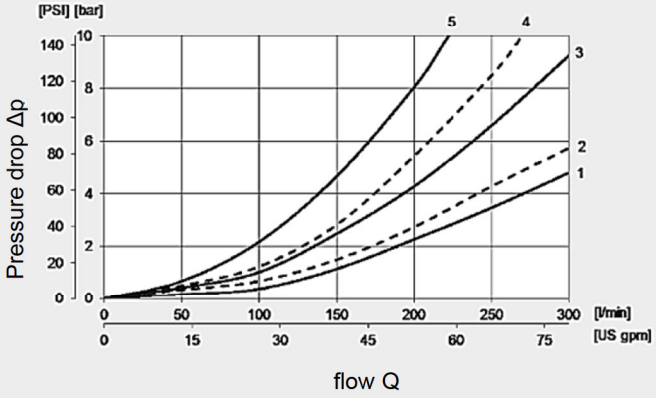
Spool	Switching position	Pressure drop					Perfor-mance limits
		P→A	P→B	A→T	B→T	P→T	
D	not operated	1			3		1
	operated		1	4			
E	not operated						1
	operated	1	1	2	3		
G	not operated					6	2
	operated	6	6	3	5		
H	not operated					6*	1
	operated	5	5	2	4		
J	not operated			1●	1○		1
	operated	1	1	2	4		
Q	not operated						1
	operated	1	1	2	2		

* A-B blocked ● B blocked ○ A blocked

PERFORMANCE NG16

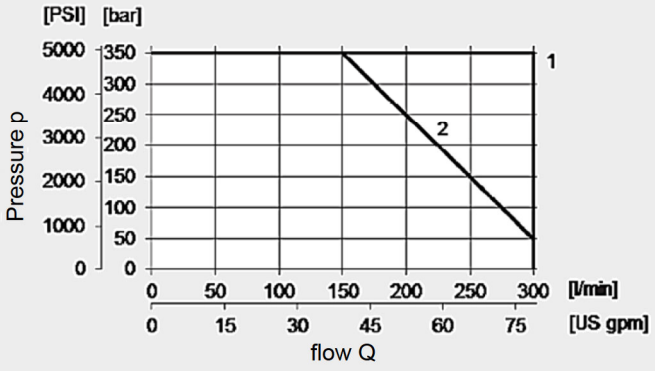
Pressure drop

measured at v = 36 mm²/s, T = 50 °C



Performance limits

measured at v = 36 mm²/s, T = 50 °C



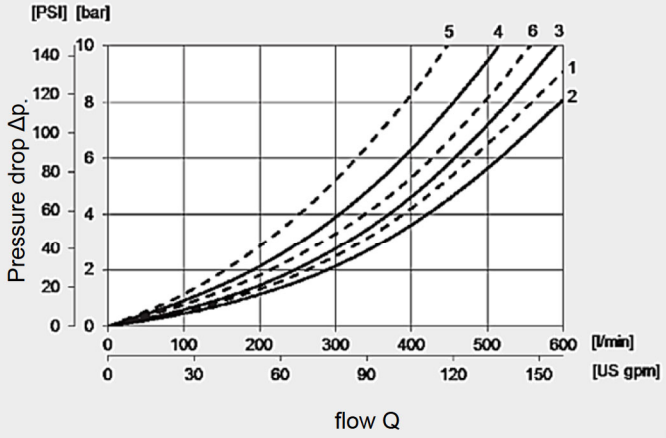
Performance assigment to the associated spools

Spool	Switching position	Pressure drop					Performance limits
		P→A	P→B	A→T	B→T	P→T	
C	Not operated	1			4		1
	Operated		1	4			
D	Not operated	1			4		1
	Operated		1	3			
E	Not operated						1
	Operated	1	1	3	4		
J	Not operated			4●	4○		1
	Operated	1	1	4	4		
H	Not operated					2**	1
	Operated	1	1	4	4		
G	Not operated					4	2
	Operated	2	2	4	5		
L	Not operated			4			1
	Operated	1	1	3	4		
Q	Not operated						1
	Operated	1	1	3	4		
Y	Not operated		1	3			1
	Operated	1			4		

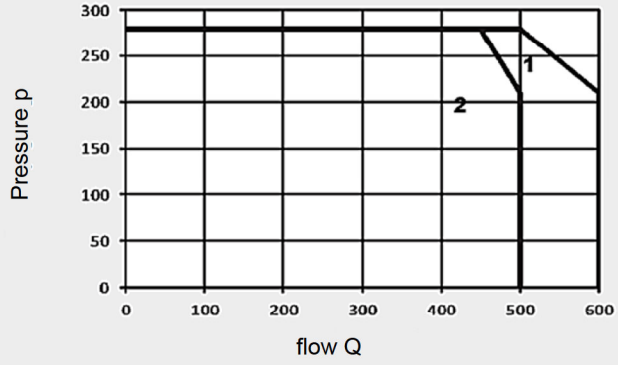
** A-B blocked ● B blocked ○ A blocked

OERFORMANCE NG25

Pressure drop
meassured at v = 36 mm²/s, T = 50 °C



Performance limits
meassured at v = 36 mm²/s, T = 50 °C



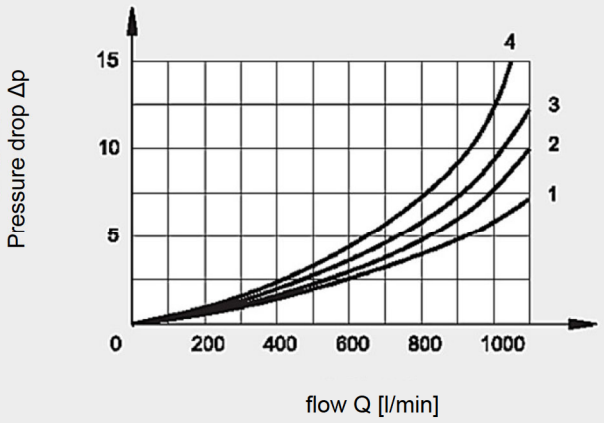
Performance assigment to the associated spools

Spool	Switching position	Pressure drop P→A	P→B	A→T	B→T	P→T	Performance limits
D	Not operated	1			3		1
	Operated		1	2			
E	Not operated						1
	Operated	1	1	2	3		
J	Not operated			4●	4○		1
	Operated	1	1	1	2		
H	Not operated					6**	1
	Operated	2	2	1	2		
G	Not operated					5	2
	Operated	6	6	3	4		

** A-B blocked ● B blocked ○ A blocked

PERFORMANCE NG32

Pressure drop
meassured at v = 36 mm²/s, T = 50 °C



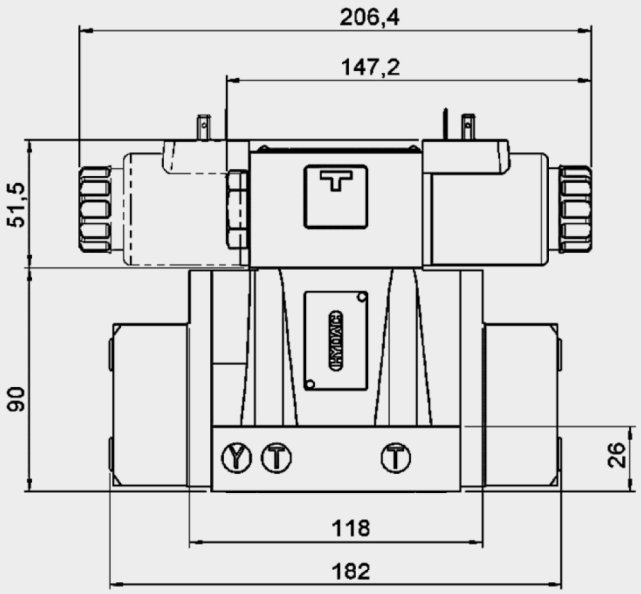
Performance limits
meassured at v = 36 mm²/s, T = 50 °C

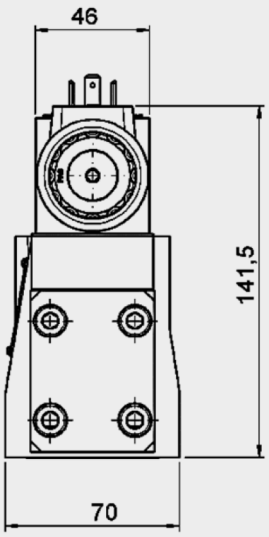
Performance assigment to the associated spools

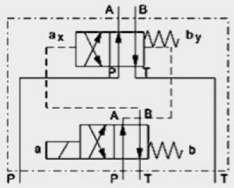
Spool	Switching position	Pressure drop P→A	P→B	A→T	B→T	P→T	Performance limits
D	Not operated	1			1		1
	Operated		1	1			
E	Not operated						1
	Operated	1	1	1	1		
J	Not operated			4●	4○		1
	Operated	1	1	4	4		
H	Not operated					3**	2
	Operated	2	2	2	2		
G	Not operated					4	2
	Operated	2	2	2	2		

** A-B blocked ● B blocked ○ A blocked

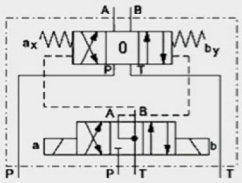
DIMENSIONS NG10



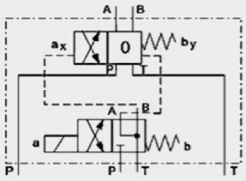




Main stage (symbol D)
+
Pilot valve (symbol D)



Main stage
+
Pilot valve (symbol J)

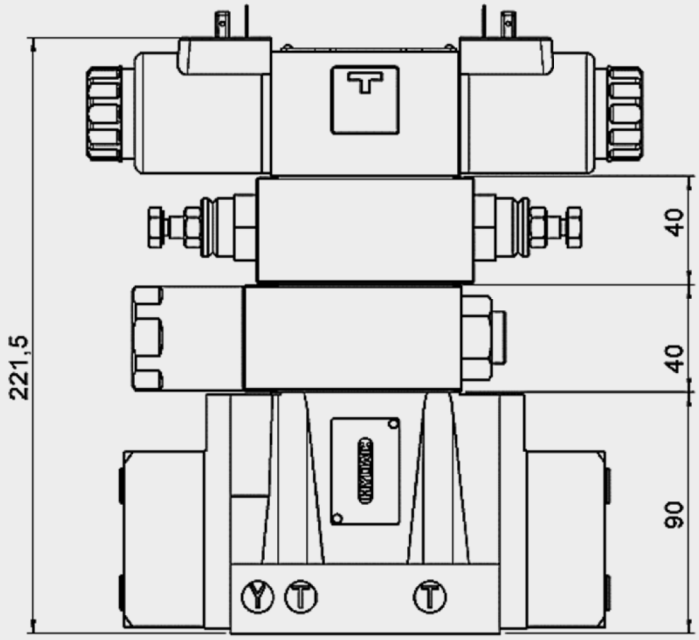


Main stage
+
Pilot valve (symbol JA)

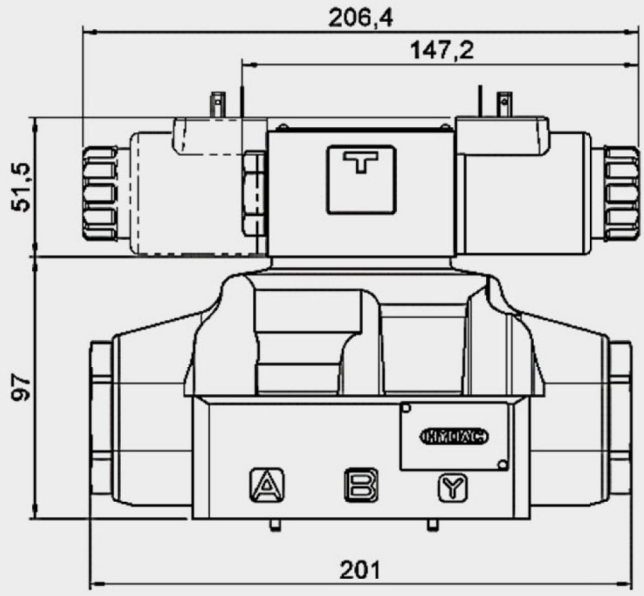
Mounting screws:
(not included in delivery)
4 screws (A10.9) M6x35 ISO4762
Torque: 12 Nm

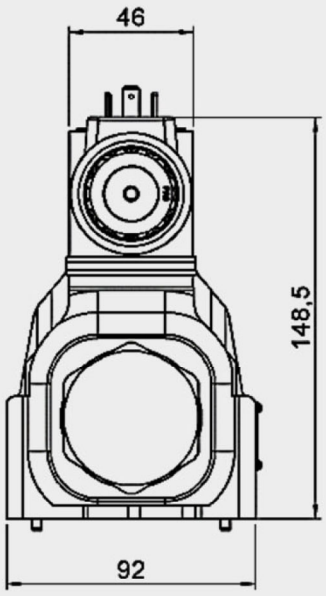
Hint:
If it is difficult to install the mounting screws, check the orientation of the valve again. Compare the port side of the pilot valve with the port side of the main stage, as shown in the dimensional drawing.

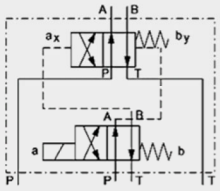
with option D and SZ/SA



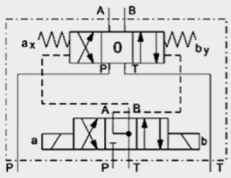
DIMENSIONS NG16



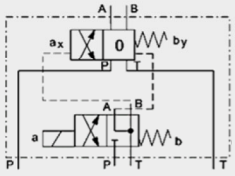




Main stage (symbol D)
+
Pilot valve (symbol D)



Main stage
+
Pilot valve (symbol J)

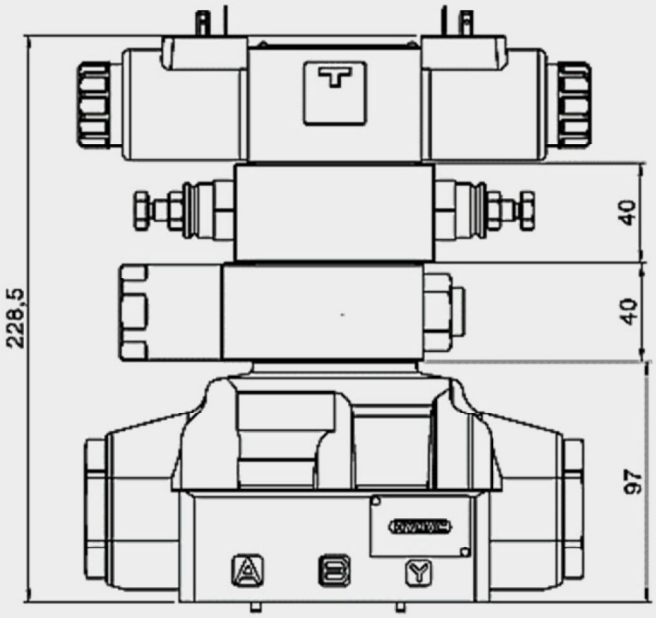


Main stage
+
Pilot valve (symbol JA)

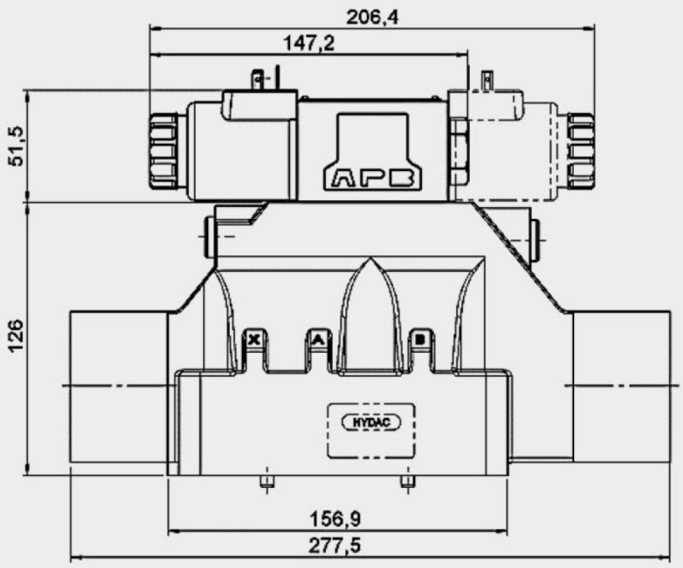
Mounting screws:
(not included in delivery)
4 screws (A10.9) M10x60 and
2 screws (A10.9) M6x50 ISO4762
Torque:
M10x60: 57 Nm and M6x50: 14 Nm

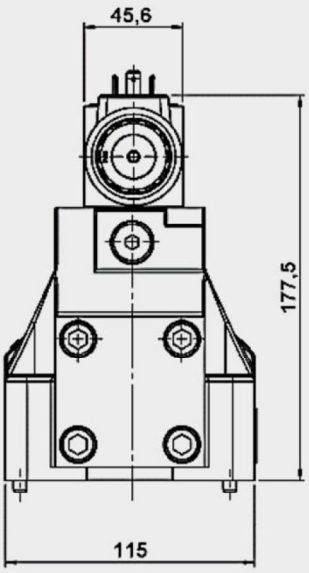
Hint:
If it is difficult to install the mounting screws, check the orientation of the valve again. Compare the port side of the pilot valve with the port side of the main stage, as shown in the dimensional drawing.

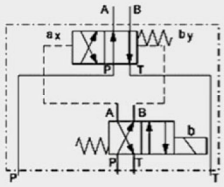
with option D and SZ/SA



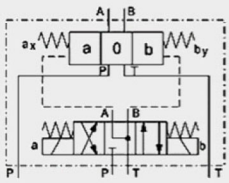
DIMENSIONS NG25



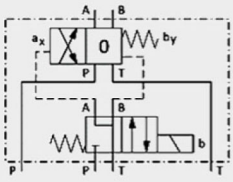




Main stag (symbol D)
+
Pilot valve (symbol Y)



Main stage
+
Pilot valve (symbol J)

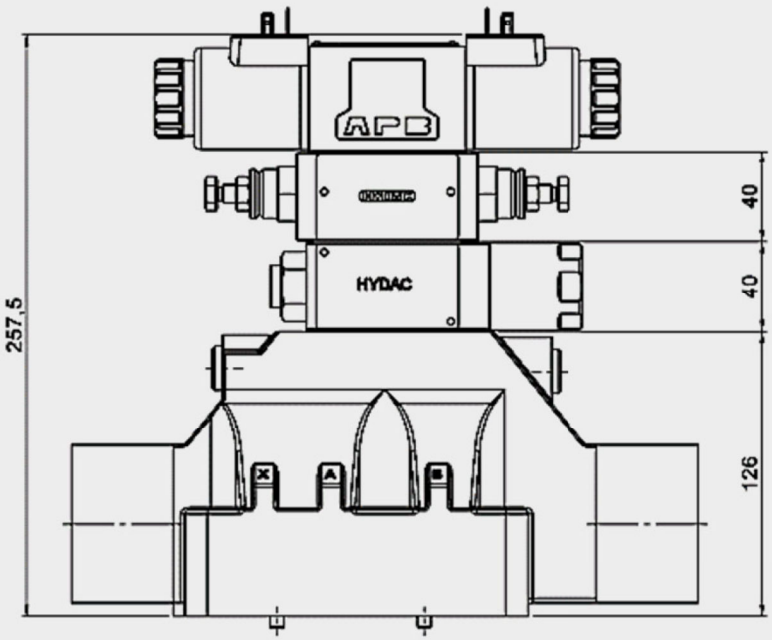


Main stage
+
Pilot valve (symbol JB)

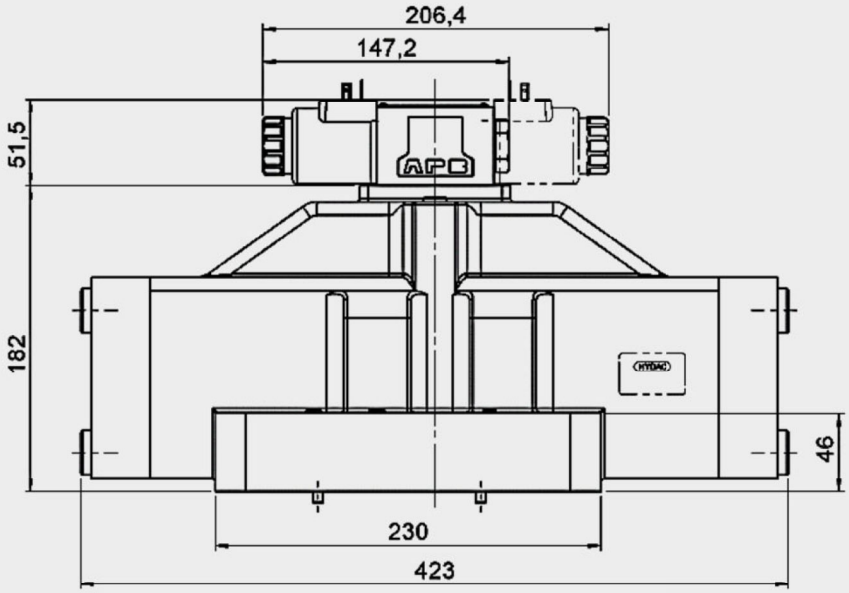
Mounting screws:
(not included in delivery)
6 screws (A10.9) M12x60 ISO4762
Torque: 115 Nm

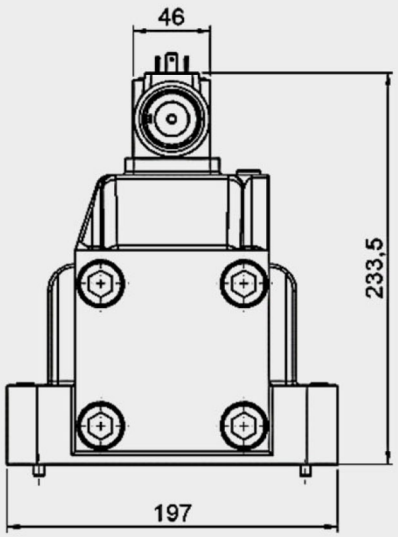
Hint:
If it is difficult to install the mounting screws, check the orientation of the valve again. Compare the port side of the pilot valve with the port side of the main stage, as shown in the dimensional drawing.

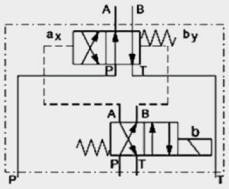
with option D and SZ/SA



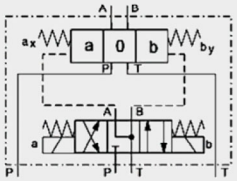
DIMENSIONS NG32



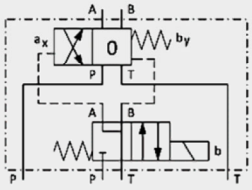




Main stage (symbol D)
+
Pilot valve (symbol Y)



Main stage
+
Pilot valve (symbol J)

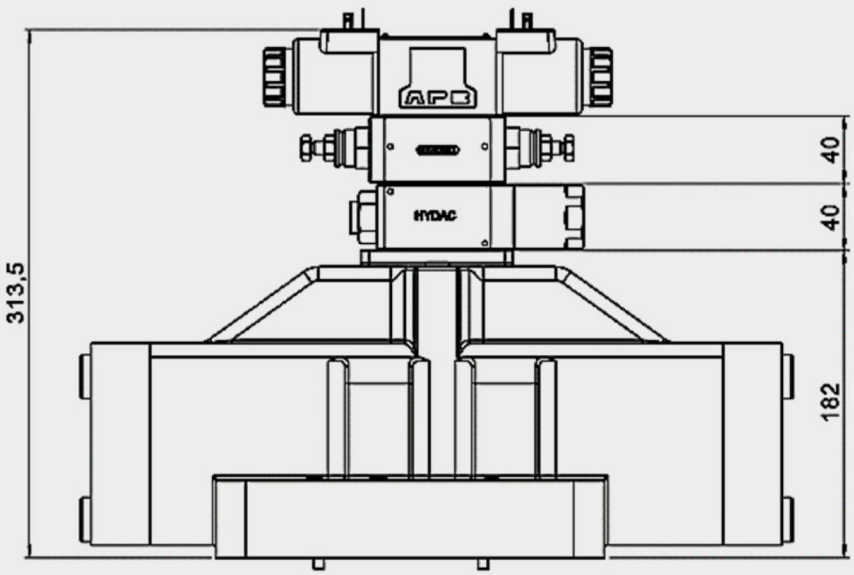


Main stage
+
Pilot valve (symbol JB)

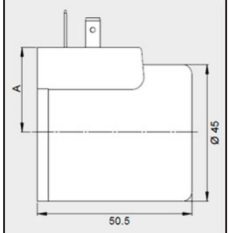
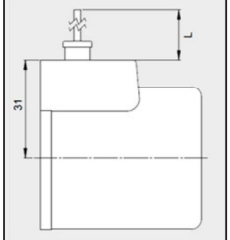
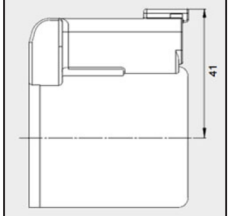
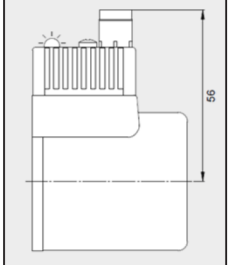
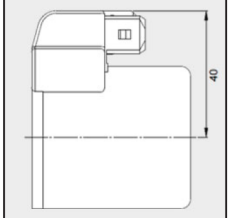
Mounting screws:
(not included in delivery)
6 screws (A10.9) M20x70 ISO4762
Torque: 560 Nm

Hint:
If it is difficult to install the mounting screws, check the orientation of the valve again. Compare the port side of the pilot valve with the port side of the main stage, as shown in the dimensional drawing.

with option D and SZ/SA

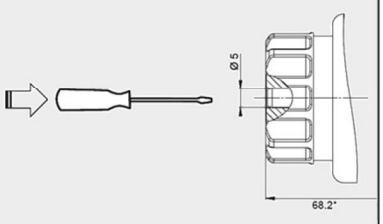
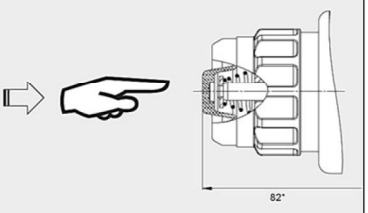
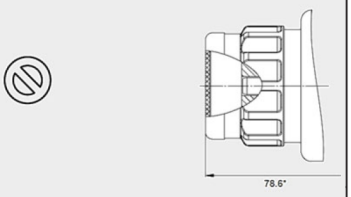
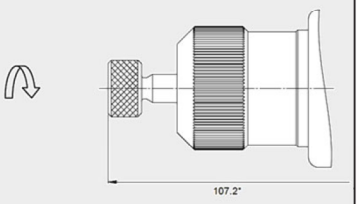
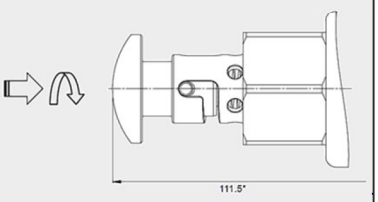
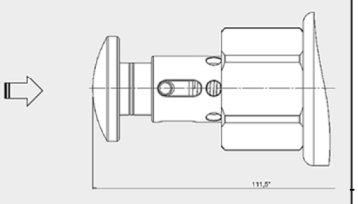


ELECTRICAL CONNECTIONS

G Device connector DIN EN 175301-803 A		• IP65 • A = 28 mm for DC (DG) • A = 30,7 mm for AC (AG)
L 2 strands		• IP65 • Standard strands length L = 457 mm • Optional with suppressor diode
N Device connector Deutsch (DT04-2P)		• IP65 / IP67 • Optional with suppressor diode
O Device connector M12		• IP65 • With yellow LED as operation indicator • Pin assigment
U Device connector Junior Timer (axial)		• IP65 • Optional with suppressor diode

Other models on request

MANUAL OVERRIDES

Standard with concealed manual override		Opertaion with tool
M1 with manual override		Operation without tool with spring return
M2 with covered manual override		Manual override covered, operation only possible after disassembly of cap
M4 with knurled-head screw		Operation by turning the knurled-head screw
M5 with mushroom head (lockable)		Operation by pressing, locking by subsequently turning the mushroom button
M6 with mushroom head (not lockable)		Operation by pressing the mushroom button

* Dimensions up to valve housing

In case of emergency, the valve can also be operated manually. There are different forms of manual override available.
The tank pressure should not exceed 50 bar. If the tank pressure is higher, the force required to operate the manual override increases accordingly.
For valves with two solenoids, simultaneous operation of both manual overrides is not permitted..

ACCESSORIES

	Designation	Part no.
Seals kits (main stage)	4WEH 10: 12,42 x 1,78 90 Sh (5 pcs) 9,25 x 1,78 90 Sh (2 pcs)	FKM: 3524523 NBR: 3524475
	4WEH 16: 22,22 x 2,62 90 Sh (4 pcs) 10,82 x 1,78 90 Sh (2 pcs)	FKM: 3524634 NBR: 3524553
	4WEH 25: 29,82 x 2,62 90 Sh (4 pcs) 20,24 x 2,62 90 Sh (2 pcs)	FKM: 3524660 NBR: 3524659
	4WEH 32: 37,59 x 3,53 90 Sh (4 pcs) 20,24 x 2,62 90 Sh (2 pcs)	FKM: 3524690 NBR: 3524685
Mounting screws	4WEH 10: ISO 4762 M6 x 35 (4 pcs)	3524691
	4WEH 16: ISO 4762 M10 x 60 (4 pcs) ISO 4762 M6 x 60 (2 pcs)	4501973
	4WEH 25: ISO 4762 M12 x 60 (6 pcs)	3524698
	4WEH 32: ISO 4762 M20 x 70 (6 pcs)	3524700
Solenoid coils	COIL 12DG -50-2345 -S	4244169
	COIL 12DN -50-2345 -S	4244170
	COIL 12DO -50-2345 -S	4250874
	COIL 24DG -50-2345 -S	4244171
	COIL 24DN -50-2345 -S	4244172
	COIL 24DO -50-2345 -S	4250885
	COIL 96DG -50-2345 -S	4244173
	COIL 110AG -50-2345 -S	4244174
	COIL 205DG -50-2345 -S	4244275
	COIL 230AG -50-2345 -S	4244276
Seal kit for solenoid coils	Nut open, O-ring	4317299
	Nut with folding cap, O-ring	4317301
	Nut with cap, O-ring	4317302
Connector	Z4 standard 2-pole without PE	394287
	ZW4 incl. rectifier	394293
	Z4L incl. LED	394285
Manual overrides	M4 with knurled-head screw	4429328
	M5 with mushroom manual override (lockable)	4373722
	M6 with mushroom manual override (not lockable)	4373490

Note

The information in this brochure relates to the operating conditions and applications described. For applications not described, please contact the relevant technical department. All technical details are subject to change without notice.