

## 4/2- and 4/3-directional spool valve hydraulically actuated pilot-operated 4WH 10

### DESCRIPTION

The 4WH valves in nominal size-10 are directional spool valves with hydraulic operation. They are used to control the start, stop and direction of the volume flow.

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

### FEATURES

- Hydraulically pilot-operated directional spool valve
- Electro-hydraulic operation via pilot valve NG 6 or hydraulic operation via interconnecting plate
- Volume flow rates up to 150 l/min
- The pilot supply and/or drain can be internal or external, which can be achieved by changing the plug
- Subplate mounting according to ISO 4401-05 and CETOP P05



Nominal size 10  
up to 150 l/min  
up to 320 bar

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# MODEL CODE

4WH E 10 D S01 /V /H

## Type

4/2- or 4/3 - directional spool valve, 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

## Nominal size

10

## Spool symbol <sup>1)</sup>

see page 3

## Type

- S01 = CETOP 4.2-4 P05-320 (Standard)
- S02 = ISO 4401-05-05-0-05

## Seal material

- N = NBR
- V = FKM (Standard)

## Options

- Not specified = without interconnecting plate (Standard)
- G = with check valve
- H = with stroke limitation of the main spool
- U = with interconnecting plate PATB, including mounting screws

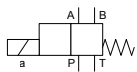
<sup>1)</sup> Other models on request

## SPOOL TYPES / SYMBOLS

### 4/2-DIRECTIONAL SPOOL VALVES

Type	Basic symbol	With intermediate position
D		

With return spring



### 4/3-DIRECTIONAL SPOOL VALVES

Type	Basic symbol	With intermediate position
E		
G		
H		
J		
Q		

## FUNCTION

The valves of the 4WH 10 type are directional spool valves, with hydraulic operation, which can control the start, stop and direction of the volume flow. They consist of the valve housing (1), the main control spool (2) and the return springs (3).

The fluid power supply of the valve is provided centrally via standard porting pattern.

Without pilot oil, the main control spool is centred in its middle position by the springs. Pressurisation is caused by actuation of the main control spool (2). The required pilot oil flows to port X and Y or is controlled to an additional pilot valve that is adopted to the valve. The pilot pressure depends on rate of volume flow. The minimal pilot pressure of 5 bar is sufficient only for low rates of volume flow. Pilot pressure has to be increased up to 12 bar by increasing rates of volume flow

Pressure loading on one of the two front sides of the main control spool (2) with pilot pressure causes the desired switching position, whereby the required ports will be linked.

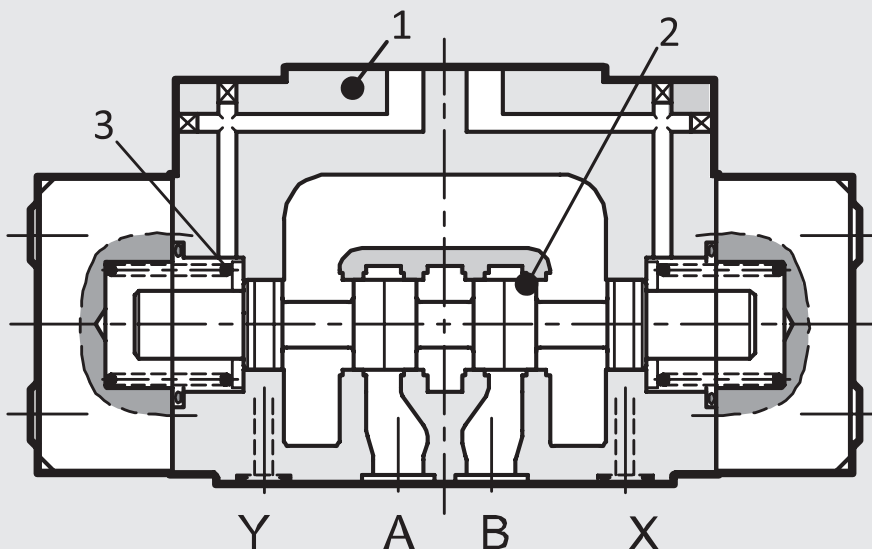
The spring, which is across from the pressurised control piston surface, causes the resetting of the piston into zero or initial position by relieving of pressure.

Two valve versions in nominal size 10 with different and non-compatible standard porting patterns are available for the hydraulic controlled valves of 4WH. The pilot pressure supplies X and Y are in different positions on the porting pattern. In the process, port X takes the pilot oil supply and port Y relieves the pressure of the pilot stage on the tank level of the pilot circuit. Port Y is used for pilot oil drain purposes and usually flows unpressurized (leakage port) into the tank.

Version **D01** according to ISO 4401-05-05-0-05

Version **D02** according to CETOP 4.2-4 P05-350

## SECTION VIEW



### 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 take place externally via port X and Y.

If the valve is used as main stage in a pilot-operated valve, there are four possible control types for each basic code. This can be seen in the model code.

The valve will be delivered correspondingly configured. Modification is possible afterwards. The glued threaded plugs will make disassembly more difficult.

- **Version "E"** – Pilot oil supply is external from a separate fluid power supply via port X. The pilot oil drain is also external via port Y.
- **Version "EI"** – Pilot oil supply is external from a separate fluid power supply via port X. The pilot oil drain is internal via port T.
- **Version "IE"** – Pilot oil supply is internal via port P. The pilot oil drain is external via port Y.
- **Version "I"** – Pilot oil supply is internal via port P. The pilot oil drain is internal via port T.

## TECHNICAL DATA

General performance data	
MTTF <sub>d</sub> :	According to EN ISO 13849-1:2015 Tables C1 & C2
Ambient temperature range: [°C]	-20 to +60
Installation position:	No orientation restrictions
Weight: [kg]	6.6
Material:	Valve casing: Cast iron
	Pole tube: Steel
	Coil casing: Steel
	Name plate: Aluminium
Surface coating:	Valve casing: Phosphate plated
	Pole tube: Zn-coating
	Coil casing: ZnNi-coating
Hydraulic specifications	
Operating pressure: [bar]	320
Pilot pressure min: [bar]	5 to 12 <sup>2</sup>
Pilot pressure max: [bar]	210
Pressure on port T with internal pilot oil drain: [bar]	max. 140
Pressure on port T with external pilot oil drain: [bar]	max. 210
Nominal flow: [l/min]	150
Operating fluid:	Hydraulic oil to DIN 51524 Part 1, 2 and 3
Media operating temperature range: [°C]	-20 to +80
Viscosity range: [mm <sup>2</sup> /s]	10 to 400
Permitted contamination level of operating fluid:	Class 20/18/15 according to ISO 4406
Sealing material:	FKM (Standard), NBR

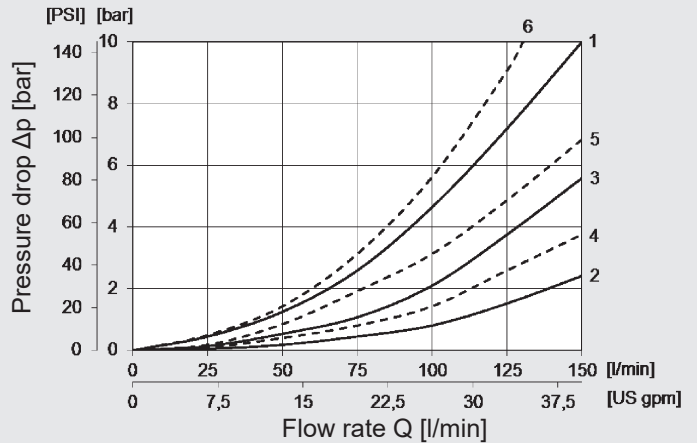
<sup>1</sup> see "Conditions and Instructions for Valves" in brochure 53.000

<sup>2</sup> 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.

## PERFORMANCE

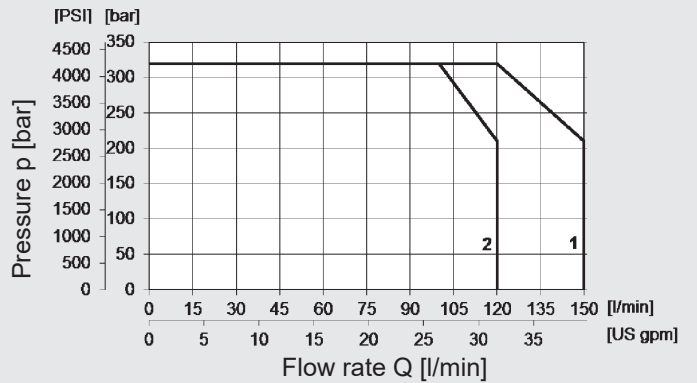
### Pressure drop

measured at  $v = 36 \text{ mm}^2/\text{s}$ ,  $T = 50 \text{ °C}$



### Performance limits

measured at  $v = 36 \text{ mm}^2/\text{s}$ ,  $T = 50 \text{ °C}$



### Performance assignment to the associated spools:

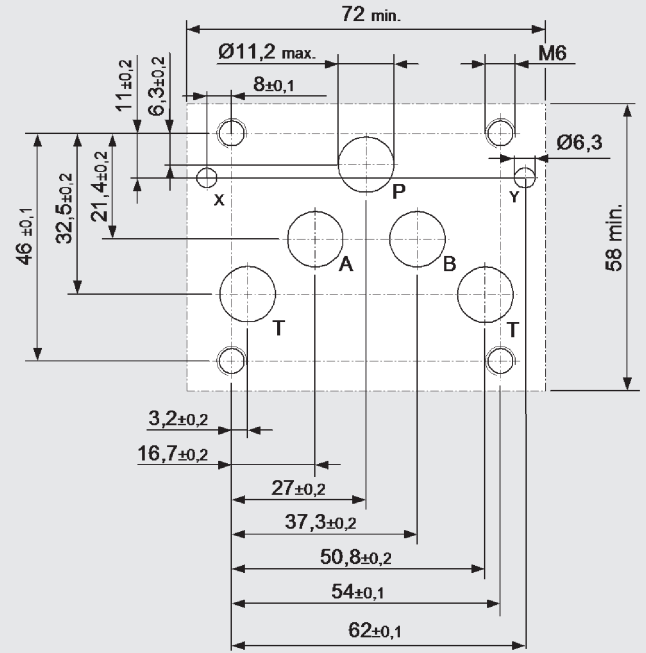
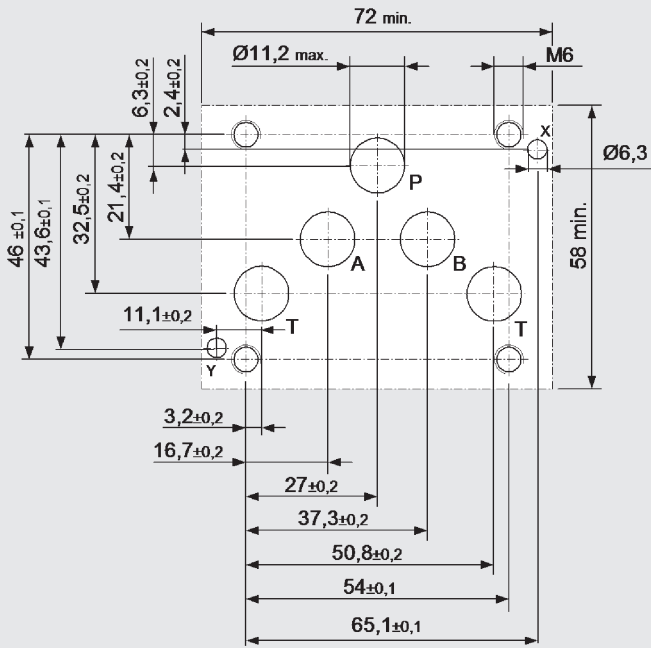
Spool	Switching position	Pressure drop					Performance limits
		P→A	P→B	A→T	B→T	P→T	
D	deenergized	1			3		1
	energized		1	4			
E	deenergized						1
	energized	1	1	2	3		
G	deenergized					6	2
	energized	6	6	3	5		
H	deenergized					6**	1
	energized	5	5	2	4		
J	deenergized	1	1	1●	1○		1
	energized	1	1	2	4		
Q	deenergized						1
	energized	1	1	2	2		

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

# DIMENSIONS

Interface according to CETOP 4.2-4 P05-320

Interface according to ISO 4401-05-05-0-05 (CETOP R5)

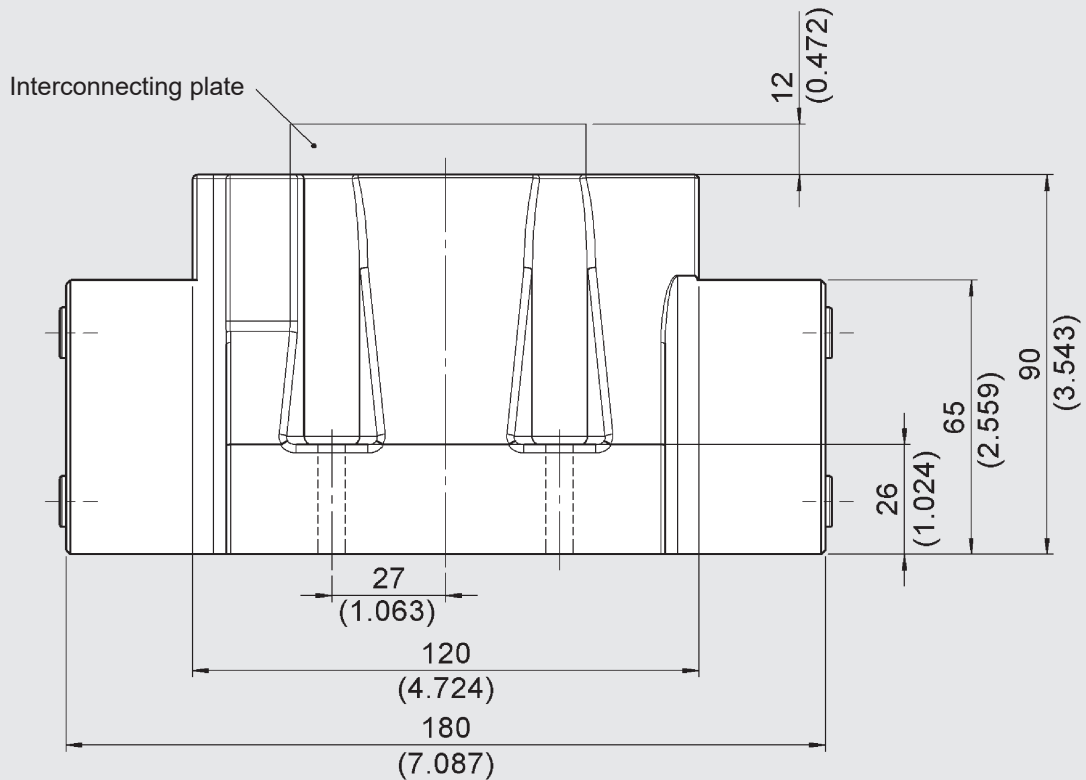
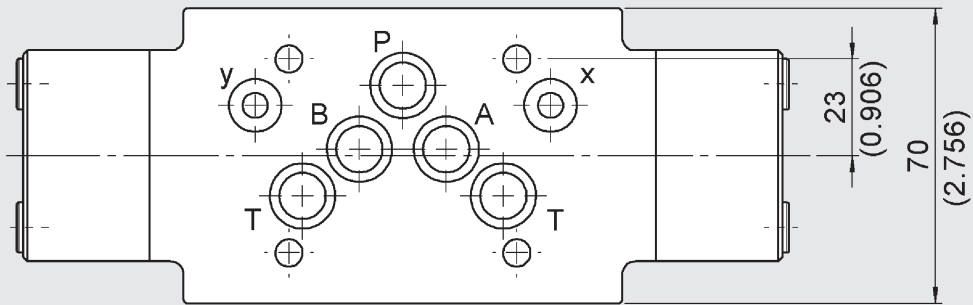


## Mounting screws:

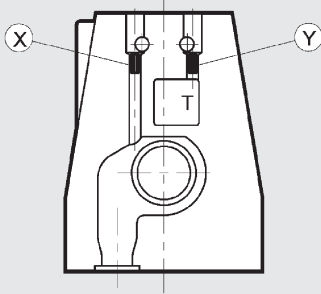
(not included in delivery)

4 screws ISO 4762 M6x35

Tightening torque: 8 Nm (screws A 8.8) -12 Nm (screws A 10.9)



## Plug

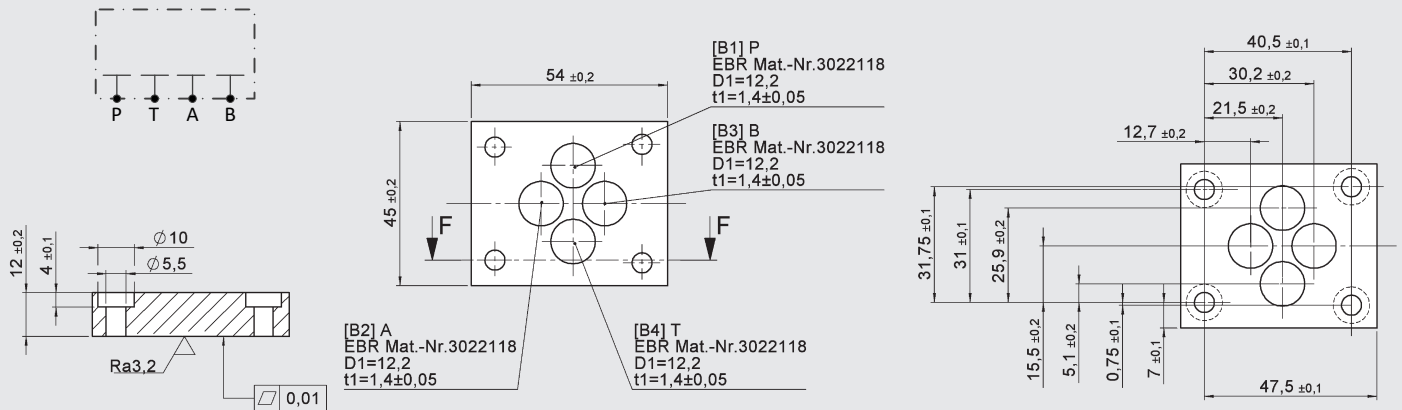


X: M5x6 for external pilot oil feed  
Y: M5x6 for external pilot oil drain

Control type		Installation	
		X	Y
E	Pilot oil drain and supply external	•	•
EI	Pilot oil supply external, pilot oil drain internal	•	–
I	Pilot oil drain and supply internal	–	–
IE	Pilot oil supply internal, pilot oil drain external	–	•

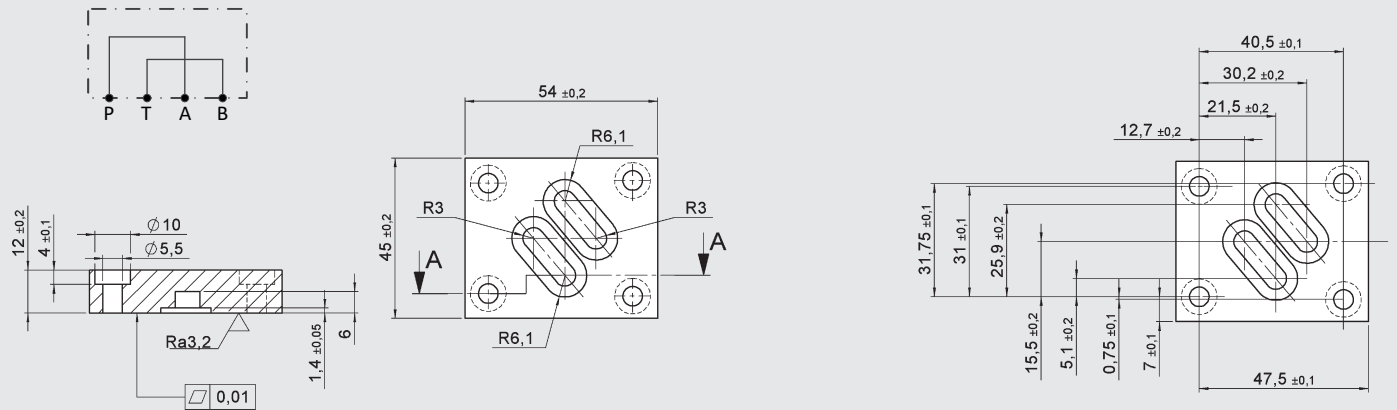
## Plates

### Check plate

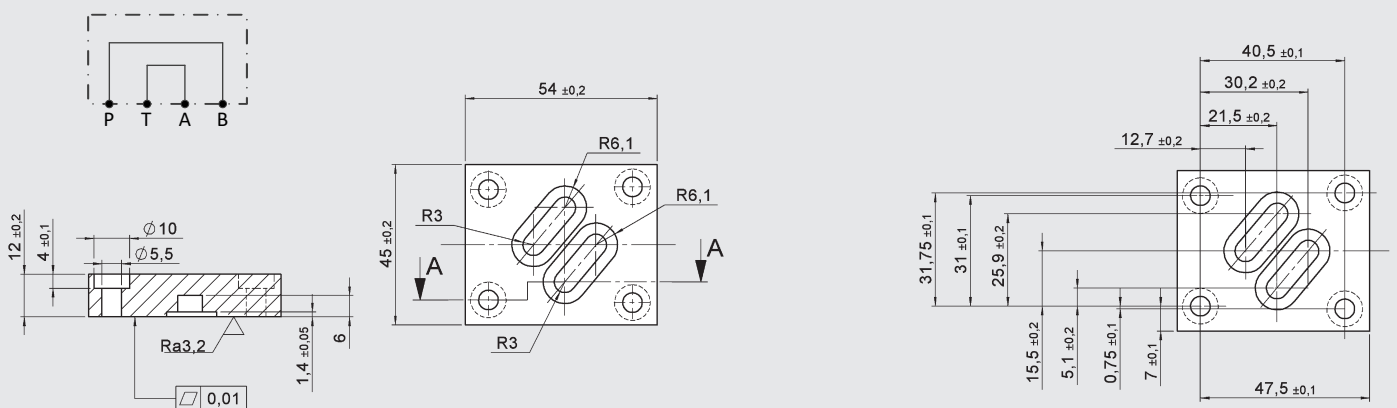


### Interconnecting plates

#### PBTB



#### PATA



## ACCESSORIES

	Designation	Part no.
Seal kits (7-part set)	12.42 x 1.78 -NBR -90 Sh (5 pieces)	3524475
	9.25 x 1.78 -NBR -90 Sh (2 pieces)	
	12.42 x 1.78 -FKM -90 Sh (5 pieces)	3524523
	9.25 x 1.78 -FKM -90 Sh (2 pieces)	
Mounting screws (4 pcs)	DIN EN ISO 4762-M6x35-10.9	3524691
Plug	M5x6 -45H	3524747
Plates	Check plate -NBR	3611576
	Check plate -FKM	3611580
	Interconnecting plate PATB -NBR	3581660
	Interconnecting plate PATB -FKM	3581661
	Interconnecting plate PBTA -NBR	3581662
	Interconnecting plate PBTA -FKM	3581663

## NOTE

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

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