

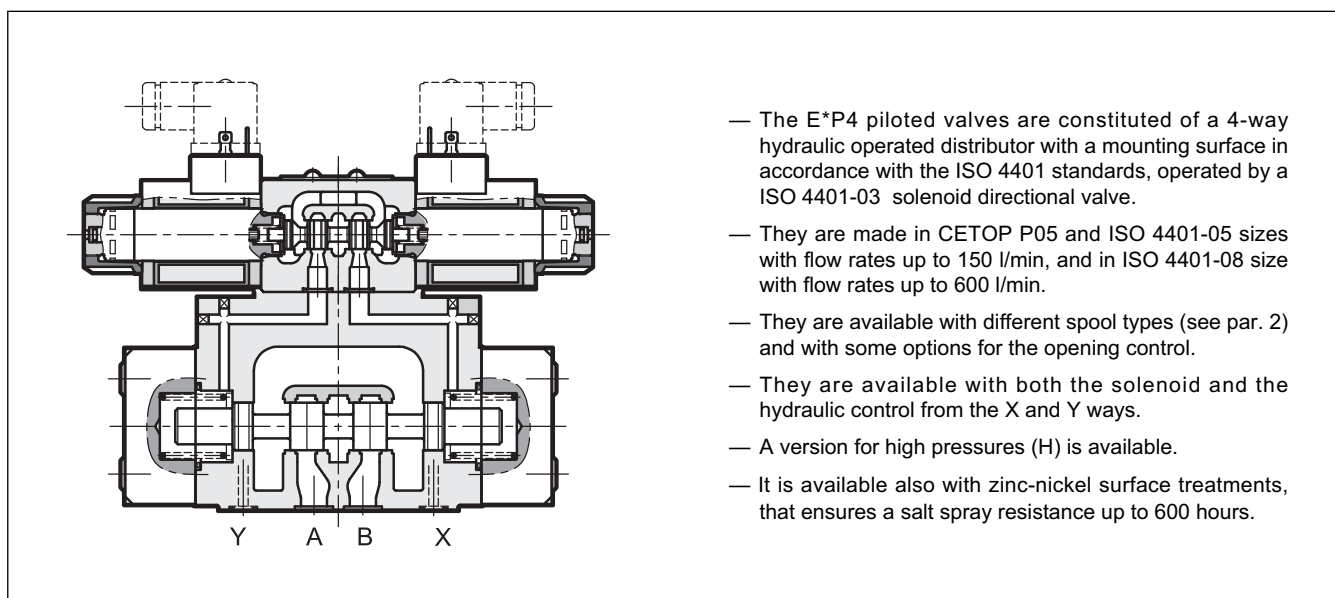
E*P4

PILOT OPERATED DISTRIBUTOR SOLENOID OR HYDRAULIC (C*P4) CONTROLLED

E4P4 CETOP P05
E4R4 ISO 4401-05
E5 ISO 4401-08

p max (see table of performances)
Q max (see table of performances)

OPERATING PRINCIPLE



- The E*P4 piloted valves are constituted of a 4-way hydraulic operated distributor with a mounting surface in accordance with the ISO 4401 standards, operated by a ISO 4401-03 solenoid directional valve.
- They are made in CETOP P05 and ISO 4401-05 sizes with flow rates up to 150 l/min, and in ISO 4401-08 size with flow rates up to 600 l/min.
- They are available with different spool types (see par. 2) and with some options for the opening control.
- They are available with both the solenoid and the hydraulic control from the X and Y ways.
- A version for high pressures (H) is available.
- It is available also with zinc-nickel surface treatments, that ensures a salt spray resistance up to 600 hours.

PERFORMANCES

(obtained with mineral oil of viscosity of 36 cSt at 50°C)

		E4*4	E4HP4	E5P4	E5HP4
Maximum operating pressure - ports P - A - B - port T (external drainage) - port T (internal drainage) (DC / AC)	bar	320 210 210 / 160	420 350 210 / 160	320 210 210 / 160	420 350 210 / 160
Maximum flow rate from port P to A - B - T	l/min	150		600	
Ambient temperature range	°C	-20 / +50			
Fluid temperature range	°C	-20 / +80			
Fluid viscosity range	cSt	10 ÷ 400			
Fluid contamination degree	according to ISO 4406:1999 class 20/18/15				
Recommended viscosity	cSt	25			
Mass: E*P4-S, RK E*P4-TA/TC	kg	7 6,4		15,6 15,0	

1 - IDENTIFICATION CODE FOR SOLENOID CONTROLLED DISTRIBUTOR

E		P	4	-		/				/		-			/	
----------	--	----------	----------	----------	--	----------	--	--	--	----------	--	----------	--	--	----------	--

Directional valve, solenoid controlled, pilot operated

Size: _____

4 = CETOP P05
5 = ISO 4401-08 (CETOP 08)

Option _____

(Omit for standard version)
H = high pressure version
p_{max} = 420 bar
E4HP4-S4 not available

P = Subplate mounting
R = Mounting interface
ISO 4401-05-05-0-05
(for E4 only - not available for high pressure version H)

Number of ways _____

Spool type (see par. 2): _____

S* **TA***
TA** **TC
TC** **RK

Options - see par. 10 (omit if not required): _____

C = main spool stroke control
D = main spool shifting speed control
G = main spool stroke and shifting speed control
PF = subplate with restrictor Ø0,8 on port P placed under solenoid valve

Piloting: _____

Omit for internal piloting
E = external pilot
Mandatory for spools types: S2 - S4 - S7 - S8 - TA002 - TC002 - RK002.
With these spools the internal piloting is possible only with E5 valve with C3 option.

Drainage: _____

Omit for external drainage, which is recommended when the valve is used with backpressure on the tank line.
I = internal drainage

Option: _____

/ C3 = Check valve incorporated on line P setting 5 bar
Option available for E5 valves only. See paragraph 8.1

Option:
/ W7 = Zinc-nickel surface treatment (see **NOTE 2**)
Omit if not required

Manual override:
omit for override integrated in the tube (**standard**)
CM = manual override, boot protected (see paragraph 16)

Coil electrical connection (see par. 14):
K1 = plug for connector type DIN 43650 (**standard**)
K7 = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S (available on D12 and D24 coils only)

Power supply (see paragraph 9)
direct current
D12 = 12 V
D24 = 24 V
D48 = 48 V
D110 = 110 V
D220 = 220 V
D00 = valve without coils (see **NOTE 1**)

alternate current
A24 = 24 V - 50 Hz
A48 = 48 V - 50 Hz
A110 = 110 V - 50 Hz / 120 V - 60 Hz
A230 = 230 V - 50 Hz / 240 V - 60 Hz
A00 = valve without coils (see **NOTE 1**)
F110 = 110 V - 60 Hz
F220 = 220 V - 60 Hz

Seals:
N = NBR seals for mineral oils (**standard**)
V = FPM seals for special fluids

Series No.:
50 - for valve E4
40 - for valve E5
(the overall and mounting dimensions within the same ten remain unchanged)

NOTE 1: Coils locking ring and related OR are supplied together with valves.

NOTE 2: The standard valve is supplied with surface treatment of phosphating black.

The zinc-nickel finishing on the valve body (both main and pilot) makes the valve suitable to ensure a salt spray resistance up to **240** hours (test operated according to UNI EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

For a salt spray resistance up to **600** hours refer to paragraph 1.1.

1.1 - High corrosion resistance version

This version, available for the basic valve (without option of par. 10) features the zinc-nickel coating on all exposed metal parts of the valve, making it resistant to exposure to the salt spray for **600 hours** (test performed according to UNI EN ISO 9227 and assessment test performed according to UNI EN ISO 10289).

The coil are DC only and specific for this version, featuring a zinc-nickel surface treatment. The coil for DEUTSCH connector has a diode inside. Electrical features at paragraph 9.2. The boot manual override (CM) is installed as standard in order to protect the solenoid tube.

Follow the identification code below to order it

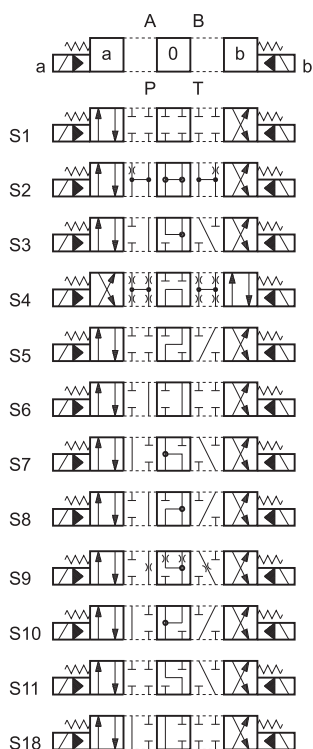
<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> E.... </div> <p>Choices as in standard identification code</p> <p>DC power supply _____</p> <p>D12 = 12 V D24 = 24 V</p>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> / </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> / </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> CM </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> / </div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> W7 </div>
<div style="display: flex; justify-content: space-between;"> <div> <p>Manual override, boot protected</p> </div> <div> <p>Coil electrical connection (see par. 15)</p> <p>WK1 = plug for connector type DIN 43650</p> <p>WK7D = plug DEUTSCH DT04-2P, for male connector type DEUTSCH DT06-2S. Coil with diode.</p> </div> </div>					

2 - SPOOLS TYPES

Symbols are referred to the solenoid valve **E***. For the hydraulic operated version **C*** please verify the connection scheme (see par. 4).

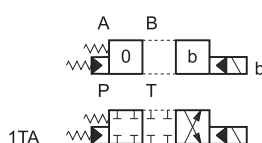
Type S:

3 positions with spring centering



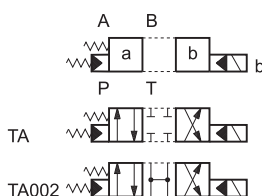
Type *TA:

2 positions (central + external) with spring centering



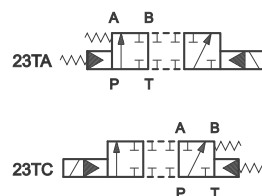
Type TA:

2 external positions with return spring



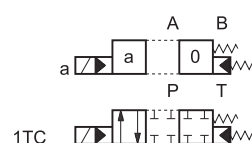
Type 23 (TA/TC):

3-way, 2 external positions with return spring



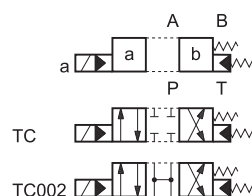
Type *TC:

2 positions (central + external) with spring centering



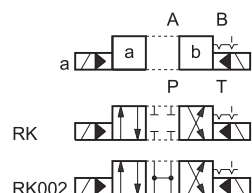
Type TC:

2 external positions with return spring



Type RK:

2 positions with mechanical detent on pilot valve



Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.

3 - IDENTIFICATION CODE FOR HYDRAULIC CONTROLLED DISTRIBUTOR C*P4

C			P	4	-			/	E	/		
----------	--	--	----------	----------	----------	--	--	----------	----------	----------	--	--

Hydraulic operated directional valve through X and Y lines

Size: _____
4 = CETOP P05
5 = ISO 4401-08 (CETOP 08)

Option (Omit for standard version) _____
H = high pressure version pmax = 420 bar
C4HP4-S4 not available

Mounting: _____
P = Subplate mounting
R = Mounting interface ISO 4401-05-05-0-05 (CETOP R05) only for C4 standard valve.

Number of ways _____

Spool type (see paragraph 2) _____
S* **TA***
TA** **TC
***TC**

Option:
/ W7 = Zinc-nickel surface treatment (see **NOTE**)
 Omit if not required

Seals:
 omit for mineral oils (**standard**)
V = FPM seals for special fluids

Series No.:
43 - for valve C4
34 - for valve C5
 (the overall and mounting dimensions within the same ten remain unchanged)

External piloting
 External drainage
 (see paragraph 8)

Spool type

The distributor is delivered with short-circuit subplate. The X and Y ports are used for the hydraulic control of the valve.

C*P4-S*

C*P4-TA

C*P4-TC

Overall dimensions

4 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N for solenoid controlled distributors, omit for hydraulic controlled). For fluids HFDR type (phosphate esters) use FPM seals (code V).

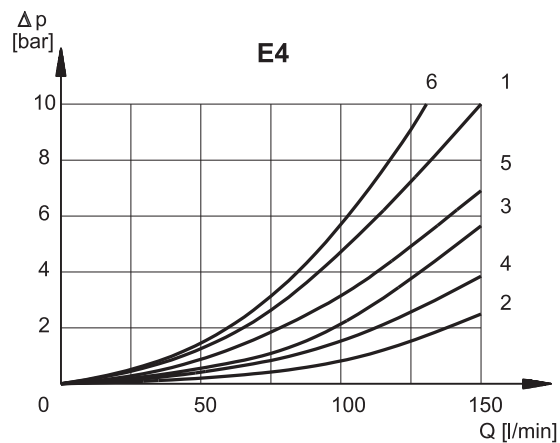
For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics.

The fluid must be preserved in its physical and chemical characteristics.

5 - PRESSURE DROPS Δp -Q

(values obtained with viscosity 36 cSt at 50 °C)

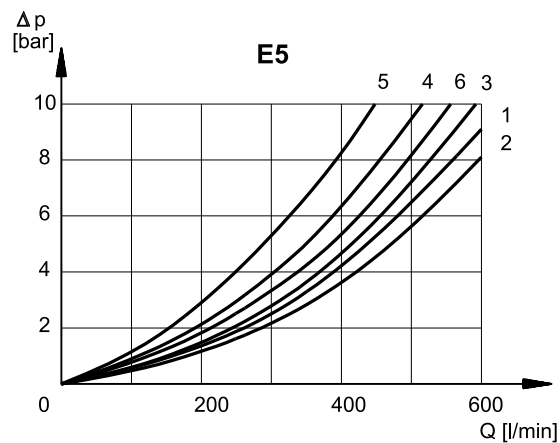
5.1 - Pressure drops E4P4



SPOOL TYPE	SPOOL POSITION	E4					
		CONNECTIONS					
		P → A	P → B	A → T	B → T	P → T	
		CURVES ON GRAPH					
S1	Energized	1	1	2	3		
S2	De-energized Energized	5	5	2	4	6*	
S3	De-energized Energized	1	1	1* 2	1° 4		
S4	De-energized Energized	6	6	3	5	6	
S5	De-energized Energized	1	1 5	2	3		
S6	De-energized Energized	1	1	2	1 4		
S7	De-energized Energized	6	6	3	5	6°	
S8	De-energized Energized	6	6	3	5	6*	
S9	Energized	1	1	2	2		
S10	De-energized Energized	1° 5	1° 5	2	3		
S11	De-energized Energized	1	1	1 2	3		
S18	De-energized Energized	5 5	1	2	3		
TA	De-energized Energized	1	1	4	3		
RK	Energized	1	1	4	3		

* A-B blocked • B blocked ° A blocked

5.2 - Pressure drops E5P4



SPOOL TYPE	SPOOL POSITION	E5				
		CONNECTIONS				
		P → A	P → B	A → T	B → T	P → T
		CURVES ON GRAPH				
S1	Energized	1	1	2	3	
S2	De-energized Energized	2	2	1	2	6*
S3	De-energized Energized	1	1	4* 1	4° 2	
S4	De-energized Energized	6	6	3	4	5
S5	De-energized Energized	1	4 2	2	3	
S6	De-energized Energized	1	1	2	4 2	
S7	De-energized Energized	6	6	3	4	5°
S8	De-energized Energized	6	6	4	3	5*
S9	Energized	1	1	2	3	
S10	De-energized Energized	4* 2	4° 2	2	3	
S11	De-energized Energized	1	1	3 1	3	
S18	De-energized Energized	4 2	1	2	3	
TA	De-energized Energized	1	1	2	3	
RK	Energized	1	1	2	3	

* A-B blocked • B blocked ° A blocked

6 - SWITCHING TIMES

6.1 - E4P4

The values indicated refer to a solenoid valve working with piloting pressure of 100 bar, with mineral oil at a temperature of 50°C, at viscosity of 36 cSt and with PA and BT connections.

The energizing and de-energizing times are obtained at the pressure variation which occurs on the lines.

E4				
TIMES (± 10%) [ms]	ENERGIZED		DE-ENERGIZED	
	2 Pos.	3 Pos.	2 Pos.	3 Pos.
CA solenoid	35	25	35	25
DC solenoid	60	50	50	40

6.2 - E5P4

The values indicated refer to a solenoid valve working with piloting pressure of 100 bar, with mineral oil at a temperature of 50°C, at viscosity of 36 cSt and with PA and BT connections.

The energizing and de-energizing times are obtained at the pressure variation which occurs on the lines.

E5				
TIMES (± 10%) [ms]	ENERGIZED		DE-ENERGIZED	
	2 Pos.	3 Pos.	2 Pos.	3 Pos.
CA solenoid	70	40	70	40
DC solenoid	100	70	80	50

7 - PERFORMANCE CHARACTERISTICS

E4 - PRESSURES [bar]	E4*4	E4HP4	C4*4	C4HP4
Max pressure in P, A, B ports	320	420	320	420
Max pressure in T line with external drainage	210	350	210	350
Max pressure in T line with internal drainage	210 (DC) 160 (AC)	210 (DC) 160 (AC)	-	-
Max pressure in Y line with external drainage	210 (DC) 160 (AC)	210 (DC) 160 (AC)	-	-
Min piloting pressure NOTE 1	5 ÷ 12			
Max piloting pressure	210	350	210	350

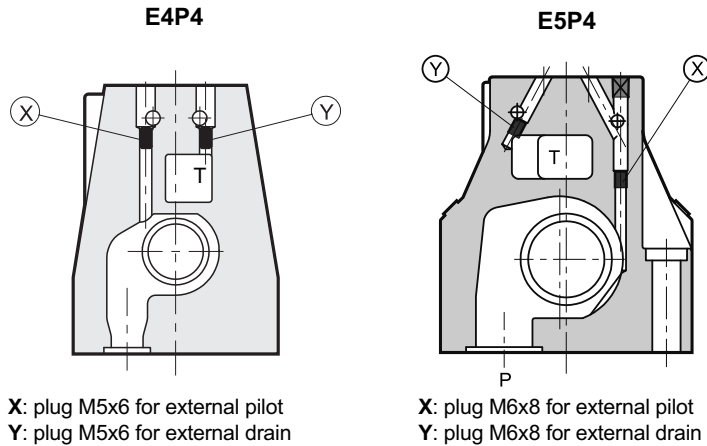
E5 - PRESSURES [bar]	E4*4	E4HP4	C4*4	C4HP4
Max pressure in P, A, B ports	320	420	320	420
Max pressure in T line with external drainage	210	350	210	350
Max pressure in T line with internal drainage	210 (DC) 160 (AC)	210 (DC) 160 (AC)	-	-
Max pressure in Y line with external drainage	210 (DC) 160 (AC)	210 (DC) 160 (AC)	-	-
Min piloting pressure NOTE 1	5 ÷ 12			
Max piloting pressure	210	350	210	350

NOTE 1 minimum piloting pressure can be the lower range value at low flows rates, but with higher flow rates the higher value is needed.

MAXIMUM FLOW RATES [l/min]	E4		E5	
Spool type	PRESSURES			
	at 210 bar	at 320 bar	at 210 bar	at 280 bar
S4, S7, S8	120	100	500	450
All other spools	150	120	600	500

8 - PILOTING AND DRAINAGE

The E*P4 valves are available with piloting and drainage, both internal and external. The version with external drainage allows for a higher back pressure on the outlet.

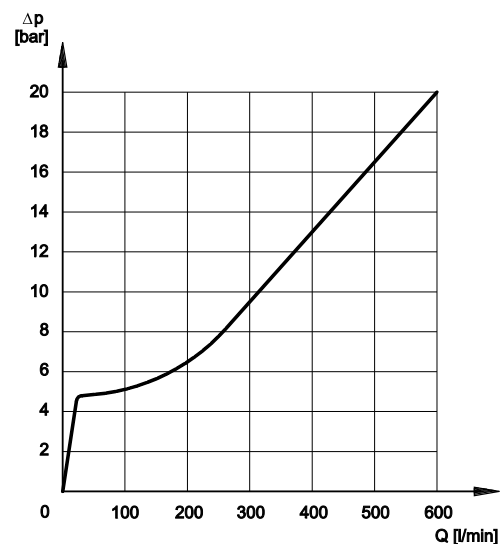
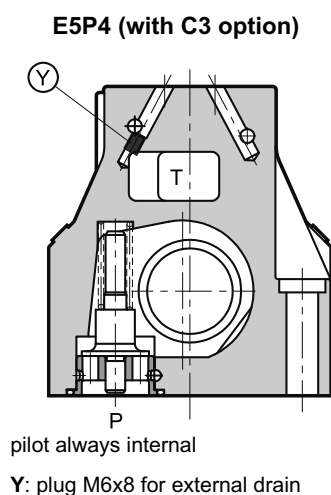
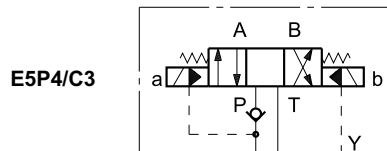


TYPE OF VALVE		Plug assembly	
		X	Y
E*P4-**	INTERNAL PILOT AND EXTERNAL DRAIN	NO	YES
E*P4-**/I	INTERNAL PILOT AND INTERNAL DRAIN	NO	NO
E*P4-**/E	EXTERNAL PILOT AND EXTERNAL DRAIN	YES	YES
E*P4-**/EI	EXTERNAL PILOT AND INTERNAL DRAIN	YES	NO

8.1 - Backpressure valve incorporated on line P available for E5 valve only)

Valve E5 is available upon request with backpressure valve incorporated on line P. This is necessary to obtain the piloting pressure when the control valve, in the rest position, has the line P connected to the T outlet (spools S2 - S4 - S7 - S8 - TA002 - TC002 - RK002). The cracking pressure is of 5 bar.

Add **C3** to the identification code for this request (see paragraph 1). In the **C3** version the piloting is always internal.



NOTE: the backpressure valve can't be used as direct check valve because it doesn't assure the seal.

The curve refers to the pressure drop (body part only) with backpressure valve energized to which the pressure drop of the reference spool must be added. (see paragraph 5)

9 - ELECTRICAL FEATURES

9.1 - Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation.

The coil is fastened to the tube by a threaded ring, and can be rotated 360°, to suit the available space.

NOTE 1: In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see catalogue. 49 000).

Protection from atmospheric agents IEC 60529

Connection	IP 65	IP 67	IP 69 K
K1 DIN 43650	x (*)		
K7 DEUTSCH DT04 male	x	x	x (*)

(*) The protection degree is guaranteed only with the connector correctly connected and installed

VOLTAGE SUPPLY FLUCTUATION	±10% Vnom
MAX SWITCH ON FREQUENCY E4 E5	10.000 ins/hr 8.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE 1)	According to 2004/108/EC
LOW VOLTAGE	According to 2006/95/EC
CLASS OF PROTECTION: Atmospheric agents (IEC 60529) Coil insulation (VDE 0580) Impregnation: DC valve AC valve	IP 65 (NOTE 2) class H class F class H

9.2 - DC coils

In direct current energizing, current consumption stays at fairly constant values, essentially determined by Ohm's law: $V = R \times I$.

The WK1 and WK7D are coils specific for the high corrosion resistance version of the valve.

The WK7D coil includes a suppressor diode of pulses for protection from voltage peaks during switching. During the switching the diode significantly reduces the energy released by the winding, by limiting the voltage to 31.4V in the D12 coil and to 58.9 V in the D24 coil.

Using connectors type "D" (see cat. 49 000) with embedded bridge rectifier it is possible to feed DC coils (starting from 48V voltage) with alternating current (50 or 60 Hz), considering a reduction of the operating limits by approximately 5 ÷ 10%.

The table shows current and power consumption values relevant to DC coils.

(values ±10%)

	Resistance at 20°C [Ω]	Current consumption [A]	Power consumption [W]	Coil code			
				K1	WK1	K7	WK7D
D12	4,4	2,72	32,7	1903080	1903050	1902940	1903400
D24	18,6	1,29	31	1903081	1903051	1902941	1903401
D48	78,6	0,61	29,5	1903083			
D110	436	0,26	28,2	1903464			
D220	1758	0,13	28,2	1903465			

9.3 - AC coils

The table shows current and power consumption values at inrush and at holding, relevant to the different coil types for AC current.

Coils for alternating current (values ± 5%)

Suffix	Nominal Voltage [V]	Freq. [Hz]	Resistance at 20°C [Ohm] (±1%)	Current consumption at inrush [A] (±5%)	Current consumption at holding [A] (±5%)	Power consumption at inrush (±5%) [VA]	Power consumption at holding (±5%) [VA]	Coil Code
A24	24	50	1,46	8	2	192	48	1902830
A48	48		5,84	4,4	1,1	204	51	1902831
A110	110V-50Hz 120V-60Hz	50/60	32	1,84	0,46	192	48	1902832
				1,56	0,39	188	47	
A230	230V-50Hz 240V-60Hz		140	0,76	0,19	176	44	1902833
				0,6	0,15	144	36	
F110	110	60	26	1,6	0,4	176	44	1902834
F220	220		106	0,8	0,2	180	45	1902835

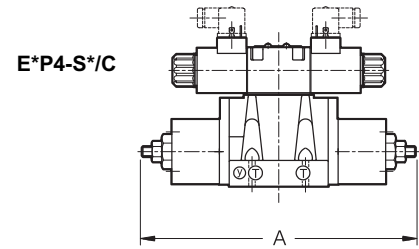
10 - OPTIONS

10.1 - Control of the main spool stroke: C

It is possible to introduce special stroke controls in the heads of the hydraulic pilot operated valve so as to vary the maximum spool clearance opening.

This solution allows control of the flow rate from the pump to the actuator and from the actuator to the outlet, obtaining a double adjustable control on the actuator.

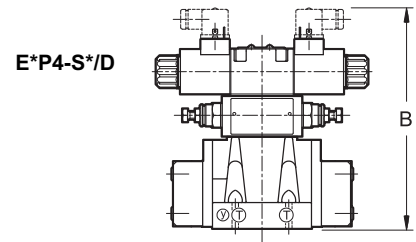
Add the letter **C** to the identification code to request this device (see paragraph 1).



10.2 - Control of the main spool shifting speed: D

By placing a MERS type double flow control valve between the pilot solenoid valve and the hydraulic operated valve, the piloted flow rate can be controlled and therefore the changeover smoothness can be varied.

Add the letter **D** to the identification code to request this device (see paragraph 1).



10.3 - Subplate with throttle on line P

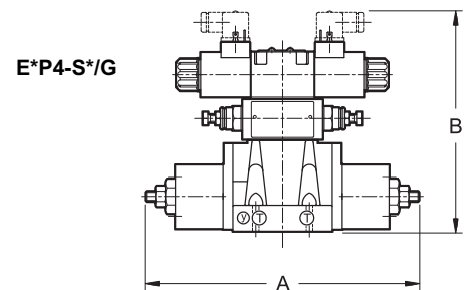
It is possible to introduce a subplate with a restrictor of $\varnothing 0,8$ on line P between the pilot solenoid valve and the main distributor.

Add **PF** to the identification code to request this option (see paragraph 1).

10.4 - Control of the main spool stroke and shifting speed: G

It is possible to have the valve fitted with both the spool stroke device and the piloting flow rate control device.

Add the letter **G** to the identification code to request this solution (see paragraph 1).



dimensions in mm

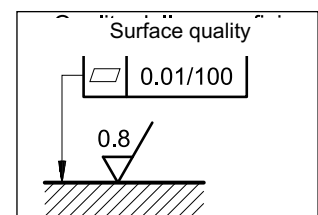
	E4	E5
A	280	401,5
B	218	254

11 - INSTALLATION

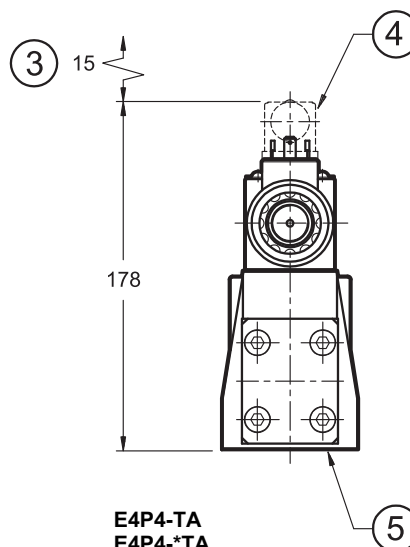
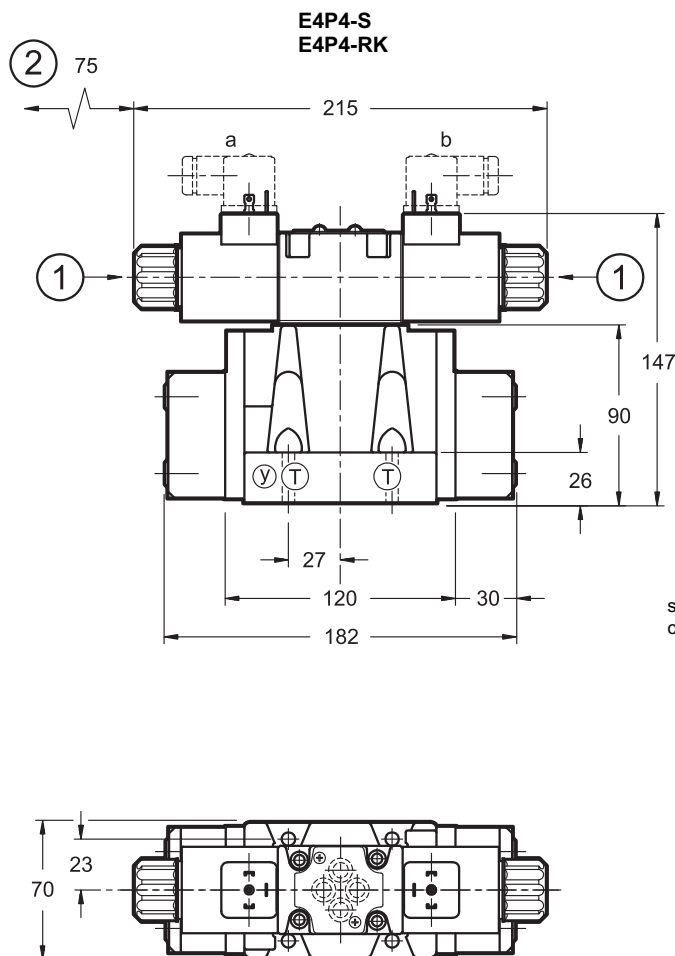
Configurations with centering and recall springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal.

Valve fastening takes place by means of screws or tie rods, laying the valve on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

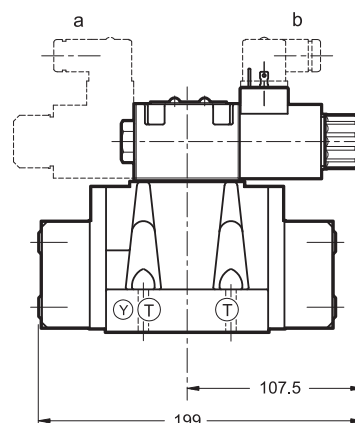
NOTE: Use of class 10.9 fastening screws is recommended for valves in version H (high pressure).



12 - E4 OVERALL AND MOUNTING DIMENSIONS



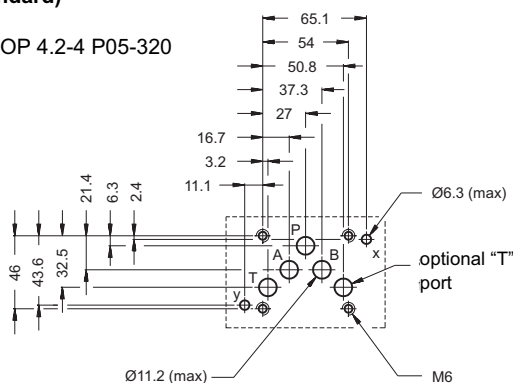
solenoid position
configuration TC/*TC



MOUNTING INTERFACES

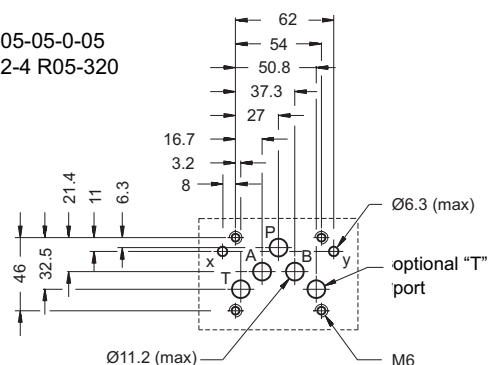
(standard)

CETOP 4.2-4 P05-320



Valves with ISO 4401-05-05-0-05 mounting interface are available upon request. See par. 1 for their identification.

ISO 4401-05-05-0-05
CETOP 4.2-4 R05-320

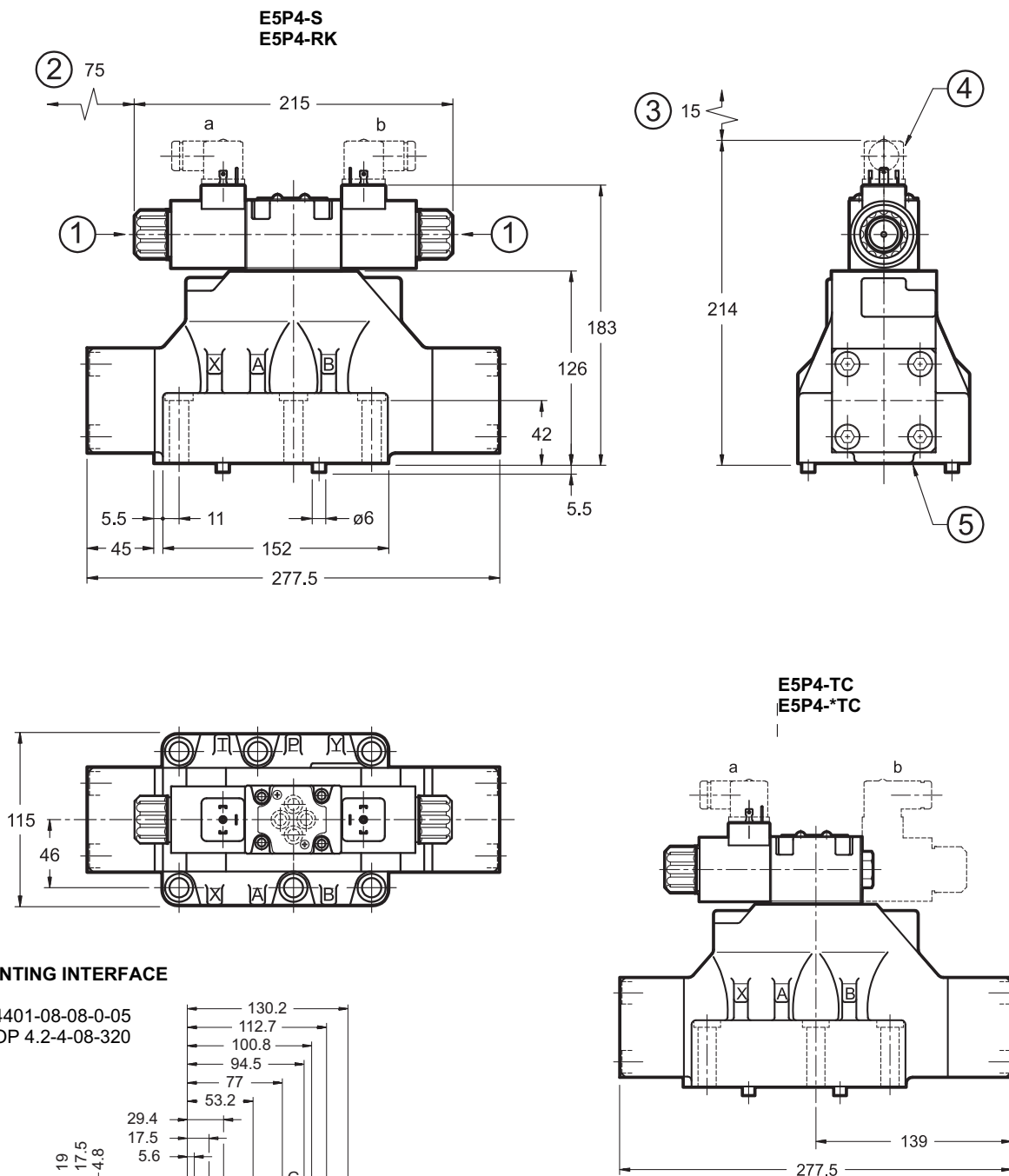


dimensions in mm

Valve fastening: 4 SHCS ISO 4762 M6x35 (see par. 11, NOTE)
Tightening torque: 8 Nm (bolt A 8.8) - 12 Nm (bolt A 10.9)
Threads of mounting holes: M6x10
Sealing rings: N. 5 OR type 2050 (12.42x1.78) - 90 Shore N. 2 OR type 2037 (9.25x1.78) - 90 Shore

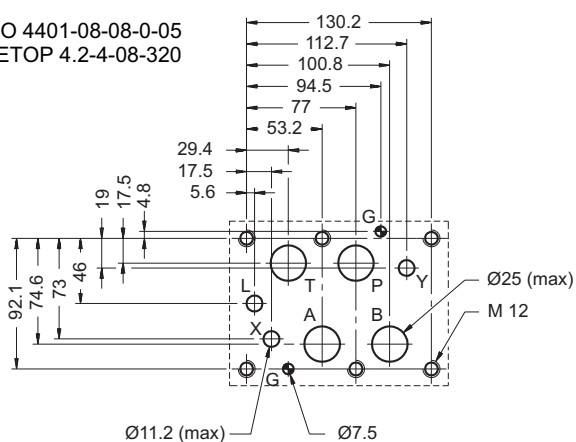
1	Manual override
2	Coil removal space
3	Connector removal space
4	Electric connector (to be ordered separately)
5	Mounting surface with sealing rings

13 - E5 OVERALL AND MOUNTING DIMENSIONS



MOUNTING INTERFACE

ISO 4401-08-08-0-05
CETOP 4.2-4-08-320



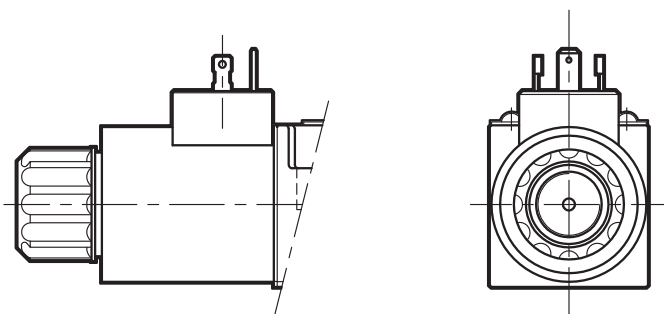
dimensions in mm

Valve fastening: 6 SHCS ISO 4762 M12x60 (see par. 11, NOTE)	
Tightening torque: 69 Nm (bolt A 8.8) - 115 Nm (bolt A 10.9)	
Threads of mounting holes: M12x20	
Sealing rings:	4 OR type 3118 (29.82x2.62) - 90 Shore 2 OR type 3081 (20.24x2.62) - 90 Shore

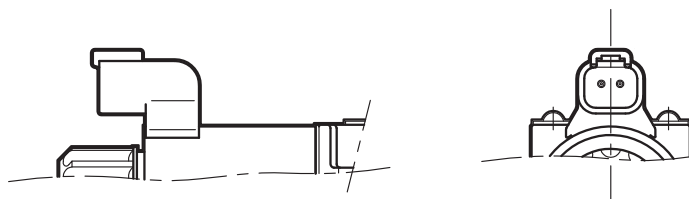
1	Manual override
2	Coil removal space
3	Connector removal space
4	Electric connector (to be ordered separately)
5	Mounting surface with sealing rings

14 - ELECTRIC CONNECTIONS

connection for DIN 43650
connector
code **K1 (standard)**
code **WK1** (W7 version only)



connection for
DEUTSCH DT06-2S male
connector type
code **K7**



connection for
DEUTSCH DT06-2S male
connector - coil with diode
code **WK7D** (W7 version only)



15 - ELECTRIC CONNECTORS

The valves are delivered without connectors. Connectors for K1/ WK1 connections (DIN 43650) can be ordered separately. See catalogue 49000.

16 - MANUAL OVERRIDE

Whenever the solenoid valve installation may involve exposure to atmospheric agents or use in tropical climates, the manual override, boot protection is recommended. For overall dimensions see catalogue 41 150.

Add the suffix **CM** to request this device (see paragraph 1).

17 - SUBPLATES

(see catalogue 51 000)

These plates are not suitable for high pressure valves E4HP4 and E5HP4..

	E4	E5
Type with rear ports	PME4-AI5G	
Type with side ports	PME4-AL5G	PME5-AL8G
P, T, A, B, port dimensions	3/4"	1½" BSP
X, Y port dimensions	1/4" BSP	1/4" BSP



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