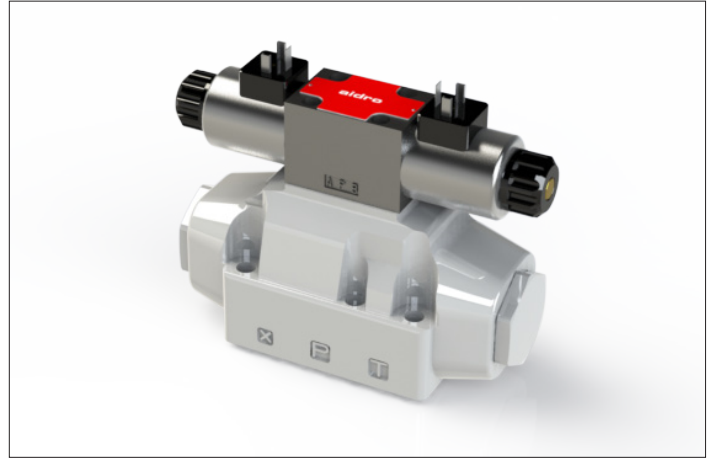
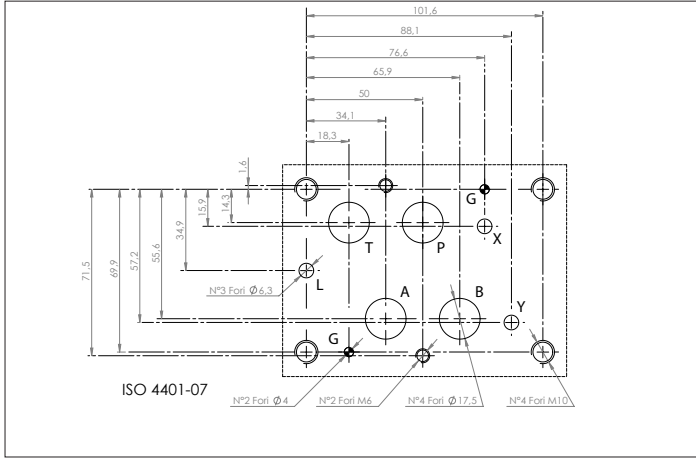


**4/2 AND 4/3 DIRECTIONAL CONTROL VALVES
PILOT OPERATED CETOP 07 (size 16)
TYPE HD7-***



DESCRIPTION

The HD7-ES solenoid operated - hydropiloted valves are consisting of an HD3-ES type solenoid operated directional control valve (see data sheet HD-310/1) that operates a 4-way hydropiloted control valve with a connection surface in accordance with the CETOP standards. They are available in various configurations and spool types. The pilot and the drain connections can be made internal or external by inserting or removing the accordant threaded plugs located in the main directional control valve.

A wide range of configurations and different solenoid operated-hydropiloted directional control valve spool positions are available:
- 4-way, 3-position directional control valve, with two solenoids; positioning of the spool in center position is obtained with centering springs.

- 4-way, 2-position directional control valve with one solenoid; positioning of the spool in center position is determined hydraulically by the pilot valve and mechanically (even without pressure) by the main stage return spring.

- 4-way, 2-position directional valve, with two solenoids, with mechanical detent of the shifted pilot spool positions when solenoids are de-energized.

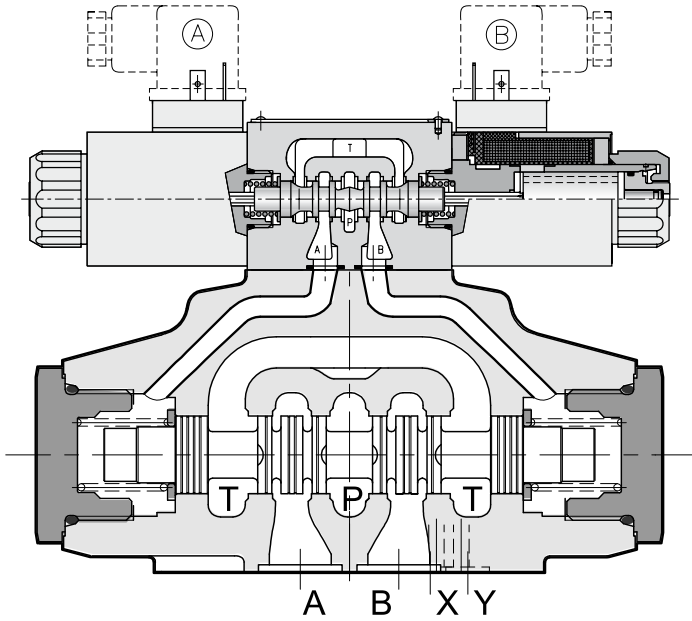
The basic surface treatment of the valve housing is phosphate coated and the solenoids are zinc coated.

HOW TO READ THE MODEL CODE FOR VALVES HD7-ES -*

HD7 - (ES) - (1) (C) / (*) (E) - (024C) / 50
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧

- ① **HD7** : 4-way directional control valve CETOP 07 - Pressure 32 MPa (320 bar)
- ② **(ES)** : ES : electrically controlled, standard
 HH : hydraulically piloted (main body)
- ③ **(1)** : spool type (see table)
- ④ **(C)** : solenoid(s) and spring(s) arrangement, see also functional symbols
 C : 2 sol. spool is spring centered (3 position)
 N : 2 sol. pilot is detented (2 position)
 LL : 1 sol. (a), spool is spring/hydr. offset (2 position, end to end)
 ML : 1 sol. (a), spool is spring offset (2 position, middle to end)
 LM : 1 sol. (a), spool is spring offset (2 position, end to middle)
- ⑤ **(*)** : code reserved for options and variants
 B : only for versions LL, MI, LM, see also functional symbols
 C : adjustable limits for main spool stroke
 D : double flow control valve to adjust shifting speed
 G : adjustable limits and adjustable shifting speed
 P : check valve incorporated in P port of the valve
- ⑥ **(E)** : Pilot and drain arrangement
 - : internal pilot and external drain (standard)
 I : internal pilot and internal drain
 E : external pilot and external drain
- ⑦ **(024C)** : Electric voltage and solenoid coils
 0000 : no coil(s)
 012C : coil(s) for V12DC
 024C : coil(s) for V24DC
 115A : coil(s) for V110/50 - V115/60 AC
 230A : coil(s) for V220/50 - V230/60 AC
 See also electric characteristic
- ⑧ Design number (progressive) of the valves

TECHNICAL DATA



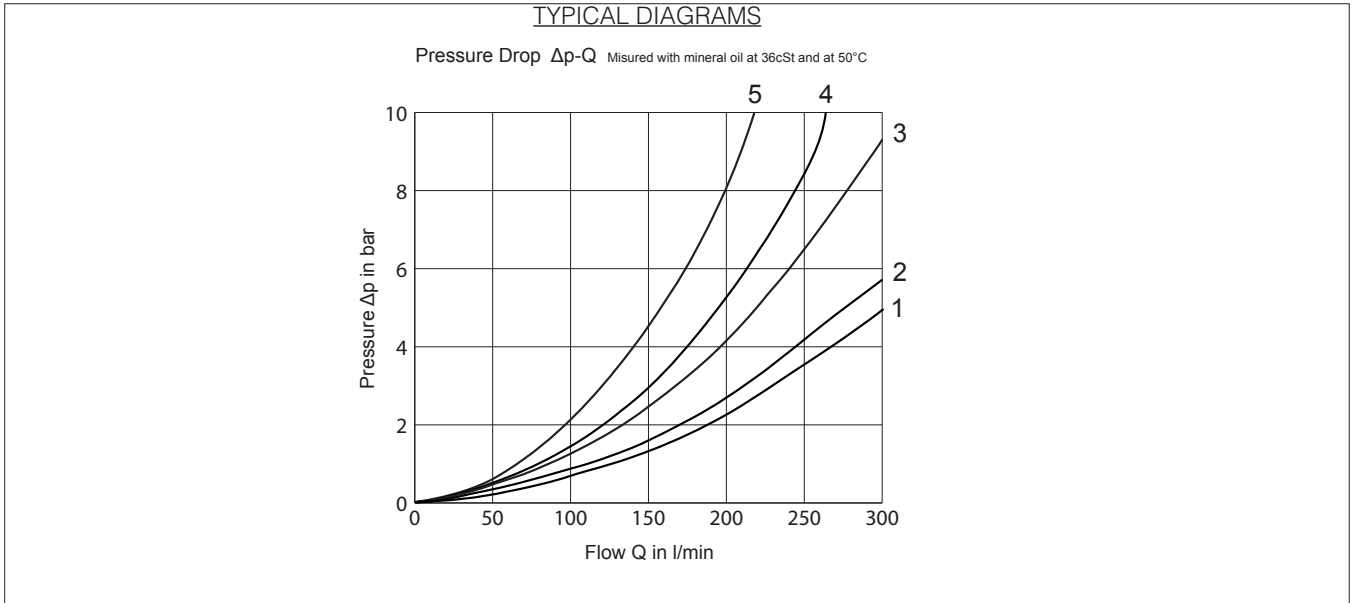
Max. recommended flow (spring centering)	250 l/min
Max. recommended flow	350 l/min
Max pressure at P, A, B ports	320 bar
Max pressure at T port (internal drain)	160 bar
Max pressure at T port (external drain)	250 bar
Pilot pressure minimum	5 bar
Pilot pressure Max. recommended	200 bar
Mass: HD7-ES	approx. 8,5 Kg
HD7-HH	approx. 7,0 Kg

FUNCTIONAL SYMBOL

Symbols are referred to the solenoid valve. For the hydraulic control version please verify the connection scheme.

Three positions with spring centering		Three positions with spring centering - special sopols		
1C			77C	
0C			56C	
3C			8C	
4C			76C	
Two positions with return spring		Two positions with mechanical detent on pilot valve		
1LL			1N	
0LL			0N	
1ML				
1LLb				
0LLb				
1MLb				

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.

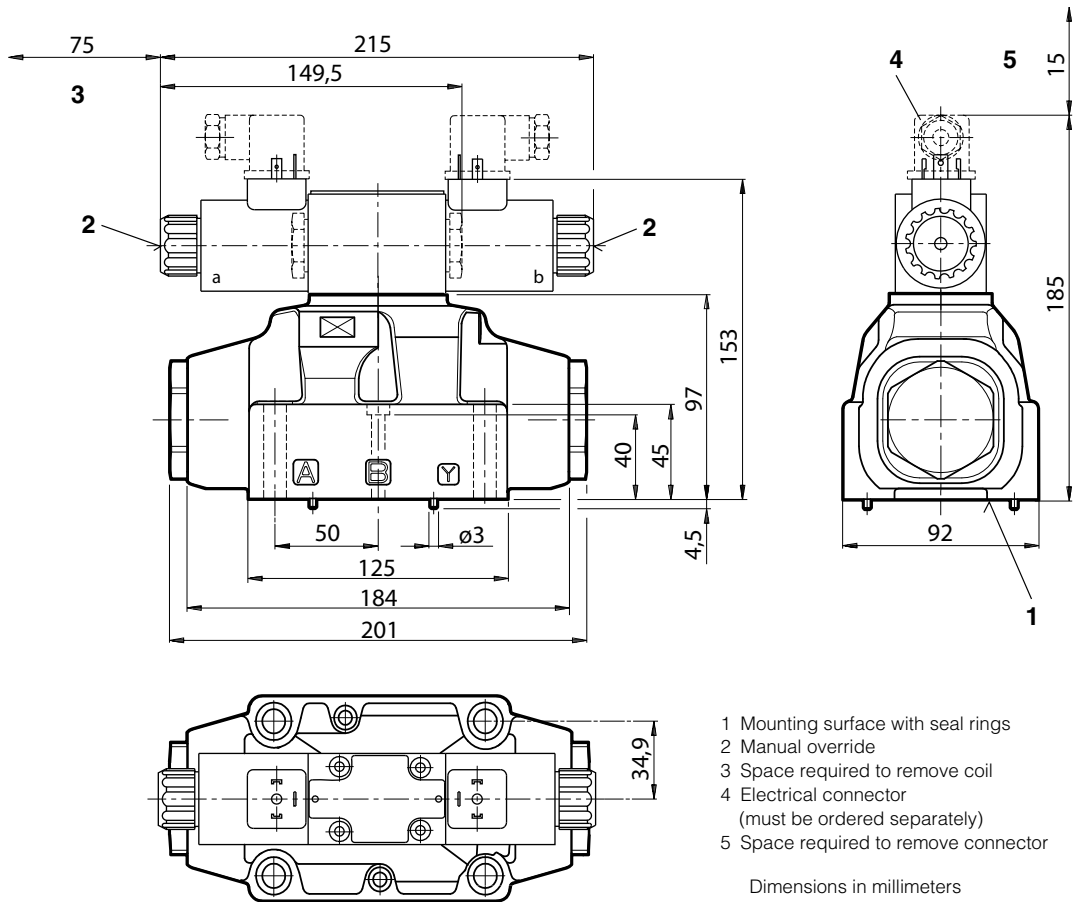


CONNECTIONS

Spool type	Spool position	Connections				
		P - A	P - B	A - T	B - T	P - T
		Curves on graph				
1C	Energized	1	1	3	4	
0C	De-energized					2*
	Energized	1	1	4	4	
3C	De-energized			4*	4°	
	Energized	1	1	4	4	
4C	De-energized					4
	Energized	2	2	4	5	
77C	De-energized				4	
	Energized	1	1	3	4	
56C	De-energized					5*
	Energized	1	1	3	4	
8C	De-energized			4	4	
	Energized	1	1	3	4	
76C	De-energized			4		
	Energized	1	1	3	4	
1LL	De-energized		1	3		
	Energized	1			4	
0LL	De-energized		1	3		
	Energized	1			4	
1ML	De-energized					
	Energized	1	1	3	4	
1N	Energized	1	1	3	4	
0N	Energized	1	1	3	4	

*: A - B blocked °: B blocked °: A blocked

VALVE DIMENSIONS



- 1 Mounting surface with seal rings
- 2 Manual override
- 3 Space required to remove coil
- 4 Electrical connector
(must be ordered separately)
- 5 Space required to remove connector

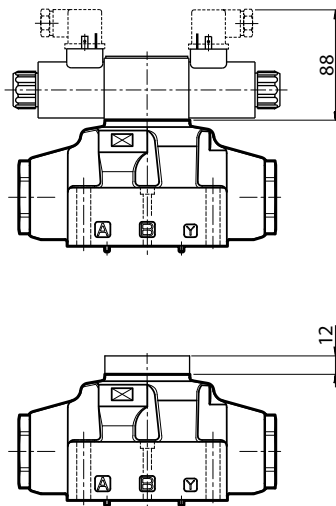
Dimensions in millimeters

Single valve fastening:	4 bolts M10 x 60 * 2 bolts M6 x 50 *	* Bolts is not supplied
Bolt torque:	M10 x 60: 40 Nm - bolts A 8.8 M6 x 50: 8 Nm - bolts A 8.8	
Threads of mounting holes:	M6 x 12; M10 x 18	
Seal rings:	4 O-rings type 22.22 x 2.62 (OR 130) 2 O-rings type 10.82 x 1.78 (OR 2043)	

TYPE OF COMMAND

Solenoid control: HD7-ES

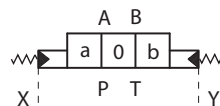
The valve is supplied with a pilot solenoid valve type HD3-ES.



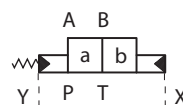
Hydraulic control: HD7-HH

The valve is supplied as main body.

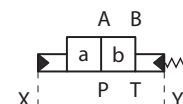
X and Y connections are used for the hydraulic control of the valve.



HD7-HH-*C/E



HD7-HH-*LL/E

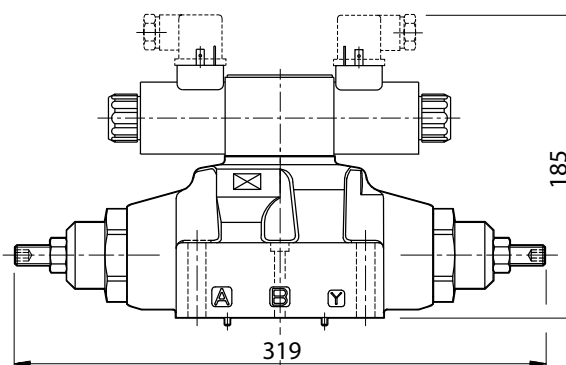


HD7-HH-*LLb/

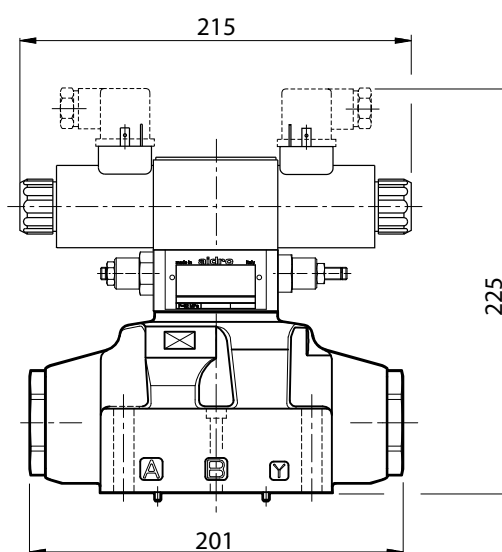
CONTROLS

Control of the main spool stroke: C

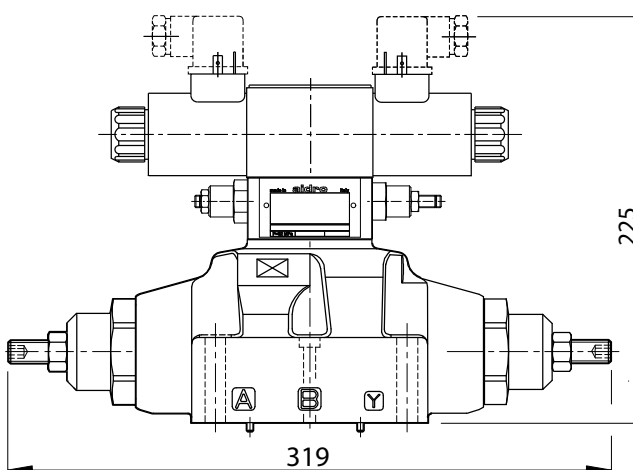
It is possible to introduce special stroke controls in the heads of the hydropiloted valve so as to vary the maximum spool stroke. This solution allows control of the flow rate from the pump to the actuator and from the actuator to the outlet, obtaining a double adjustable control on the actuator. Add the letter **C** to the identification code to request this device.

**Control of the main spool shifting speed: D**

By placing a double flow control valve between the pilot solenoid valve and the hydropiloted valve, the piloted flow rate can be controlled and therefore the shifting speed can be varied. Add the letter **D** to the identification code to request this device.

**Control of the main spool stroke and shifting speed: G**

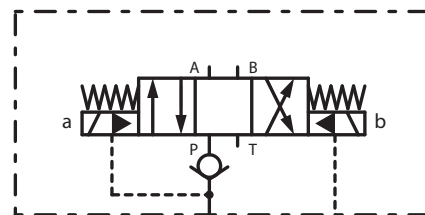
It is possible to have the valve fitted with both the spool stroke device and the piloting flow rate control device. Add the letter **G** to the identification code to request this solution.



SPECIAL CONFIGURATIONS

Check valve incorporated on line P : option P

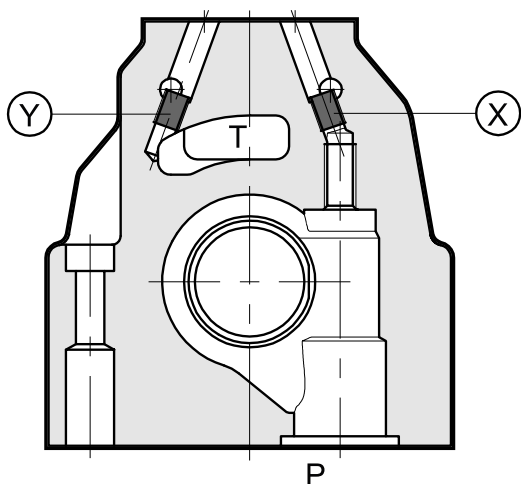
Valve HD7 is available upon request with check valve incorporated on line P. This is particularly useful to obtain the necessary piloting pressure when the main control valve, in the rest position, has line P connected to the T outlet and the piloting is internal. Typically it is for spools 4C, 0C, 0ML, 4ML and 56C. The cracking pressure is 5 bar. Add P to the identification code for this request.



PILOT AND DRAIN

The HD7 valves are available with pilot and drain, both internal and external. The version with external drain allows for a higher back pressure on the outlet.

Type of valve		Plug assembly	
		X	Y
HD7-ES-**/*	Internal pilot and external drain	NO	YES
HD7-ES-**/*I	Internal pilot and internal drain	NO	NO
HD7-ES-**/*E	External pilot and external drain	YES	YES
HD7-ES-**/*EI	External pilot and internal drain	YES	NO



X: plug M6 x 8 for external pilot
Y: plug M6 x 8 for external drain