

4/2 and 4/3 DIRECTIONAL CONTROL VALVES PILOT OPERATED

HD7-*

350 l/min 32 MPa (320 bar)

1 DESCRIPTION

Valves HD7-ES are directional control valve pilot operated with subplate mounting interface acc. to ISO 4401-07, DIN 24340 (CETOP 07 - NG16). The body is made with a high quality casting. The CETOP 3 pilot valve is available with interchangeable metallic DC solenoids, also for AC power supply using a built-in rectifier bridge inside the coil. In the standard version the valve housing is phosphated.



2 ORDERING CODE

(1)	(2)	(3)	(4)	(5)	(6)	(7)
HD7	-	-	/		-	/ 50

(1) HD7: 4-way directional control valve CETOP 07 - Pressure 32 MPa (320 bar)

(2) Variants:

ES: electrically controlled, standard
 HH: hydraulically piloted (main body)

(3) Spool type:

- number is the main spool type
- letter is the solenoid or spring arrangement:
 - C : 2 solenoids spool is spring centered (3 position)
 - N : 2 solenoids pilot is detented (2 position)
 - LL : 1 solenoid (a), spool is spring/hydr. offset (2 position, end to end)
 - ML : 1 solenoid (a), spool is spring offset (2 position, middle to end)
 - LM : 1 solenoid (a), spool is spring offset (2 position, end to middle)
 - b : only for versions LL, MI, LM, see also functional symbols

(4) Code reserved for options and variants

- 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
- K : waterproof caps on override pins (see section 10 of page 3-0004)

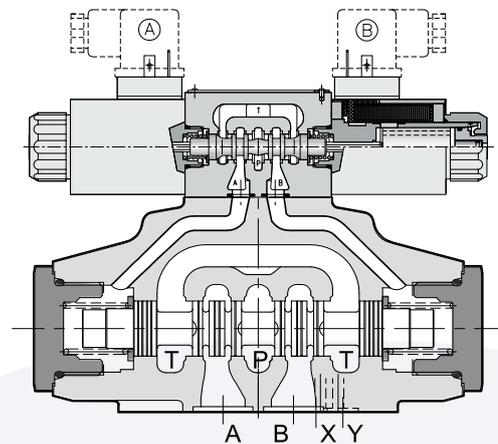
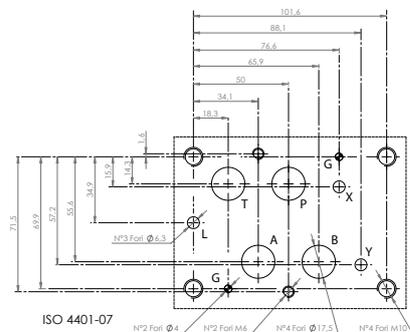
(5) Pilot and drain arrangement

- No designation : internal pilot and external drain (standard)
- I : internal pilot and internal drain
- E : external pilot and external drain

(6) Electric voltage and solenoid coils

- 0000 : no coils
- 012C : coils for V12DC
- 024C : coils for V24DC
- 115A : coils for V110/50 - V115/60 AC
- 230A : coils for V220/50 - V230/60 AC
- See also electric characteristic

(7) Design number (progressive) of the valves



The HD7-ES solenoid operated - hydropiloted valves are consisting of an HD3-ES type solenoid operated directional control valve (see data sheet HD3-ES) 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.

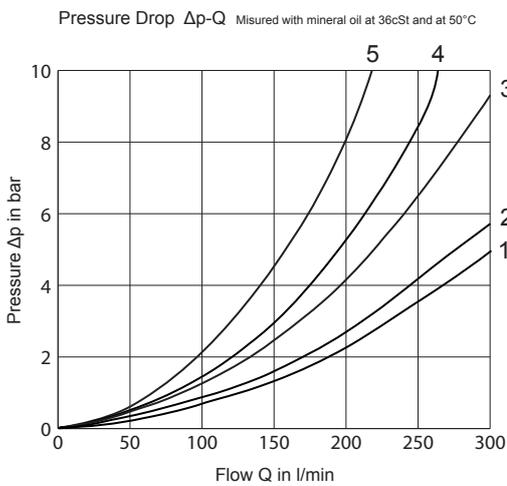
3 TECHNICAL DATA

Max. recommended flow (spring centering)	250 l/min
Max. recommended flow (hydraulic centering and hydraulic off set)	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. 9 Kg
HD7-HH	approx. 7,5 Kg

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

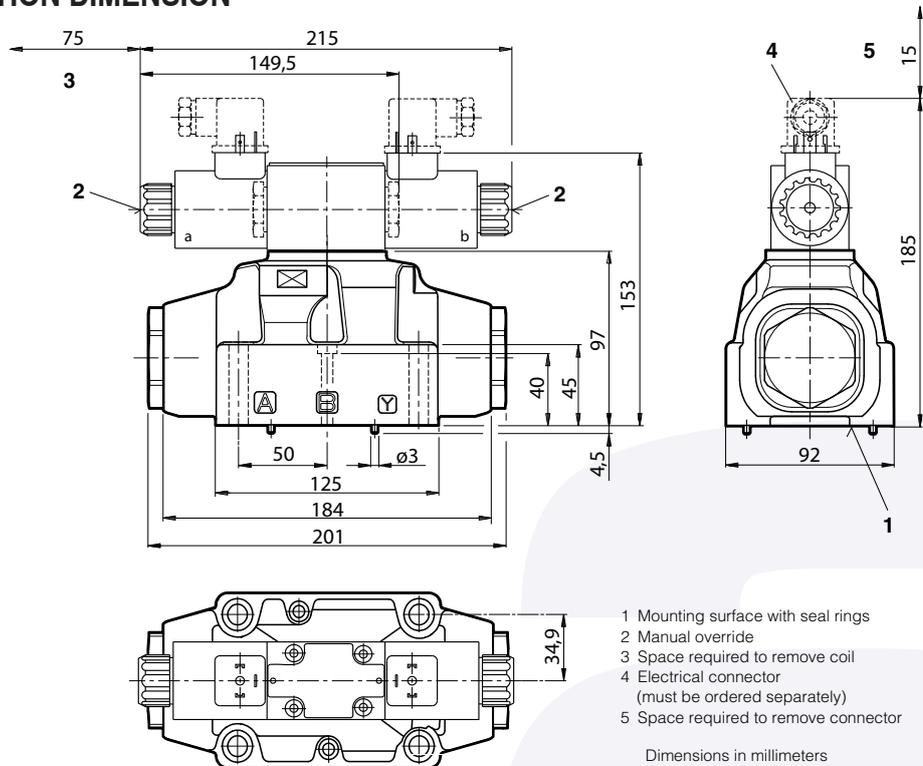
1C			77C		
0C			56C		
3C			8C		
4C			76C		
Two positions with return spring			Two positions with mechanical detent on pilot valve		
1LL			1N		
0LL			0N		
1ML					
1LLb					
0LLb					
1MLb					

5 TYPICAL DIAGRAMS



Spool type	spool position	Connections				
		P-A	P-B	A-T	B-T	P-T
Curves on graph						
1C	Energized	1	1	2	3	
0C	De-energized	5	5	1	2	6*
3C	De-energized			4	4	
	Energized	1	1	1	2	
4C	De-energized			3	4	6
	Energized	6	6			
67C	De-energized	1	4	2	3	
	Energized		5			
77C	De-energized			2	4	6°
	Energized	1	1		2	
55C	De-energized			3	4	6
	Energized	6	6			
56C	De-energized			4	3	
	Energized	6	6			
35C	Energized	1	1	2	3	
8C	De-energized	4°	4	2	3	
	Energized	5	5			
76C	De-energized			3	3	
	Energized	1	1	1		
65C	De-energized	4		2	3	
	Energized	5	1			
1LL,OLL,1ML	De-energized	1		2	3	
	Energized		1			
1N,ON	Energized	1	1	2	3	

6 INSTALLATION DIMENSION



Single valve fastening:	4 bolts M10 x 60 * 2 bolts M6 x 60 *	* Bolts is not supplied
Bolt torque:	M10 x 60: 40 Nm - bolts A 8.8 M6 x 60: 8 Nm - bolts A 8.8	
Threads of mounting holes:	M6 x 18; 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)	

7 TYPE OF COMMAND

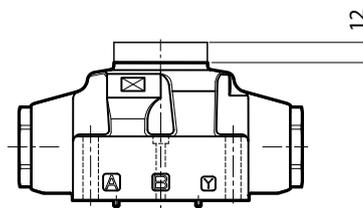
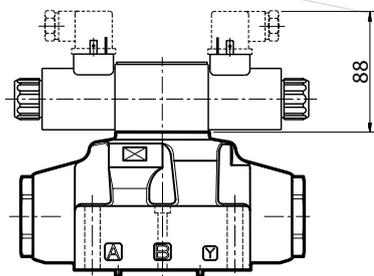
Solenoid control: HD7-ES

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

Hydraulic control: HD7-HH

The valve is supplied as main body.

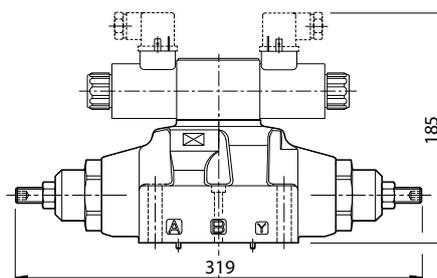
X and Y connections are used for the hydraulic control of the valve.



8 CONTROLS

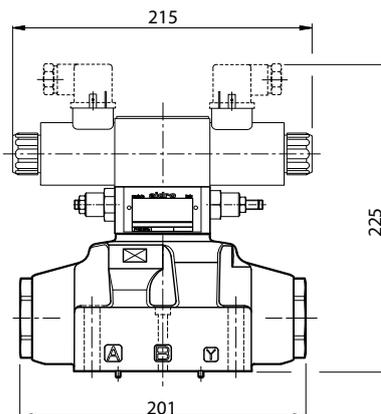
Control of the main spool stroke: C

It is possible to introduce special stroke controls in the heads of the hydro-piloted 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.



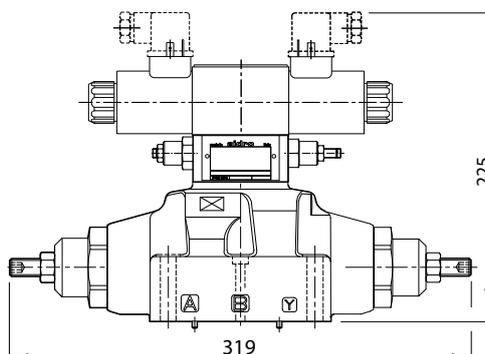
Control of the main spool shifting speed: D

By placing a double flow control valve between the pilot solenoid valve and the hydro-piloted 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

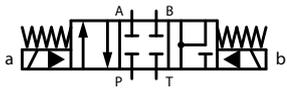
It is possible to have the valve fitted with both the spool stroke device and the piloting flow rate control device. Add the letter **G** to the identification code to request this solution.



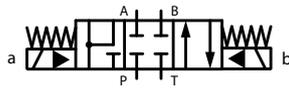
9 SPECIAL CONFIGURATION

Solenoid valves with special spools

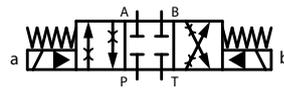
Besides the standard configurations (see pages 2 and 3), we can develop, on request, connection diagrams with special spools for a wide range of applications: consult our technical department for their identification, feasibility and operating limits.



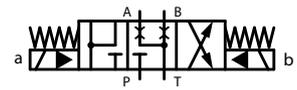
19C



18C



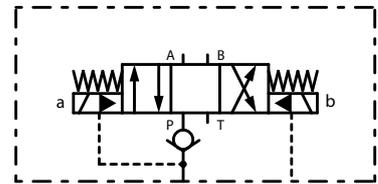
15C



38C

Check valve incorporated on line P: P

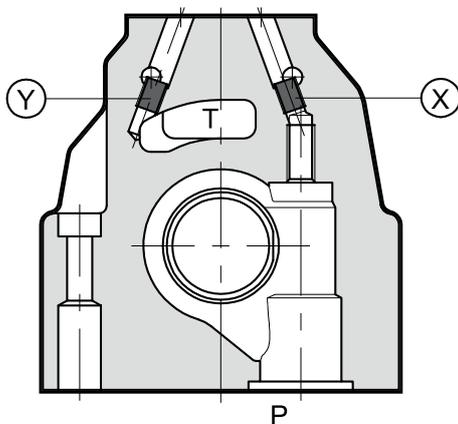
Valve HD7 is available upon request with check valve incorporated on line P. This is particularly useful to obtain the necessary piloting pressure when the main control valve, in the rest position, has line P connected to the T outlet. The cracking pressure is 5 bar. Add P to the identification code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



10 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