

## DIRECTIONAL CONTROL VALVES SOLENOID OPERATED

### HD3-ES-\*/-20

60 l/min - 32 MPa (320 bar)

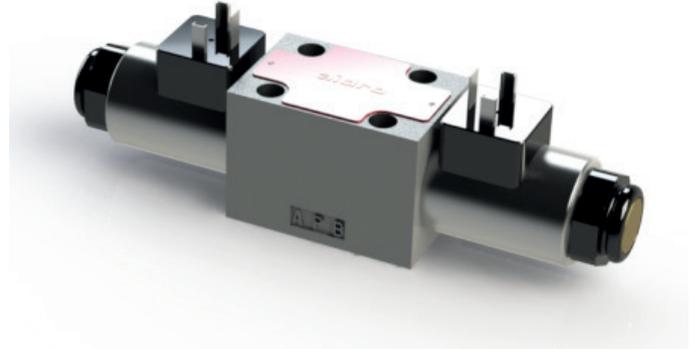
#### 1 DESCRIPTION

Valves HD3-ES are directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03).

The design of the body is a high quality five chamber casting.

The 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 for 240 h salt spray protection acc. to ISO 9227. Enhanced surface protection for mobile sector available (ISO 9227, 520 h salt spray).



#### 2 ORDERING CODE

(1)	(2)	(3)	(4)	(5)	(6)	(7)
HD3	-	ES	-	-	-	/ 20

(1) HD3: 4-way directional control valve CETOP 03

(2) Electrically controlled

(3) Spool type (see 4):

-number is the main spool type

-letter is the solenoid or spring arrangement:

C : 2 solenoids, spool is spring centered (3 position)

LL : 1 solenoid, spool is spring offset (2 position)

ML : 1 solenoid, spool is spring centered (2 position)

(4) Code reserved for option and variants:

S-\*\*: calibrated orifice on P port, see 11

K : Water proof caps on emergency pin, see 10

(5) Electric voltage and solenoid coils: see 6

0000: no coils

012C: coils for V12DC

024C: coils for V24DC

115A: coils for V110/50- V 115/60AC

230A: coils for V220/50- V 230/60AC

(6) Coil connection

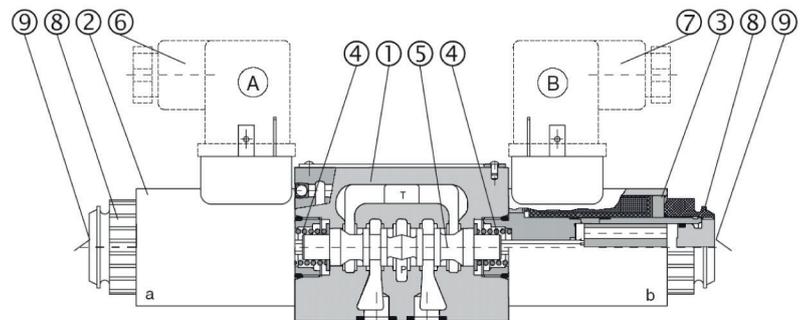
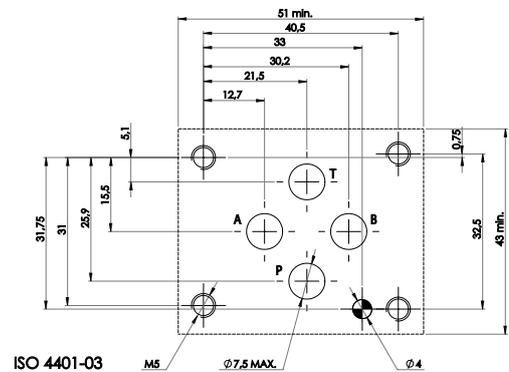
no designation: DIN 43650-A ISO 4400

AMP: Amp Junior Timer- vertical configuration, see 12

AMPX: Amp Junior Timer- axial configuration, see 12

D: Deutsch, see 12

(7) Design number (progressive) of the valves

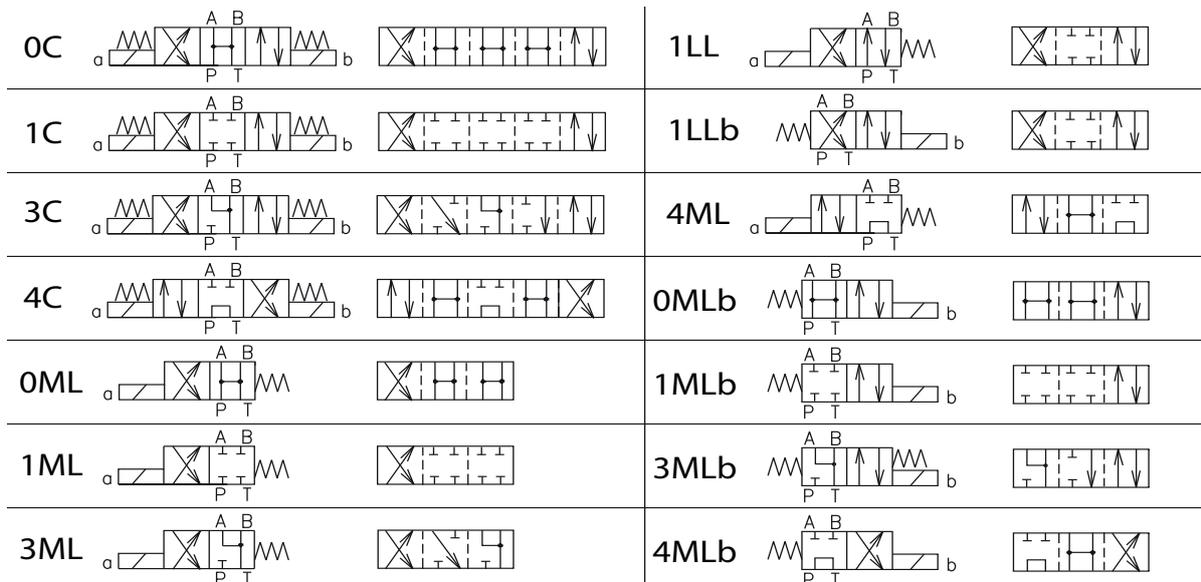


The spool 5 shifts into the valve body 1 subject to the acting springs 4 and solenoids 9. Spool 5 depending from its shape and its position in the valve body 1, opens and/ or closes passages between P,A,B and T ports, thus controlling the direction of the hydraulic flow.

### 3 TECHNICAL DATA

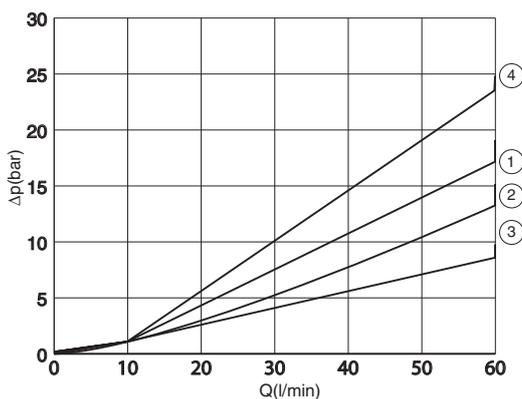
Nominal flow	50 l/min	<b>Electric characteristics:</b> Valve type HD3-ES-* are operated by solenoid that are energized : Directly from a D.C. voltage supply: V 12 DC = 012C V 24 DC = 024C By the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply: V 110/50 - V 115/60 = 115A V 220/50 - V 230/60 = 230A Other available voltages are : 014C ; 048C ; 060C ; 102C ; 205C ; and V24/50 = 024A All connectors must conform to ISO 4400 (DIN 43650) and electric circuitry must be able to carry the following rated current values : V 12 DC = 2,4 A V 115/50 = 0,26 A V 24 DC = 1,2 A V 230/50 = 0,14 A Coils with 2 electric pins, conforming with AMP connectors, are only available for DC supply (example of code : B02-012C AMP)). Permissible supply voltage variation : ± 10 %
Maximum rec. flow rate	60 l/min	
Maximum nominal pressure (P, A, B)	32 MPa (320 bar)	
Maximum pressure at T port	21 MPa (210 bar)	
Pressure drops	see 5	
Protection to DIN 40050	IP 65	
Duty cycle	100%	
Installation and dimensions	see 9	
Mass	1,6/1,2 kg	

### 4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



### 5 TYPICAL DIAGRAMS

Typical  $\Delta p$ -Q curves for valves HD3-ES-\* in standard configuration, with mineral oil at  $v=32 \text{ mm}^2/\text{s}$  and  $T=40^\circ\text{C}$



Spool	P-A	P-B	A-T	B-T	P-T
1C	2	2	2	2	
4C	4	4	4	4	2
0C	2	2	3	3	2
3C	2	2	3	3	
1LL	3	3	4	4	
1LLb	3	3	4	4	
1ML		2	2		
4ML	4		4		2
0ML	2		3		2
3ML	2		2		

## 6 SOLENOID

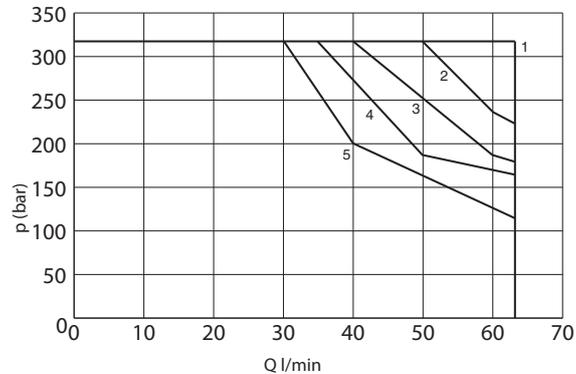
Solenoid valves can be supplied without electric coils, as HD3-ES-\*\*\*\*-0000. Coils are supplied separately; standard, 3 electric pins, coils are : - B02-012C ; B02-024C - B02-115A ; B02-230A Connections to the electric supply is made by standard 3-PIN connectors, according to ISO 4400 (DIN 43650). Connectors can be with different cable exit size (PG9, PG11) and beside of the plain connecting function they may incorporate various features like -Signal led - Voltage surge suppressor, etc.

## 8 HYDRAULIC FLUID

Seals and materials used on standard valves HD3-\* are fully compatible with hydraulics fluids of mineral base, upgraded with antifoaming and anti oxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

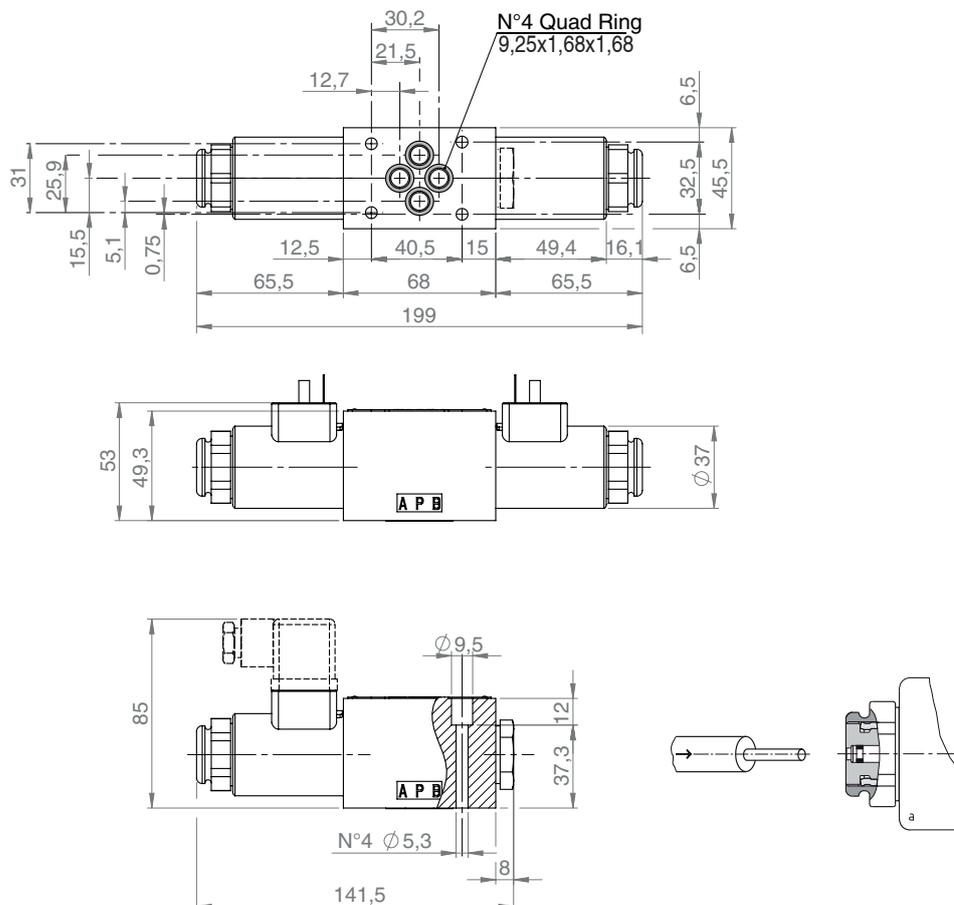
## 7 HYDRAULIC LIMIT OF USE

$\Delta p$ -Q characteristics limits for safe use of HD3-ES-\* solenoid operated valves. Measured at  $v = 32\text{mm}^2/\text{s}$  and  $T = 40^\circ\text{C}$



1C	1
4C	5
0C	1
3C	2
1LL	3
3ML	2
4ML	5
1ML	1
0ML	1
1MLb	1
1LLb	1
4MLb	5
0MLb	1
3MLb	2

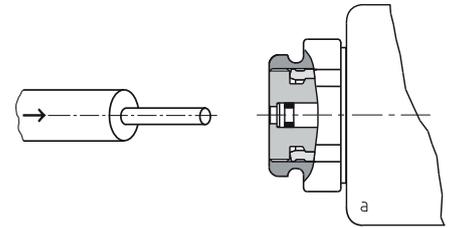
## 9 INSTALLATION DIMENSIONS (mm)



All valves HD3-\* conform with ISO and CETOP specifications for mounting surface dimensions (see 8) and for valves height. When assembled to its mounting plate valve HD3-\* must be fastened with 4 bolts M5x45 (or M5x\*\* according to the number of modules) tightened at 8 Nm torque. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of Quad Ring type 9,25x1,68x1,68

## 10 VERSION "K": OVERRIDE PIN

Solenoid valves according to "K" version have extended emergency actuator pins protruding from the solenoid shape, that permit a quick and easy "hand operation" of the valves, without the need of any tool. The actuator pin and the end of the solenoid are protected by a flexible rubber cap that makes easy operation and protects from moisture and water splashes



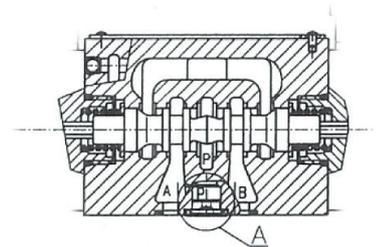
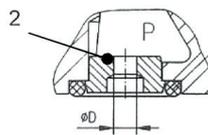
## 11 VERSION "S\*"; CALIBRATED ORIFICE ON P PORT

Option "S\*" is represented by an element suitably shaped to be inserted on P port of the solenoid valve, having a calibrated orifice (of various sizes) able to restrict, depending on the  $\Delta P$  value, the flow rate entering the solenoid valve.

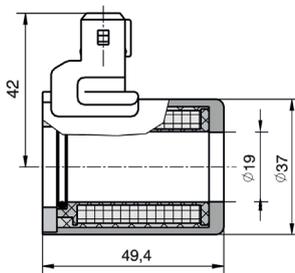
Those elements have the following orifice diameters :

- 3S-00 -> D = 0 mm
- 3S-10 -> D = 1,0 mm
- 3S-15 -> D = 1,5 mm
- 3S-20 -> D = 2,0 mm
- 3S-25 -> D = 2,5 mm

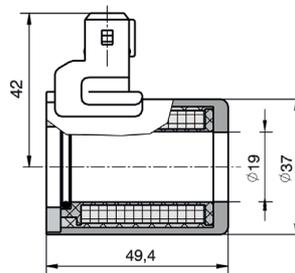
and are kept sealed on the P port of the valve by an OR of 9,25x1,78 mm sizes (example OR 110-2037)



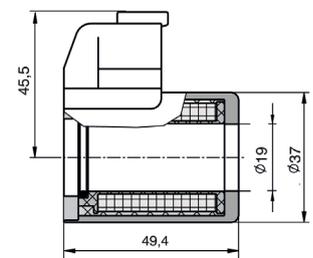
## 12 SPECIAL COIL CONNECTIONS



AMP =Amp Junior Timer  
vertical configuration

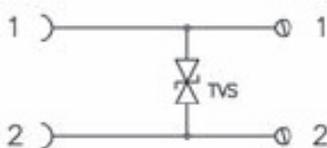


AMP =Amp Junior Timer  
axial configuration



D = Deutsch

## 13 QUENCHING DIODE



On request, coils can be supplied with an integrated bidirectional quenching diode (transil type BZW06-19B) able to provide high overvoltage protection. Their instantaneous response to transient overvoltages makes them particularly suited to protect voltage sensitive devices