

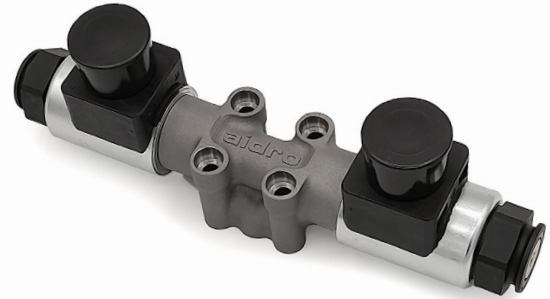
## DIRECTIONAL CONTROL VALVES SOLENOID OPERATED IN STAINLESS STEEL

### HD2-AMES-\*

25 l/min - 32 MPa (320 bar)

#### 1 DESCRIPTION

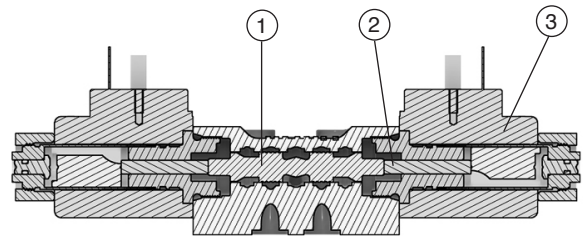
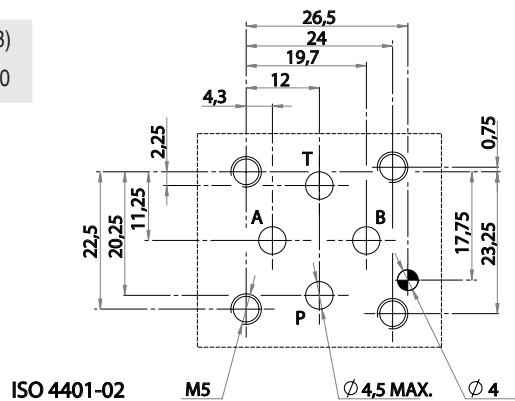
Valves HD2-AMES are directional control valve with subplate mounting interface according to ISO 4401, DIN 24340 (CETOP 02). The design of the body is a special three chambers, manufactured by Additive Manufacturing technology for high performance and low pressure drops. Body type is available in stainless steel AISI 316L for extreme corrosion resistance or 17-4PH for standard applications. The valve is available with interchangeable DC coils, also for AC power supply using connectors with a built-in rectifier bridge.



#### 2 ORDERING CODE

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
HD2	-	AMES	-	-	-	-	/ 10

- (1) HD2: 4-way directional control valve CETOP 02- Pressure 32 MPa (320 bar)
- (2) AMES: electrically controlled, additive manufactured body
- (3) Spool type (see 4)
  - number is the main spool type
  - letter is solenoid and spring arrangement:
    - C: 2 solenoids, spool is spring centered (3 position)
    - N: 2 solenoids, spool is detented (2 position)
    - LL: 1 solenoid (a), spool is spring 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)
- (4) Side options:
  - b: only for version LL, ML, LM solenoid b installed (instead of solenoid a)
- (5) Material options:
  - 174: 17-4 PH body
  - 316: AISI 316L Stainless steel body
- (6) Code reserved for option and variants:
  - K: protruding emergency pins, protected by rubber caps (see 7)
  - 2S\*: calibrated orifice on P port (see 8)
- (7) 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
- (8) Design number (progressive) of the valves

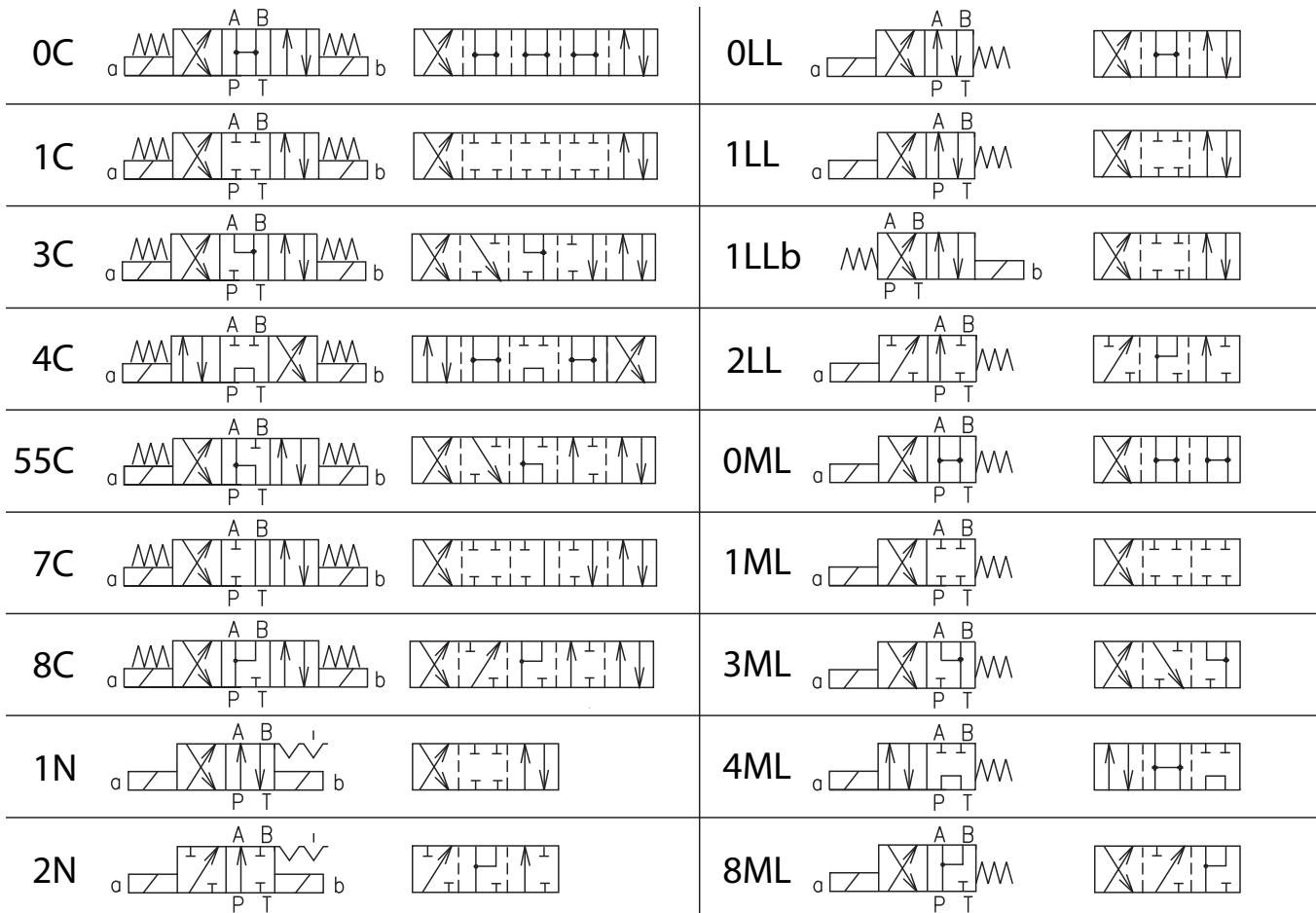


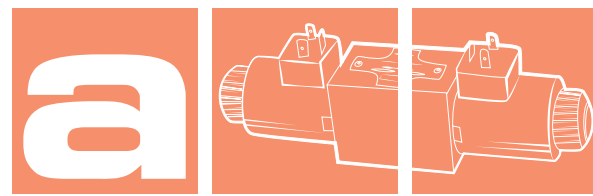
Spools ①, springs ② and solenoids ③ combination permit to obtain almost every type of ports (P, A, B, T) connection and sequence. For almost all types of solenoids/springs combination and for all type of spools (with the exception of spool 4), when solenoid “a” is energized, hydraulic connections are P→B and A→T; to obtain P→A and B→T solenoid “b” must be energized. The hydraulic connections that are obtained in the “central” (neutral) position when solenoids are not energized is the characteristic mark of the spool shape and from it derives its identification number: 0 = P, A, B, T connected 1 = P, A, B, T closed 3 = P closed, A, B, T, connected for other types see 4

### 3 TECHNICAL DATA

Maximum nominal flow	20 l/min	<b>Electric characteristics:</b>  Valves HD2 -AMES-* 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) =115 A V 220/50 (V 230/60) =230 A  All standard valves are to be fitted with connectors 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 24 DC = 1,2 A V 110/50 = 0,30 A V 220/50 = 0,15 A  Permissible supply voltage variation: +10% -10%
Maximum rec. flow rate	25 l/min (6)	
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%	
Service life	≥ 10 <sup>7</sup> cycles	
Installation and dimensions	see (7)	
Mass	approx 0,63/0,41 kg	

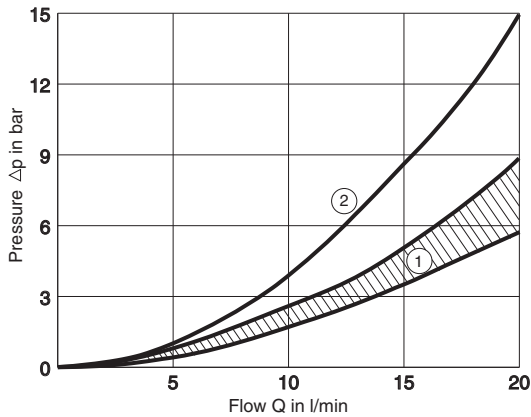
### 4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES





## 5 TYPICAL DIAGRAMS

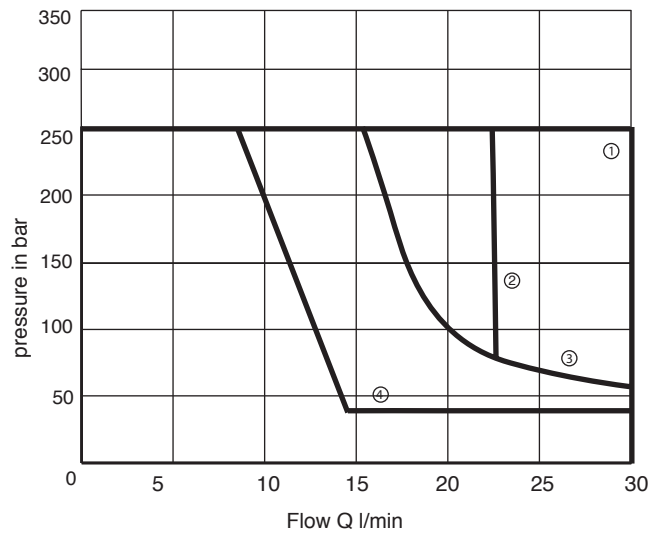
Typical  $\Delta p$ -Q curves for valves HD2-AMES-\* in standard configuration, with mineral oil at 36 cSt and at 50°C for flow P -> A/B, A/B -> T



- ①=all spool P -> A/B and A/B -> T ; P -> T spool 4 and 0
- ②= P -> A/B spool 4 ; A/B -> T spool 4

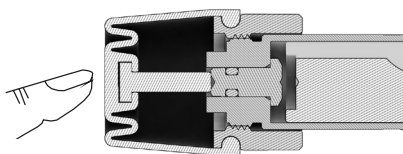
## 6 HYDRAULIC LIMITS OF USE

Operating limits for maximum hydraulic power at rated temperature and supply voltage equal to 90% nominal



- ① Spools: 1C, 1MC, OC, OML
- ② Spools: 1CC, 1CCb
- ③ Spools: 3C, 3MC
- ④ Spools: 4C, 4ML

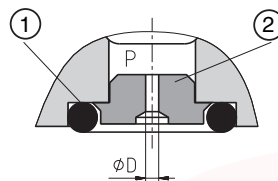
## 7 VERSION "K": EXTENDED EMERGENCY PIN



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.

## 8 OPTIONS



### OPTION S CALIBRATED ORIFICE ON P PORT

Option "S" is represented by elements ②, suitably shaped to be inserted on P port of the solenoid valve, having a calibrated orifice (of various sizes) able to restrict, at the requested  $\Delta p$  value, the flow rate entering the solenoid valve.

Those elements have the following orifice diameter:

2S - 08 -> D=0,8 mm

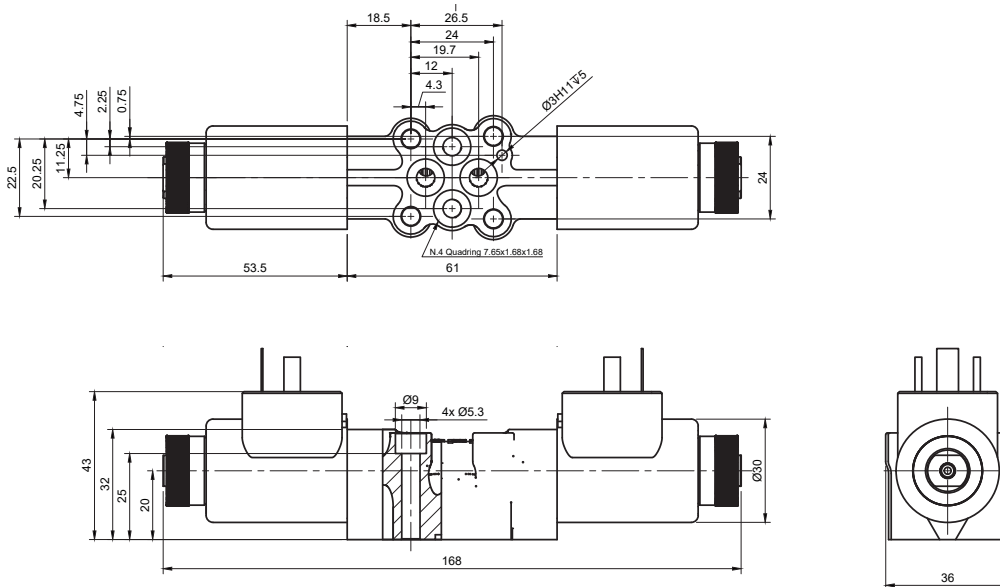
2S - 10 -> D=1 mm

2S - 12 -> D=1,2 mm

2S - 15 -> D=1.5 mm

and are kept sealed on the P port of the valve by an OR ① of 7,65x1,78 mm sizes (example OR 107-2031).

## 9 INSTALLATION DIMENSIONS (mm)



All valves HD2-\* conform with ISO and CETOP specifications for mounting surface dimensions (see [6]) and for valves height. When assembled to its mounting plate valve HD2 - \* must be fastened with 4 bolts M5x (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/ O Ring type 7,65x1,68x1,68. Solenoid valves can be supplied without electric coils, as HD2 - AMES -\*\*-0000 - .

Coils are supplied separately: standard, 3 electric pins coils are BO1 family Connectors to the electric supply is made:

a) On standard solenoid coils 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.

b) On type "AMP" solenoid coils, by connectors conforming to AMP-Timer

## 10 HYDRAULIC FLUIDS

Seals and materials used on standard valves HD2-\* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and filtered to ISO 4406 class 19/17/14 or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.