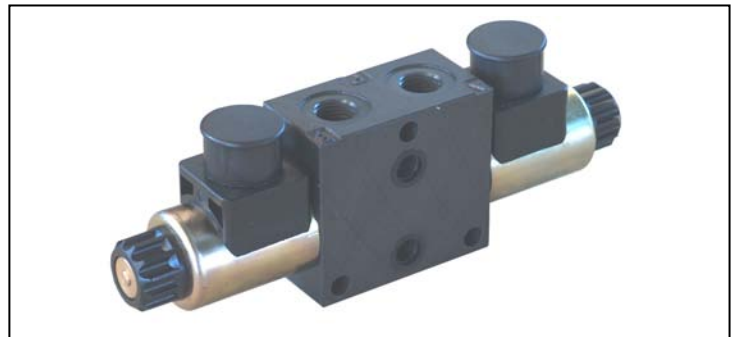
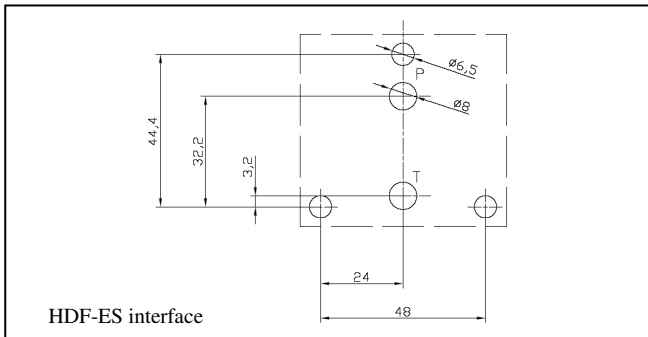


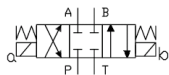
# Directional Control Valves Solenoid Operated – Stackable Type HDF(\*)-ES-\*



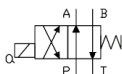
## 2 FUNCTIONAL SYMBOLS

Spring/Stroke combination for spool type "1"

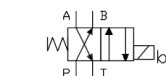
1C



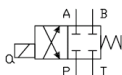
1LL



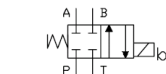
1LLb



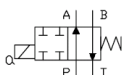
1ML



1MLb



1LM



1LMb



## 1 HOW TO READ THE MODEL CODE FOR VALVES HDF(\*)-\*

<b>HDF</b>	<b>(*)</b>	<b>-</b>	<b>ES</b>	<b>-</b>	<b>(1)</b>	<b>(C)</b>	<b>*</b>	<b>-</b>	<b>(024C)</b>	<b>/</b>	<b>10</b>
①	②		③		④	⑤	⑥		⑦		⑧

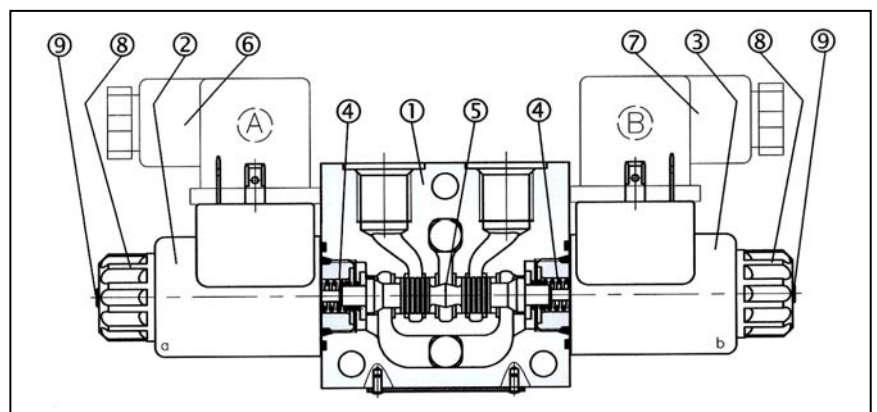
- ① **HDF**: 4-way directional control valve – Pressure 25 Mpa (250 bar)
- ② **(\*)**: ports variants (see 9)
  - (C) : P and T not passing (closing element with seals)
  - (B) : P and T not passing (closing element without seals)
  - (2) : additional ports A and B on mounting surface
- ③ **ES**: electrically controlled, standard
- ④ **(1)** : spool type (see 7)
- ⑤ **(C)** : solenoid(s) and spring(s) arrangement, see also functional symbols 2.
  - C : 2 sol., spool is spring centered (3 position)
  - N : 2 sol., spool is detented (2 position)
  - LL : 1 sol. (a), spool is spring 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)
- ⑥ **\*** : Code reserved for option and variants
  - b : only for version LL, ML, LM  
sol. b installed (instead of sol. a)
  - S-\*\* : calibrated orifice on P port (see 11)
  - ZT : body, solenoid tubes and coils are zinc trivalent plated
- ⑦ **(024C)** : Electric voltage and solenoid coils
  - 0000 : no coil(s)
  - 012C : coil(s) for V12DC
  - 024C : coil(s) for V24DC
  - 220R : coil(s) for V220/50 – V230/60 AC
- ⑧ Design number (progressive) of the valves

## 3 DESCRIPTION

The spool 5 shifts in to the valves body 1 subject to the action of springs 4 and solenoids 2 3

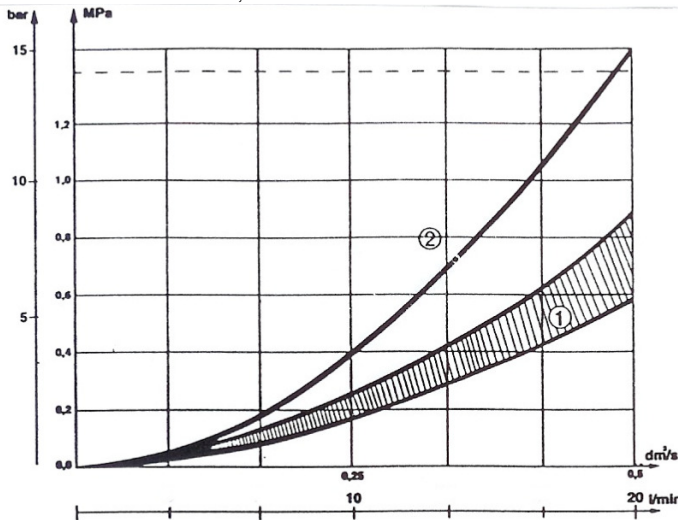
Spool 5 depending from its shape and its position in the valves body 1, opens and/or closes passages between P, A, B, T ports, thus controlling the direction of the hydraulic flow.

Solenoids 2 and 3 are energized by electric current flowing-in through connectors 6 and 7; in case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins 9, located at the end of the solenoids and accessible through the retaining nuts 8.



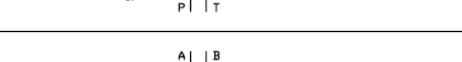
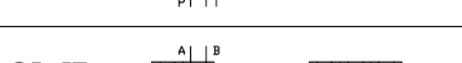
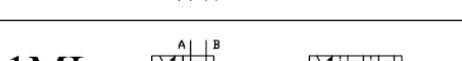
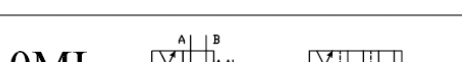
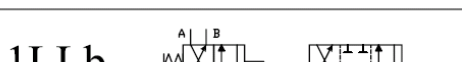
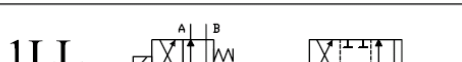
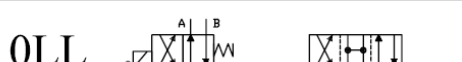
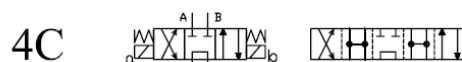
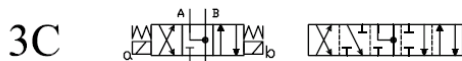
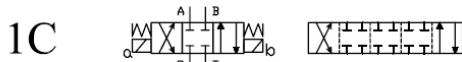
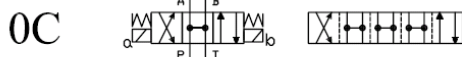
## 4 TYPICAL DIAGRAMS

Typical  $\Delta p$ -Q curves for valves HDF - ES - \* 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  
 ② = P → A/B spool 4

## 7 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



## 5 TECHNICAL DATA

nominal flow	20 l/min
maximum rec. flow rate	25 l/min
maximum nominal pressure (P,A,B)	25 MPa (250 bar)
maximum pressure at T port	20Mpa (200bar)
pressure drops	see 4.
electric characteristics	see 6.
protection to DIN 40050	IP 65
duty cycle	100%
service life	≥ 10 <sup>7</sup> cycles
dimensions	see
installation	see
mass	approx

## 6 ELECTRIC CHARACTERISTICS

Valves type HDF-ES-\* are operated by solenoid that are energized:

- directly from a D.C. voltage supply:  
 V 12 DC  
 V 24 DC.
- by the use of connectors that incorporate a full wave bridge rectifier, from A.C. voltage supply:  
 V 220/50 (V 230/60).

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 = 1,83 A
  - V 24 DC = 0,92 A
  - V 220 R = 0,08 A
- Permissible supply voltage variation:  
 +5% -10%

## 8 FUNCTIONAL SYMBOLS

Spools, springs and solenoids 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:

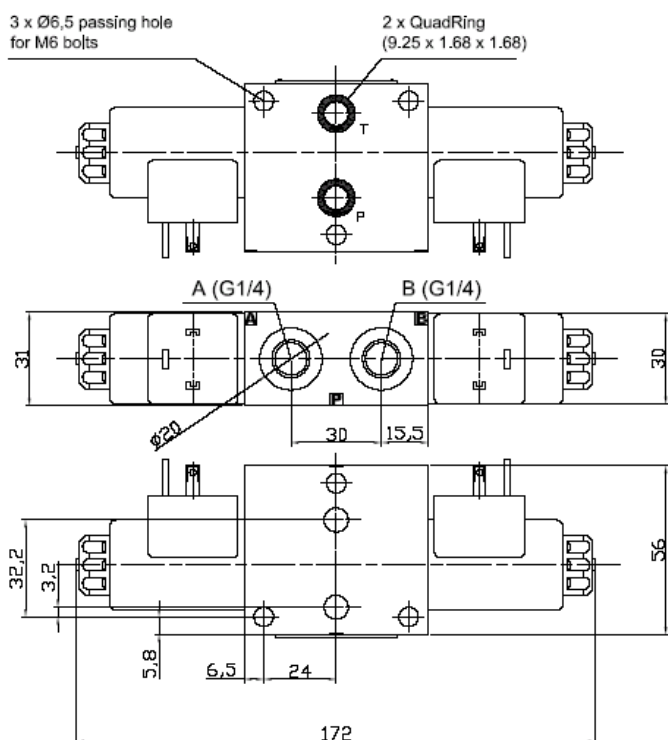
- 0 = P, A, B, T connected
  - 1 = P, A, B, T closed
  - 3 = P closed, A, B, T, connected
- for other types see 7.

9

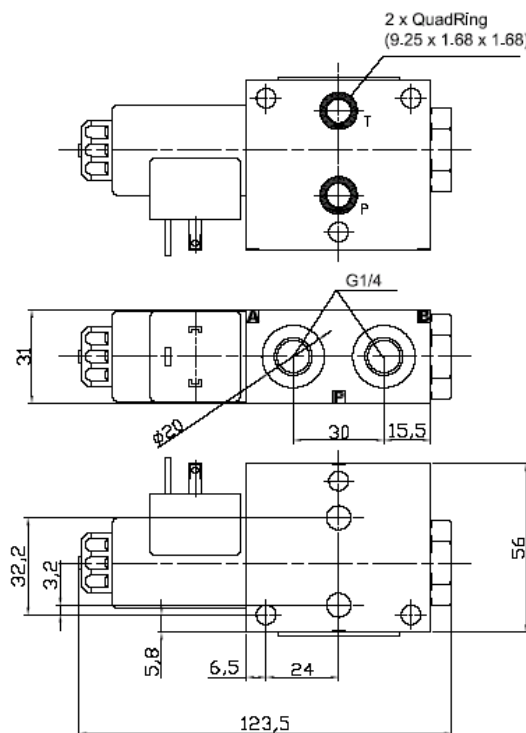
## INSTALLATION DIMENSIONS

(all dimensions are mm)

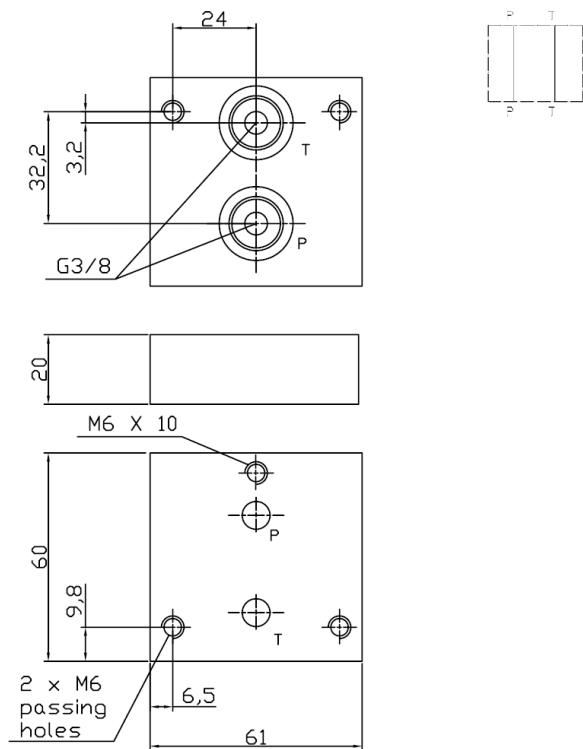
### HDF-ES-(1)C-\*



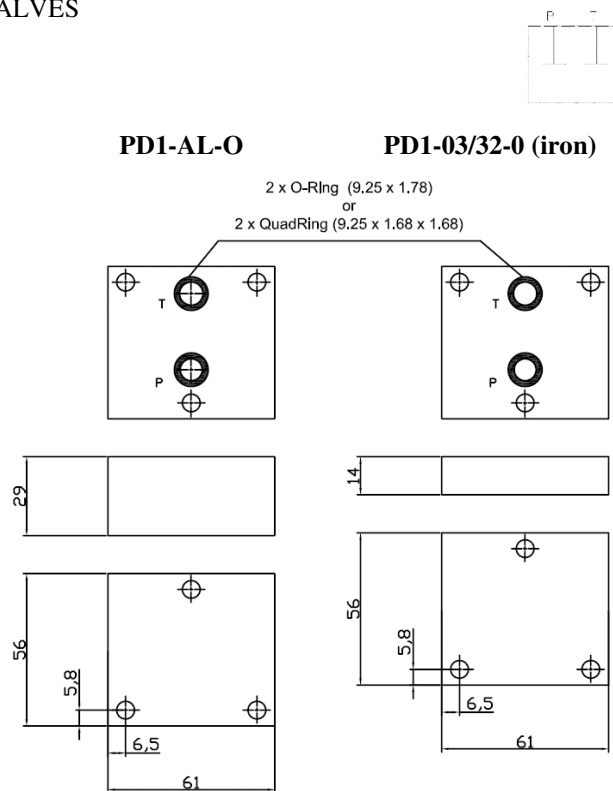
### HDF-ES-(1)LL ; HDF-ES-(1)ML-\* ; HDF-ES-(1)LM-\*



### INLET PLATE, STACKABLE WITH HDF(\*)-ES VALVES, TYPE PD1-03/32-5

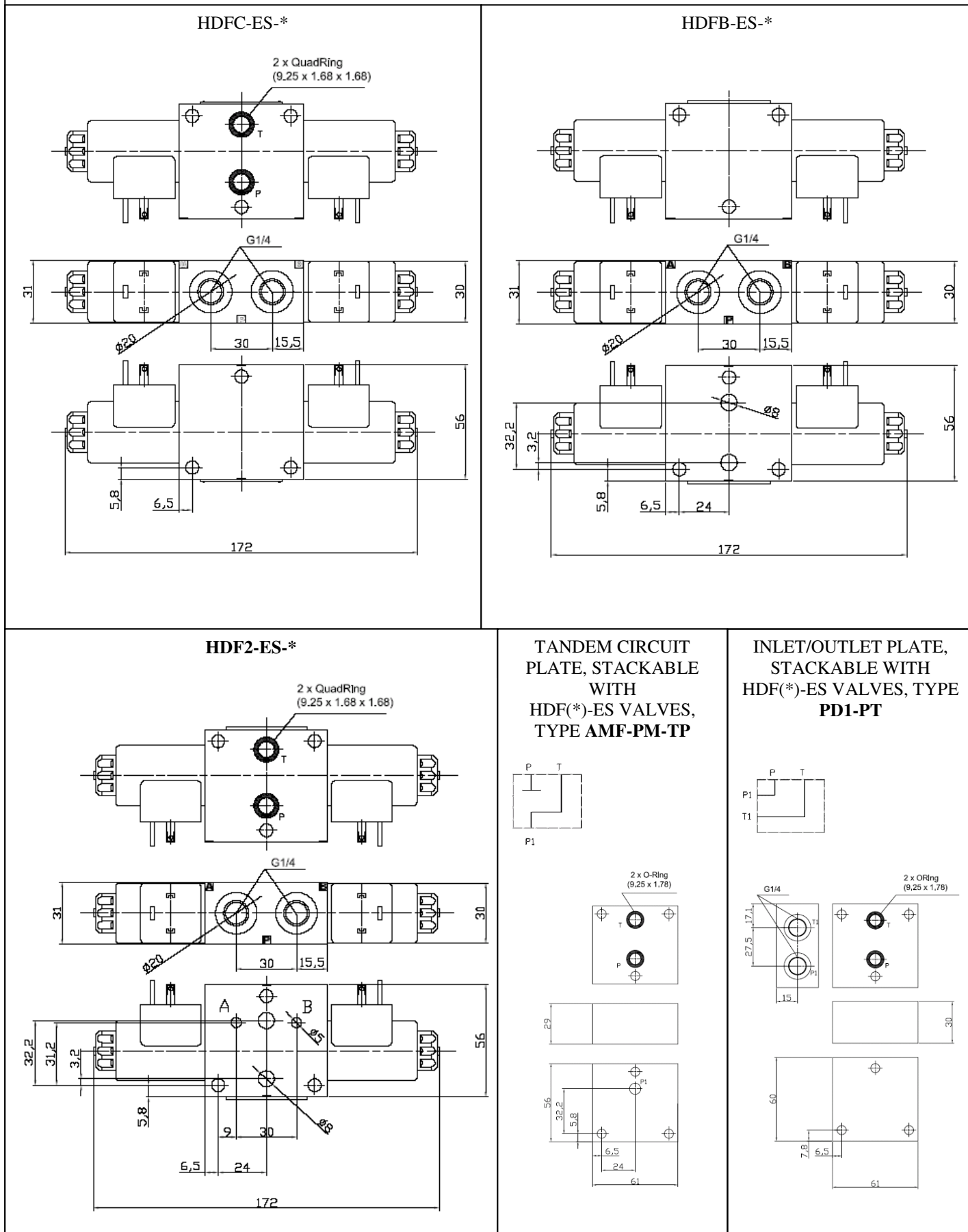


### CLOSING PLATES, STACKABLE WITH HDF(\*)-ES VALVES



## INSTALLATION DIMENSIONS

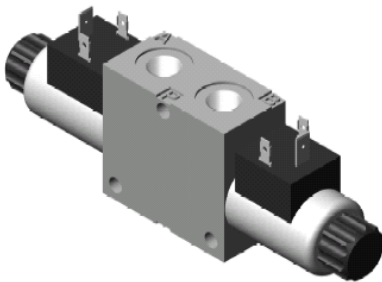
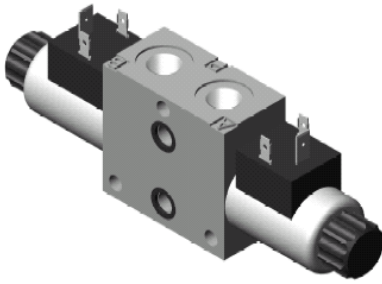
(all dimensions are mm)



10

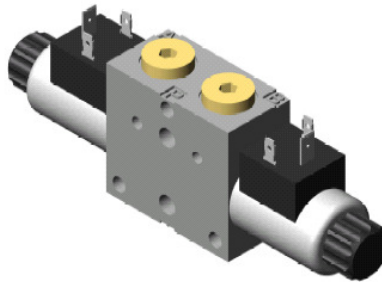
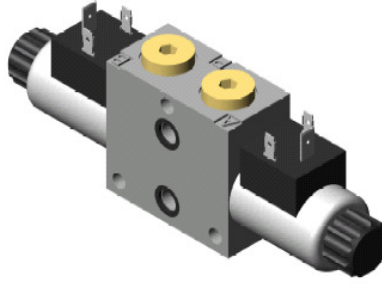
PORTS VARIANTS

**HDFC-ES-\***



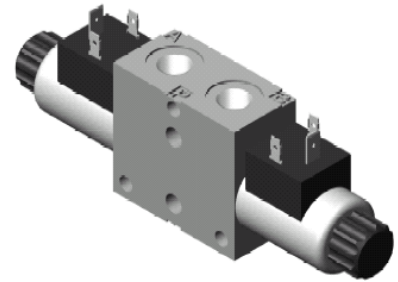
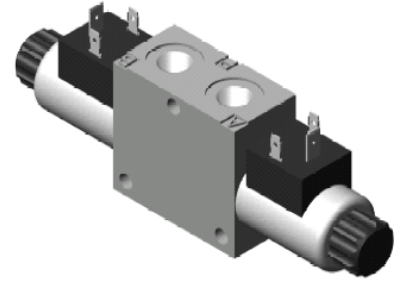
Suitable to be used as closing element in a stack of HDF-ES-\* valves

**HDF2-ES-\***



Especially designed (with A and B additional ports) to be stacked with the double pilot operated check valve type AMF-CP-AB (see table AM-F50). HDF2-ES-\* valves are supplied with G1/4 A and B ports plugged

**HDFB-ES-\***

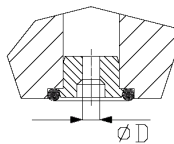


Suitable to be used as closing element in a stack of HDF-ES-\* valves

11

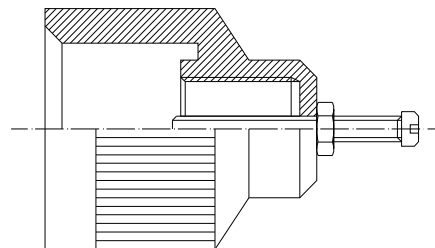
OPTIONS

Available for P and T lines “section reducer” or “stop” with O ring



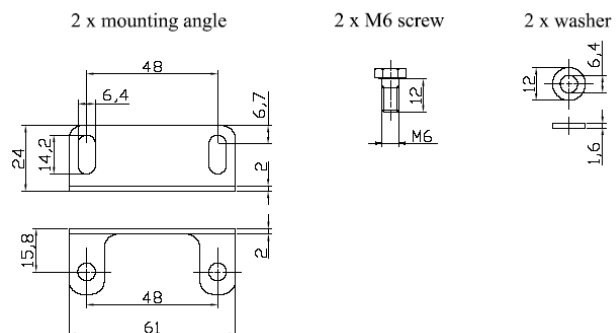
D (mm)	CODE
0	3S-00
1,0	3S-10
1,5	3S-15
2,0	3S-20
2,5	3S-25

Standard retaining nut can be replaced by a mechanical override nut device, code G01-E:



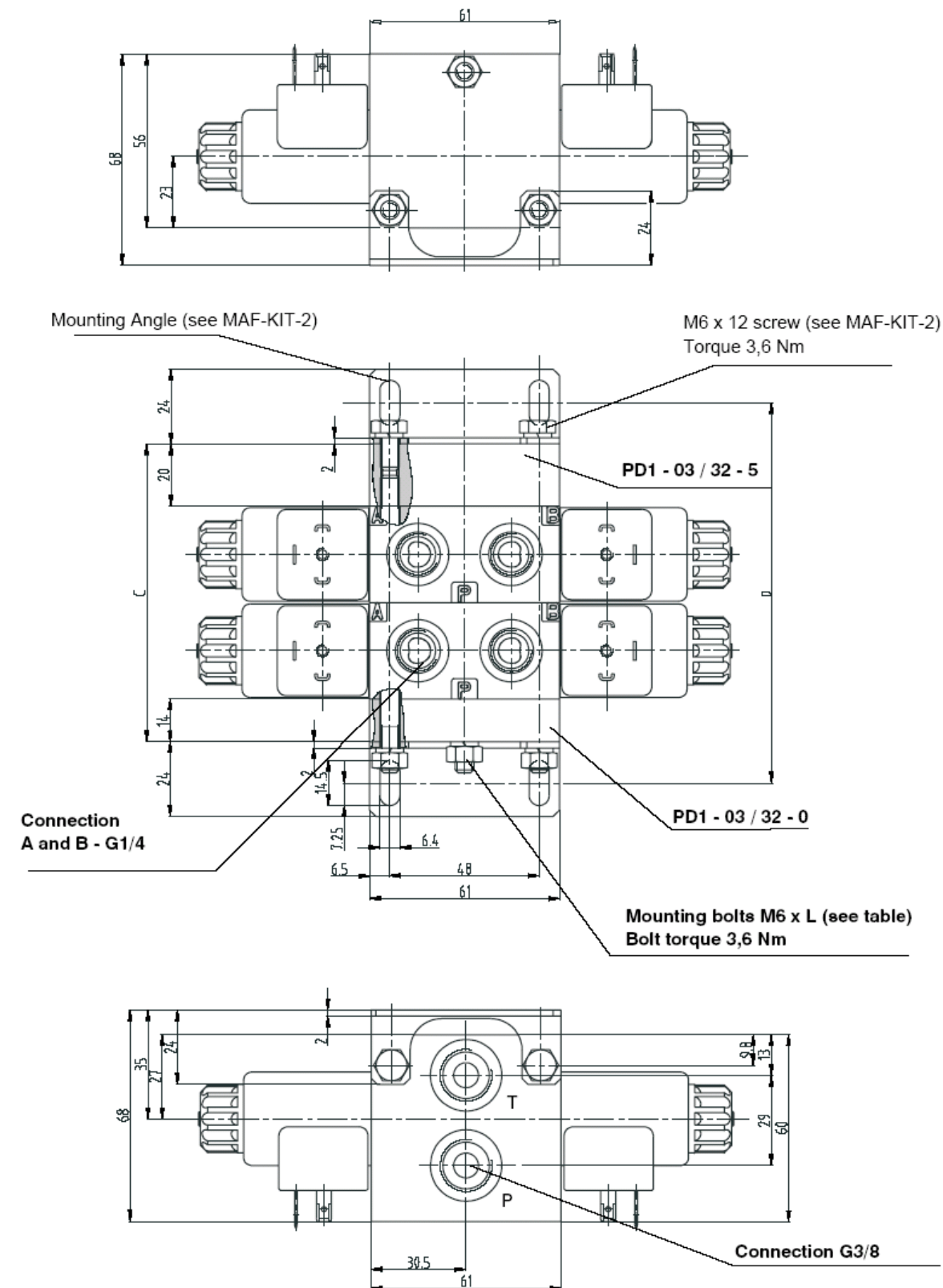
**MOUNTING ANGLES KIT TYPE MAF-KIT-2**

Fixing elements for HDF-ES-\* stack :



## Block Assembly

Dimensions in millimeters



## Dimensions

Number of section	1	2	3	4	5	6	7	8
Dimension C [mm]	65	96	127	158	189	220	251	282
Dimension D [mm]	91,5	122,5	153,5	184,5	215,5	264,5	277,5	308,5
Dimension L [mm]	55	100	133	163	194	224	256	287