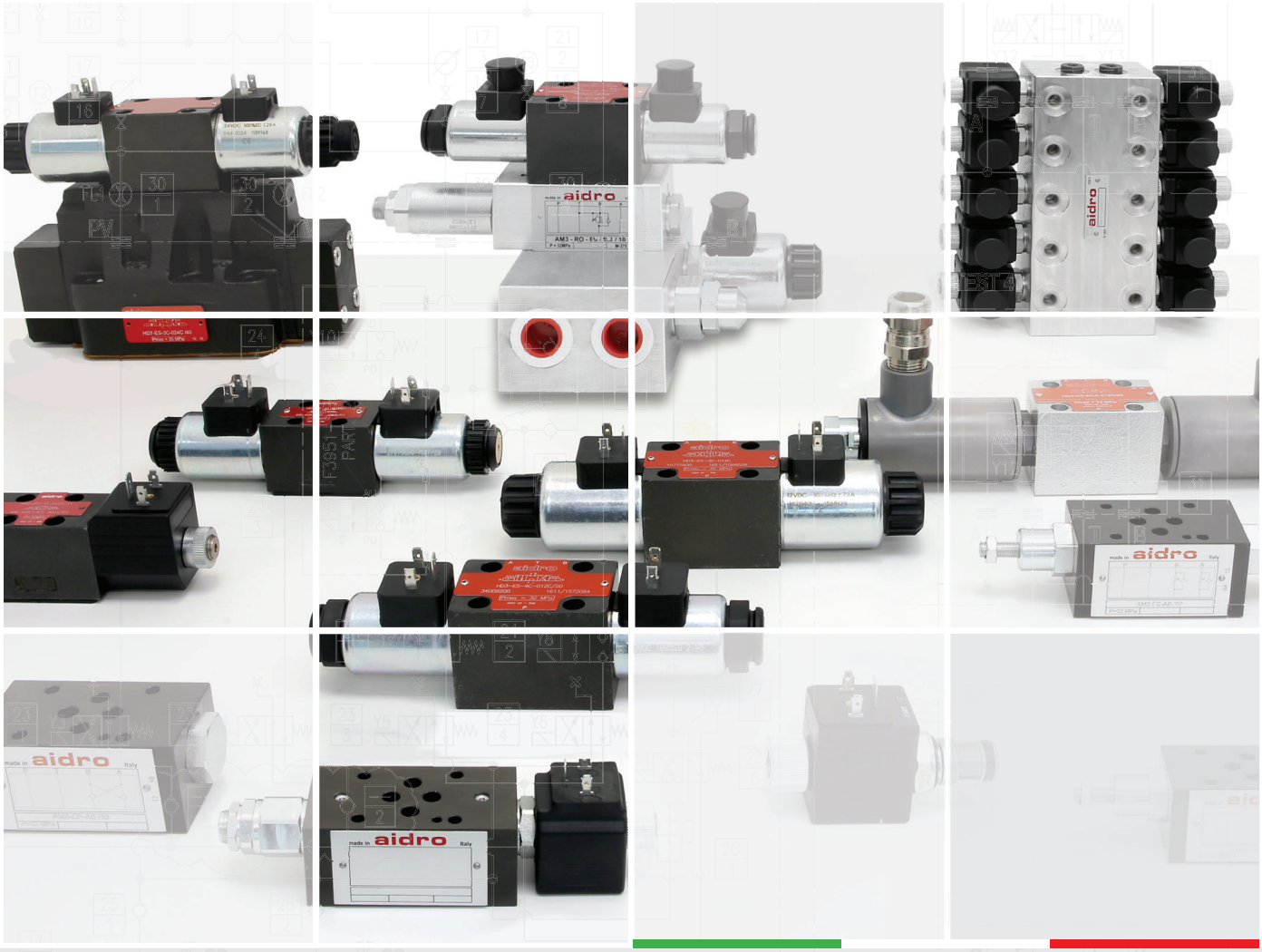
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Desktop Metal Company

Products catalogue



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the technical data of the catalogue can consequently change.

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7 PROPORTIONAL VALVE

8 CARTRIDGE VALVES SAE8-SAE10

9 IN LINE CONTROL VALVES

10 VARIOUS SCREW IN CARTRIDGE AND MODULES

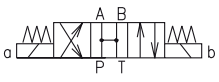
11 POWER PACK

12 VARIOUS

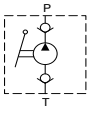
13 3D - STAINLESS STEEL

SUMMARY

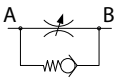
1 HDF stackable valves

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED - STACKABLE
HDF*-ES-*


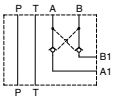
0001

STACKABLE HAND PUMP
AMF-HP2


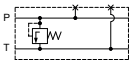
0007

IN LINE THROTTLE VALVE
HFC-14


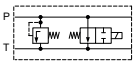
0009

PILOT OPERATED CHECK VALVE
AMF-CP-AB


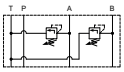
0011

AMF COMBINED PRESSURE RELIEF
AMF-MOP/*


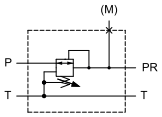
0013

AMF PRESSURE RELIEF COMBINED WITH ELECTRIC BY-PASS
AMF-MOP/*-EV2*


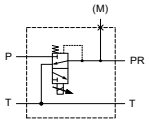
0017

AMF PRESSURE RELIEF VALVE
AMF-MO-BA


0019

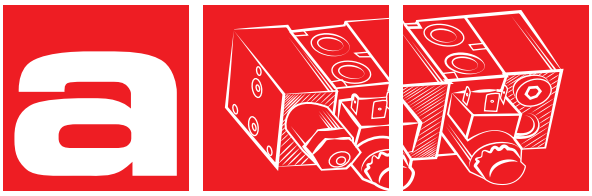
AMF DIRECT OPERATED PRESSURE REDUCING VALVE
AMF-RO-P/*


0021

AMF PROPORTIONAL PRESSURE REDUCING VALVE
AMF-RE-P/*


0023

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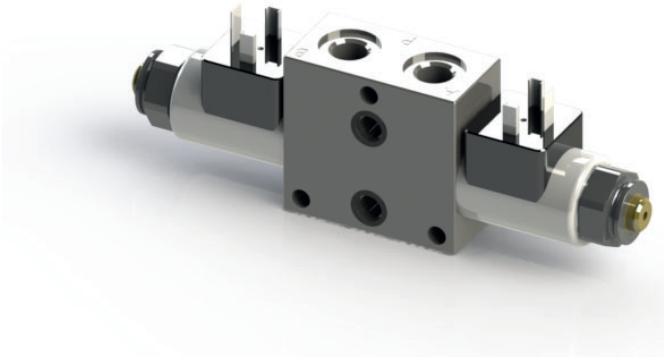
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED - STACKABLE

HDF*-ES-*

25 l/min - 25 MPa (250 bar)

1 DESCRIPTION

Distributors HDF type are the basic elements for building blocks through horizontal assembly without the need of additional manifolds. Channels A, B outputs at the upper surface of the body are provided with threads G1/4. The individual distributor bodies are connected into a compact block using three bolts. Directional valves and the other modules can be combined in order to have different hydraulic circuits. The basic surface treatment of the valve housing phosphate coated and the solenoids are zinc coated.



2 ORDERING CODE

(1)	(2)		(3)		(4)	(5)		(6)		(7)
HDF		-	ES	-			-		/	10

(1) HDF: 4-way directional control valve – Pressure 25 Mpa (250 bar)

(2) Ports variants (see 8):
- no designation: standard version
- 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

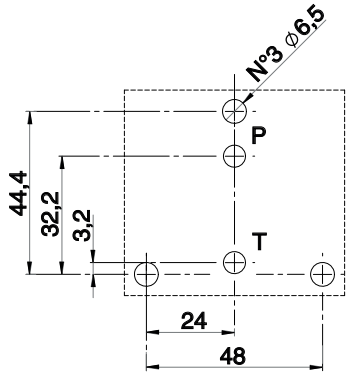
(3) ES: electrically controlled, standard

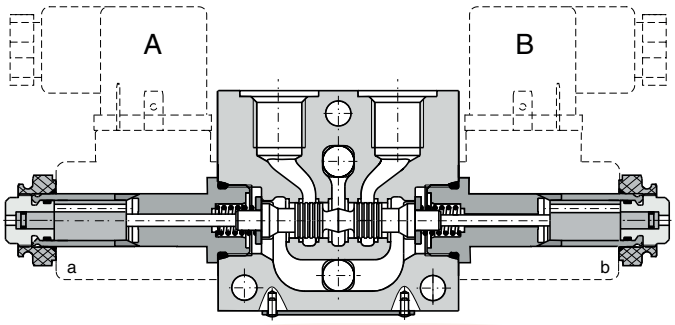
(4) Spool type (see 4):
- -number is the main spool type
- -letter is the solenoid or spring arrangement:
  - C : 2 solenoids, spool is spring centered (3 position)
  - N : 2 solenoids, spool is detented (2 position)
  - LL : 1 solenoid (a), spool is spring offset (2 position, end to end)
  - ML : 1 solenoid (a), spool is spring offset (2 position, middle to end)
  - LM : 1 solenoid (a), spool is spring offset (2 position, end to middle)

(5) Code reserved for option and variants:
- b : only for version LL, ML, LM solenoid b installed (instead of solenoid a)
- S-**: calibrated orifice on P port (see 9)
- ZT : body, solenoid tubes and coils are zinc trivalent plated

(6) Electric voltage and solenoid coils (see 3) :
- 0000: no coils
- 012C: coils for V12DC
- 024C: coils for V24DC
- 220R: coils for V220/50 – V230/60 AC

(7) Design number (progressive) of the valves





Spools, spring 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 4

3 TECHNICAL DATA

Maximum nominal flow	20 l/min
Maximum rec. flow rate	25 l/min
Maximum nominal pressure (P, A, B)	25 MPa (250bar)
Maximum pressure at T port	20 MPa (200bar)
Pressure drops	see 5
Protection to DIN 40050	IP 65
Duty cycle	100%
Service life	≥ 10^7 cycles
Installation and dimensions	see 7
Mass	1,04 - 0,9 Kg

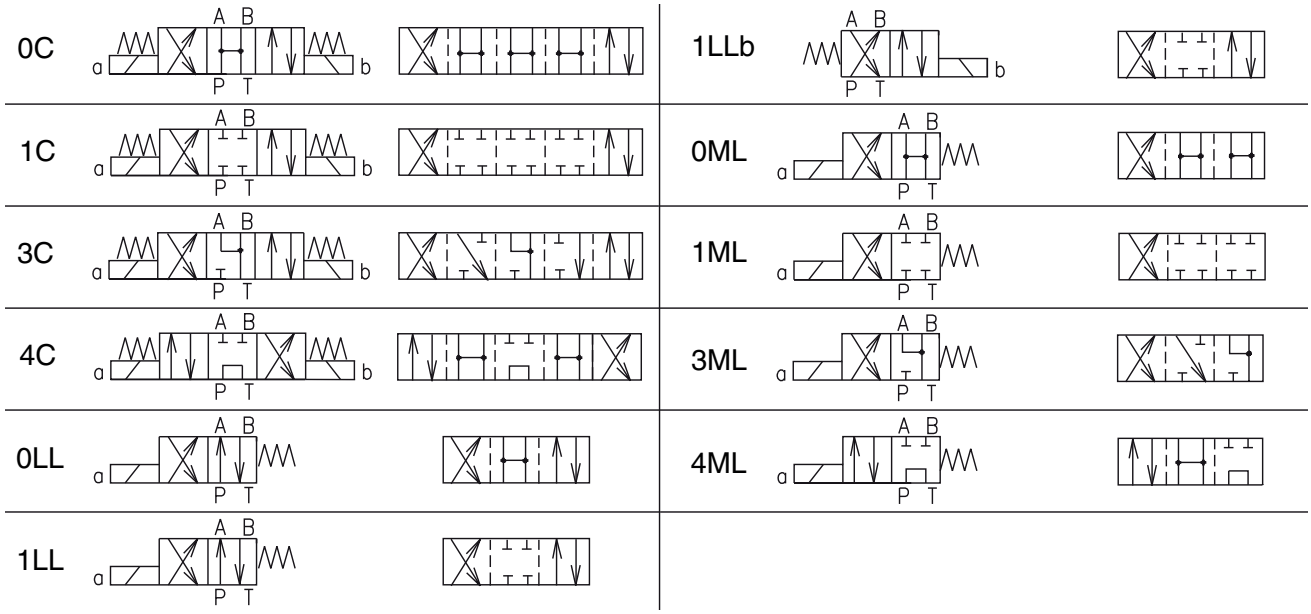
Electric characteristics:

Valves HDF-ES-* are operated by solenoid B01 (see cap 12 pag 0011) 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 circuitery 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

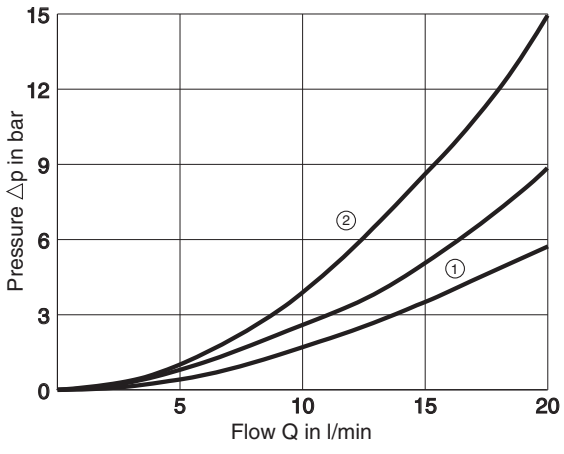
Permissible supply voltage variation: +5% -10%

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



5 TYPICAL DIAGRAMS

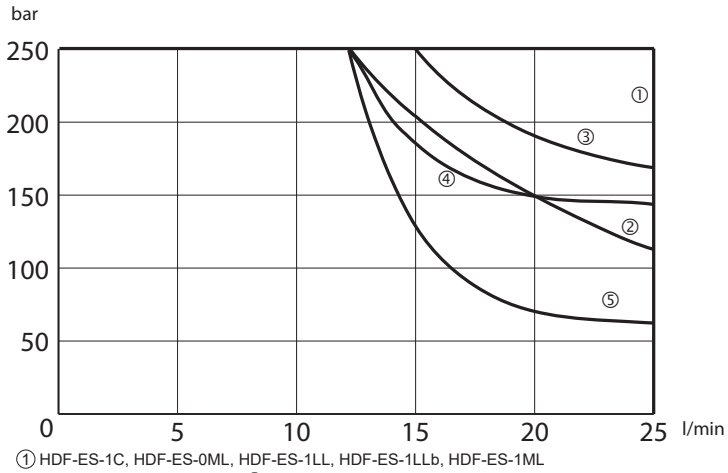
Typical Δp-Q curves for valves HDF -ES-* in standard configuration, with mineral oil at 36 cSt and at 50°C for flow P -> A/B, A/B -> T



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

6 POWER LIMITS

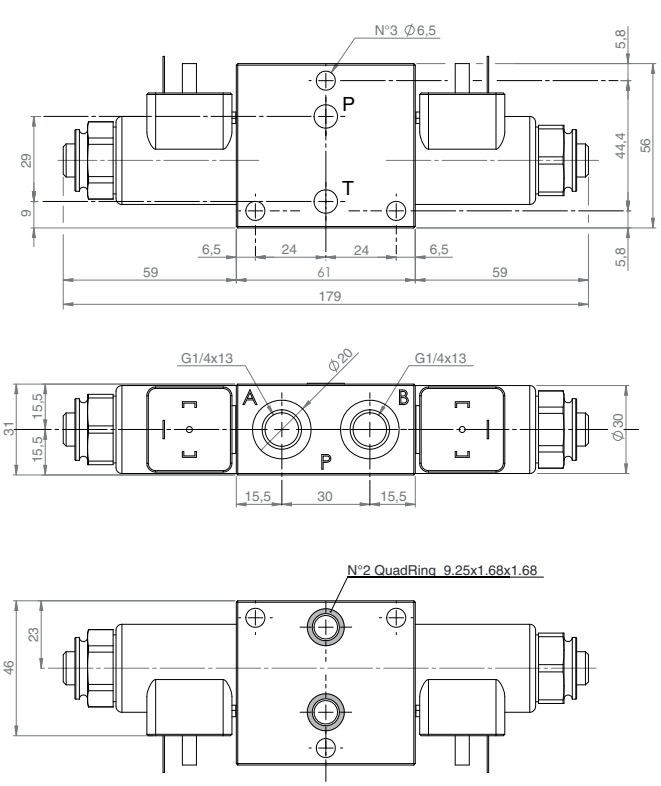
p-Q characteristic limits for safe use of HDF-ES* solenoid operated valves. Limit curves applye to solenoid valves energized with rated voltage -5% and flushed with hydraulic fluid.



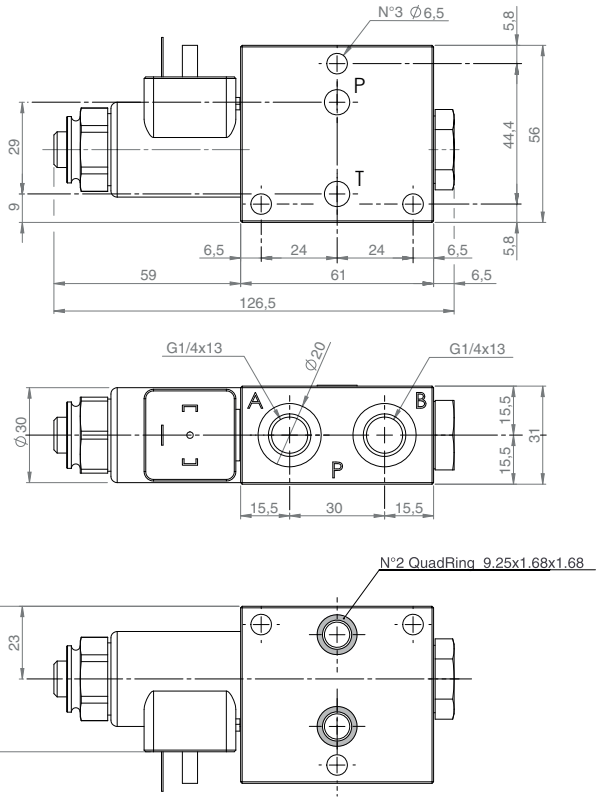
① HDF-ES-1C, HDF-ES-0ML, HDF-ES-1LL, HDF-ES-1LLb, HDF-ES-1ML
② HDF-ES-4C, HDF-ES-4ML ③ HDF-ES-0C, HDF-ES-0ML
④ HDF-ES-3C, HDF-ES-3ML ⑤ HDF-ES-0LL

7 INSTALLATION DIMENSIONS (mm)

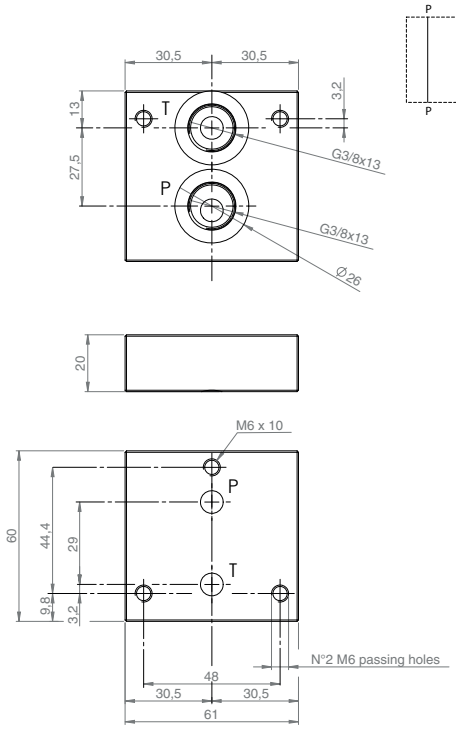
HDF-ES-*C -*



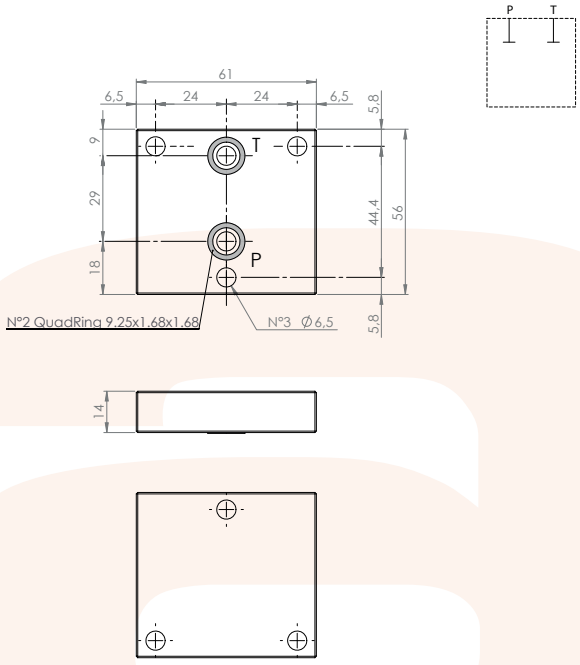
HDF-ES-*LL-* HDF-ES-*ML-* HDF-ES-*LM-*

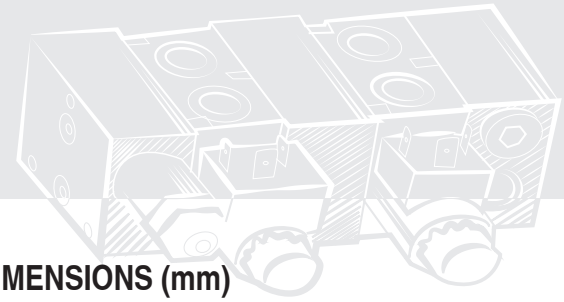


INLET PLATE, STACKABLE WITH HDF-ES VALVES, TYPE PD1-03/32-5



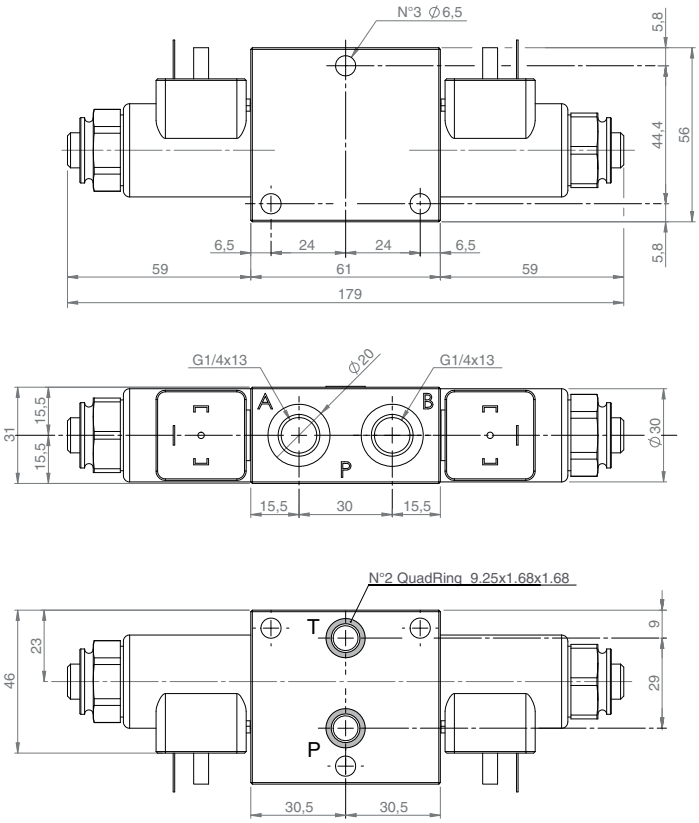
CLOSING PLATES, STACKABLE WITH HDF-ES VALVES TYPE PD1-03/32



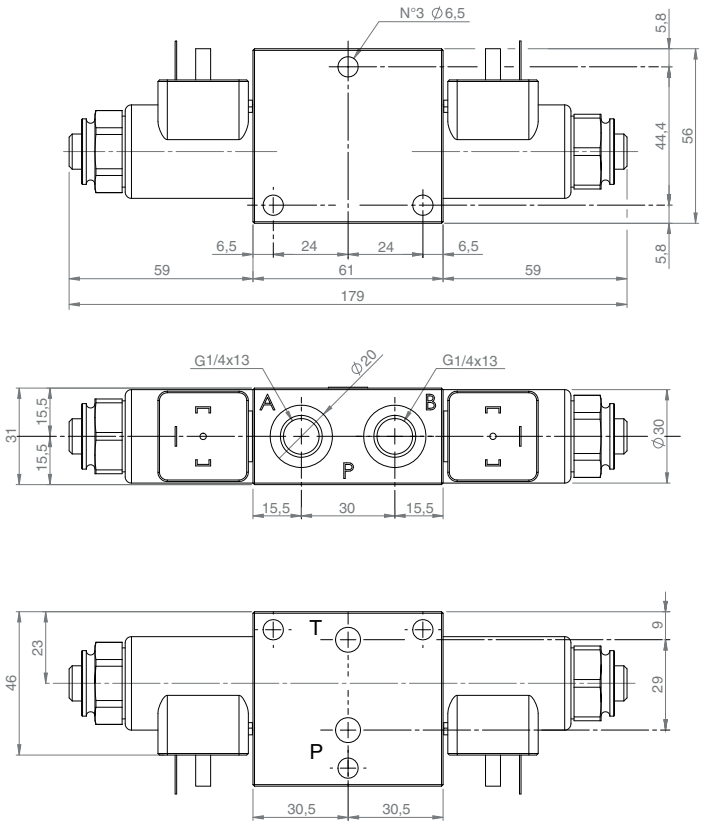


INSTALLATION DIMENSIONS (mm)

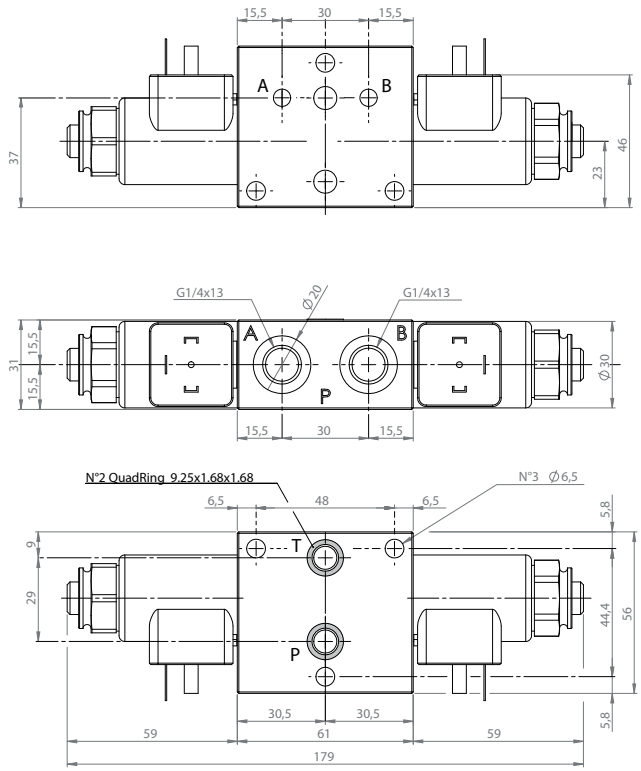
HDFC-ES-*



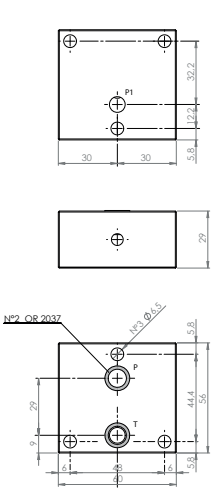
HDFB-ES-*



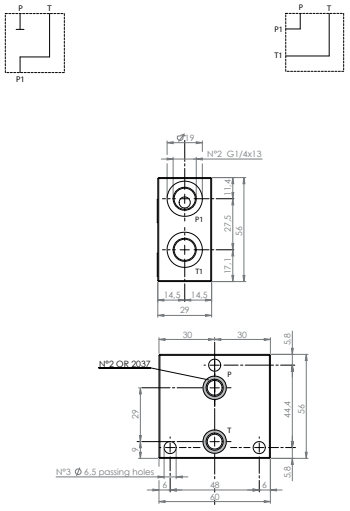
HDF2-ES-*



Tandem circuit plate, stackable with HDF-ES valves, **AMF-PM-TP**

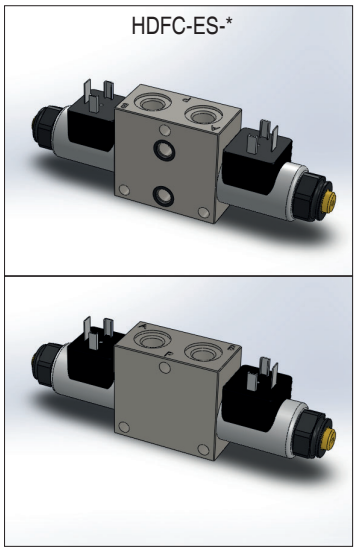


inlet/outlet plate, stackable with HDF-ES valves, **PD1 -PT**



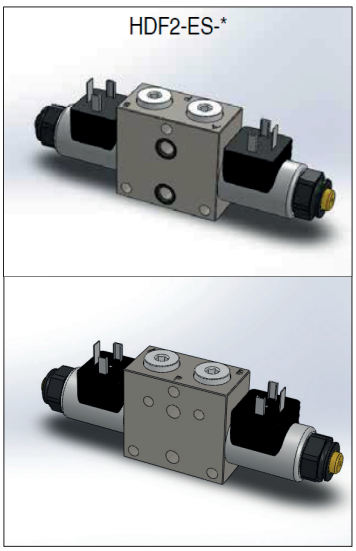
8 PORTS VARIANTS

HDFC-ES-*



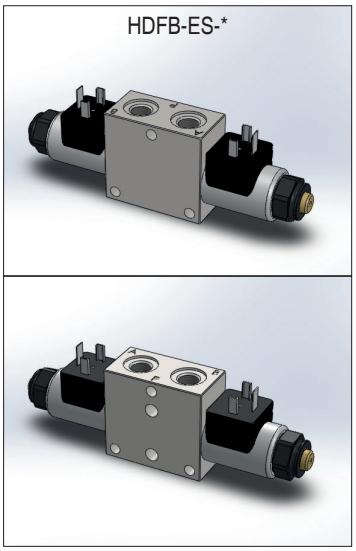
Suitable to be used as closing element in a stack of HDF-ES-* valves

HDF2-ES-*



Especially designed (with A and B additional ports) to be stacked with the double pilot operated check valve type AMF-CP-AB. HDF2ES-* valves are supplied with G1/4 A and B ports plugged

HDFB-ES-*

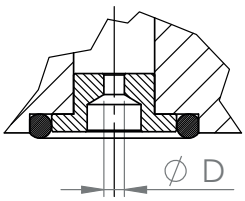


Suitable to be used as closing element in a stack of HDF-ES-* valves

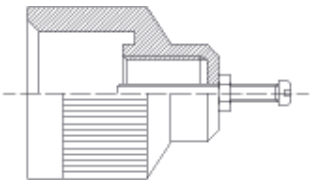
9 OPTIONS

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



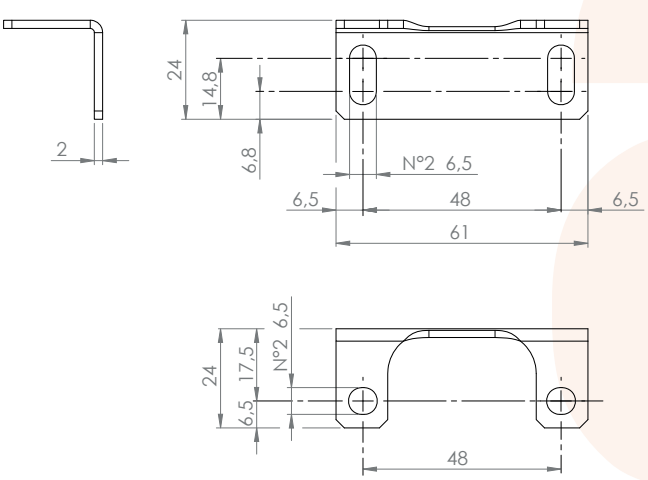
Standard retaining nut can be replaced by a mechanical override nut device, code G01-E:



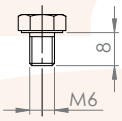
10 MOUNTING ANGLES KIT TYPE MAF-KIT

Fixing elements for HDF-ES-* stack :

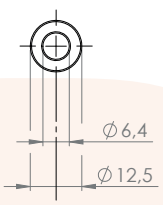
N°2 Mounting angle

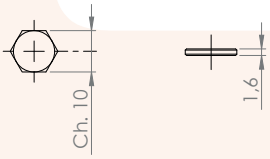


N°2 M6 Screw

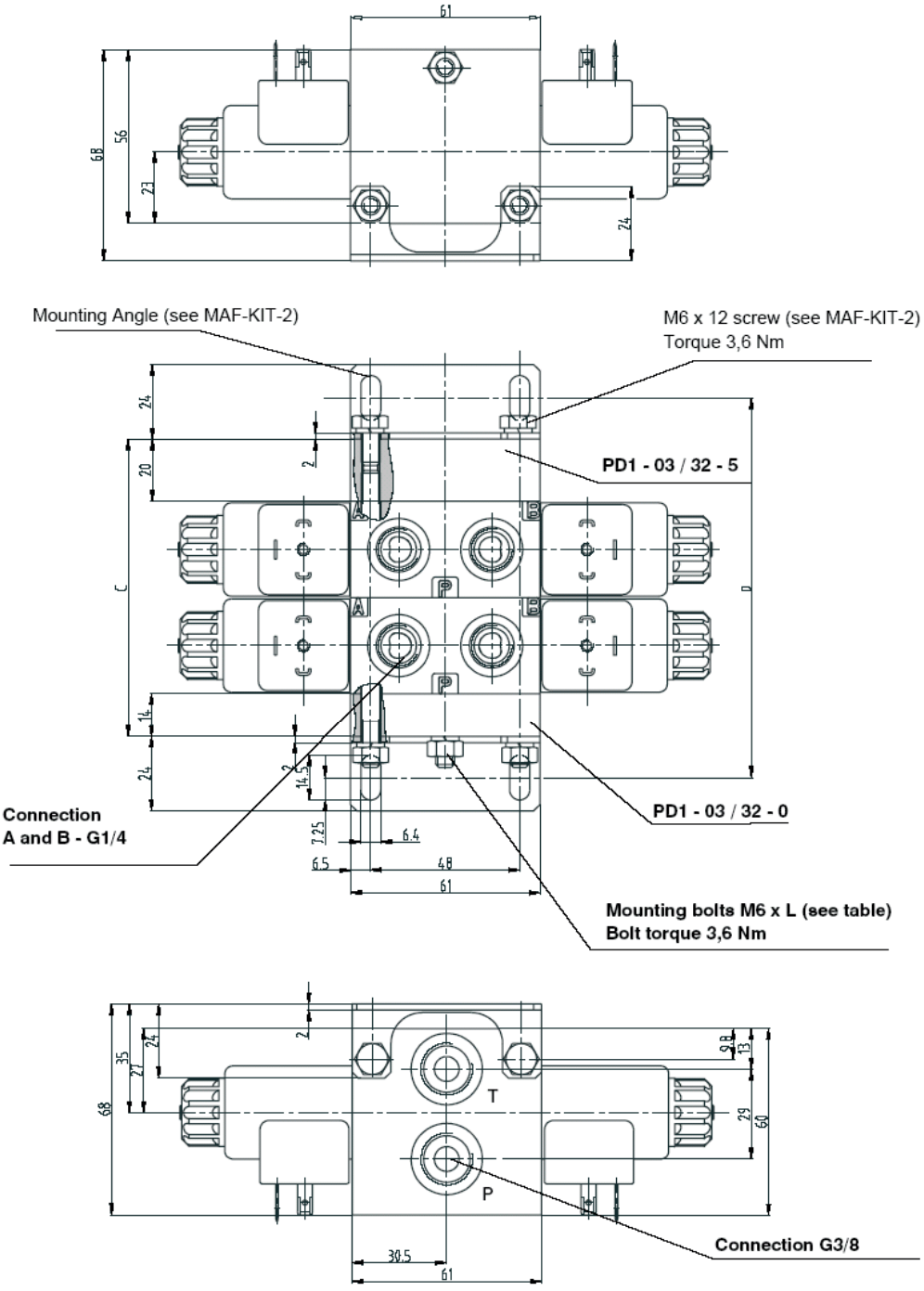


N°2 Washer





11 BLOCK ASSEMBLY (mm)



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

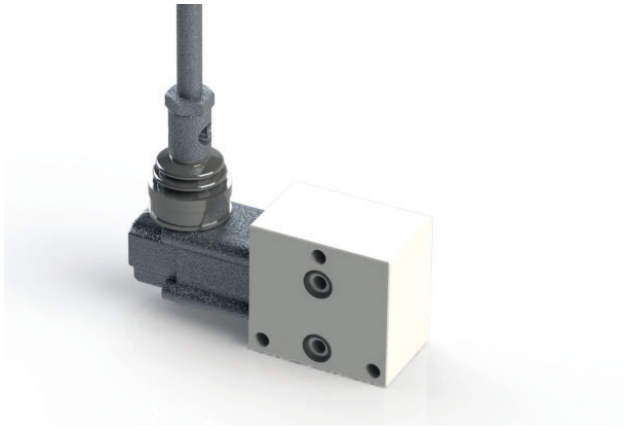
Stackable Hand Pump

AMF-HP2

2 cm³ - 20 MPa (200 bar)

1 DESCRIPTION

Stackable hand pump for HDF valves serie.
With this hand pump it is possible to operate the hydraulic systems even if there is no power supply. It is normally very useful as emergency tool.
The hand lever can also be installed only in case of necessity in order to save space.
The body of the valve is in Aluminium.



2 ORDERING CODE

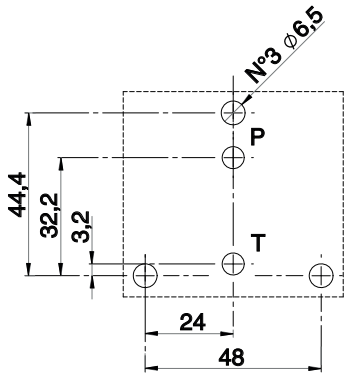
(1)		(2)	(3)		(4)
AMF	-	HP2		/	10

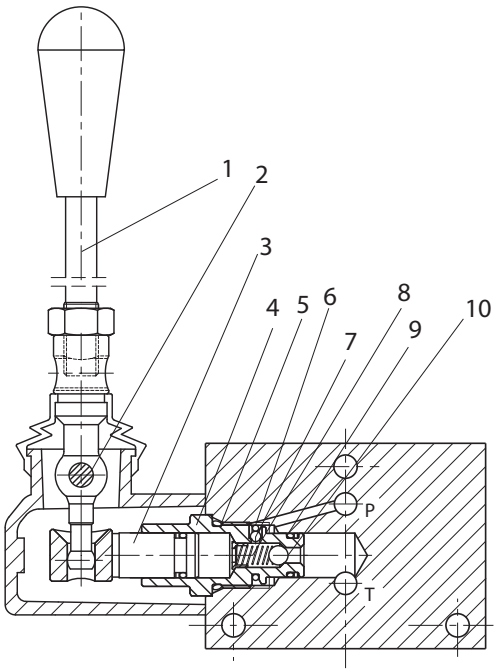
(1) AMF: module stackable with 4 way solenoid valve type HDF-ES

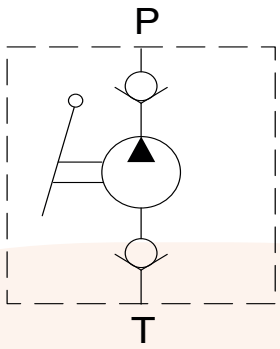
(2) HP2: hamd pump 2 cm³

(3) Code reserved for options and variants

(4) Design number (progressive) of the pump module







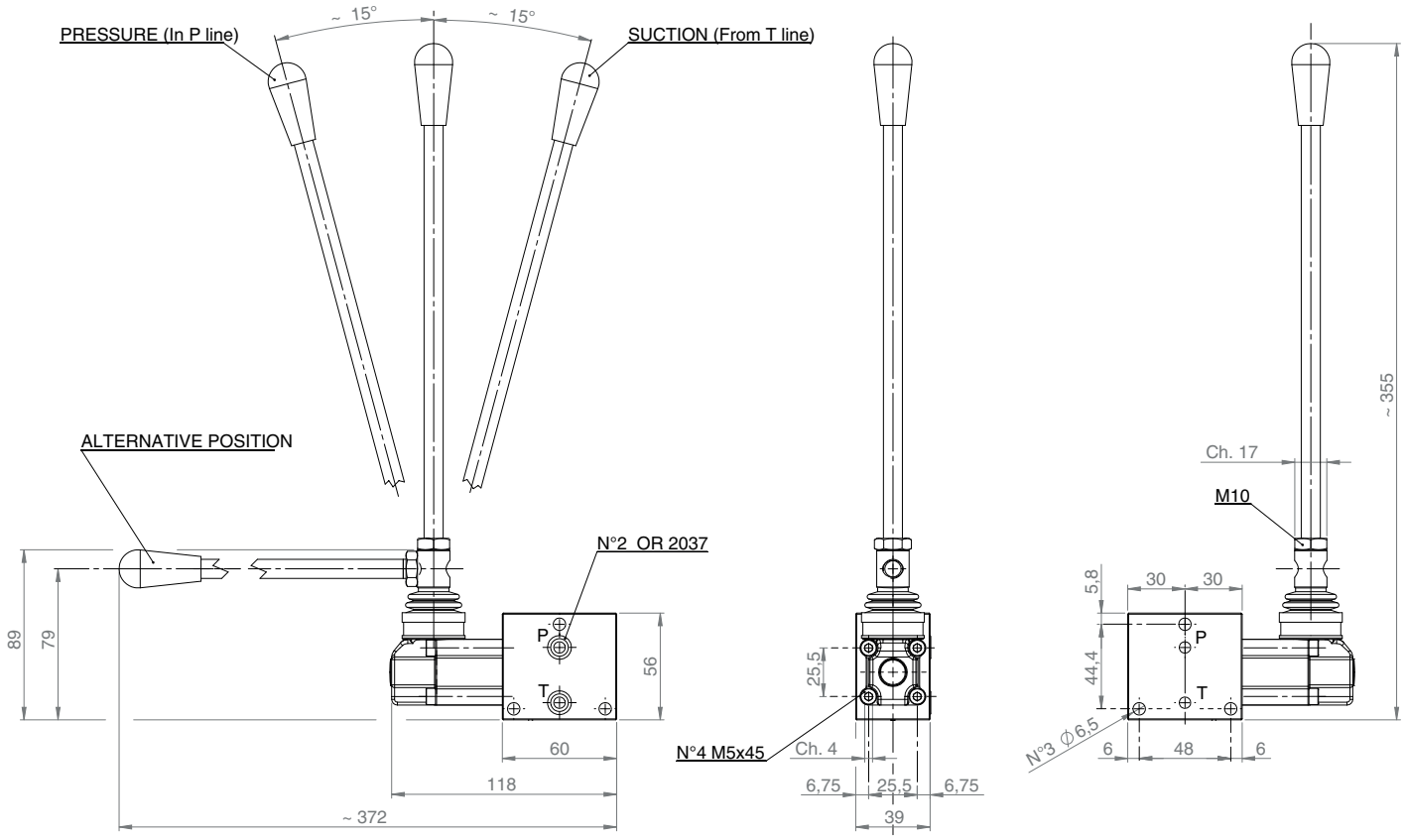
On the intake stroke piston 1 moves backward and fluid flows from port T trough check valve 4, while check valve 2 is kept close. When lever moves piston 1 forward, check valve 4 is kept close by spring 3, while check valve 2 opens and permits fluid to flow in pressure line.

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3 TECNICAL DATA

Displacement	2 cm^3 each (double) stroke
Maximum pressure	200 bar
Lever is normally used only in case of emergency and can be screwed in two different position (vertical or horizontal)	

4 INSTALLATION DIMENSIONS (mm)



5 HYDRAULIC FLUIDS

Seals and materials used on standard valves AMF are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 21/18/15, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

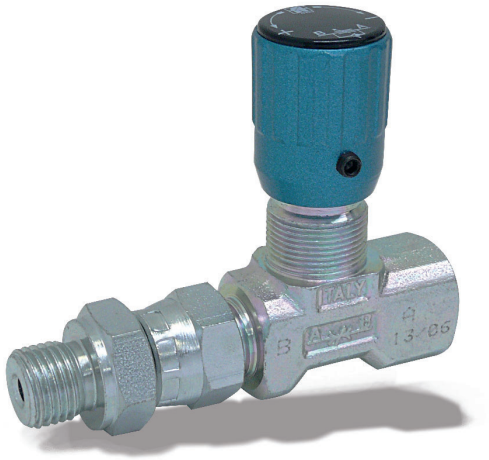
IN LINE THROTTLE VALVE

HFC-14

20 l/min - 35 MPa (350 bar)

1 DESCRIPTION

This in line throttle valve is very useful to control the flow rate out from the ports A and B of the HDF valves.
It can be easily installed and rotated in order to be easily accesible.



2 ORDERING CODE

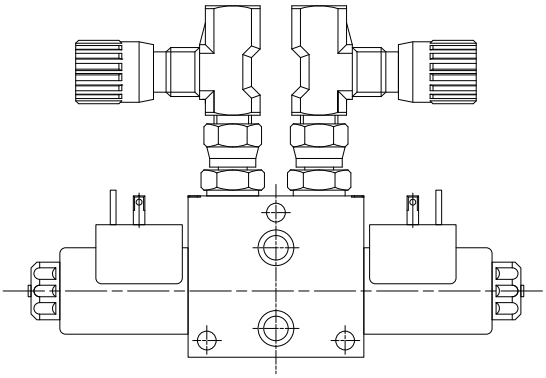
(1)		(2)	(3)		(4)
HFC	-	14		/	10

(1) HFC: Flow control for HDF valves

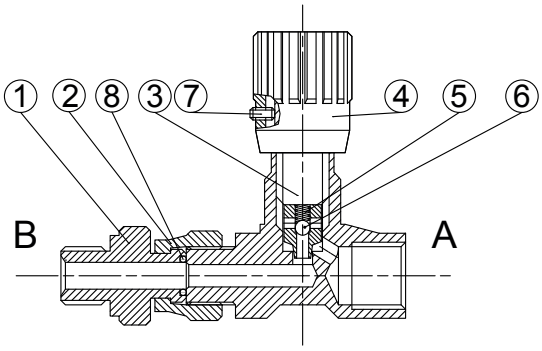
(2) 14: size G1/4

(3) Code reserved for options and variants

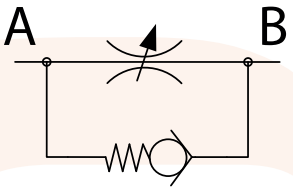
(4) Design number (progressive) of the pump module



Example of HDF-ES-* with HFC-14 installed



When fluid flows from A to B the check ball 6 (kept in its position by the spring 5) closes the main passage, thus the fluid passes through the restricted annular section, which area depends on the position of the throttling spool 3. During flow from B to A the fluid shifts the check ball 6 against the spring 5 thus permitting free flow. Typically HFC-14 valves are mounted on the A and B ports of HDF-ES-*** solenoid valves; the presence of “turning joint” 2, acting on nipple 1, allows easy installation and contemporary mounting of flow valves on both A and B ports.

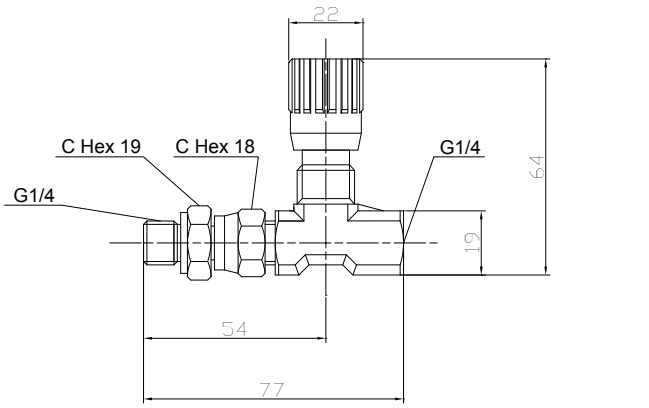


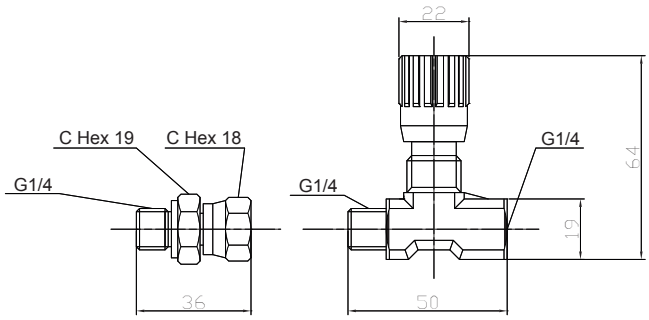
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3 TECNICAL DATA

Maximum nominal flow	20 l/min
Maximum nominal pressure	25 MPa (250 bar)
Mass	

4 INSTALLATION DIMENSIONS (mm)





INSTALLATION

1. Lock the nipple 1 in a G1/4 port.

2. Put O-Ring 8 in its seat.

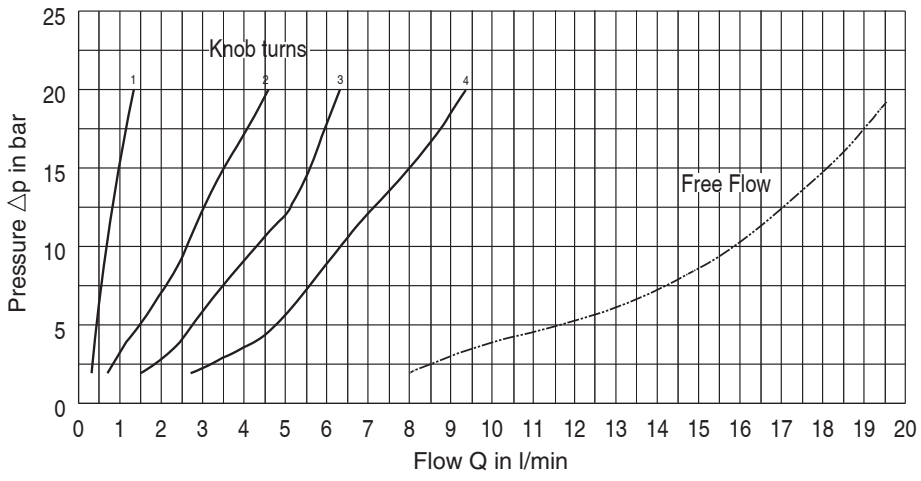
3. Fit the male thread of the valve in the turning connector.

4. While keeping the valve in the desired final orientation, screw the turning connector until blocking.

ADJUSTMENT OF THE REGULATED FLOW

To reduce the flow rate in the regulated direction (A ->fiB) turn clockwise knob, after having unlocked its retaining screw.

5 TYPICAL DIAGRAMS



10010

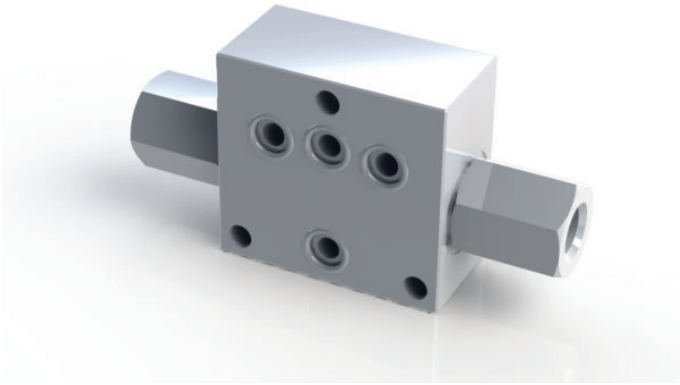
PILOT OPERATED CHECK VALVE

AMF-CP-AB

20 l/min - 25 MPa (250 bar)

1 DESCRIPTION

Pilot operated check valve to be used with HDF2-ES directional valves which have the ports A and B plugged.
Steel body and high precision machining of the internal parts assures a long service life and an high tightness.
The standard coating is the phosphate coating. On demand it is possible to have the zinc coating for an higher protection degree.



2 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)
AMF		-	CP	-	AB	-		/	10

(1) AMF: module stackable with 4 way solenoid valve type HDF2-ES (with P and T passing)

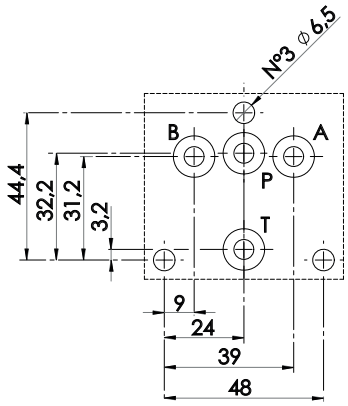
(2) Type end of stack module:
no designation: standard
C: end of stack module (P and T plugged)

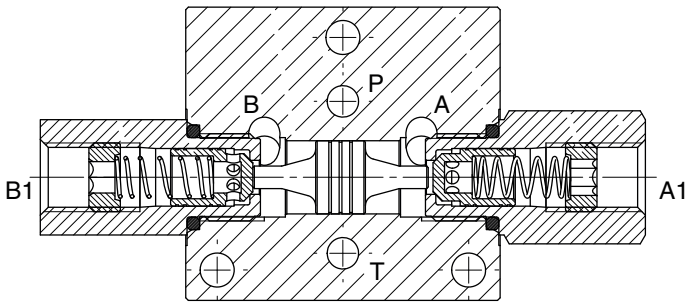
(3) CP: check valve, pilot operated (hydraulically)

(4) AB: service lines where the controls operate

(5) Code reserved for options and variants

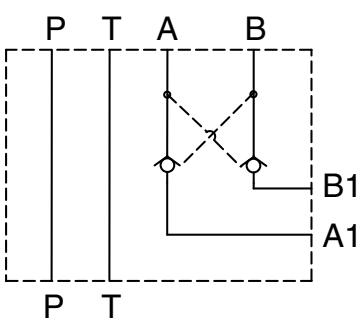
(6) Design number (progressive) of the valves



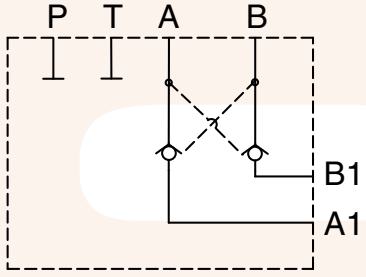


Fluid flows freely on P and T lines (AMF-CP-AB). Fluid is blocked on P and T lines (AMFC-CP-AB). On service lines A and/or B with p.o. check, fluid flows A --> A1 (and/or B --> B1) overcoming the force of spring acting on poppet and fluid is blocked A1-->fiA (and/or B1 -->fiB). When, by switching the solenoid 4-way directional valve, pressure is made available, at, for instance, port B, fluid flows B --> B1 and the pilot piston 3, shifting from its central position, forces poppet 2 , on service line A, to open and permit flow A1--> A.

AMF-CP-AB



AMFC-CP-AB



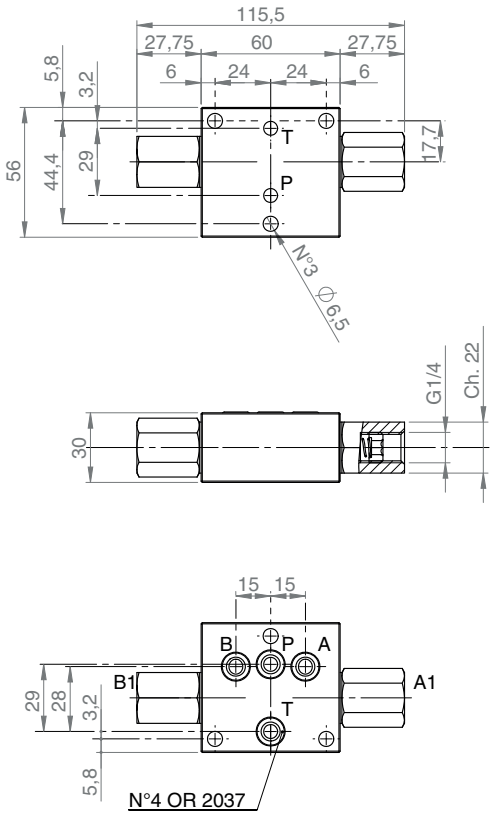
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3 TECHNICAL DATA

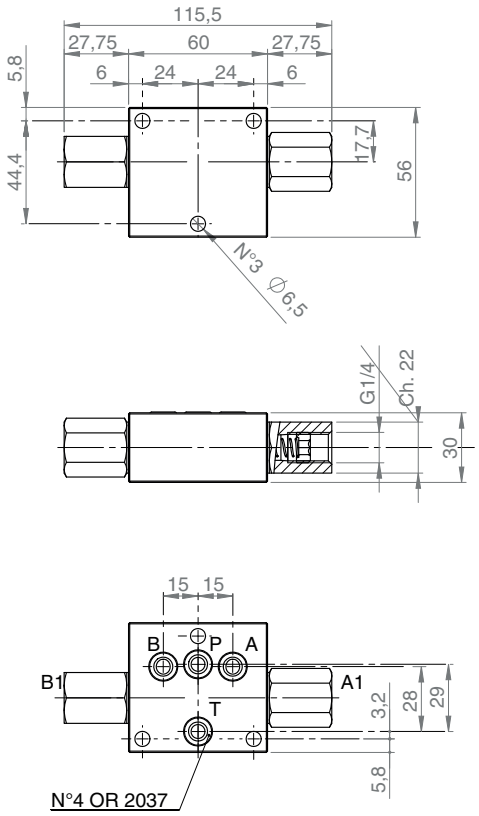
Maximum nominal flow	20 l/min	Pilot area ratio piston/check valve	approx 4.7
Maximum rec. flow rate	25 l/min	Piloting pressure	To shift the pilot piston and to open the check in A the piloting pressure must be, at B: $P_p = P_b = \frac{P_{a1} + P_m - P_a}{4.7}$ Were: P_p = Piloting pressure, P_b = Pressure in B, P_a = Pressure in A, P_{a1} = Pressure in A1, P_m = Check valve opening pressure (spring)
Maximum nominal pressure	25 MPa (250 bar)		
Material	Steel body		
Surface protection	Phospate coating		
Duty cycle	100%		
Service life	10^7		
Dimensions and Installation	see [4]		
Mass	0,81kg	Cracking Pressure	1 bar

4 INSTALLATION DIMENSIONS (mm)

AMF-CP-AB



AMFC-CP-AB

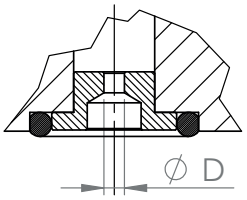


5 HYDRAULIC FLUIDS

Seals and materials used on standard valves AMF are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing agents.
The hydraulic fluid must be kept clean and filtered to ISO 4406 class 21/18/15, or better, and used in a recommended viscosity range from
10 cSt to 60 cSt.

6 OPTIONS

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



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

AMF COMBINED PRESSURE RELIEF

AMF-MOP/*

20 l/min - 25 MPa (250 bar)

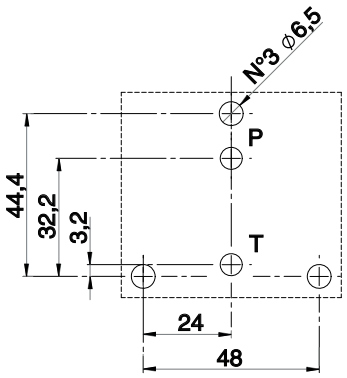
1 DESCRIPTION

With this module it is possible to have the pressure relief function of the main HDF system. In combination with the pressure relief function it is possible to add other flow controls in order to bleed a specific flow to the T line.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AMF	-	MOP	/		-		-		/	10

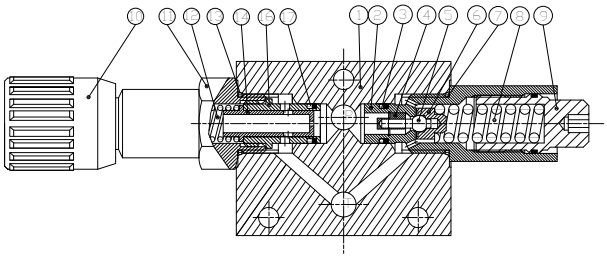


(1) AMF: module stackable with HDF-ES 4 way solenoid valve

(2) MOP: pressure relief on P line

(3) Pressure adjustment ranges:
- 10 : from 32 to 100 bar
- 16 : from 63 to 160 bar
- 25 : from 100 to 250 bar

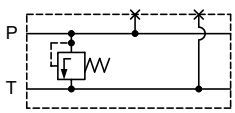
(4) Additional port or bleeding arrangement:
- CC : no auxiliary port
- P1 : P auxiliary port ¼" BSPP
- T1 : T auxiliary port ¼" BSPP
- CF : bleeding P->T by variable throttle
- CV : bleeding P->T by variable throttle with graduated knob
- QV : bleeding P->T by variable pressure compensated flow control
- Q* : bleeding P->T by fixed pressure compensated flow control
  - *: 1=1 l/min
    2=2 l/min
    3=3 l/min
    ...



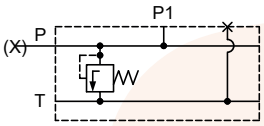
(5) Code reserved for option and variants

(6) Design number (progressive) of the valves

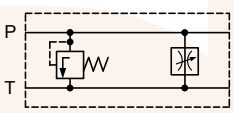
AMF-MOP/*-CC



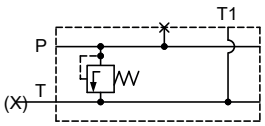
AMF-MOP/*-P1



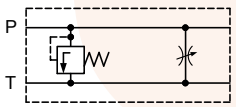
AMF-MOP/*-QV



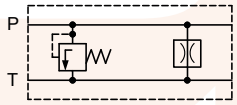
AMF-MOP/*-T1

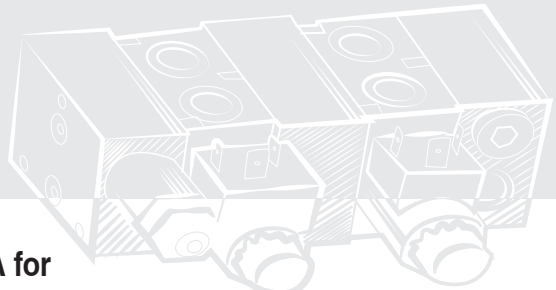


AMF-MOP/*-C



AMF-MOP/*-Q(*)





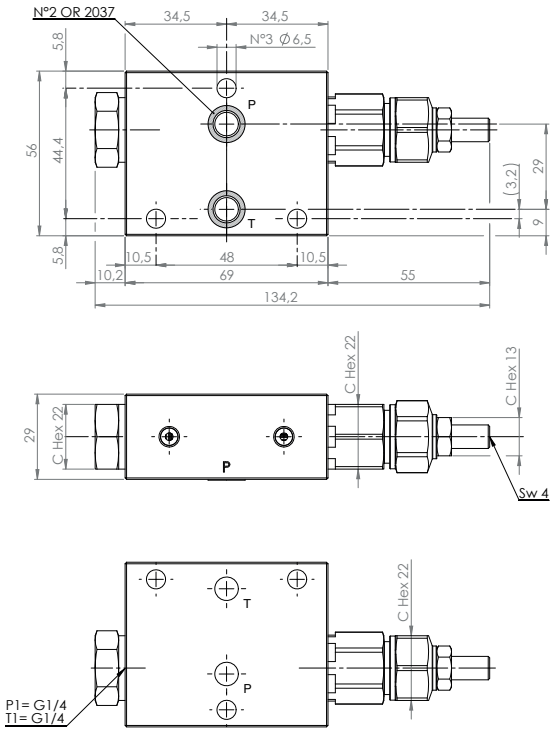
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3 TECHNICAL DATA for AMF-MOP-CC, AMF-MOP-P1, AMF-MOP-T1

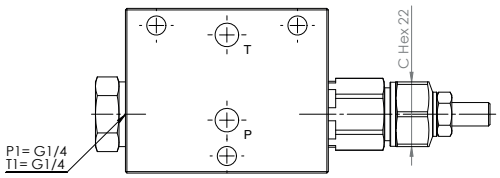
Maximum rec. flow rate	20 l/min
Maximum nominal pressure	25 MPa (250 bar)
Mass	1,20 kg

4 INSTALLATION DIMENSIONS (mm)

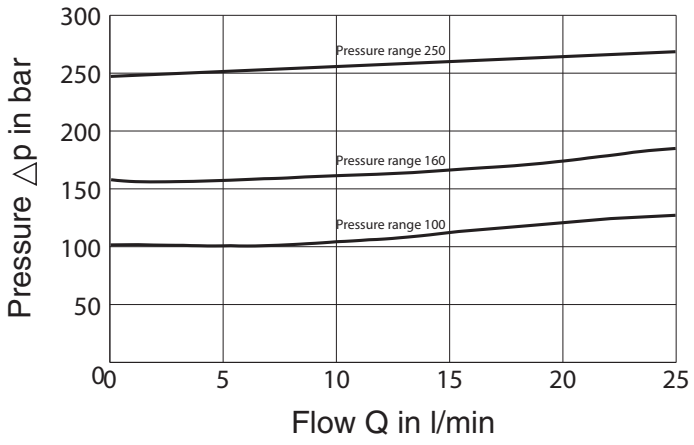
AMF-MOP-CC



AMF-MOP-P1 **AMF-MOP-T1**



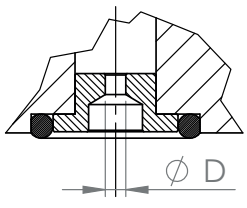
5 TYPICAL DIAGRAMS of PRESSURE RELIEF VALVE



6 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



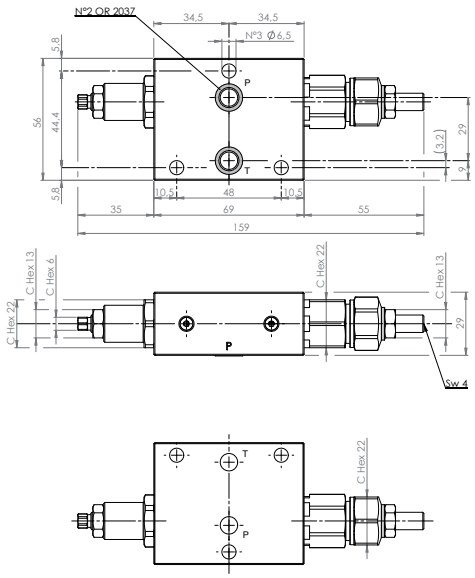
Relief pressure is reached when the axial hydraulic forces on piston 5 equal the force on spring 8; the value of the relief pressure can be therefore changed, within the range, by changing the compression of spring 8. To increase the relief pressure, turn clock wise the adjustment nut 9.

7 TECHNICAL DATA for AMF-MOP-CF, AMF-MOP-CV

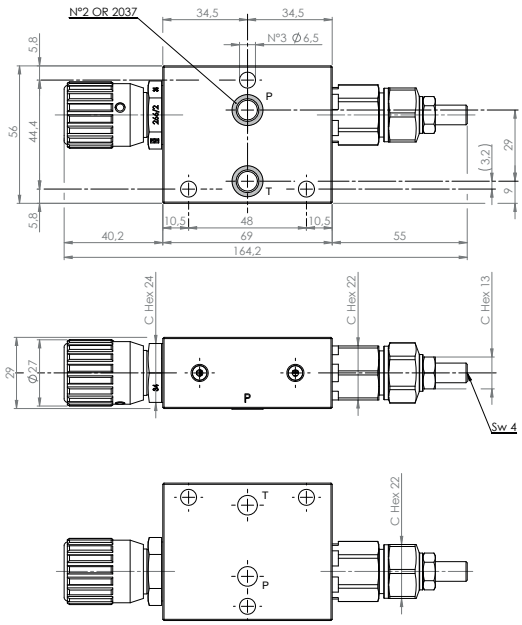
Maximum rec. flow rate in service line	20 l/min
Maximum flow rate in bleeding line	16 l/min
Maximum nominal pressure	25 MPa (250 bar)

8 INSTALLATION DIMENSIONS (mm)

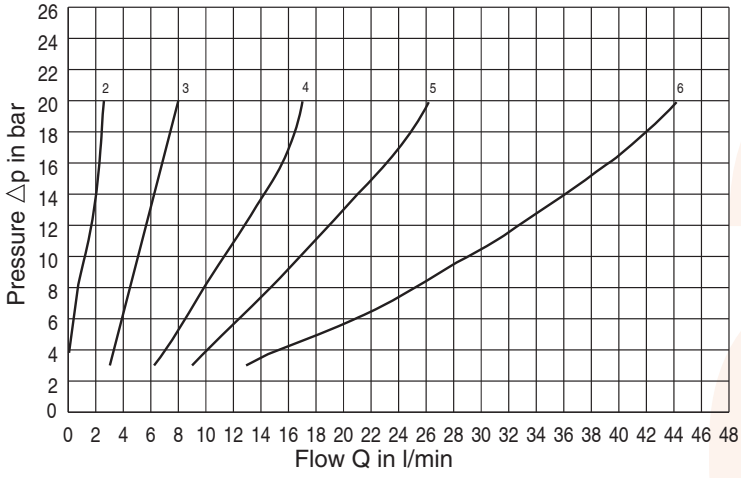
AMF-MOP-CF with VCF-34



AMF-MOP-CV with FT-266/2-34



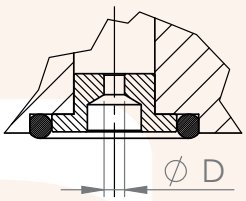
9 TYPICAL DIAGRAMS of FLOW CONTROL VALVE (FT-266/2-34)



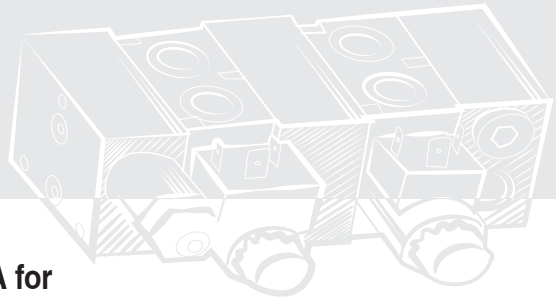
10 OPTIONS

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



Bleeding flow, taken from main P line, is regulated by a variable throttle valve (type VCF-34 or FT266/2-34) that changes the section of an annular passage to T line. To decrease bleeding flow rate, from main P line to main T line, turn clockwise the graduated knob or the adjustment screw, after having unlocked its nut.



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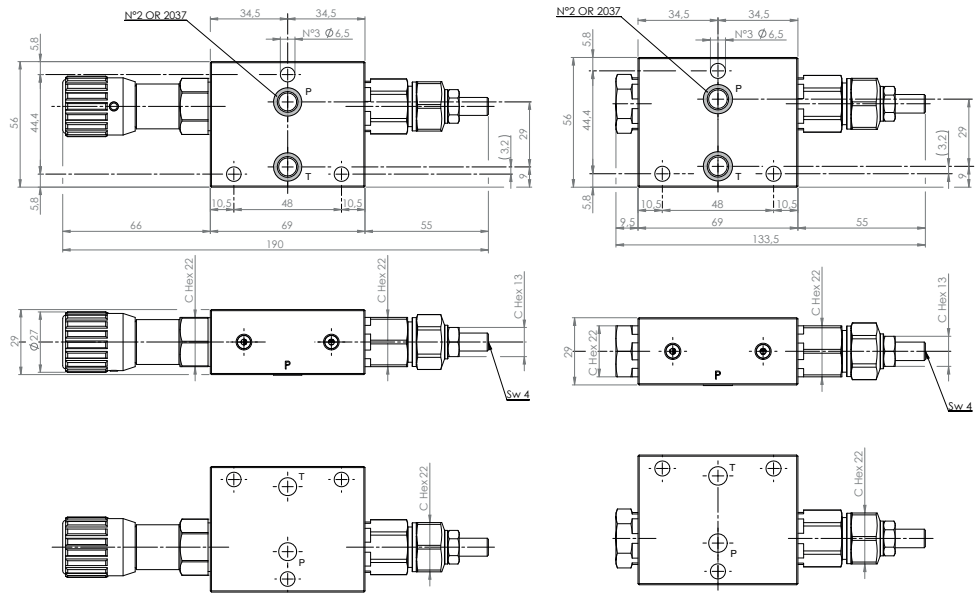
11 TECHNICAL DATA for AMF-MOP-Q(*), AMF-MOP-QV

Maximum rec. flow rate in service line	20 l/min
Maximum flow rate in bleeding line	16 l/min
Maximum nominal pressure	25 MPa (250 bar)

12 INSTALLATION DIMENSIONS (mm)

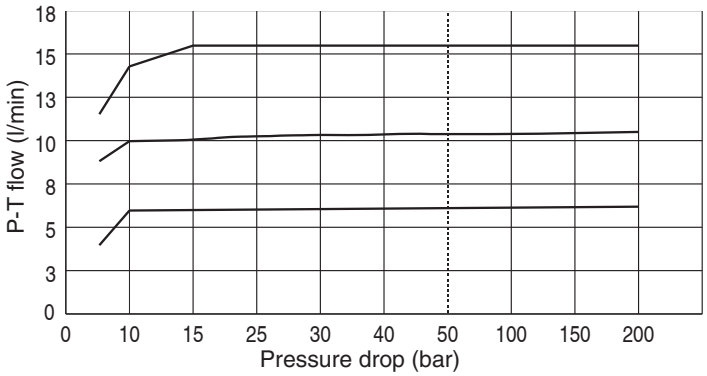
AMF-MOP-QV with FT-268/2-34

AMF-MOP-Q(*) with VSC-34



Fluid flows in P line and a part a of it bleeds to T line trough orifice of the throttle valve. When pressure diffence between P and T increases the throttle moves reducing the area of lateral orifices, thus keeping bleeding flow rate constant at the requested value. When on line P the pressure exceeds the settled value the internal piston pushed by hydraulic axial forces, overcomes the force of spring and shifts, opening to the pressurized fluid annular passage to T, thus keeping the pressure level at the requested value

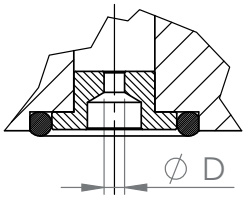
13 TYPICAL DIAGRAMS of VARIABLE PRESSURE COMPENSATED FLOW CONTROL VALVE (FT-268/2-34)



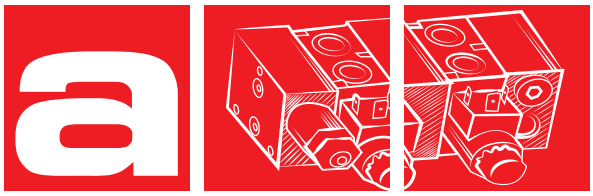
14 OPTIONS

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



Bleeding flow, taken from main P line, is regulated by a variable pressure compensated flow control valve (FT 268/2), that changes the flow rate to T line. To decrease bleeding flow rate, from main P line to main T line, turn anticlockwise the graduated knob of valve FT-268/2-34



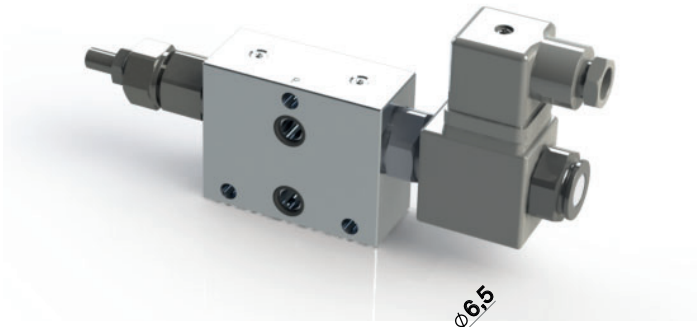
AMF PRESSURE RELIEF COMBINED WITH ELECTRIC BY-PASS

AMF-MOP/*-EV2*

20 l/min - 25 MPa (250 bar)

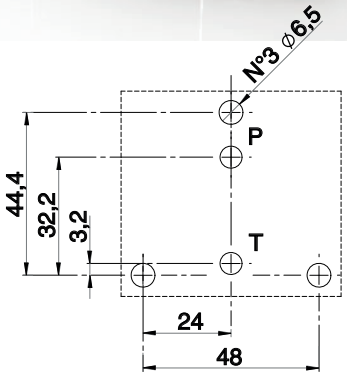
1 DESCRIPTION

With this module it is possible to have the pressure relief function combined with the by-pass of the main HDF system. The by-pass valve can be normally open or normally closed. As standard the valve is a spool type valve. For specific requirments, a poppet valve with a standard SAE08 cavity can be installed in the main body.



2 ORDERING CODE

(1)		(2)		(3)		(4)	(5)		(6)		(7)		(8)
AMF	-	MOP	/		-	EV2		-		-		/	10



(1) AMF: module stackable with 4 way solenoid valve HDF-ES

(2) MOP: pressure relief on P line

(3) Pressure adjustment ranges:
- 10 : from 32 to 100 bar
- 16 : from 63 to 160 bar
- 25 : from 100 to 250 bar

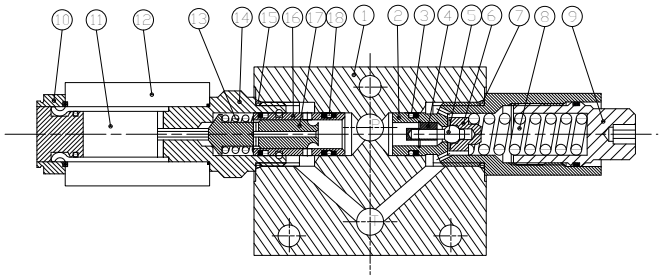
(4) EV2 : spool type 2/2 by-pass solenoid operated valve

(5) Variants:
- O: normally open
- C: normally close

(6) Code reserved for option and variants

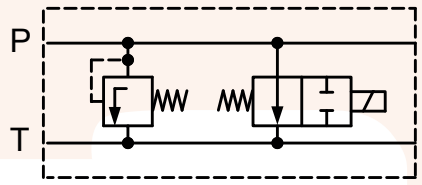
(7) Electric voltage and solenoid coils:
- 0000 : no coils
- 012C : coils for V12DC
- 024C : coils for V24DC
- 220R : coils for V220-230 RAC

(8) Design number (progressive) of the valves

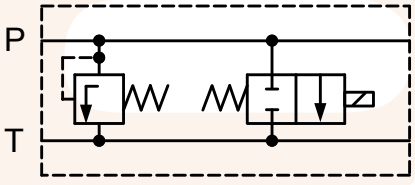


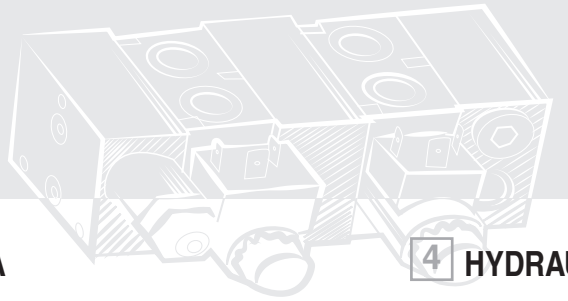
Fluid flows freely from P line to T line The spool 17 is normally kept open by spring 13. When the solenoid 12 is energized, the mobile armature 11 overcomes the force of spring 13 and moves spool 17 thus closing passage between P and T. When on line P the pressure exceeds the settled value, the piston 5 is pushed by axial hydraulic forces, overcomes the force of spring 8 and shifts in its cylindrical seat and opens to the pressurized fluid annular passage to T, thus keeping the pressure level at the requested value.

AMF-MOP/(*)-EV2O



AMF-MOP/(*)-EV2C





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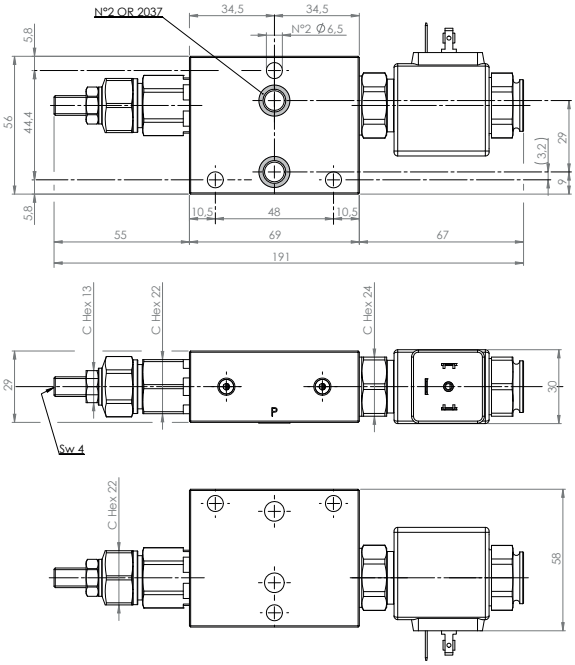
3 TECHNICAL DATA

Maximum rec. flow rate	20 l/min
Maximum flow rate	20 l/min
Maximum nominal pressure	25 MPa (250 bar)

4 HYDRAULIC FLUIDS

Seals and materials used on standard valve AMF are fully compatible with hydraulic fluids of mineral base, upgraded with antifoaming anti antioxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 21/18/15, or better, and used in a recommended viscosity range from 10 cSt to 60

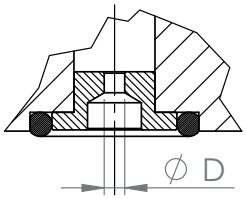
5 INSTALLATION DIMENSIONS (mm)



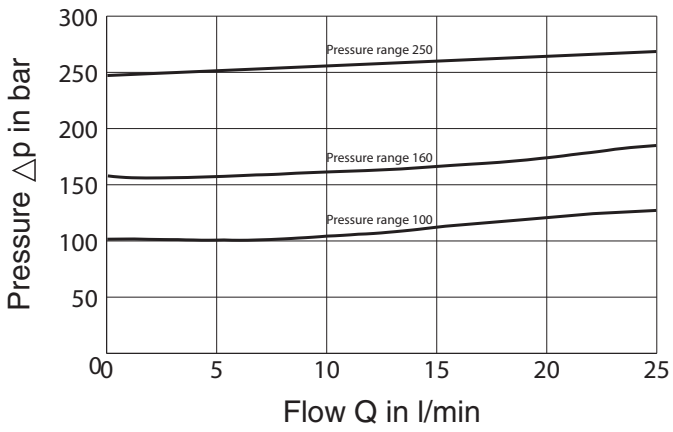
6 OPTIONS

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

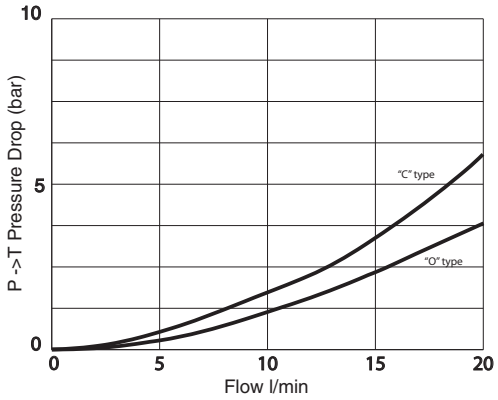
D (mm)	CODE
0	3S-00
1,0	3S-10
1,5	3S-15
2,0	3S-20
2,5	3S-25



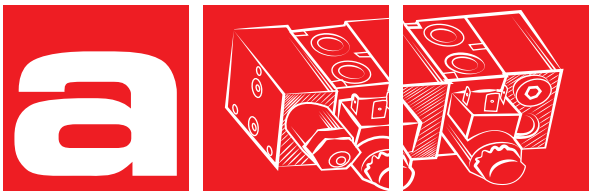
7 TYPICAL DIAGRAMS of PRESSURE RELIEF VALVE



ELECTRIC BY-PASS VALVE



Relief pressure is reached when the axial hydraulic forces on piston 5 equal the force on spring 8; the value of the relief pressure can be therefore changed, within the range, by changing the compression of spring 8. To increase the relief pressure, turn clock wise the adjustment nut 9



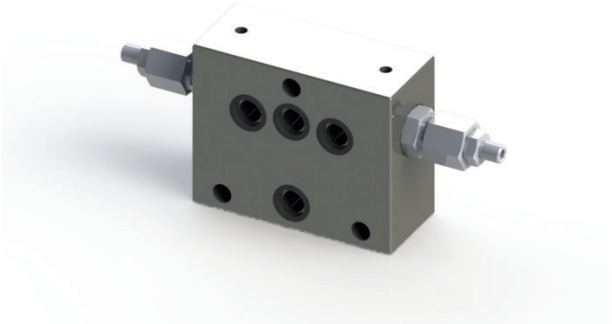
AMF PRESSURE RELIEF VALVE

AMF-MO-BA

20 l/min - 25 MPa (250 bar)

1 DESCRIPTION

The module AMF-MO-BA is designed to control the maximum pressure in lines A and B. Two pressure relief valves direct operated can be set independently at different pressure levels.
The main body is in aluminium black anodized.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AMF	-	MO	-	BA	-		-		/	10

(1) AMF: module stackable with 4 way solenoid valve HDF2-ES

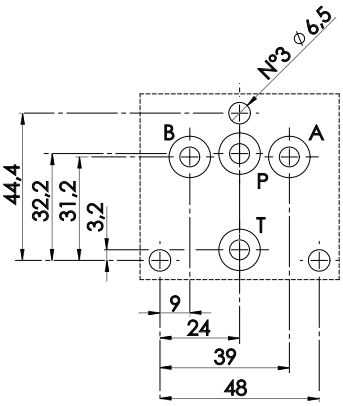
(2) MO: pressure relief valve

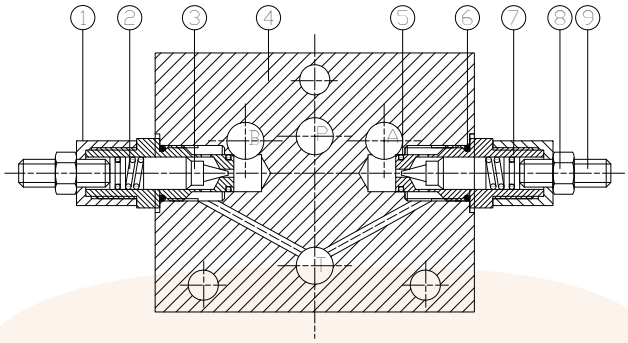
(3) BA: service lines where the control operates : A->T and B->T

(4) Standard pressure range up to 250bar

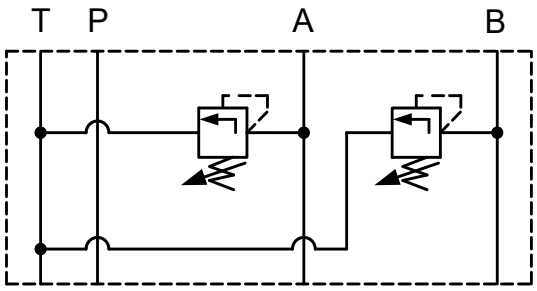
(5) Code reserved for option and variants

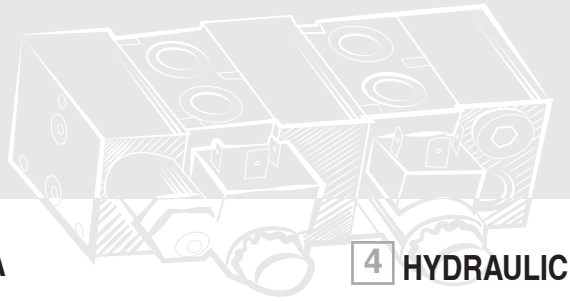
(6) Design number (progressive) of the valves





Relief pressure is reached when the axial hydraulic forces on piston 3 equal the force on spring 2 ; the value of the relief pressure can be therefore changed, within the range, by changing the compression of spring 2. To increase the relief pressure, turn clock wise the adjustment screw 9, after having unlocked its nut 8.





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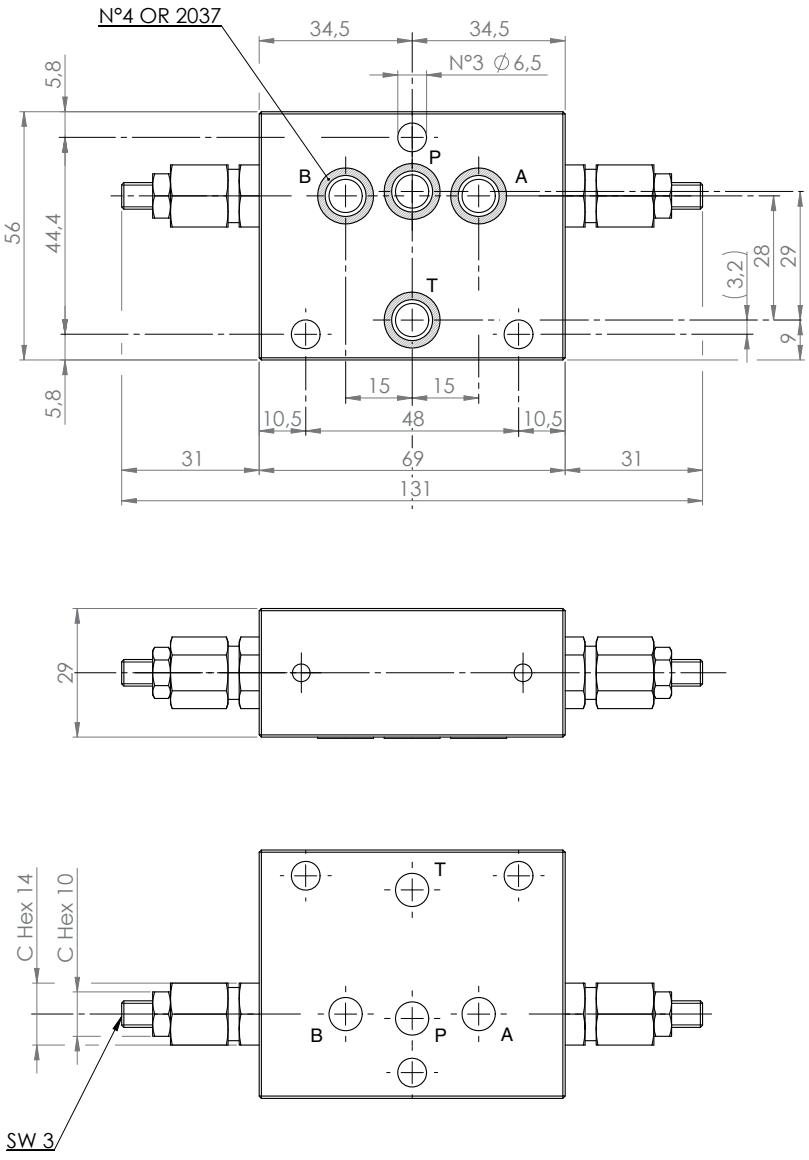
3 TECHNICAL DATA

Maximum rec. flow rate in P and T lines	20 l/min
Maximum flow rate in A and B lines	6 l/min
Maximum nominal pressure	25 MPa (250 bar)
Mass	1 kg

4 HYDRAULIC FLUIDS

Seals and materials used on standard valves AMF are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 21/18/15, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

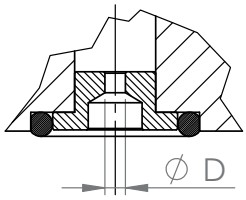
5 INSTALLATION DIMENSIONS (mm)



6 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



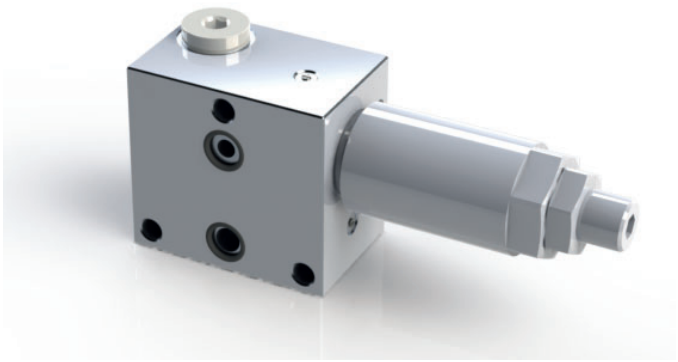
AMF DIRECT OPERATED PRESSURE REDUCING VALVE

AMF-RO-P/*

20 l/min - 32 MPa (320 bar)

1 DESCRIPTION

The module AMF-RO-P is designed to reduce the pressure in the P line. A 3 way cartridge valve with different pressure ranges is installed in a aluminium body suitable to be stacked with other HDF or AMF valves.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AMF	-	RO	-	P	/		-		/	10

(1) AMF: module stackable with 4 way solenoid valve HDF-ES

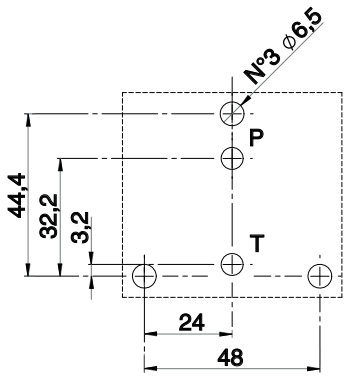
(2) RO: direct operated pressure reducing valve

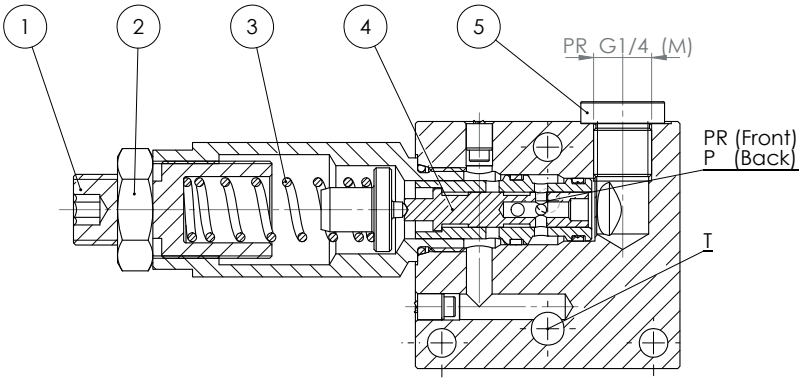
(3) P: line where the control operates

(4) PR regulated pressure range:
- 6,3: from 1,6 to 6,3 MPa (16 to 63 bar)
- 16 : from 4,0 to 16,0 MPa (40 to 160 bar)
- 20 : from 5,0 to 21,0 MPa (50 to 210 bar)

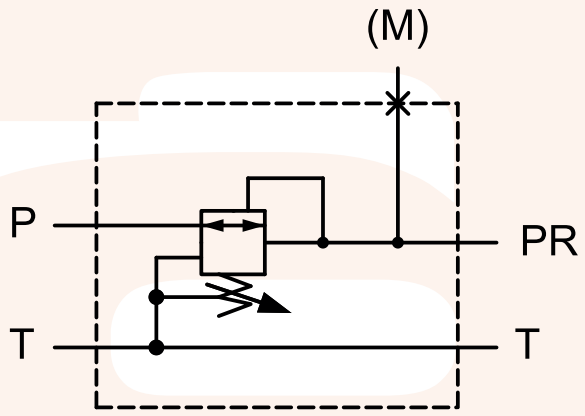
(5) Code reserved for option and variants

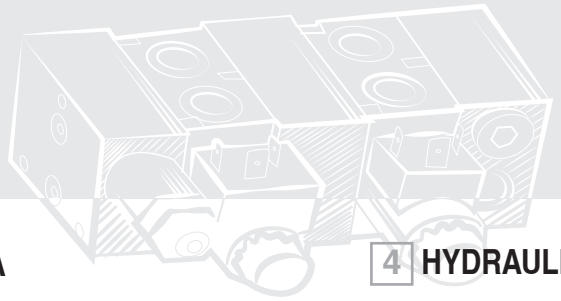
(6) Design number (progressive) of the valves





This 3-way direct operated pressure reducing valve is designed to maintain the desired value of pressure in the exit line(s) PR. Normally fluid flows from P to PR. The pressure in line PR acts on the control spool 4 (against the force due to spring 3), that shifts closing flow P tofiPR until the pressure falls back to the set value. If pressure in PR line overcomes the set value, the spool shifts until it opens the passage PR to T, allowing the oil to flow to the tank. Additional M (manometer) G 1/4" port is available (normally is closed by plug 5).





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3 TECHNICAL DATA

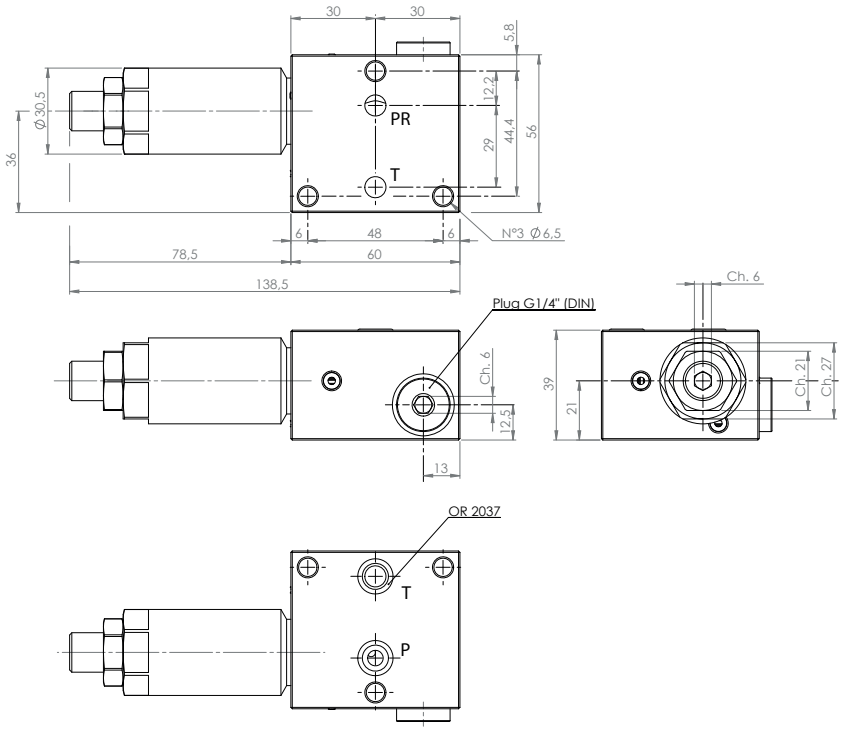
Maximum nominal flow rate	20 l/min
Regulated pressure	see 2
Maximum imput pressure (P line)	for 6,3 -> 16 MPa (160 bar) for 16 -> 25 MPa (250 bar) for 20 -> 32 MPa (320 bar)
Mass	0,65 Kg

4 HYDRAULIC FLUIDS

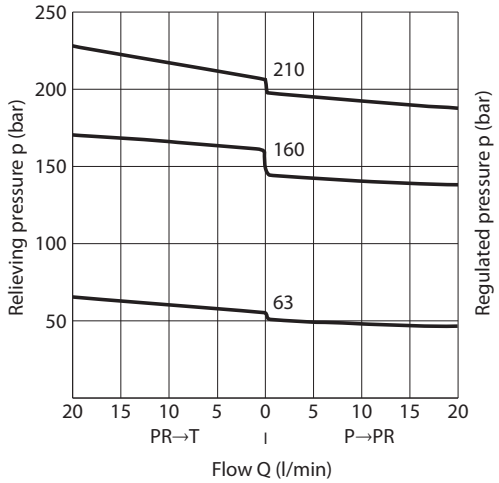
Seals and materials used on standard valves AMF are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 21/18/15, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

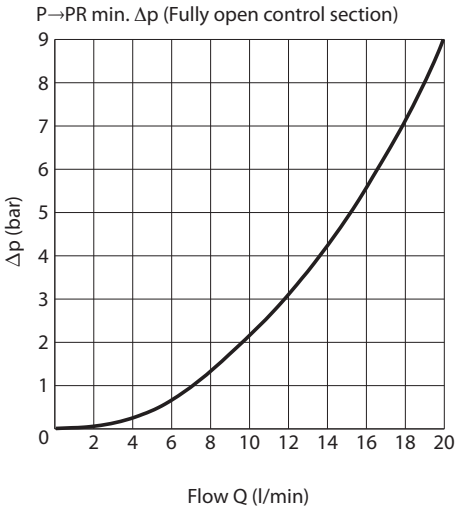
5 INSTALLATION DIMENSIONS (mm)

Leakage between valve and mounting surface is prevented by the positive compression on their seats of 2 seals of OR type 2037 (9,25 x 1,78) or Quad-Rings (9,25 x 1,68 x 1,68 mm).



6 TYPICAL DIAGRAMS (measured at ν = 36 cSt and 50 C)





10022

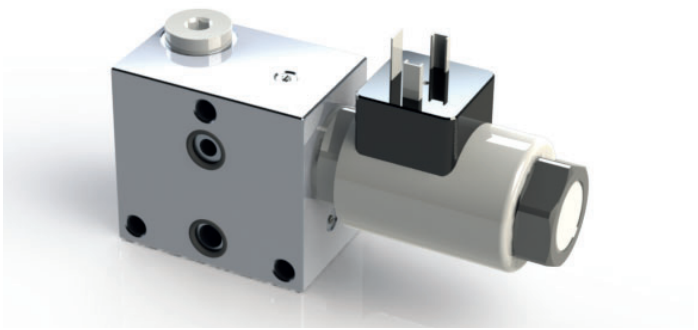
AMF PROPORTIONAL PRESSURE REDUCING VALVE

AMF-RE-P/*

20 l/min 5 MPa (50 bar)

1 DESCRIPTION

The module AMF-RE-P is designed to proportionally reduce the pressure in the P line. A 3 way proportional cartridge valve with different pressure ranges is installed in a body suitable to be stacked with other HDF or AMF valves.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)	(6)		(7)
AMF	-	RE	-	P	/		-	R*		/	10

(1) AMF: module stackable with 4 way solenoid valve HDF-ES

(2) RE: proportional pressure reducing valve

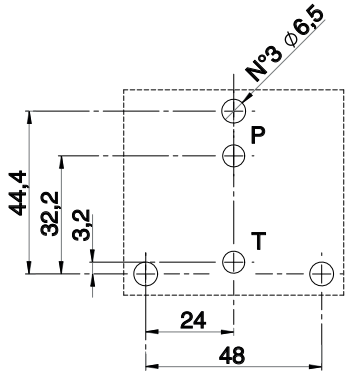
(3) P: line where the control operates

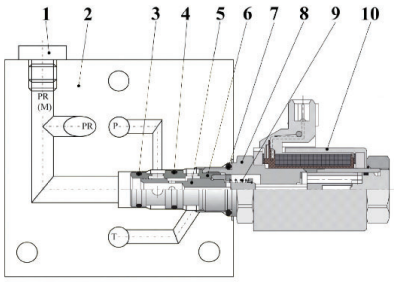
(4) PR regulated pressure ranges:
- 2: from 0 to 2,0 MPa (0 to 20bar)
- 3,2: from 0 to 3,2 MPa (0 to 32bar)

(5) R* supply voltage:
- *: 2 = coil for V12DC
- 4 = coil for V24DC

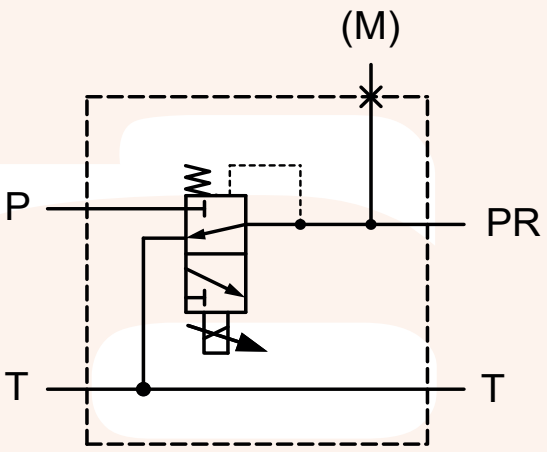
(6) Connection to electric supply:
- no designation : standard 3-PIN according to ISO 44000 (DIN 43650)
- AMP: 2-poles AMP Junior-Timer

(7) Design number (progressive) of the valves





AMF-RE-P/* is a directly operated 3-way valve controlled by proportional solenoid 10. In the de-energized state, the spring 9 keeps the spool 5 in the position that closes the P line and connects PR line to tank. When the solenoid 10 is energized, it pushes the spool with a force proportional to the current. This force makes the spool shift, thus gradually opening the passage P-PR and closing the return line. In this configuration the reduced pressure in PR and the spring force act against the solenoid force. This balance is maintained by the spool 5 that opens the passage P-PR if the reduced pressure is lower than value sets by the solenoid, or opens the passage to tank if the reduced pressure overcomes the solenoid force. Additional M (manometer) G 1/4" port is available (normally closed by plug 1)



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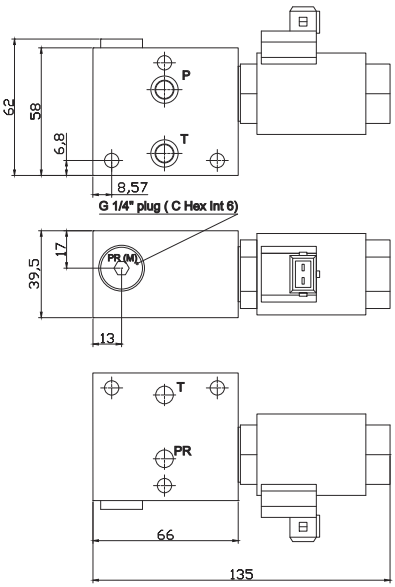
3 TECHNICAL DATA

Maximum nominal flow rate	20 l/min	Solenoid technical data:	
Maximum rec. flow rate	25 l/min	Control	PWM signal 100Hz
Maximum input pressure	5 MPa (50 bar)	Maximum current	12V: 1,5A 24V: 0,75A
Regulated pressure range	AMF-RE-P/2-R*: up to 2,0 MPa (20 bar) AMF-RE-P/3,2-R*: up to 3,2 MPa (32 bar)	Resistance at 20°C	12V: 7,2 Ω 24V: 21 Ω
		Duty cycle	100%
		Insulation class	F
		Enclosure type to DIN 40050	IP 65

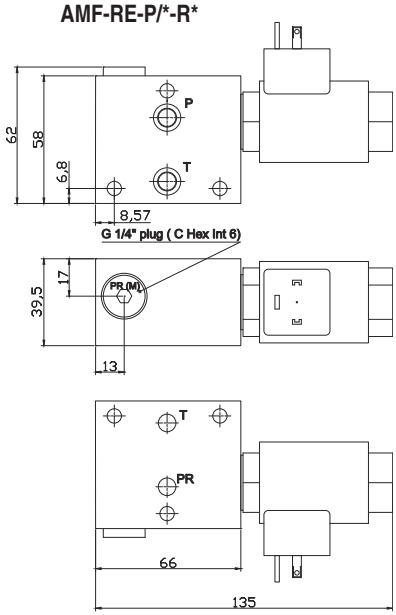
4 INSTALLATION DIMENSIONS (mm)

Leakage between valve and mounting surface is prevented by the positive compression on their seats of 2 seals of OR type 2037 (9,25 x 1,78) or Quad-Rings (9,25 x 1,68 x 1,68 mm).

AMF-RE-P/*-R*AMP



AMF-RE-P/*-R*

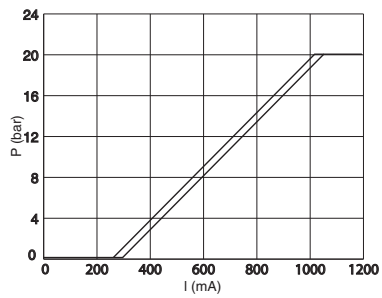


5 HYDRAULIC FLUIDS

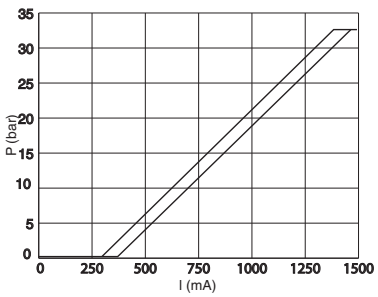
Seals and materials used on standard valves AMF are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 21/18/15, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

6 TYPICAL DIAGRAMS

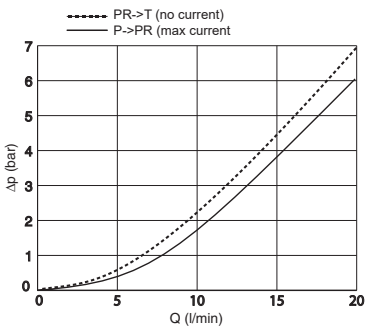
20 bar



32 bar

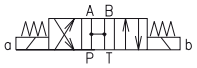


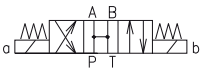
p-Q characteristics

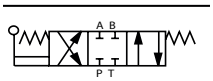


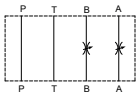
SUMMARY

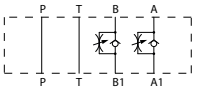
2 CETOP 02

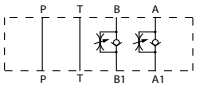
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED
HD2-EI-*  0001

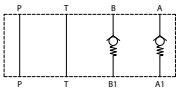
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED
HD2-ES-*  0004

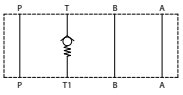
DIRECTIONAL CONTROL VALVES LEVER OPERATED
HD2-LO-*  0008

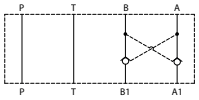
STACKABLE VALVES FLOW RESTRICTOR
AM2-FO-*  0011

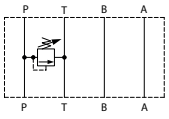
STACKABLE VALVES FLOW CONTROL
AM2-FC-*  0013

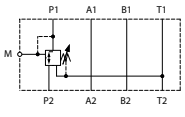
STACKABLE VALVES FLOW CONTROL
AM2-FX-*  0015

STACKABLE CHECK VALVES
AM2-CO-*/10  0017

STACKABLE CHECK VALVES
AM2-CO-*/20  0019

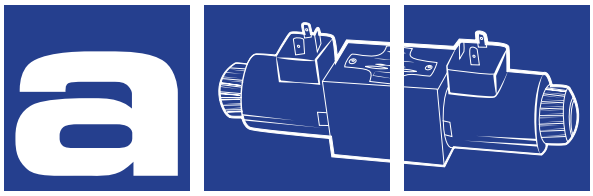
STACKABLE PILOT OPERATED CHECK VALVES
AM2-CP-*  0021

STACKABLE PRESSURE RELIEF VALVES
AM2-MO-*  0023

MODULAR VALVES PRESSURE REDUCING
AM2-RO-*  0025

MONOBLOCK WITH MULTIPLE SECTIONS ISO 02
PM2-AL 0027

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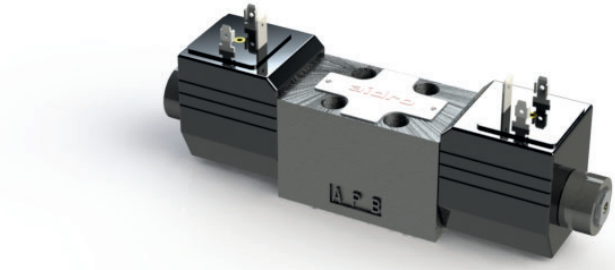


DIRECTIONAL CONTROL VALVES SOLENOID OPERATED

HD2-EI-*

25 l/min - 25 MPa (250 bar)

1 DESCRIPTION



Valves HD2-EI are directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 02).
The design of the body is a three chamber casting for production cost saving and low pressure drops.
The valve is available with interchangeable plastic DC solenoids, also for AC power supply using connectors with a built-in rectifier bridge.
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)
HD2	-	EI	-			-		-		/	10

(1) HD2: 4-way directional control valve CETOP 02

(2) EI: electrically controlled

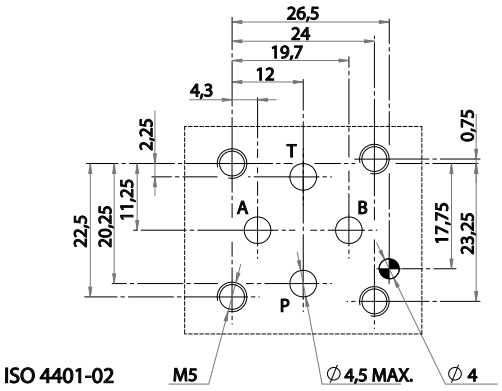
(3) Spool type (see 4)
-number is the main spool type
-letter is solenoid and spring arrangement:
C: 2 solenoids, spool is spring centered (3 position)
LL: 1 solenoid (a), spool is spring offset (2 position, end to end)
ML: 1 solenoid (a), spool is spring offset (2 position, middle to end)
N: 2 solenoids, spool is mechanically detented

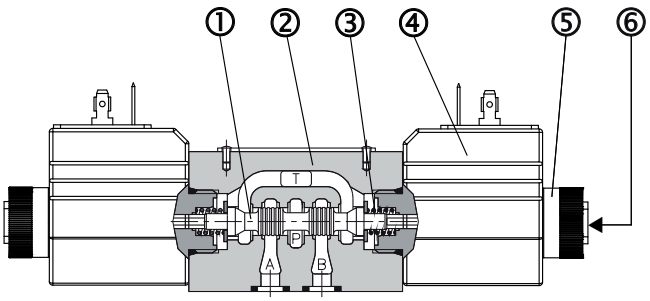
(4) Side options
b: only for version LL and ML,solenoid b installed (instead of solenoid a)

(5) Code reserved for option and variants:
ZN: Zinc Nichel surface treatment
2S-*:calibrated orifice on P port (see 7)
K: protruding emergency pins, protected by rubber caps (see 8)

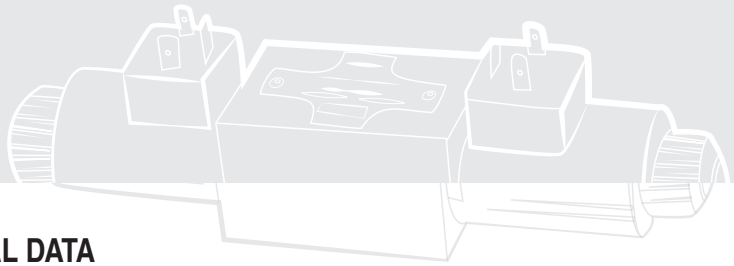
(6) Electric voltage and solenoid coils:
0000: no coils
012C: coils for V12DC
024C: coils for V24DC
110R: coils for V98DC (V110/50 – V115/60 RAC)
220R: coils for V198DC (V220/50 – V230/60 RAC)

(7) Design number (progressive) of the valves





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 4

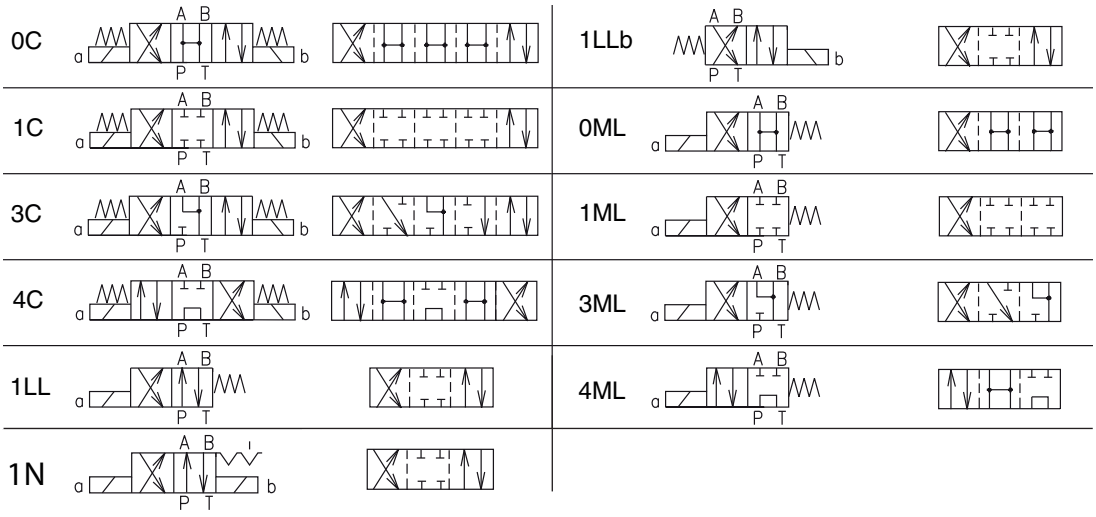


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3 TECHNICAL DATA

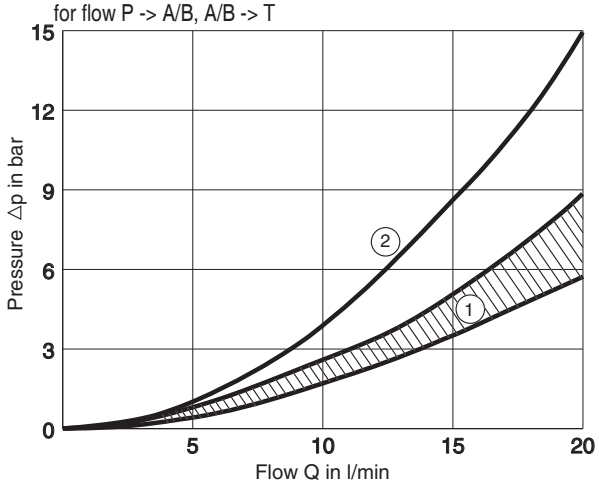
Maximum nominal flow	20 l/min	Electric characteristic:
Maximum rec. flow rate	25 l/min	Valves HD2-EI-* are operated by solenoid that are energized: - directly from a D.C. voltage supply: V 12 DC (012C) V 24 DC (024C) - by the use of connectors that incorporate a full wave bridge rectifier, from A.C. voltage supply: V 110/50, V 115/60 or V115/50 (110R) V 220/50, V 230/60 or V 230/50 (220R) All connectors must conform to ISO 4400 (DIN 43650) and electric circuitery must be able to carry the following rated current values: V 12 DC= 2,4 A V 24 DC= 1,2 A V 110 R= 0,30 A V 220 R= 0,15 A Permissible supply voltage variation: +5% -10%
Maximum nominal pressure (P, A, B)	25 MPa (250 bar)	
Maximum pressure	32 MPa (320 bar)	
Maximum pressure at T port	16 MPa (160 bar)	
Pressure drops	see 5	
Protection to DIN 40050	IP 65	
Duty cycle	100%	
Service life	≥ 10^7 cycles	
Installation and dimensions	see 7	
Mass	approx 0,8/1,1kg	

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



5 TYPICAL DIAGRAMS

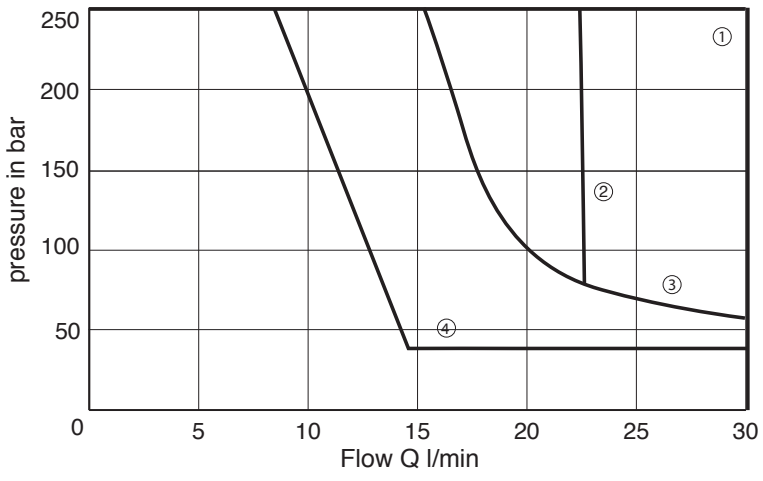
Typical Δp-Q curves for valves HD2 -EI-* in standard configuration, with mineral oil at 36 cSt and at 50°C for flow P -> A/B, A/B -> T



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

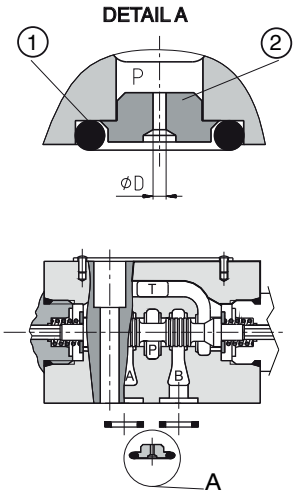
6 HYDRAULIC LIMITS OF USE

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

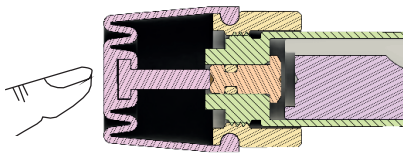
7 OPTIONS



OPTION S CALIBRATED ORIFICE ON P PORT

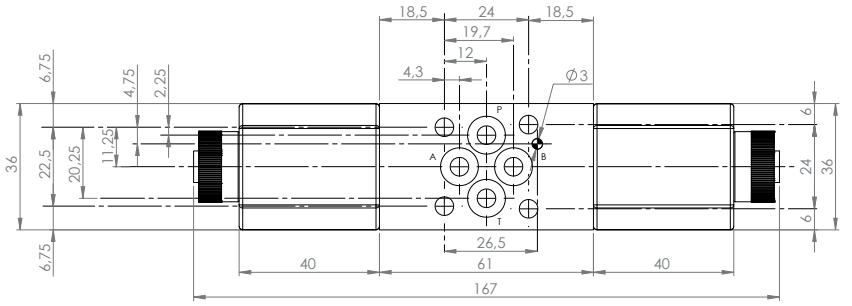
Option "S" is rappresented by elements ②, suitably shaped to be inserted on P port of the solenoid valve, having a calibrated orifice (of various sizes) able to restrict, at the requested Δp value, the flow rate entering
the solenoid valve.
Those elements have the following orifice diameter:
2S - 08 -> 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).

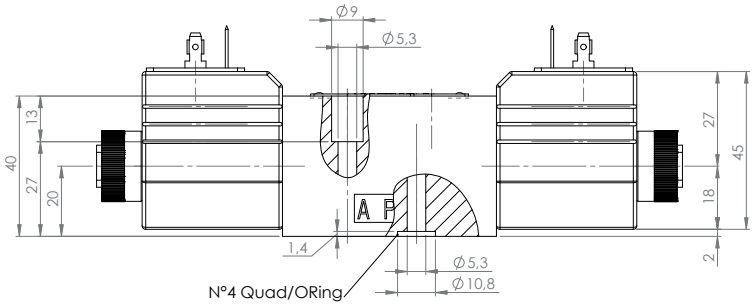
8 VERSION "K": EXTENDED EMERGENCY PIN

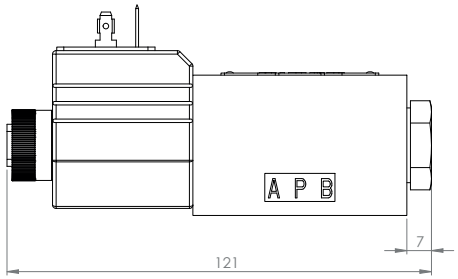


Solenoid valves according to "K" version have extended emergency actuator pins protuding from the solenoid shape, that permit a quick and easy "Hand operation" of the valves, without the need of any tool.
The actuator pin and the end of the solenoid are protected by a flexible rubber cap that makes easy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

9 INSTALLATION DIMENSIONS (mm)



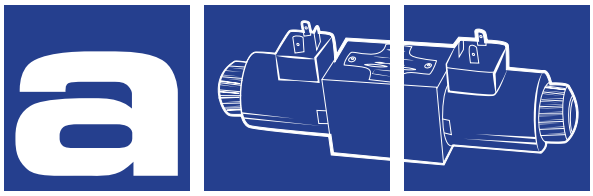




All valves HD2-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height. When assembled to its mounting plate valve HD2 - * must be fastened with 4 bolts M5x35 (or M5x** according to the number of modules) tightened at 8 Nm torque. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of QUAD/O Ring type 7,65x1,68x1,68. 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
- bridge rectifier for AC supply
- voltage surge suppressor, etc.

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 antioxidizing 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.



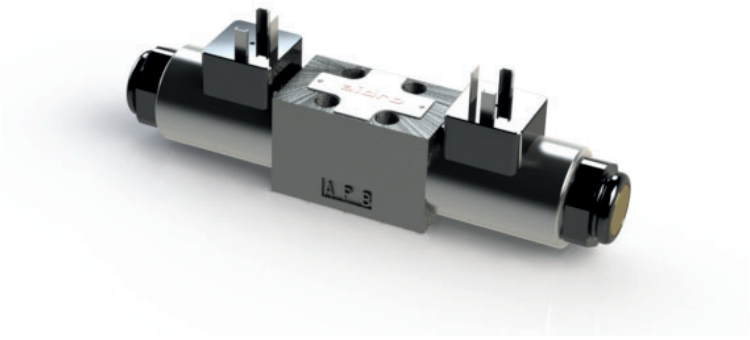
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED

HD2-ES-*

30 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Valves HD2-ES are directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 02).
The design of the body is a three chamber casting for production cost saving and low pressure drops.
The valve is available with interchangeable metallic DC solenoids, also for AC power supply using coils with a built-in rectifier bridge.
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)
HD2	-	ES	-			-		-		/	11

(1) HD2: 4-way directional control valve CETOP 02- Pressure 32 MPa (320 bar)

(2) ES: electrically controlled standard

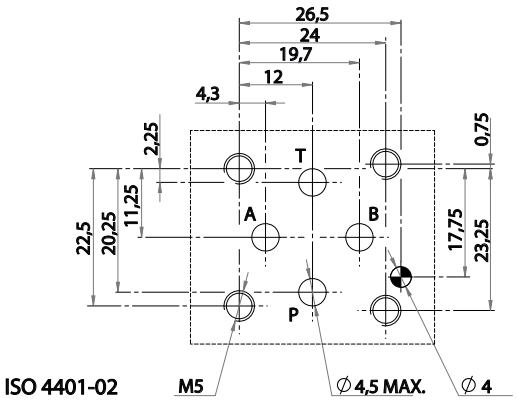
(3) Spool type (see 4)
-number is the main spool type
-letter is solenoid and spring arrangement:
C: 2 solenoids, spool is spring centered (3 position)
N: 2 solenoids, spool is detented (2 position)
LL: 1 solenoid (a), spool is spring offset (2 position, end to end)
ML: 1 solenoid (a), spool is spring offset (2 position, middle to end)
LM: 1 solenoid (a), spool is spring offset (2 position, end to middle)

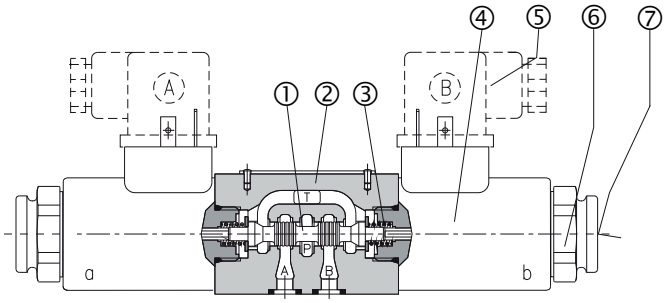
(4) Side options:
b: only for version LL, ML, LM solenoid b installed (instead of solenoid a)

(5)Code reserved for option and variants:
K: protuding emergency pins, protected by rubber caps (see 9)
2S*: calibrated orifice on P port (see 10)
ZC:zinc plated valve (see 12)
ZN:Zinc nichel plated body (see 12)

(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

(7) Design number (progressive) of the valves





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 4

3 TECHNICAL DATA

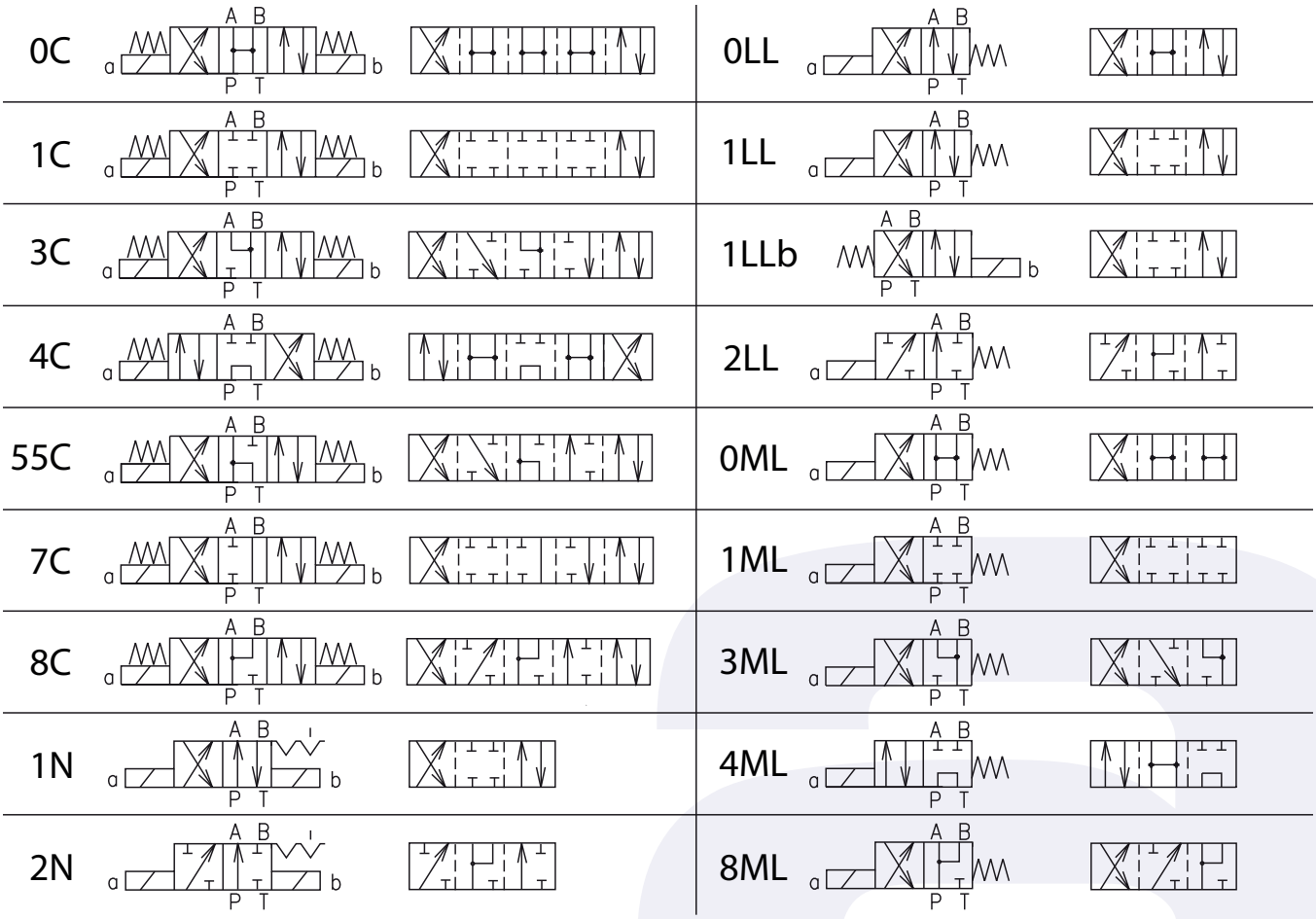
Maximum nominal flow	0,5 dm³/s (30 l/min)
Maximum rec. flow rate	see 6
Maximum nominal pressure (P, A, B)	32 MPa (320 bar)
Maximum pressure at T port	21 MPa (210 bar)
Pressure drops	see 5
Protection to DIN 40050	IP 65
Duty cycle	100%
Service life	≥ 10^7 cycles
Installation and dimensions	see 7
Mass	approx 1,0/1,4 kg

Electric characteristics:

Valves HD2 -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) =115 A
  V 220/50 (V 230/60) =230 A

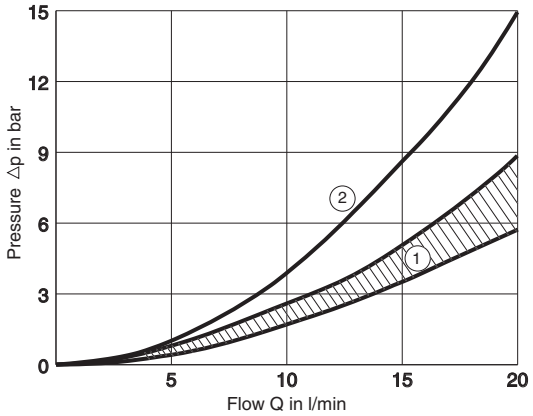
All standard valves are to be fitted with connectors conform to ISO 4400 (DIN 43650) and electric circuitery must be able to carry the following rated current values:
V 12 DC = 2,4 A
V 24 DC = 1,2 A
V 110/50 = 0,30 A
V 220/50 = 0,15 A
Permissable supply voltage variation: +10% -10%

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



5 TYPICAL DIAGRAMS

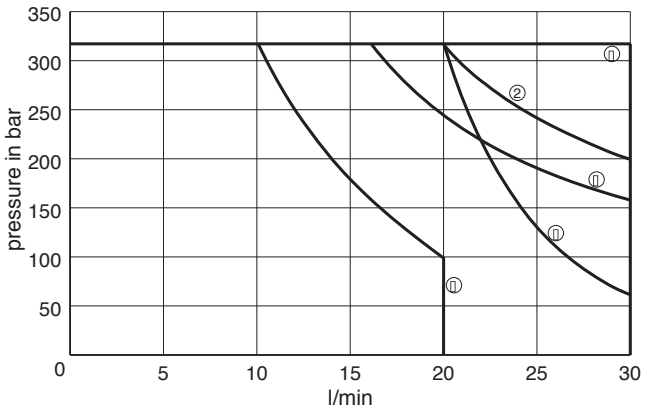
Typical Δp-Q curves for valves HD2-ES-* in standard configuration, with mineral oil at 36 cSt and at 50°C for flow P -> A/B, A/B -> T



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

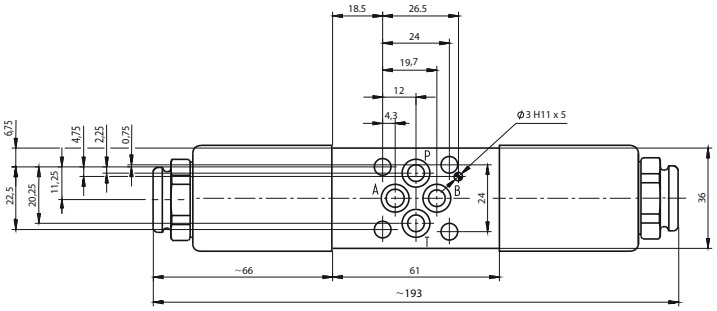
6 HYDRAULIC LIMITS OF USE

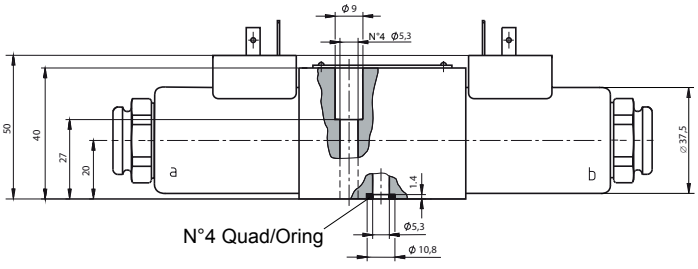
P/Q characteristic limits for safe use of HD2-ES-* solenoid operated valves. Limit curves apply to solenoid valves energized with rated voltage - 5% and flushed with hydraulic fluid with properties according to 8.

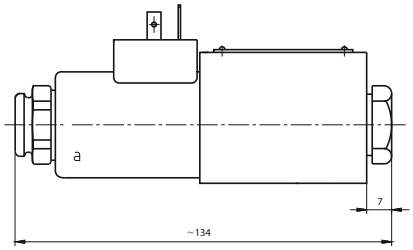


①= HD2 - ES - 0C; - 1C; - 1N; - 3C; - 8C; - 0ML; - 1LL; - 1ML; - 3ML; - 8ML
②= HD2 - ES - 2N; - 7C
③= HD2 - ES - 0LL
④= HD2 - ES - 4C; - 4ML
⑤= HD2 - ES - 55C; - 2LL

7 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 M5x35 (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 - ES -**-0000 - .
Coils are supplied separately: standard, 3 electric pins coils are BO2-012C, BO2-024C, BO2-115A and BO2-230A.
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.

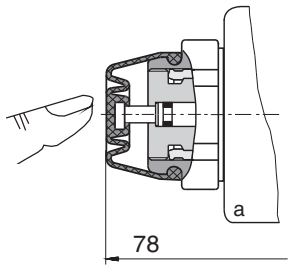
b) On type "AMP" solenoid coils, by connectors conforming to AMP-Timer (see 11)

8 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 raccomended viscosity range from 10 cSt to 60 cSt.

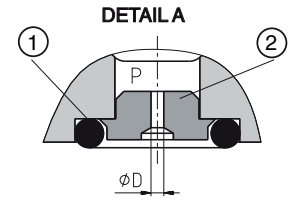
9 VERSION "K": EXTENDED EMERGENCY PIN

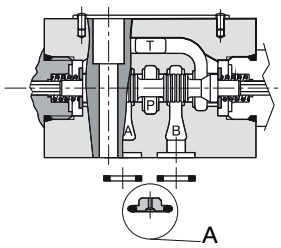
Solenoid valves according to "K" version have extended emergency actuator pins protuding from the solenoid shape, that permit a quick and easy "Hand operation" of the valves, without the need of any tool. The actuator pin and the end of the solenoid are protected by a flexible rubber cap that makes easy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



10 VERSION "2S*":CALIBRATED ORIFICE ON P PORT

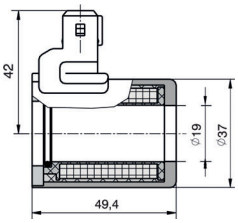
Option "2S" is rappresented by elements ②, suitably shaped to be inserted on P port of the solenoid valve, having a calibrated orifice (of various size) able to restrict, at the requested ΔΔp value, the flow rate entering the solenoid valve. Those elements have the following orifice diameter:
2S - 08 D = 0,8 mm
2S - 10 D = 1
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 ①① of 7,65x1,78 mm sizes (example OR 107-2031)



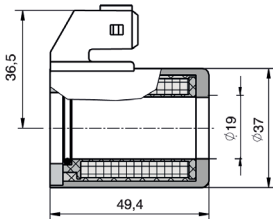


11 VERSION "AMP" and VERSION "Deutsch":

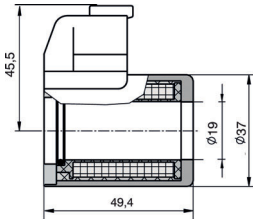
AMP



AMPX (axial)



D (Deutsch)



They are typically used on DC mobile application and they are available for many different coltages voltages:

12 VERSION "ZC" and VERSION "ZN" ZINC PLATED VALVES

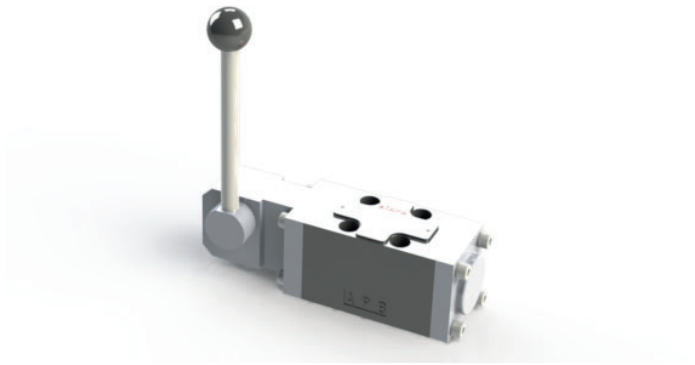
Solenoid valves according to "ZC" version are completely zinc plated and protected against every type of corrosion due to saline ambiance or other aggressive chemicals. Zinc thickness are:
on the valve body 10-15 µm
on the solenoid tubes 8-12 µm
on the solenoid coils 8-12 µm

Version ZN (Zinc Nichel) has an higher protection degree which achieve the ISO 9227, 720 h salt spray test requirments

DIRECTIONAL CONTROL VALVES LEVER OPERATED

HD2-LO-*

30 l/min - 32 MPa (320 bar)



1 DESCRIPTION

The hand operated directional control valves are used mainly to control start, stop and direction of fluid. Manual lever and actuating section can be rotated in 90° increments for flexible installation. The directional control valves are being manufactured as two-position and three-position valves (see table with functional symbols). In the standard version, the valve housing is phosphated and steel parts zinc-coated 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)
HD2	-	LO	-			-		/	10

(1) HD2: 4-way directional control valve CETOP 02- Pressure 32 MPa (320bar)

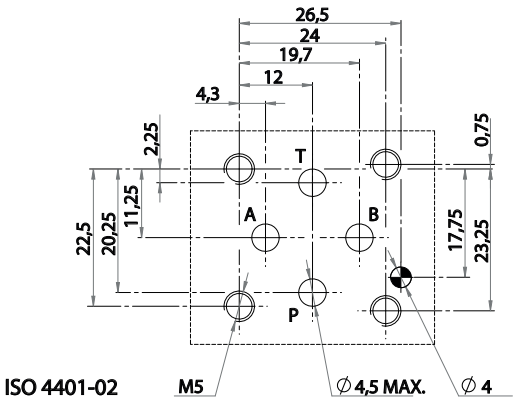
(2) LO: standard lever operated

(3) Spool type (see 4)
-number is the main spool type
-letter is lever and spring arrangement:
C: spool is spring centered (3 position)
D: spool is detented (3 position)
N: spool is detented (2 position, end to end)
LL: spool is spring offset (2 position, end to end)
ML: spool is spring offset (2 position, middle to end)

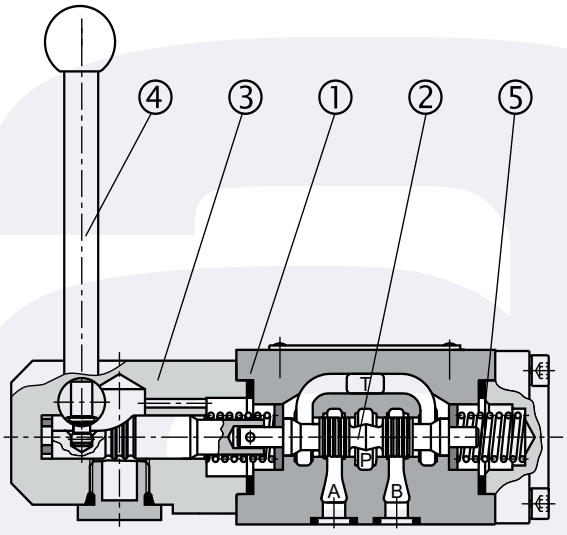
(4) Code reserved for option and variants:
b: level mechanism on B port side (only for version LL, ML)

(5) Code reserved for special variants

(6) Design number (progressive) of the valves



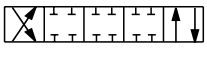
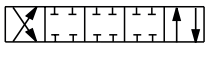
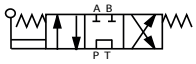
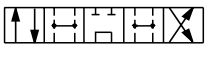
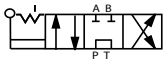
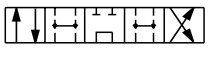
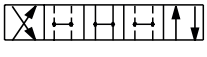
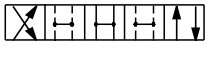
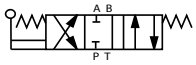
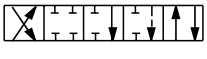
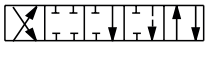
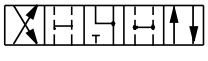
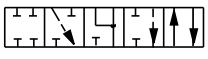
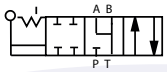
The hydraulic connections that are obtained in the "central" (neutral) position is the characteristic mark of the spool shape and from it derives its identification number: 0 = P,A,B,T connected 1 = P,A,B,T closed 3 = P closed, A,B,T connected for other types see All standard valves have the lever mechanism on the side of port "A". All 2 position, spring offset, standard valves are operated by pulling the lever. All 3 position standard valves have a +/15° angle stroke of the lever. Average effort required on the lever to operate the valve: less than 50 N. Other spool/spring/detent/lever position combinations are possible and they are indicated by a xxx 3 digits code.

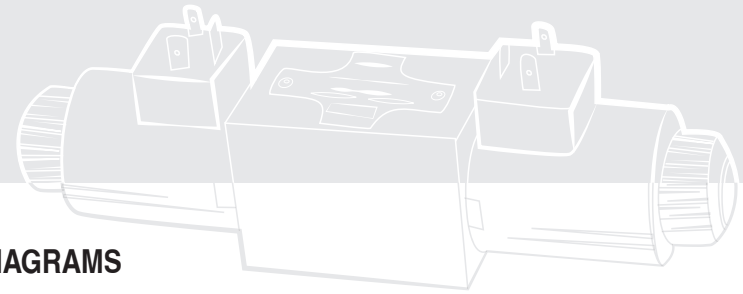


3 TECHNICAL DATA

Maximum nominal flow	30 l/min	Pressure drops	see 5
Maximum rec. flow rate	30 l/min	Installation and dimensions	see 6
maximum nominal pressure (P,A,B)	32 MPa (320 bar)	Mass	approx 1 kg
Pressure at T port	10 MPa (100 bar)		
Exception C54 and C55	10 l/min at 320 bar 30 l/min at 100 bar		

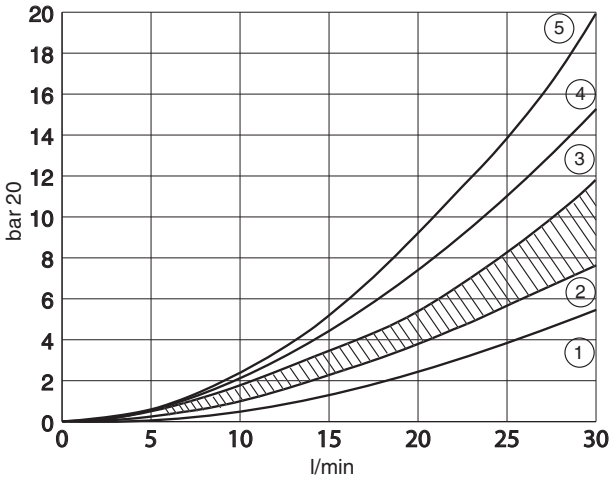
4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

1C			1D		
4C			4D		
0C			0D		
8C			8D		
3C			3D		
7C			7D		
54C			54D		
55C			55D		
33C			33D		
31C			31D		
1LL			1N		
2LL			2N		
0LL			0N		
1ML					



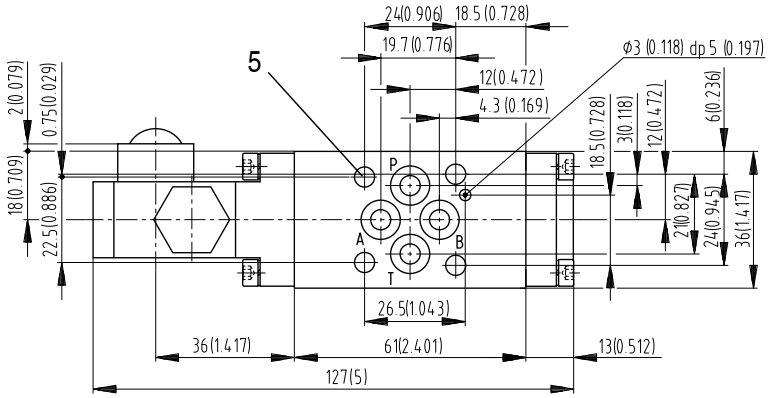
5 TYPICAL DIAGRAMS

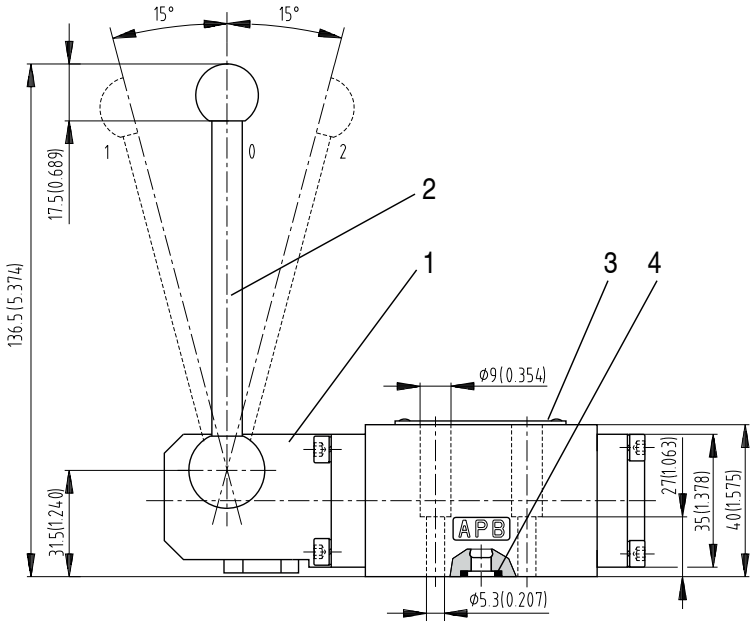
Δp-Q characteristics



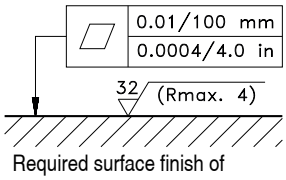
P-> A,P-> B spool 0,8
①③ spool 0, 1, 2, 3, 7, 54, 55, 33, 31
②and P->T spool 4
④ A->T,B->T spool 4 P->T spool 54,55
⑤ P->A,P->B spool 4

6 INSTALLATION DIMENSIONS (mm)





1 Actuating section
2 Hand lever
3 Name plate
4 Square ring 7.65x1.68 (4 pcs.) supplied with valve
5 4 mounting holes



Required surface finish of interface

2 CETOP 02

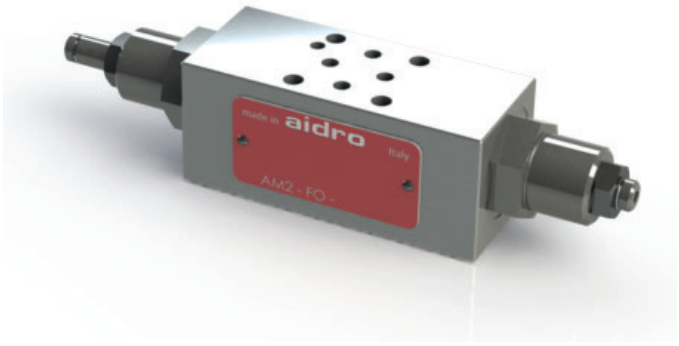
STACKABLE VALVES FLOW RESTRICTOR

AM2-FO-*

30 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable valve CETOP 2 with flow restrictor function. It is possible to control the lines A, B or AB simply turning the side screws.
On demand it is possible to have also the fine control option.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM2	-	FO	-		-		-		/	10

(1) AM2: stackable valve CETOP 02- Pressure 32 MPa (320bar)

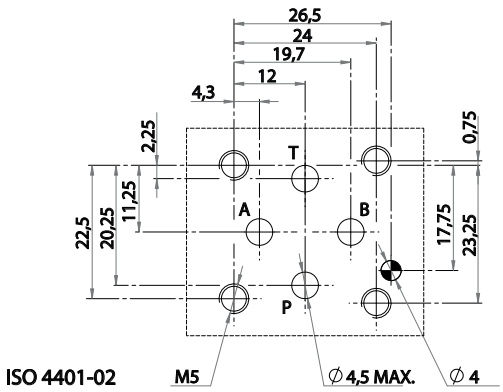
(2) FO: flow restrictor valves with two-way control

(3) Service lines where the controls operate:
AB: controls on A and B. Fluid flows restricted A <-> A and B <-> B
A : flow is restricted A <-> A; free on B, P and T
B : flow is restricted B <-> B; free on A, P and T

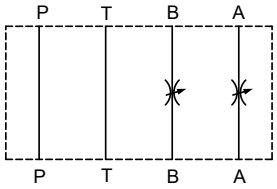
(4) Flow control characteristics
no designation : standard control
F: fine and sensitive control

(5) Code reserved for special variants (materials, seals, surface treatments etc.)

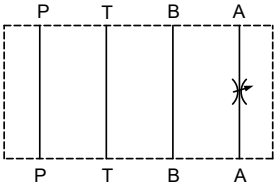
(6) Design number (progressive) of the valves



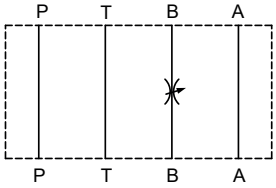
AM2-FO-AB

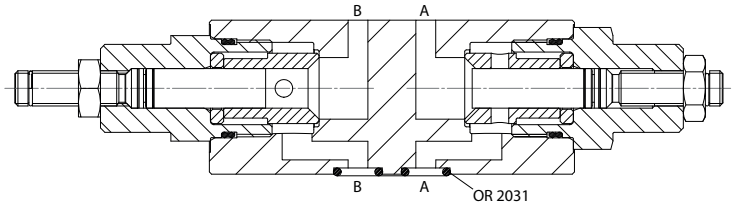


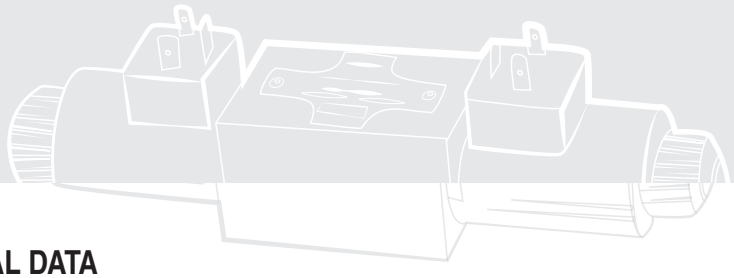
AM2-FO-A



AM2-FO-B







aidro
Desktop Metal Company

3 TECHNICAL DATA

Maximum nominal flow	32 l/min
Maximum rec. flow rate	0,5 dm^3/s (30 l/min)
maximum nominal pressure	32 MPa (320 bar)
Pressure drops	see 4
Installation and dimensions	see 6
Mass	approx 0,8 kg

Control of the flow:

The control is made by throttling through variable orifices obtained on sleeve and partially obstructed by throttling axis. Depending on the various sleeve/axis combination, the control adjustment is:

- (standard) : orifices area is reduced from 100% (*) to 0% with 6 complete turns of the adjustment screw.

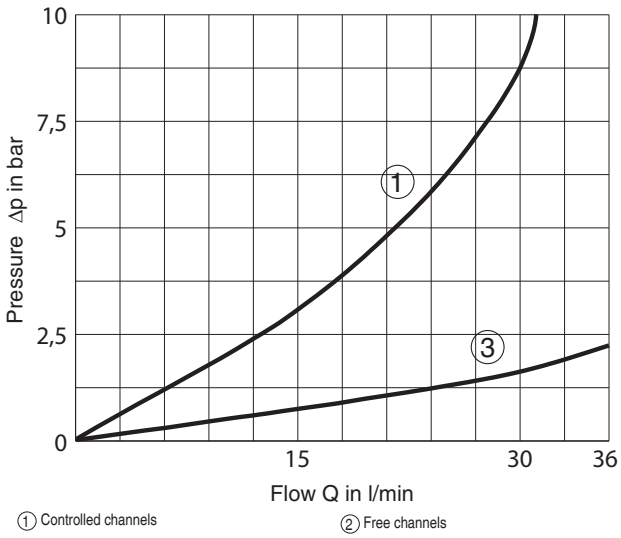
F (fine and sensitive): from 100% (*) to 0% with 8 complete turns - special variant

(*) 100% approx: Q=0.5 dm3/s (30 l/min) at Δp=1MPa (10 bar)

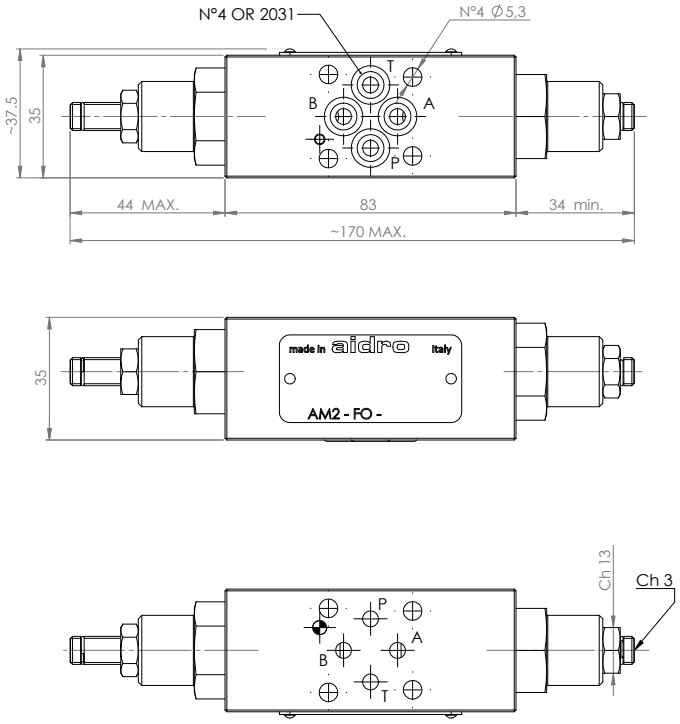
The axis is shifted to increase throttling by unlocking its nut and turning clock wise the adjustment screw. Suitable mechanical stops prevent dangerous manoevring.

4 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves AM2-FO-* in standard configuration, with mineral oil at 36 cSt and at 50° C with throttling axis at full retraction



5 INSTALLATION DIMENSIONS (mm)



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM2-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

All stackable valves AM2-FO conform with ISO and CETOP specifications for mounting surface dimensions (see also front page). Valves height 35 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type. All valves have on their “mounting” surface a ø 4 mm cylindrical hole and are equipped on their “seals” surface by a ø 3 mm locating pin, to conform with the norms. In case of necessity, the pin can be easily removed.

2 CETOP 02

STACKABLE VALVES FLOW CONTROL

AM2-FC-*

30 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable valve CETOP 2 with meter out control (referred to the hydraulic actuator). It is possible to control the lines A, B or AB simply turning the side screws.
On demand it is possible to have also the fine control option.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM2	-	FC	-		-		-		/	10

(1) AM2: stackable valve CETOP 02- Pressure 32 MPa (320 bar)

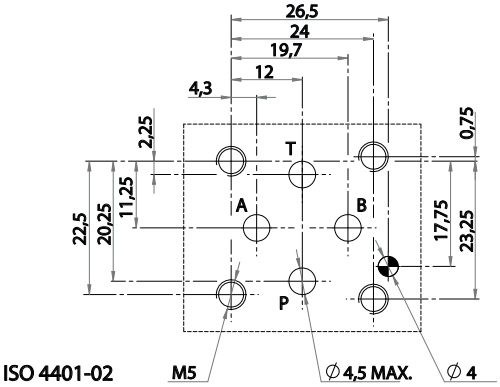
(2) FC: one-way flow control valves with meter-out control
(referred to the hydraulic actuator)

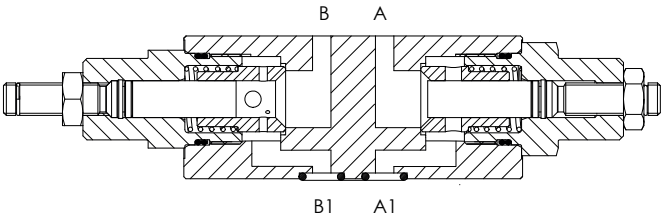
(3) Service lines where the controls operate:
AB : controls on A and B. Fluid flows unrestricted A -> A1, and flow is controlled from A1 -> A and B1 -> B
A : flow is controlled from A1 -> A; free on B, P and T
B : flow is controlled from B1 -> B; free on A, P and T

(4) Flow control characteristics for A1 -> A and B1 -> B and check valve opening pressure (Pm) for flow A -> A1 and B -> B1
no designation: standard control and Pm approx 0.04 MPa (0.4 bar)
F : fine and sensitive control
4 : Pm approx 0.4 MPa (4 bar)

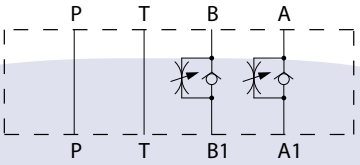
(5) Code reserved for special variants (materials, seals, surface treatments etc.).

(6) Design number (progressive) of the valves

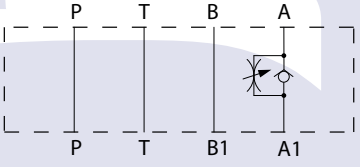




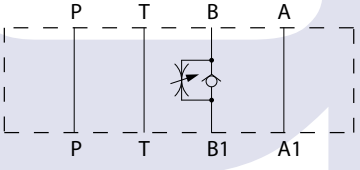
AM2-FC-AB



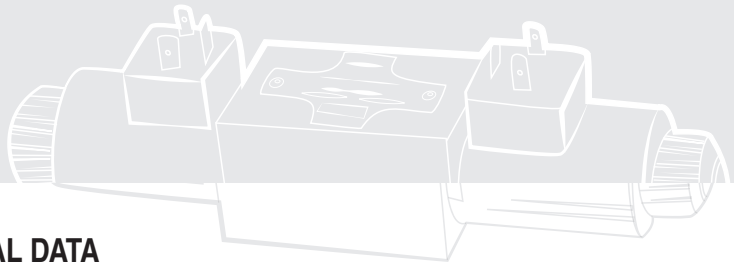
AM2-FC-A



AM2-FC-B



Fluid flows freely on P and T lines; on service lines A and/or B with controls, fluid flows from A -> A1 (and/or B ->B1) overcoming the force of spring acting on sleeve; fluid flows from A1 ->A (and/or B1 ->B) through orifices of sleeve which is pushed against its seat; the throtling axis, which is shifted by screwing it and locked by its nut, partially obstructs the control orifices, thus making the flow rate entirely dependent upon the available pressure drop.



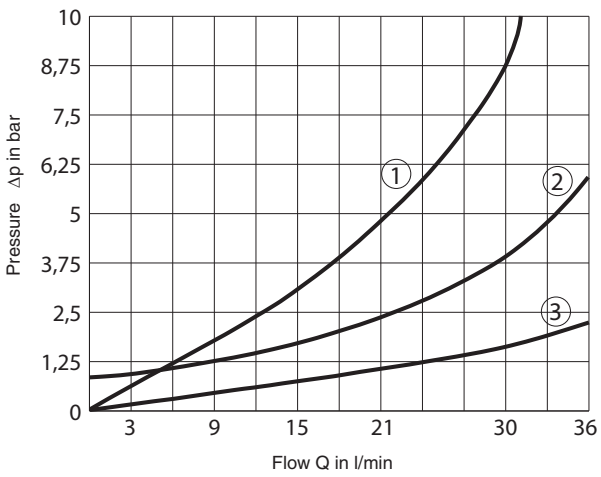
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3 TECHNICAL DATA

Maximum nominal flow	32 l/min	Control of the flow:
Maximum rec. flow rate	30 l/min	The control is made by throttling from A1 -> A (and/or B1 ->B) through variable orifices. Depending on the various sleeve/axis combination, the control adjustment is:
maximum nominal pressure	32 MPa (320 bar)	no designation: standard, orifices area is reduced from 100% (*) to 0% with 6 complete turnsof the adjustement screw
Pressure drops	see 5	F (fine and sensitive): from 100% (*) to 0 with 8 complete turns - special variant
Installation and dimensions	see 7	(*)100 approx: Q=0,5dm³/s (30l/min) at Δp= 1MPa (10bar)
Mass	approx 0,8 kg	

4 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves AM2-FC-AB in standard configuration, with mineral oil at 36 cSt and at 50°C with throttling axis at full retraction.

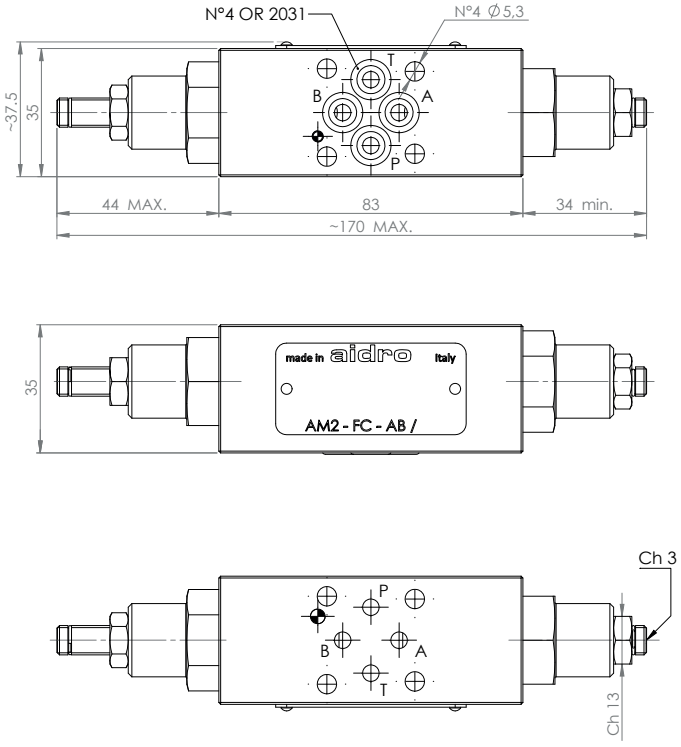


① A1 -> A
B1 -> B

② A -> A1
B -> B1

③ P <-> P
T <-> T

5 INSTALLATION DIMENSIONS (mm)



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM2-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

All stackable valves AM2-FC-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page). Valves height 35 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type. All valves have on their "mounting" surface a ø 4 mm cylindrical hole and have on their "seals" surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.

2 CETOP 02

STACKABLE VALVES FLOW CONTROL

AM2-FX-*

30 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable valve CETOP 2 with meter in control (referred to the hydraulic actuator).
It is possible to control the lines A, B or AB simply turning the side screws.
On demand it is possible to have also the fine control option.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM2	-	FX	-		-		-		/	10

(1) AM2: stackable valve CETOP 02- Pressure 32MPa (320bar)

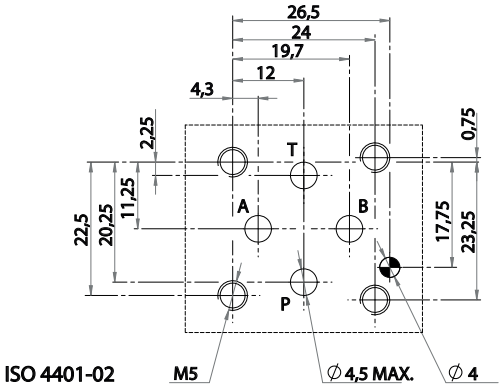
(2) FX: one-way flow control valves with meter-in control
(referred to the hydraulic actuator)

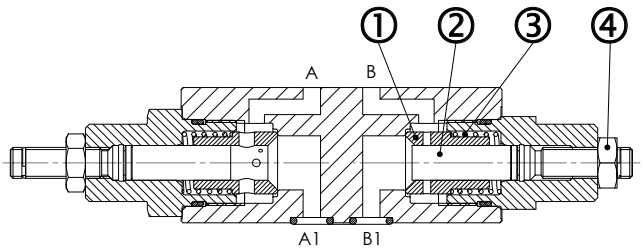
(3) Service lines where the controls operate:
AB: controls on A and B. Fluid flows unrestricted A1 -> A, and B1 -> B and flow is controlled from A -> A1 and B -> B1
A : flow is controlled from A -> A1; free on B, P and T
B : flow is controlled from B -> B1; free on A, P and T

(4) Flow control characteristics for A -> A1 and B -> B1 and check valve opening pressure (Pm) for flow A1-> A and B1 -> B
no designation : standard control and Pm approx 0.04 MPa (0.4 bar)
F: fine and sensitive control
4 : Pm approx 0.4 MPa (4 bar)

(5) Code reserved for special variants (materials, seals, surface treatments etc.).

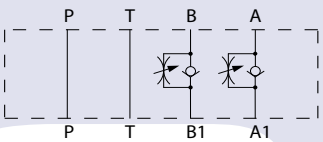
(6) Design number (progressive) of the valves



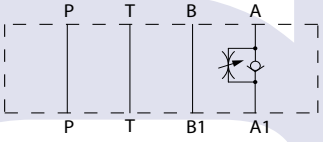


Fluid flows freely on P and T lines; on service lines A and/or B with controls, fluid flows from A->A1 (and/or B ->B1) overcoming the force of spring acting on sleeve; fluid flows from A1 ->A (and/or B1-> B) through orifices of sleeve which is pushed against its seat; the throtling axis which is shifted by screwing it and locked by its nut, partially obstructs the control orifices, thus making the flow rate entirely dependent upon the available pressure drop.

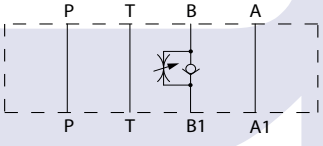
AM2-FX-AB

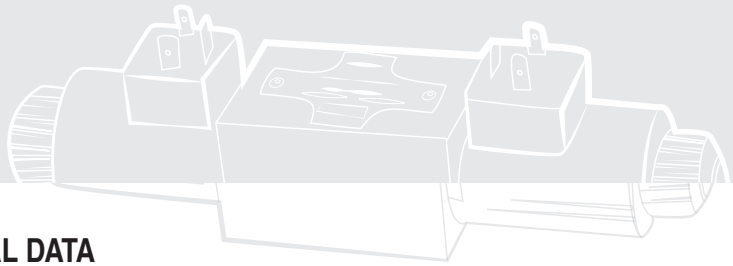


AM2-FX-A



AM2-FX-B





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3 TECHNICAL DATA

Maximum nominal flow	32 l/min
Maximum rec. flow rate	30 l/min
maximum nominal pressure	32 MPa (320 bar)
Pressure drops	see 4
installation and dimensions	see 5
Mass	approx 0,8 kg

Control of the flow:

The control is made by throttling from A1 -> A (and/or B1 ->B) through variable orifices. Depending on the various sleeve/axis combination, the control adjustment is:

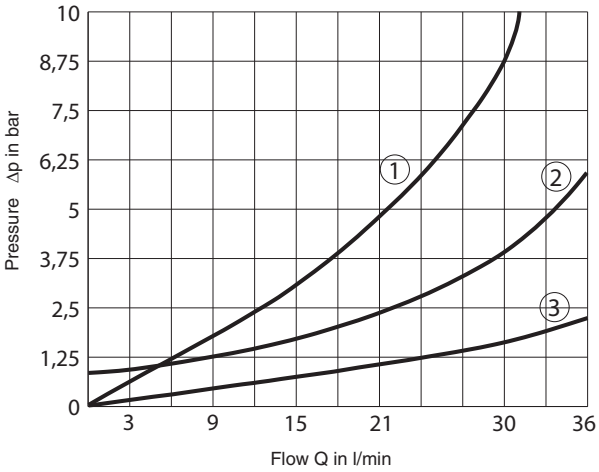
no designation: standard, orifices area is reduced from 100% (*) to 0% with 6 complete turns of the adjustment screw

F (fine and sensitive): from 100% (*) to 0% with 8 complete turns - special variant

(*)100 approx: Q=0,5dm³/s (30l/min) at Δp= 1MPa (10bar)

4 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves AM2 -FX-AB in standard configuration, with mineral oil at 36 cSt and at 50°C with throttling axis at full retraction.

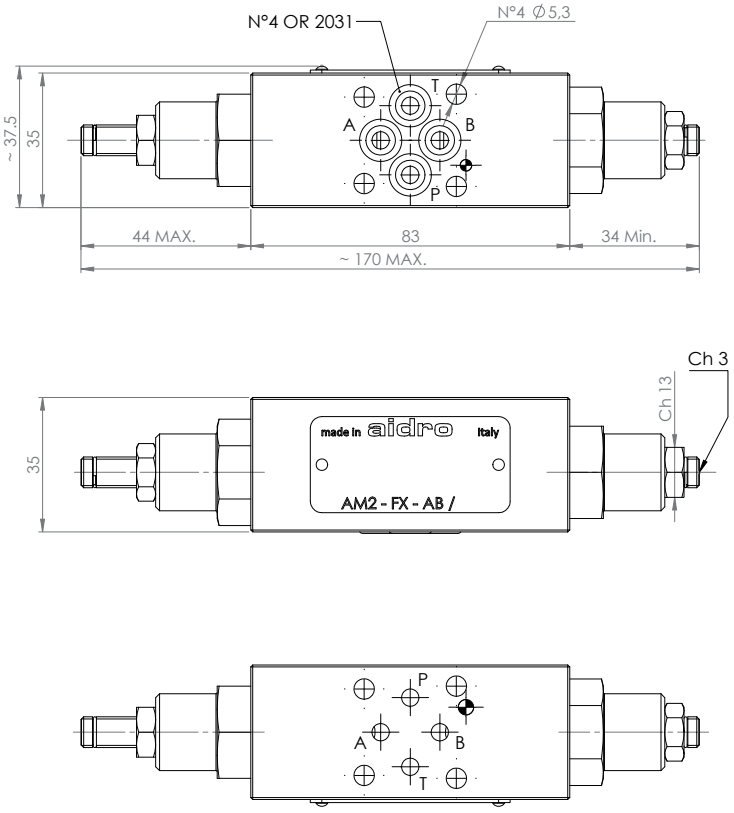


① A -> A1
B -> B1

② A1 -> A
B1 -> B

③ P <-> P
T <-> T

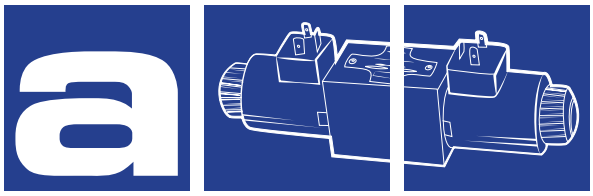
5 INSTALLATION DIMENSIONS (mm)



All stackable valves AM2-FX-* conform with ISO and CETOP specifications for mounting surface dimensions. Valves height 35 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type. All valves have on their "mounting" surface a ø 4 mm cylindrical hole and are equipped on their "seals" surface by a ø 3 mm locating pin conform with ISO and CETOP norms. In case of necessity, the pin can be easily removed.

6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM2-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.



STACKABLE CHECK VALVES

AM2-CO-*/10

30 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Direct operated check valve. All the internal part are made with high strenght steel and are machined with accouracy in order to assure the requested tightness.
The controlled lines are A, B or AB.
The standard surface treatment of the body is phosphate coated. Plugs are zinc coated.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM2	-	CO	-		-		-		/	10

(1) AM2: stackable valve CETOP 02- Pressure 32MPa (320bar)

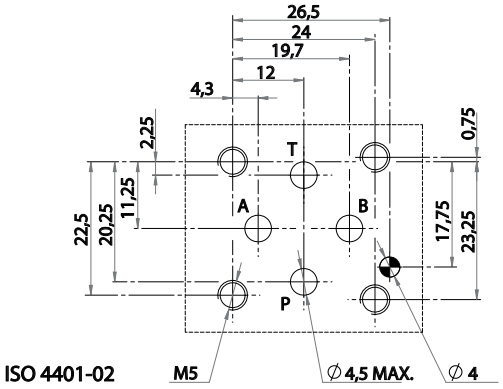
(2) CO: check valve, spring operated

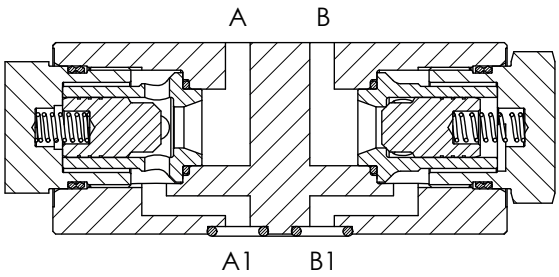
(3) Service lines where the controls operate:
AB : checks on A and B. Fluid flows A -> A1 and B -> B1
and cannot flow A1->A, B1->B, free on P and T
A : check on A: flow A1 -> A is blocked, free on B,P and T
B : check on B: flow B1 -> B is blocked, free on A,P and T

(4) Check valve opening (cracking) pressure (Pm):
no designation: Pm approx 0,2MPa (2bar)
4: Pm approx 0,4MPa (4bar)

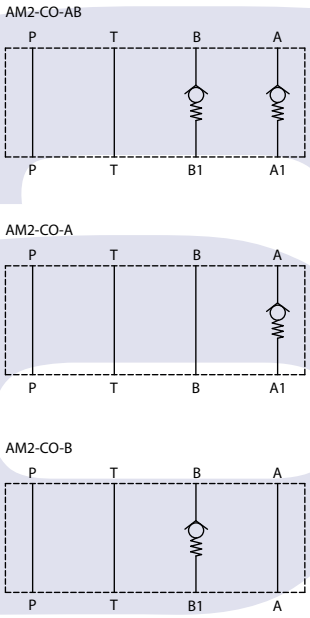
(5) Code reserved for special variants (materials, seals, surface treatments etc.).

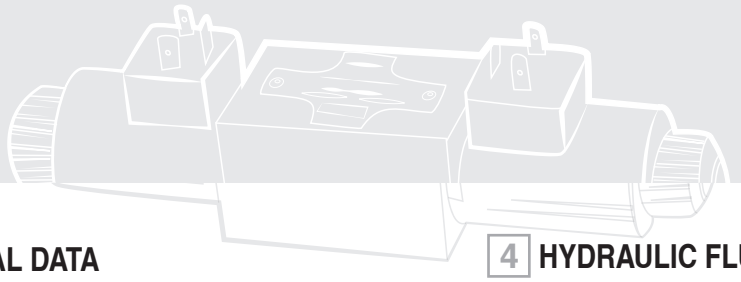
(6) Design number (progressive) of the valves





Fluid flows freely on P and T lines; on service lines A and/or B with controls, fluid flows from A -> A1 (and/or B -> B1) overcoming the force of spring acting on sleeve ; fluid flows from A1 -> A (and/or B1 -> B) through orifices of sleeve which is pushed against its seat; the throtling axis which is shifted by screwing it and locked by its nut, partially obstructs the control orifices, thus making the flow rate entirely dependent upon the vailable pressure drop.





3 TECHNICAL DATA

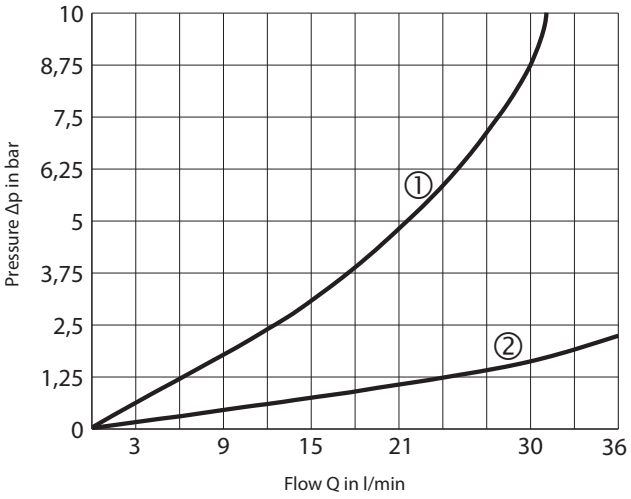
Maximum rec. flow rate	30 l/min
Maximum nominal pressure	32 MPa (320 bar)
Pressure drops	see 5
Installation and dimensions	see 6
Mass	approx 0,75 kg

4 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM2-*are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

5 TYPICAL DIAGRAMS

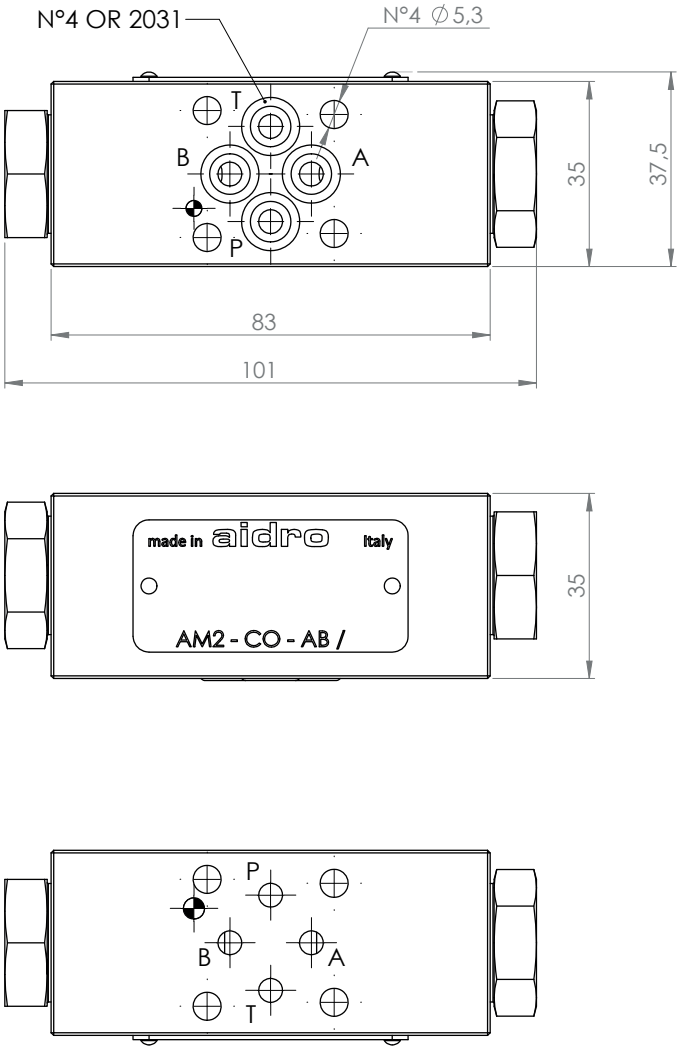
Typical Δp-Q curves for valves AM2-CO in standard configuration, with mineral oil at 36 cSt and at 50°C.



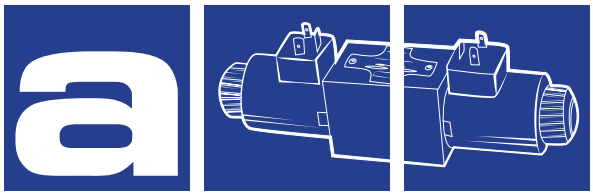
① A -> A1
B -> B1

② Free channels

6 INSTALLATION DIMENSIONS (mm)



All stackable valves AM2-CO-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page). Valves height 35 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type. All valves have on their "mounting" surface a ø 4 mm cylindrical hole and have on their "seals" surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.



STACKABLE CHECK VALVES

AM2-CO-*/20

30 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Direct operated check valve. All the internal part are made with high strenght steel and are machined with accouracy in order to assure the requested tightness.
The controlled lines are P and T in different combinations.
The standard surface treatment of the body is phosphate coated.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM2	-	CO	-		-		-		/	20

(1) AM2: stackable valve CETOP 02 - Pressure 32 MPa (320 bar)

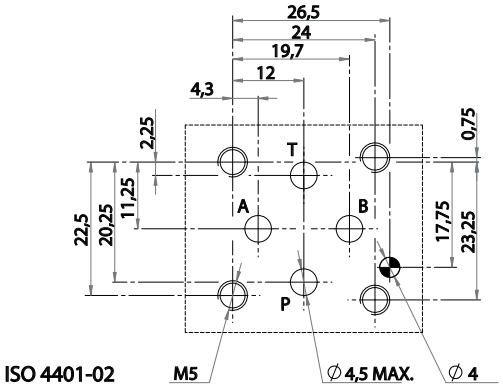
(2) CO: check valve, spring operated

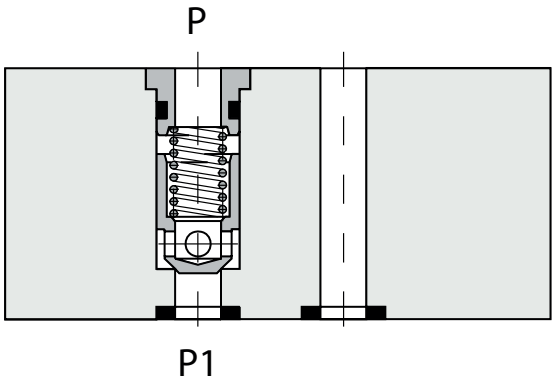
(3) Service lines where the controls operate:
T : checks on T: flow T1 -> T is blocked, free on A, B and P
P : check on P: flow P -> P1 is blocked, free on A, B and T
PT : check on P and T: P -> P1 and T1 -> T are blocked, free on A and B

(4) Check valve opening (cracking) pressure (Pm):
no designation (standard): Pm approx 0.2 MPa (2 bar)

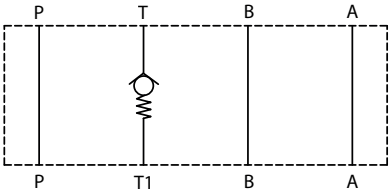
(5) Code reserved for special variants (materials, seals, surface treatments, etc.)

(6) Design number (progressive) of the valves.

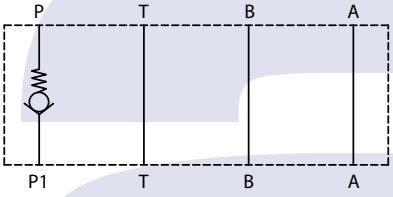




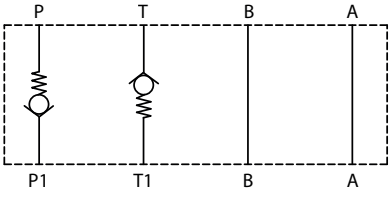
AM2-CO-T-*-**/20

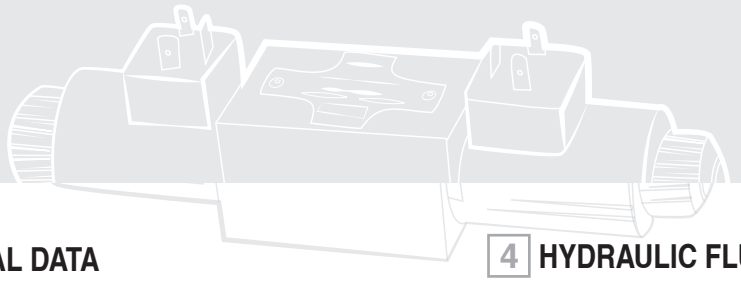


AM2-CO-P-*-**/20



AM2-CO-PT-*-**/20





3 TECHNICAL DATA

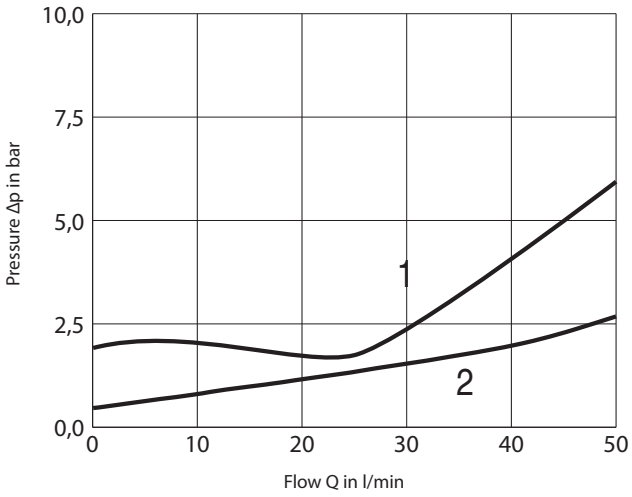
Maximum rec. flow rate	30 l/min
Maximum nominal pressure	32 MPa (320 bar)
Pressure drops	see 5
Installation and dimensions	see 6
Mass	approx 0,5 kg

4 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM2-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

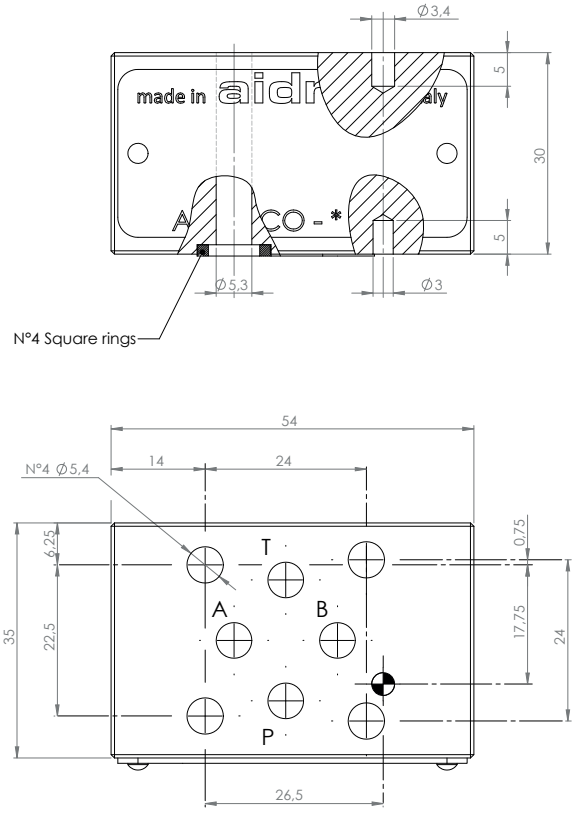
5 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves AM2-CO-/20 in standard configuration, with mineral oil at 36 cSt and at 50°C

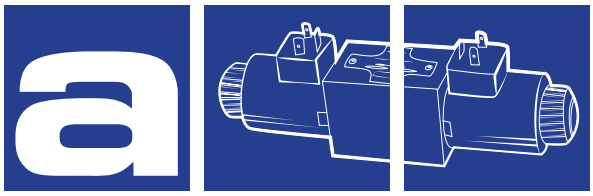


① P ->P1 and T1 ->T ② Free channel

6 INSTALLATION DIMENSIONS (mm)



All stackable valves AM2-CO-*/20 conform with ISO and CETOP specifications for mounting surface dimensions. Valves height 30 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals. All valves have on their "mounting" surface a ø 4 mm cylindrical hole and have on their "seals" surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.



STACKABLE PILOT OPERATED CHECK VALVES

AM2-CP-*

30 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Pilot operated check valve. All the internal part are made with high strenght steel and are machined with accouracy in order to assure the requested tightness.
The controlled lines are A, B or AB.
The standard surface treatment of the body is phosphate coated. Plugs are zinc coated.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM2	-	CP	-		-		-		/	10

(1) AM2: stackable valve CETOP 02 - Pressure 32 MPa (320 bar)

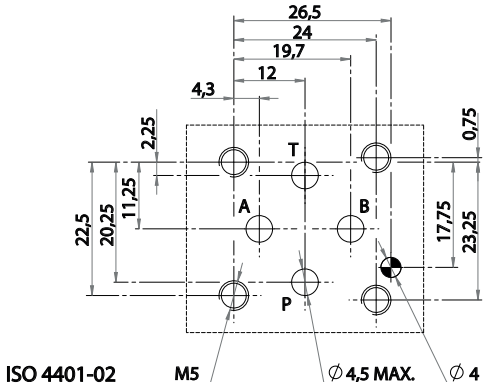
(2) CP: check valve, pilot operated (hydraulically)

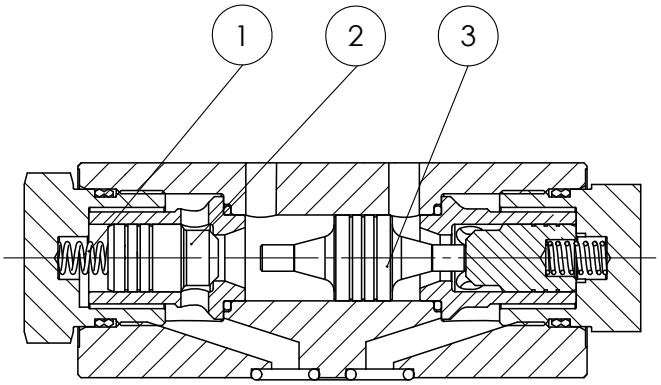
(3) Service lines where the controls operate:
AB: pilot operated checks on A and B. Fluid flows A -> A1 and B -> B1 and flow A1 -> A (or B1 -> B) is permitted only when B (or A) is pressurized
A : pilot operated check on A; flow A1 -> A is permitted only when B is pressurized
B : pilot operated check on B; flow B1 -> B is permitted only when A is pressurized

(4) Check valve opening (cracking) pressure (Pm) for free flow A -> A1 and B -> B1
no designation: Pm approx 0.2 MPa (2 bar)
4: Pm approx 0.4 MPa (4 bar)

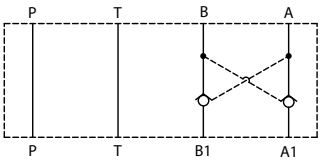
(5) Code reserved for special variants (materials, seals,surface treatments, etc.)

(6) Design number (progressive) of the valves.

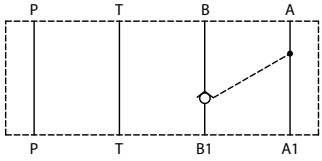




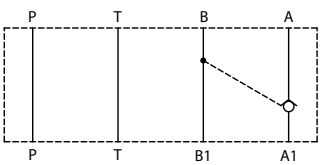
AM2-CP-AB



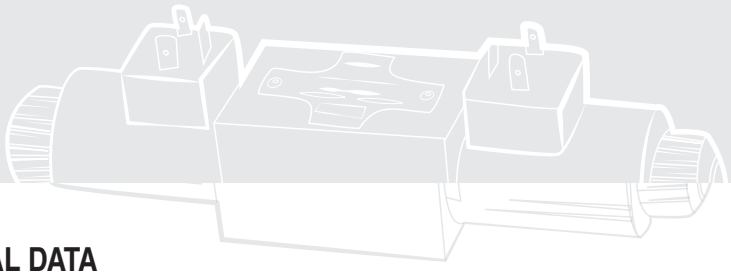
AM2-CP-B



AM2-CP-A



Fluid flows freely on P and T lines; on service lines A and/or B with p.o. check, fluid flows from A -> A1 (and/or B -> B1) overcoming the force of spring 1 acting on poppet 2, and fluid is blocked from A1-> A (and/or B1 ->B). When, by switching the solenoid operated 4-way directional valve, pressure is made available at, for instance, port B fluid flows B -> B1 and the pilot piston 3, shifting from its central position, forces poppet 2, on service line A, to open and permit flow A1 -> A.



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3 TECHNICAL DATA

Maximum rec. flow rate	30 l/min
Maximum nominal pressure	32 MPa (320 bar)
Pressure drops	see 4
Pilot area ratio piston/check valve	approx 3,5
Installation and dimensions	see 5
Mass	approx 0,5 kg

Piloting pressure:

To shift the pilot piston and to open the check in A the piloting pressure must be at B:

$$Pp=Pb=\frac{Pa1+Pm-Pa}{3,5}+Pa$$

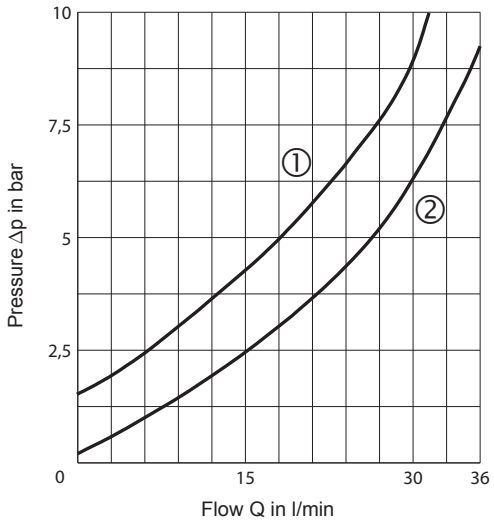
or: to open the check in B:

$$Pp=Pa=\frac{Pb1+Pm-Pb}{3.5}+Pb$$

where:
Pp = piloting pressure;
Pb = pressure in B;
Pa = pressure in A;
Pa1= pressure in A1;
Pm = check valve opening pressure (spring)
Pb1= pressure in B1

4 TYPICAL DIAGRAMS

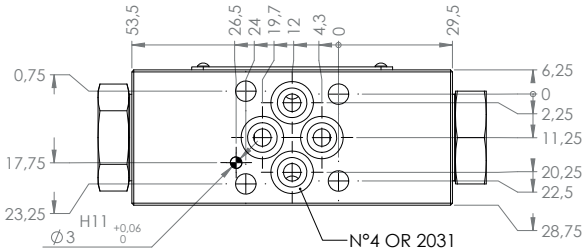
Typical Δp-Q curves for valves AM2 -CP-AB in standard configuration, with mineral oil at 36 cSt and at 50°C

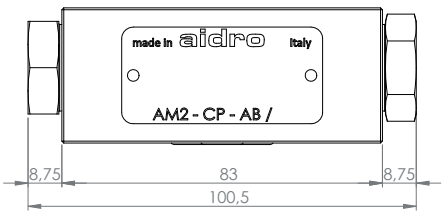


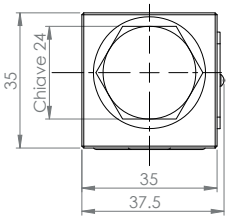
① **A -> A1**
B -> B1

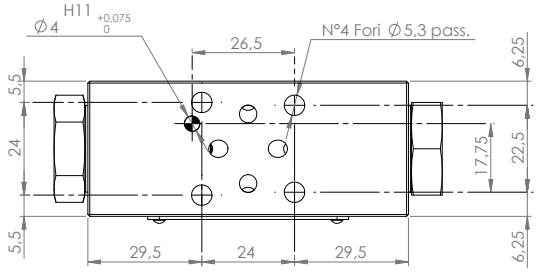
② **A1 -> A**
B1 -> B

5 INSTALLATION DIMENSIONS (mm)









6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM2-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

All stackable valves AM2-CP-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page). Valves height 35 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type. All valves have on their "mounting" surface a ø 4 mm cylindrical hole and have on their "seals" surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.

2 CETOP 02

STACKABLE PRESSURE RELIEF VALVES

AM2-MO-*

20 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable pressure relief valve direct operated. The valve is made with a steel body combined with a pressure relief cartridge valve with an anti vibration system. The body of the valve is phosphate coated. The cartridge valve is zinc coated. The pressure can be set in different pressure ranges.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)
AM2	-	MO	-		/		-		-		/	10

(1) AM2 : stackable valve CETOP 02 - Pressure 32 MPa (320 bar)

(2) MO : pressure relief, direct acting

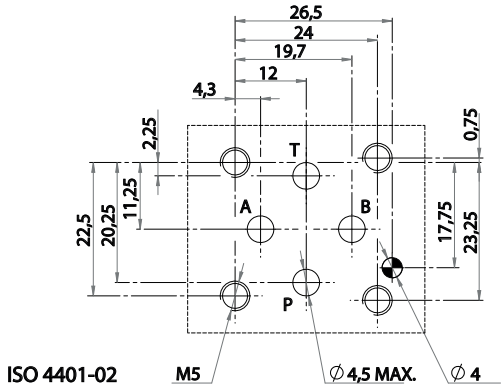
(3) Service lines where the controls operate:
P : relief on P and discharge to T
B : relief on B and discharge to T
BA: indipendent relief on B and on A and discharge to T
AB: relief on A and B with crossed discharge

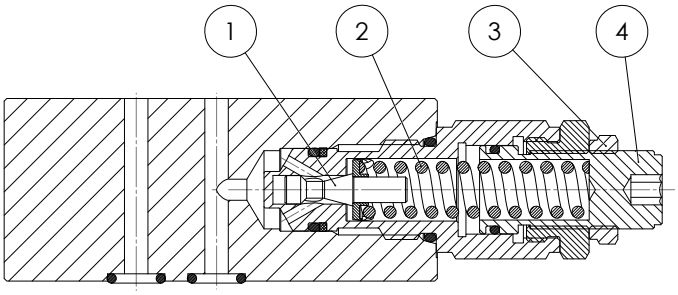
(4) Pressure adjustment ranges:
10: from 6,3 MPa to 12,5 MPa (from 63 to 125 bar)
20: from 8 MPa to 21 MPa (from 80 to 210 bar)
32: from 12,5 MPa to 35 MPa (from 125 to 350 bar)

(5) Pressure adjustment range for relief on A (only for models AM2-MO-BA)

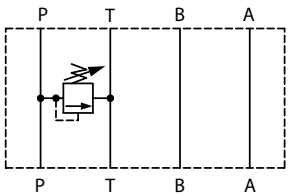
(6) Code reserved for special variants (materials, seals,surface treatments, etc.)

(7) Design number (progressive) of the valves.

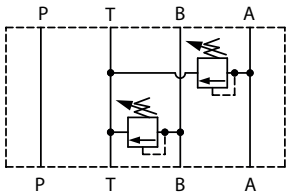




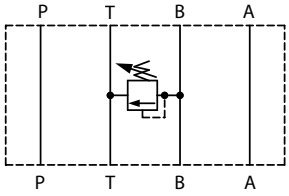
AM2-MO-P



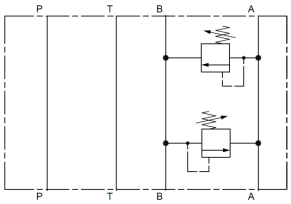
AM2-MO-BA



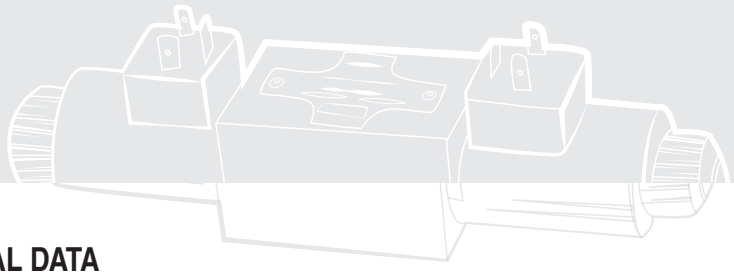
AM2-MO-B



AM2-MO-AB



Fluid flows freely on A, B, P and T lines; when on service line,protected by the relief valve, the pressure exceeds the settled value, the piston 1 is pushed by axial hydraulic force, overcomes the force of spring 2, and shifts in its cylindrical seat and opens to the pressurized fluid annular passage to T, thus keeping the pressure level at the requested value.



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3 TECHNICAL DATA

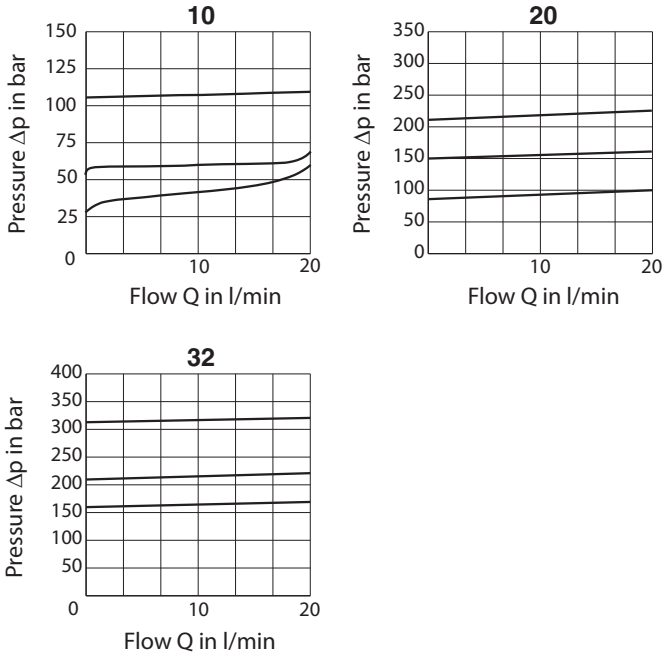
Maximum rec. flow rate	20 l/min
Maximum nominal pressure	32 MPa (320 bar)
Pressure relief curves	see 4
Installation and dimensions	see 5
Masses:	
AM2-MO-P or -B	approx 0,85 kg
AM2-MO-BA	approx 1 kg

Adjustment of the relief pressure:

Relief pressure is reached when the axial hydraulic forces on piston equal the force of spring; the value of the relief pressure can be therefore changed, within the limits of the chosen adjustment range, by changing the compression of spring. To increase the relief pressure, turn clock wise the adjustment screw, after having unlocked its nut.
For each pressure adjustment range, the pressure gradient is approx:
10 : 1,6 MPa/mm (16 bar/turn)
20 : 2,6 MPa/mm (26 bar/turn)
32 : 5 MPa/mm (50 bar/turn)
When the required level of pressure is reached, lock the nut.

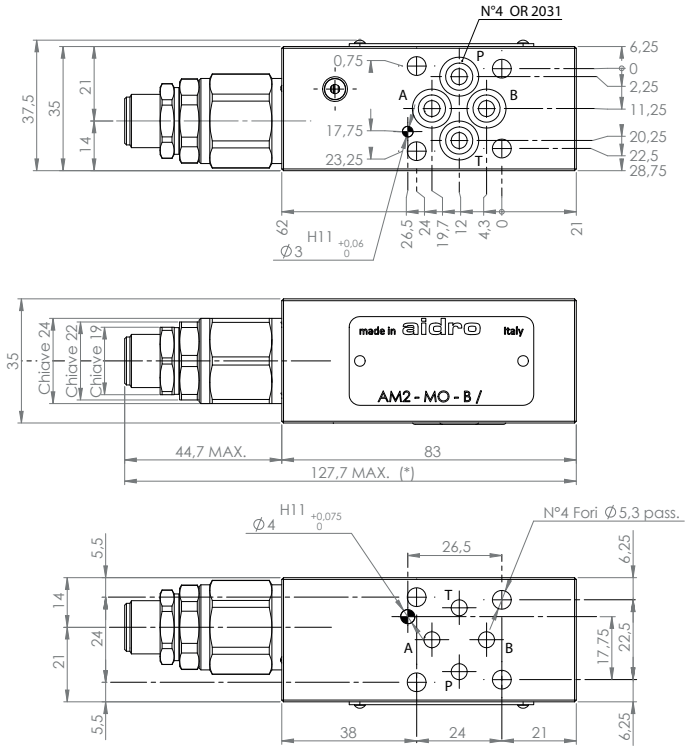
4 TYPICAL DIAGRAMS

Typical curves for valves AM2-MO-* in standard configuration, with mineral oil at 36 cSt and at 50°C.

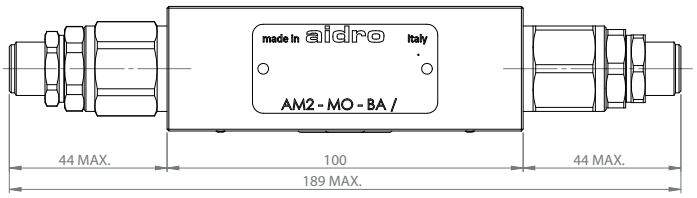


5 INSTALLATION DIMENSIONS (mm)

AM2-MO-B or AM2-MO-P



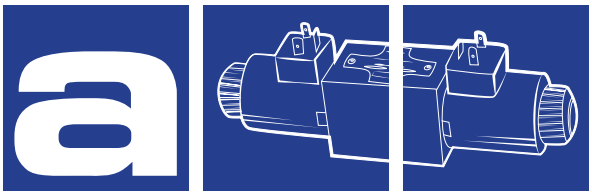
AM2-MO-BA



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM2-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

All stackable valves AM2-MO-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page). Valves height 35 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type. All valves have on their "mounting" surface a ø 4 mm cylindrical hole and have on their "seals" surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.



MODULAR VALVES PRESSURE REDUCING

AM2-RO-*

30 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable pressure reducing valve direct operated. The valve is made with a steel body combined with a pressure relief cartridge valve.The body of the valve is phosphate coated. The cartridge valve is zinc coated.
The pressure can be set in different pressure ranges.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM2	-	RO	-		/		-		/	20

(1) AM2 : stackable valve CETOP 02 - Pressure 32 MPa (320 bar)

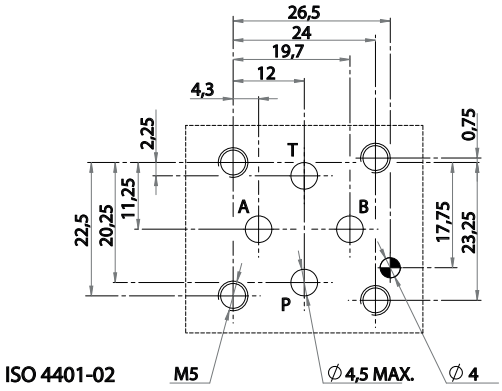
(2) RO : pressure reducing, direct operated- 3 way valve

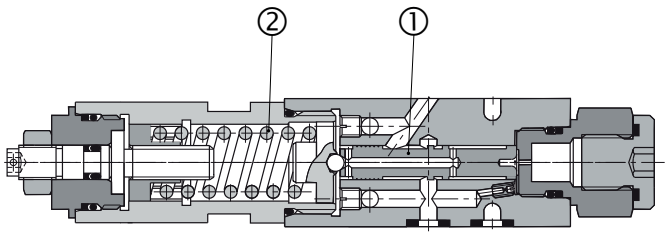
(3) Service lines where the controls operate:
P : control on P with 3[a] way and drain to T line
AC: control on A with check valve
B : control on P with pressure reduced on B

(4) Controlled pressure adjustment ranges:
2,5: from 1 MPa to 2,5 MPa (from 10 to 25 bar)
6,3: from 2 MPa to 6,3 MPa (from 20 to 63 bar)
16: from 3 MPa to 16 MPa (from 30 to 160 bar)
20: from 5 MPa to 21 MPa (from 50 to 210 bar)

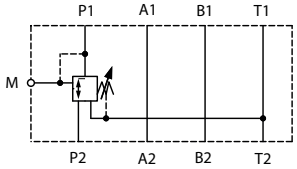
(5) Code reserved for special variants (materials, seals,surface treatments, etc.)
M= adjustment hand knob
V= viton seals

(6) Design number (progressive) of the valves.

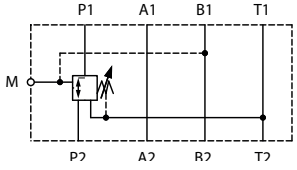




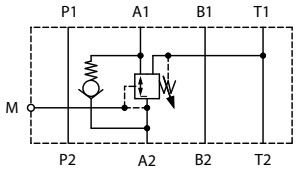
AM2-RO-P



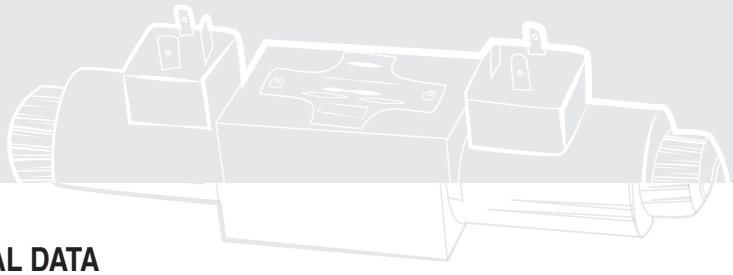
AM2-RO-B



AM2-RO-AC



Reduced pressure is obtained by throttling the flow on spool 2 which is balanced, on one side, by the reduced pressure and, on the other side, by the spring. All valves AM2-RO-* are 3 way, direct operated: If the pressure in the regulated chamber overcomes the value of the adjusted, reduced pressure, the valve discharges to T (at pressure value higher than the reduced pressure, see diagrams) thus acting as safety or relief valve.



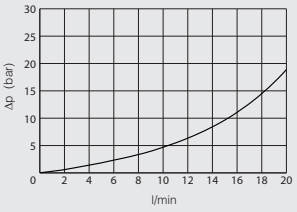
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3 TECHNICAL DATA

Maximum rec. flow rate on free lines	30 l/min
on controlled lines	20 l/min
Maximum nominal pressure	32 MPa (320 bar)
Maximum pressure on T	21 MPa (210 bar)
Pressure curves	see 4
Installation and dimensions	see 5
Masses:	
AM2-RO-P or -B	approx 0,6 kg
AM2-RO-AC	approx 0,8 kg

Adjustment of the pressure:

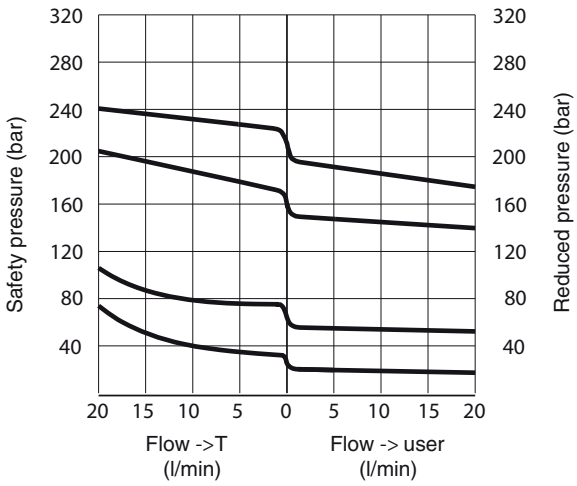
The value of the reduced pressure, is changing the compression of spring.
To increase the value of the reduced pressure, unlock nut ch. 13 and turn clockwise the screw with outside hex 4.



Valve reducing pressure on A or B lines can be:
- indirect (type AM2-RO-B) they act on P line, receive reduced pressure pilot signal from B line that is controlled; (eventual pressurized reverse flow is directed to T by 3[a] way).
- with integral check valve (type AM2-RO-AC) they act on A line and they allow free reverse flow to port A of the solenoid valve. (see ΔP).

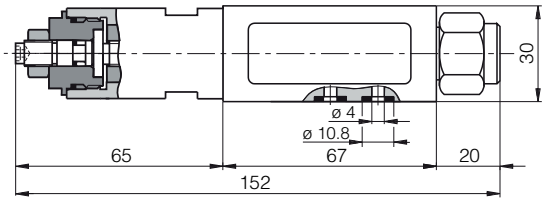
4 TYPICAL DIAGRAMS

Typical curves for valves AM2-RO in standard configuration, with mineral oil at 36 cSt and at 50°C.

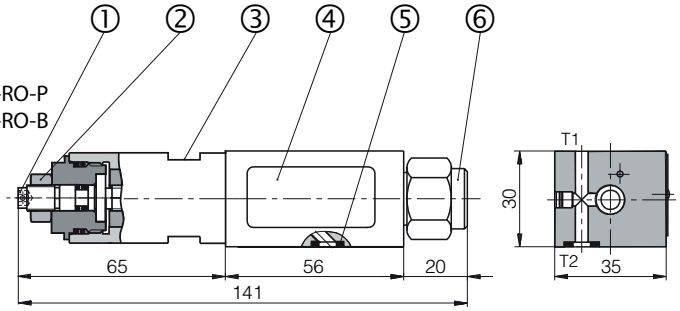


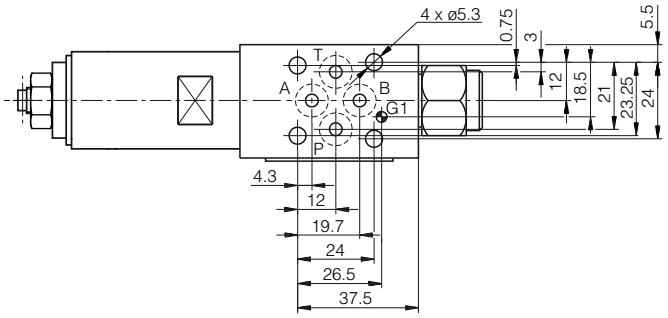
5 INSTALLATION DIMENSIONS (mm)

AM2-RO-AC



AM2-RO-P
AM2-RO-B



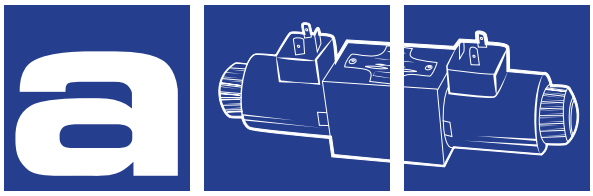


①Pressure adjustment element, screw with outside ch. 4
②Locknut ch. 13
③Wrench flats ch. 24
④Name plate
⑤N°4 square ring 7.65x1.68 supplied with each valve
⑥Plug for pressure gauge connection, thread G1/4"

6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM2-RO* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

All stackable valves AM2-* conform with ISO and CETOP specifications for mounting surface dimensions. Valves height 30 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type.



MONOBLOCK WITH MULTIPLE SECTIONS ISO 02

PM2-AL

30 l/min 30 MPa (300 bar)

1 DESCRIPTION

Ports A and B (1/4" BSP) on the sides P (1/4" BSP) and T (3/8" BSP) lines with ports (1/4" BSP) on the two rear sides Parallel connections P and T Monoblocks with multiple sections from 1 to 8, for hydraulic 4 ways operated valves ISO 02 with parallel internal connections P and T. The utility ports A and B are positioned laterally to the valve assembly face.

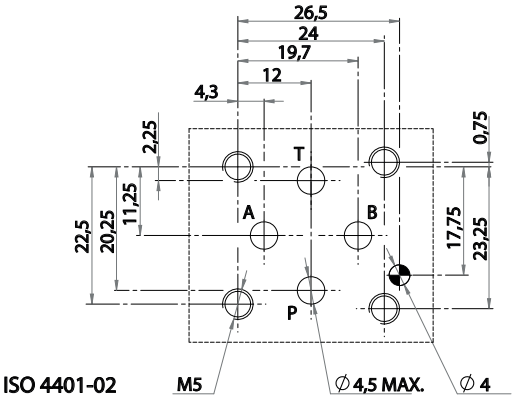


2 ORDERING CODE

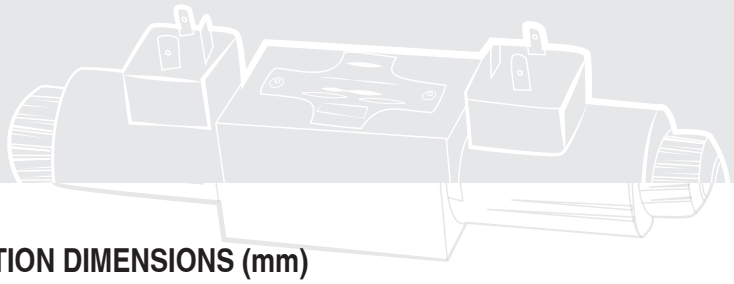
(1)	(2)	(3)
PM	2	G

3 TECHNICAL DATA

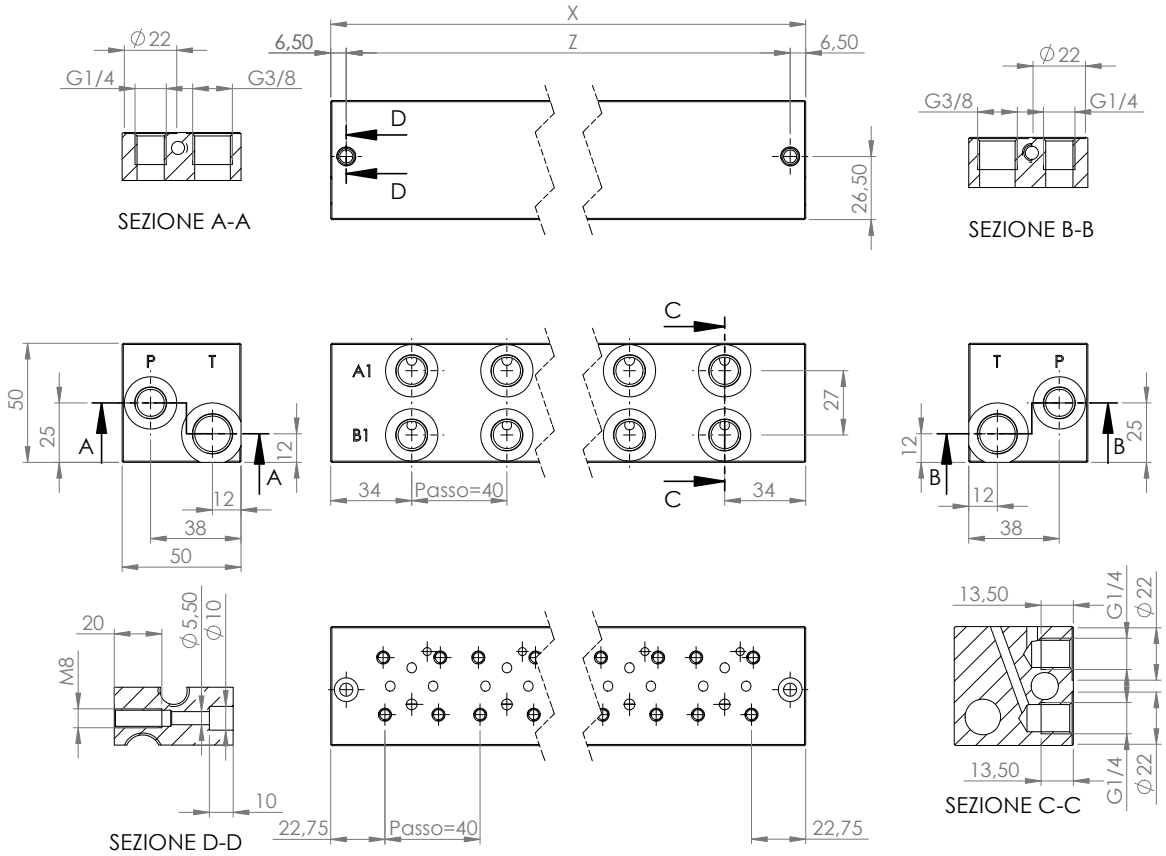
Material:	Aluminium alloy
Coating:	Natural
Pressure allowed in the ports:	P, A, B and T = 300 bar
Incoming flow, maximum recommended: (*)	From 30 to 15 l/min, decreasing with the rise of the number of sections. If both pairs of ports P and T are used, maximum recommended Q values can be increased.
Connecting ports:	Standard cylindrical BSP thread with maximum rugosity of a surface Ra 1,6 for the fitting of connections.
A and B ports P:	3/8" BSP one pair per section
P port:	1/4" BSP one pair on each rear side of a monoblock; it allows to double supply if needed (P) 3/8" BSP, one on each rear side of the monoblock; it allows double outlet if needed (T)



Type	Number of sections 02	Q max recommended (*) l/min
PM2-AL-1 G	1	30 - 30
PM2-AL-2 G	2	30 - 30
PM2-AL-3 G	3	25 - 30
PM2-AL-4 G	4	25 - 30
PM2-AL-5 G	5	20 - 30
PM2-AL-6 G	6	20 - 30
PM2-AL-7 G	7	15 - 30
PM2-AL-8 G	8	15 - 30



4 INSTALLATION DIMENSIONS (mm)



- 2 passing holes diameter ø 5,5 mm, with a counterbore for a bolt head with diameter ø 9x8 mm
- 4 mounting holes threaded M8 on the rear side

Type	X (mm)	Z (mm)	mass (kg)
PM2-AL-1 G	70	54	0,39
PM2-AL-2 G	120	104	0,62
PM2-AL-3 G	170	154	0,85
PM2-AL-4 G	220	204	1,00
PM2-AL-5 G	270	254	1,20
PM2-AL-6 G	320	304	1,50
PM2-AL-7 G	370	354	1,80
PM2-AL-8 G	420	404	1,92

5 HYDRAULIC FLUID

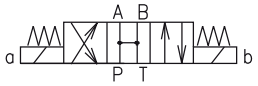
Seals and materials used on standard valves PM2-AL are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from 10 cSt to 60 cS.

6 MOUNTING SURFACE OF THE VALVE:

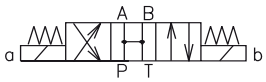
Planary of the surface: 0,01/100
rugosity: Ra 0,8
Every section has a mounting surface according to ISO 4401-02.

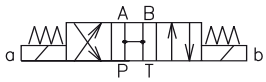
SUMMARY

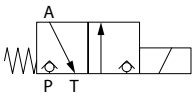
3 CETOP 03

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED
HD3-ES-*/10  0001

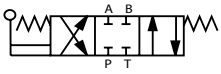
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HD3-ES-*/20  0006

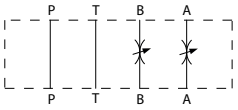
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HD33-EF-*  0010

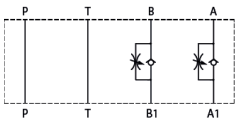
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED
HD33-ES  0013

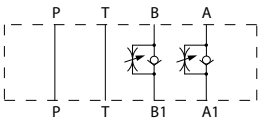
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED POPPET TYPE
HD3-EST-*  0017

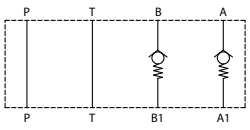
DIRECTIONAL CONTROL VALVES SOLENOID / LEVER OPERATED
HD3-EL-*/10  0021

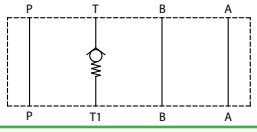
DIRECTIONAL CONTROL VALVES LEVER OPERATED
HD3-LO-*  0027

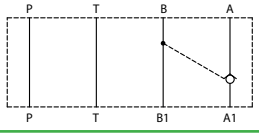
FLOW RESTRICTOR VALVES
AM3-FO-*  0029

FLOW CONTROL VALVES
AM3-FC-*  0031

FLOW CONTROL VALVES
AM3-FX-*  0033

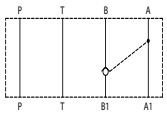
DIRECT OPERATED CHECK VALVES
AM3-CO-*/10  0035

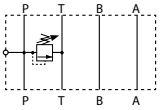
DIRECT OPERATED CHECK VALVES
AM3-CO-*/25  0037

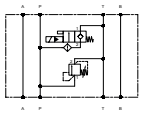
PILOT OPERATED CHECK VALVES
AM3-CP-*  0039

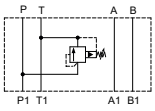
SUMMARY

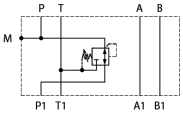
3 CETOP 03

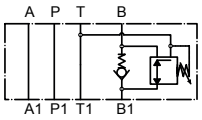
PILOT OPERATED CHECK VALVES
AM3-CP-B/10A  0041

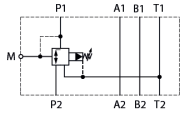
PRESSURE RELIEF VALVES
AM3-MO-*  0043

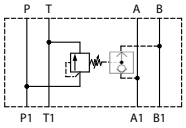
STACKABLE VALVE RELIEF AND BYPASS
AM3-M*-EV*  0045

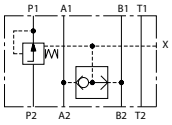
PRESSURE RELIEF VALVES
AM3-MP-*  0047

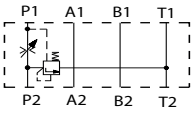
PRESSURE REDUCING VALVES
AM3-RO-*  0049

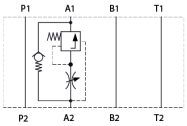
DIRECT ACTING, PRESSURE REDUCING VALVES ON B LINE
AM3-RO-BC/6,3  0051

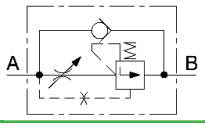
PRESSURE REDUCING MODULAR VALVES
AM3-RP-*  0053

MODULAR VALVES 3-WAY PRESSURE COMPENSATOR WITH LOAD SENSING
AM3-LS-P3  0055

2-WAY PRESSURE COMPENSATOR MODULAR VALVES
AM3-PC-*  0057

PRESSURE COMPENSATED FLOW CONTROL VALVES
AM3-Q3-P  0059

PRESSURE COMPENSATED FLOW CONTROL VALVES
AM3-Q*-A  0061

PRESSURE COMPENSATED FLOW CONTROL VALVES
QVC-06  0063

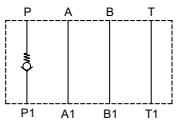
aidro
Desktop Metal Company

3 CETOP 03

SANDWICH BODY FOR CARTRIDGE VALVES
SANDWICH VALVES WITH 3/4” 16 UNF 2-WAY CARTRIDGE VALVES

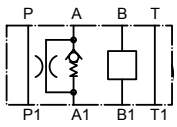
0065

CETOP 03 SANDWICH BODY FOR CARTRIDGE VALVES
SAE STANDARD 2-WAY CAVITY 3/4 16” UNF ON P LINE
AM3-*-P/34



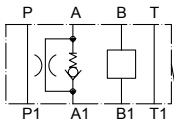
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CETOP 03 SANDWICH BODY FOR CARTRIDGE VALVES
SAE STANDARD 2-WAY CAVITY 3/4 16” UNF ON A AND B LINES
AM3-*-C



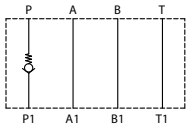
0067

CETOP 03 SANDWICH BODY FOR CARTRIDGE VALVES
SAE STANDARD 2-WAY CAVITY 3/4 16” UNF ON A AND B LINES
AM3-*-X



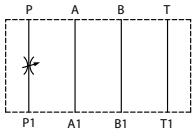
0069

STACKABLE VALVE CHECK VALVE ON P LINE
AM3-CO-P/34



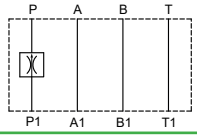
0071

STACKABLE VALVE ADJUSTABLE FLOW CONTROL
AM3-FO-P/34



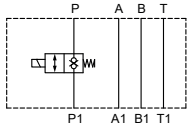
0073

STACKABLE VALVE PRESSURE COMPENSATED, FIXED CONTROL VALVES
AM3-Q*-P/34



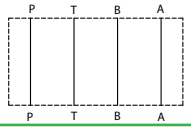
0075

STACKABLE VALVE LOCK, SOLENOID OPERATED CONTROL VALVE ON P LINE
AM3-EVD-P/34-(024C)



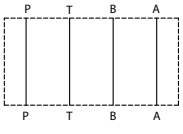
0077

MONOBLOCK WITH MULTIPLE SECTIONS ISO 03
MR-3-*G



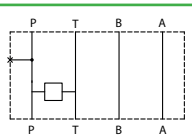
0079

MONOBLOCK WITH MULTIPLE SECTIONS ISO 03
MRK-3-*G



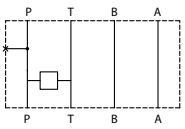
0081

MONOBLOCK SINGLE SECTION ISO 03 - BOTTOM PORTS
MRSK-3-38G

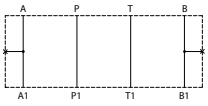


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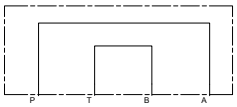
3 CETOP 03

ISO 03 PLATE
BM3-G


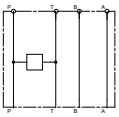
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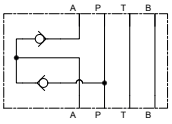
SANDWICH PLATE CETOP 3
PM3-AB/10


0087

SANDWICH PLATE CETOP 3
PT3


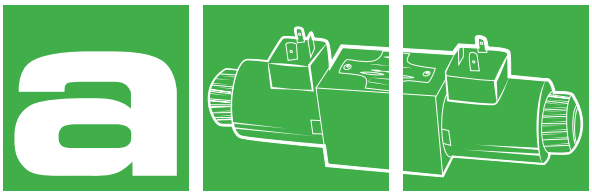
0089

MONOBLOCK SINGLE SECTION ISO 03 - BOTTOM PORTS
MRSK-3-GE-14

0091

REGENERATIVE MODULAR VALVE
AM3-RGT


0093

aidro
Desktop Metal Company



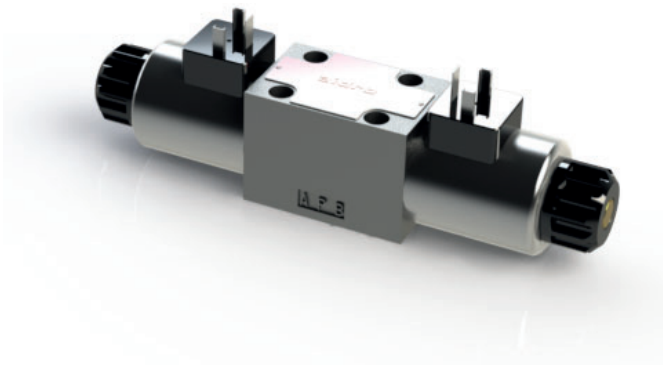
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED

HD3-ES-*/10

80 l/min - 35 MPa (350 bar)

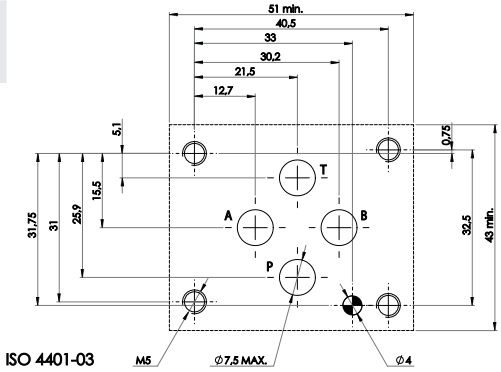
1 DESCRIPTION

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 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)		(8)
HD3	-	ES	-			-					/	10



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

(2) ES: 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)
N : 2 solenoids, spool is detented see 13 (2 position)

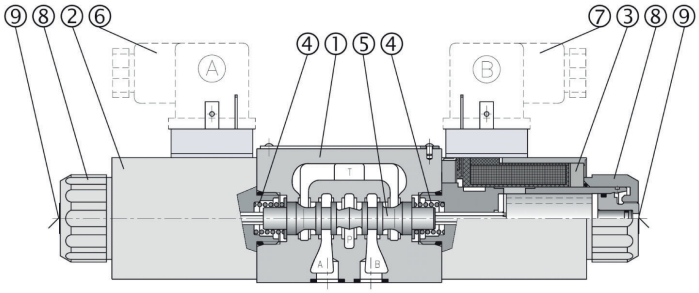
(4) b: only for LL, ML, LM sol. b installed (instead of sol. a)

(5) Code reserved for option and variants:
S-**: calibrated orifice on P port, see 11
K : water proof caps on emergency pin, see 10
T : soft shifting device, see 12
Z* : anti corrosion coating (variants), see 14
S1, S4: proximity sensors, see 15

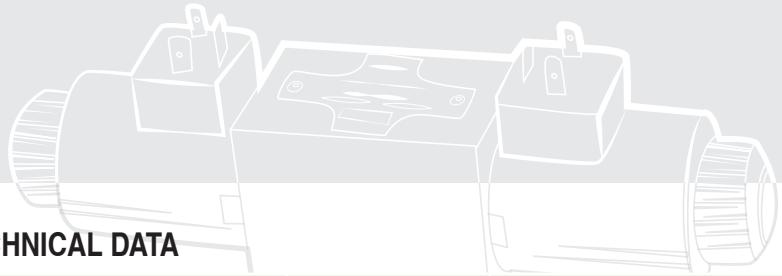
(6) Electric voltage and solenoid coils: see 8
0000: no coils
012C: coils for V12DC
024C: coils for V24DC
048C: coils for V48DC
024A: coils for V24/50AC
115A: coils for V110/50- V 115/60AC
230A: coils for V220/50- V 230/60AC

(7) Coil connection (see 16):
no designation: DIN 43650-A ISO 4400
AMP: Amp Junior Timer- vertical configuration
AMPX: Amp Junior Timer- axial configuration
D: Deutsch

(8) Design number (progressive) of the valves



The spool 5 shifts into the valve body 1 subject to the action of springs 4 and solenoids 2. Spool 5, depending from its shape and its position in the valve body, opens and/ or closes passages between P, A, B and T ports, thus controlling the direction of the hydraulic flow.



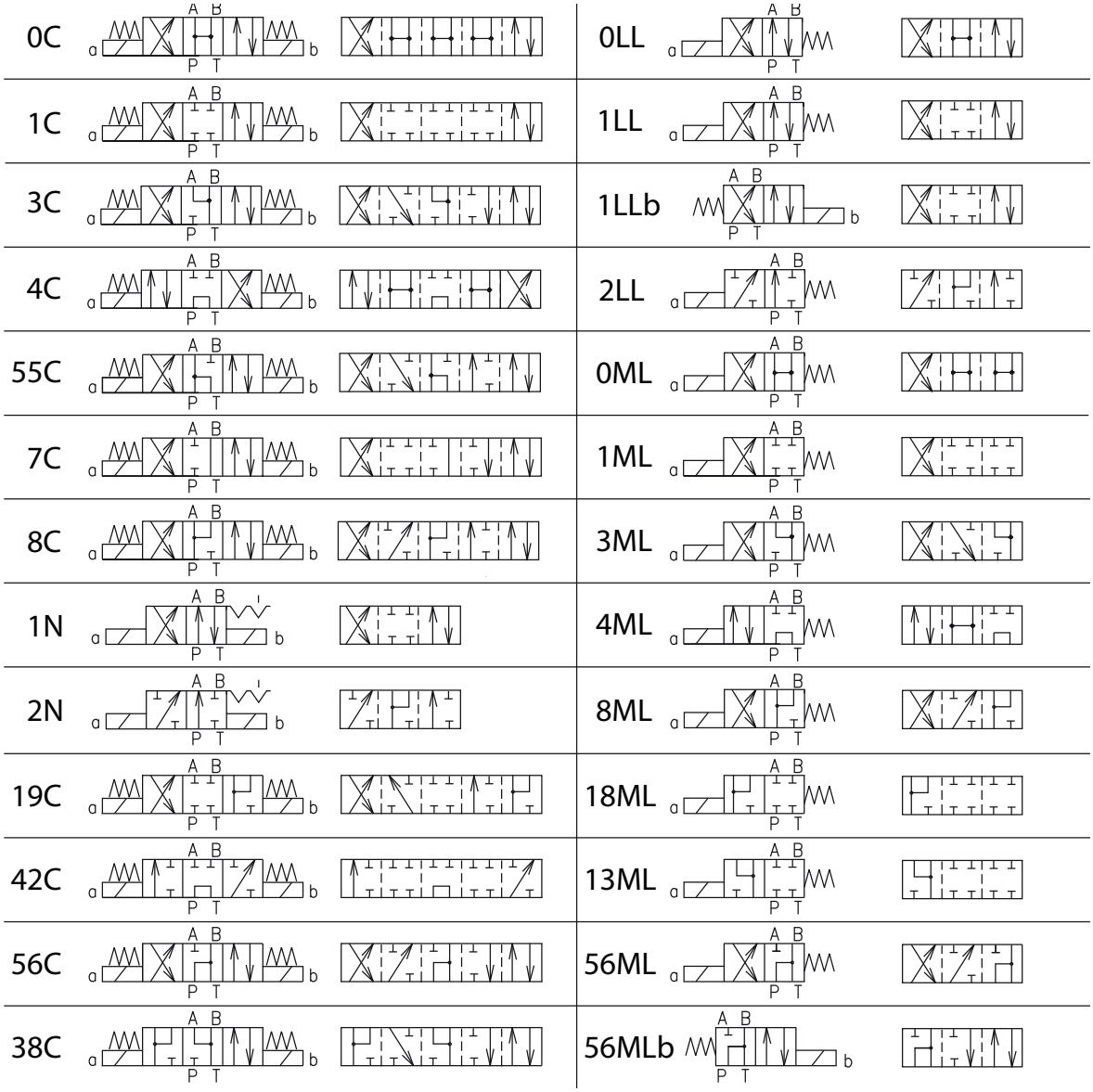
3 TECHNICAL DATA

Nominal flow	60 l/min
Maximum rec. flow rate	80 l/min
Maximum nominal pressure (P, A, B)	35 MPa (350 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 6
Mass	2,1/1,6 kg

Electric characteristics:

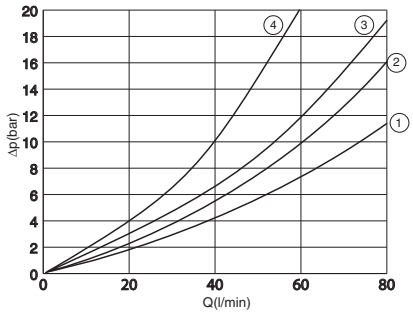
Valve type HD3-ES-* are operated by solenoid that are energized :
Directly from a D.C. voltage supply:
V 12 DC = 012 C V 24 DC = 024C
By the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply:
V 110/50 - V 115/60 = 115A
V 220/50 - V 230/60 = 230A
Other available voltages 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 = 2,4A V 115/50 = 0,26A
V 24 DC = 1,2A V 230/50 = 0,14A
Coils with 2 electric pins, conforming with AMP connectors or Deutsch connectors, are only available for DC supply (example of code: B03.012C AMPX or B03.012C D).
Permissible supply voltage variation : ± 10 %

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



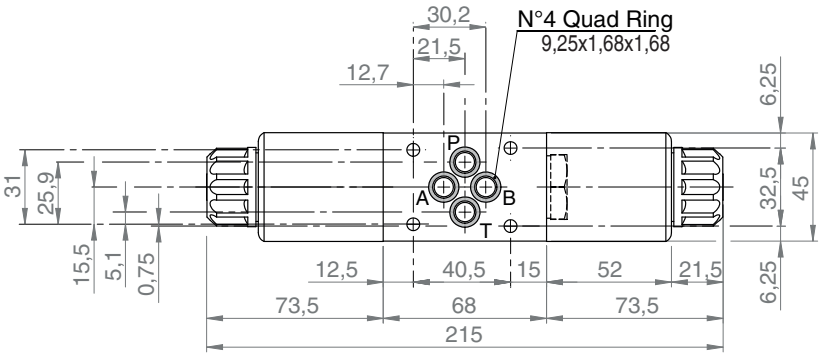
5 TYPICAL DIAGRAMS

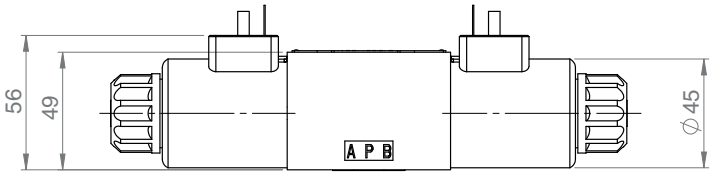
Typical Δp-Q curves for valves HD3 -ES-* in standard configuration, with mineral oil at 32 mm²/s and T=40°C

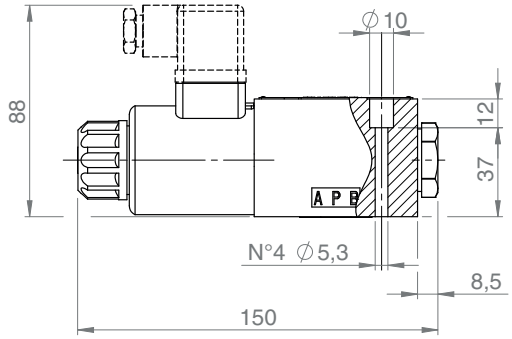


Spool	P-A	P-B	A-T	B-T	P-T
1C	1	1	2	2	
4C	3	3	4	4	1
0C	1	1	2	2	1
3C	1	1	2	2	
1LL	1	1	2	2	
1LLb	1	1	2	2	
1ML		1	2		
4ML	4		4		2
0ML		1	2		1
3ML	1		2		

6 INSTALLATION DIMENSIONS (mm)



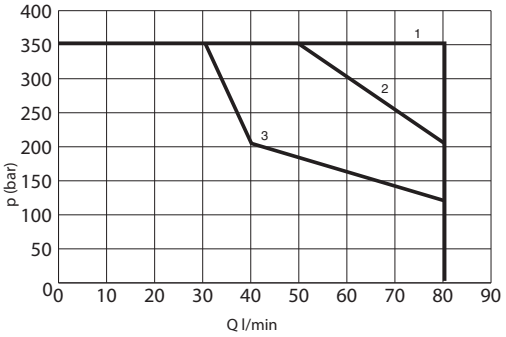




All valves HD3-* conform with ISO and CETOP specifications for mounting surface dimensions (see 9) and for valves height. When assembled to its mounting plate valve HD3-* must be fastened with 4 bolts M5x45 (or M5x** according to the number of modules) tightened at 8 Nm torque. Leakage between valve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

7 HYDRAULIC LIMIT OF USE

Δp-Q characteristics limits for safe of HD3-ES-* solenoid operated valves.
Measured at ν = 32mm²/s and T = 40°C



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

8 SOLENOID

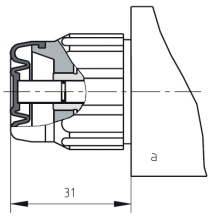
Solenoid valves can be supplied without electric coils, as HD3-ES-****-0000. Coils are supplied separately; standard, 3 electric pins, coils are : - B03.012C ; B03.024C ; B03.115A ; B03.230A Connections to the electric supply is made by standard 3-PIN connectors, according to ISO 4400 (DIN 43650). Connectors 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. (see 18)

9 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.

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



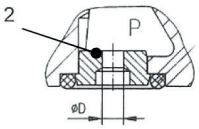
11 VERSION "3S*" ; CALIBRATED ORIFICE ON P PORT

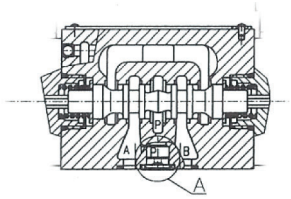
Option "3S*" is represented by an element suitably shaped to be inserted on P port of the solenoid valve, having a calibrated orifice (of various sizes) able to restrict, depending on the ΔP value, the flow rate entering the solenoid valve.

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

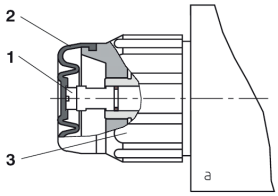
and are kept sealed on the P port of the valve by an OR of 9,25x1,78 mm sizes (example OR 110-2037)





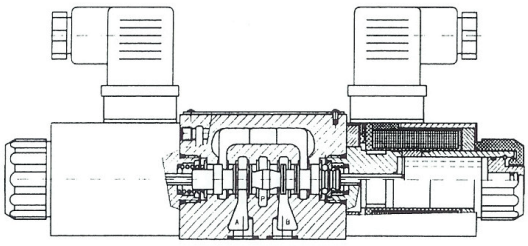
12 VERSION "T": SOFT SHIFTING

Solenoid valves with "soft shifting" devices are 2 or 3 positions valves controlled by solenoids which incorporate calibrated orifices in the armature plungers. The hydraulic controls on the shifting speed of the plunger, and therefore of the spool in the valve's body, permit progressive transitories, thus reducing or eliminating water hammer effects in the circuit. Typically the shifting time of a "T" version solenoid valve is, when energized, in the order of 300-500 ms (versus 30-50 ms of a standard valve) provided that the armature plunger properly works in the hydraulic fluid. The appropriate conditions are given by assuring a minimum counter pressure on T line and by bleeding the air from the solenoid acting on purge's valve 1, which is accessible after removing the rubber boot 2 from the solenoid retaining nut 3.



13 VERSION "N": MECHANICAL DETENT ON SPOOL

Solenoids valves with detent typically are 2 position, 2 solenoid, no-spring valves where the spool is kept at the extreme ends of its stroke by a mechanical device. This permits that solenoids are energized by short time current pulses and the spool remains at its position regardless of forces due to hydrodynamics or gravitational/ inertial effects (vibrations).



14 VERSION "Z": ANTICORROSION OPTION

On HD3-ES-* standard valves the body is phosphate coated, the solenoid tubes are not treated and coils mantel and irons are zinc trivalent plated. To increase the resistance to corrosive agents different variants are available :

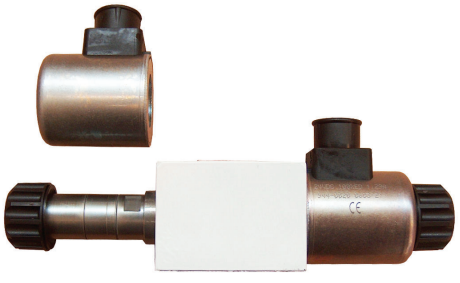
Example of ZK painted : HD3-ES-3C-ZK-024C/10

ZT: Body, solenoid tubes and coils irons are zinc trivalent plated

ZL: Body is coated with special TEMADUR 20 zinc painting
Solenoids have 8-12 µm zinc plating

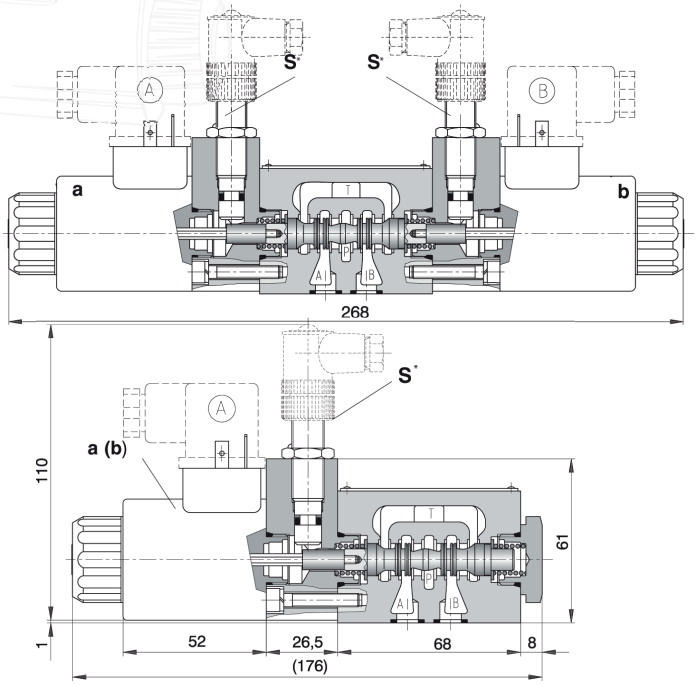
ZK: Body is coated with special TEMADUR 20 zinc painting
Solenoids tube and coils irons are "zinc-nickel" plated

ZN: Body, solenoid tubes and coils irons are Zinc Nichel coating



15 VERSION “S1 and S4”: POSITION SENSOR

Solenoid valves with spool position sensors are equipped with a proximity sensor able to transform the spool position into an electric signal. It can be used with directional control valves with one or two solenoids. It’s possible to have the two different versions, normally open and normally closed sensor. This option is mandatory in “safe” application, where an electric signal of positive valves spool (displacement) position is needed. In both S1 and S4 version each coil has one sensor applied; this means that with bistable valves sensors are applied on both sides. For different versions ask our sales department.

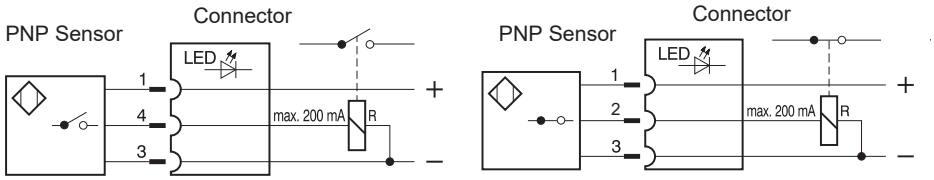


Technical data of the Sensor	
Supply Voltage	24 V DC
Supply voltage range	10..30 V DC
Rated current	200 mA
Protection	IP67
Max. operating Pressure	210 bar (standard)
Indication	yellow led

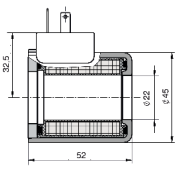
16 POSITION SENSOR TYPE

S1 Circuit diagram of the normally - OPEN sensor

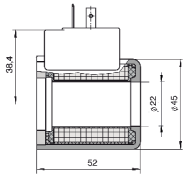
S4 Circuit diagram of the normally - CLOSED sensor



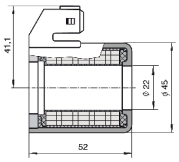
17 SOLENOID COILS types B03 *see CAP 12 pag 0011*



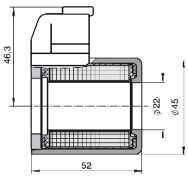
ISO 4400 (DIN 43650)
(standard configuration)
B03-0xxC



115A/230A = ISO 4400 (DIN 43650)
with integrated rectifier
B03-xxxA



AMPX = Amp Junior Timerwith
axial configuration
B03-0xxCAMPX

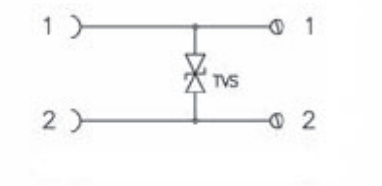


D = Deutsch

B03-0xxD

18 QUENCHING DIODE

On request, DC 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

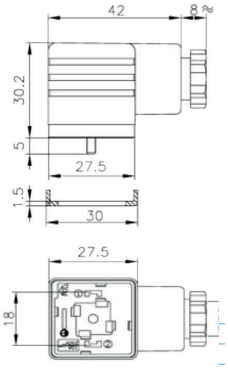


19 CONNECTORS FOR ISO 4400 (DIN 43650) series KA132

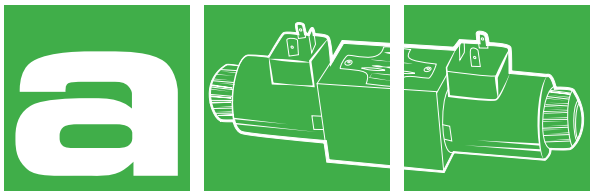
Connectors are available for coils with ISO 4400 (DIN 43650) connection. Most common configuration are: Standard, simple, 3 pin connectors:



KA132000B9 = black with PG9
KA132000B1 = black with PG11
KA132000A1 = grey with PG11
KA132L34T9 = transparent with led indication
KA132T54T9 = transparent with led indication and diode transil for protection against overvoltages



For more details and models see aidro table KA-132



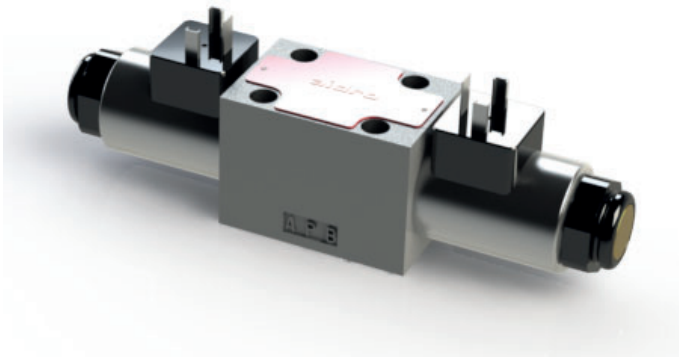
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED

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 qulaity 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

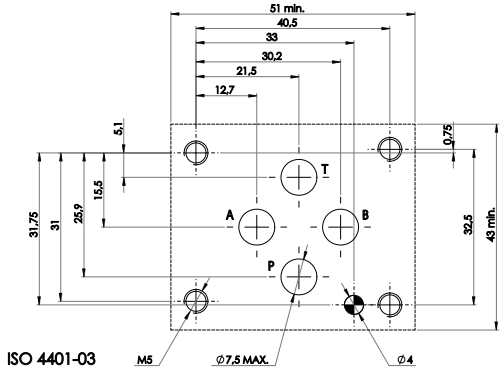
(3) Spool type (see 4):
-number is the main spool type
-letter is the solenoid or spring arrangement:
C : 2 solenoids, spool is spring centered (3 position)
LL : 1 solenoid, spool is spring offset (2 position)
ML : 1 solenoid, spool is spring centered (2 position)

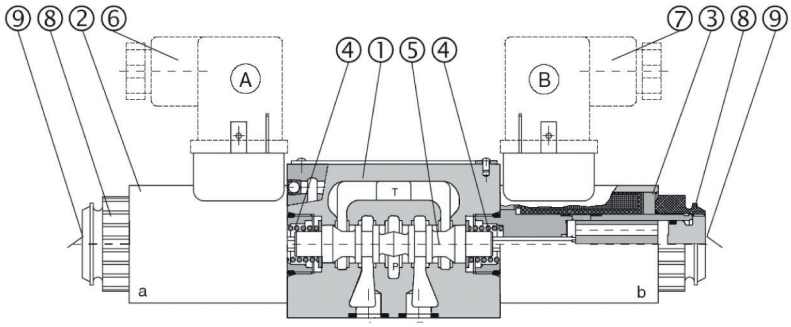
(4) Code reserved for option and variants:
S-**: calibrated orifice on P port, see 11
K : Water proof caps on emergency pin, see 10

(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 actiong 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.

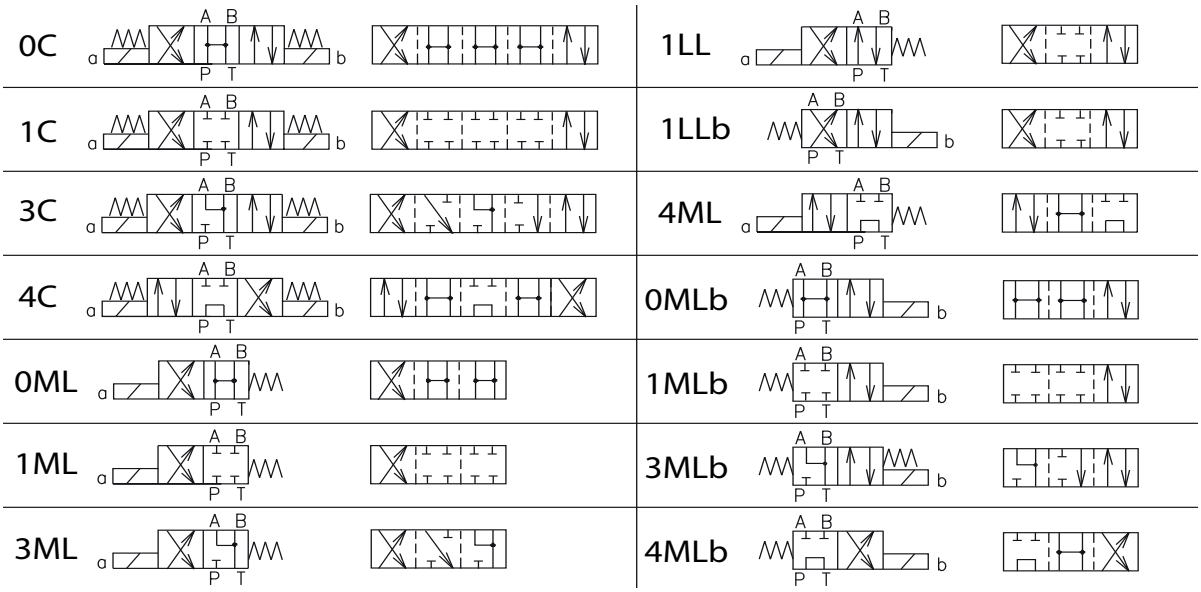
3 TECHNICAL DATA

Nominal flow	50 l/min
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

Electric characteristics:

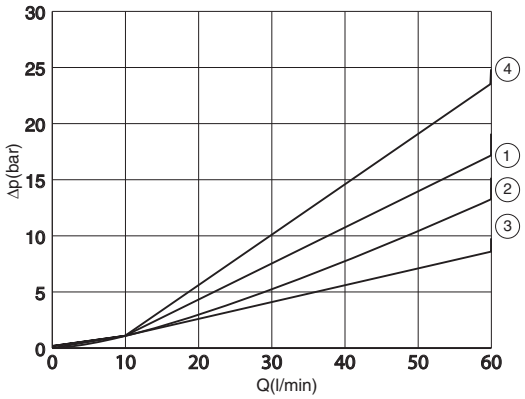
Valve type HD3-ES-* are operated by solenoid that are energized :
Directly from a D.C. voltage supply:
V 12 DC = 012C V 24 DC = 024C
By the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply:
V 110/50 - V 115/60 = 115A
V 220/50 - V 230/60 = 230A
Other available voltages 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 %

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



5 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves HD3-ES-* in standard configuration, with mineral oil at ν=32 mm²/s and T=40°C



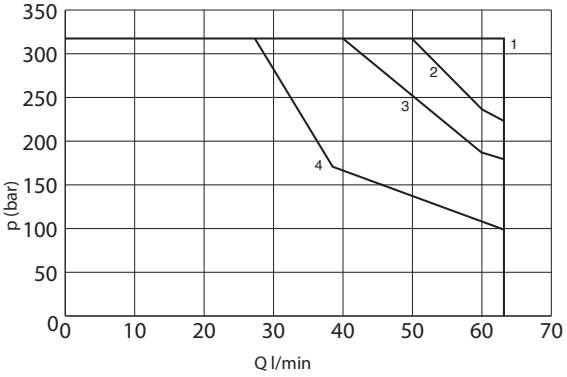
Spool	P-A	P-B	A-T	B-T	P-T
1C	2	2	2	2	
4C	4	4	4	4	2
0C	2	2	3	3	2
3C	2	2	3	3	
1LL	3	3	4	4	
1LLb	3	3	4	4	
1ML		2	2		
4ML	4		4		2
0ML	2		3		2
3ML	2		2		

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.

7 HYDRAULIC LIMIT OF USE

Δp-Q characteristics limits for safe use of HD3-ES-* solenoid operated valves. Measured at ν = 32mm²/s and T= 40°C

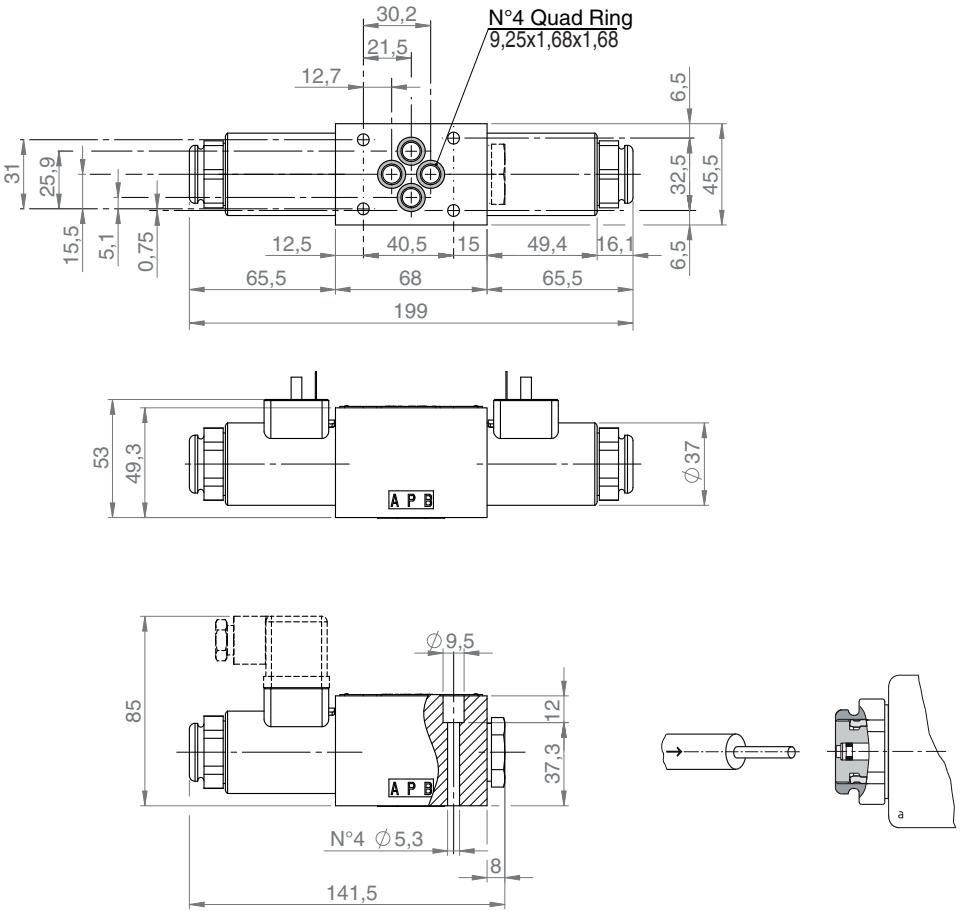


1C	1
4C	5
0C	1
3C	2
1LL	3
3ML	2
4ML	5
1ML	1
0ML	1
1MLb	1
1LLb	1
4MLb	5
0MLb	1
3MLb	2

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.

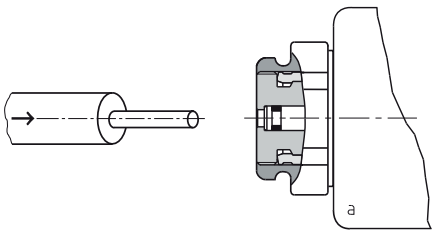
9 INSTALLATION DIMENSIONS (mm)



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

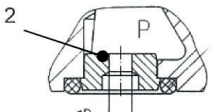


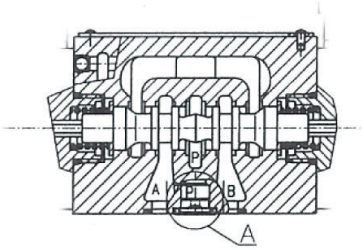
11 VERSION "S*" ; CALIBRATED ORIFICE ON P PORT

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 ΔP value, the flow rate entering the solenoid valve. Those elements have the following orifice diameters :

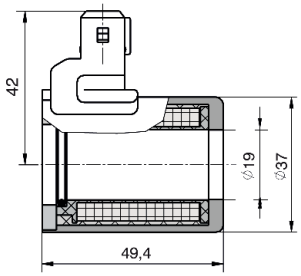
- 3S-00 -> D = 0 mm
- 3S-10 -> D = 1,0 mm
- 3S-15 -> D = 1,5 mm
- 3S-20 -> D = 2,0 mm
- 3S-25 -> D = 2,5 mm

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

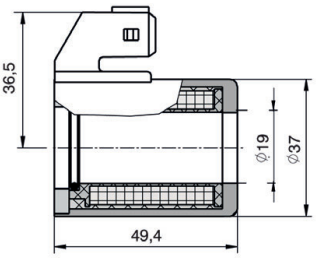




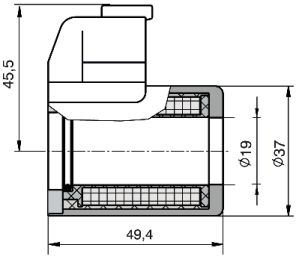
12 SPECIAL COIL CONNECTIONS



AMP =Amp Junior Timer
vertical configuration

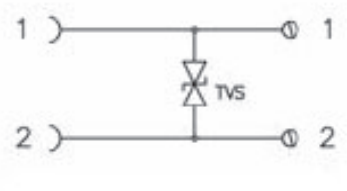


AMPX =Amp Junior Timer
axial configuration



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

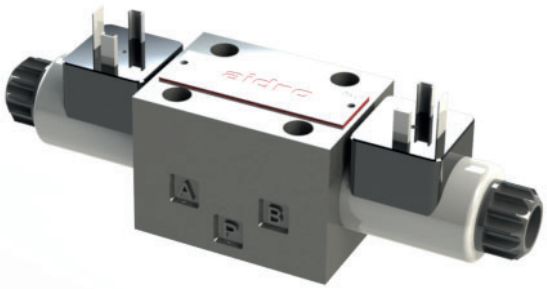
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED

HD33-EF-*

40 l/min - 25 MPa (250 bar)

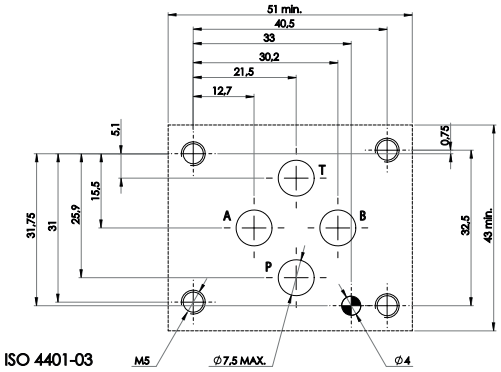
1 DESCRIPTION

Valves HD33-EF are directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03).
The design of the body is a three chamber casting for production cost saving and low pressure drops. HD33-EF has a low power consumption (18 W) and a coMPact design.
The valve is available with interchangeable metallic DC solenoids, also for AC power supply using connectors with a built-in rectifier bridge.
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)
HD33	-	EF	-		-		-			/	10



(1) HD33: 4-way directional control valve CETOP 03

(2) Electrically controlled

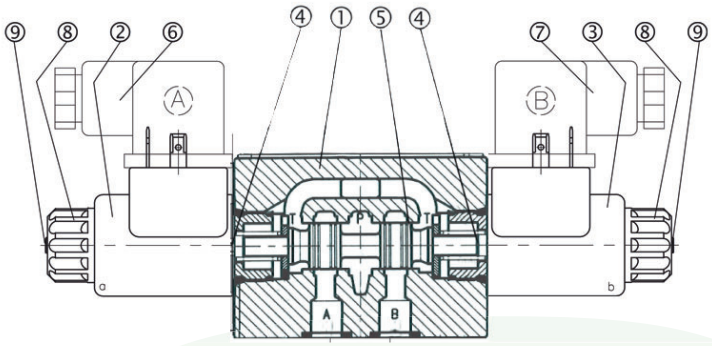
(3) Spool type (see 4):
-number is the main spool type
-letter is the solenoid or spring arrangement:
C : 2 solenoids, spool is spring centered (3 position)
LL : 1 solenoid, spool is spring offset (2 position)
ML : 1 solenoid, spool is spring centered (2 position)

(4) Code reserved for option and variants

(5) Electric voltage and solenoid coils: see 6
0000: no coils
012C: coils for V12DC
024C: coils for V24DC

(6) Coil connection
no designation: DIN 43650-A ISO 4400
AMPX: Amp Junior Timer

(7) Design number (progressive) of the valves

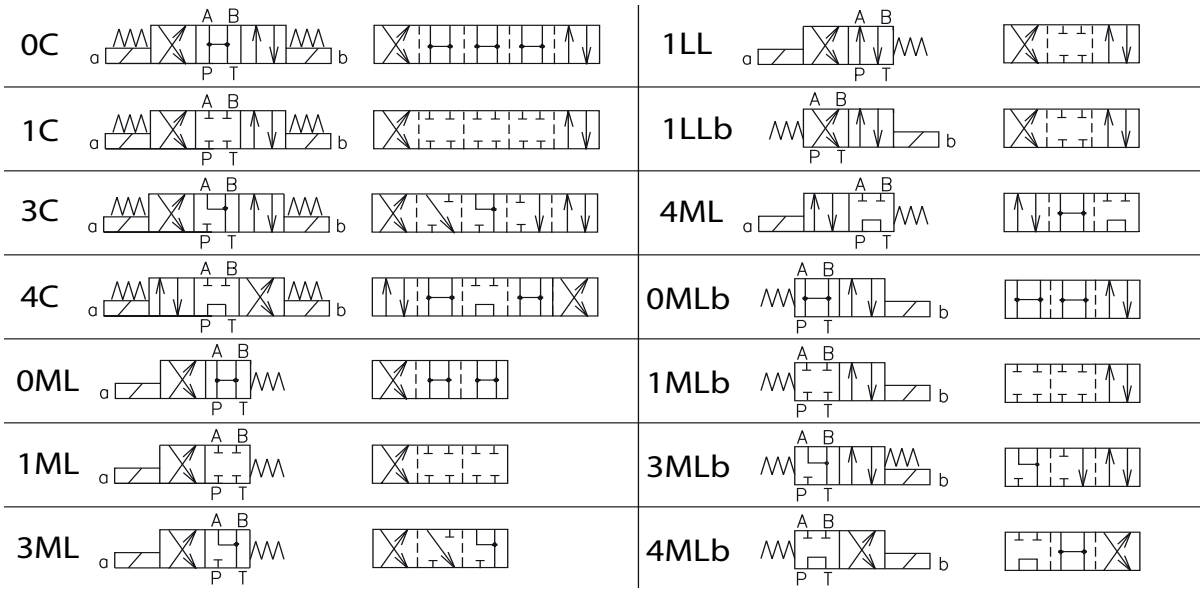


The spool 5 shifts into the valve body 1 subject to the actiong springs 4 and solenoids 9. Spool 5 depending from its shape and its position in the valve body 1, opens and/or closes passages between P,A,B and T ports, thus controlling the direction of the hydraulic flow.

3 TECHNICAL DATA

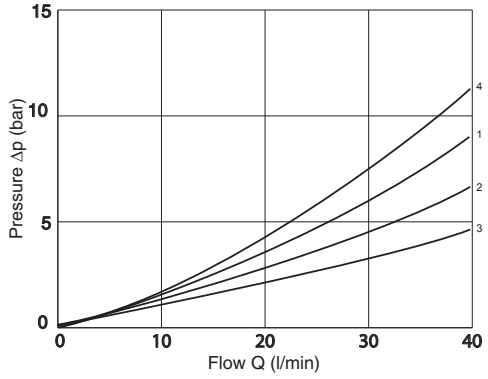
Nominal flow	25 l/min	Electric characteristics:
Maximum rec. flow rate	40 l/min	Valve type HD33-EF-* are operated by solenoid that are energized : directly from a D.C. voltage supply V 12 DC = 012C V 24 DC = 024C 3 pin connectors must conform to ISO 4400 (DIN 43650) Permissible supply voltage variation : ± 10 %
Maximum nominal pressure (P, A, B)	25 MPa (250 bar)	
Maximum pressure at T port	16 MPa (160 bar)	
Pressure drops	see ☐	
Protection to DIN 40050	IP 65	
Duty cycle	100%	
Installation and dimensions	see 9	
Mass	1,25/1,10 kg	

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

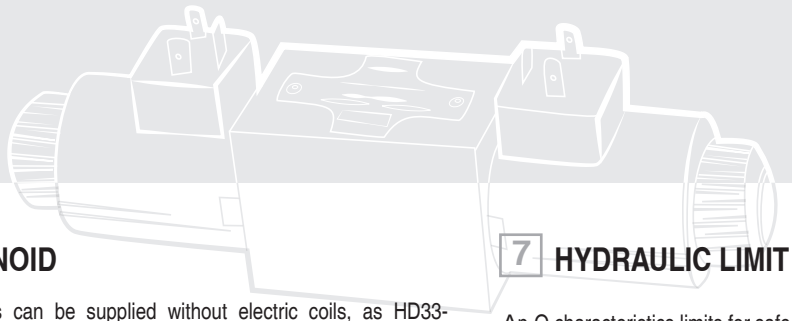


5 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves HD33 -EF-* in standard configuration, with mineral oil at ν=32 mm²/s and T=40°C



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

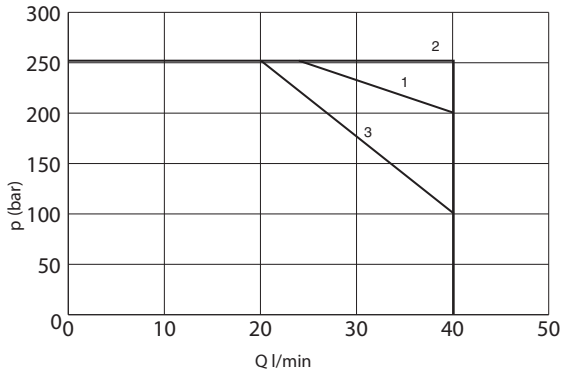


6 SOLENOID

Solenoid valves can be supplied without electric coils, as HD33-EF-****-0000. Coils are supplied separately; standard, 3 electric pins, coils are : - B01-012C - B01-024C. 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.

7 HYDRAULIC LIMIT OF USE

Δp-Q characteristics limits for safe use of HD33-EF-* solenoid operated valves. Measured at ν = 32mm²/s and T = 40°C

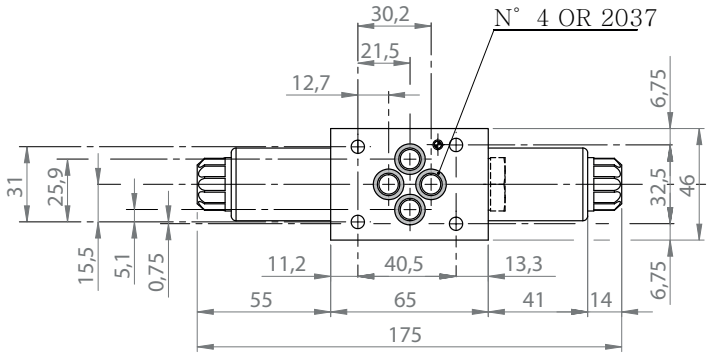


1C	2
4C	3
0C	1
3C	3
1LL	1
3ML	3
4ML	3
1ML	2
0ML	1
1MLb	2
1LLb	1
4MLb	3
0MLb	1
3MLb	3

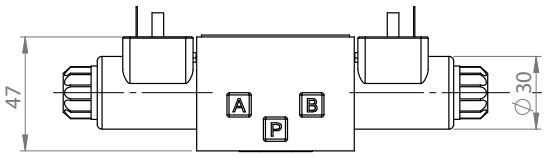
8 HYDRAULIC FLUID

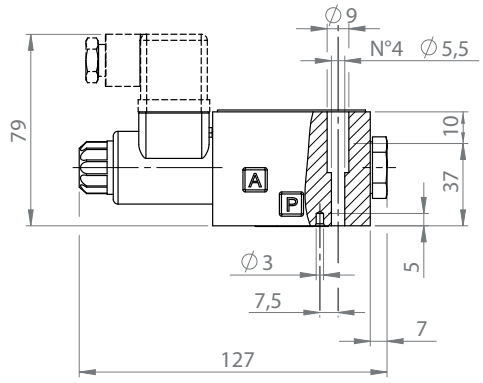
Seals and materials used on standard valves HD3-* are fully coMPatible with hydraulics fluids of mineral base, upgraded with antifoaming and anti oxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from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

9 INSTALLATION DIMENSIONS (mm)



All valves HD33-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height. When assembled to its mounting plate valve HD33-* 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 O Ring type 9,25x1,78

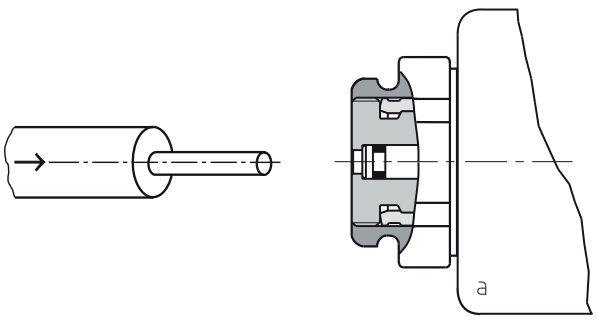


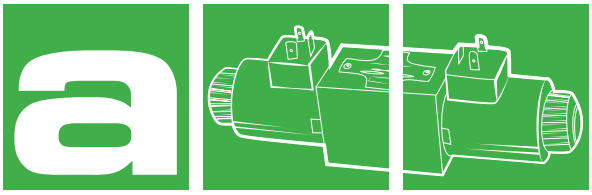


10 MANUAL OVERRIDE

In case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins, located at the end of the solenoids and accessible through the retaining nuts.

Standard model of the manual override





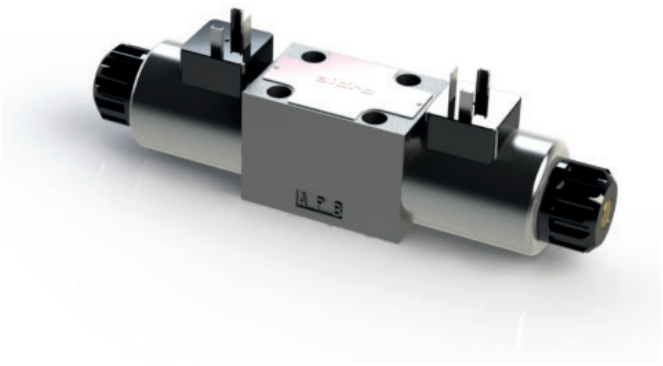
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED

HD33-ES

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Valves HD33-ES are directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03).
The design of the body is a 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)
HD33	-	ES	-		-		-			/	10

(1) HD33: 4-way directional control valve CETOP 03

(2) ES: Electrically controlled

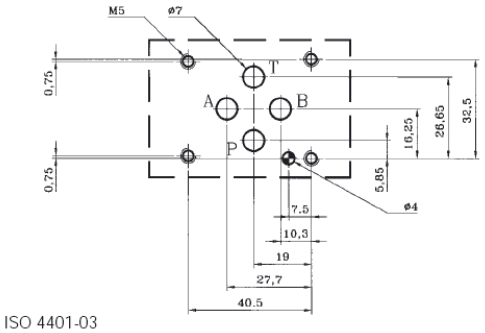
(3) Spool type (see 4):
-number is the main spool type
-letter is the solenoid or spring arrangement:
C : 2 solenoids, spool is spring centered (3 position)
LL : 1 solenoid, spool is spring offset (2 position)
ML : 1 solenoid, spool is spring centered (2 position)

(4) Code reserved for option and variants:
S-**: calibrated orifice on P port, see 11
K : water proof caps on emergency pin, see 10

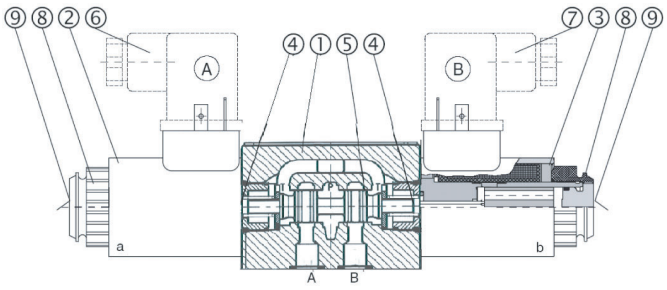
(5) Electric voltage and solenoid coils: see 8
0000: no coils
012C: coils for V12DC
024C: coils for V24DC
024A: coils for V24/50AC
115A: coils for V110/50- V 115/60AC
230A: coils for V220/50- V 230/60AC

(6) Coil connection (see 16):
no designation: DIN 43650-A ISO 4400
AMP: Amp Junior Timer- vertical configuration
AMPX: Amp Junior Timer- axial configuration
D: Deutsch

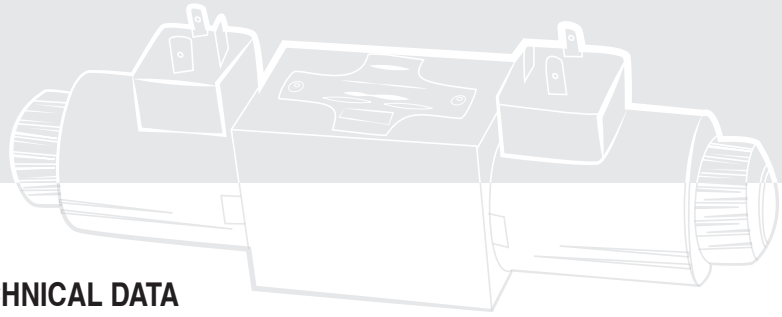
(7) Design number (progressive) of the valves



ISO 4401-03



The spool 5 shifts into the valve body 1 subject to the action of springs 4 and solenoids 2. Spool 5, depending from its shape and its position in the valve body, opens and/ or closes passages between P, A, B and T ports, thus controlling the direction of the hydraulic flow.



aidro
Desktop Metal Company

3 TECHNICAL DATA

Nominal flow	50 l/min
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 ELECTRIC CHARACTERISTICS

Valve type HD33-ES-* are operated by solenoid that are energized :

• directly from a D.C. voltage supply:
V 12 DC = 012C
V 24 DC = 024C

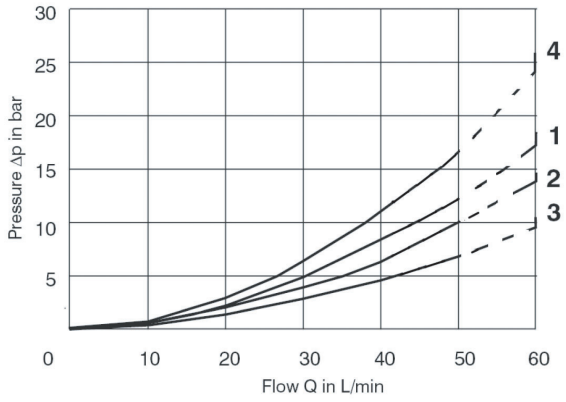
• by the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply :
V 110/50 - V 115/60 = 115A
V 220/50 - V 230/60 = 230A

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 %

5 TYPICAL DIAGRAMS

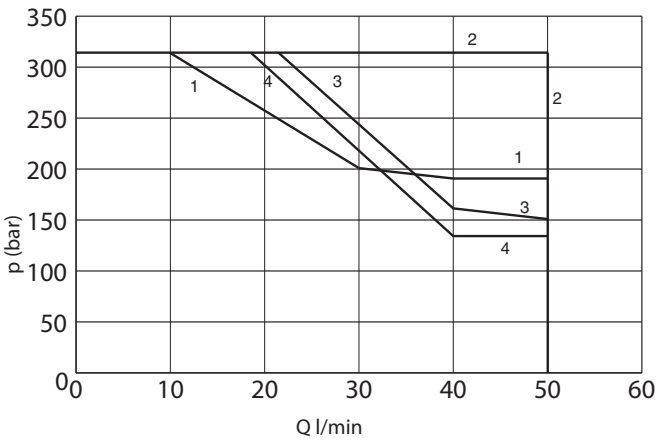
Typical Δp-Q curves for valves HD33-ES-* in standard configuration, with mineral oil at ν=32 mm2/s and at T=40°C.



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

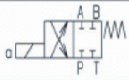
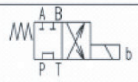
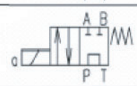
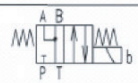
6 HYDRAULIC LIMIT OF USE

Δp-Q characteristics limits for safe use of HD33-ES-* solenoid operated valves. Measured at ν = 32mm²/s and T = 40°C



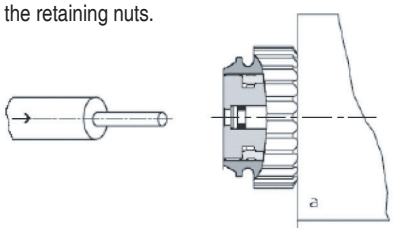
1C	2	1ML	2
4C	4	0ML	3
0C	3	1MLb	2
3C	1	1LLb	2
1LL	2	4MLb	4
3ML	1	0MLb	3
4ML	4	3MLb	1

7 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

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

8 MANUAL OVERRIDE

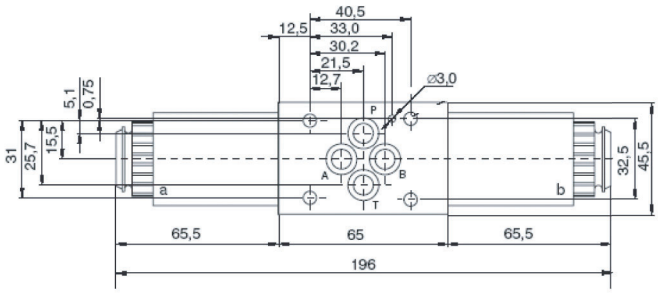
In case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins, located at the end of the solenoids and accessible through the retaining nuts.

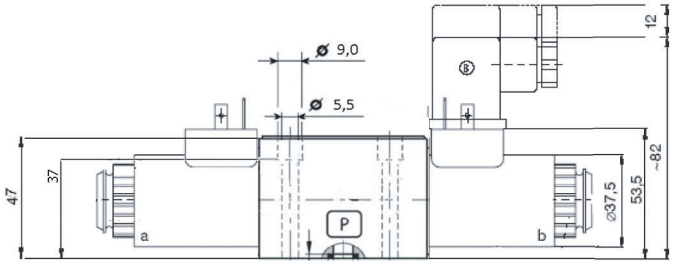


9 HYDRAULIC FLUID

Seals and materials used on standard valves HD33-* 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.

10 INSTALLATION DIMENSIONS

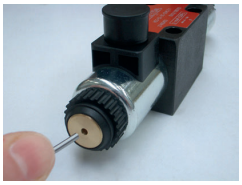




All valves HD33-* conform with ISO and CETOP specifications for mounting surface dimensions (see 9) and for valves height. When assembled to its mounting plate valve HD33-* must be fastened with 4 bolts M5x30 (or M5x** according to the number of modules) tightened at 8 Nm torque. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of O Ring type 9,25x1,78.

11 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.



standard manual override





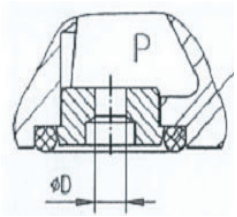
Version “K” Override pin

12 VERSION “S*” ; CALIBRATED ORIFICE ON P PORT

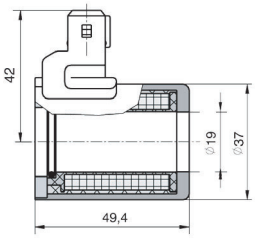
Option “S*” is represented by an element suitably shaped to be inserted on P port of the solenoid valve, having a calibrated orifice (of various sizes) able to restrict, depending on the ΔP value, the flow rate entering the solenoid valve. Those elements have the following orifice diameters :

- 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

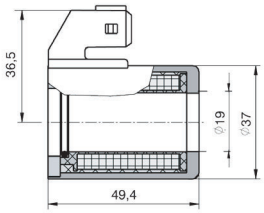
and are kept sealed on the P port of the valve by an OR of 9,25x1,78 mm sizes (example OR 110-2037)



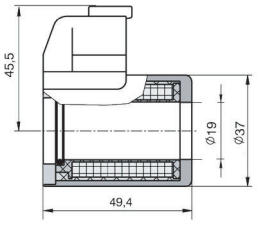
13 SPECIAL COIL CONNECTIONS



AMP =Amp Junior Timer
vertical configuration



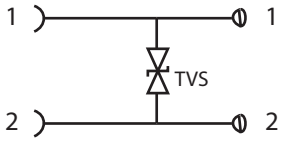
AMPX = Amp Junior Timer
axial configuration

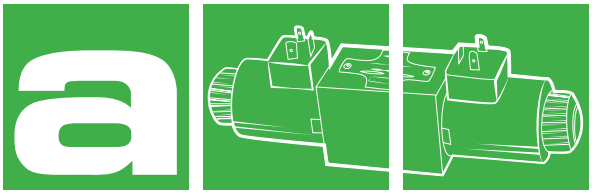


D = Deutsch

14 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.





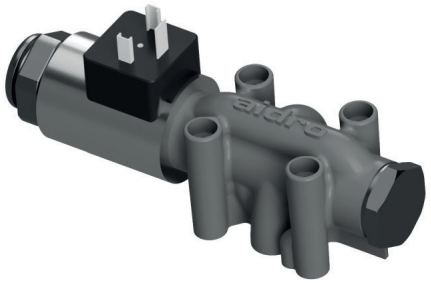
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED POPPET TYPE

HD3-EST

40 l/min - 35 MPa (350 bar)

1 DESCRIPTION

Valves HD3-EST are directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03).
The design of the body is optimized for a better flow path and pressure drops. Thanks to additive manufacturing it is possible to produce an ultralight valve with high performances. The valve is available with interchangeable metallic DC solenoids, also for AC power supply using a built-in rectifier bridge inside the coil.
The valve housing could be produced in AlSi10Mg aluminum alloy or in AISI316L stainless steel.



2 ORDERING CODE

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

(1) HD3: directional control valve CETOP 03

(2) EST: Electrically controlled poppet type for zero leackage applications

(3) Spool type (see 6):

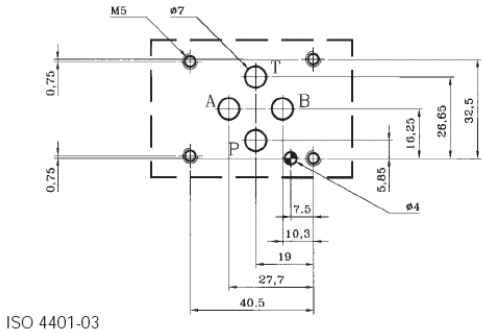
-letter is the solenoid or spring arrangement:
C : Normally closed
O : Normally open

(4) Code reserved for option and variants:
ALU : Aluminum alloy body
316L: stainless steel 316L body
K : water proof caps on emergency pin, see 10

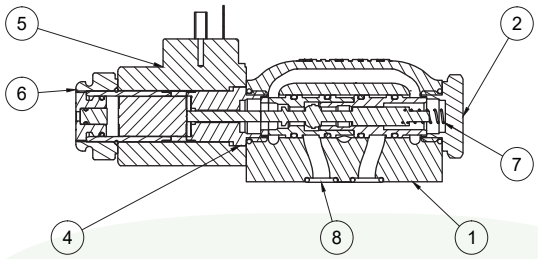
(5) Electric voltage and solenoid coils: see 4 11
0000: no coils
012C: coils for V12DC
024C: coils for V24DC
115A: coils for V110/50- V 115/60AC
230A: coils for V220/50- V 230/60AC

(6) Coil connection (see 11):
no designation: DIN 43650-A ISO 4400
AMPX: Amp Junior Timer- axial configuration
D: Deutsch

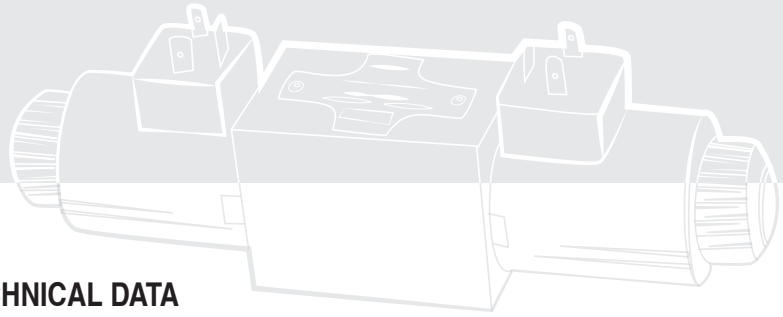
(7) Design number (progressive) of the valves



ISO 4401-03



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



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3 TECHNICAL DATA

Nominal flow	32 l/min
Maximum rec. flow rate	40 l/min
Maximum nominal pressure (P, A, B)	35 MPa (350 bar) - 25 MPa for Aluminum body
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	1,1 Steel/ 0,8 Alu (kg)

4 ELECTRIC CHARACTERISTICS

Valve type HD3-EST-* are operated by solenoid that are energized :

• directly from a D.C. voltage supply:
V 12 DC = 012C
V 24 DC = 024C

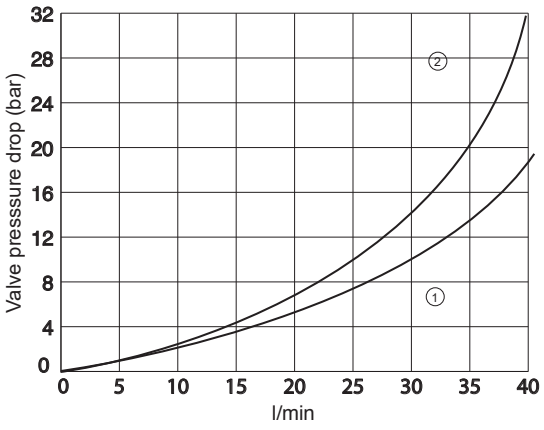
• by the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply :
V 110/50 - V 115/60 = 115A
V 220/50 - V 230/60 = 230A

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

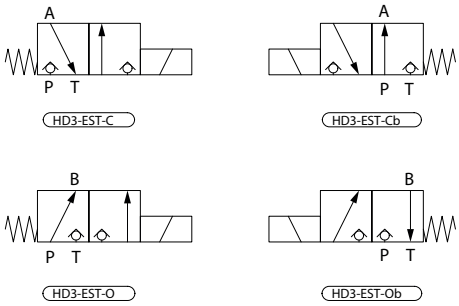
Coils with 2 electric pins, conforming with AMP connectors, are only available for DC supply (example of code: B02-012C AMP). Permissible supply voltage variation : ± 10 %

5 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves HD3-EST-* in standard configuration, with mineral oil at ν=32 mm2/s and at T=40°C.

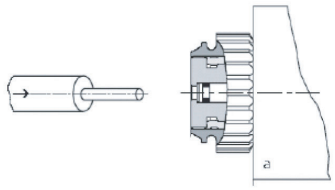


6 SPOOL IDENTIFICATION



7 MANUAL OVERRIDE

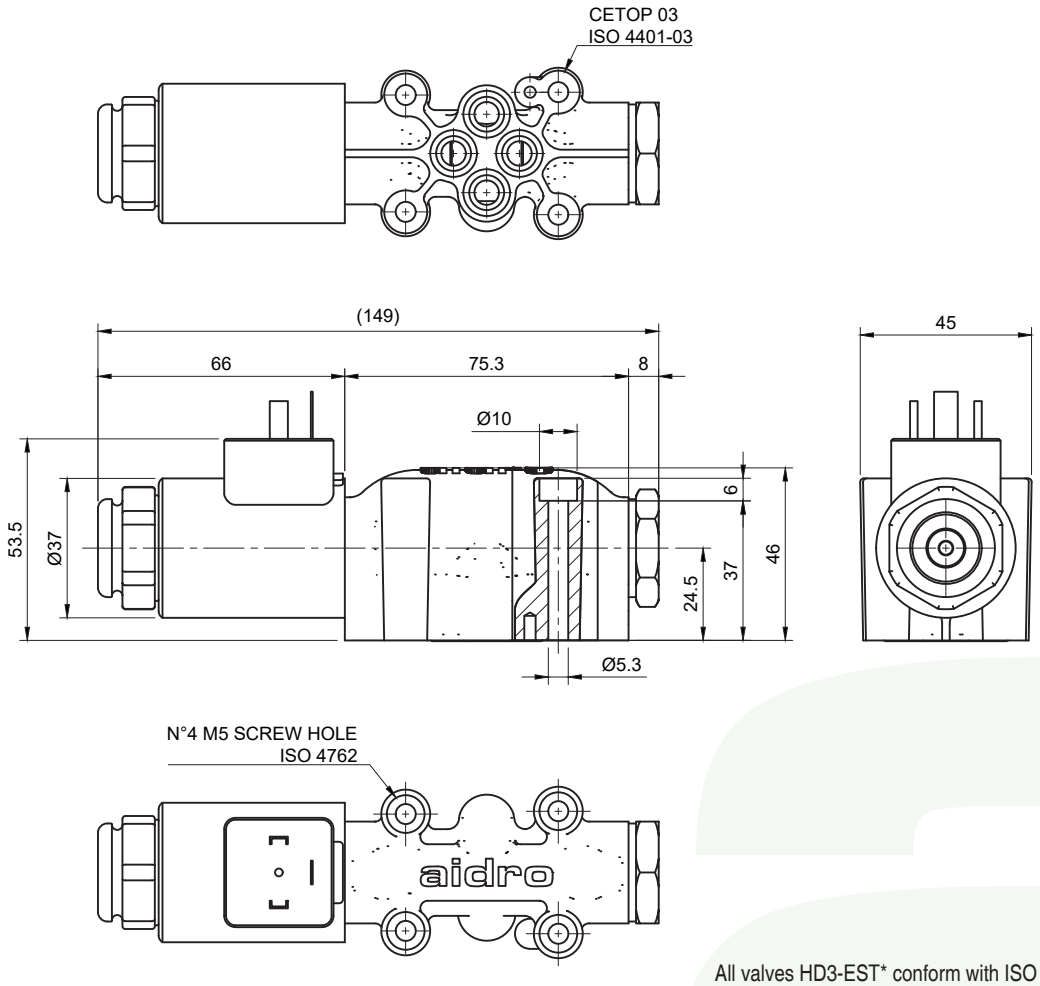
In case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins, located at the end of the solenoids and accessible through the retaining nuts.



8 HYDRAULIC FLUID

Seals and materials used on standard valves HD3-EST 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.

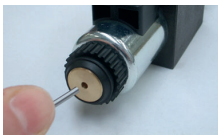
9 INSTALLATION DIMENSIONS



All valves HD3-EST* conform with ISO and CETOP specifications for mounting surface dimensions (see 10) 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 O Ring type 9,25x1,78.

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.



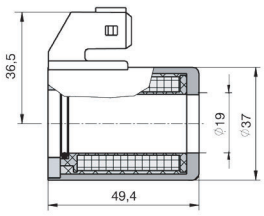
standard manual override



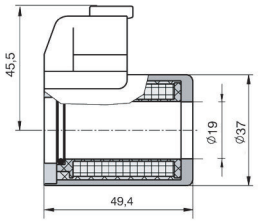


Version “K” Override pin

11 SPECIAL COIL CONNECTIONS



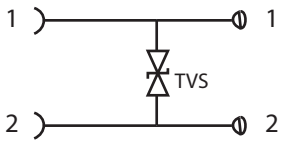
AMPX = Amp Junior Timer
axial configuration

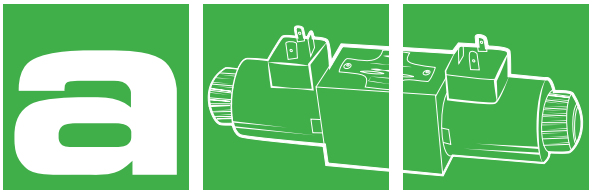


D = Deutsch

12 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.





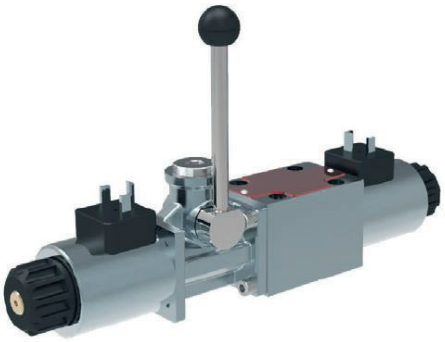
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED

HD3-EL-*/10

80 l/min - 35 MPa (350 bar)

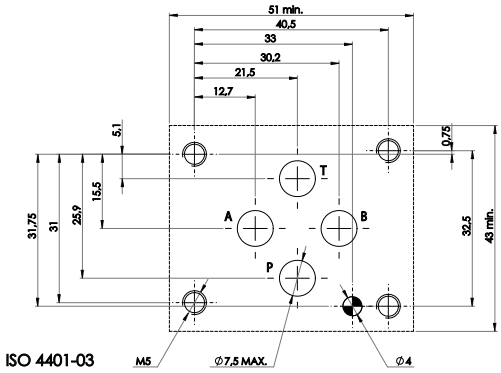
1 DESCRIPTION

Valves HD3-EL are directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03).
The design of the body is a 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). HD3-EL are equipped with an additional lever for manual operations.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)	(6)		(7)
HD3	-	EL	-		-		-			/	10



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

(2) EL: Electrically controlled with additional manual control
-no designation: lever mounted on A side (standard)
-b: lever mounted on B side

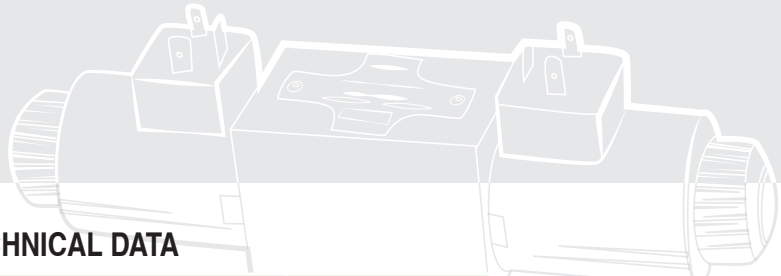
(3) Spool type (see 4):
-number is the main spool type
-letter is the solenoid or spring arrangement:
C : 2 solenoids, spool is spring centered (3 position)
LL : 1 solenoid, spool is spring offset (2 position)
ML : 1 solenoid, spool is spring centered (2 position)

(4) Code reserved for option and variants:
S-**: calibrated orifice on P port, see 10
T : soft shifting device, see 11
Z* : anti corrosion coating (variants), see 13

(5) Electric voltage and solenoid coils: see 8
0000: no coils
012C: coils for V12DC
024C: coils for V24DC
048C: coils for V48DC
024A: coils for V24/50AC
115A: coils for V110/50- V 115/60AC
230A: coils for V220/50- V 230/60AC

(6) Coil connection (see 16):
no designation: DIN 43650-A ISO 4400
AMP: Amp Junior Timer- vertical configuration
AMPX: Amp Junior Timer- axial configuration
D: Deutsch

(7) Design number (progressive) of the valves



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3 TECHNICAL DATA

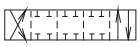
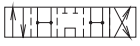
Nominal flow	60 l/min
Maximum rec. flow rate	80 l/min
Maximum nominal pressure (P, A, B)	35 MPa (350 bar)
Maximum pressure at T port	21 MPa (210 bar)
Pressure drops	see 5
Protection to DIN 40050	IP 65
Duty cycle	100%
Installation and dimensions	see 6
Mass	2,1/1,6 kg

Lever characteristics		
Total stroke angle	deg	±20
Working stroke angle		±12 to 20
Operating force	40 N	
Lever device mass	0.59 kg	

Electric characteristics:

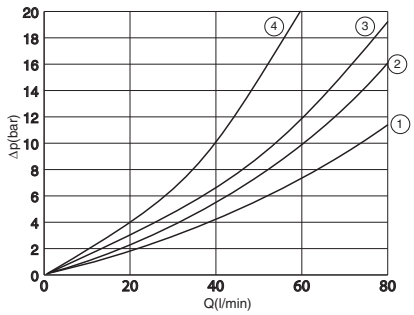
Valve type HD3-EL-* are operated by solenoid that are energized :
Directly from a D.C. voltage supply:
V 12 DC = 012 C V 24 DC = 024C
By the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply:
V 110/50 - V 115/60 = 115A
V 220/50 - V 230/60 = 230A
Other available voltages 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 = 2,4A V 115/50 = 0,26A
V 24 DC = 1,2A V 230/50 = 0,14A
Coils with 2 electric pins, conforming with AMP connectors or Deutsch connectors, are only available for DC supply (example of code: B03.012C AMPX or B03.012C D).
Permissible supply voltage variation : ± 10 %

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

1C			1LL		
4C			0ML		
0C					
3C					

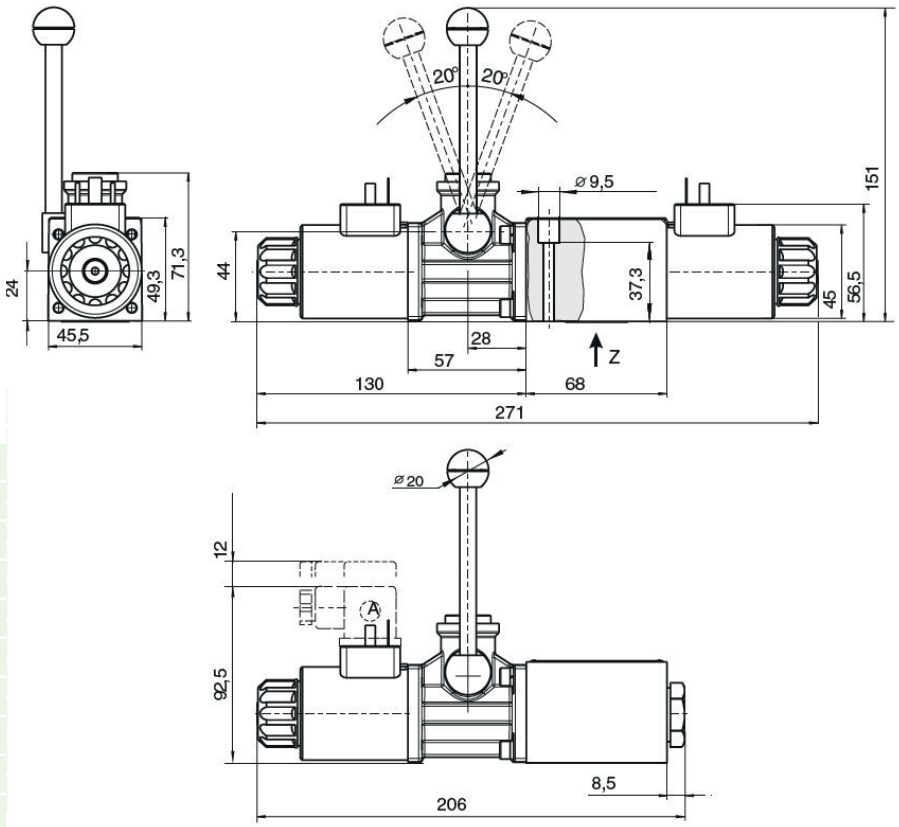
5 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves HD3 -EL-* in standard configuration, with mineral oil at 32 mm²/s and T=40°C



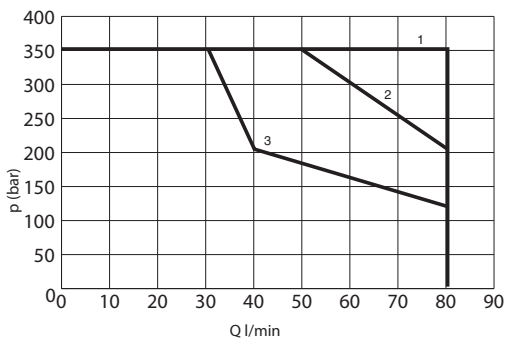
Spool	P-A	P-B	A-T	B-T	P-T
1C	1	1	2	2	
4C	3	3	4	4	1
0C	1	1	2	2	1
3C	1	1	2	2	
1LL	1	1	2	2	
1LLb	1	1	2	2	
1ML		1	2		
4ML	4		4		2
0ML		1	2		1
3ML	1		2		

6 INSTALLATION DIMENSIONS (mm)



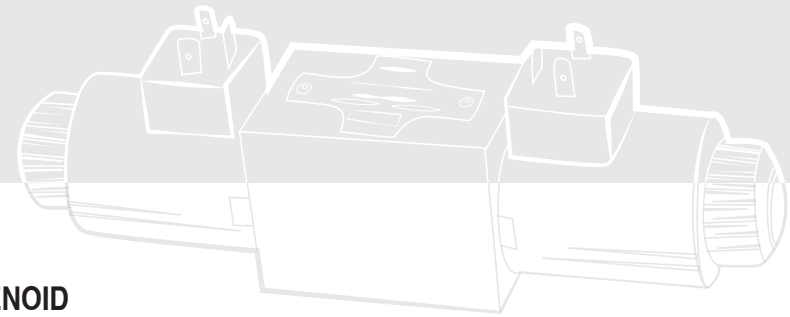
7 HYDRAULIC LIMIT OF USE

Δp-Q characteristics limits for safe of HD3-EL-* solenoid operated valves.
Measured at ν = 32mm²/s and T = 40°C



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

All valves HD3-* conform with ISO and CETOP specifications for mounting surface dimensions (see 9) 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 8,9 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.



8 SOLENOID

Solenoid valves can be supplied without electric coils, as HD3-EL-****-0000. Coils are supplied separately; standard, 3 electric pins, coils are : - B03.012C ; B03.024C ; B03.115A ; B03.230A 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. (see 17)

9 HYDRAULIC FLUID

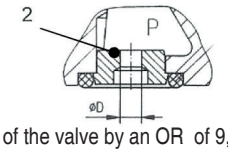
Seals and materials used on standard valves HD3-* are fully coMPatible with hydraulics fluids of mineral base, upgraded with antifoaming and anti oxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from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

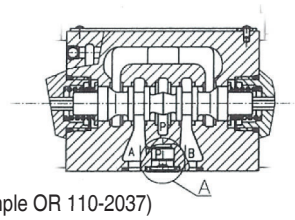
10 VERSION "S*" ; CALIBRATED ORIFICE ON P PORT

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 ΔP 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

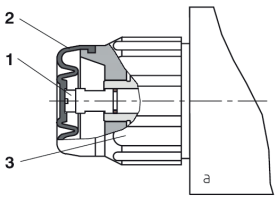




and are kept sealed on the P port of the valve by an OR of 9,25x1,78 mm sizes (example OR 110-2037)

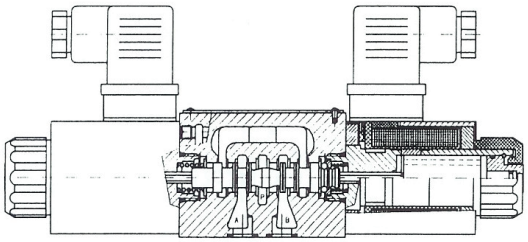
11 VERSION "T": SOFT SHIFTING

Solenoid valves with "soft shifting" devices are 2 or 3 positions valves controlled by solenoids which incorporate calibrated orifices in the armature plungers. The hydraulic controls on the shifting speed of the plunger, and therefore of the spool in the valve's body, permit progressive transitories, thus reducing or eliminating water hammer effects in the circuit. Typically the shifting time of a "T" version solenoid valve is, when energized, in the order of 300-500 ms (versus 30-50 ms of a standard valve) provided that the armature plunger properly works in the hydraulic fluid. The appropriate conditions are given by assuring a minimum counter pressure on T line and by bleeding the air from the solenoid acting on purge's valve 1, which is accessible after removing the rubber boot 2 from the solenoid retaining nut 3.



12 VERSION “N”: MECHANICAL DETENT ON SPOOL

Solenoids valves with detent typically are 2 position, 2 solenoid, no-spring valves where the spool is kept at the extreme ends of its stroke by a mechanical device. This permits that solenoids are energized by short time current pulses and the spool remains at its position regardless of forces due to hydrodynamics or gravitational/ inertial effects (vibrations).

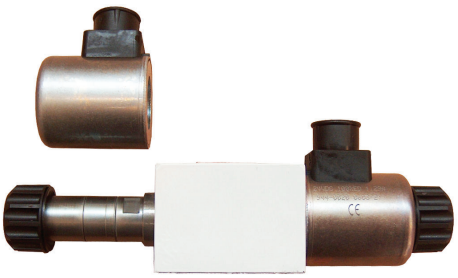


13 VERSION “Z”: ANTICORROSION OPTION

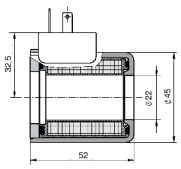
On HD3-EL-* standard valves the body is phosphate coated, the solenoid tubes are not treated and coils mantel and irons are zinc trivalent plated.

To increase the resistance to corrosive agents different variants are available :

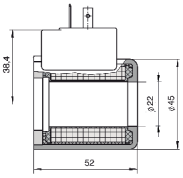
Example of ZK painted : HD3-EL-3C-ZK-024C/10
ZT: Body, solenoid tubes and coils irons are zinc trivalent plated
ZL: Body is coated with special TEMADUR 20 zinc painting
Solenoids have 8-12 µm zinc plating
ZK: Body is coated with special TEMADUR 20 zinc painting
Solenoids tube and coils irons are “zinc-nickel” plated
ZN: Zinc-nickel plating (720 h)



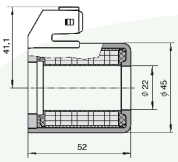
14 SOLENOID COILS types B03 (see BO* coils datasheet)



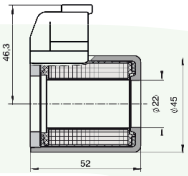
ISO 4400 (DIN 43650)
(standard configuration)
B03-0xxC



115A/230A = ISO 4400 (DIN 43650)
with integrated rectifier
B03-xxxA

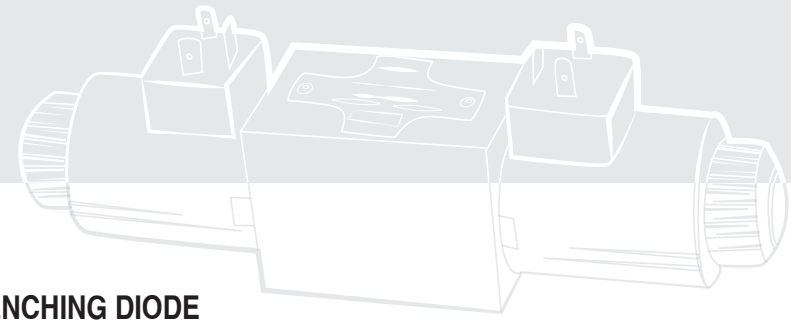


AMPX = Amp Junior Timerwith
axial configuration
B03-0xxCAMPX



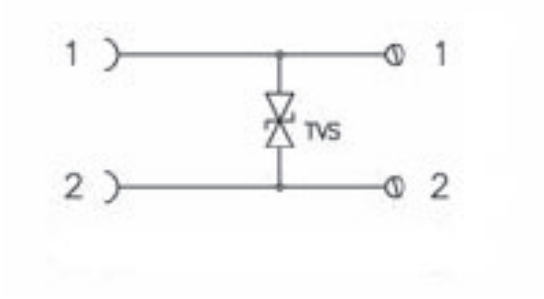
D = Deutsch

B03-0xxD



15 QUENCHING DIODE

On request, DC 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



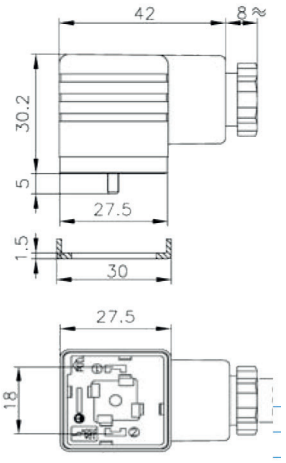
16 CONNECTORS FOR ISO 4400 (DIN 43650) series KA132

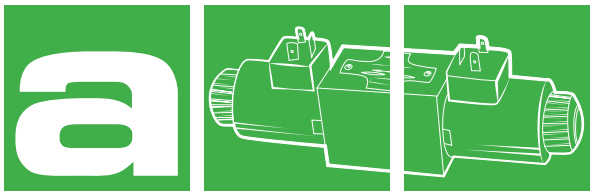
Connectors are available for coils with ISO 4400 (DIN 43650) connection. Most common configuration are: Standard, simple, 3 pin connectors:

KA132000B9 = black with PG9
KA132000B1 = black with PG11
KA132000A1 = grey with PG11
KA132L34T9 = transparent with led indication
KA132T54T9 = transparent with led indication and diode transil for protection against overvoltages

For more details and models see aidro table KA







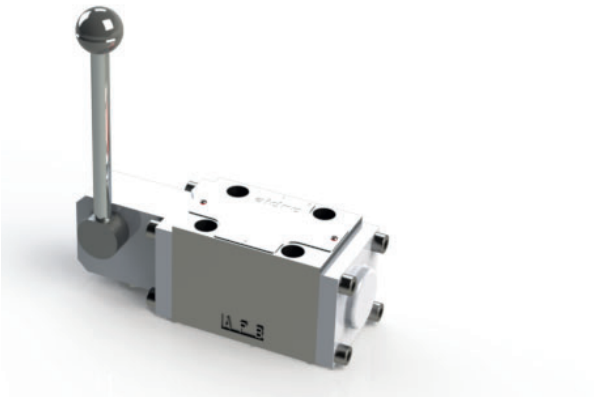
DIRECTIONAL CONTROL VALVES LEVER OPERATED

HD3-LO-*

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

The hand operated directional control valves are used mainly to control start, stop and direction of fluid. Manual lever and actuating section can be rotated in 90° increments for flexible installation. The directional control valves are being manufactured as two-position and three-position valves (see table with functional symbols). In the standard version, the valve housing is phosphated and steel parts zinc-coated 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)
HD3	-	LO	-			-		/	10

(1) HD3: 4-way directional control valve CETOP 03 - Pressure 32 MPa (320bar)

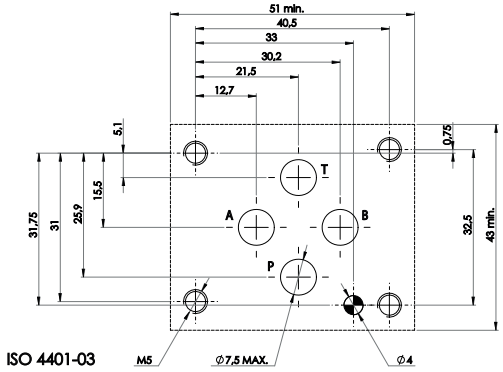
(2) Standand, level operated

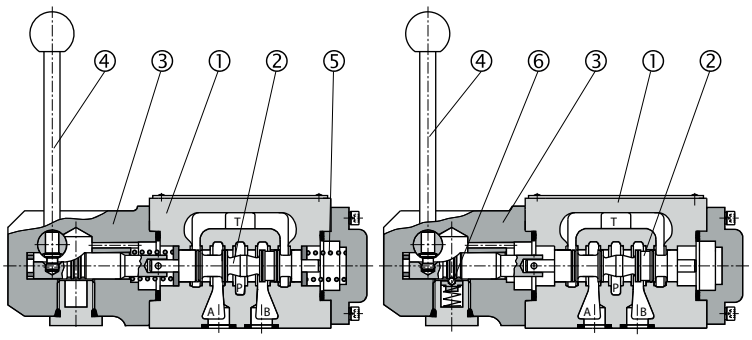
(3) Spool type (see 4):
-number is the main spool type
-letter is the spring arrangement:
C : spool is spring centered (3 position)
D : spool is detented (3 position)
N : spool is detented (2 position, end to end)
LL :spool is spring offset (2 position, end to end)
ML:spool is spring offset (2 position, middle to end)

(4) Lever mechanism side:
- no designation: A port side
- b: B port side

(5) Code reserved for option and variants

(6) Design number (progressive) of the valves





Type with return springs

Type with detent assembly

The hand operated directional valves are used mainly to control start, stop and direction of fluid. they consist of housing 1 with control spool 2 and the actuating section 3. the actuating section consists either of the hard lever 4 and of one or two return springs 5, or of the hand lever 4 and the detent assembly 6. The detent assembly holds the spool in its last shifted position.



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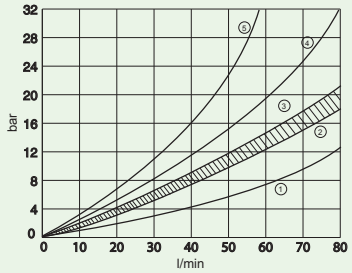
3 TECHNICAL DATA

Maximum nominal flow	60 l/min
Maximum rec. flow rate	80 l/min
Maximum nominal pressure (P, A, B)	32 MPa (320 bar)
Maximum pressure at T port	10 MPa (100 bar)
Installation and dimensions	see 5
Mass	approx 1,6 kg
Actuating force	48N (max)
Fluid temperature (NBR seals)	-30°C..+95°C
Fluid temperature (Viton seals)	-20°C..+115°C

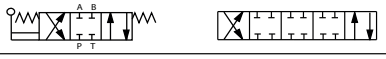
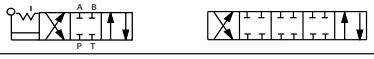
Pressure drops:

Δp-Q characteristics

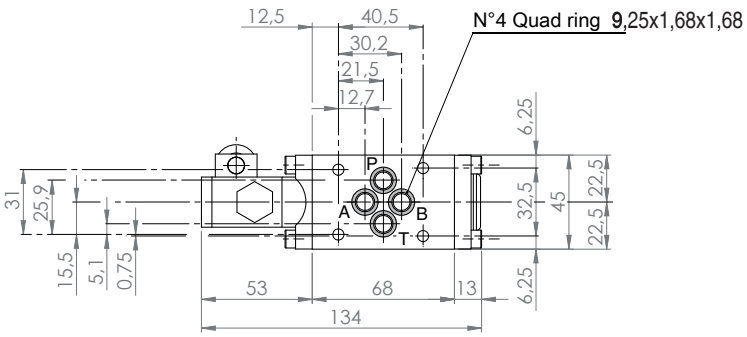
①P -> A, P-> B spool 0,8
②->③spool 0,1,2,3,4,7
④A ->T, B->T spool 4
⑤P ->T spool 4



4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

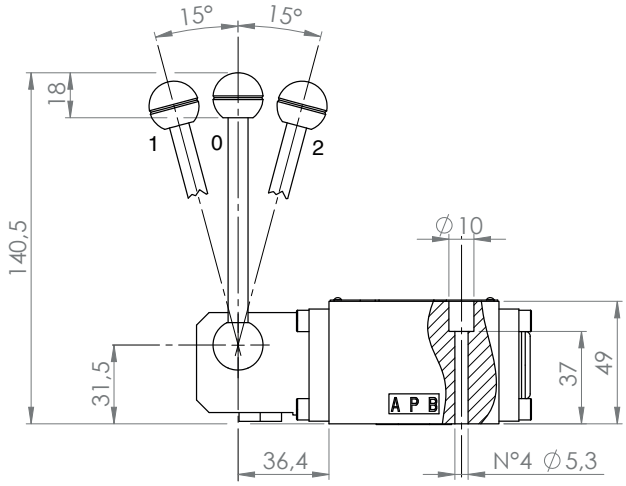
1C		1D	
4C		4D	
0C		0D	
8C		8D	
3C		3D	
7C		7D	
1LL		1N	
2LL		2N	
0LL		0N	

5 INSTALLATION DIMENSIONS (mm)

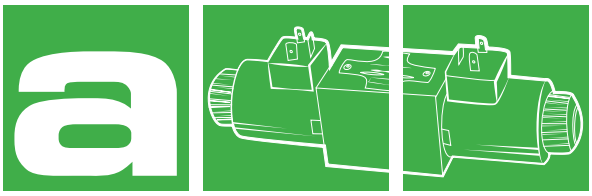


6 HYDRAULIC LIMITS OF USE

Valves HD3-LO-1C, 1LL and all detent type valve can operate at 320 bar and 80 l/min. Other spring centered and spring offset valves have limits reduced to max 60l/min flow



3 0028



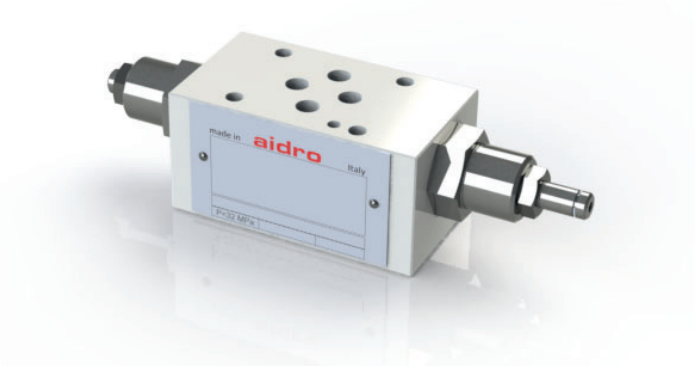
FLOW RESTRICTOR VALVES

AM3-FO-*

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable valve CETOP 3 with flow restrictor function. It is possible to control the lines A, B or AB simply turning the side screws.
On demand it is possible to have also the fine control option.



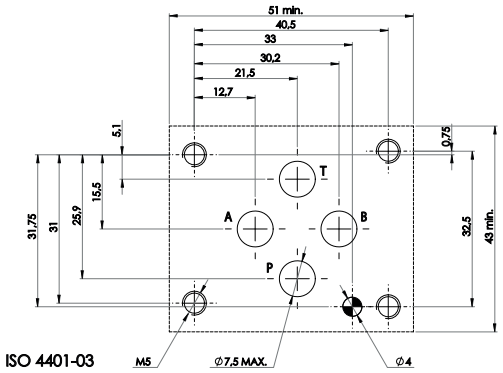
2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	FO	-		-		-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

(2) FO: flow restrictor valves with two-way control

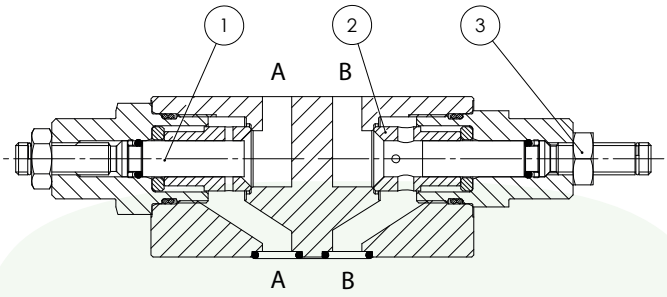
(3) Service lines where the controls operates:
AB: controls on A and B. Fluid flows restricted A <-> A, and B <-> B
A : flow is restricted A<-> A; free on B, P and T
B : flow is restricted B<-> B; free on A, P and T



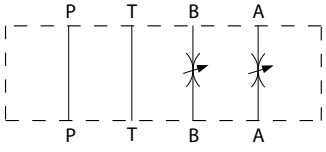
(4) Flow control characteristics
no designation: standard control
F: fine control

(5) Code reserved for option and variants
M: hand knob
V: viton seals

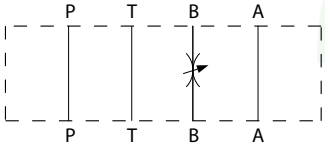
(7) Design number (progressive) of the valves



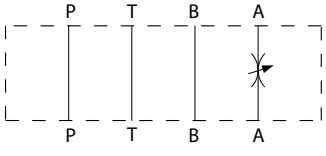
AM3-FO-AB

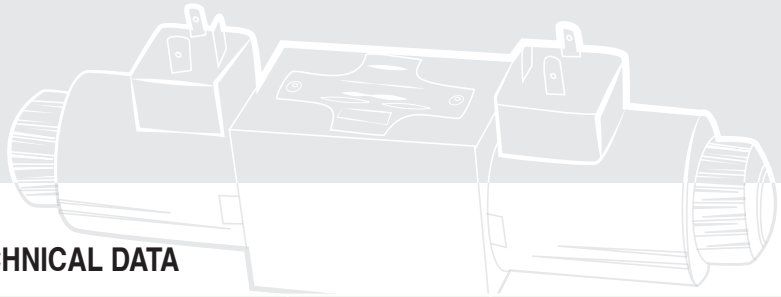


AM3-FO-B



AM3-FO-A





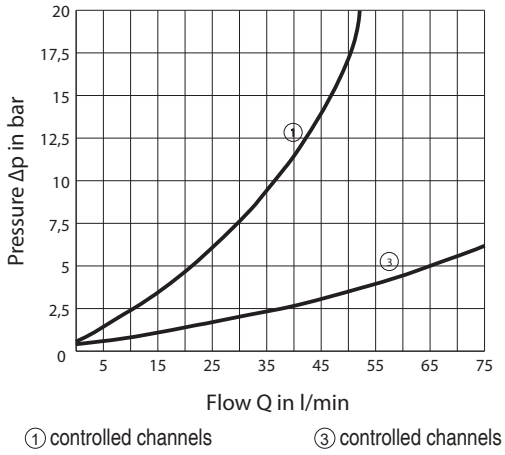
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3 TECHNICAL DATA

Maximum nominal flow		Control of the flow:
Maximum rec. flow rate	60 l/min	The control is made by throttling from through variable orifices obtained on sleeve and partially obstructed by throttling axis.Depending on the various sleeve/axis combination,the control adjustment is: - (standard): orifices area is reduced from 100% (*) to 0% with 6 complete turns of the adjustment screw. - F (fine): from 100% (**) to 0% with 5 complete turns of the adjustment screw. (*) 100% approx Q=60 l/min at □p=20 bar (**) 100% approx Q=30 l/min at □p=20 bar The axis □ is shifted to increase throttling by unlocking its nut □ and turning clock wise the adjustment screw. Suitable mechanical stops prevent dangerous manoevring.
Maximum nominal pressure	32 MPa (320 bar)	
Pressure drops	see 4	
Installation and dimensions	see 5	
Mass	approx 1,2 kg	

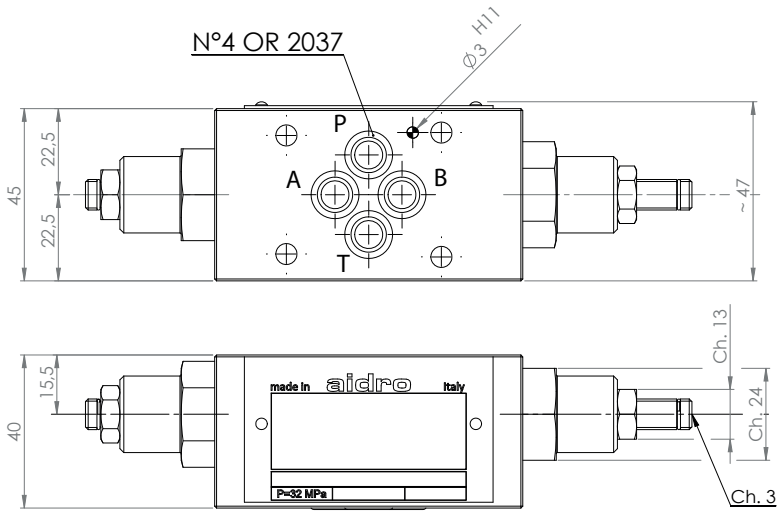
4 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves AM3-FO-* in standard configuration, with mineral oil at 36 cSt and at 50°C with throttling axis at full retraction.



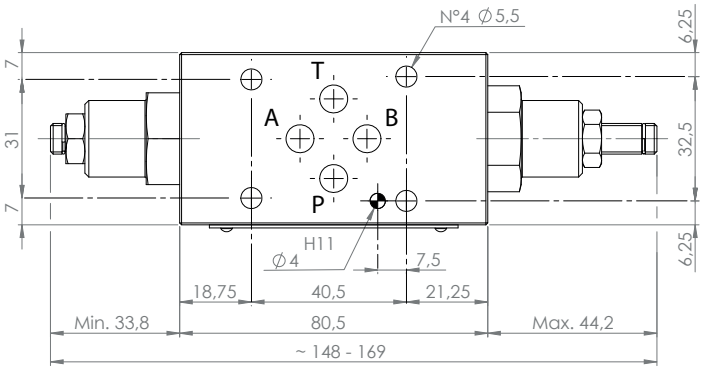
① controlled channels ③ controlled channels

5 INSTALLATION DIMENSIONS (mm)

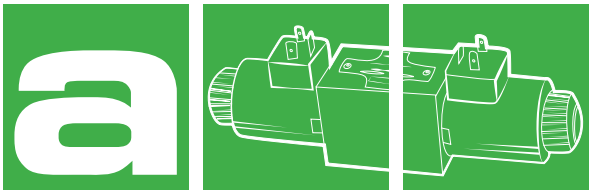


6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3- * are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.



All stackable valves AM3-FO-* conform with ISO and CETOP specifications for mounting surface dimensions. Valves height 40 mm.
Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type. All valves have on their "mounting" surface a ø 4 mm cylindrical hole and have on their "seals" surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.



FLOW CONTROL VALVES

AM3-FC-*

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable valve CETOP 3 with meter out control (referred to the hydraulic actuator).
It is possible to control the lines A, B or AB simply turning the side screws.
On demand it is possible to have also the fine control option.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	FC	-		-		-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

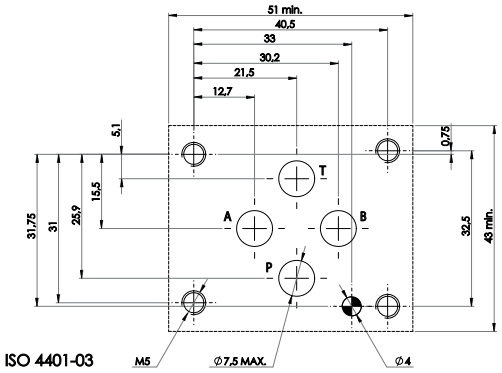
(2) FC:one way flow control valves with meter-out control (referred to the hydraulic actuator)

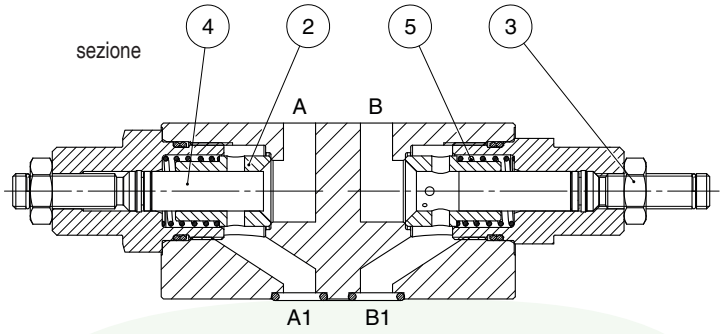
(3) Service lines where the controls operate:
AB: controls on A and B. Fluid flows unrestricted from
A <-> A1 and flow is controlled from A1 -> A and B1 -> B
A : flow is controlled from A1 <-> A, free on B
B : flow is controlled from B1 <-> B; free on A

(4) Flow control characteristics for A1 -> A and B1 -> B) and check valve opening pressure (Pm) for flow A ->A1 and B -> B1
no designation: standard control and Pm approx 0,04 MPa (0,4 bar)
F: fine control
4: Pm approx 0,4 MPa (4 bar)

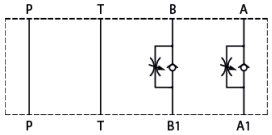
(5) Code reserved for option and variants
M: hand knob
V: viton seals

(6) Design number (progressive) of the valves

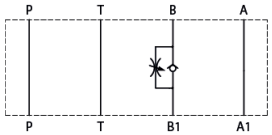




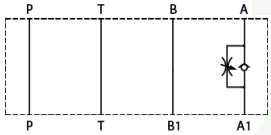
AM3-FC-AB



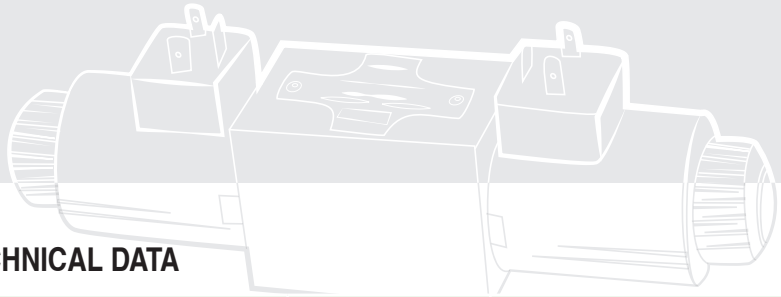
AM3-FC-B



AM3-FC-A



Fluids flows freely on P and T lines: on service lines A and/or B with controls, fluid flows from A -> A1 (and/or B-> B1) overcoming the force of spring 5 acting on sleeve 2; fluid flows from A1-> A (and/or B1->B) through orifices to sleeve 2 which is pushed against its seat; the throttling axis 4, which is shifted by screwing it and locked by its nut 3, partially obstructs the control orifices, thus making the flow rate entirely dependent upon the available pressure drop.

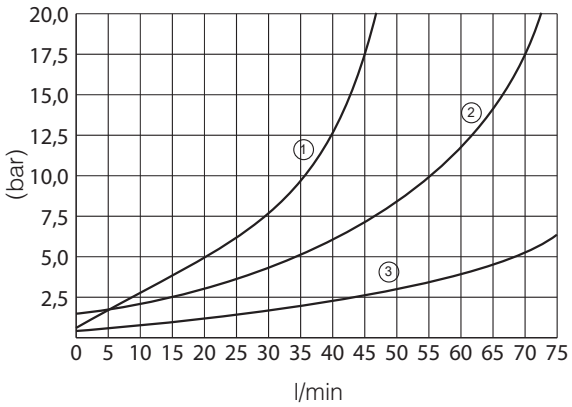


3 TECHNICAL DATA

Maximum nominal flow		Control of the flow:
Maximum rec. flow rate	60 l/min	The control is made by throttling from through variable orifices obtained on sleeve and partially obstructed by throttling axis.Depending on the various sleeve/axis combination,the control adjustment is: - (standard): orifices area is reduced from 100% (*) to 0% with 6 complete turns of the adjustment screw. - F (fine): from 100% (**) to 0% with 5 complete turns of the adjustment screw. (*) 100% approx Q=60 l/min at □p=20 bar (**) 100% approx Q=30 l/min at □p=20 bar The axis □ is shifted to increase throttling by unlocking its nut □ and turning clock wise the adjustment screw. Suitable mechanical stops prevent dangerous manoevring.
Maximum nominal pressure	32 MPa (320 bar)	
Pressure drops	see □	
Installation and dimensions	see 5	
Mass	approx 1,2 kg	

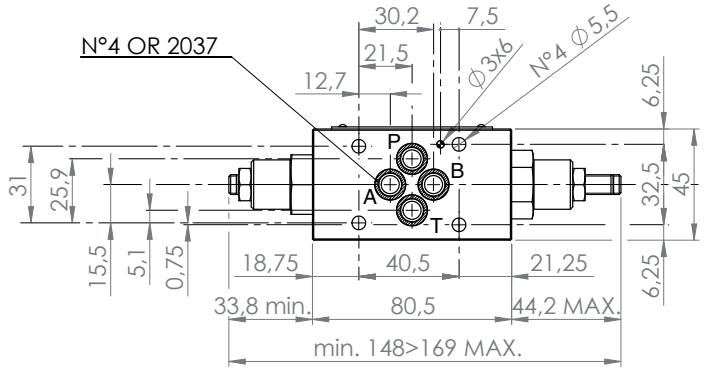
4 TYPICAL DIAGRAMS

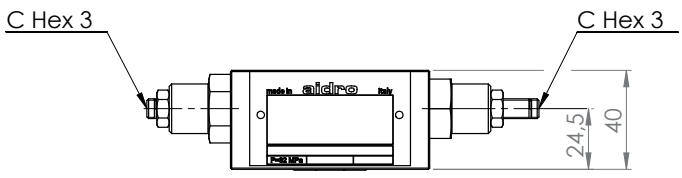
Typical Δp-Q curves for valves AM3-FC- * in standard configuration, with mineral oil at 36 cSt and at 50°C with throttling axis at full retraction.

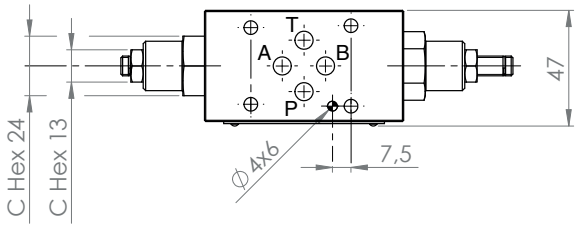


① A1->A B1->B ② A->A1 B->B1 ② P->P T ->T

5 INSTALLATION DIMENSIONS (mm)



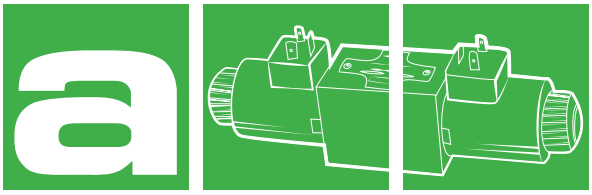




6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3-*are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

All stackable valves AM3-FC-* conform with ISO and CETOP specifications for mounting surface dimensions.Valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type. All valves have on their “mounting” surface a ø 4 mm cylindrical hole and have on their “seals” surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.



FLOW CONTROL VALVES

AM3-FX-*

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable valve CETOP 3 with meter in control (referred to the hydraulic actuator). It is possible to control the lines A, B or AB simply turning the side screws.
On demand it is possible to have also the fine control option.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	FX	-		/		-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

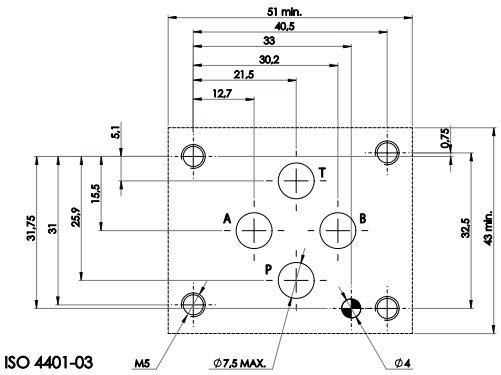
(2) FX:one way flow control valves with meter-in control
(referred to the hydraulic actuator)

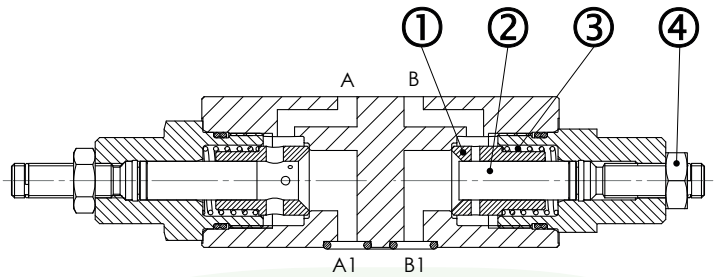
(3) Service lines where the controls operate:
AB: controls on A and B. Fluid flows unrestricted from
A1-> A and B1 -> B and flow is controlled from A -> A1 and B -> B1
A : flow is controlled from A-> A1, free on B
B : flow is controlled from B-> B1; free on A

(4) Flow control characteristics for A -> A1 and B -> B1 and check valve opening pressure (Pm) for flow A1 -> A and B1 -> B
no designation: standard control and Pm approx 0,04 MPa (0,4 bar)
F: fine control
4: Pm approx 0,4 MPa (4 bar)

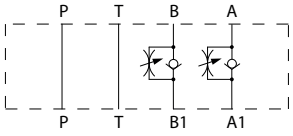
(5) Code reserved for option and variants
M: hand knob
V: viton seals

(6) Design number (progressive) of the valves

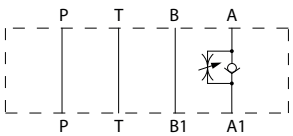




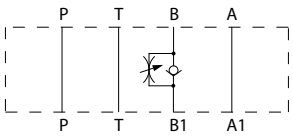
AM3-FX-AB



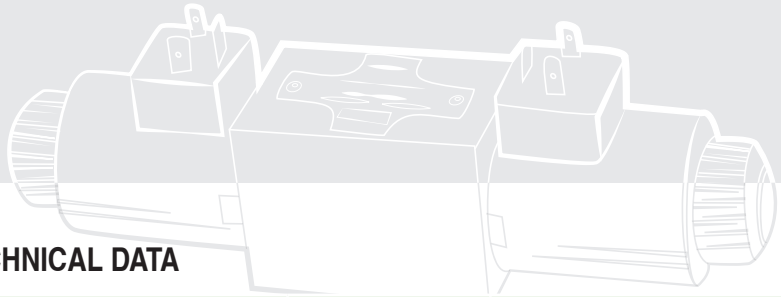
AM3-FX-A



AM3-FX-B



Fluids flows freely on P and T lines: on service lines A and/or B with controls, fluid flows from A -> A1 (and/or B-> B1) overcoming the force of spring 5 acting on sleeve 2; fluid flows from A1-> A (and/or B1->B) through orifices to sleeve 2 which is pushed against its seat; the throttling axis 4, which is shifted by screwing it and locked by its nut 3, partially obstructs the control orifices, thus making the flow rate entirely dependent upon the available pressure drop.



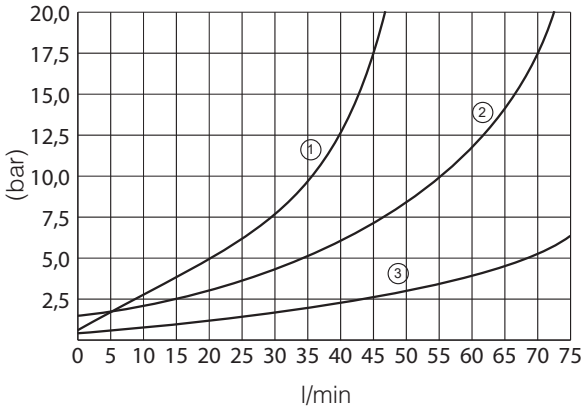
aidro
Desktop Metal Company

3 TECHNICAL DATA

Maximum nominal flow		Control of the flow:
Maximum rec. flow rate	60 l/min	The control is made by throttling from through variable orifices obtained on sleeve and partially obstructed by throttling axis.Depending on the various sleeve/axis combination,the control adjustment is: - (standard): orifices area is reduced from 100% (*) to 0% with 6 complete turns of the adjustment screw. - F (fine): from 100% (**) to 0% with 5 complete turns of the adjustment screw. (*) 100% approx Q=1 dm3/s (60 l/min) at Δp=2 MPa (20 bar) (**) 100% approx Q=0,5 dm3/s (30 l/min) at Δp=2 MPa (20 bar) The axis is shifted to increase throttling by unlocking its nut ▯ and turning clock wise the adjustment screw. Suitable mechanical stops prevent dangerous manoevring.
Maximum nominal pressure	32 MPa (320 bar)	
Pressure drops	see 4	
Installation and dimensions	see 5	
Mass	approx 1,2 kg	

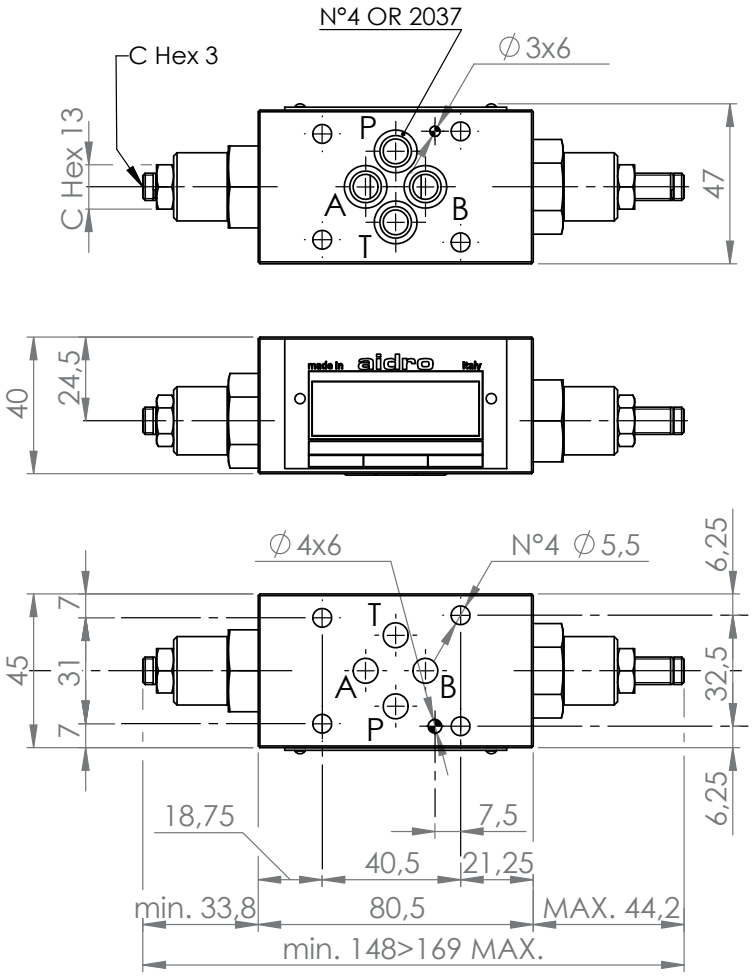
4 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves AM3-FX- * in standard configuration, with mineral oil at 36 cSt and at 50°C with throttling axis at full retraction.



① A->A1 B->B1 ② A1->A B1->B ③ P->P T ->T

5 INSTALLATION DIMENSIONS (mm)



All stackable valves AM3-FX-* conform with ISO and CETOP specifications for mounting surface dimensions. Valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type. All valves have on their "mounting" surface a ø 4 mm cylindrical hole and have on their "seals" surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.

6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3-* are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

DIRECT OPERATED CHECK VALVES

AM3-CO-*/10

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Direct operated check valve. All the internal part are made with high strenght steel and are machined with accouracy in order to assure the requested tightness.
The controlled lines are A, B or AB.
The standard surface treatment of the body is phosphate coated. Plugs are zinc coated.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	CO	-		/		-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

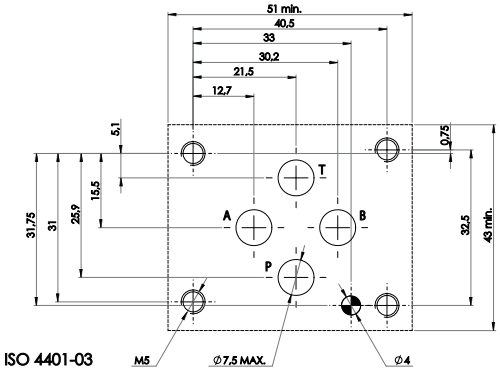
(2) CO: check valve. spring operated

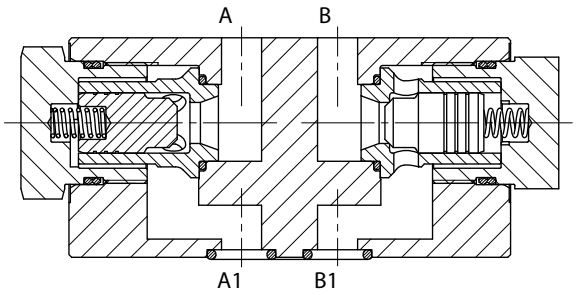
(3) Service lines where the controls operate:
AB : checks on A and B. Fluid flows A->A1 and B->B1 and cannot flow A1->A, B1->B. P and T: free.
A : check on A: flow A1-> A is blocked, free on B, P and T
B : check on B: flow B1->B is blocked, free on A, P and T

(4) check valve opening (cracking) pressure (Pm):
no designation (standard): Pm approx 0.2 MPa (2 bar)
4: Pm approx 0.4 MPa (4 bar)

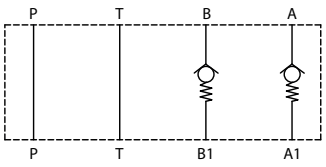
(5) Code reserved for option and variants

(6) Design number (progressive) of the valves

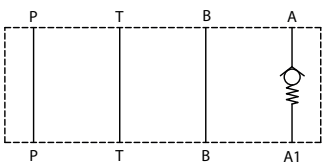




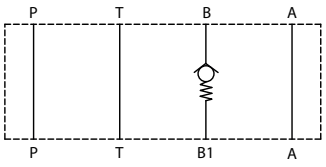
AM3-CO-AB

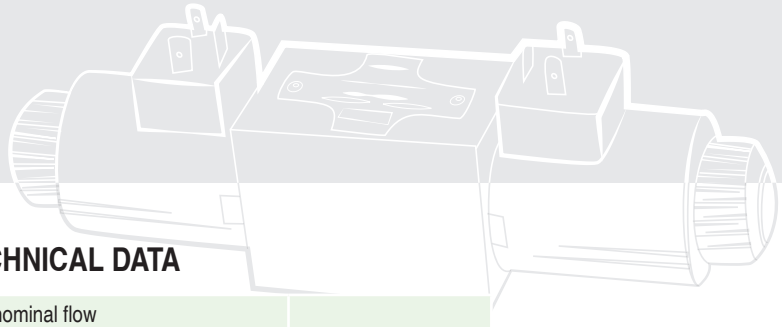


AM3-CO-A



AM3-CO-B



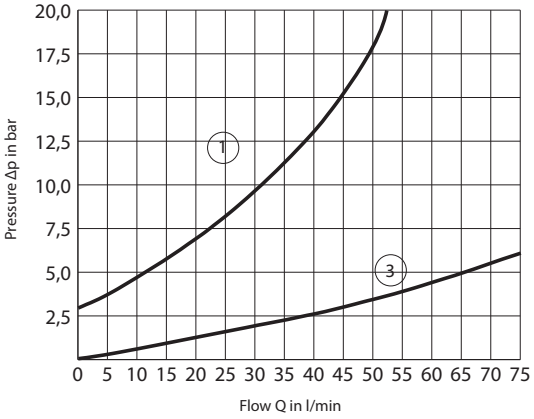


3 TECHNICAL DATA

Maximum nominal flow	
Maximum rec. flow rate	60 l/min
Maximum nominal pressure	32 MPa (320 bar)
Pressure drops	see 4
Installation and dimensions	see 5
Mass	approx 1 kg

4 TYPICAL DIAGRAMS

Typical ΔΔp-Q curves for valves AM3-CO in standard configuration, with mineral oil at 36 cSt and at 50°C



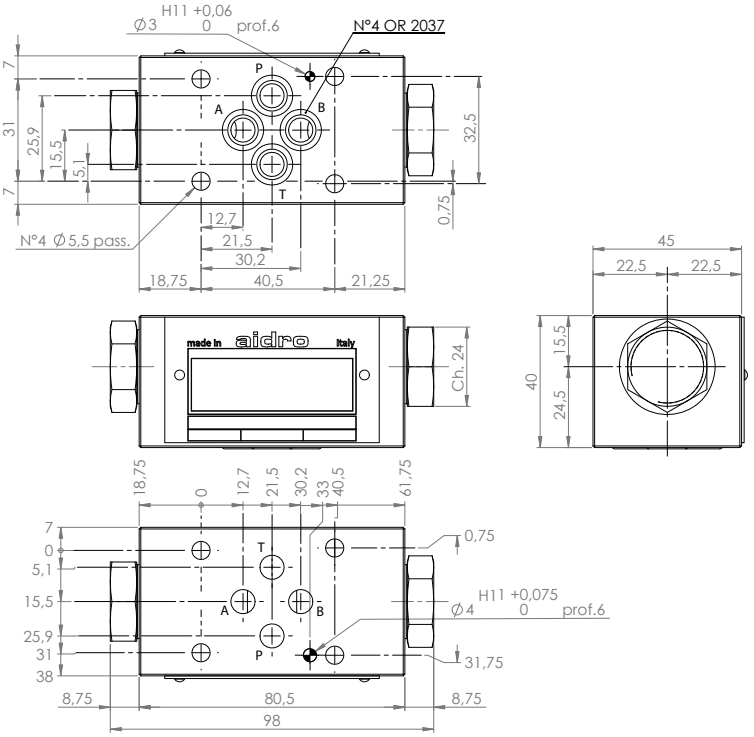
① A1->A; P1->P
B1->B; T->T1

③ free channels

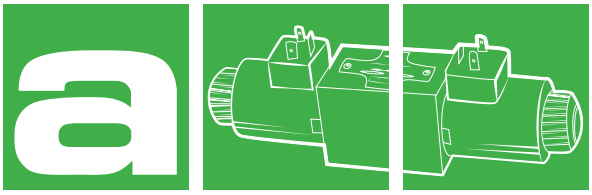
6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3-* are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

5 INSTALLATION DIMENSIONS (mm)



All stackable valves AM3 -* conform with ISO and CETOP specifications for mounting surface dimensions. Valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type. All valves have on their "mounting" surface a ø 4 mm cylindrical hole and have on their "seals" surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.



DIRECT OPERATED CHECK VALVES

AM3-CO-*/25

50 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Direct operated check valve. All the internal part are made with high strenght steel and are machined with accouracy in order to assure the requested tightness.
The controlled lines are P, T or PT.
The standard surface treatment of the body is phosphate coated. Plugs are zinc coated.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	CO	-		/		-		/	25

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

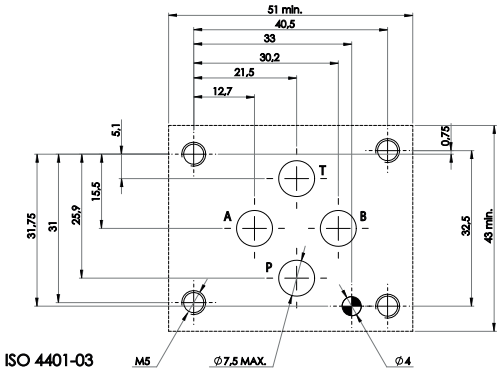
(2) CO: check valve. spring operated

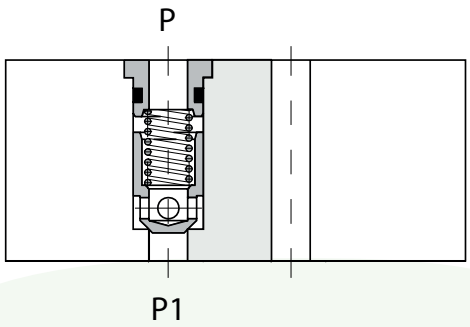
(3) Service lines where the controls operate:
T: checks on T: flow T1->T is blocked, free on A, B and P
P: check on P: flow P-> P1 is blocked, free on A, B and T
PT : check on P and T: P-> P1 and T1-> T are blocked, free on A and B

(4) check valve opening (cracking) pressure (Pm):
no designation (standard): Pm approx 0.2 MPa (2 bar)
05: Pm approx 0,05 MPa (0,5 bar)
30: Pm approx 0,3 MPa (3 bar)
50: Pm approx 0,5 MPa (5 bar)

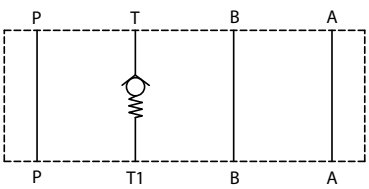
(5) Code reserved for option and variants
V: viton seals

(6) Design number (progressive) of the valves

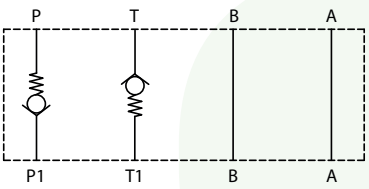




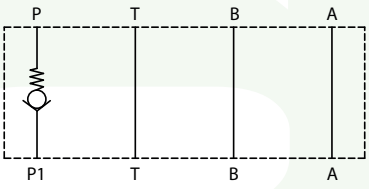
AM3-CO-T-*-**/25



AM3-CO-PT-*-**/25



AM3-CO-P-*-**/25



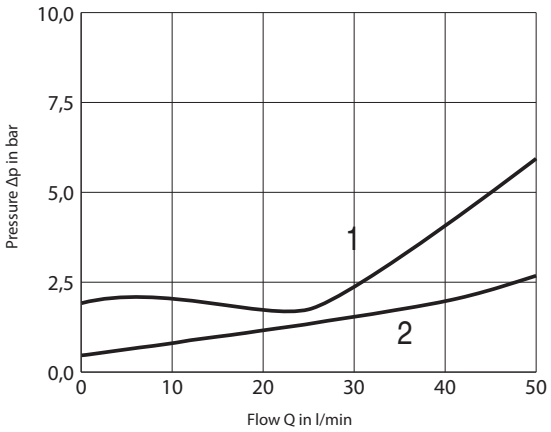


3 TECHNICAL DATA

Maximum nominal flow	50 l/min
Maximum rec. flow rate	50 l/min
Maximum nominal pressure	32 MPa (320 bar)
Pressure drops	see 4
Installation and dimensions	see 5
Mass	approx 0,9 kg

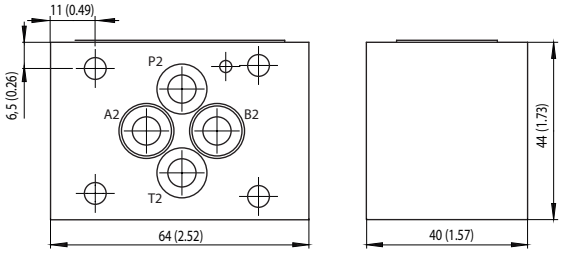
4 TYPICAL DIAGRAMS

Typical ΔΔp-Q curves for valves AM3-CO in standard configuration, with mineral oil at 36 cSt and at 50°C



① P->P1; T1->T ②free channels

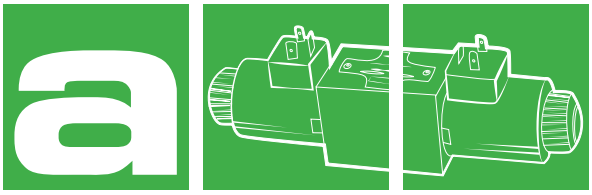
5 INSTALLATION DIMENSIONS (mm)



All stackable valves AM3-CO-*/25 conform with ISO and CETOP specifications for mounting surface dimensions.Valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals. All valves have on their “mounting” surface a ø 3.4 mm cylindrical hole and have on their “seals” surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.

6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3-* are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.



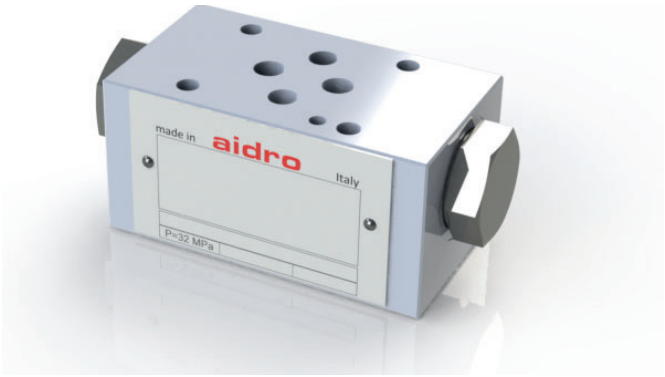
PILOT OPERATED CHECK VALVES

AM3-CP-*

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Pilot operated check valve. All the internal part are made with high strenght steel and are machined with accouracy in order to assure the requested tightness.
The controlled lines are A, B or AB.
The standard surface treatment of the body is phosphate coated. Plugs are zinc coated.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	CP	-		-		-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

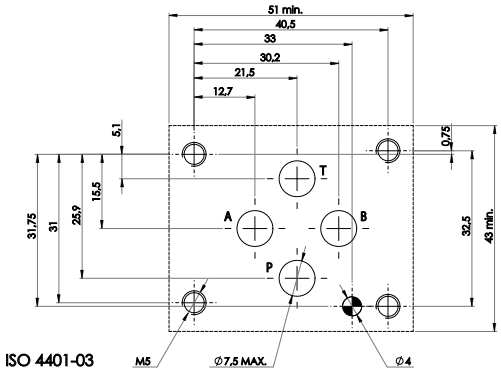
(2) CP: check valve. spring operated (hydraulically)

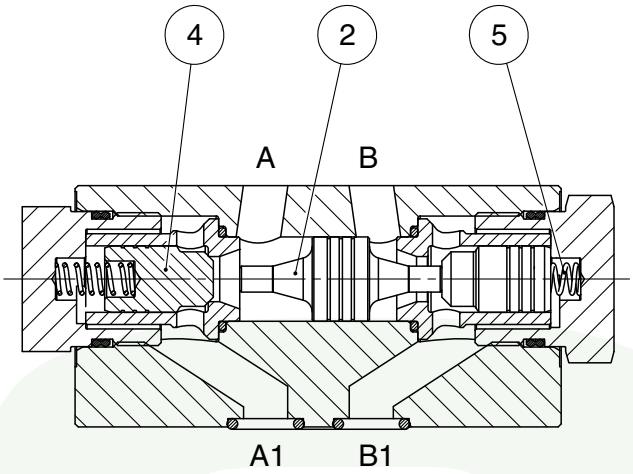
(3) Service lines where the controls operate:
AB: pilot operated checks on A and B, fluids flows A -> A1 and B- > B1 and flow A1 -> A (or B1 -> B) is permitted only when B (or A) is pressurized
A : pilot operated check on A; flow A1 -> A is permitted only when B is pressurized
B : pilot operated check on B; flow B1 -> B is permitted only when A is pressurized

(4) check valve opening (cracking) pressure (Pm)
for free flow A->A1 and B->B1:
no designation (standard): Pm approx 0.2 MPa (2 bar)
4: Pm approx 0.4 MPa (4 bar)
8: Pm approx 0.8 MPa (8 bar)
15: Pm approx 1.5 MPa (15 bar)

(5) Code reserved for option and variants

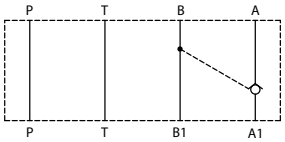
(6) Design number (progressive) of the valves



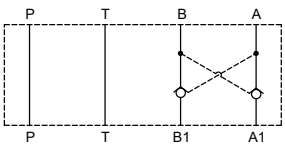


Fluid flows freely on P and T lines;
On service lines A and/or B with p.o. check, fluid flows from A ->A1 (and/or B ->B1) overcoming the force of spring 5 acting on poppet 4, and fluid is blocked from A1 ->A (and/or B1 -> B). When, by switching the solenoid operated 4-way directional valve, pressure is made available at, for instance, port B fluid flows B -> B1 and the pilot piston 2, shifting from its central position, forces poppet 2, on service line A, to open and permit flow A1 -> A.

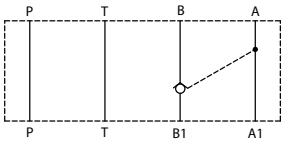
AM3-CP-A

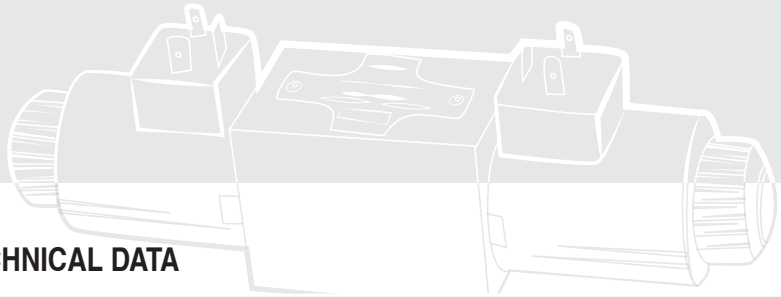


AM3-CP-AB



AM3-CP-B



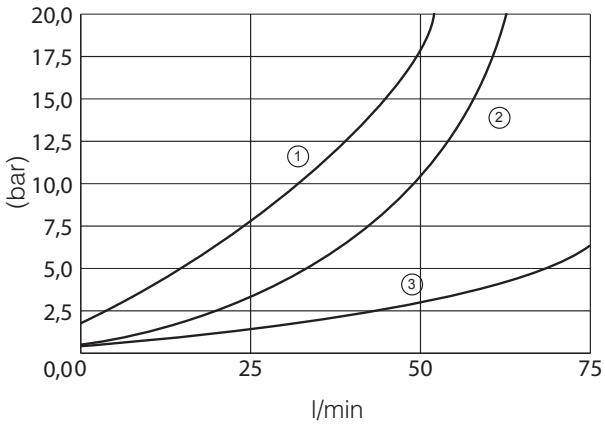


3 TECHNICAL DATA

Maximum nominal flow		Piloting pressure:
Maximum rec. flow rate	60 l/min	To shift the pilot piston and to open the check in A the piloting pressure must be at B:
Maximum nominal pressure	32 MPa (320 bar)	$Pp=Pb=\frac{Pa1+Pm-Pa}{3,5}+Pa$
Pressure drops	see 4	or to open the check in B
Pilot area ration piston/check valve	approx 3,5	$Pp=Pa=\frac{Pb1+Pm-Pb}{3,5}+Pb$
Installation and dimensions	see 5	where: Pp= piloting pressure Pb= pressure in B Pa= pressure in A Pa1= pressure in A1 Pb1= pressure in B1 Pm= check valve opening pressure (spring)
Mass	approx 1 kg	

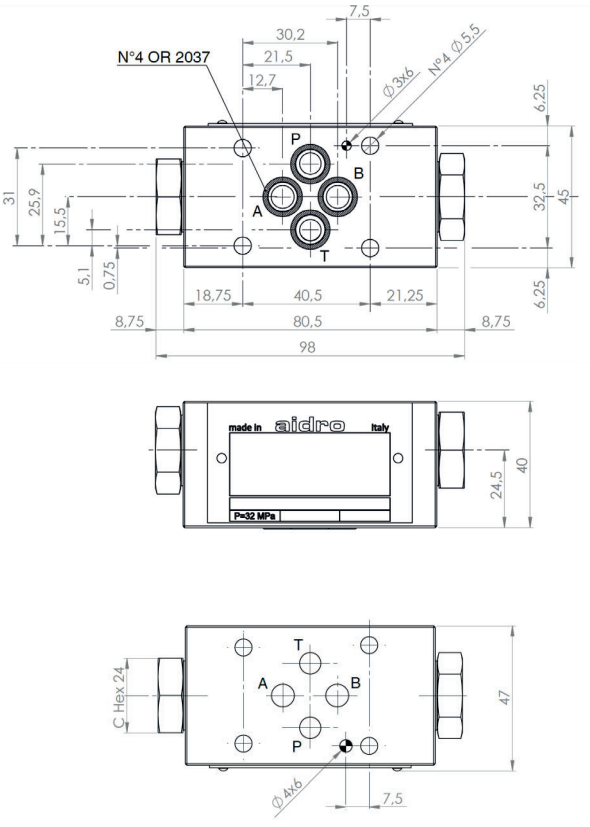
4 TYPICAL DIAGRAMS

Typical ΔΔp-Q curves for valves AM3-CP in standard configuration, with mineral oil at 36 cSt and at 50°C



①A->A1 B->B1 ②A1->A B1->B ③P<->P T <->T

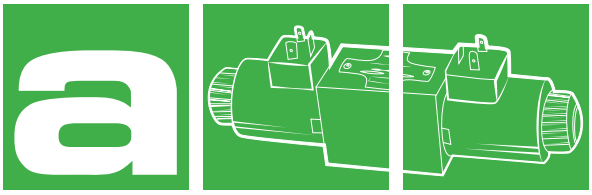
5 INSTALLATION DIMENSIONS (mm)



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3 - * are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

All stackable valves AM3-CP-*/10 conform with ISO and CETOP specifications for mounting surface dimensions. Valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals. All valves have on their "mounting" surface a ø4 mm cylindrical hole and have on their "seals" surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.



PILOT OPERATED CHECK VALVES

AM3-CP-B/10A

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Pilot operated check valve. All the internal part are made with high strenght steel and are machined with accouracy in order to assure the requested tightness.
The controlled lines is B; The body of the valve is specific for the control of B line, avoiding extra plugs and potential leaks.
The standard surface treatment of the body is phosphate coated. Plugs are zinc coated.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	CP	-	B	-		-		/	10A

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

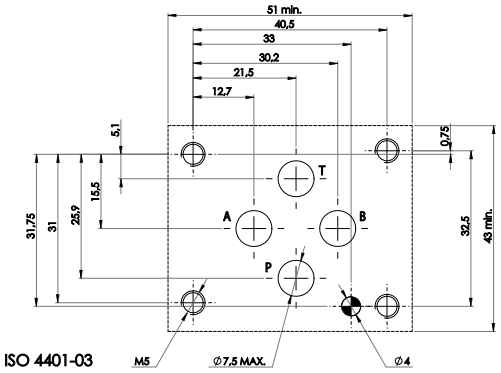
(2) CP: check valve. spring operated (hydraulically)

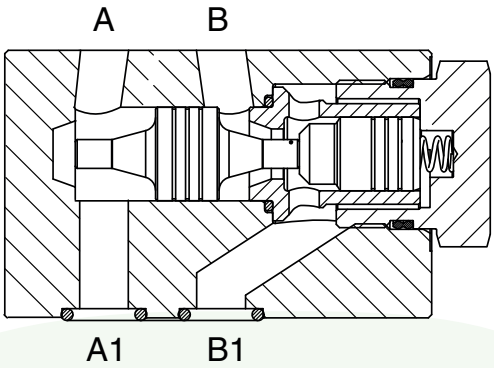
(3) Service lines where the controls operate:
B : pilot operated check on B; flow B1 -> B is permitted only when A is pressurized

(4) check valve opening (cracking) pressure (Pm)
for free flow B->B1:
no designation (standard): Pm approx 0.2 MPa (2 bar)
4: Pm approx 0.4 MPa (4 bar)

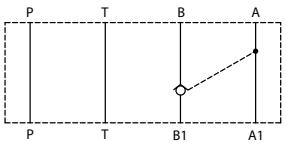
(5) Code reserved for option and variants

(6) Design number (progressive) of the valves

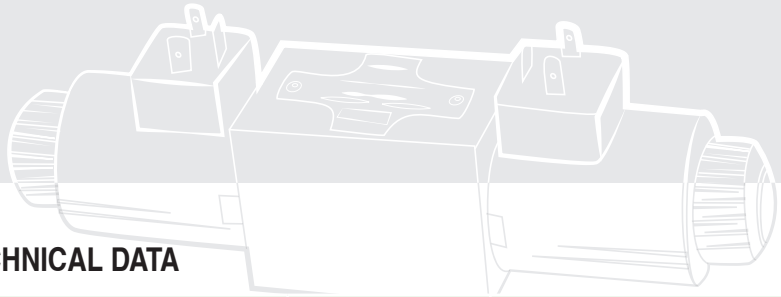




AM3-CP-B



Fluid flows freely on P and T lines;
On service lines B with p.o. check, fluid flows from B -> BA overcoming the force of spring 5 acting on poppet 4, and fluid is blocked from B1-> B. When, by switching the solenoid operated 4-way directional valve, pressure is made available at, for instance, port A fluid flows A -> A1 and the pilot piston 3, shifting from its central position, forces poppet 2, on service line B, to open and permit flow B1 -> A.



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3 TECHNICAL DATA

Maximum nominal flow	
Maximum rec. flow rate	60 l/min
Maximum nominal pressure	32 MPa (320 bar)
Pressure drops	see 4
Pilot area ration piston/check valve	approx 3,5
Installation and dimensions	see 5
Mass	approx 1 kg

Piloting pressure:

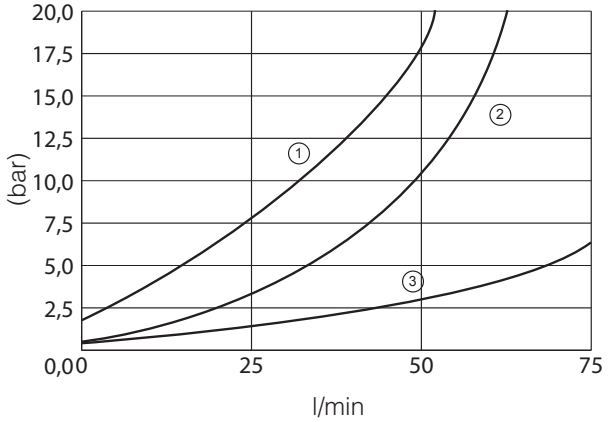
To shift the pilot piston and to open the check in B the piloting pressure must be at A:

$$Pp=Pa=\frac{Pb1+Pm-Pb}{3,5}+Pb$$

where: Pp= piloting pressure
Pb= pressure in B
Pa= pressure in A
Pm= check valve opening pressure (spring) or to open the check in B

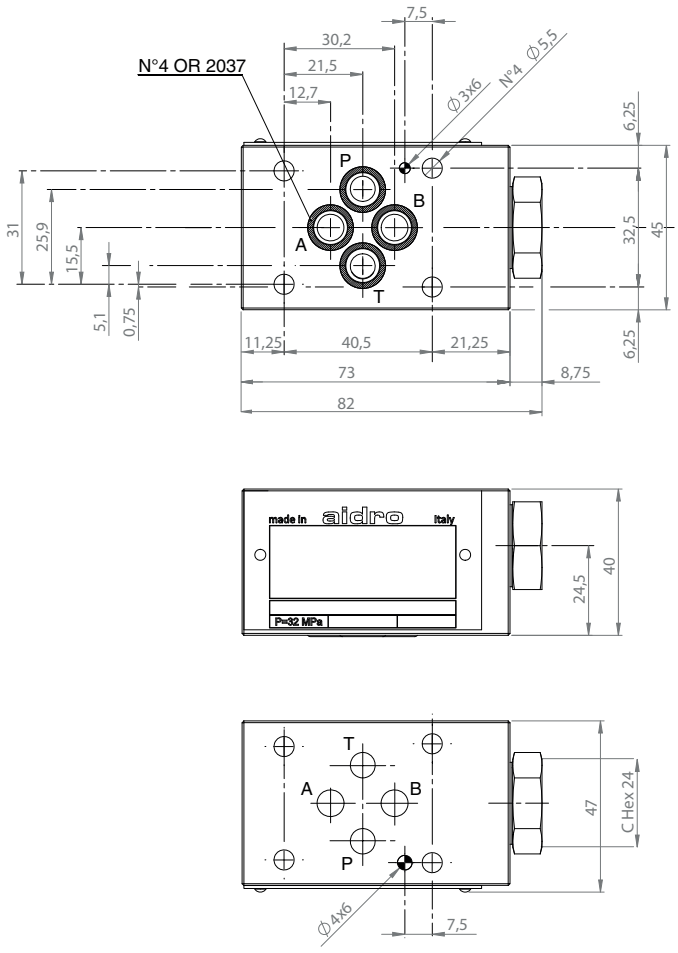
4 TYPICAL DIAGRAMS

Typical ΔΔp-Q curves for valves AM3-CP in standard configuration, with mineral oil at 36 cSt and at 50°C



①A->A1 B->B1 ②A1->A B1->B ③P<->P T <->T

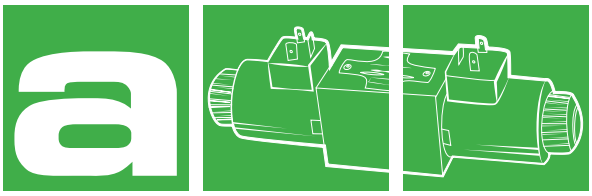
5 INSTALLATION DIMENSIONS (mm)



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3 - * are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

All stackable valves AM3-CP-*/10 conform with ISO and CETOP specifications for mounting surface dimensions. Valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals. All valves have on their "mounting" surface a ø4 mm cylindrical hole and have on their "seals" surface a ø 3 mm cylindrical hole, conform with ISO and CETOP norms.



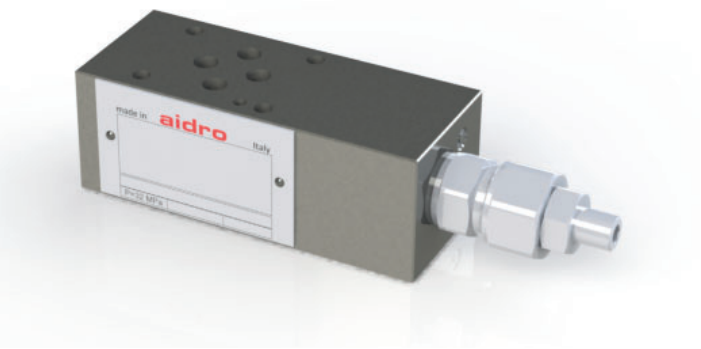
PRESSURE RELIEF VALVES

AM3-MO-*

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable pressure relief valve direct operated. The valve is made with a steel body combined with a pressure relief cartridge valve with an anti vibration system. The body of the valve is phosphate coated. The cartridge valve is zinc coated. The pressure can be set in different pressure ranges.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)
AM3	-	MO	-		/		/		-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

(2) MO: pressure relief, direct acting

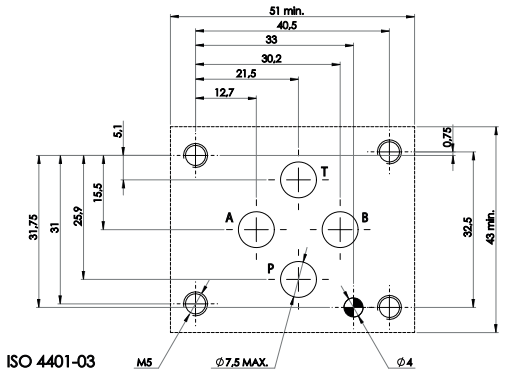
(3) Service lines where the controls operate:
- P: relief on P and discharge to T
- A: relief on A and discharge to T
- B: relief on B and discharge to T
- BA: indipendent relief on B and on A and discharge to T

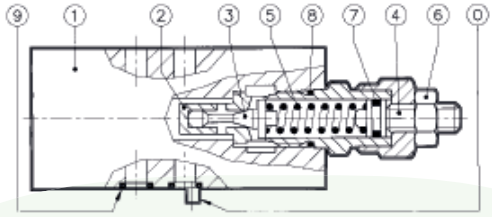
(4) Pressure adjustment ranges:
- 10: from 2,5 MPa to 12,5 MPa (from 25 to 125 bar)
- 20: from 4 MPa to 25 MPa (from 40 to 250 bar)
- 32: from 10 MPa to 32MPa (from 100 to 320 bar)

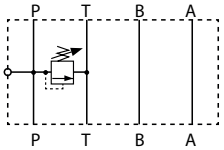
(5) Pressure adjustment range for relief on A (only for models AM3-MO-BA) see 4

(6) Code reserved for more options and variants
- M: hand knob
- V: viton seals

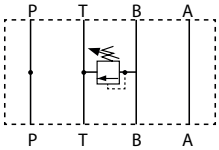
(7) Design number (progressive) of the valves



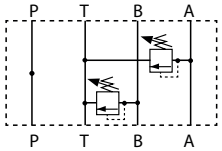




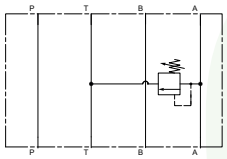
AM3-MO-P



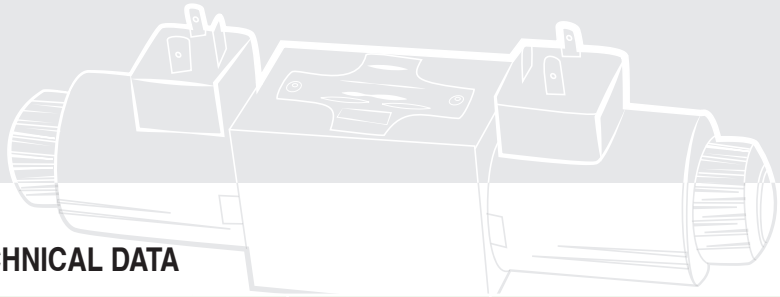
AM3-MO-B



AM3-MO-BA



AM3-MO-A



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3 TECHNICAL DATA

Maximum nominal flow	
Maximum rec. flow rate on free lines	1dm³/s (60 l/min)
On protected lines	0,5 dm³/s approx 32 l/min
Maximum nominal pressure	32 MPa (320 bar)
Pressure relief curves	see 4
Installation and dimensions	see 5
Masses	
AM3-MO-P or B	approx 1,7 kg
AM3-MO-BA	approx 2,3 kg

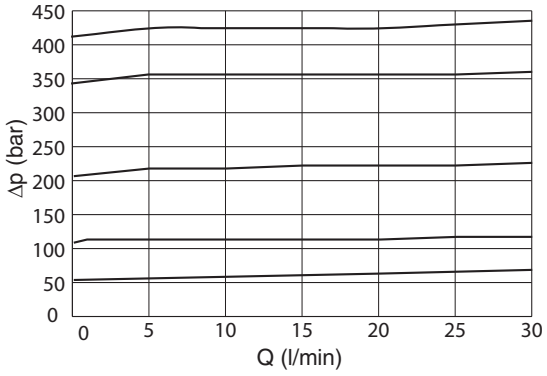
Adjustment of the relief pressure:

Relief pressure is reached when the axial hydraulic forces on piston 3 equal the force of spring 5; the value of the relief pressure can be therefore changed, within the limits of the chosen adjustment range, by changing the compression of spring 5. To increase the relief pressure, turn clock wise the adjustment screw 4, after having unlocked ist nut 6.
For each pressure adjustment range, the pressure gradient is approx:
- 10: 1,6 MPa/mm (24 bar/turn)
- 20: 3,2 MPa/mm (48 bar/turn)
- 32: 5 MPa/mm (75 bar/turn)

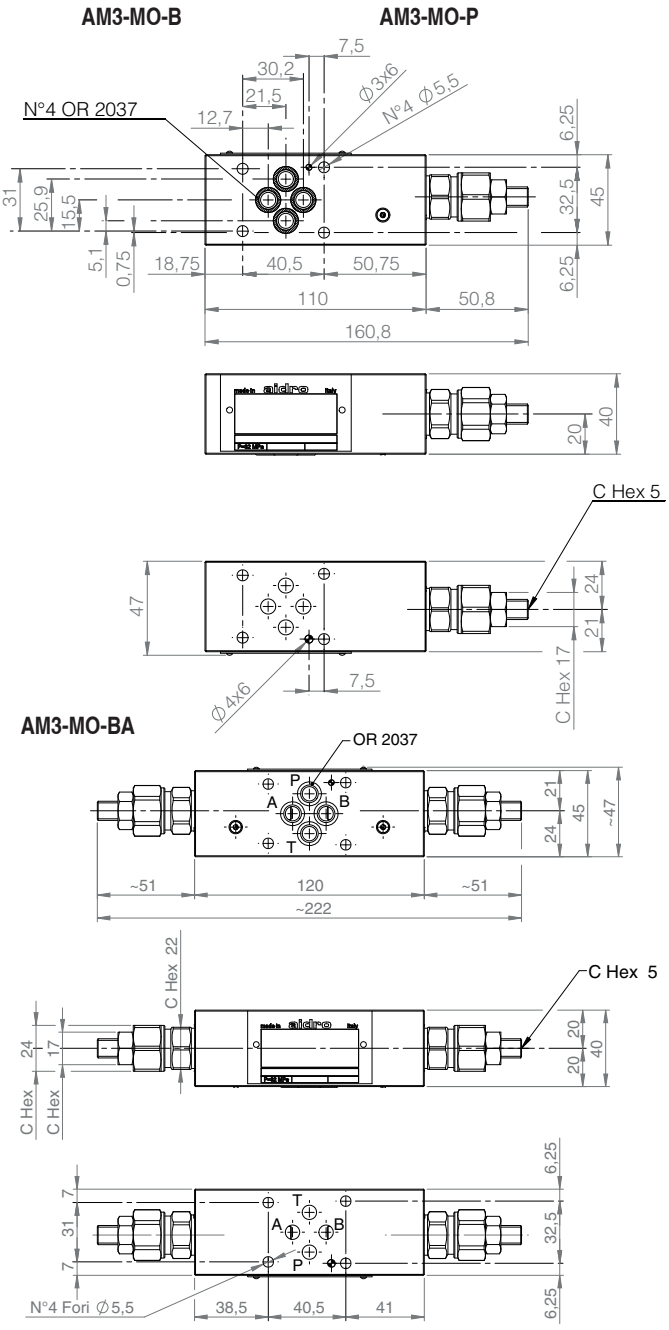
When the required level of pressure is reached, lock the nut 6.

4 TYPICAL DIAGRAMS

Typical ΔΔp-Q curves for valves AM3-MO-* in standard configuration, with mineral oil at 36 cSt and at 50°C



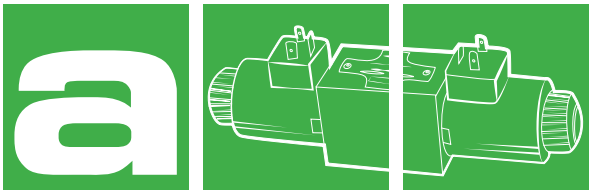
5 INSTALLATION DIMENSIONS (mm)



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3 - * are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

All stackable valves AM3-* conform with ISO and CETOP specifications for mounting surface dimensions. Valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type. All valves have on their "mounting" surface a ø4 mm cylindrical hole and have on their "seals" surface a ø 3 mm locating pin, to conform with the norms. In case of necessity, the pin can be easily removed.



STACKABLE VALVE RELIEF AND BYPASS

AM3-M*-EV*

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

The module acts as relief valve and solenoid by-pass valve with high performances and full CETOP 03 flows. The Pressure relief valve is a 7/8" 14 UNF valve direct operated . Optionally can be installed the pilot operated relief valve which assure a constant behavior at different flow rates. The by-pass valve is a special 3/4" 16 UNF valve with bigger nose, able to manage 50 l/min with low pressure drops.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)
AM3	-		-		-		-		-		/	10

(1) AM3:stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

(2) Pressure relief valve:
MO: Pressure relief valve direct operated
MP: Pressure relief valve pilot operated

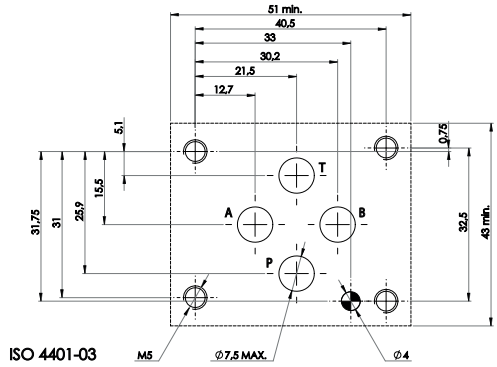
(3) EV: bypass valve pilot operated
EVC: bypass valve normally closed
EVO: bypass valve normally open

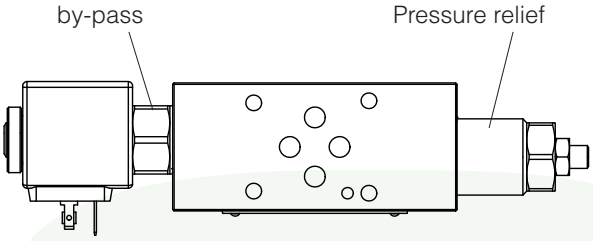
(4) Code reserved for options and variants
04:emergency push button

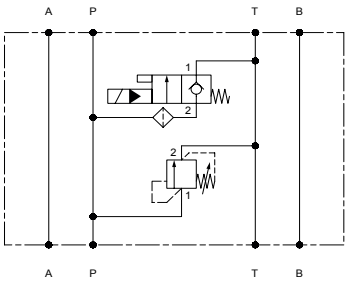
(5) Electric voltage and solenoid coils:
012C: coils for V12DC
024C: coils for V24DC
220R: coils for V220-230 RAC
230/50: coils for V230/50 AC

(6) Coil connection:
no designation: DIN 43650-A ISO 4400
AMP: Amp Junior Timer

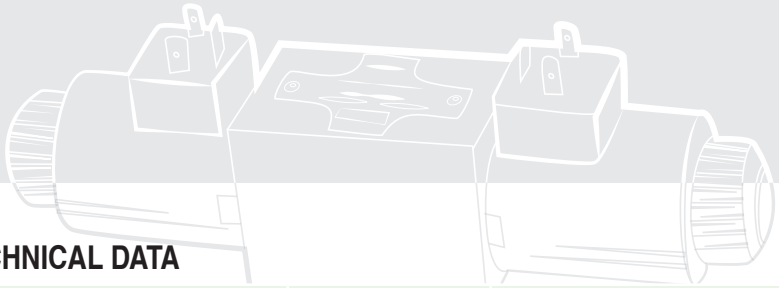
(7) Design number (progressive) of the valves.







Example AM3-MO-EVC.*



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3 TECHNICAL DATA

Maximum nominal flow	50 l/min
Maximum rec. flow rate on free lines	60 l/min
Protection to DIN 40050	IP 65
Maximum nominal pressure	32 MPa (320 bar)
Pressure drops	see 4
Installation and dimensions	see 5
Valve body	steel
Mass	1,5 kg

Electric characteristics:

Valve type AM3-M*EV 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 220/50 - V 230/60 = 230/50

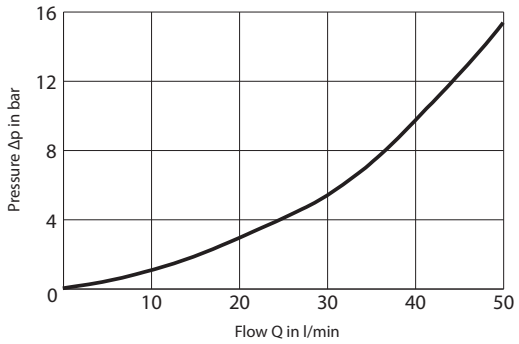
All connectors must conform to ISO 4400 (DIN 43650) and electric circuitry must be able to carry the following rated current values :

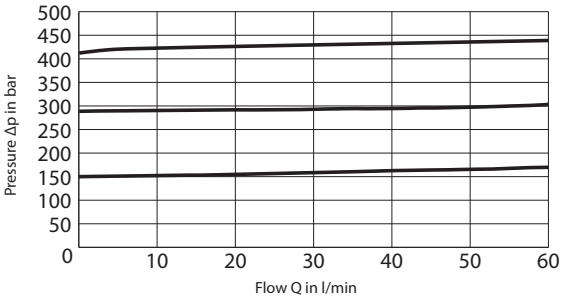
V 12 DC = 1,5 A
V 24 DC = 0,8 A V 230/50 = 0,14 A

Permissible supply voltage variation : ± 10 %

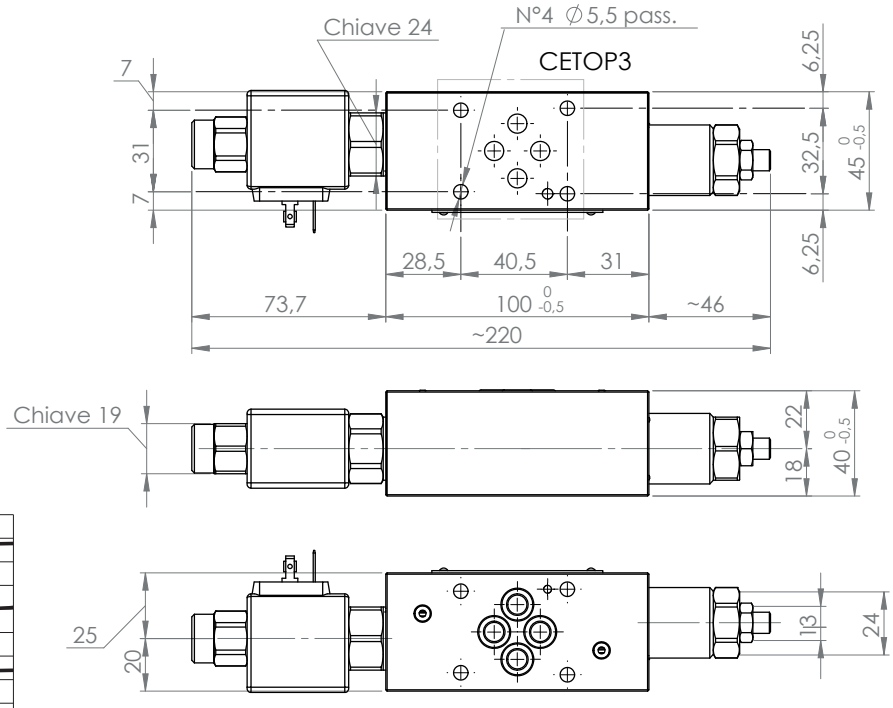
4 TYPICAL DIAGRAMS

Typical P-Q curves for valves AM3-M*EV in standard configuration, with mineral oil at ν=32 mm²/s and at T=40°C.





5 INSTALLATION DIMENSIONS (mm)

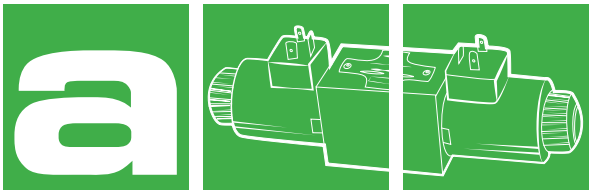


Example AM3-MP-EVC

When assembled to its mounting plate, valve AM3-M*EV 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 O-Ring type 2037.

6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3-* 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.



PRESSURE RELIEF VALVES

AM3-MP-*

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable pressure relief valve pilot operated. The valve is made with a steel body combined with a pressure relief cartridge valve pilot operated for a stable pressure control.
The body of the valve is phosphate coated. The cartridge valve is zinc coated.
The pressure can be set in different pressure ranges.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)
AM3	-	MP	-		/		/		-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

(2) MP: pressure relief- pilot operated

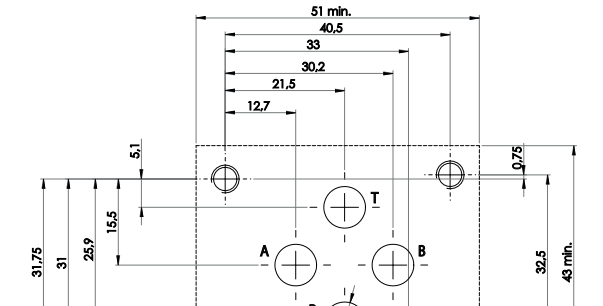
(3) Service lines where the controls operate:
P: relief on P and discharge to T
A: relief on A and discharge to T
B: relief on B and discharge to T
BA: indipendent relief on B and on A and discharge to T
AB: relief on A and B with crossed discharge

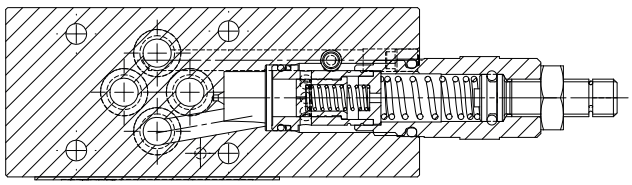
(4) Pressure adjustment ranges:
6,3 : from 1 to 7 MPa (from 10 to 70 bar)
12,5: from 1to 14 MPa (from 10 to 140 bar)
20: from 2 to 21 MPa (from 20 to 210 bar)
32: from 2 to 32 MPa (from 20 to 320 bar)

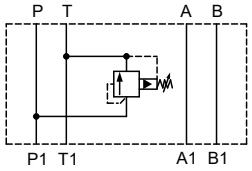
(5) Pressure adjustment range for relief on A
(only for models AM3-MP-BA) or for relief on B for models AM3-MP-AB

(6) Code reserved for more options and variants
M: hand knob
V: viton seals

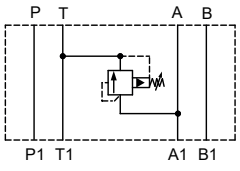
(6) Design number (progressive) of the valves



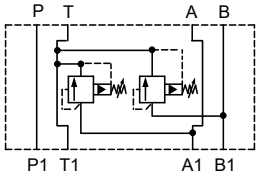




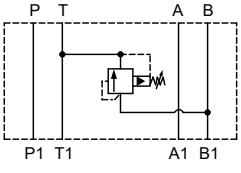
AM3-MP-P



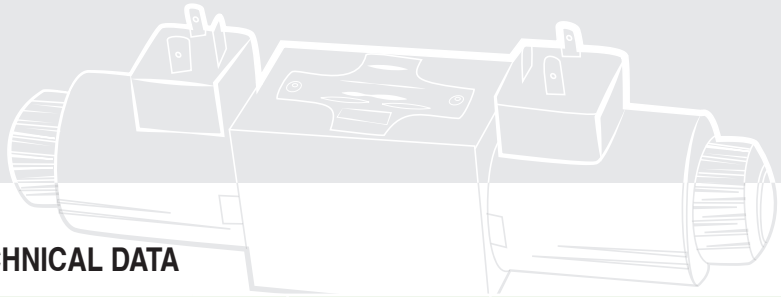
AM3-MP-A



AM3-MP-BA



AM3-MP-B



aidro
Desktop Metal Company

3 TECHNICAL DATA

Maximum nominal flow	
Maximum rec. flow rate	1 dm³/s (60 l/min)
Maximum nominal pressure	32 MPa (320 bar)
Pressure relief curves	see 4
Installation and dimensions	see 5
Masses	
AM3-MP-P	approx 1,7 kg
AM3-MP-BA	approx 2,3 kg

Adjustment of the relief pressure:

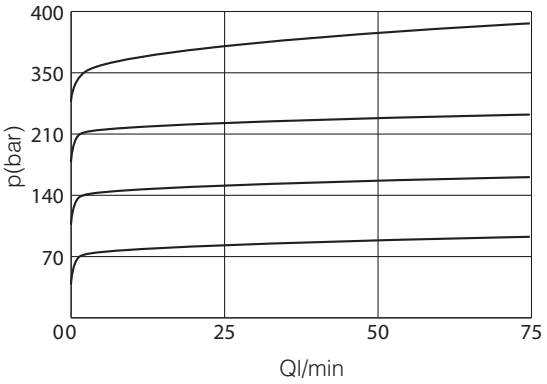
Relief pressure is reached when the axial hydraulic forces on piston 3 equal the force of spring; the value of the relief pressure can be therefore changed, within the limits of the chosen adjustment range, by changing the compression of spring. To increase the relief pressure, turn clock wise the adjustment screw CH5, after having unlocked ist nut CH17 mm.
For each pressure adjustment range, the pressure gradient is approx:

- 6,3: 2 MPa/turn (24 bar/turn)
- 12,5: 4 MPa/turn (40 bar/turn)
- 20: 6,3 MPa/turn (630 bar/turn)
- 32: 10 MPa/turn (100 bar/turn)

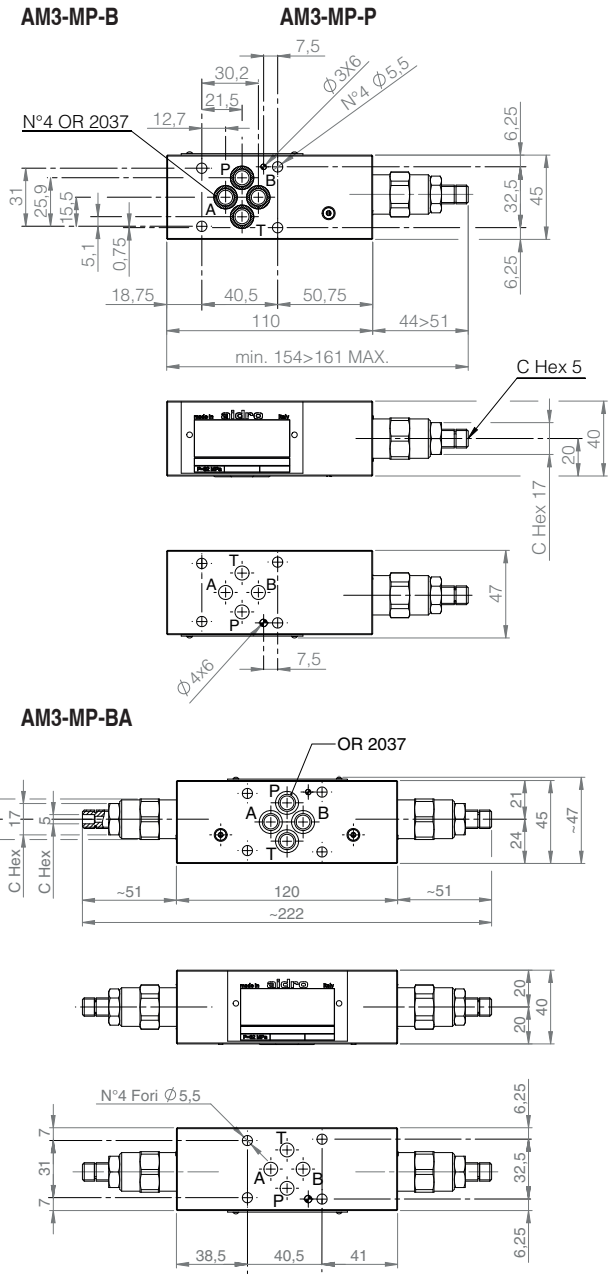
When the required level of pressure is reached, lock the nut CH17mm.

4 TYPICAL DIAGRAMS

Typical curves for valves AM3-MP in standard configuration, with mineral oil at 36 cSt and at 50°C



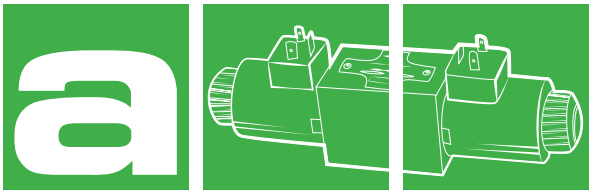
5 INSTALLATION DIMENSIONS (mm)



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3-* are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

All stackable valves AM3-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals type OR 2037.



PRESSURE REDUCING VALVES

AM3-RO-*

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable pressure reducing valve direct operated. The valve is made with a steel body combined with a pressure relief valve integrated in the body.The body of the valve is phosphate coated. The cartridge valve is zinc coated. The pressure can be set in different pressure ranges.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	RO	-		/		-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

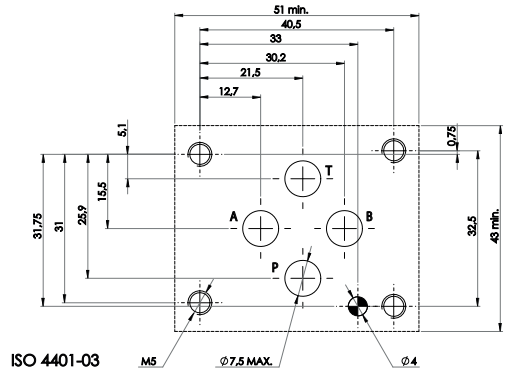
(2) RO: pressure reducing,direct operated- 3 way valve

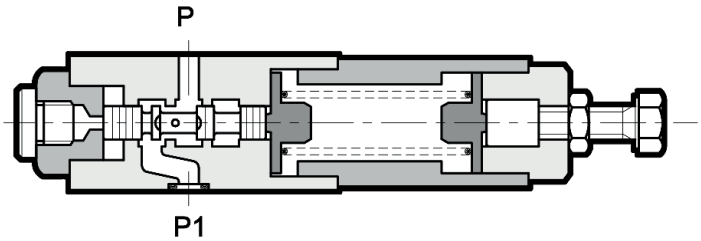
(3) Service lines where the controls operate:
P: control on P with 3ª way and drain to T line
A: control on A with 3ª way and drain to T line
B: control on B with 3ª way and drain to T line

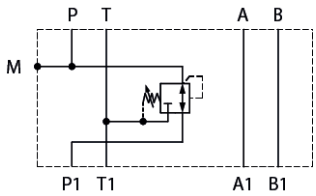
(4) Pressure adjustment ranges:
3,2 : from 0,3 to 3,5 MPa (from 3 to 35 bar)
6,3: from 1 to 7 MPa (from 10 to 70 bar)
12,5: from 3 to 14 MPa (from 30 to 140 bar)
25: from 6 to 28 MPa (from 60 to 280 bar)

(5) Code reserved for more options and variants
M= adjustment hand knob

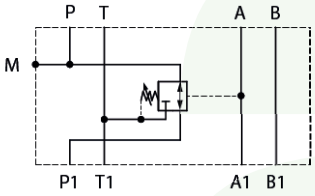
(6) Design number (progressive) of the valves



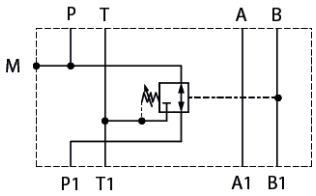




AM3-RO-P

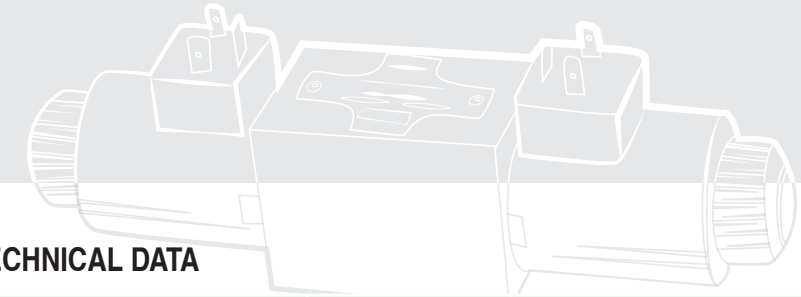


AM3-RO-A



AM3-RO-B

All valves AM3-RO-* are 3 way, direct operated: If the pressure in the regulated chamber overcomes the value of the adjusted, reduced pressure, the valve discharges to T (at pressure value higher then the reduced pressure- see diagrams) thus acting as safety or relief valve.



3 TECHNICAL DATA

Maximum rec. flow rate on free lines	1d m^3/s (60 l/min)
on controlled lines	0,66 dn3/s (40 l/min)
Maximum nominal pressure	32 MPa (320 bar)
Maximum pressure on T	10 MPa (100 bar)
Max drain	<1,2 cm^3/s (0,07 l/min)
Pressure curves	see 4
Installation and dimensions	see 5
Masses	
AM3-RO	approx 2,3 kg

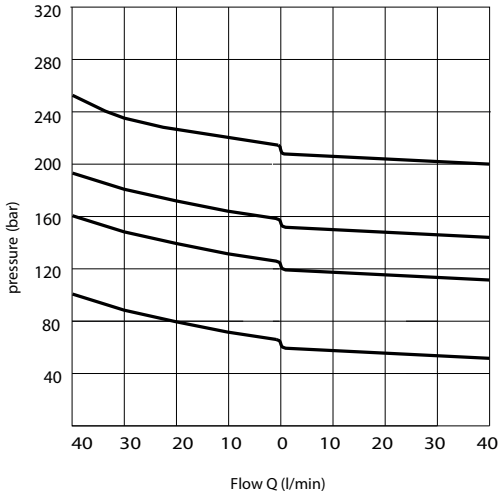
Adjustment of the relief pressure:

Reduced pressure is obtained by throtting the flow on spool which is balanced, on one side, by the reduced pressure and, on the other side by the positioning spring. The value of the reduced pressure is changed by changing the compression of spring. To increase the value of the reduced pressure, turn clockwise the handknob or screw 3 by acting on ex. CH17 mm, after having unlocked ist nut. when the required level of pressure is reached, lock the nut.

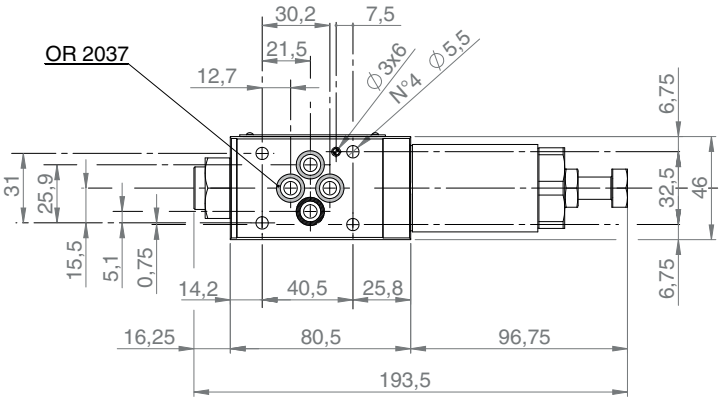
For each pressure adjustment range, the pressure gradient is approx:
- 3,2: 0,7 MPa/turn (7 bar/turn)
- 6,3: 1,4 MPa/turn (14 bar/turn)
- 12,5: 2,5 MPa/turn (25 bar/turn)
- 25: 5 MPa/turn (50 bar/turn)

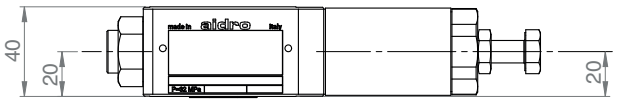
4 TYPICAL DIAGRAMS

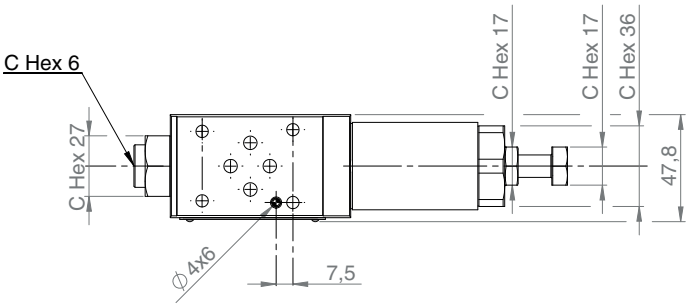
Typical curves for valves AM3-RO in standard configuration, with mineral oil at 36 cSt and at 50°C



5 INSTALLATION DIMENSIONS (mm)



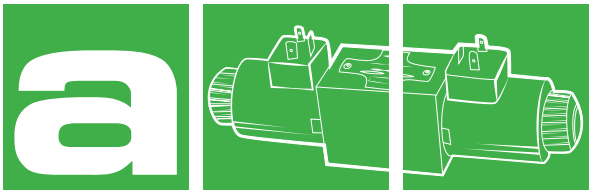




6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3-* are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 406 class 19/17/14, or better, and used in a recom ended viscosity range from 10 cSt to 60 cSt.

All stackable valves AM3-RO-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals type OR 2037.



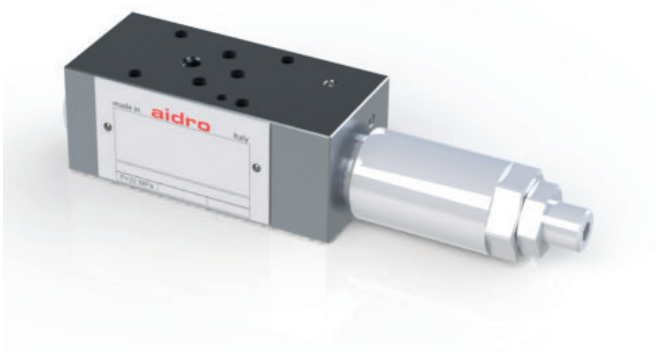
DIRECT ACTING, PRESSURE REDUCING VALVES ON B LINE

AM3-RO-BC/6,3

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable pressure reducing valve direct operated. The valve is made with a steel body combined with a pressure relief cartridge valve and with a check valve. The body of the valve is in aluminium. The cartridge valve is zinc coated.
The pressure can be set in different pressure ranges.



2 ORDERING CODE

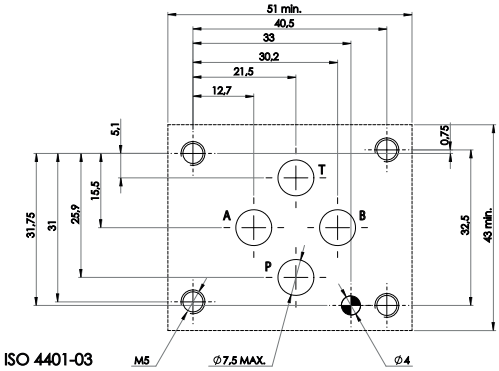
(1)		(2)		(3)		(4)
AM3	-	RO	-	BC	/	6,3

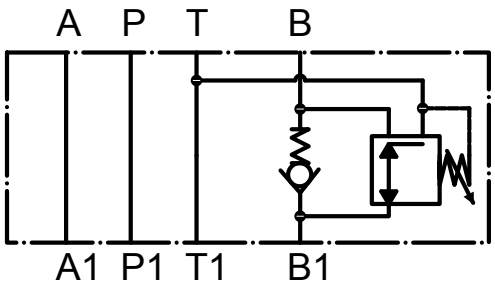
(1) AM3: stackable valve CETOP 03

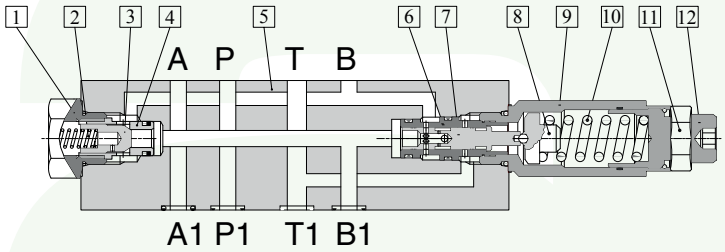
(2) RO: pressure reducing,direct operated- 3 way valve

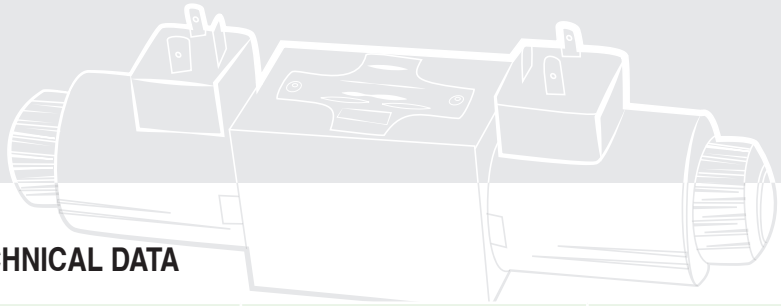
(3) BC: line where the control operates: B with check valve

(4) 6,3: controlled pressure adjustment ranges (up to 6,3 MPa)





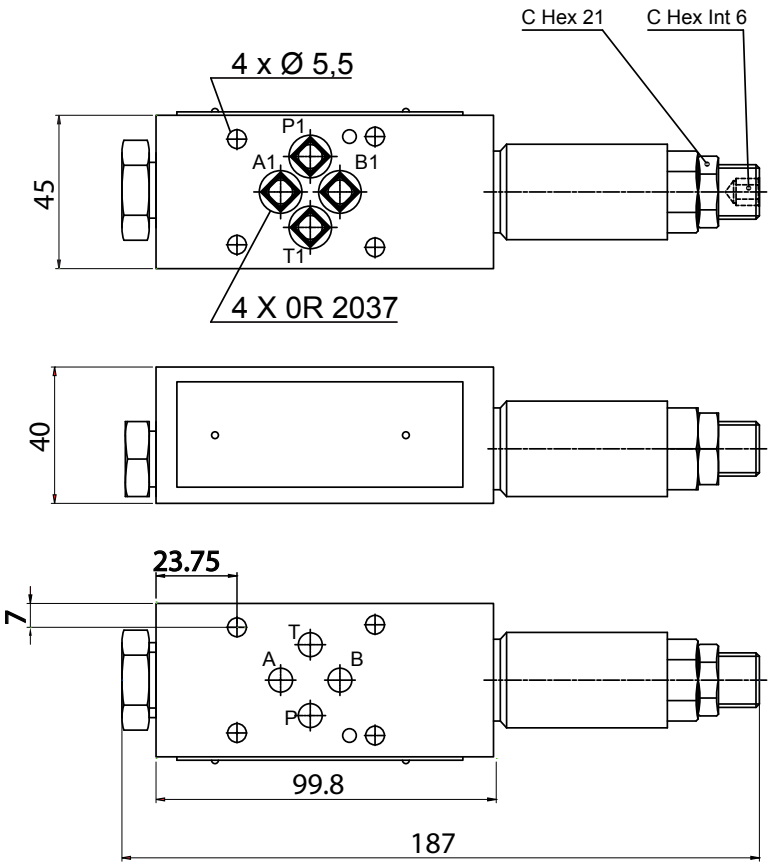




3 TECHNICAL DATA

Maximum nominal pressure	32 MPa (320 bar)	Adjustment of the regulated pressure:
Maximum pressure on B line	15 MPa (150 bar)	The pressure in B1 line can be set by acting on the adjustment element 12 (screw with internal hexagon 6 mm), after having unlocked its retaining nut 11. Turn clockwise to increase pressure at B1 port.
Maximum rec. flow on B line	20 l/min	
Maximum rec. flow on free lines	60 l/min	
Regulated pressure on B1 line	up to 6,3 MPa (63 bar)	

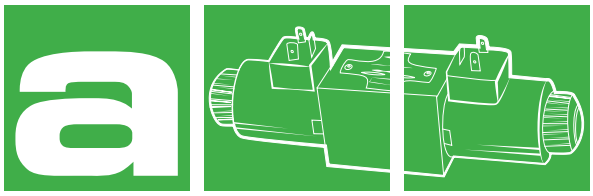
4 INSTALLATION DIMENSIONS (mm)



All stackable valves AM3- * conform with ISO and CETOP specifications for mounting surface dimensions. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type.

5 HYDRAULIC FLUIDS

Seals and materials used on standard valve AM3-* are fully coMPatible with hydraylic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.



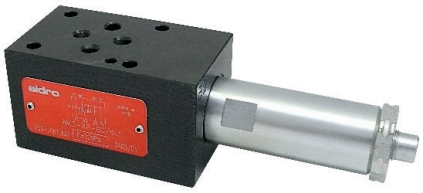
PRESSURE REDUCING MODULAR VALVES

AM3-RP-*

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable pressure reducing valve pilot operated. The valve is made with a steel body combined with a pressure relief valve. The body of the valve is phosphate coated. The cartridge valve is zinc coated.
The pressure can be set in different pressure ranges.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	RP	-		/		-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

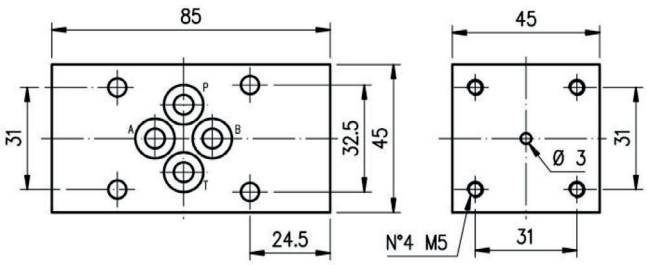
(2) RP: pressure reducing, pilot operated- 3 way valve

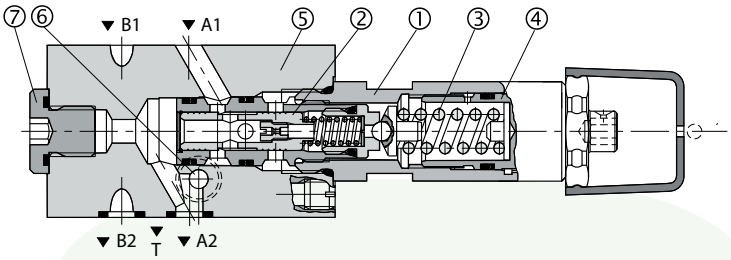
(3) Service lines where the controls operate:
P: control on P with 3ª way and drain to T line
AC: control on A with check valve

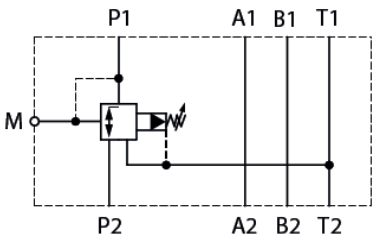
(4) Pressure adjustment ranges:
6,3: from 0,5 to 7MPa (from 5 to 70 bar)
14: from 1 to 14MPa (from 30 to 140 bar)
20: from 1 to 21 MPa (from 10 to 210 bar)

(5) Code reserved for more options and variants
M= adjustment hand knob

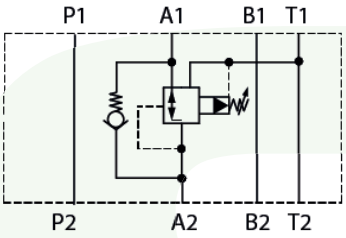
(6) Design number (progressive) of the valves



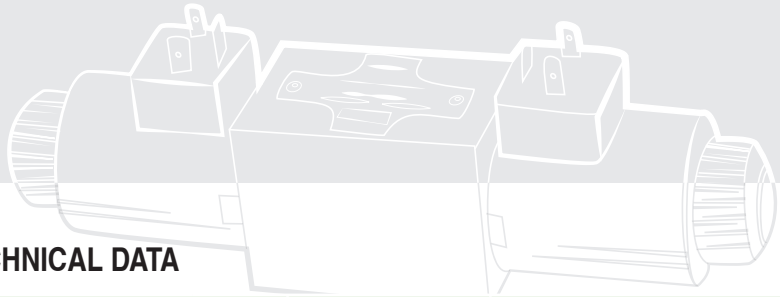




AM3-RP-P



AM3-RP-AC



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3 TECHNICAL DATA

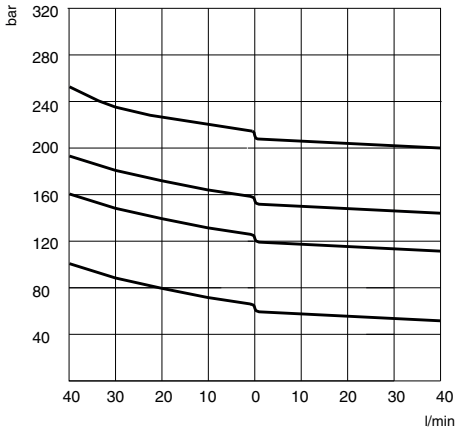
Maximum rec. flow rate on free lines	1 dm³/s (60 l/min)
on controlled lines	0,66 dm³/s (40 l/min)
Maximum nominal pressure	32 MPa (320 bar)
Maximum pressure on T	10 MPa (100 bar)
Pilot flow rate	4 cm³/s (0,24 l/min)
Pressure curves	see ☐
Installation and dimensions	see 5
Masses	
AM3-RP-P	approx 1,1 kg
AM3-RP-AC	approx 1,45 kg

Adjustment of the pressure:

Reduced pressure is obtained by throtting the flow on spool 2 which is balanced, on one side, by the reduced pressure and, on the other side by the positioning spring and by the pilot pressure. Pilot pressure in estabilished by the action on spring 3 on the pilot valve 7. The value of the reduced pressure is changed by changing the compression of spring 3. To increase the value of the reduced pressure, turn clockwise the handknob or screw by acting on ex. CH10mm, after having unlocked ist nut 8 (CH 26 mm). When the required level of pressure is reached, lock the nut 8.

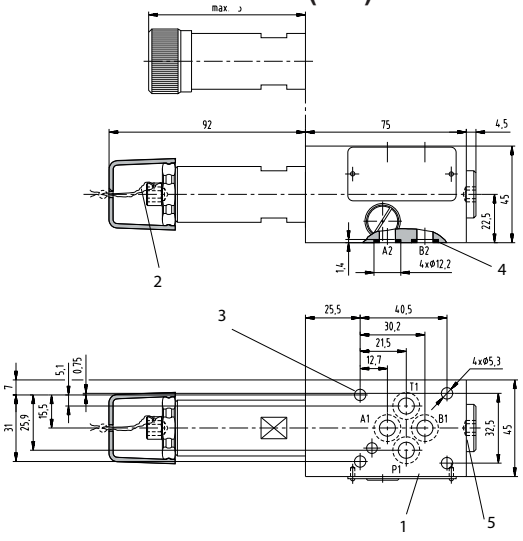
4 TYPICAL DIAGRAMS

Typical curves for valves AM3-RP in standard configuration, with mineral oil at 36 cSt and at 50°C

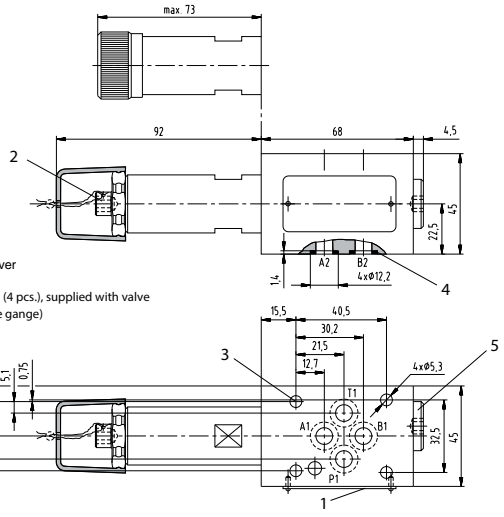


All valves AM3-RP-* are 3 way, direct operated:
If the pressure in the regulated chamber overcomes the value of the adjusted, reduced pressure, the valve discharges to T (at pressure value higher then the reduced pressure- see diagrams) thus acting as safety or relief valve. Valves reducing pressure anA or B lines are with integral check valve 9 (types AM3-RP-AC or BC) and they allow reverse flow to port A or B of the solenoid valve.

5 INSTALLATION DIMENSIONS (mm)

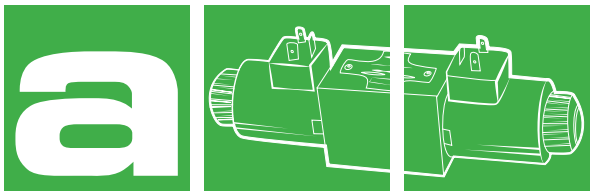


Model AM3-RP-P



1 Label
2 Adjustment screw cover
3
4 Square ring 9.25 x 1.68 (4 pcs.), supplied with valve
5 Plug G1/4 (for pressure gange)

All stackable valves AM3-RP-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height 45 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals type OR 2037.



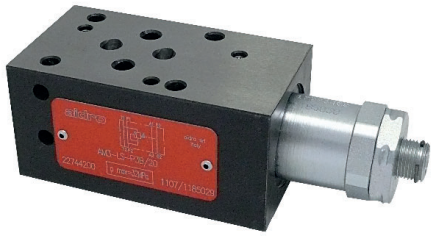
MODULAR VALVES 3-WAY PRESSURE COMPENSATOR WITH LOAD SENSING

AM3-LS-P3

40 l/min - 32 MPa (320 bar)

1 DESCRIPTION

3 way pressure compensator normally used together with proportional directional valves in order to control the flow indipendetly from pressure variations.
The selection of the piloting pressure is made by the use of the integrated shuttle valve which controls the ports A and B.



2 ORDERING CODE

(1)		(2)		(3)	(4)	(5)		(6)		(7)
AM3	-	LS	-	P	3		/		/	10

(1) AM3: 4-way modular valve CETOP 03

(2) LS: pressure compensator with "Load sensing" function and adjustable QP

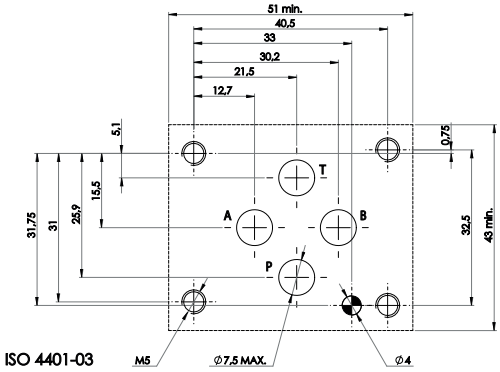
(3) P: control on P line

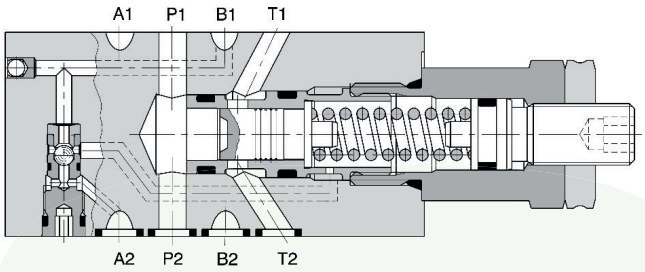
(4) 3: 3-way compensator with unloading of exceed pressure in T

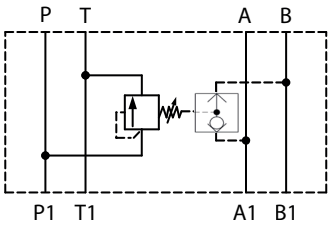
(5) Control versions:
no designation: control in A and B
A: control in A
B: control in B

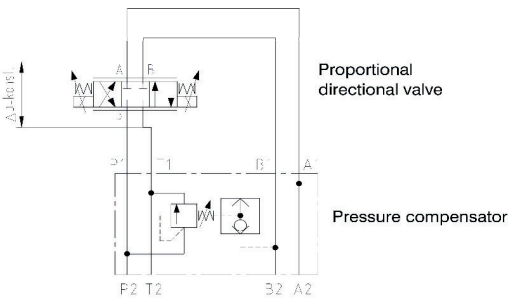
(6) Code reserved for more options and variants
M= adjustment knob

(7) Design number (progressive) of the valves



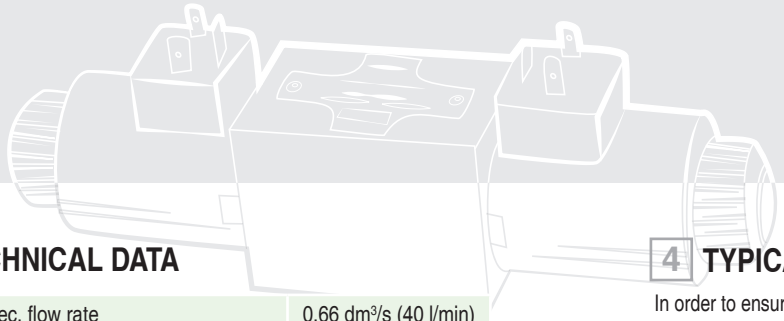






example of application

The valve is a 3-way pressure compensator, with direct action, modular version with the mounting surface correspondent to CETOP and ISO standards. It's function is a maintenance of pressure drops DP characteristics between the P and A or B. Normally used in a combination with directional proportional valves in order to provide control of the flow independently from the variations of the pressure. The selection of the pressure of the pilot on A and B lines is automatically executed by a check valve incorporated in the compensator

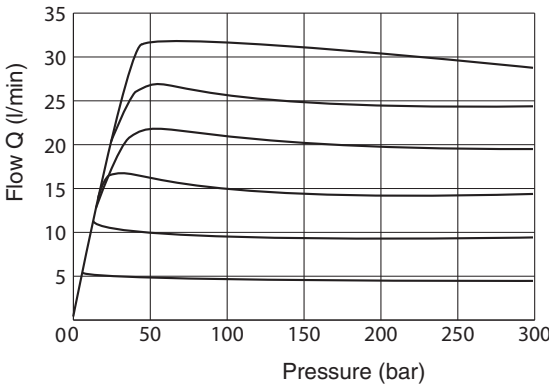


3 TECHNICAL DATA

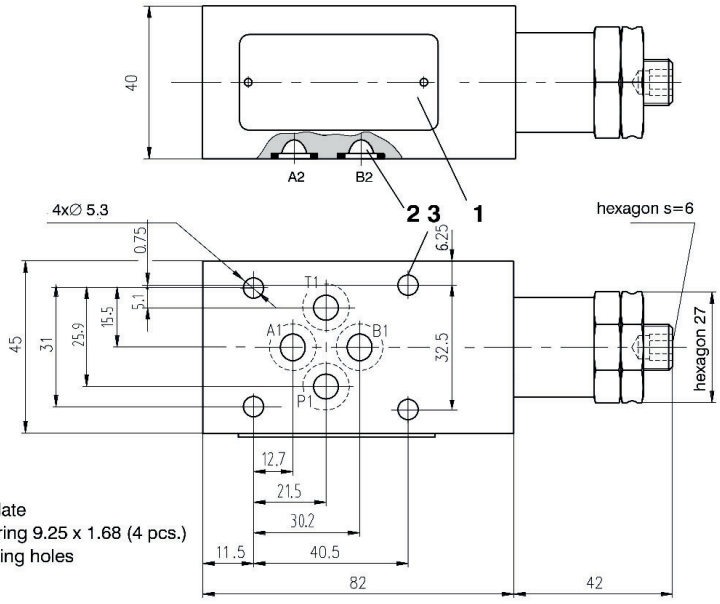
Maximum rec. flow rate	0,66 dm³/s (40 l/min)
Maximum nominal pressure	32 MPa (320 bar)
Setting calibration Δp	adjustable from 0,5 to 4 MPa (5-40 bar)
Installation and dimensions	see 5
Mass	1kg

4 TYPICAL DIAGRAMS

In order to ensure the correct control function the outside pressure difference has to be increased when increasing the flow resistance due to a flow rate increase



5 INSTALLATION DIMENSIONS (mm)



1 Name plate
2 Square ring 9.25 x 1.68 (4 pcs.)
3 4 mounting holes

The valves AM3-LS-P3* conform to ISO and CETOP standards with regards to mounting surface. Height of stacking is 40 mm. The sealing between the valve and mounting surface is insured by 4 seals type OR 2037 or Quad-ring.

6 CALIBRATION OF ΔP

Efficient calibration of ΔP of the valve AM3-LSP3 is fundamental procedure for setting range of flow to utensils. Increasing DP, according to the non-linear law, increases also value of compensated flows, that pass through regulating organ (throttle with variable orifice) independently of working pressure of the system. For example in a system illustrated in Typical applications p.1, composed of AM3-LSP3 and proportional valve HD3-PS-3RC-xx (see table HD3-PS), with DP of the valve of 1 MPa (10 bar), the flow to the actuator will be between 0 and 16 l/min, with ΔP of the valve of 3 MPa (30 bar), the flow to the actuator will be between 0 and 28 l/min (always independently of working pressure of the system). Therefore it is essential in order to optimize functioning of the system to regulate ΔP of the compensator. This can be done by acting with CH6 mm on the pin regulator after locking nut has been loosen to CH27 mm: it is suggested to loosen the spring completely by turning the pin with thread pitch 1,25 mm anticlockwise until full mechanical stop.

Thereafter by turning clockwise you obtain:
ΔP = 0,4 MPa (4 bar) run 2,5 mm* (2 turns)
ΔP = 1,2 MPa (12 bar) run 3,75 mm* (3 turns)
ΔP = 2,1 MPa (21 bar) run 5 mm* (4 turns)
ΔP = 3 MPa (30 bar) run 6,25 mm* (5 turns)
ΔP = 3,9 MPa (39 bar) run 7,5 mm* (6 turns)
* including one initial "dead" turn of appr. 2 mm (1,5 turns).

After desired calibration was done, lock with the fixing nut 1 to CH27 mm.

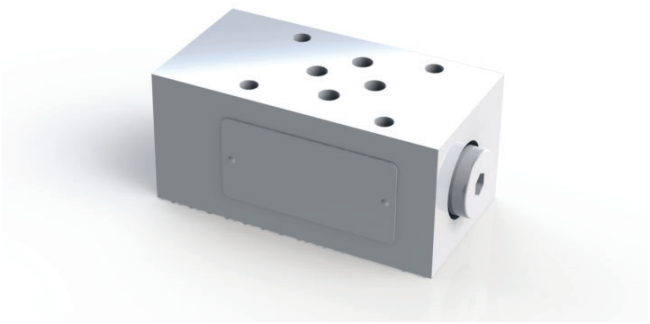
2-WAY PRESSURE COMPENSATOR MODULAR VALVES

AM3-PC-*

32 l/min - 32 MPa (320 bar)

1 DESCRIPTION

2 Way pressure compensator for meter- in application. The pressure variations due to loading changes are compensated that means that an increase in pump pressure cannot result in any flow icrease. Provided that there is no preloading of the outlet port, the use of a meter in pressure compensator is limited only to drives with exclusively positive load direction.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	PC	-		/		-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

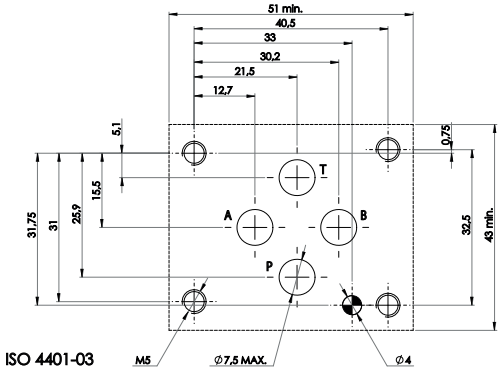
(2) PC: pressure compensator 2-way valve

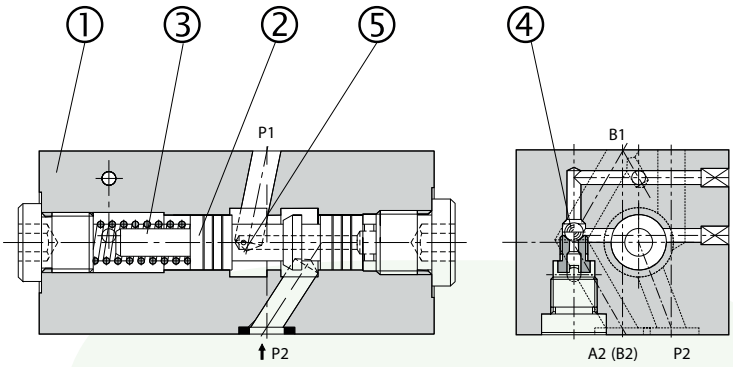
(3) Service lines where the controls operate:
P: control on P with A, B selection
A: control on A
B: control on B

(4) Pressure compensator Δp
Δp standard= 1MPa (10 bar)

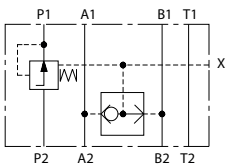
(5) Code reserved for more options and variants
V: viton seals

(6) Design number (progressive) of the valves

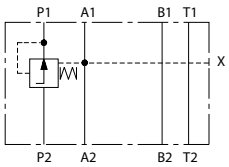




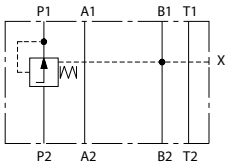
AM3-PC-P



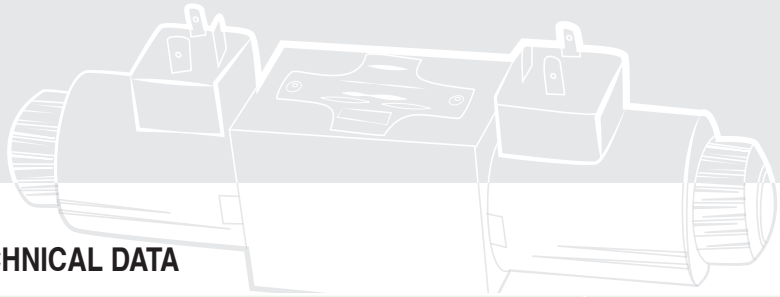
AM3-PC-A



AM3-PC-B



Valves AM3-PC-* are directly operated 2-way pressure compensators .
The main parts of these valves are the housing 1, control spool 2, spring 3 and logic valve 4. The spring 3 holds the spool in the open position from P2 to P1, provided that the pressure difference between P1 and A (P1 - B) is less than fip = 10 bar. When the pressure difference exceeds the value of fip = 10 bar, the spool shifts against spring until the desired pressure difference has been restored.



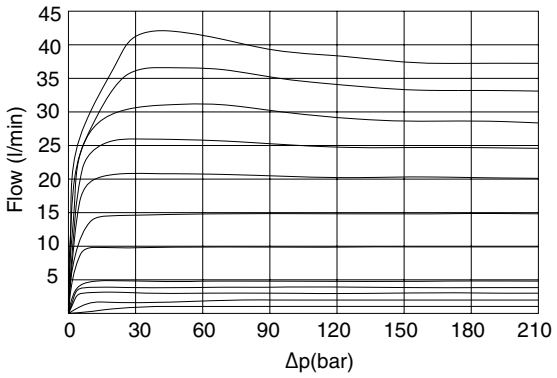
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3 TECHNICAL DATA

Maximum rec. flow rate	32 l/min
Maximum nominal pressure	32 MPa (320 bar)
Pressure curves	see 4
Installation and dimensions	see 5
AM3-PC-P	approx 1,1 kg

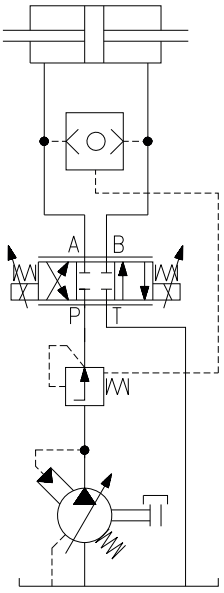
4 TYPICAL DIAGRAMS

Typical curves for valves AM3-PC in standard configuration, with mineral oil at 36 cSt and at 50°C

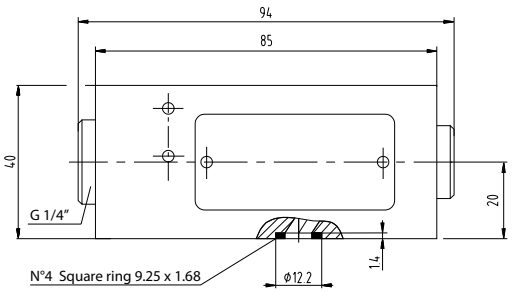


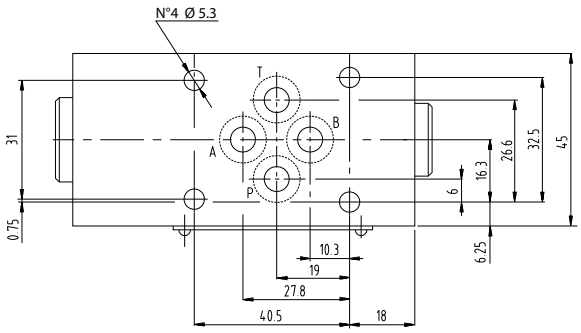
EXAMPLE

Two way pressure compensator for meter-in application



5 INSTALLATION DIMENSIONS (mm)

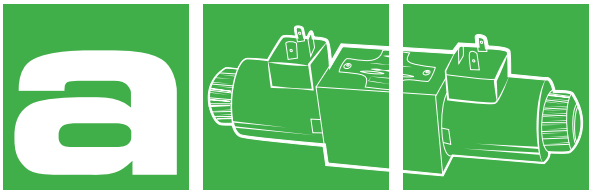




All stackable valves AM3-PC-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals type OR 2037.

6 HYDRAULIC FLUIDS

Seals and materials used on standard valve AM3-* are fully coMPatible with hydraylic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.



PRESSURE COMPENSATED FLOW CONTROL VALVES

AM3-Q3-P

40 l/min - 32 MPa (320 bar)

1 DESCRIPTION

3 way pressure compensated flow control valves are designed to provide adjustable controlled flow rates indipendently from system pressure variations



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	Q3	-	P	/	16	-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

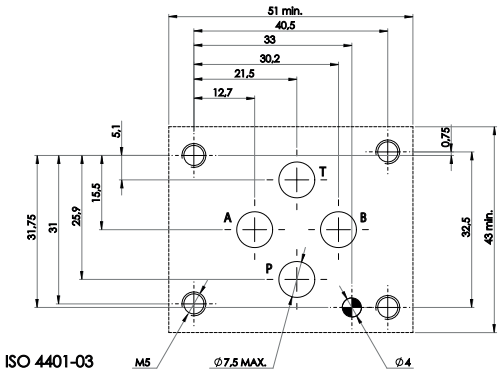
(2) Q3: 3-way pressure compensated flow control valves

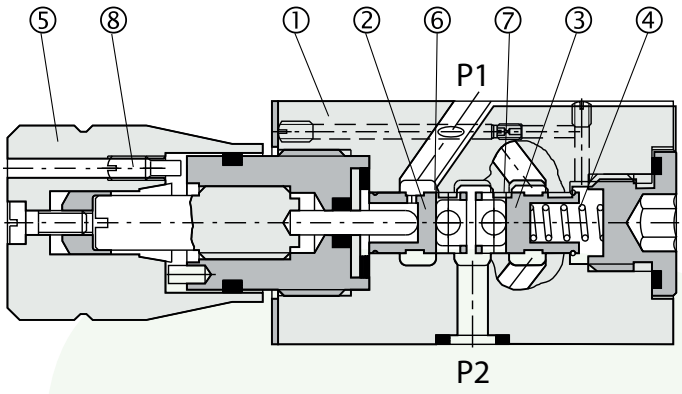
(3) P: Service lines where the controls operate

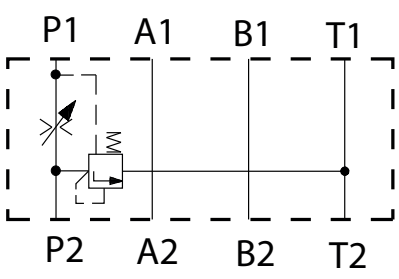
(4) Flow control characteristics:
16=0,06-> 16l/min max regulated flow control rate to P1.
When the inlet flow (at P2) is more than the regulated value, the excess is discharged at T line

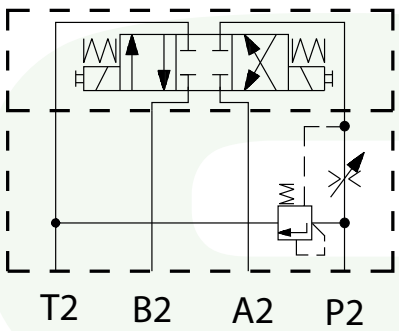
(5) Code reserved for more options and variants

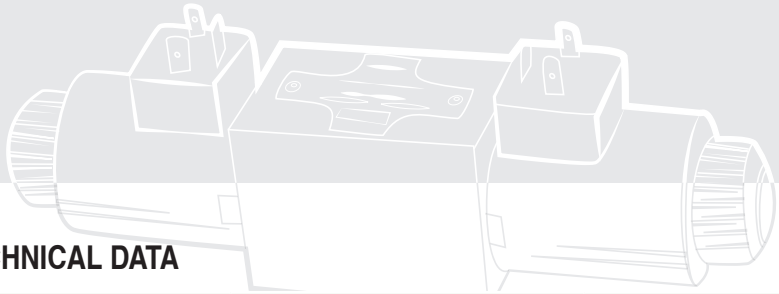
(6) Design number (progressive) of the valves











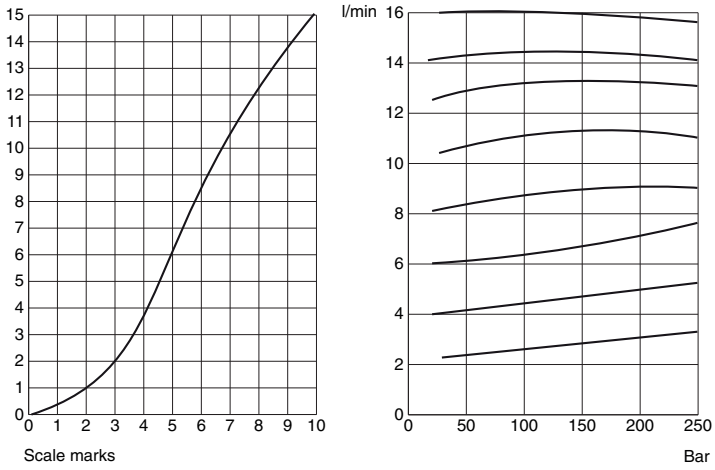
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3 TECHNICAL DATA

Maximum rec. flow rate	40 l/min	Control of the flow:
Maximum flow rate on P1 port	16 l/min	By turning the knob 5, the value of the regulated flow changes. The scale/flow characteristic is approx linear and the full range is covered by turning the knob by approx 320°. The scale is divided in 10 marks. Clockwise: flow increases Anticlockwise: flow decreases When the required value is reached, set the knob position by fixing screw 8.
Maximum nominal pressure	32 MPa (320 bar)	
Flow curves	see 4	
Installation and dimensions	see 6	
Mass	approx 0,8 kg	

4 TYPICAL DIAGRAMS

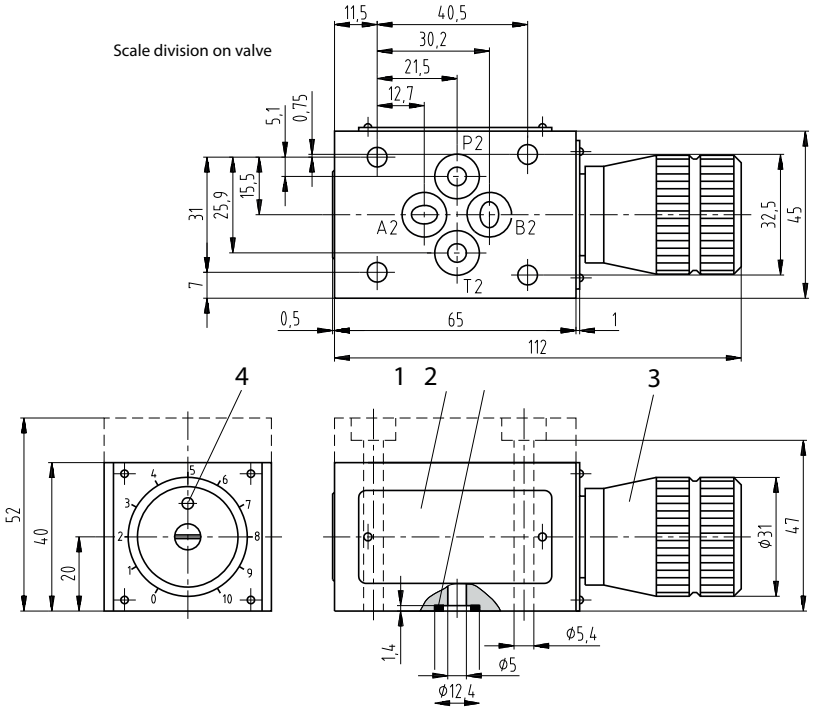
Typical adjustment curves (Q-marcks and Q-P) for valves AM3-Q3-P in standard configuration



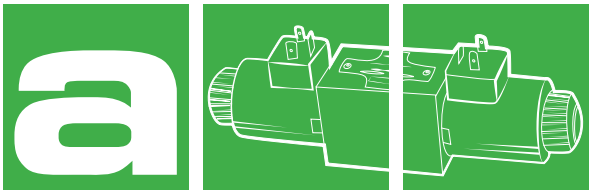
5 HYDRAULIC FLUIDS

Seals and materials used on standard valve AM3-* are fully coMPatible with hydraylic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

6 INSTALLATION DIMENSIONS (mm)



All stackable valves AM3-Q3- * conform with ISO and CETOP specifications for mounting surface dimensions and for valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals type OR 2037.



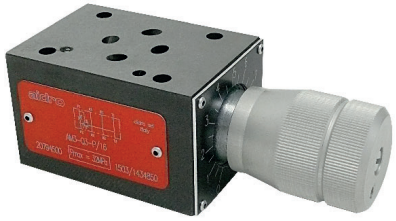
PRESSURE COMPENSATED FLOW CONTROL VALVES

AM3-Q*-A

40 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Pressure compensated flow control valve designed to provide adjustable controlled flow indipendent from system pressure variations.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	Q*	-	A	/		-		/	10

(1) AM3: stackable valve CETOP 03 - Pressure 32 MPa (320 bar)

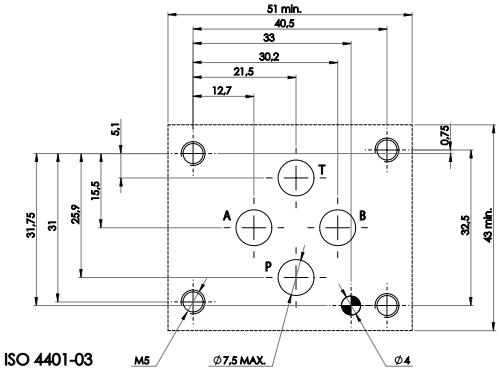
(2) Q: the options are:
QC: one-way pressure compensated flow control valves with meter-out control (referred to the hidraulic actuator)
QX: as above, with meter-in control

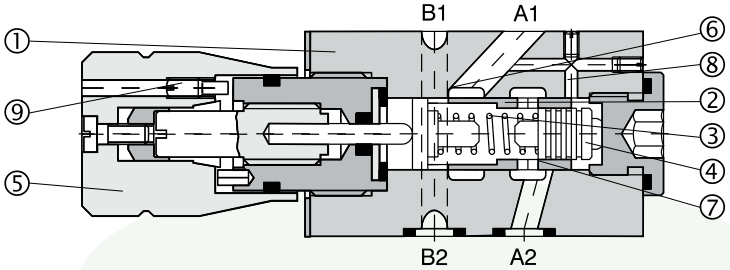
(3) A: Service lines where the controls operate

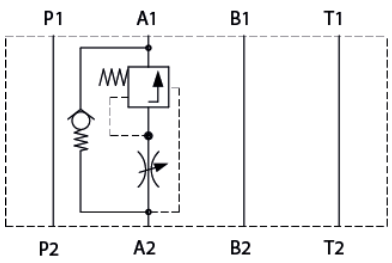
(4) Range of regulated flow:
06= 0-> 6 l/min
12= 0-> 12 l/min
22= 0-> 22 l/min

(5) Code reserved for more options and variants

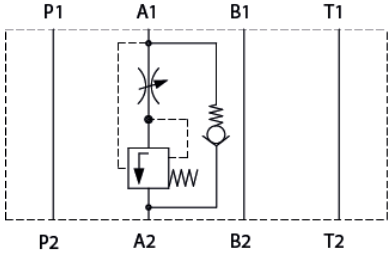
(6) Design number (progressive) of the valves



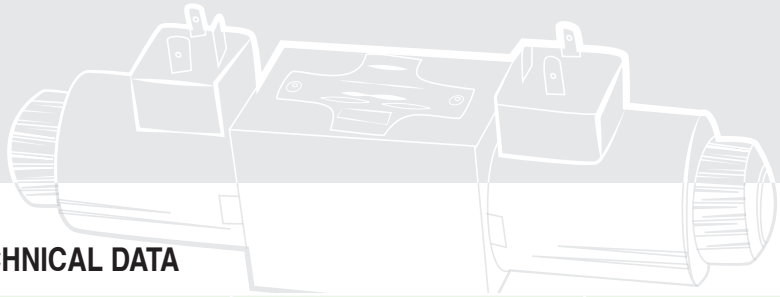




AM3-QC-A



AM3-QX-A



aidro
Desktop Metal Company

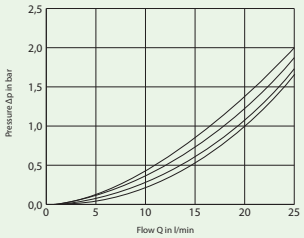
3 TECHNICAL DATA

Maximum rec. flow rate	40 l/min
Maximum flow rate on A port	24 l/min
Maximum nominal pressure	32 MPa (320 bar)
Flow curves	see 4
Installation and dimensions	see 5
Mass	approx 0,8 kg

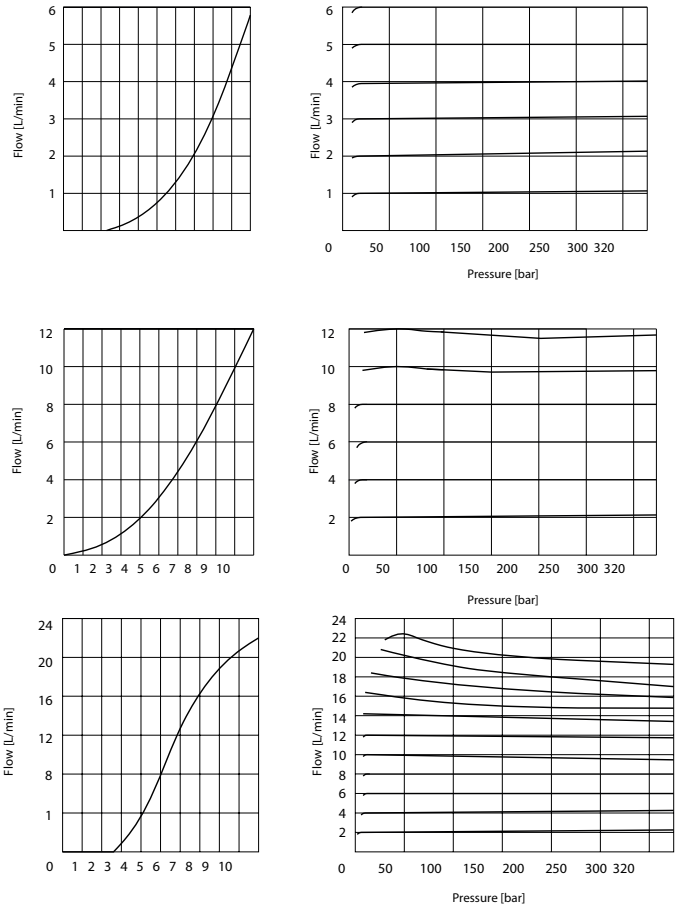
Control of the flow:

By turning the knob 5, the value of the regulated flow changes. The scale/flow characteristic is approx linear (see 4) and the full range is covered by turning the knob by approx 320°. The scale is divided in 10 marks.
Clockwise: flow increases
Anticlockwise: flow decreases
When the required value is reached, set the knob position by fixing screw 8.

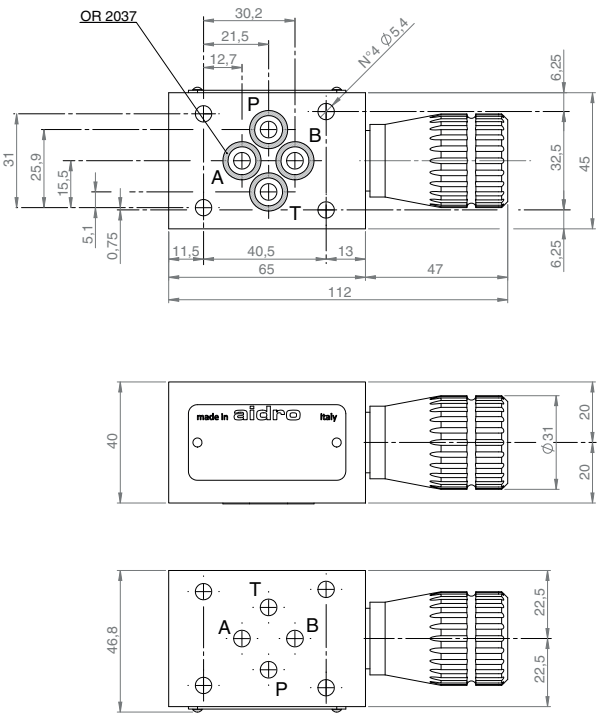
Δp-Q characteristics
Pressure drops for reverse flow



4 TYPICAL DIAGRAMS



5 INSTALLATION DIMENSIONS (mm)



All stackable valves AM-Q*-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height 40 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals type OR 2037.

6 HYDRAULIC FLUIDS

Seals and materials used on standard valve AM3-* are fully coMPatible with hydraylic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

PRESSURE COMPENSATED FLOW CONTROL VALVES

QVC-06

32 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Pressure compensated flow control valve designed to provide adjustable controlled flow indipendent from system pressure variations.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
QVC	-	06	/		-		-		/	10

(1) QVC: pressure compensated, variable flow control valve with integral check valve for reverse flow

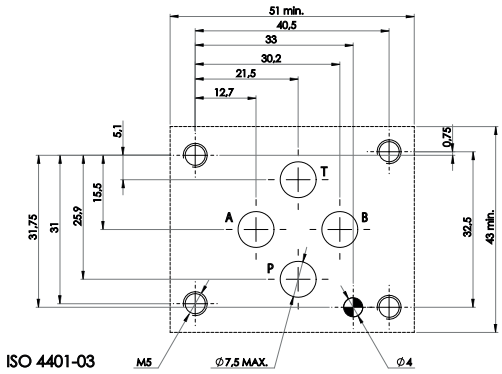
(2) 06: size CETOP 03- pressure 32 MPa (320 bar)

(3) Range of regulated flow:
- 01= 0 -> 1,6 l/min
- 03= 0 -> 3,2 l/min
- 06= 0 -> 6,3 l/min
- 16= 0 -> 16 l/min
- 32= 0 -> 32 l/min

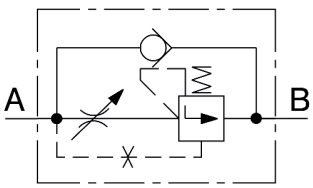
(4) Pilot pressure arrangement
- no designation: internal (standard)
- E: external via P port

(5) Code reserved for more options and variants
- no designation: no variant (standard)
- K: key lock on the adjustment knob

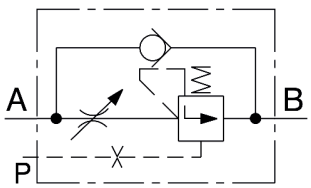
(6) Design number (progressive) of the valves

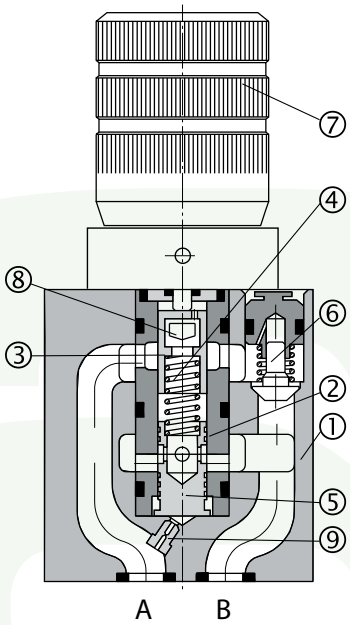


without external pilot



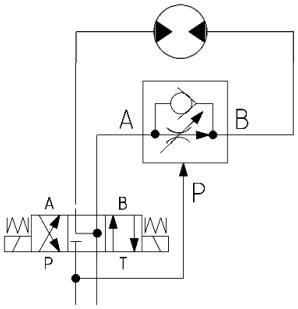
with external pilot

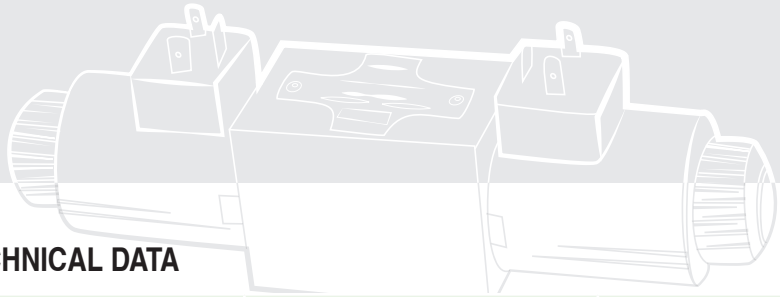




EXAMPLE:

QVC-06/*-E with external pilot is used for metering-in circuits to avoid “jumps” when the actuator starts



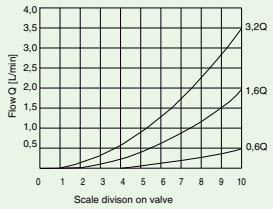


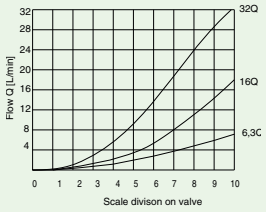
3 TECHNICAL DATA

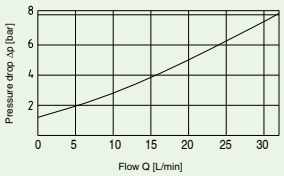
Maximum rec. flow rate	32 l/min
Maximum nominal pressure	32 MPa (320 bar)
Flow curves	see 4
Adjustment	see
Installation and dimensions	see
Mass	approx 1,2 kg

Control of the flow:

By turning the knob 5, the value of the regulated flow changes. For each range of flow (0->1,6; 0->3,2; 0->6,3; 0->16; 0->32 l/min) the scale/flow characteristics is approx linear (see below) and the full range is covered by turning the knob by approx 350°. The scale is divided in 10 marks.
Clockwise: flow increases
Anticlockwise: flow decreases
When the required value is reached, set the knob position by fixing screw 8.

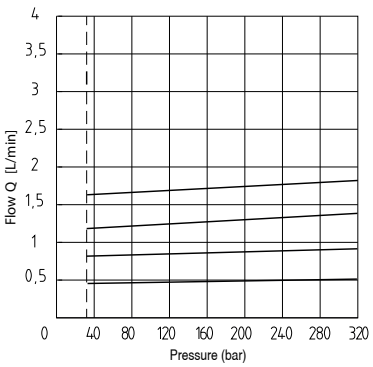




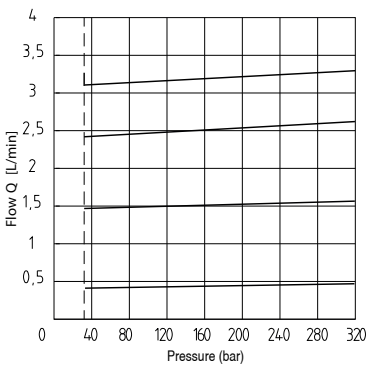


4 TYPICAL DIAGRAMS

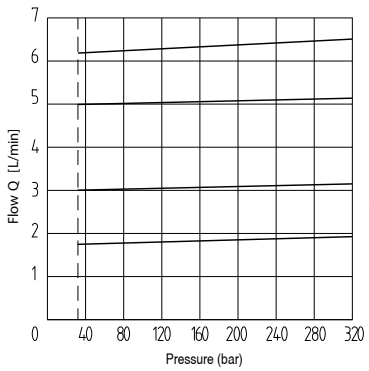
01



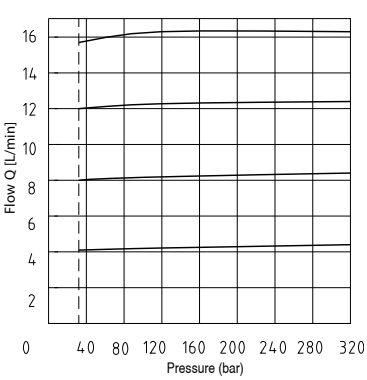
03



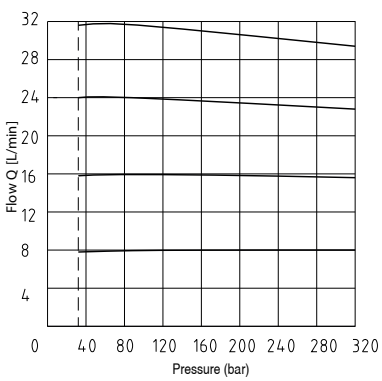
06



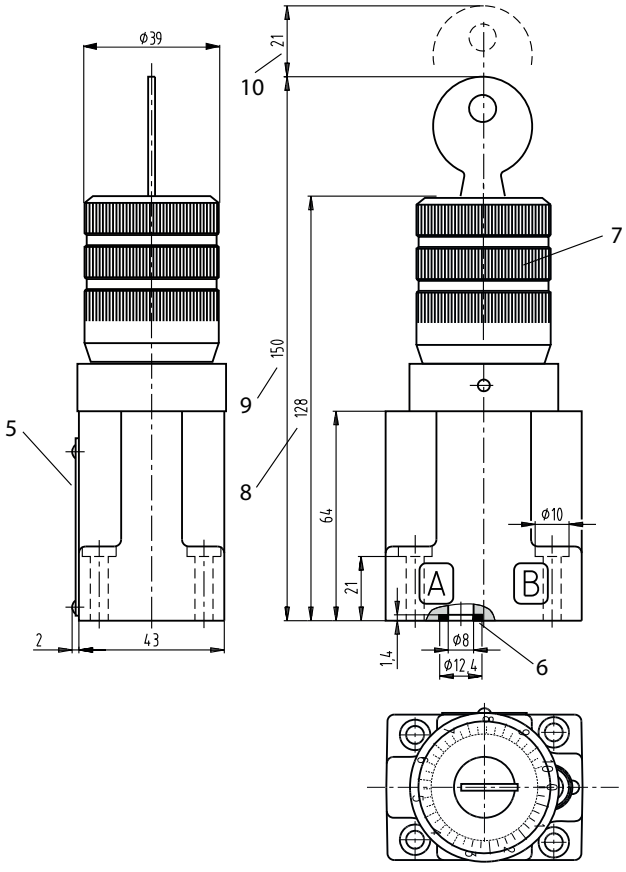
16



32

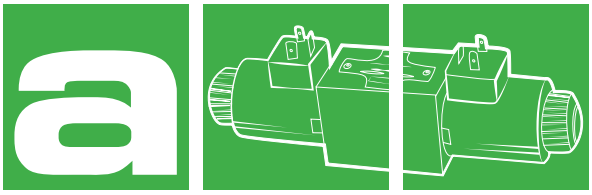


5 INSTALLATION DIMENSIONS (mm)



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves QVC* are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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 10cSt to 60 cSt.



SANDWICH VALVES WITH 3/4” 16 UNF 2-WAY CARTRIDGE VALVES

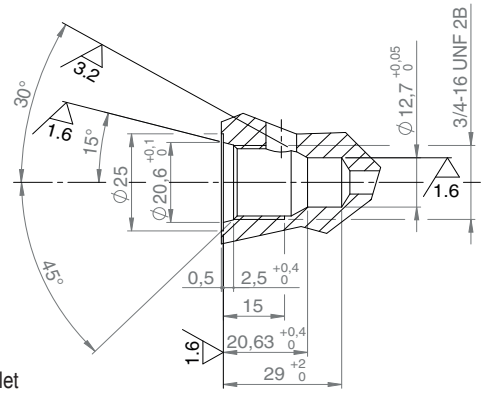
1 PRODUCTS OVERVIEW

In order to obtain an extensive flexibility in the design of the hydraulic circuits in systems based on CETOP 03 solenoid operated directional valves, Aidro introduces a new family of CETOP-03 modular bodies designed to be equipped with 3/4” 16 UNF 2-way cartridge valves. Since the cavity present on the bodies is a standard (see 2) the circuit designer has the possibility to choose between a wide range of products (and therefore of functions) of cartridge valves to fit into the body. It’s important to notice that the same cartridge valve perform different functions if fit into different bodies, thus further increasing the available configurations. Some of the possible functions are the following :

- Variable throttling
- Pressure compensated flow control (Meter-In or Meter-Out)
- Electric by-pass (normally open and normally closed)
- Unidirectional check valve

2 THE 3/4 16” UNF CAVITY

All the bodies of the family present SAE standard 2-way cavity 3/4” 16 UNF

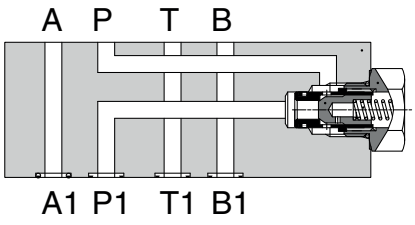


For cartridge valves that perform flow control only in one direction (like check valves) 1 represents the inlet line, while 2 is the outlet.

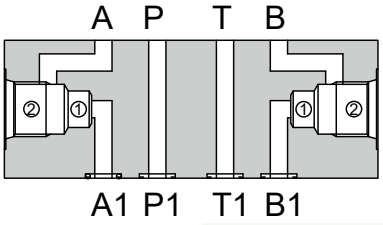
3 STANDARD BODIES

Three types of standard bodies are available :

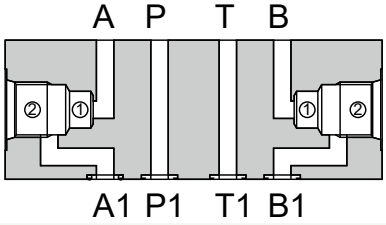
AM3-*-P/34
control on **P line**



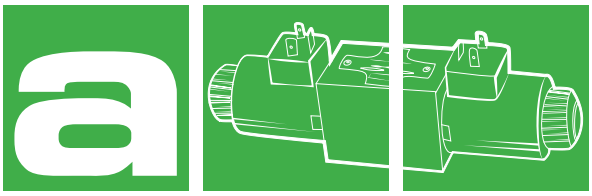
AM3-*-ABX/34
control on **A** and/or **B line**
(Meter-Out)



AM3-*-ABC/34
control on **A** and/or **B line**
(Meter-In)

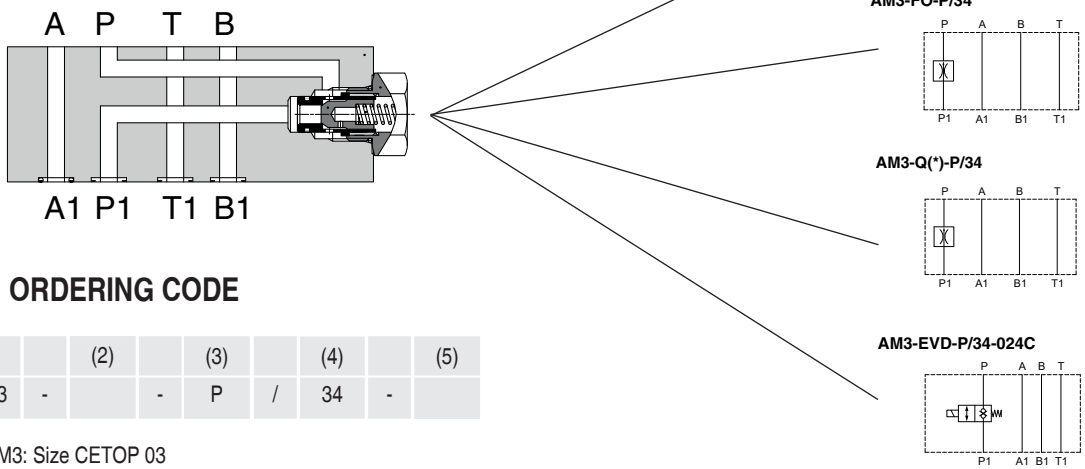


For a more detailed list of the functions available see the technical tables AM3-*P/34, AM3-*-ABX/34 and AM3-*-ABC/34. Our technical department is available to study the feasibility of requested special configurations.



SANDWICH BODY FOR CARTRIDGE VALVES
SAE STANDARD 2-WAY CAVITY 3/4 16” UNF ON P LINE
AM3-*-P/34

1 FUNCTIONAL SCHEME AND CONFIGURATION OPTIONS



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)
AM3	-		-	P	/	34	-	

(1) AM3: Size CETOP 03

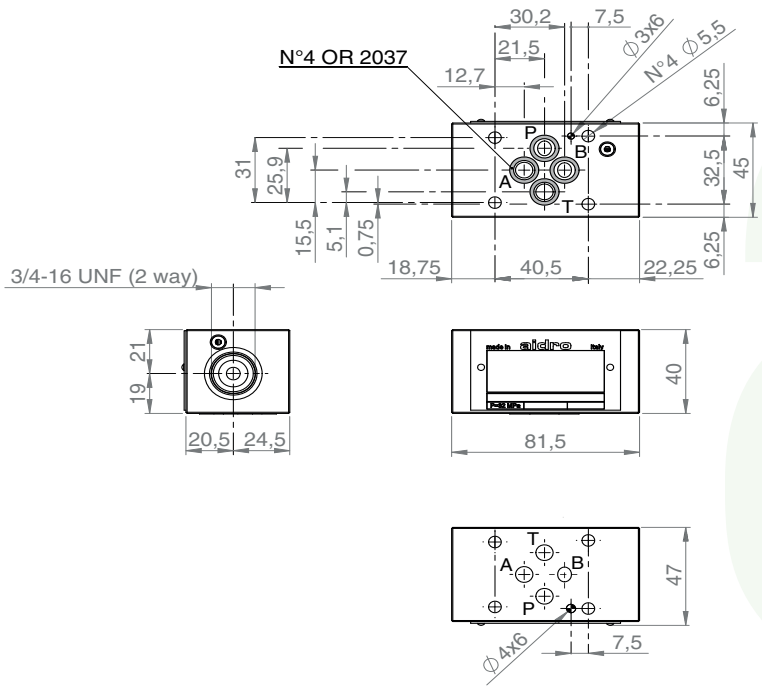
(2) Cartridge function on P line (see the above schemes)

(3) P: Line where the valves operate

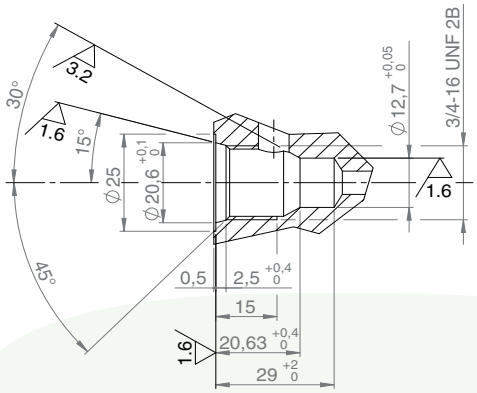
(4) 34: 3/4” 16 UNF cavity

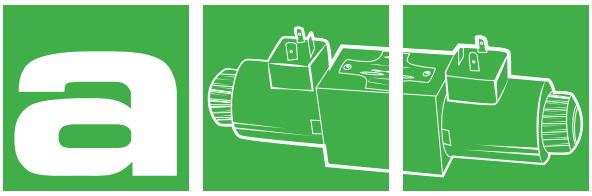
(5) Voltage for the solenoid operated valve:
024C: 24V DC
012C: 12V DC
230/50: 230V AC

3 INSTALLATION DIMENSIONS



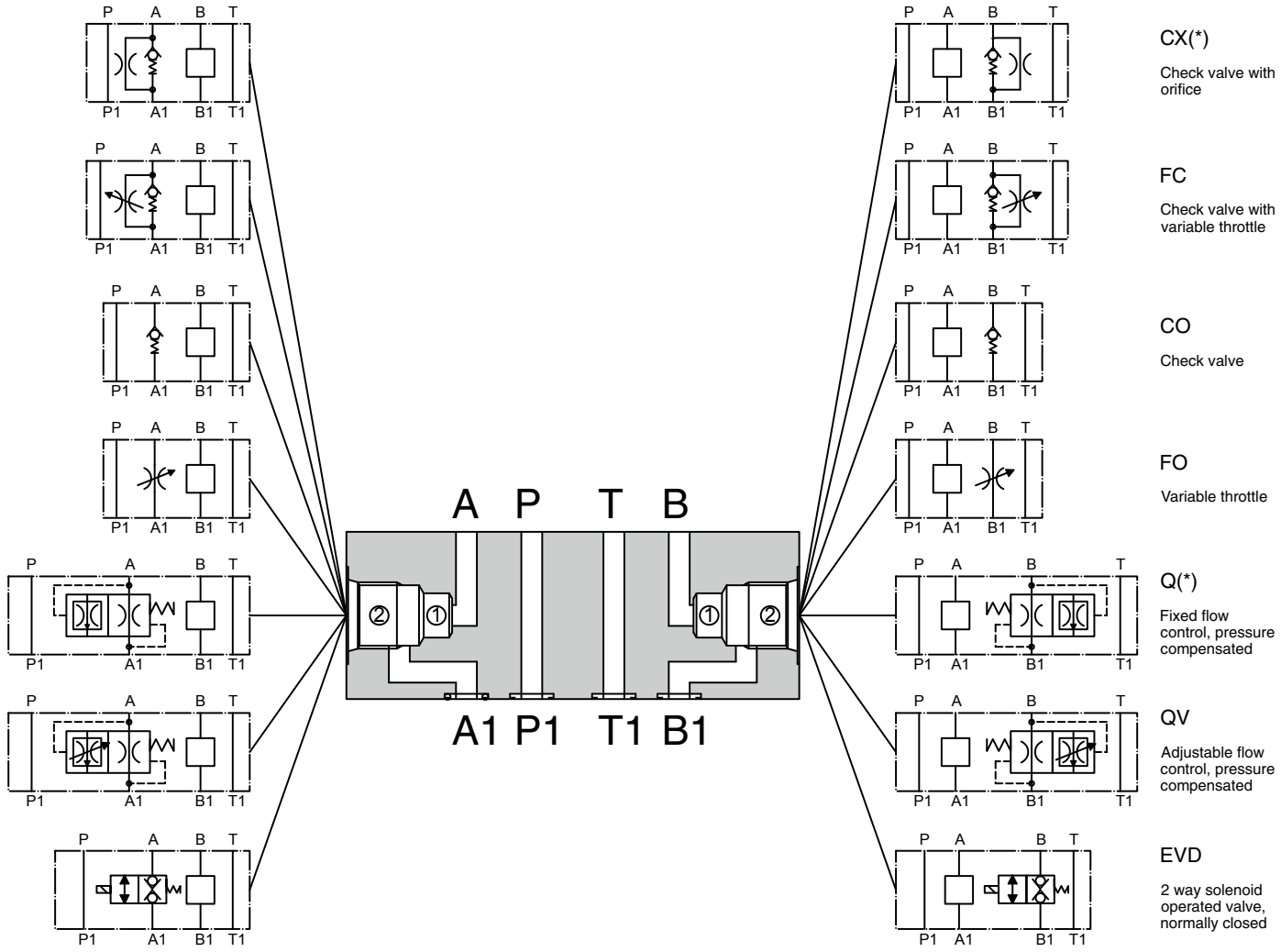
4 3/4 16” UNF cavity (2-way)





CETOP 03 SANDWICH BODY FOR CARTRIDGE VALVES
SAE STANDARD 2-WAY CAVITY 3/4 16" UNF ON A AND B LINES
AM3-*-C

1 FUNCTIONAL SCHEME AND CONFIGURATION OPTIONS



2 ORDERING CODE

(1)		(2)		(3)	(4)		(5)		(6)
AM3	-		-		C	/	34	-	

(1) AM3: Size CETOP 03

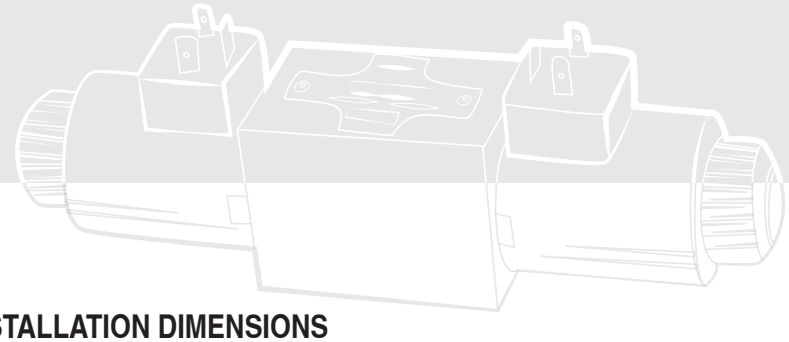
(2) Cartridge function (see the above schemes)

(3) Lines where the valves operate (A, B, AB)

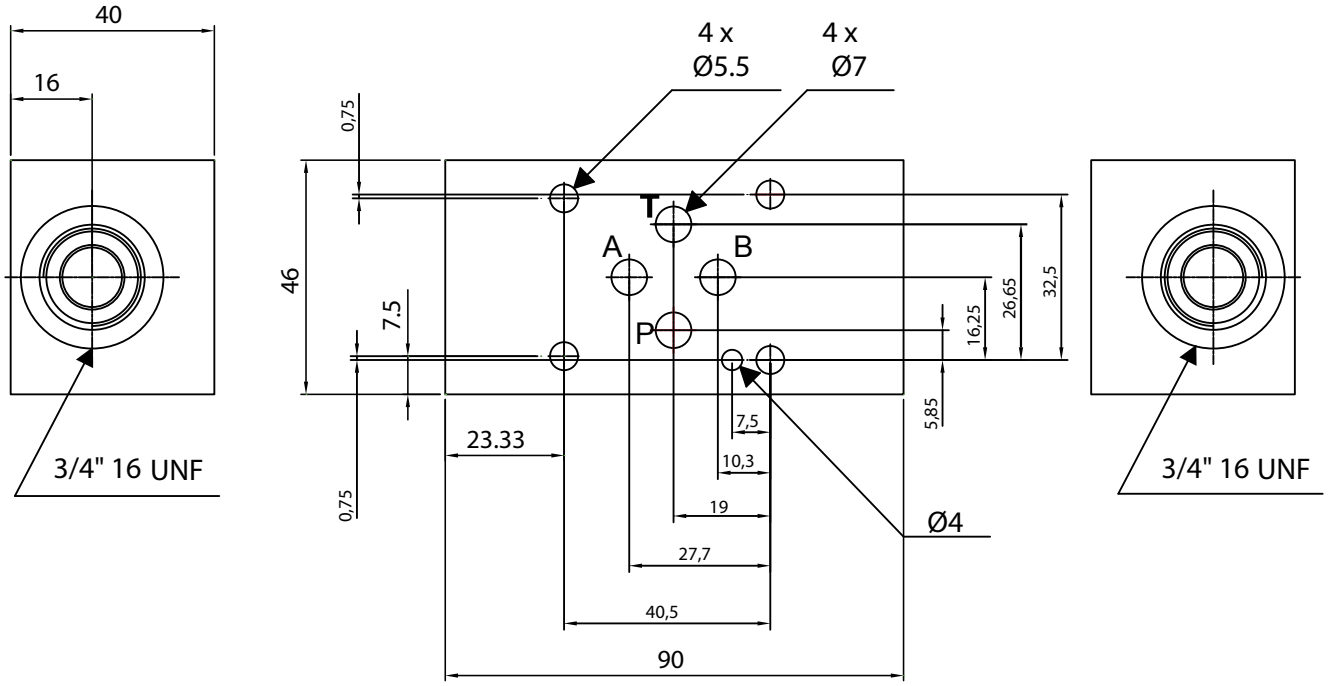
(4) C: orifices A and B connected to chambers 1:
chambers 2 connected to ports A1 and B1

(5) 34: 3/4" 16 UNF cavity (chambers 1 and 2)

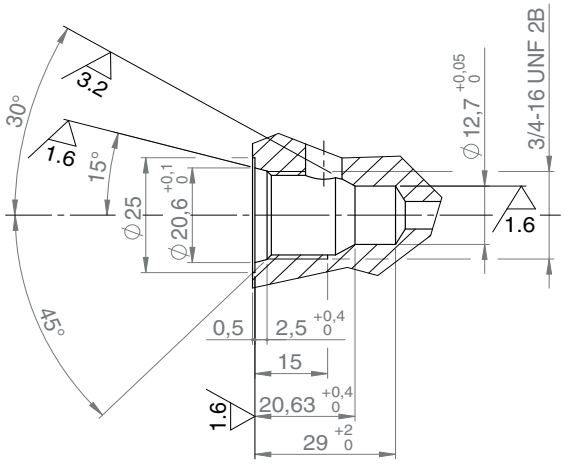
(6) Voltage for the solenoid operated valve
024C: 24V DC
012C: 12V DC
230/50: 230V AC

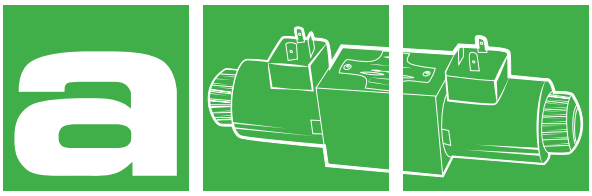


3 INSTALLATION DIMENSIONS



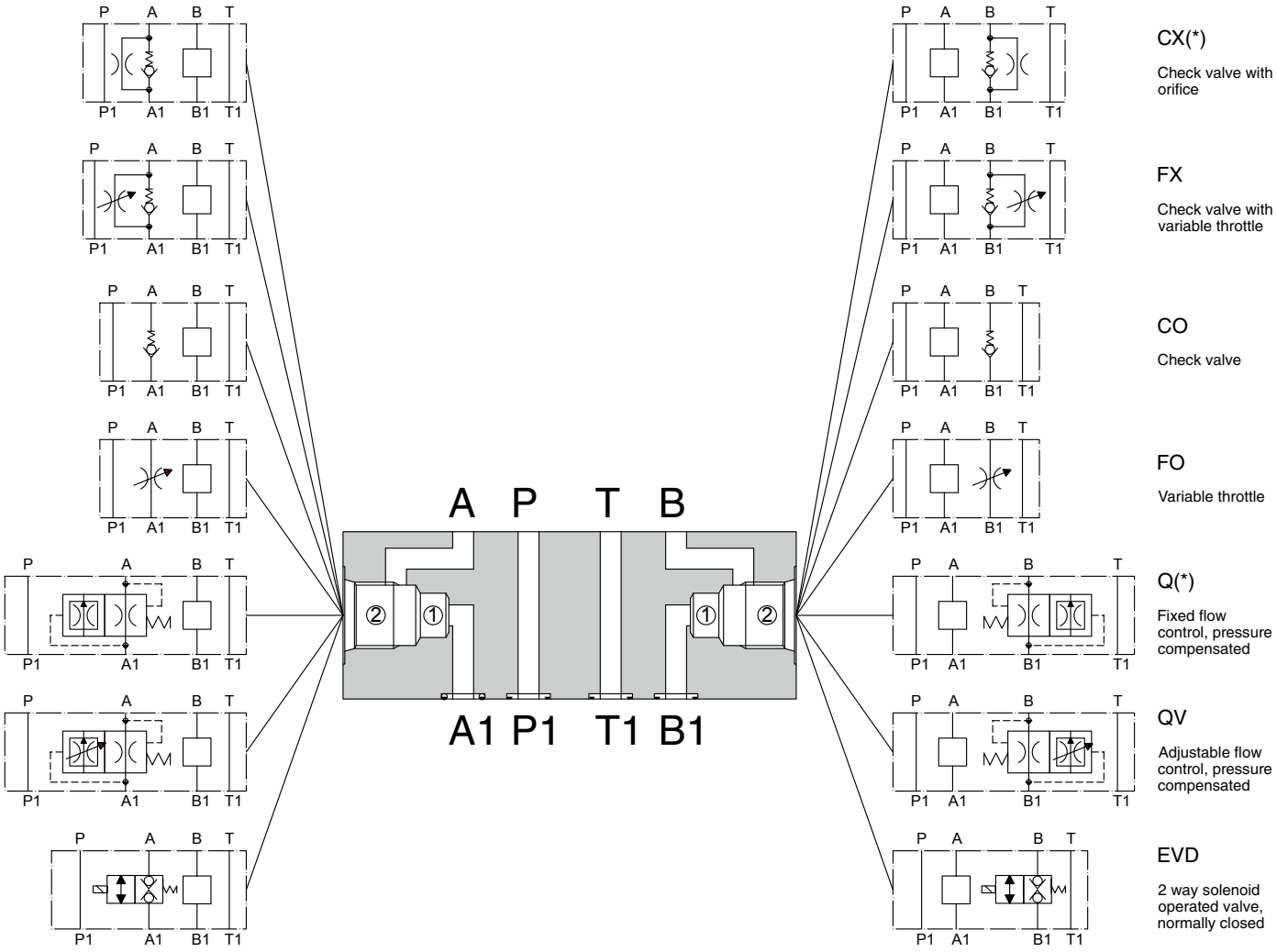
4 3/4 16" UNF cavity (2-way)





CETOP 03 SANDWICH BODY FOR CARTRIDGE VALVES
SAE STANDARD 2-WAY CAVITY 3/4 16" UNF ON A AND B LINES
AM3-*-X

1 FUNCTIONAL SCHEME AND CONFIGURATION OPTIONS



2 ORDERING CODE

(1)		(2)		(3)	(4)		(5)		(6)
AM3	-		-		X	/	34	-	

(1) AM3: Size CETOP 03

(2) Cartridge function (see the above schemes)

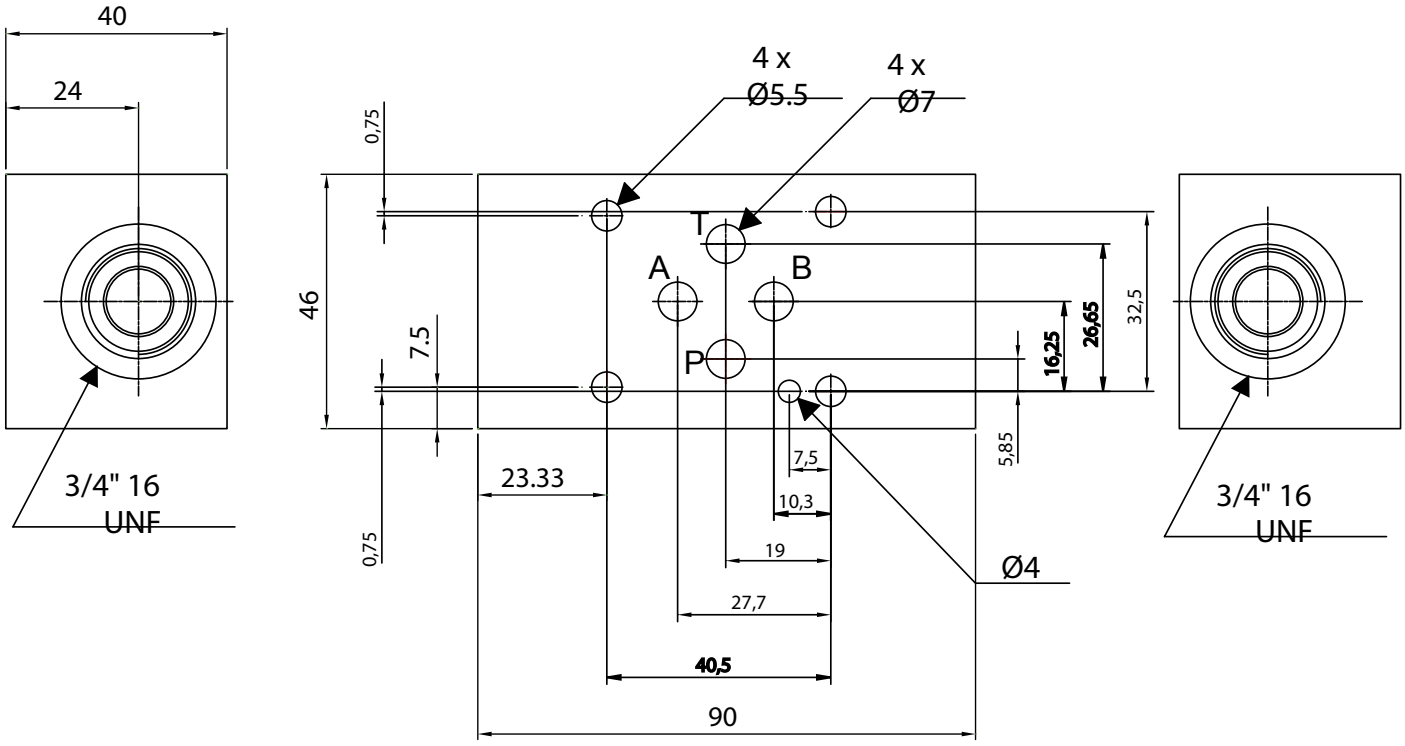
(3) Lines where the valves operate (A, B, AB)

(4) X: orifices A and B connected to chambers 1:
chambers 2 connected to ports A1 and B1

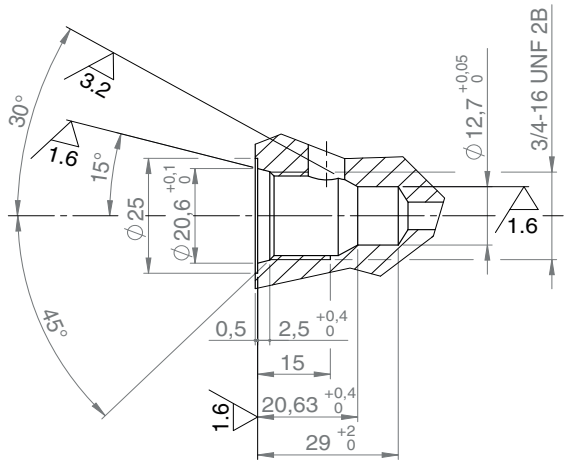
(5) 34: 3/4" 16 UNF cavity (chambers 1 and 2)

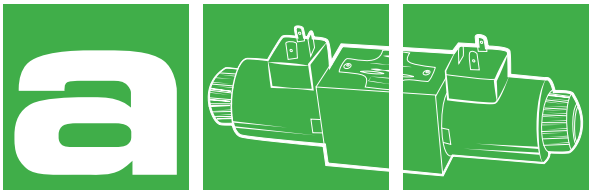
(6) Voltage for the solenoid operated valve:
024C: 24V DC
012C: 12V DC
230/50: 230V AC

3 INSTALLATION DIMENSIONS



4 3/4 16" UNF cavity (2-way)





STACKABLE VALVE CHECK VALVE ON P LINE

AM3-CO-P/34

25 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Direct operated check valve. All the internal parts are made with high strenght steel and are machined with accouracy in order to assure the requested tightness.
The controlled lines is on P line.
The standard suraface treatment of the body is phosphate coated. Plugs are zinc coated.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	CO	-	P	/		-		/	34

(1) AM3: Stackable valve CETOP 03

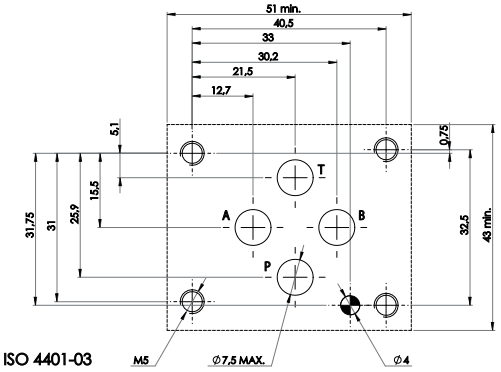
(2) CO: Unidirectional check valve

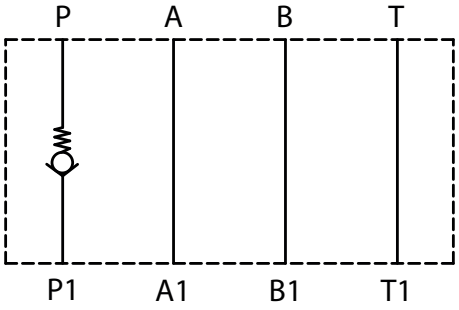
(3) P: Line where the control operates

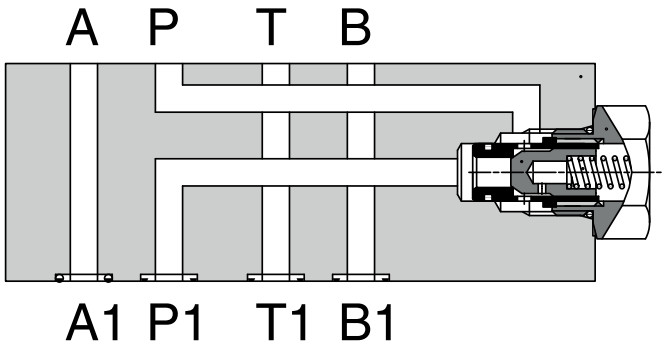
(4) Check valve opening (cracking) pressure (Pm):
no designation: Pm approx. 0.3 MPa (3 bar)
8: Pm approx. 0.8 MPa (8 bar)

(5) Code reserved for more options and variants

(6) Cavity for cartridge valves is 3/4" 16 UNF







Fluid flows freely in A, B and T lines. When pressure in P1 overcomes the sum of the pressure in P and the pressure due to the pre-load of spring, the poppet shifts axially and fluid flows from P1 to P. Reverse flow is prevented (without leakage) by the poppet, which kept against its seat by spring.

3 TECHNICAL DATA

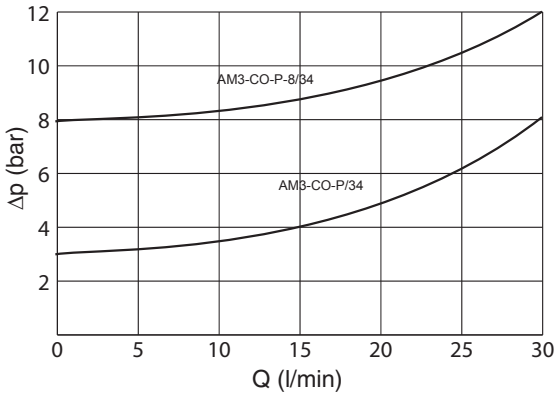
Maximum rec. flow rate on P line	25 l/min
Maximum nominal pressure	32 MPa (320 bar)

4 HYDRAULIC FLUIDS

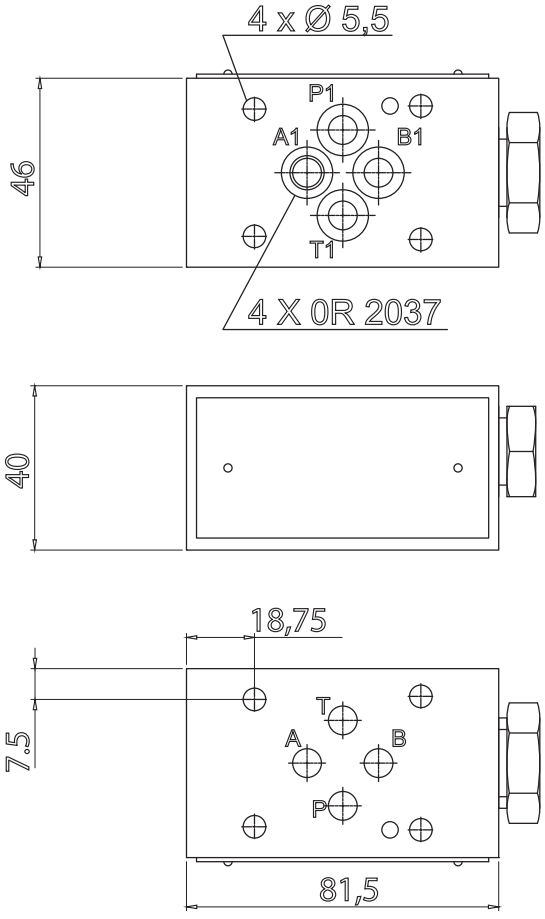
Seals and materials used on standard valves AM3-* are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from 10cSt to 60 cSt.

5 TYPICAL DIAGRAMS

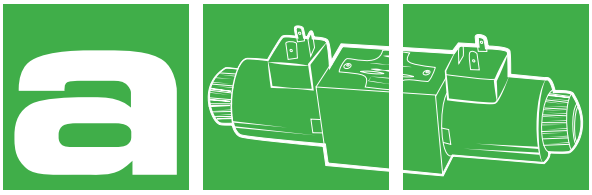
measured at ν= 36 cSt and 50°C



6 INSTALLATION DIMENSIONS (mm)



All stackable valves AM3-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height (40 mm). Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type



STACKABLE VALVE ADJUSTABLE FLOW CONTROL

AM3-FO-P/34

25 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Stackable valve CETOP 3 with flow restrictor function. With this model It is possible to control the line P.
On demand it is possible to have also the fine control option.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	FO	-	P	-		-		/	34

(1) AM3: Stackable valve CETOP 03

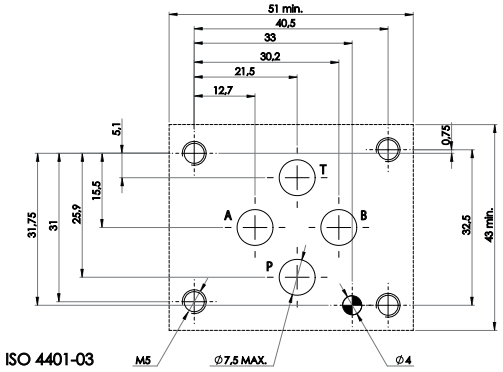
(2) FO: adjustable flow control valve

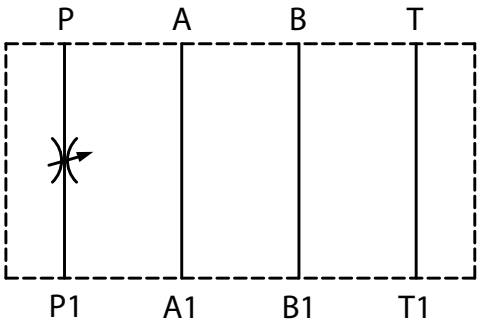
(3) P: Line where the control operates

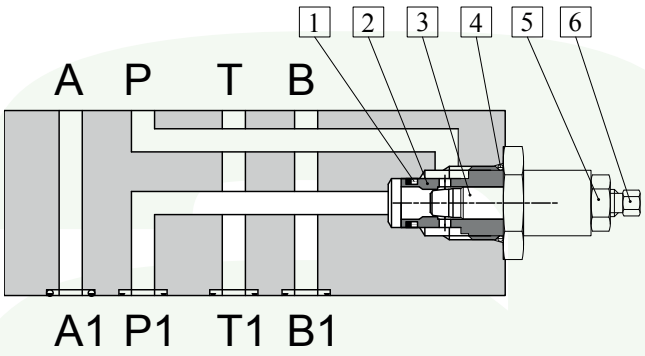
(4) Flow adjustment device :
no designation : hexagon screw
M: hand knob

(5) Code reserved for more options and variants

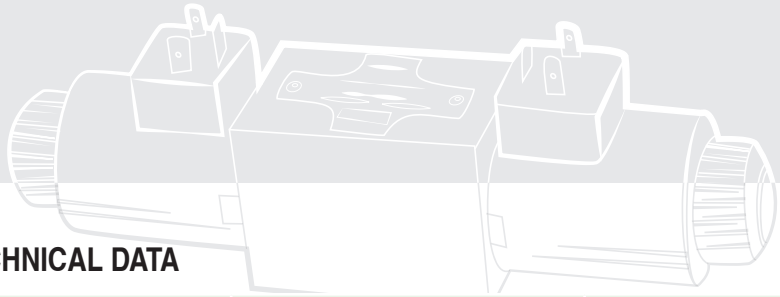
(6) Cavity for cartridge valves is 3/4" 16 UNF







Fluid flows freely on A, B and T lines. Fluid that flows on P line is regulated by a variable throttle valve, consisting in a needle 3 (which position is set by the adjustment screw 6) that changes the section of an annular passage.



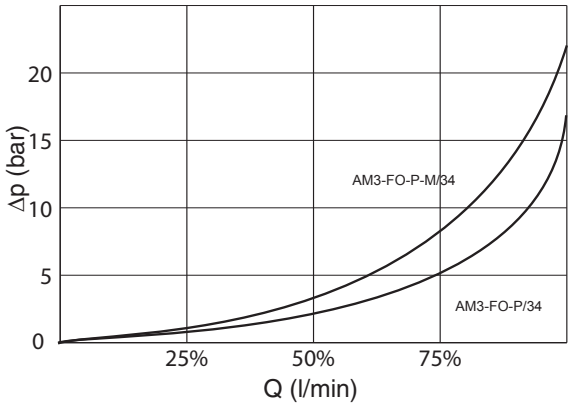
aidro
Desktop Metal Company

3 TECHNICAL DATA

Maximum rec. flow rate on P line	25 l/min	Adjustment of the regulated flow:
Maximum nominal pressure	32 MPa (320 bar)	To decrease flow in P line turn clockwise the adjustment screw 6 (or the hand knob), after having unlocked its retaining nut 5

4 TYPICAL DIAGRAMS

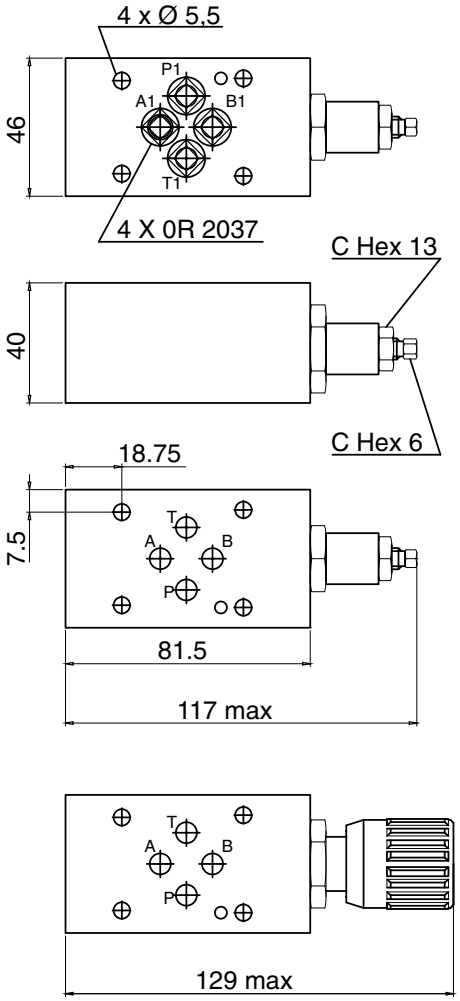
measured at □ = 36 cSt and 50°C



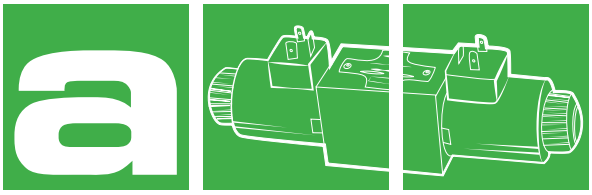
5 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3-* are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

6 INSTALLATION DIMENSIONS (mm)



All stackable valves AM3-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height (40 mm). Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type



STACKABLE VALVE PRESSURE COMPENSATED, FIXED CONTROL VALVES

AM3-Q*-P/34

32 MPa (320 bar)

1 DESCRIPTION

Stackable valve CETOP 3 with flow restrictor function pressure compensated. With this model It is possible to control the line P.
Different orifice sizes are available.



2 ORDERING CODE

(1)		(2)	(3)		(4)		(5)		(6)
AM3	-	Q		-	P	-		/	34

(1) AM3: Stackable valve CETOP 03

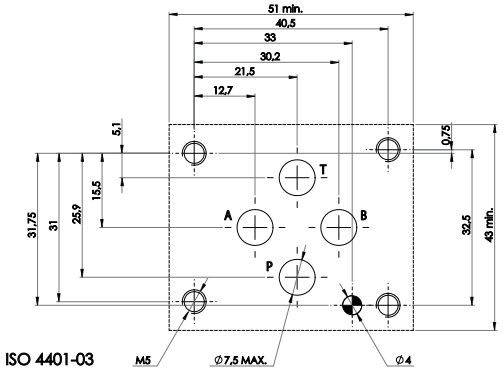
(2) Q: Pressure compensated, fixed flow control

(3) Flow rate setting (see 3)

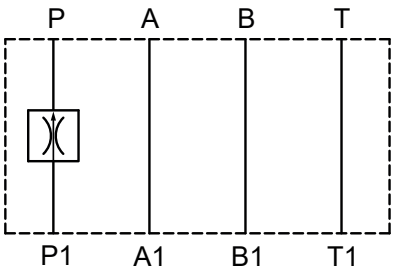
(4) P: Line where the control operates

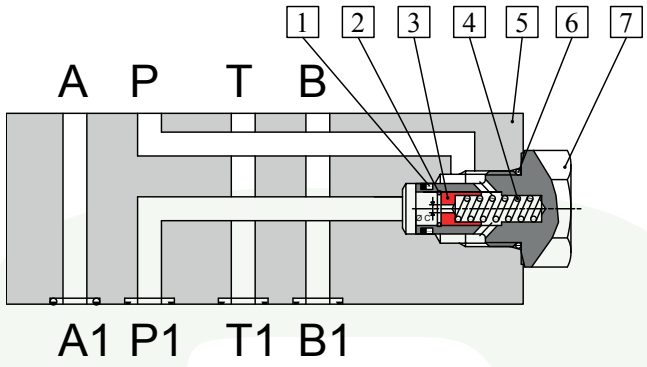
(5) Code reserved for more options and variants

(6) Cavity for cartridge valves is 3/4" 16 UNF

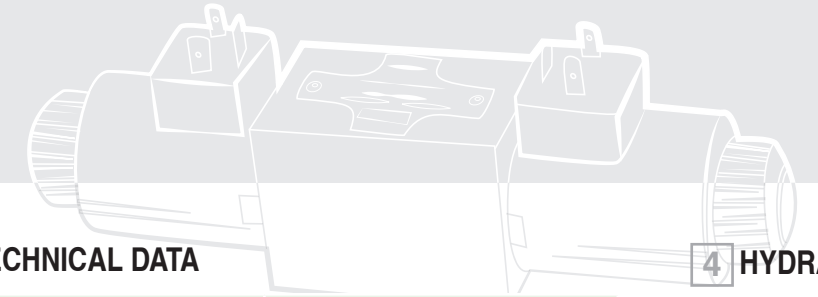


AM3-Q(*)-P/34





Fluid flows freely in A, B and T lines. P1->P : fluid flows through orifice of throttle 3 (flow rate depending on the value orifice diameter Ø C). When pressure difference between P1 and P increases, throttle 3 moves against spring 4 and reduces the area of the lateral orifices, thus keeping flow rate constant at the requested value.



3 TECHNICAL DATA

Maximum rec. flow rate on P line	25 l/min
Maximum nominal pressure	32 MPa (320 bar)

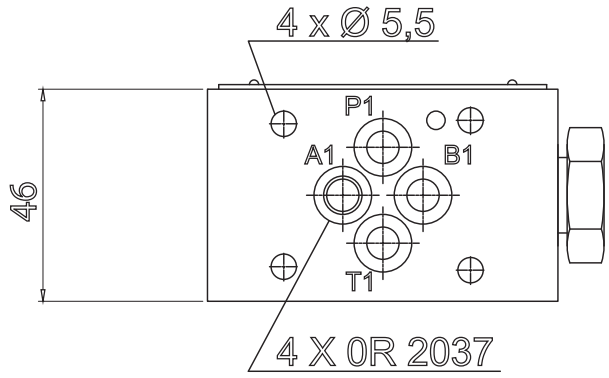
Approximate flow rates corresponding with the orifice Ø C

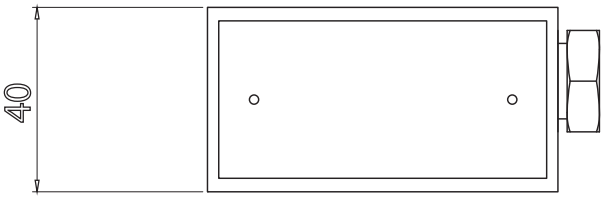
Ordering Code	ORIFICE Ø C (mm)	Flow (l/min)
AM3-Q1-P/34	0,8	1
AM3-Q2-P/34	1	2
AM3-Q3-P/34	1,25	3
AM3-Q4-P/34	1,5	4
AM3-Q5-P/34	1,75	5
AM3-Q6-P/34	2	6
AM3-Q9-P/34	3	9
AM3-Q12-P/34	4	12

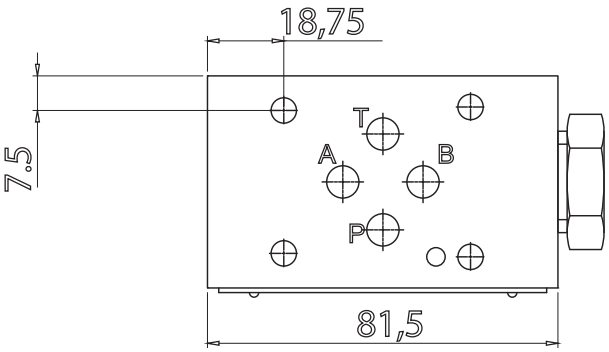
4 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3-* are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

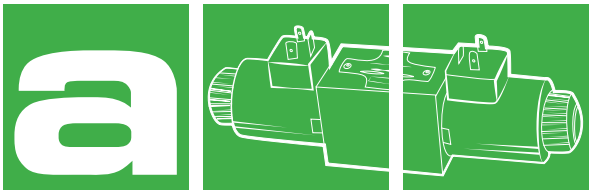
5 INSTALLATION DIMENSIONS (mm)







All stackable valves AM3-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height (40 mm). Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type



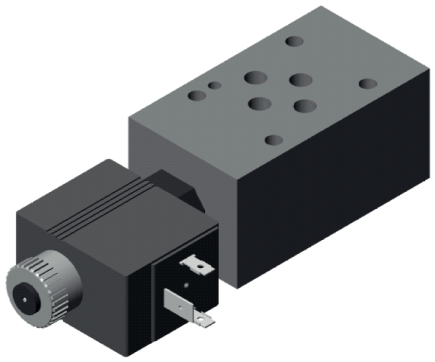
STACKABLE VALVE LOCK, SOLENOID OPERATED CONTROL VALVE ON P LINE

AM3-EVD-P/34-(024C)

25 l/min 25 MPa (250 bar)

1 DESCRIPTION

Stackable valve CETOP 3 with double poppet solenoid valve on P line.
With this model It is possible to control the line P.
Different voltages are available.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM3	-	EVD	-	P	-		/	34	-	

(1) AM3: Stackable valve CETOP 03

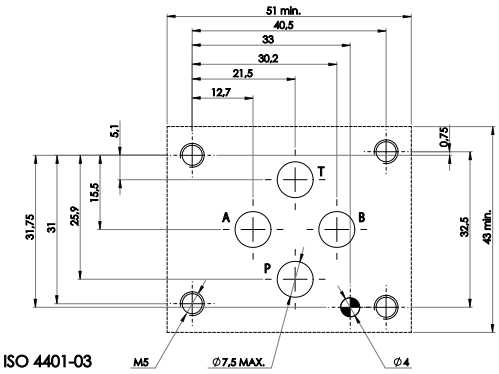
(2) EVD: 2-way solenoid operated poppet valve

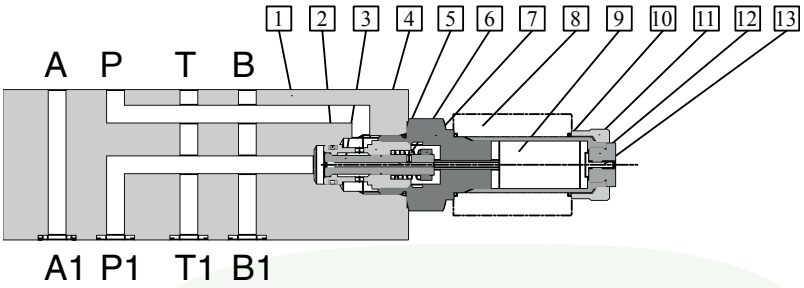
(3) P: Line where the control operates

(4) Code reserved for more options and variants

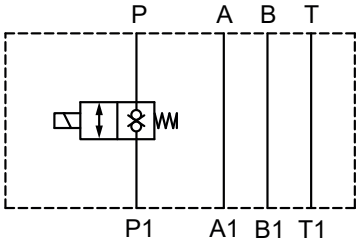
(5) 34: cavity for cartridge valves is 3/4" 16 UNF

(6) Electric voltage and solenoid coils:
- 0000: no coils
- 012C: coils for V12DC
- 024C: coils for V24DC
- 220R: coils for V220-230 RAC

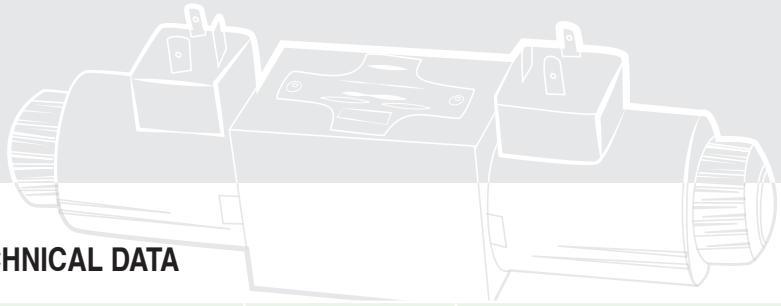




AM3-EVD-P/34-024C



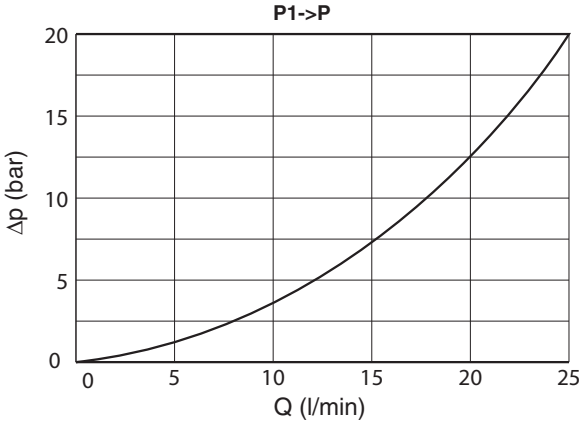
The poppet 3 is balanced by pressure and it is kept against its seat 4 by spring 6. When the solenoid 8 is energized, the mobile armature 9 moves the poppet 3 against spring 6, thus permitting flow between P1 and P. The manual override 13 is of the pin type and, when pushed, it permits the valve's operation in case of electric failure.



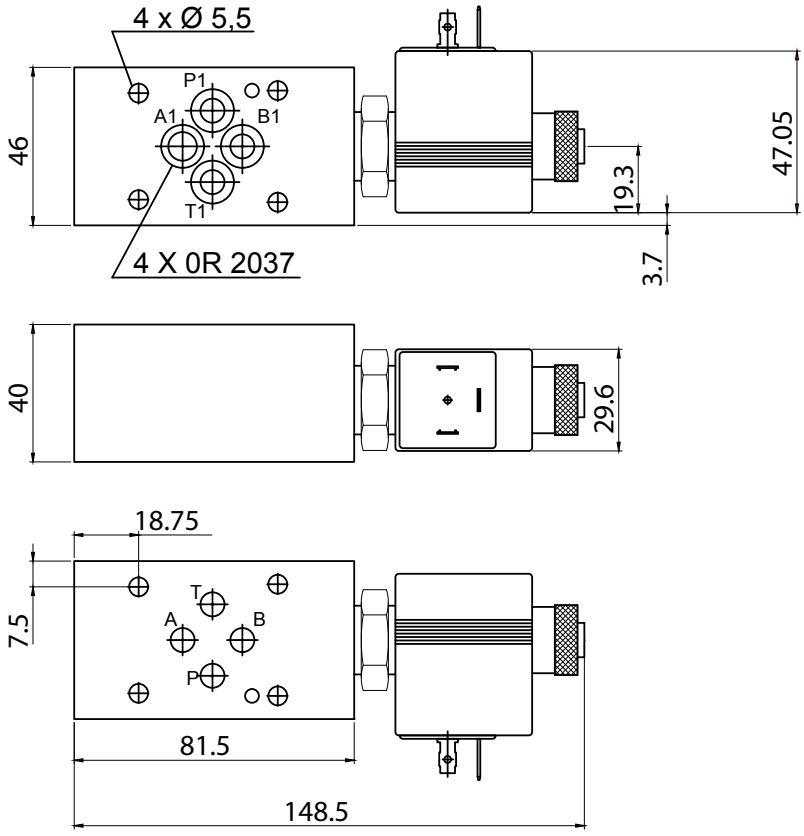
3 TECHNICAL DATA

Maximum nominal pressure	25 MPa (250 bar)	Electric features:
Nominal flow rate on P line	16 l/min	Those solenoid valves are normally equipped by coils type C33, which are energized from DC or AC supply. Coils type C33-***C are DC energized directly from a V***DC supply. Coils type C33-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Coils type C33 are normally provided for use of ISO4400/ DIN43650/A connectors. Standard coils are coMPatible with KA-132 connectors (see table)
Maximum rec. flow rate on P line	20 l/min	

4 TYPICAL DIAGRAMS



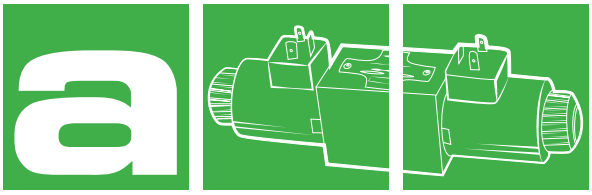
5 INSTALLATION DIMENSIONS (mm)



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM3-* are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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 cS

All stackable valves AM3-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height (40 mm). Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type



MONOBLOCK WITH MULTIPLE SECTIONS ISO 03

MR-3-*G

80 l/min 30 MPa (300 bar)

1 DESCRIPTION

Monoblocks with multiple sections from 1 to 8, for hydraulic 4 ways operated valves ISO 03 with parallel internal connections P and T. The utility ports A and B are positioned laterally to the valve assembly face. Ports A and B (3/8" BSP) on the sides. P and T lines with ports (1/2" BSP) on the two rear sides Parallel connections P and T.

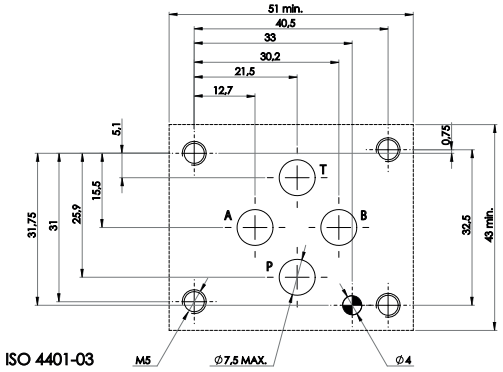


2 ORDERING CODE

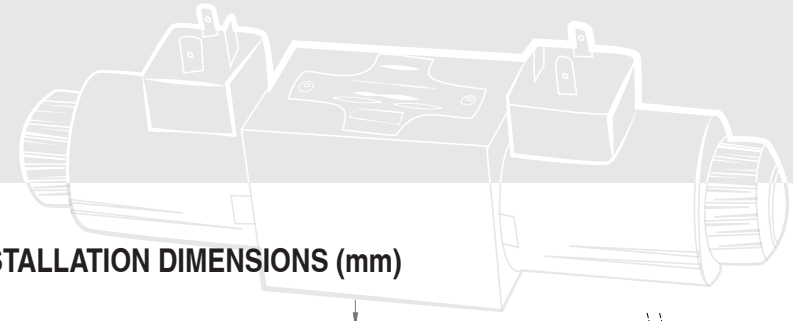
(1)		(2)		(3)	(4)
MR	-	3	-		G

3 TECHNICAL DATA

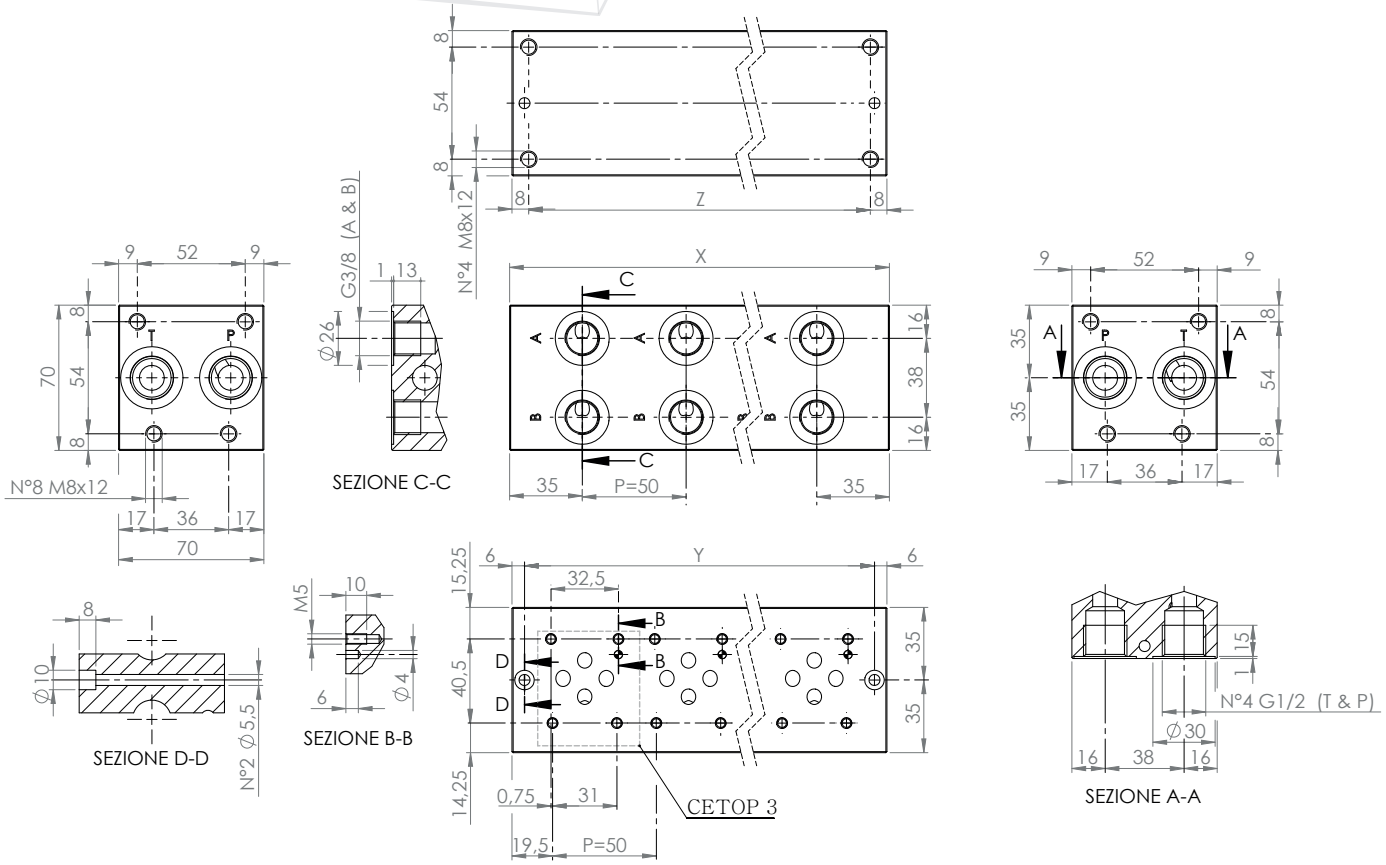
Material:	Cast Iron GG 25
Coating:	Manganese phosphating
Pressure allowed in the ports:	P, A, B and T = 300 bar
Incoming flow, maximum recommended: (*)	From 40 to 80 l/min, decreasing with the rise of the number of sections. If both pairs of ports P and T are used, maximum recommended Q values can be increased.
Connecting ports:	Standard cylindrical BSP thread with maximum rugosity of a surface Ra 1,6 for the fitting of connections.
A and B ports P:	3/8" BSP one pair per section
P and T:	1/2" BSP one pair on each rear side of a monoblock; it allows to double supply if needed (P) or double outlet (T); close the unused ports



Type	Number of sections 03	Q max recommended (*) l/min
MR-3-1 G	1	80 - 80
MR-3-2 G	2	80 - 80
MR-3-3 G	3	60 - 80
MR-3-4 G	4	60 - 80
MR-3-5 G	5	50 - 80
MR-3-6 G	6	50 - 80
MR-3-7 G	7	40 - 80
MR-3-8 G	8	40 - 80



4 INSTALLATION DIMENSIONS (mm)



- 2 passing holes diameter ø 5,5 mm, with a counterbore for a bolt head with diameter ø 9x8 mm
- 4 mounting holes threaded M8 on the rear side

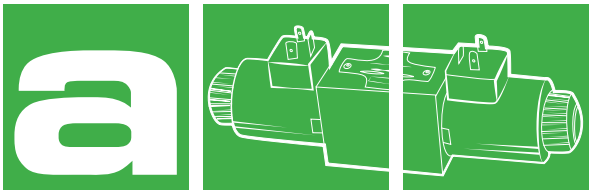
Type	X (mm)	Y (mm)	Z (mm)	mass (kg)
MR-3-1 G	70	58	54	2,10
MR-3-2 G	120	108	104	3,60
MR-3-3 G	170	158	154	5,20
MR-3-4 G	220	208	204	6,70
MR-3-5 G	270	258	254	8,30
MR-3-6 G	320	308	304	9,80
MR-3-7 G	370	358	354	11,40
MR-3-8 G	420	408	404	13,00

5 HYDRAULIC FLUID

Seals and materials used on standard valves MR-3-*G are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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

6 MOUNTING SURFACE OF THE VALVE:

Planary of the surface: 0,01/100
Rugosity: Ra 0,8
Every section has a mounting surface according to ISO 4401-03.



MONOBLOCK WITH MULTIPLE SECTIONS ISO 03

MRK-3-*G

80 l/min 30 MPa (300 bar)

1 DESCRIPTION

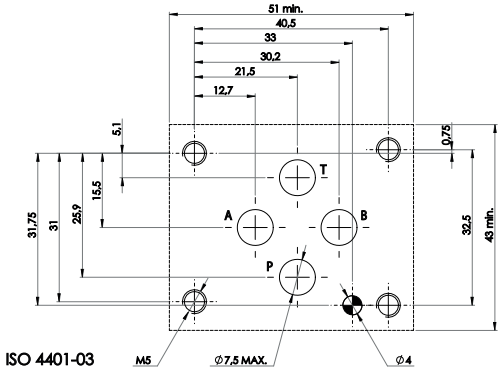
Monoblocks with multiple sections from 2 to 8, for hydraulic 4 ways operated valves ISO 03 with parallel internal connections P and T. Ports A and B are positioned on the back side of the block relative to the valve assembly face. Ports A and B (3/8" BSP) on the back. P and T lines with ports (1/2" BSP) on the two rear sides Parallel connections P and T.



2 ORDERING CODE

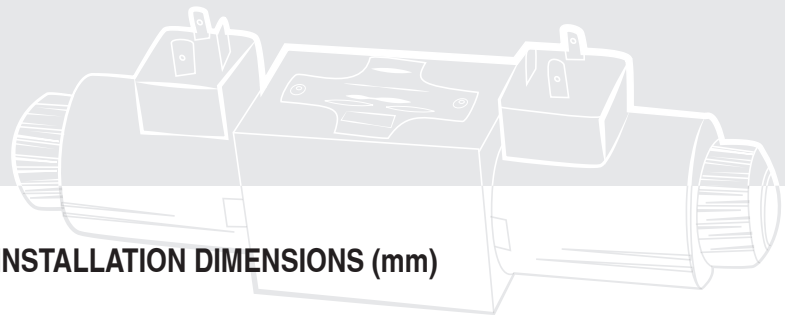
(1)		(2)		(3)	(4)
MRK	-	3	-		G

Type	Number of sections 03	Q max recommended (*) l/min
MRK-3-2 G	2	80 - 80
MRK-3-3 G	3	60 - 80
MRK-3-4 G	4	60 - 80
MRK-3-5 G	5	50 - 80
MRK-3-6 G	6	50 - 80
MRK-3-7 G	7	40 - 80
MRK-3-8 G	8	40 - 80

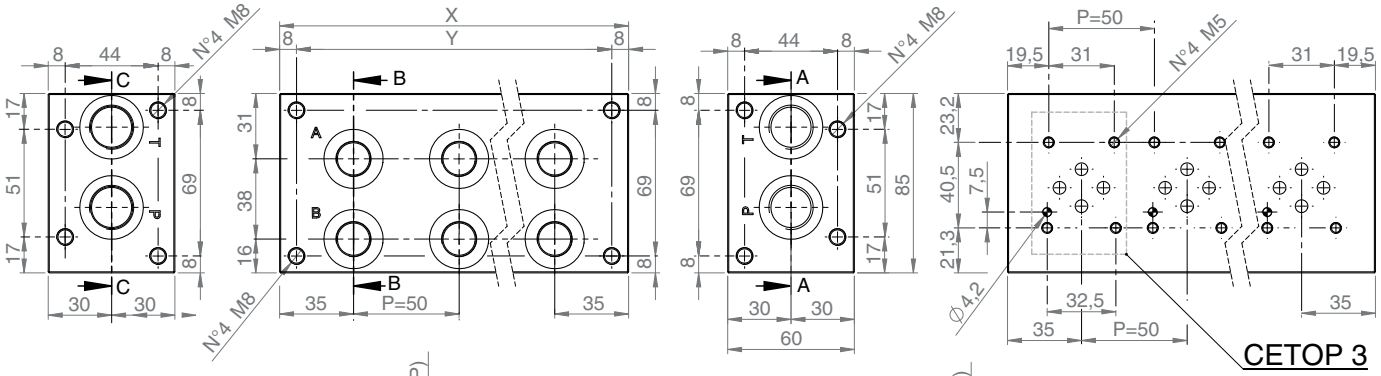


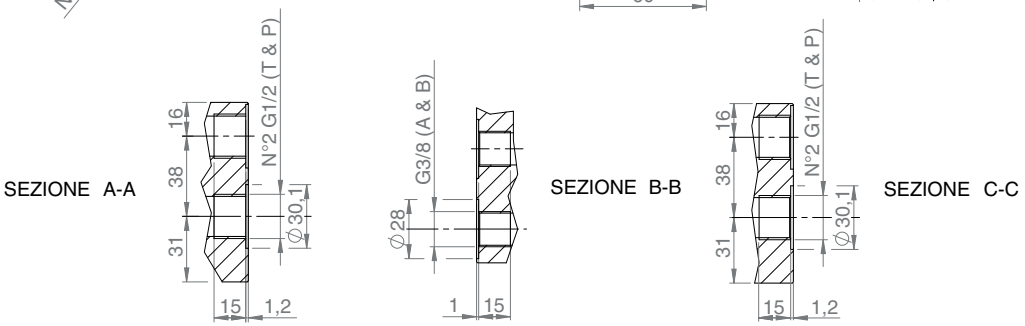
3 TECHNICAL DATA

Material:	Cast Iron GG 25
Coating:	Manganese phosphating
Pressure allowed in the ports:	P, A, B and T = 300 bar
Incoming flow, maximum recommended: (*)	From 40 to 80 l/min, decreasing with the rise of the number of sections. If both pairs of ports P and T are used, maximum recommended Q values can be increased.
Connecting ports:	Standard cylindrical BSP thread with maximum rugosity of a surface Ra 1,6 for the fitting of connections.
A and B ports P:	3/8" BSP one pair per section
P and T:	1/2" BSP one pair on each rear side of a monoblock; it allows to double supply if needed (P) or double outlet (T); close the unused ports



4 INSTALLATION DIMENSIONS (mm)





4 mounting holes threaded M8 on the rear side

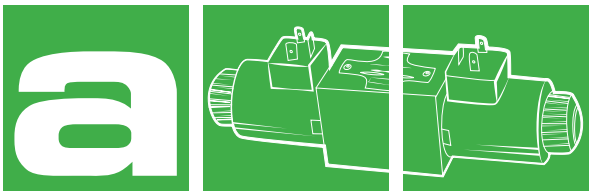
Type	X (mm)	Z (mm)	mass (kg)
MRK-3-2G	120	104	3,90
MRK-3-3G	170	154	5,45
MRK-3-4G	220	204	7,00
MRK-3-5G	270	254	8,55
MRK-3-6G	320	304	10,10
MRK-3-7G	370	354	11,65
MRK-3-8G	420	404	13,20

5 HYDRAULIC FLUID

Seals and materials used on standard valves MRK-3-*G are fully coM-Patible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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

6 MOUNTING SURFACE OF THE VALVE:

Planarity of the surface: 0,01/100
Rugosity: Ra 0,8
Every section has a mounting surface according to ISO 4401-03.



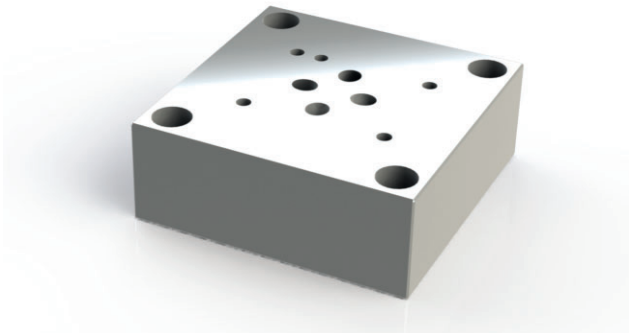
MONOBLOCK SINGLE SECTION ISO 03 - BOTTOM PORTS

MRSK-3-38G

80 l/min 35 MPa (350 bar)

1 DESCRIPTION

MRSK-3-38 is a basic CETOP 3 baseplate useful for the connection of a single cetop section with A, B, P, T ports which are located in the bottom.
The plate is in steel phosphate coated.



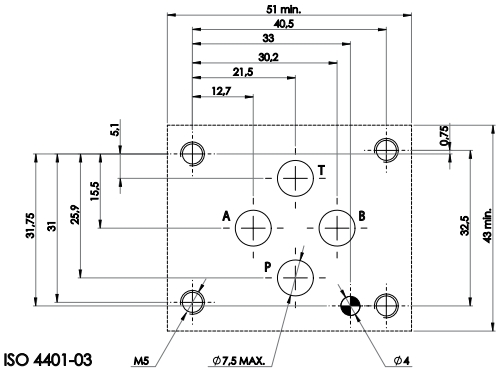
2 ORDERING CODE

(1)		(2)		(3)
MRSK	-	3	-	38G

MRSK: Base plate single section and bottom ports

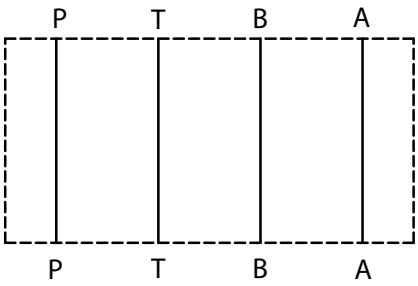
3 : CETOP 3

38 : Ports with G3/8" threads

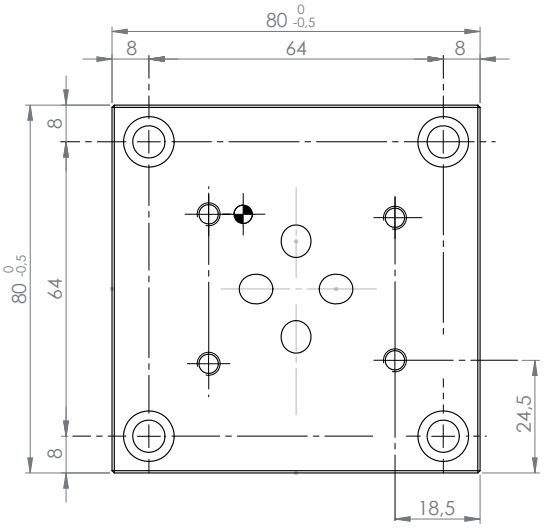


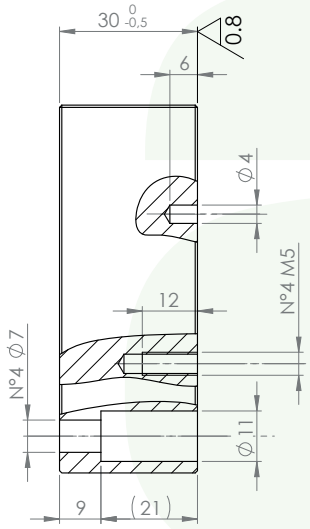
3 TECHNICAL DATA

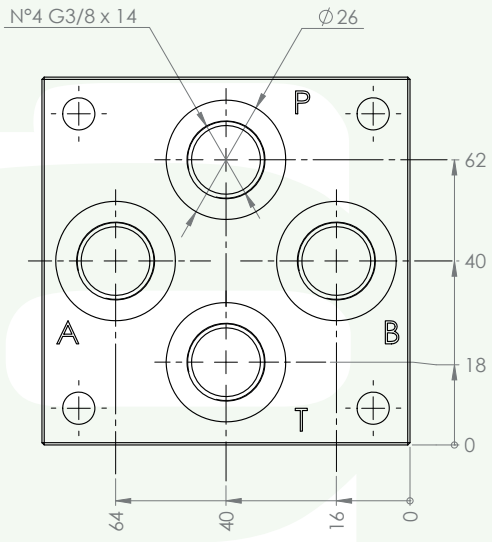
Material:	Steel
Coating	Phosphated
Max pressure	35 MPa (350 bar)
Max flow rate	80 l/min
Mass	1,24 kg

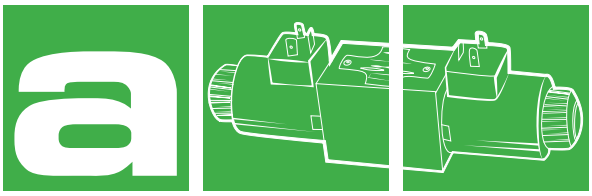


4 INSTALLATION DIMENSIONS









ISO 03 PLATE

BM3-G

80 l/min 30 MPa (300 bar)

1 DESCRIPTION

BM3-G is a multi functional CETOP 3 manifold useful to combine many options.
It has a standard cavity 7/8" 16 UNF where is possible to install a pressure relief valve, direct operated or pilot operated or proportional. It is possible to have also a by-pass function integrated in the manifold.



2 ORDERING CODE

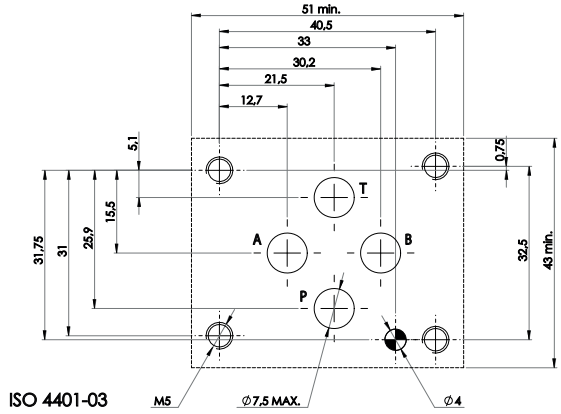
(1)		(2)		(3)		(4)
BM	-	3	-	G	/	*

(1) BM: Multi function base plate

(2) 3: CETOP 3

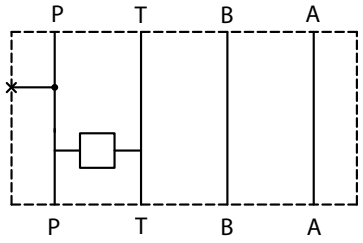
(3) G: Ports with G3/8" threads

(4) *: Different options see 5



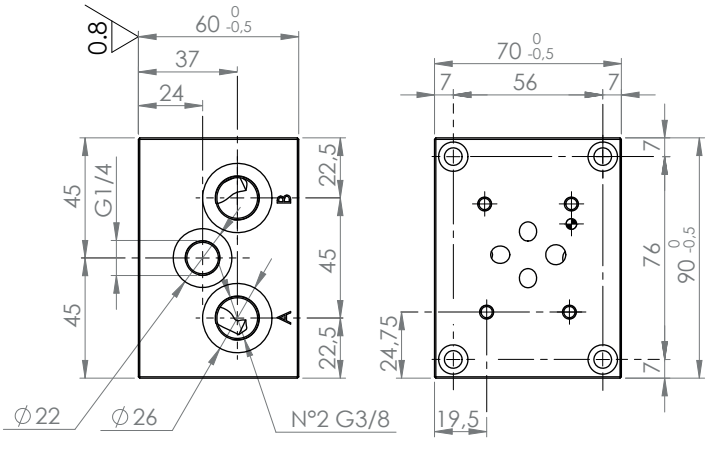
3 TECHNICAL DATA

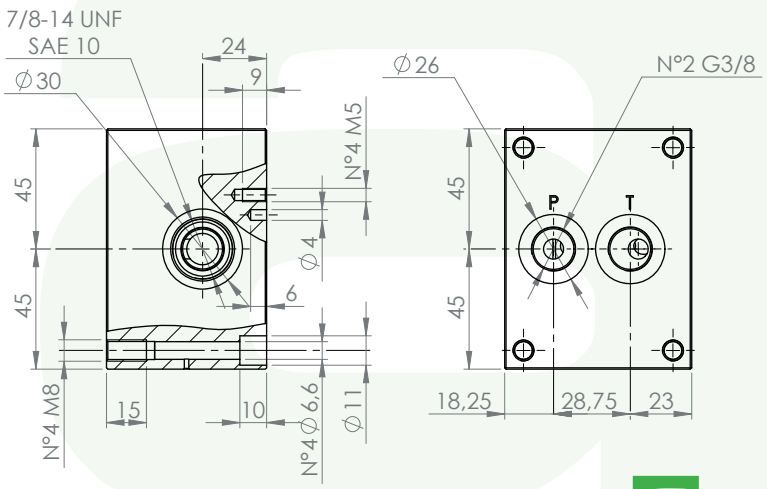
Material:	Aluminium alloy
Coating	black anodizing
Max pressure	300 bar
Max flow rate	60 l/min
Mass	0,9 Kg



4 INSTALLATION DIMENSIONS

See 5 for options



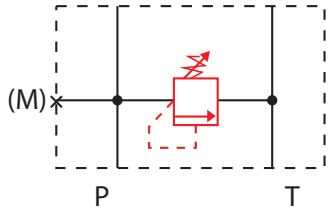


3 0084

5 OPTIONS

RELIEF VALVE, DIRECTLY OPERATED

Example ordering code: BM3-G/20



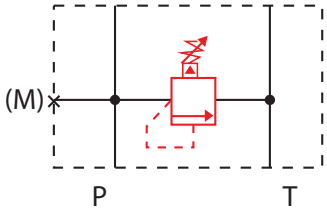
16: Pressure setting 50-116 bar

20: Pressure setting 110-220 bar

32: Pressure setting 200-320 bar

RELIEF VALVE, PILOT OPERATED

Example ordering code: BM3-G/P20



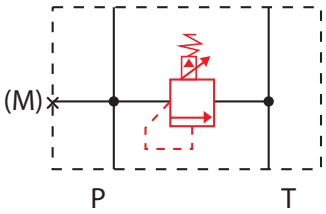
16: Pressure setting 50-116 bar

20: Pressure setting 110-220 bar

32: Pressure setting 200-320 bar

RELIEF VALVE, ELECTRICALLY PROPORTIONAL PILOT OPERATED

Example ordering code: BM3-G/PR20



PR12: Pressure up to 120 bar

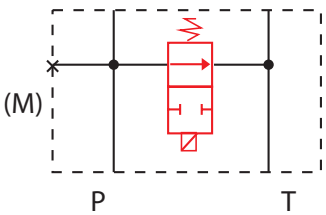
PR21: Pressure up to 210 bar

PR35: Pressure up to 350 bar

(*) for more details about proportional valve see datasheet PMO*-78

BY-PASS ELECTRICALLY OPERATED VALVE

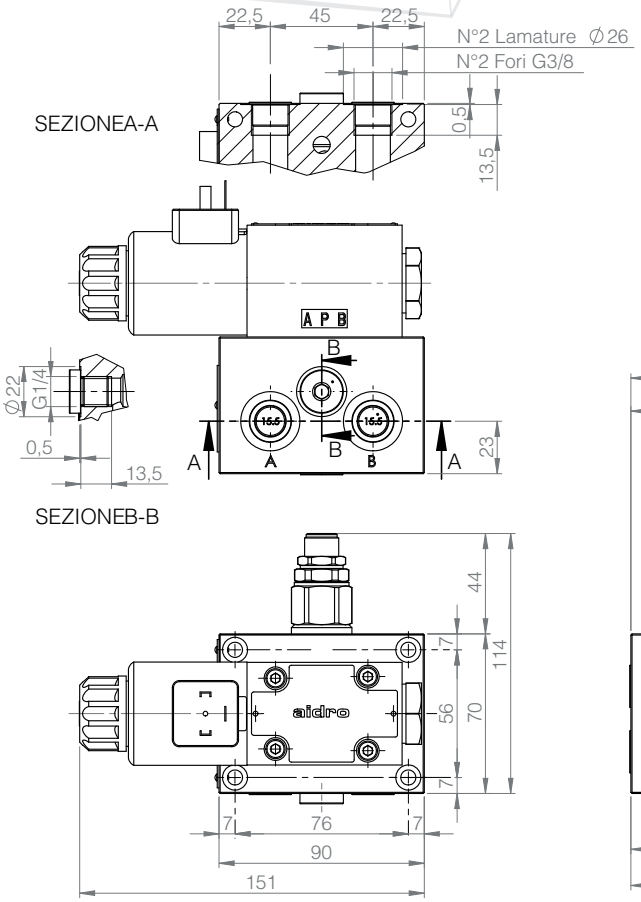
Example ordering code: BM3-G/NO

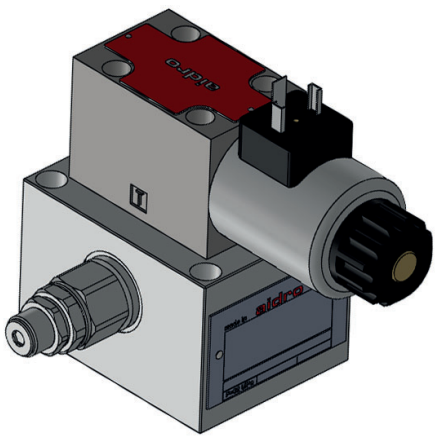


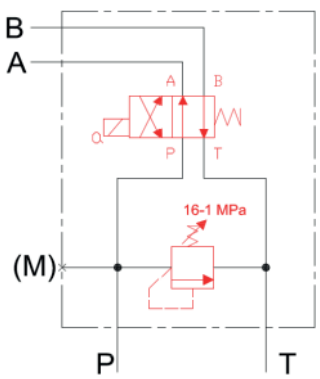
NO: Normally open

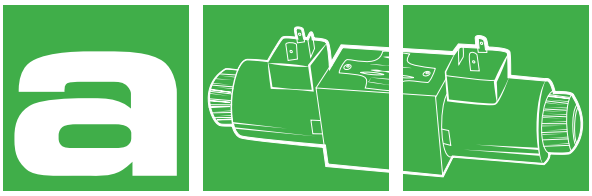
NC: Normally closed

6 INSTALLATION DIMENSIONS example









SANDWICH PLATE CETOP 3

PM3-AB/10

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Sandwich plate made of machined cast iron with phosphate coating with CETOP 3 standard mounting interface for vertical modular stacking. A and B lines are intercepted with G1/4" ports on the side of the module.
Fluid flows freely in P, A, B and T lines for PM3-AB/10 version; for PM3-AB-COT/10 version T line is provided with check valve. When force due to pressure in T overcomes the sum of force due to pressure in T1 and the force due to the pre-load of spring, the poppet shifts axially and fluid flows from T to T1.
Reverse flow is prevented by the poppet, which is kept against its seat by spring.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
PM3	-	AB	-		-		-		/	10

(1) PM3: stackable sandwich valve CETOP03

(2) AB: Manometer port on A and B

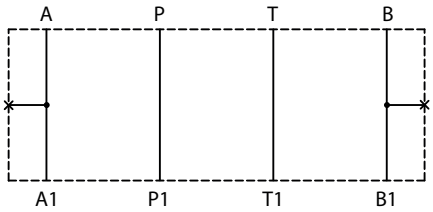
(3) Version:
CO: Check valve version

(4) Line where control operates:
T: T line

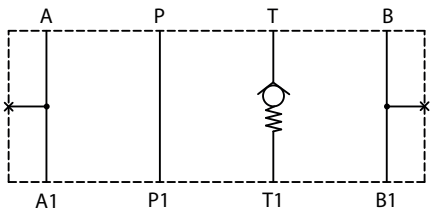
(5) Cracking pressure (Pm)
no designation: Pm approx 1 bar

(6) Design number (progressive) of the valve

PM3-AB

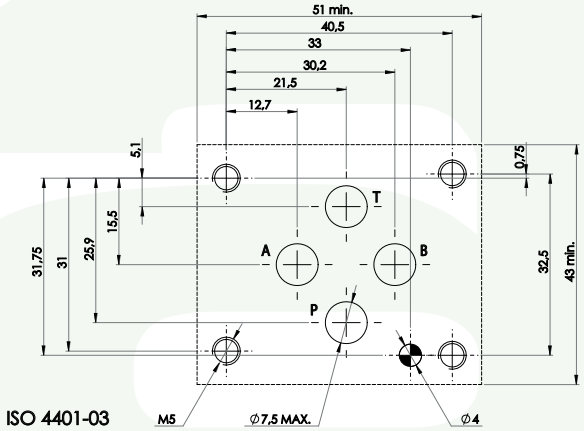


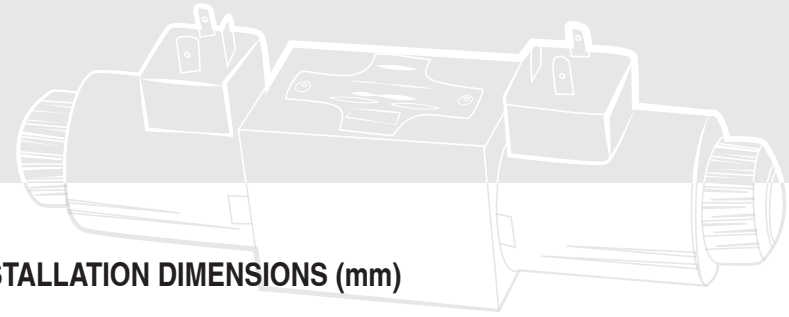
PM3-AB-COT



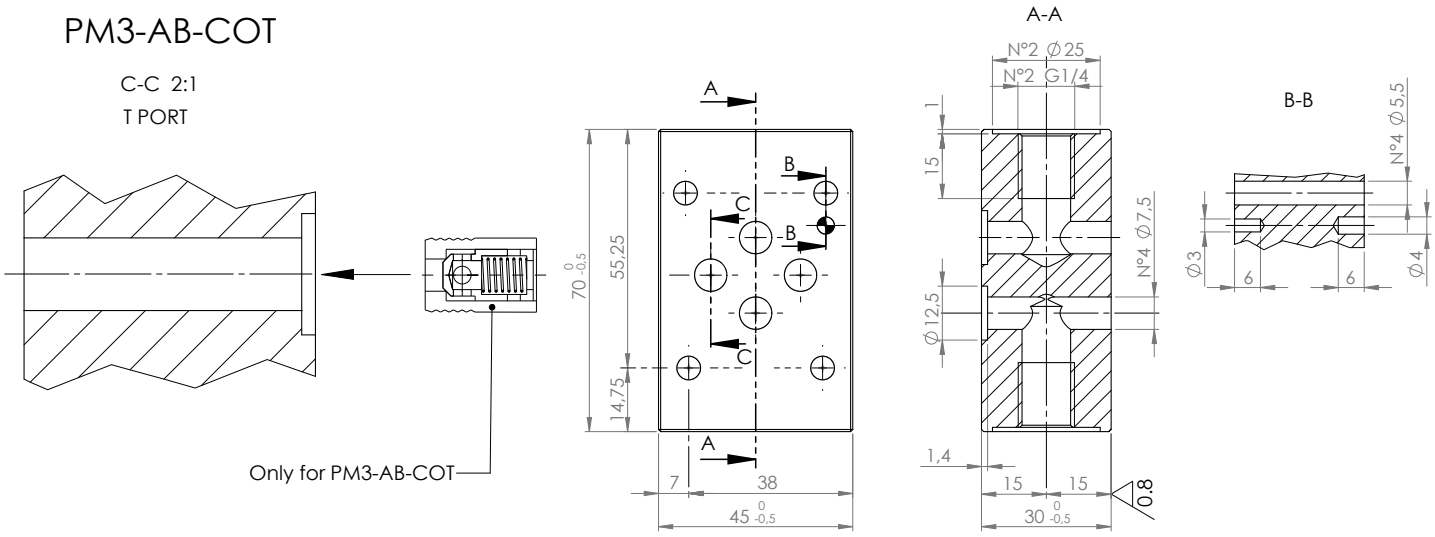
3 TECHNICAL DATA

Material:	Cast Iron GG 25
Coating:	Manganese phosphating
Max pressure on T port	320 bar
Max flow rate on T port	60 l/min (PM3-AB)
Max flow rate on T port	25 l/min (PM3-AB-COT)
Incoming flow, maximum recommended:	80l/min
Mass	1,1 kg
A and B ports:	Standard G1/4" with min surface rugosity of Ra 1.6





4 INSTALLATION DIMENSIONS (mm)

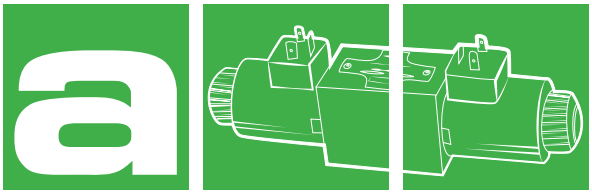


5 HYDRAULIC FLUID

Seals and materials used on standard valves PM3-AB-*are fully coMPatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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 cS

6 MOUNTING SURFACE OF THE VALVE:

Planarity of the surface: 0,01/100
Rugosity: Ra 0,8
Every section has a mounting surface according to ISO 4401-03.



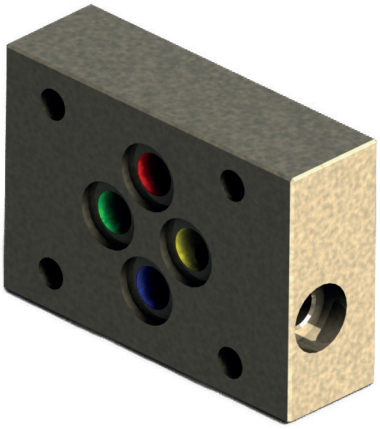
SANDWICH PLATE CETOP 3

PT3

60 l/min - 32 MPa (320 bar)

1 DESCRIPTION

Sandwich plate made of machined cast iron with phosphate coating with CETOP 3 standard mounting interface for vertical modular stacking. This plate serves as a closing plate in “O” version or as a direct connection between P/T and A/B port depending on the version



2 ORDERING CODE

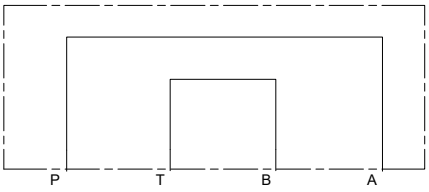
(1)		(2)		(3)
PT3	-		/	20

(1) PT3: CETOP03 plate

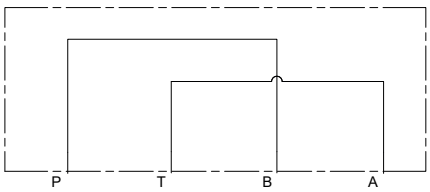
(2) Versions:
0: closing plate
PA/BT: P in A and B in T
PB/AT: P in B and A in T

(3) progressive of the valve

PT3-PA-BT



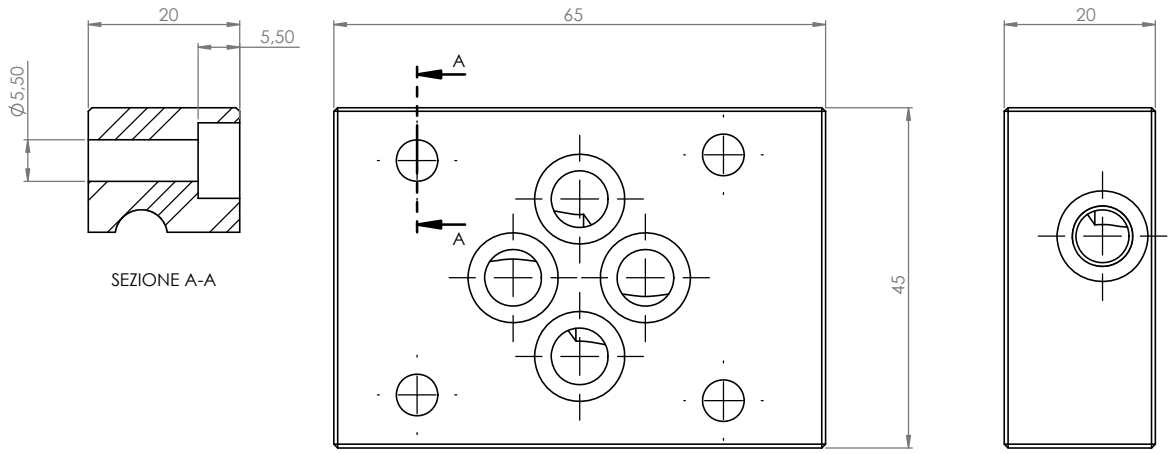
PT3-PB-AT



3 TECHNICAL DATA

Material:	Cast Iron GG 25
Coating:	Manganese phosphating
Max pressure on T port	320 bar
Incoming flow, maximum recommended:	60l/min
Mass	1,1 kg
A and B ports:	Standard G1/4” with min surface rugosity of Ra 1.6

4 INSTALLATION DIMENSIONS (mm)

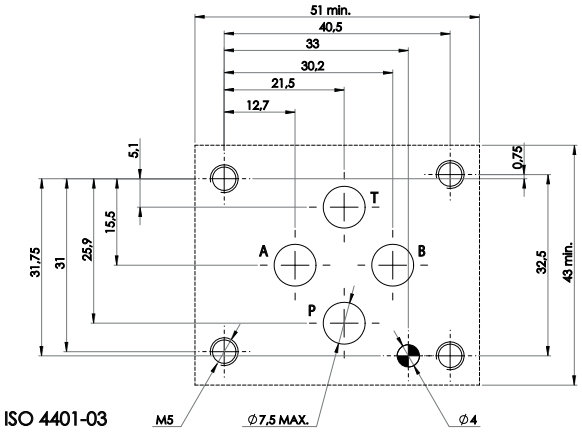


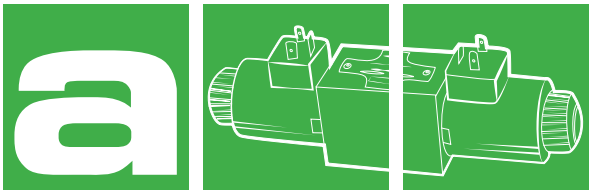
5 HYDRAULIC FLUID

Seals and materials used on standard valves PT3-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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 cS

6 MOUNTING SURFACE OF THE VALVE:

Planarity of the surface: 0,01/100
Rugosity: Ra 0,8
Every section has a mounting surface according to ISO 4401-03.





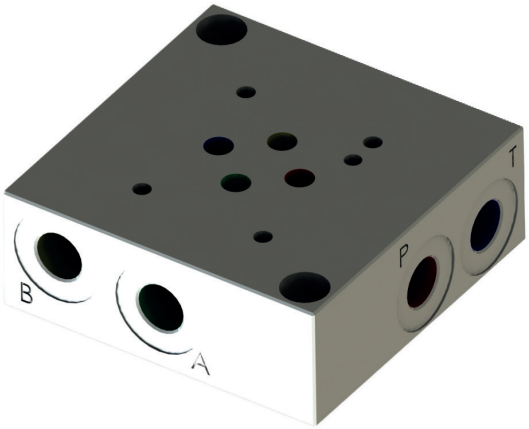
MONOBLOCK SINGLE SECTION ISO 03 - BOTTOM PORTS

MRSK-3-GE-14

80 l/min 35 MPa (350 bar)

1 DESCRIPTION

MRSK-3-GE is a basic CETOP 3 baseplate useful for the connection of a single cetop section with A, B, P, T ports which are located on the sides; it has a standard SAE08 cavity on the side allowing a relief valve installation.
The plate is in steel phosphate coated.



2 ORDERING CODE

(1)		(2)		(3)		(4)
MRSK	-	3	-	GE	-	14

(1) MRSK: Base plate single section and bottom ports

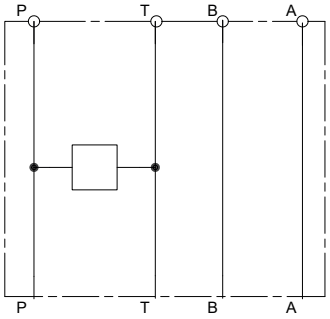
(2) 3 : CETOP 3

(3) GE: version with relief valve cavity

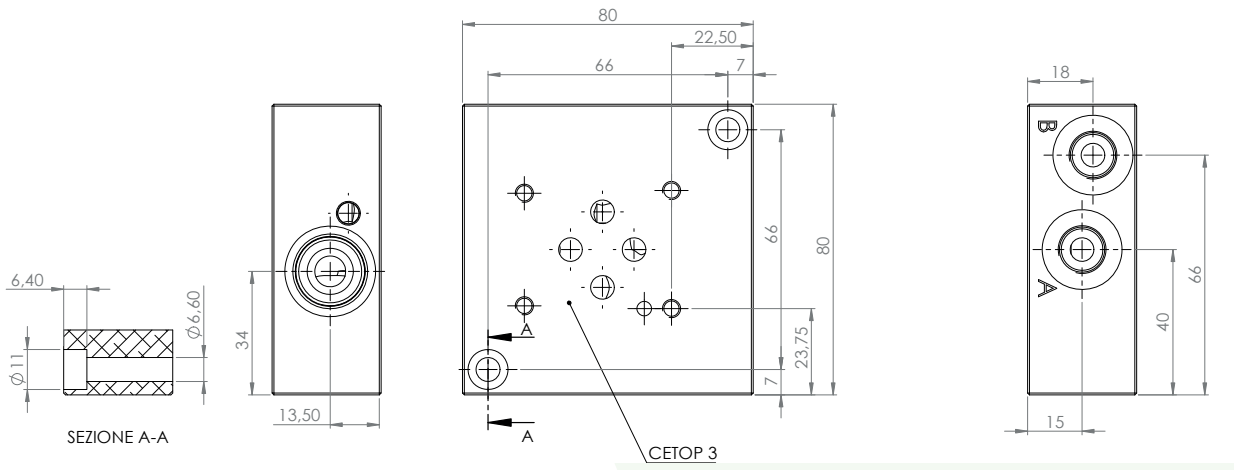
(4) 14. Ports 1/4”

3 TECHNICAL DATA

Material:	Steel
Coating	Phosphated
Max pressure	35 MPa (350 bar)
Max flow rate	80 l/min
Mass	1,24 kg



4 INSTALLATION DIMENSIONS



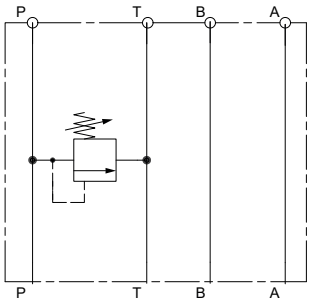
5 OPTIONS

MRSK-3-GE-14 plates can be supplied with a direct acting relief valve type MO-020 (see page 8-0031) and can be order according to the following code:

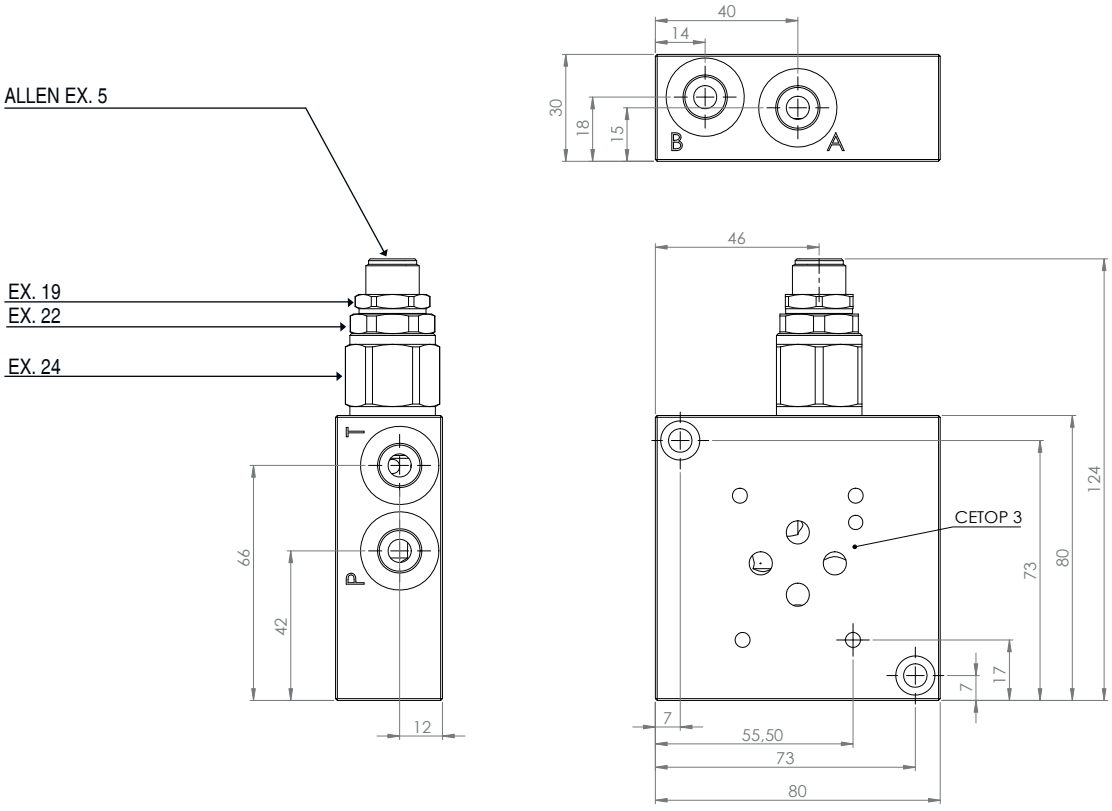
ORDERING CODE

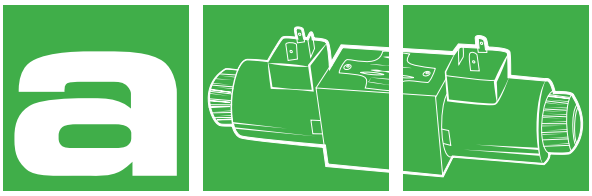
								(1)
MRSK	-	3	-	GE	-	14	/	

(1) Relief valve spring options:
- 10: settings 32-125 bar, increase 15 bar/turn
- 20: settings 63-200 bar, increase 30 bar/turn
- 32: settings 125-350 bar, increase 40 bar/turn



INSTALLATION DIMENSIONS (with MO-020)





REGENERATIVE MODULAR VALVE

AM3-RGT

30 l/min – 25 MPa (250 bar)

1 DESCRIPTION

The regenerative function of this valve provides consist in a increase of the actuator (differential cylinder) exit speed as shown in the diagram. When used with a cylinder with a 2:1 ratio of the operating surfaces the exit and re-entry speeds will be equal. The standard surface treatment of the body is phosphate coating, valves are zinc plated. Optional Zinc-Nickel coating (720h) is available



2 ORDERING CODE

(1)		(2)	(3)		(4)		(5)		(6)
AM3	-	RGT		/		-		/	10

(1) Stackable valve CETOP 03 - Pressure 350 bar

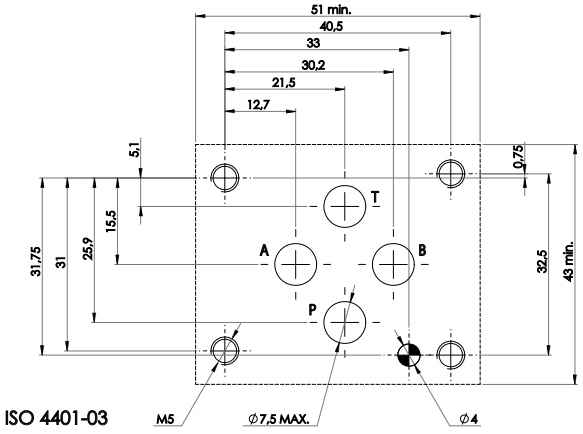
(2) RGT: regenerative circuit

(3) Regeneration flow
- no designation (standard): flow from A to P
- AB: flow from A to B

(4) Check valve opening (cracking) pressure (Pm)
- no designation (standard): 0,3 MPa (3 bar)
- 5: 0,05 MPa (0,5 bar)
- 10: 0,1 MPa (1 bar)
- 25: 0,25 MPa (2,5 bar)

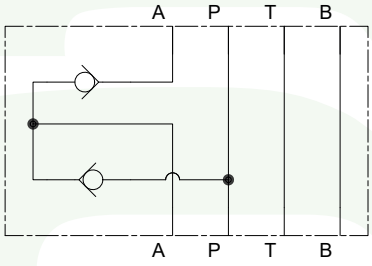
(5) Code reserved for option and variants:
- V: Viton seals

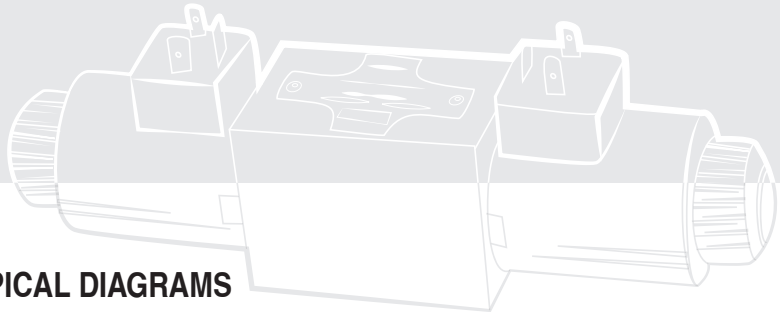
(6) Design number (progressive) of the valve



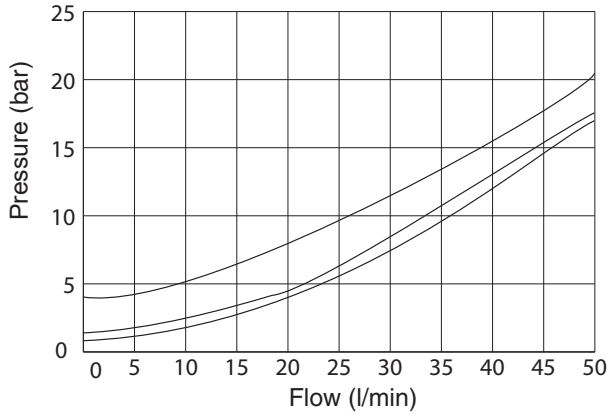
3 TECHNICAL DATA

Maximum rec. Flow rate	30 l/min
Maximum nominal pressure	25 MPa (250 bar)
Pressure curves	See 4
Installation dimensions	see 5
Weight	Approx. 1,7 kg

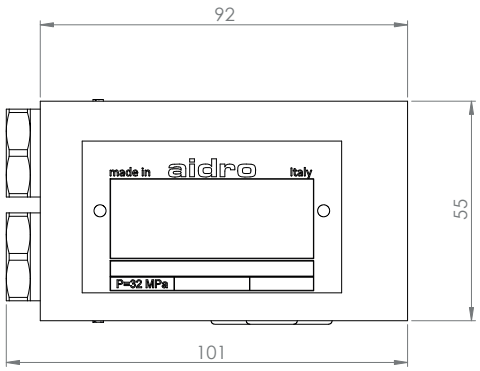


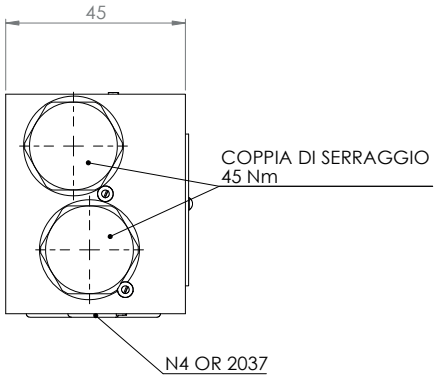


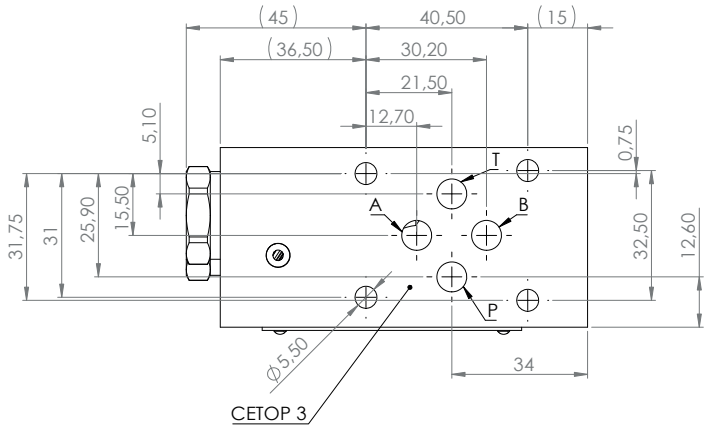
4 TYPICAL DIAGRAMS



5 INSTALLATION DIMENSIONS







6 HYDRAULICS FLUID

Seals and materials used on standard valves AM3-RGT are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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 cS

SUMMARY

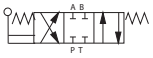
4 CETOP 05

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED
HD5-ES-*

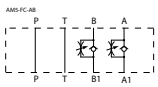

0001

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED
HD5-ED-*

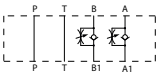

0006

DIRECTIONAL CONTROL VALVE MANUALLY OPERATED
HD5-LO-*/20


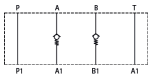
0009

STACKABLE VALVES FLOW CONTROL
AM5-FC-*


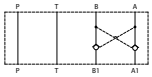
0013

STACKABLE VALVES FLOW CONTROL
AM5-FX-*


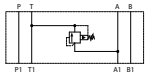
0015

STACKABLE CHECK VALVES
AM5-CO-*


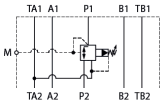
0017

STACKABLE CHECK VALVES
AM5-CP-*/20


0019

STACKABLE VALVES PILOT OPERATED
AM5-MP-*


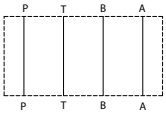
0021

STACKABLE VALVES PRESSURE REDUCING
AM5-RP-*


0023

MONOBLOCK WITH MULTIPLE SECTIONS ISO 05
MR-5-*-G
0025

MONOBLOCK WITH MULTIPLE SECTIONS ISO 05
MRK-5-*-G
0027

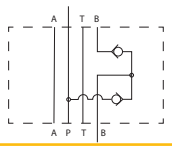
MONOBLOCK SINGLE SECTION ISO 05 - BOTTOM PORTS
MRSK-5


0029

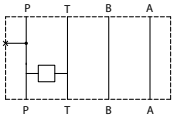
SUMMARY

4 CETOP 05

REGENERATIVE MODULAR VALVE

AM5-RGT  0030

ISO 05 PLATE

BM5-G  0032

aidro
Desktop Metal Company

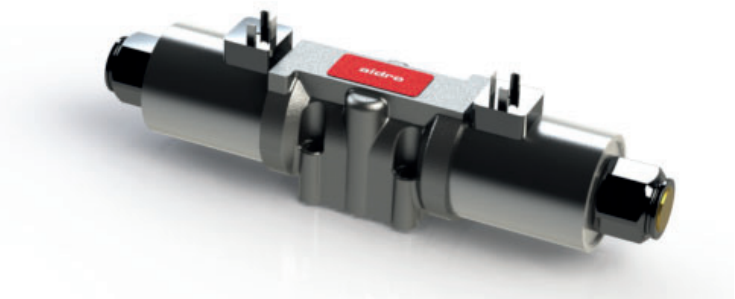
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED

HD5-ES-*

120 l/min 35 MPa (350 bar)

1 DESCRIPTION

Valves HD5-ES are directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 05).
The design of the body is a 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)
HD5	-	ES	-		-		-		-		/	20

(1) HD5 : 4-way directional control valve CETOP 05 – Pressure 32 MPa (320 bar)

(2) ES : electrically controlled, standard

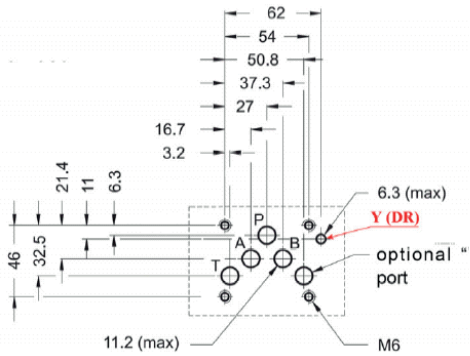
(3) Spool type (see 4)
-number is the main spool type
-letter is the solenoid or spring arrangement:
C : 2 sol. , spool is spring centered (3 position)
N : 2 sol. , spool is detented (2 position)
LL : 1 sol. (a), spool is spring offset (2 pos. , end to end)
ML: 1 sol. (a), spool is spring centered (2 pos. , middle to end)
LM: 1 sol. (a), spool is spring offset (2 pos. , end to middle)

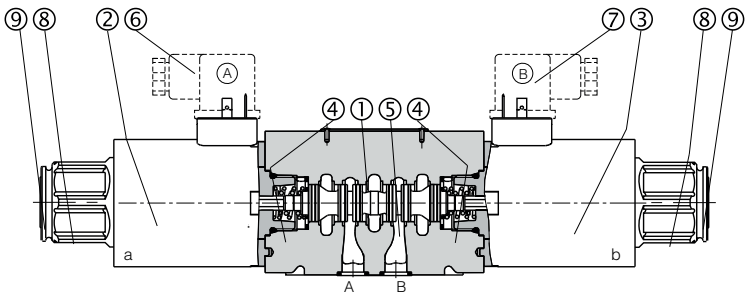
(4) Code reserved for special variants:
b: only for version LL, ML, LM, solenoid b installed (instead of a)
T* : soft shifting options (see 12, 13 and 14)
K : water proof caps on override pin (see 15)
Z* : anti-corrosion variants (see 16)
DR: solenoid(s) chamber draining (see 15)
5S-**: calibrated orifice on P port (see 17)

(5) Electric voltage and solenoid coils: (see 8, 9, 10)
0000: no coils
012C: coils for V12DC
024C: coils for V24DC
048C: coils for V48DC
024A: coils for V24/50AC
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
AMPX: Amp Junior Timer- axial configuration
D: Deutsch

(7) 20: design number (progressive) of the valve



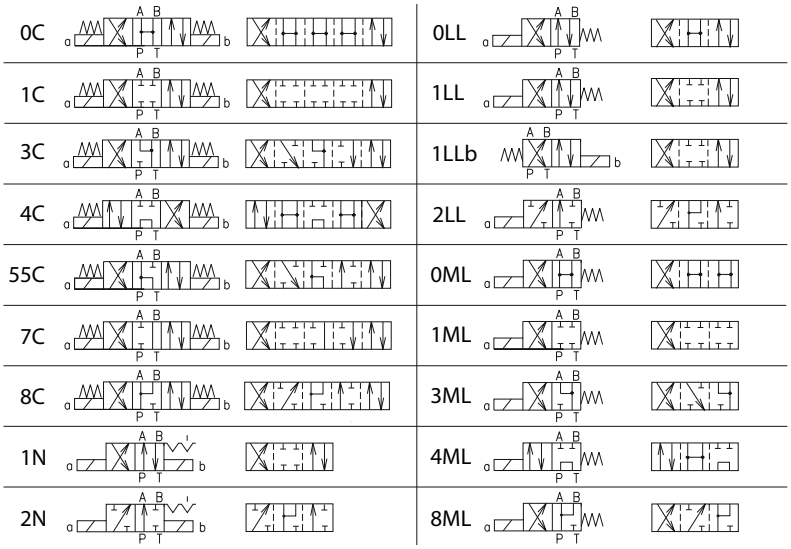


The spool 1 shifts into the valve body 4 subject to the action of springs and solenoids 2 and 3. Spool 1, depending from its shape and its position in the valve body 4, opens and/or closes p assages b etween P , A , B a nd T ports, thus controlling the direction of the ydraulic flow. In case of electric cut-offs the spool can be manually shifted by acting on the override pins 9, located at the end of the solenoids and accessible through the retaining nuts.

3 TECHNICAL DATA

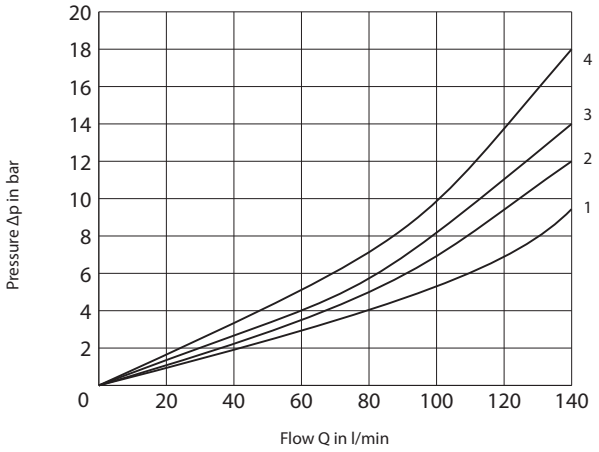
Nominal flow	120 l/min
Max. rec. flow	see 5
Nominal pressure (P, A,B)	32 MPa (320 bar)
Max. rec. Pressure (P, A, B)	35 MPa (350 bar)
Max. rec. Pressure (T port)	21 MPa (210 bar)
Pressure drops	see 6
Protection to DIN 40050	IP 65
Duty cycle	100 %
Service life	> 10^7 cycles
Mass	1 sol. 3,9 kg 2 sol. 5,4 kg

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



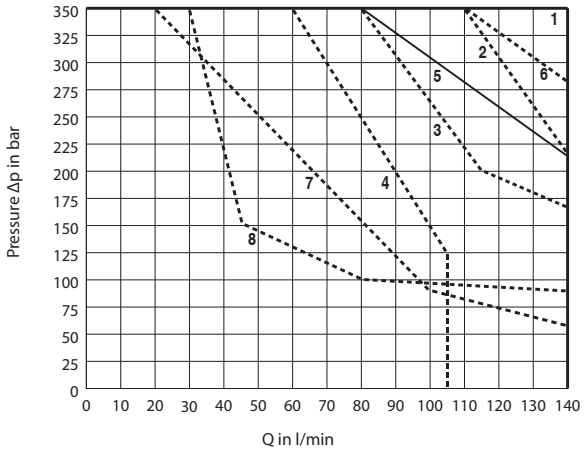
5 TYPICAL DIAGRAMS

Typical Δp curves for valves HD5-ES-*, with mineral oil at ν= 32 mm²/s and t = 40°C, for flow P -> A/B, A/B -> T and P -> T



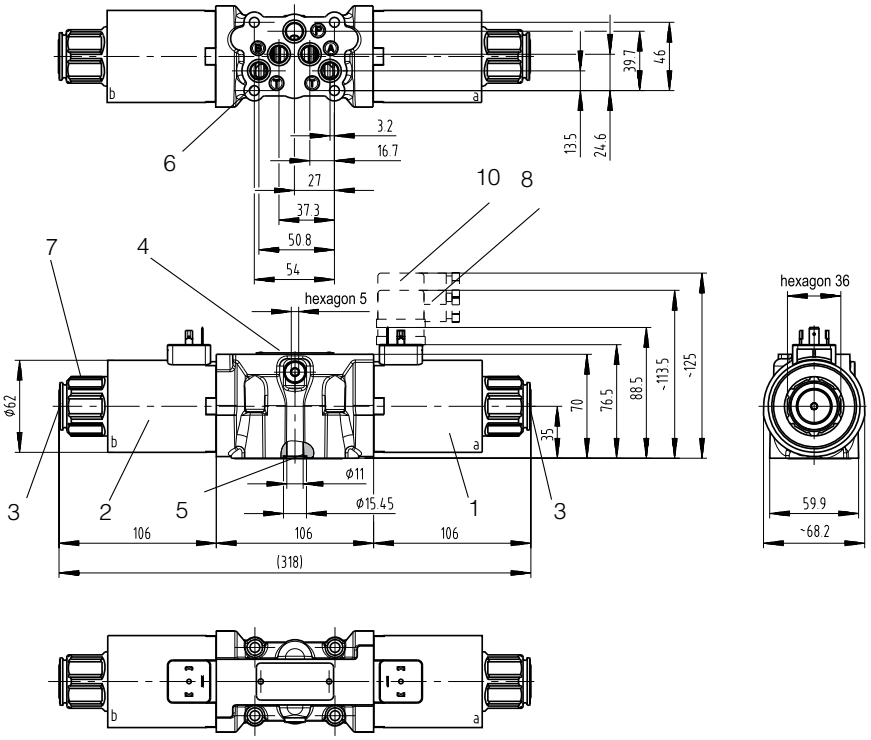
Spool type	P-A	P-B	A-T	B-T	P-T
0C	1	1	2	2	1
1C	1	1	2	2	-
3C	1	1	2	2	-
4C	3	3	4	4	1
55C	1	1	1	2	2
7C	1	1	2	2	-
8C	1	1	2	2	-
1N	1	1	2	3	-
2N	1	1	-	-	-
0LL	1	1	1	3	-
1LL	1	1	2	2	-
1LLb	1	1	2	2	-
2LL	1	1	-	-	-
0ML	-	1	2	-	1
1ML	-	1	2	-	-
3ML	-	1	2	-	-
4ML	3	-	-	4	1
8ML	-	1	2	-	-

6 HYDRAULIC LIMIT OF USE



Spool type	Limit
0C	1
1C	
8C	
0ML	
1ML	
8ML	
3C	5
3ML	
4C	3
55C	7
7C	4
1N	6
2N	8
0LL	2
1LL	2
1LLb	2
2LL	8
4ML	3

7 INSTALLATION DIMENSION (mm)

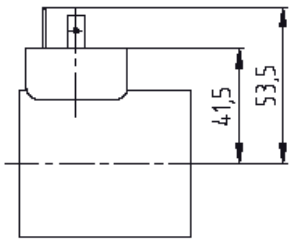


All valves HD5-ES-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height.
When assembled to its mounting plate, valve HD5-ES-* must be fastened with 4 fixing bolts (socket head screws to ISO 4762) M6 x 40 mm (or M6 x* according to the number of modules) of class 12,9 (ISO898) tightened at 12 Nm torque.
Leakage between valve and mounting surface is prevented by the positive compression on their seats of 5 seals of Quad-Ring type 12,42 x 1,68 x 1,68 mm.

8 SOLENOID COILS, WITH STANDARD ELECTRIC CONNECTION TO ISO 4400 / DIN 43650, FOR DC SUPPLY

Standard valves type HD5-ES-* are operated by solenoid that are energized directly from a D.C. voltage supply. Solenoid valves can be supplied without electric coils as HD5-ES-*-0000 and coils can be supplied separately as B05-***C.

Directly from D.C. supply			
Voltage	Valve Code	Coil Code	Nominal Current (A)
V 12 DC	HD5-ES-*-*-012C	B05-012C	3,17
V 24 DC	HD5-ES-*-*-024C	B05-024C	1,73

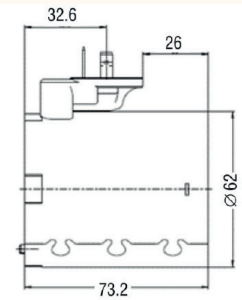


Permissible supply voltage variation : +5% -10%
Special voltages available : V 48 DC, V 106 DC, V 205 DC

9 SOLENOID COILS, WITH STANDARD ELECTRIC CONNECTION TO ISO 4400 / DIN 43650, FOR AC SUPPLY

Valves type HD5-ES-* can be operated from A.C. supply by the use of coils that incorporate a full wave bridge rectifier. Coils with rectifier can be supplied separately as B05-***A.

Directly from A.C. supply			
Voltage	Valve Code	Coil Code	Nominal Current (A)
V 115 AC / 50 (60) Hz	HD5-ES-*-*-115A	B05-115A	0,40
V 230 AC / 50 (60) Hz	HD5-ES-*-*-230A	B05-230A	0,20



Permissible supply voltage variation : +5% -10%
Special voltages available : V 48 DC, V 106 DC, V 205 DC

10 OPTIONAL ELECTRIC CONNECTION

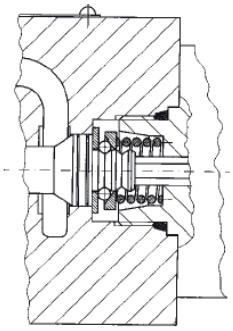
Coils type B05-* for valves HD5-ES-* can be supplied with 2-poles AMP Junior-Timer electric connection. Coils with AMP connection can be supplied separately as B05-***CAMP

AMP electric connection			
Voltage	Valve Code	Coil Code	Nominal Current (A)
V 12 DC	HD5-ES-*-*-012 CAMP	B05-012CAMP	3,17
V 24 DC	HD5-ES-*-*-024 CAMP	B05-024CAMP	1,73

Other optional electric connection are available :
- Flying Leads
- Flying Leads (250 mm) with Deutsch connection (DT04-2P)

11 VERSION "N" : MECHANICAL DETENT ON SPOOL

Solenoids valves with detent typically are 2 position, 2 solenoid, no-spring valves where the spool is kept at the extreme ends of its stroke b y a mechanical device. This permits that solenoids are energized by short time current pulses and the spool remains at its position regardless of forces due to hydrodinamics or gravitational/inertial effects (vibrations).

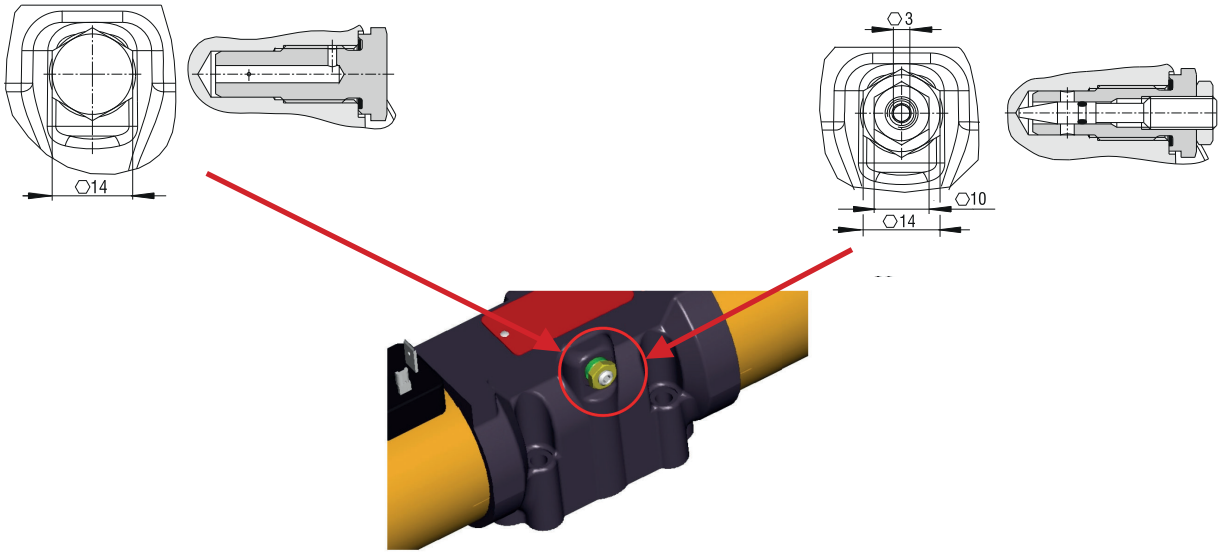


12 VERSION "T": SOFT SHIFTING

Solenoid valves with soft shifting devices are 2 or 3 position valves which incorporated a fixed throttling orifice (Ø 0,6 mm) on the channel that connects the extreme hydraulic chambers of the valve. The throttling effect controls the spool shifting time, thus limiting unwanted hydraulic shocks.

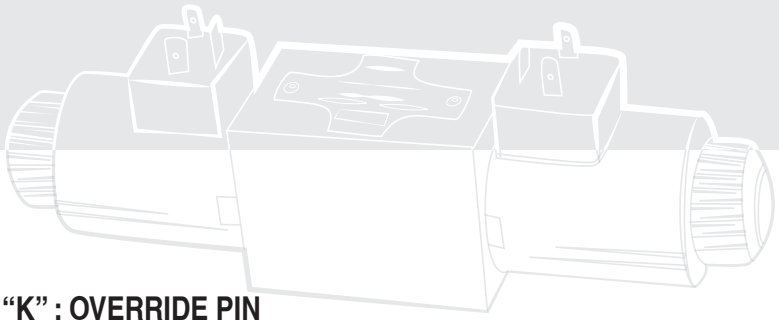
13 VERSION "TR": ADJUSTABLE SOFT SHIFTING

In Version "TR" valves, the fixed orifice is replaced by an adjustable, variable throttle valve that permit a fine and precise adjustment of the spool shifting time. To increase the throttling (and therefore the shifting time) turn clock-wise the adjusting screw (Ch. 3 mm), after having unlocked its retaining nut (Ch. 10 mm).



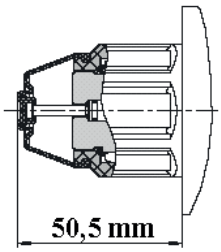
14 VERSION "T0"

Drilled cavity plugged suitable for soft shift options T and TR.



15 VERSION "K" : OVERRIDE PIN

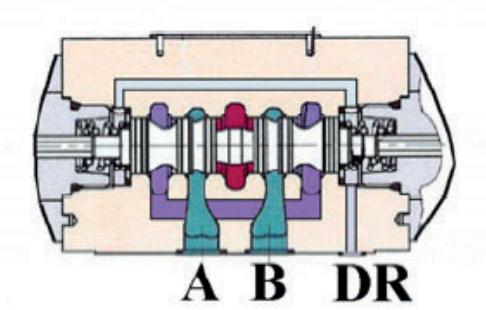
Solenoid valves according to "K" version have override actuators that push on the valve's override pins and permit a quick and easy "hand operation" of the valves, without the need of any tool. The override actuator is incorporated in a flexible rubber cap that is e asily applicable on the solenoid retaining nuts and that protects from moisture and water splashes.





16 VERSION "DR" : SEPARATE DRAINING OF THE SOLENOID CHAMBER

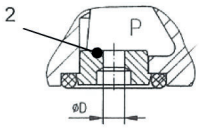
Solenoid valves according to "DR" version present a draining line of the chambers of the solenoids. This version should be adopted in presence of high counterpressure on T line that exceed the permissible recommended maximum pressure for T ports of the valve (210 bar). Position of additional draining port DR is conform with ISO 4401-05 interface and correspond to the Y port.



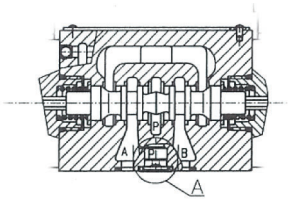
17 VERSION "5S*" ; CALIBRATED ORIFICE ON P PORT

Option "5S*" 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 ΔP value, the flow rate entering the solenoid valve.
Those elements have the following orifice diameters :

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



and are kept sealed on the P port of the valve by an OR of 12,42x1,78 mm sizes (example OR)



18 ANTICORROSION OPTIONS

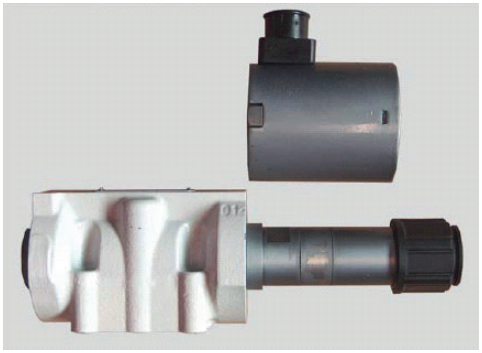
On HD5-ES-* standard valves the body is phosphate coated, the solenoid tubes are not treated and coils mantel and irons are zinc trivalent plated.
To increase the resistance to corrosive agents different variants are available :

ZT : Body, solenoid tubes and coils irons are zinc trivalent plated

ZN: Body, solenoids tubes and coils iron are zinc-nickel plated

ZL : Body is coated with special TEMADUR 40 zinc painting
Solenoids have 8-12 µm zinc plating

ZK : Body is coated with special TEMADUR 40 zinc painting
Solenoids tube and coils irons are "zinc-nickel" plated



Example of ZK painted valve : HD5-ES-1LLb-ZK-024C/20 .

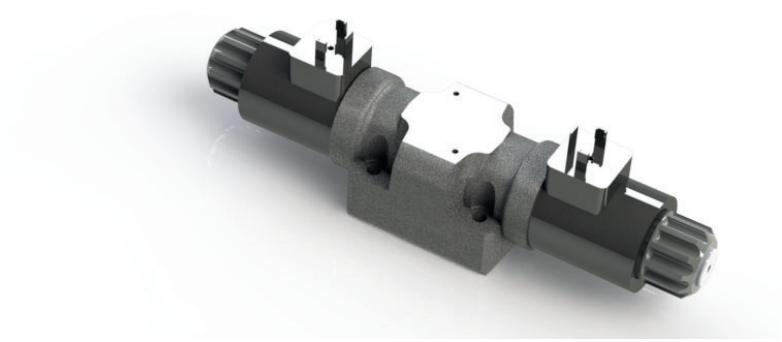
DIRECTIONAL CONTROL VALVES SOLENOID OPERATED

HD5-ED-*

100 l/min 32 MPa (320 bar)

1 DESCRIPTION

Valves HD5-ED are directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 05).
The valve is designed for low performance applications when you need a CETOP 5 interface but limited flow rates.
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.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)
HD5	-	ED	-		-		-		-		/	10

(1) HD5 : 4-way directional control valve CETOP 05

(2) ED : electrically controlled

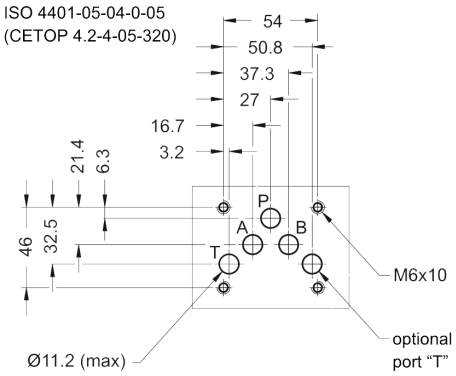
(3) Spool type (see 4)
-number is the main spool type
-letter is the solenoid or spring arrangement:
C : 2 solenoid , spool is spring centered (3 position)
LL : 1 solenoid, spool is spring offset (2 position)
ML: 1 solenoid, spool is spring centered (2 position)

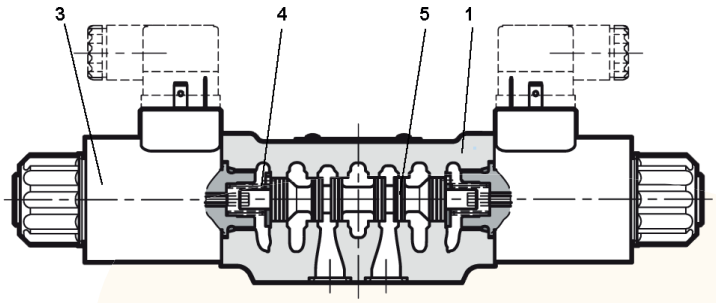
(4) Code reserved for special variants

(5) Electric voltage and solenoid coils:
0000: no coil(s)
012C: coil(s) for 12 V DC
024C: coil(s) for 24 V DC
115A: coil(s) for 110/50 V AC- 115/60 V AC
230A: coil(s) for 220/50 V AC - 230/60 V AC

(6) Coil connection:
no designation: DIN 43650-A ISO 4400
AMP: Amp Junior Timer - vertical configuration
AMPX: Amp Junior Timer - axial configuration
D: Deutsch

(7) Design number (progressive) of the valve





The spool 5 shifts into the valve body 1 subject to the action of springs 4 and solenoids. 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	100 l/min
Maximum rec. flow rate see	100 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
Energizing switching times	70-100 ms
Protection to DIN 40050	IP 65
Duty cycle	100%
Installation and dimensions	see 7
Mass	3,0/2,4 kg

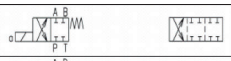
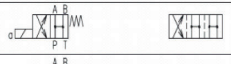
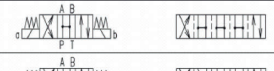
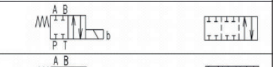
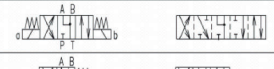
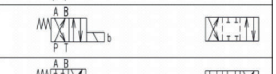
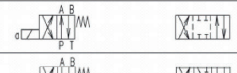
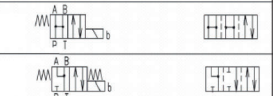
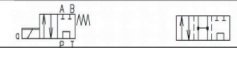
Electric characteristics:

Valve type HD5-ED-* are operated by solenoid that are energized:
- directly from a DC voltage supply
  24 V DC = 024C
  12 V DC = 012C
- by the use of coils that incorporate a full wave rectifier, from AC voltage supply:
  115A110/50 V AC- 115/60 V AC = 115A
  220/50 V AC - 230/60 V AC = 230A

All connectors must conform to ISO 4400 (DIN 43650) and electric circuitery 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

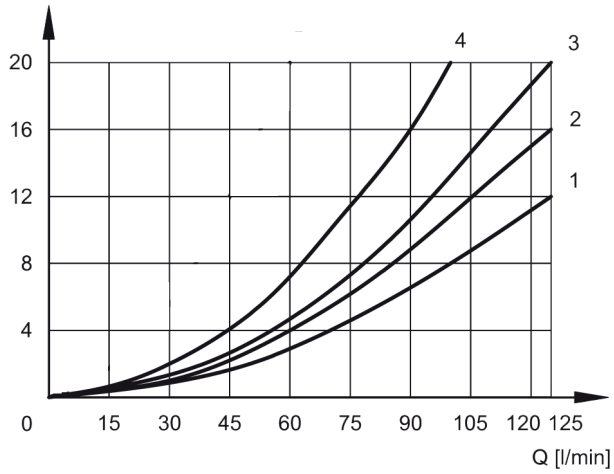
Coils with 2 electric pins, conforming with AMP connectors, are only available for DC supply (example of code : B03-012C AMP).
Permissible supply voltage variation : ± 10 %

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

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

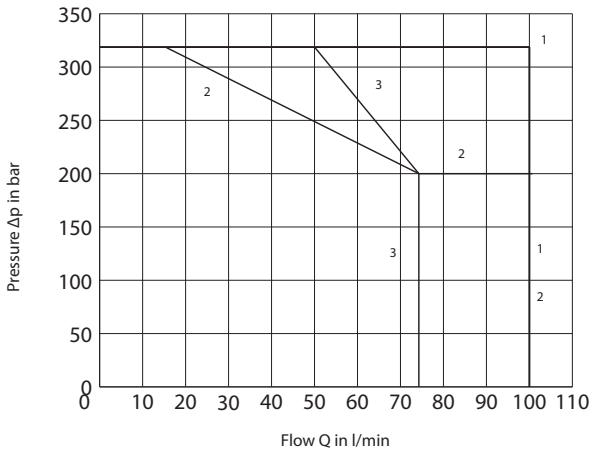
5 TYPICAL DIAGRAMS

Typical P-Q curves for valves HD5-ED-* in standard configuration, with mineral oil at ν=32 mm²/s and at T=40°C.



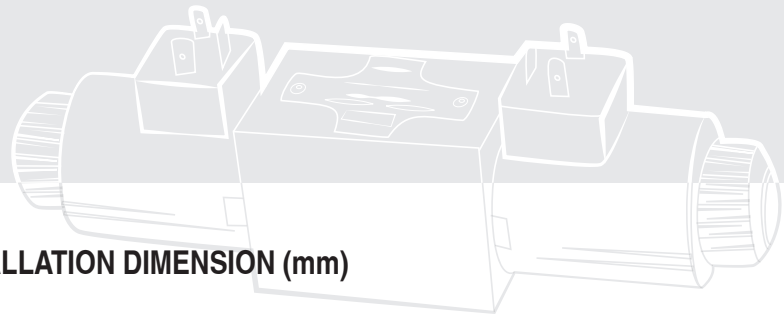
6 HYDRAULIC LIMIT OF USE

P-Q characteristics limits for safe use of HD5-ED-* solenoid operated valves. Measured at ν=32 mm²/s and T = 40°C

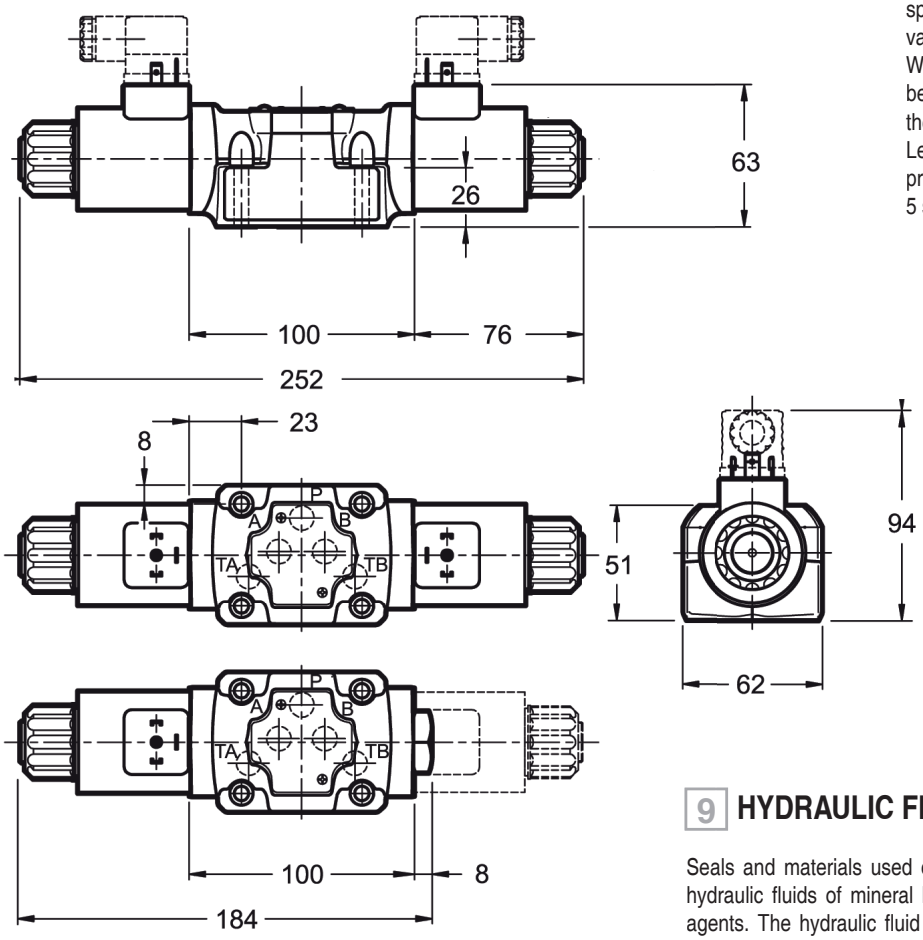


1C	1
4C	3
0C	1
3C	2
1LL	1
3ML	2
4ML	3
1ML	1
1MLb	1
1LLb	1
4MLb	3

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



7 INSTALLATION DIMENSION (mm)



All valves HD5-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height.
When assembled to its mounting plate valve HD5-* must be fastened with 4 bolts M6x35 (or M6x** according to the number of modules) tightened at 12 Nm torque.
Leakage between valve and mounting surface is prevented by the positive compression on their seats of 5 seals of O Ring type 12,42x1,78 - 90 Shore.

8 SOLENOID

Solenoid valves can be supplied without electric coils, as HD5-ED-****-0000.Coils are ordered separately ; standard, 3 electric pins, coils are :

- B03-024C ; B03-012C
- B03-115A ; B03-230A

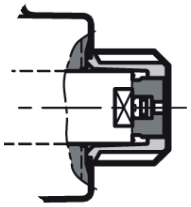
Connections to the electric supply is made by standard 3-PIN connectors, according to ISO 4400 (DIN 43650). Connectors can be with different cable exit size (PG9, PG11) and beside of the plain connecting function they may incorporate various features like

- Signal led
- Voltage surge suppressor, etc.

9 HYDRAULIC FLUID

Seals and materials used on standard valves HD5-* are fully compatible with hydraulic 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.

10 MANUAL OVERRIDE



In case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins, located at the end of the solenoids and accessible through the retaining nuts.

DIRECTIONAL CONTROL VALVE MANUALLY OPERATED

HD5-LO-*/20

140 l/min 35 MPa (350 bar)

1 DESCRIPTION

Directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 05). High transmitted hydraulic power up to 350 bar with optimized design to minimize pressure drops. Three chamber housing design for production cost saving. Manual lever and actuation element can be rotated in 90° increments for flexible installation. Wide range of interchangeable spools available. Springless, detented valves available, valve holds last selected position, available for all spools. Spool end position sensing option. Spool stroke limit option. In the standard version, the valve housing is phosphated and steel parts zinc-coated 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)
HD5	-	LO	-		-		-	/	20

(1) HD5 : 4-way directional control valve CETOP 05 – Pressure 35 MPa (350 bar)

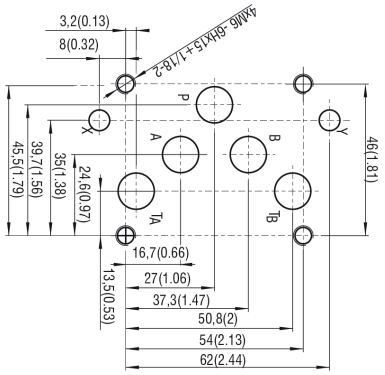
(2) LO : lever operated

(3) Spool type (see 4)
- -number is the main spool type
- -Spool nominal flow
  - no designation: directional control spool
  - R: 30 l/min
  - P: 60 l/min
- -letter is the solenoid or spring arrangement:
  - C : spool is spring centered (3 position)
  - N : spool is detented (2 position) see 11
  - LL : spool is spring offset (2 pos. , end to end)
  - ML: spool is spring centered (2 pos. , middle to end)
  - LM: spool is spring offset (2 pos. , end to middle)
  - b: only for version LL, ML, LM, lever installed on side b

(4) Code reserved for special variants:
- CAB: stroke limiter on A e B (see 9)
- CA: stroke limiter on A (see 9)
- CB: stroke limiter on B (see 9)
- Z* : anti-corrosion variants (see 16)
- DR: actuation chamber draining (see 12)
- 5S-**: calibrated orifice on P port
- S*: position sensor (see 10)

(5) 20: design number (progressive) of the valve

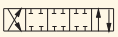
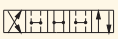
ISO 4401-05-04-0-05



3 TECHNICAL DATA

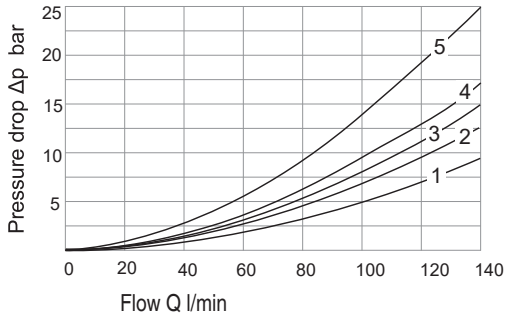
Max flow	140 l/min
Max. operating pressure (P,A,B)	350 bar
Max. operating pressure (T port)	100 bar 50 (with sensors)
Operating force	<40 N
Fluid temperature range (NBR)	-30+100 °C
Fluid temperature range (FPM)	-20+120 °C
Service life	10^6 cycles
Weight	3,4 kg

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

1C					
4C			1LL		
0C			0LL		
8C					
3C			1N		
4D					

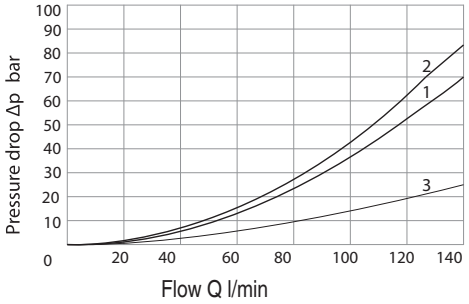
5 TYPICAL DIAGRAMS

Pressure drop related to flow rate



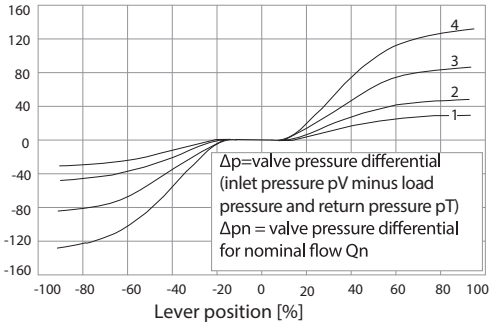
	P-A	P-B	A-T	B-T	P-T		P-A	P-B	A-T	B-T	P-T
1C	1		3	3		3H	1	1	1	1	3
3C	1		2	2		2C	1	1	1	3	5
8C	1		3	3		2R	1	1	1	4	

Pressure drop related to flow rate proportional



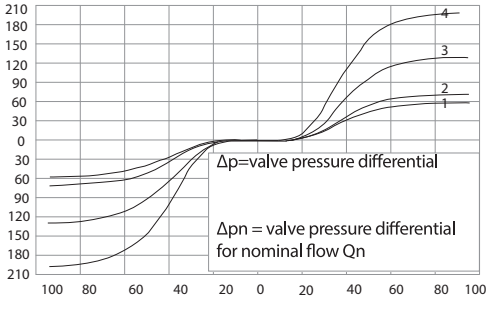
	P-A	P-B	A-T	B-T
1C/R	1	1	2	2
3C/R	1	1	2	2
1C/P	3	3	3	3
3C/P	3	3	3	3

Proportional spool flow rate 30l/min



1	Δpn= 10 bar	3	Δp= 160 bar
2	Δp= 50 bar	4	Δp= 350 bar

Proportional spool flow rate 60l/min

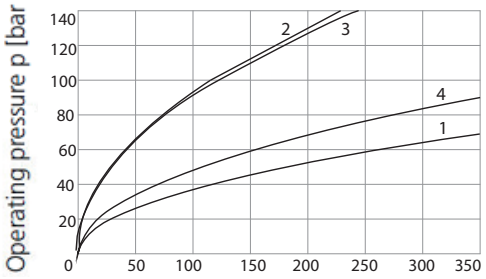


1	Δpn= 10 bar	3	Δp= 160 bar
2	Δp= 50 bar	4	Δp= 350 bar

6 HYDRAULIC LIMIT OF USE

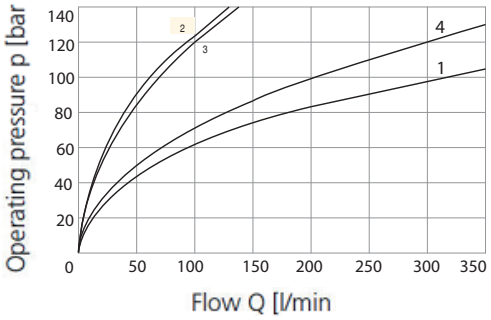
Operating limits (proportional valve)

Operating limits for maximum hydraulic power and rated lever force
30 l/min



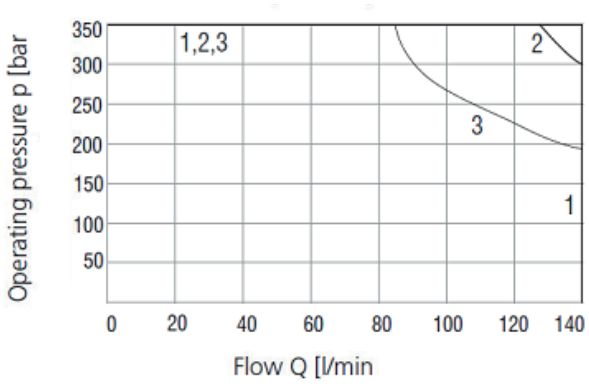
Spool	50% 2,3 mm	100% 4,6 mm
1C/R	1	2
3C/P	3	4

60 l/min (15.8 GPM)



Operating limits (Directional valve)

Operating limits for maximum hydraulic power and rated lever force



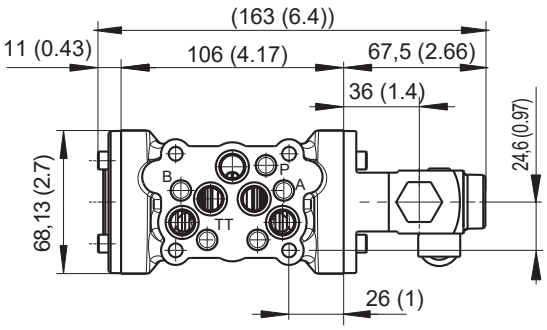
1	0C	1
1	4C	3
1	1LL	2

For operating limits under conditions and flow directions other than shown contact our technical support. Admissible operating limits may be considerably lower with only one direction of flow (A or B plugged, or without flow.)

Spool	50% 2,3 mm	100% 4,6 mm
1C/P	1	2
3C/P	3	4

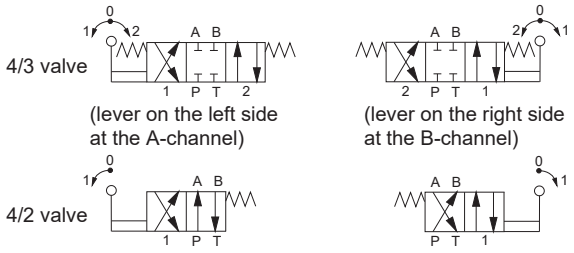
7 INSTALLATION DIMENSION (mm)

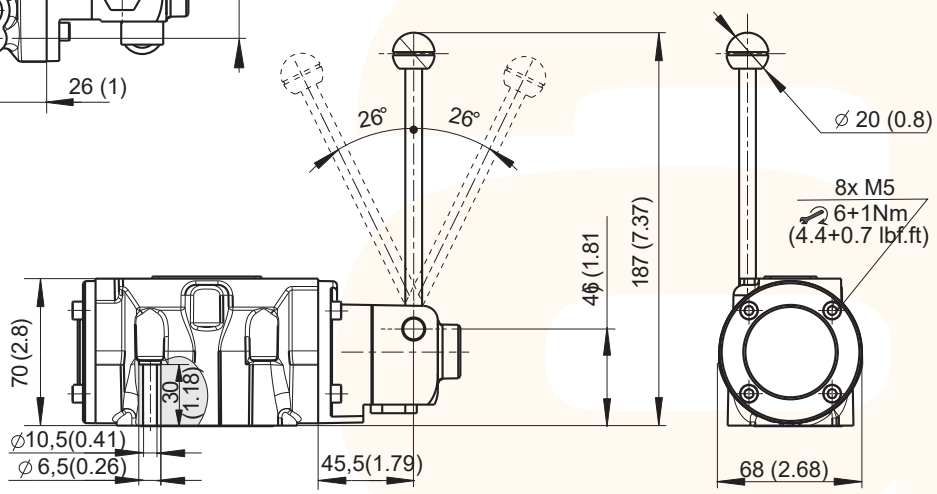
HD5-LO-*/20 without stroke limiter and position sensor



Manual lever and actuating section are shown in the most frequently used standard position. Both elements can be rotated in 90° increments. For other positions of lever and actuating section contact our technical support.

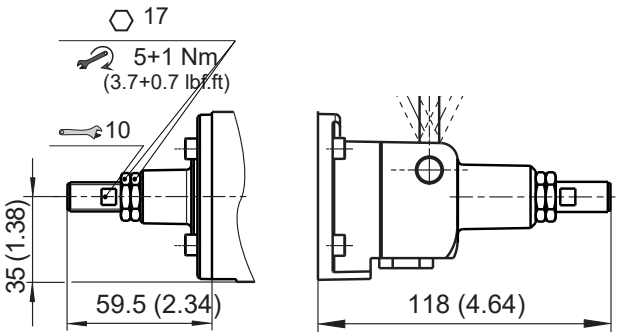
Spool position according to the position of hand lever





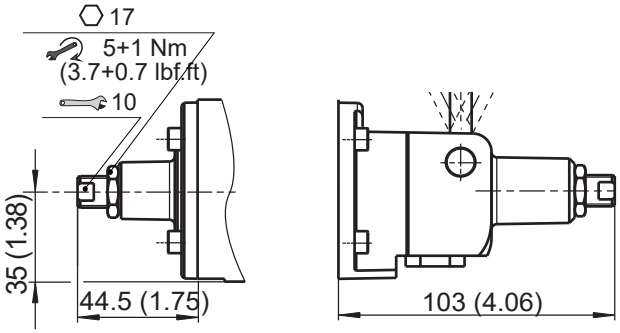
8 HD5-LO-*-S1(S4)

Position sensor



9 HD5-LO-*-C*-/20

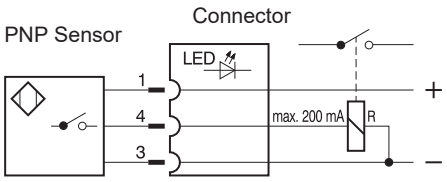
Stroke limiter



10 POSITION SENSOR TYPE

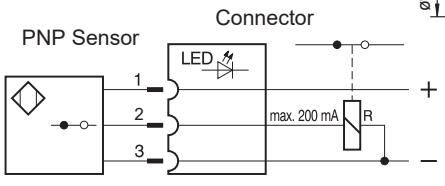
S1

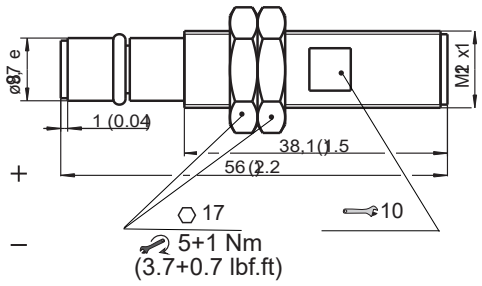
Circuit diagram of the normally - OPEN sensor



S4

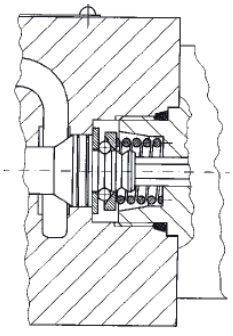
Circuit diagram of the normally - CLOSED sensor

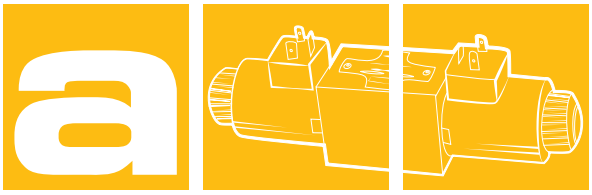




11 VERSION "N" : MECHANICAL DETENT ON SPOOL

Solenoids valves with detent typically are 2 position, 2 solenoid, no-spring valves where the spool is kept at the extreme ends of its stroke b y a mechanical device. This permits that solenoids are energized by short time current pulses and the spool remains at its position regardless of forces due to hydrodinamics or gravitational/ inertial effects (vibrations).





STACKABLE VALVES FLOW CONTROL

AM5-FC-*

100 l/min 32 MPa (320 bar)

1 DESCRIPTION

Stackable valve CETOP 5 with meter out control (referred to the hydraulic actuator). It is possible to control the lines A, B or AB simply turning the side screws.
On demand it is possible to have also the fine control option.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM5	-	FC	-		-		-		/	10

(1) AM5 : stackable valve CETOP 05 - Pressure 32 MPa (320 bar)

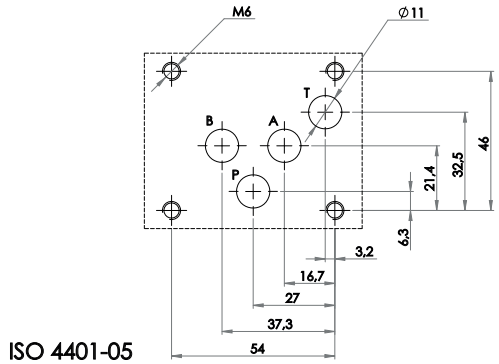
(2) FC : one-way flow control valves with meter-out control
(referred to the hydraulic actuator)

(3) Service lines where the controls operates:
AB : controls on A and B. Fluid flows unrestricted A->A1 and B->B1; flow is controlled from A1->A and B1->B.
A : flow is controlled from A1->A; free on B.
B : flow is controlled from B1->B; free on A.

(4) flow control characteristics for A1->A and B1->B
and check valve opening pressure (Pm) for flow A ->A1 and B->B1
no designation : standard control and Pm approx 0.04 MPa (0.4 bar)
F : fine control
4 : Pm approx 0.4 MPa (4 bar)

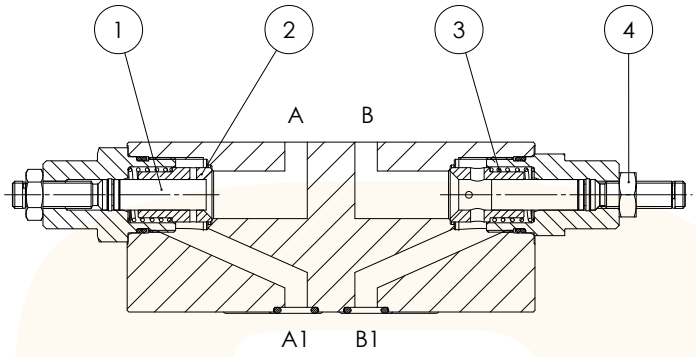
(5) Code reserved for special variants
V: viton seals

(6) Design number (progressive) of the valve

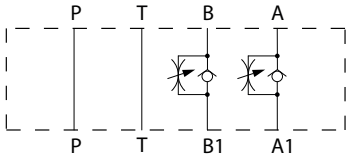


ISO 4401-05

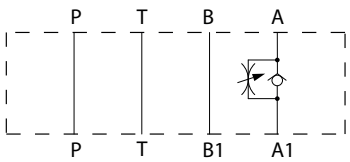
AM5-FC-AB



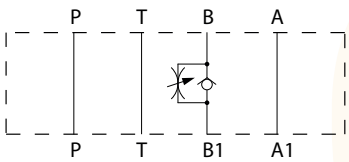
AM5-FC-AB



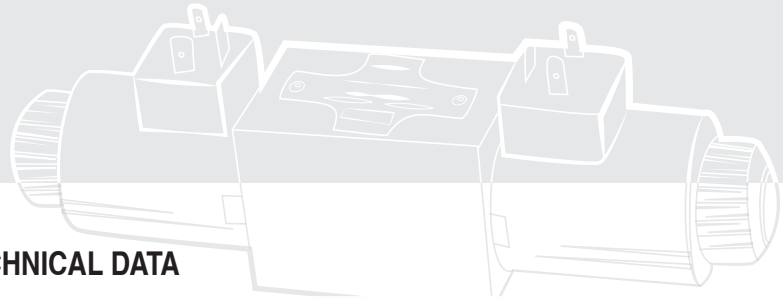
AM5-FC-A



AM5-FC-B



Fluids flows freely on P and T lines: on service lines A and/or B with controls, fluid flows from A -> A1 (and/or B-> B1) overcoming the force of spring 3 acting on sleeve 2; fluid flows from A1-> A (and/or B1->B) through orifices to sleeve 2 which is pushed against its seat; the throttling axis 1, which is shifted by screwing it and locked by its nut 4, partially obstructs the control orifices, thus making the flow ate entirely dependent upon the available pressure drop.



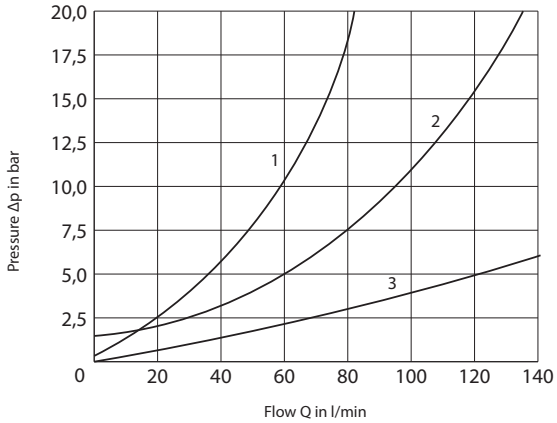
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3 TECHNICAL DATA

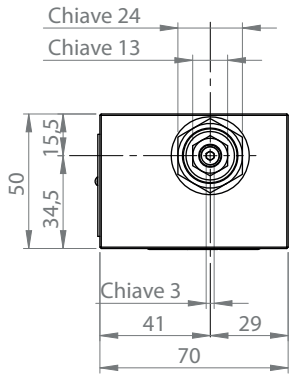
Maximum rec. flow rate	100 l/min	Control of the flow:
Maximum nominal pressure	32 MPa (320 bar)	The control is made by throttling from A1->A (and/or B1->B), through variable orifices. Depending on the various sleeve/axis combination, the control adjustment is: - (standard) : orifices area is reduced from 100% (*) to 0% with 6 complete turns of the adjustment screw. -F (fine): from 100% (**) to 0% with 5 complete turns of the adjustment screw. (*) 100% approx: Q=60 l/min at □p=20 bar (**) 100% approx : Q=30 l/min at □p=20 bar The axis □ is shifted to increase throttling by unlocking its nut □ and turning clock wise the adjustment screw. Suitable mechanical stops prevent dangerous manoevring.
Pressure drops	see 4	
Installation and dimensions	see 6	
mass	approx 3 kg	

4 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves AM5-FC-AB in standard configuration, with mineral oil at 36 cSt and at 50°C with throttling axis at full retraction.



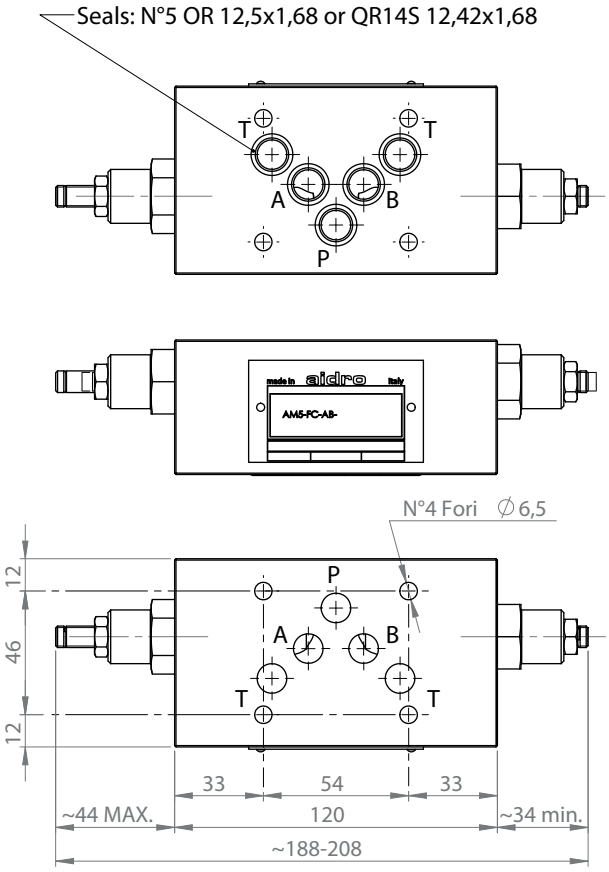
① A1->A B1-> B ② A->A1 B->B1 ③P<->P T<->T



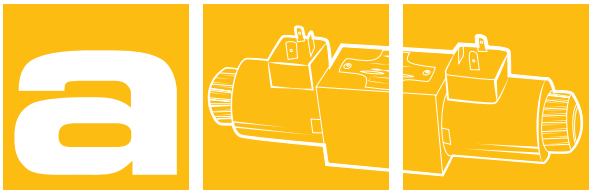
5 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM5-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

6 INSTALLATION DIMENSIONS



All stackable valves AM5-FC-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page). Valves height 50 mm. Leakage between valve and mounting surface is prevented by the positive ompression on their seats of 4 seals of OR type or Quadring type.



STACKABLE VALVES FLOW CONTROL

AM5-FX-*

100 l/min 32 MPa (320 bar)

1 DESCRIPTION

Stackable valve CETOP 5 with meter in control (referred to the hydraulic actuator). It is possible to control the lines A, B or AB simply turning the side screws.
On demand it is possible to have also the fine control option.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM5	-	FX	-		-		-		/	10

(1) AM5 : stackable valve CETOP 05 - Pressure 32 MPa (320 bar)

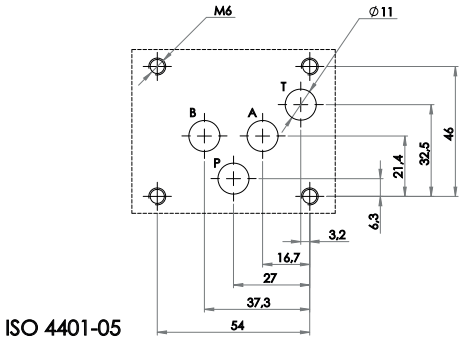
(2) FC : one-way flow control valves with meter-out control
(referred to the hydraulic actuator)

(3) Service lines where the controls operates:
AB : controls on A and B. Fluid flows unrestricted A->A1 and B->B1; flow is controlled from A1->A and B1->B.
A : flow is controlled from A1->A; free on B.
B : flow is controlled from B1->B; free on A.

(4) flow control characteristics for A1->A and B1->B (see also 6)
and check valve opening pressure (Pm) for flow A ->A1 and B->B1
no designation : standard control and Pm approx 0.04 MPa (0.4 bar)
F : fine control
4 : Pm approx 0.4 MPa (4 bar)

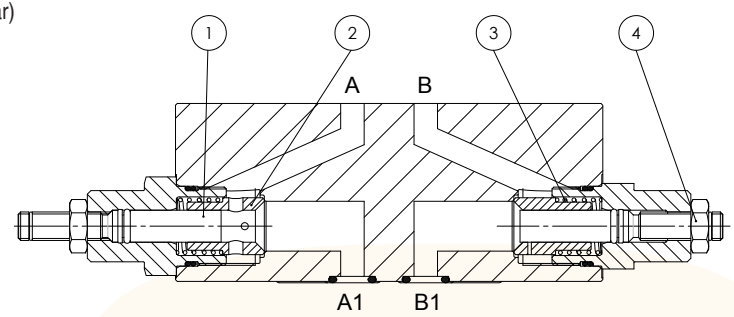
(5) Code reserved for special variants
V: viton seals

(6) Design number (progressive) of the valve

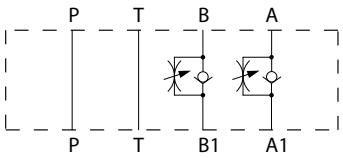


ISO 4401-05

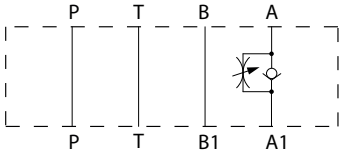
AM5 - FX - AB



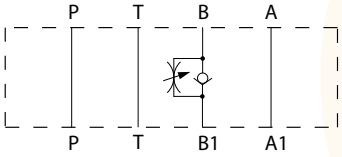
AM5-FX-AB



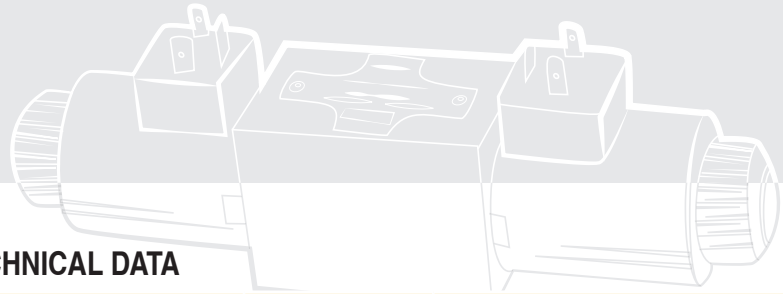
AM5-FX-A



AM5-FX-B



Fluid flows freely on P and T lines; on service lines A and/or B with controls, fluid flow from A1->A (and/or B1->B) overcoming the force of spring acting on sleeve; fluid flows from A->A1 (and/or B->B1) through orifices of sleeve which is pushed against its seat; the trotling axis, which is shifted by screwingit and locked by its nut , partially obstructsthe control orifices, thus making the flow rate entirely dependent upon the availablepressure drop.



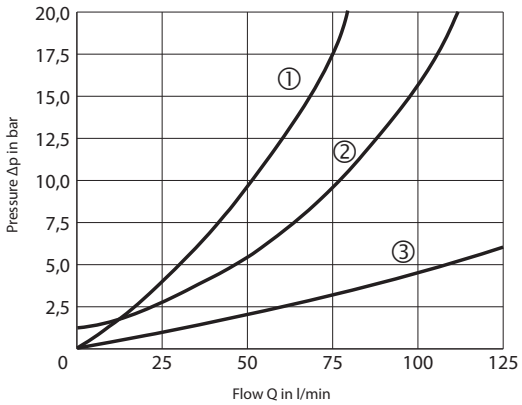
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3 TECHNICAL DATA

Maximum rec. flow rate	100 l/min	Control of the flow:
Maximum nominal pressure	32 MPa (320 bar)	The control is made by throttling from A1->A (and/or B1->B), through variable orifices. Depending on the various sleeve/axis combination, the control adjustment is: - (standard) : orifices area is reduced from 100% (*) to 0% with 6 complete turns of the adjustment screw. -F (fine): from 100% (**) to 0% with 5 complete turns of the adjustment screw. (*) 100% approx: Q=60l/min at Δp= 20 bar (**) 100% approx: Q=30l/min at Δp= 20 bar The axis □ is shifted to increase throttling by unlocking its nut and turning clock wise the adjustment screw. Suitable mechanical stops prevent dangerous manoevring.
Pressure drops	see 4	
Installation and dimensions	see 6	
mass	approx 3 kg	

4 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves AM5-FX-AB in standard configuration, with mineral oil at 36 cSt and at 50°C with throttling axis at full retraction.

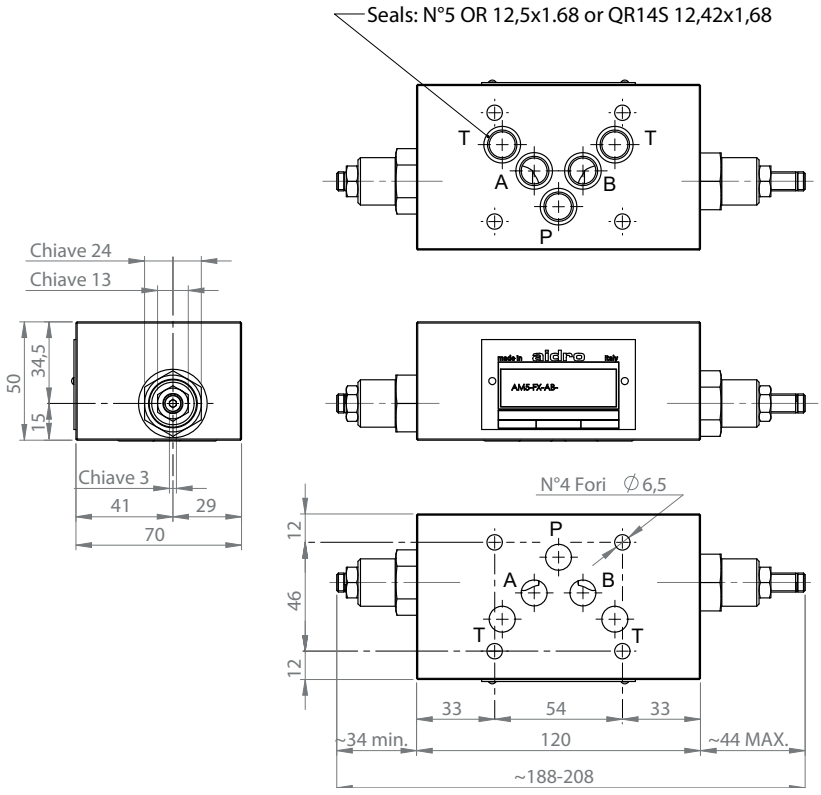


① A->A1 B->B1 ② A1->A B1->B ③ P<->P T<->T

5 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM5-*are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

6 INSTALLATION DIMENSIONS



All stackable valves AM5-FX-* conform with ISO and CETOP specifications for mounting surface dimensions. Valves height 50 mm. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of OR type or Quadring type.

STACKABLE CHECK VALVES

AM5-CO-*

100 l/min 35 MPa (350 bar)

1 DESCRIPTION

Direct operated check valve. All the internal part are made with high strenght steel and are machined with accouracy in order to assure the requested tightness.
The controlled lines are A, B or AB.
The standard surface treatment of the body is phosphate coated.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM5	-	CO	-		-		-		/	10

(1) AM5 : stackable valve CETOP 05 – Pressure 32 MPa (320 bar)

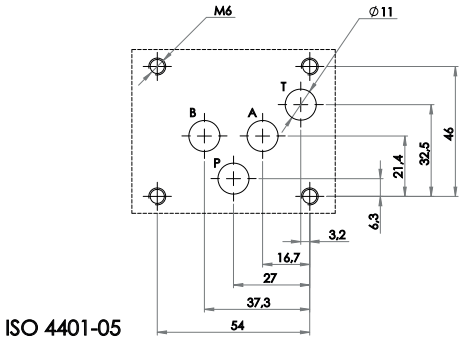
(2) CO : check valve, spring operated

(3) Service lines where the controls operates
AB : controls on A and B. Fluid flows unrestricted A2->A1 and B2->B1; flow is controlled from A1->A2 and B1->B2.
A : flow is controlled from A1->A2; free on B.
B : flow is controlled from B1->B2; free on A.

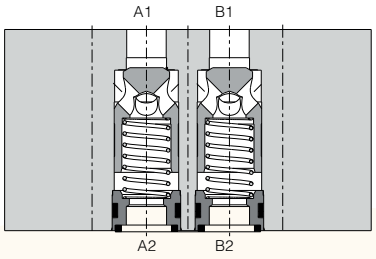
(4) Check valve opening (cracking pressure):
no designation : 0,05 MPa (0,5 bar)
3 : 0,3 MPa (3 bar)
5 : 0.5 MPa (5 bar)

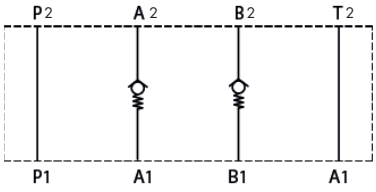
(5) Code reserved for special variants
V : Viton seals
ZT: Zinc- trivalent coated (240 h)
ZN : Zinc-nickel coated (520 h)

(6) Design number (progressive) of the valve

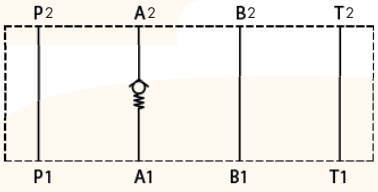


ISO 4401-05

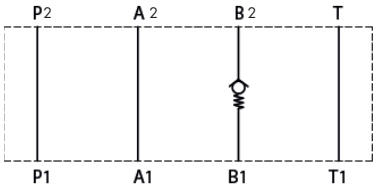




AM5-CO-AB



AM5-CO-A



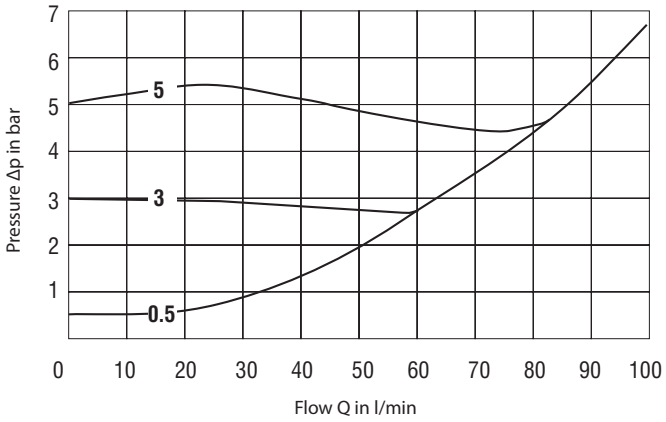
AM5-CO-B

3 TECHNICAL DATA

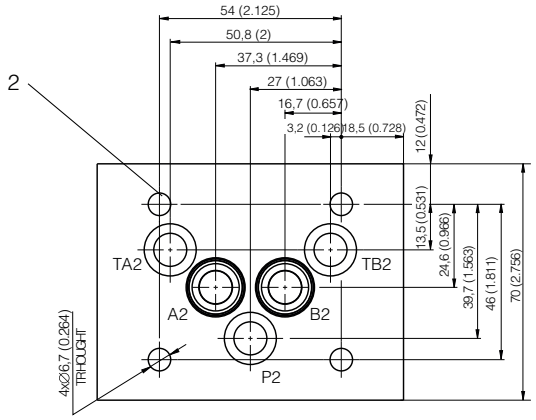
Maximum rec. flow rate on controlled lines	60 l/min
Maximum rec. flow rate on free channels	100 l/min
Maximum nominal pressure	35 MPa (350 bar)
Pressure drops	see 4
Installation and dimensions	see 5
Weight	2,25 kg

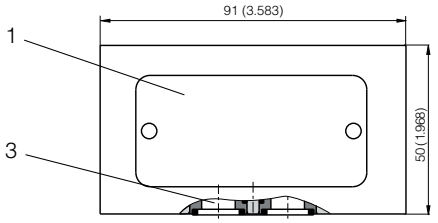
4 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves AM5-CO-* in standard configuration, with mineral oil at 36 cSt and T=50°C.

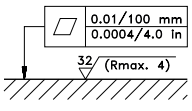


5 INSTALLATION DIMENSIONS



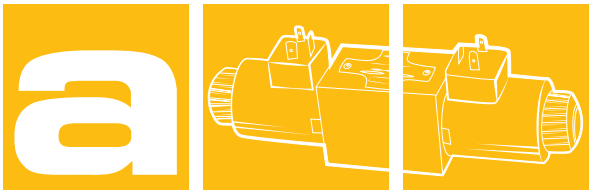


Dimensions in millimeters:
1 Name plate
2 4 mounting through-holes
3 Square ring 12.42x1.68 (5 pcs.) supplied with valve



Required surface finish of interface

All stackable valves AM5-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height (50 mm). Leakage between valve and mounting surface is prevented by the positive compression on their seats of 5 seals of Quad-Rings type 12,42 x 1,68 x 1,68 mm or 5 ORings type 12,5 x 1,68.



STACKABLE CHECK VALVES

AM5-CP-*/20

140 l/min 35 MPa (350 bar)

1 DESCRIPTION

Pilot operated check valve. All the internal part are made with high strenght steel and are machined with accouracy in order to assure the requested tightness.
The controlled lines are A, B or AB.
The standard surface treatment of the body is phosphate coated. Plugs are zinc coated.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)
AM5	-	CP	-		/		-		-		-		/	20

(1) AM5 : stackable valve CETOP 05 - Pressure 35 MPa (350 bar)

(2) CP : check valve, pilot operated (hydraulically)

(3) Service lines where the controls operates:
AB: p.o. checks on A and B. Fluid flows A.->A1 and B->B1 and flow A1 ->A (or B1->B) is permitted only when B (or A) is pressurized
A: p.o. check on A; flow A1->A is permitted only when B is pressurized
B: p.o. check on B; flow B1->B is permitted only when A is pressurized

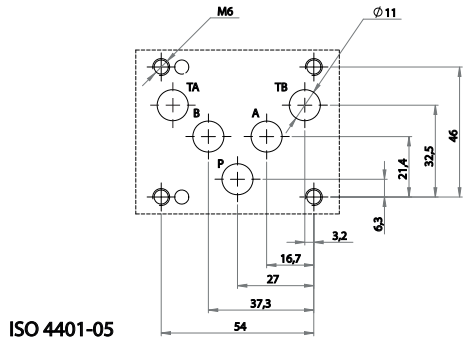
(4) Check valve opening (cracking) pressure (Pm) for free flow A->A1 and B->B1
- no designation (standard):Pm approx 0.2 MPa (2 bar)

(5) Seals
- no designation: standard NBR
- V: Viton seals

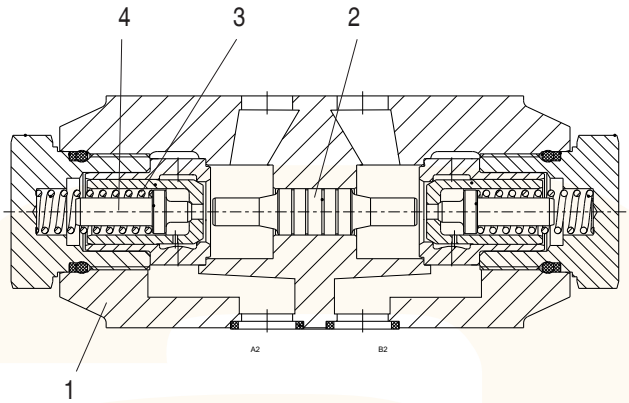
(6) Surface treatment
- no designation: standard phospate coated
- ZN: zinc coated (ZnNi)

(7) Code reserved for special variants (materials, seals,surface treatments, etc.)

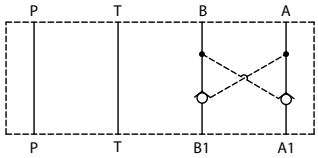
(8) Design number (progressive) of the valves.



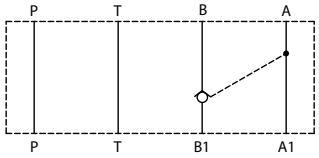
ISO 4401-05



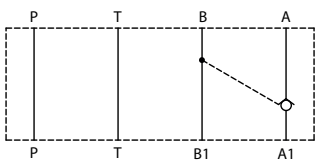
AM5-CP-AB



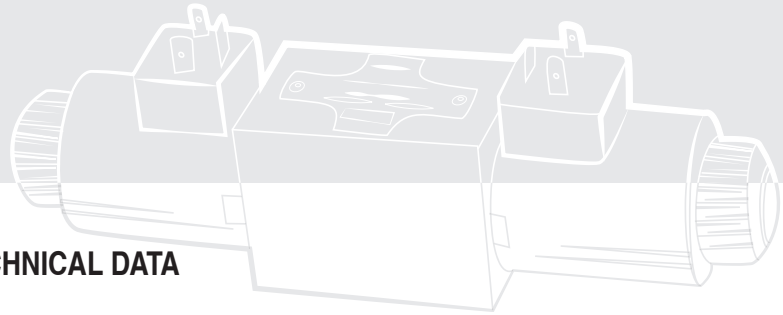
AM5-CP-B



AM5-CP-A



Fluid flows freely on P and T lines; on service lines A and/or B with p.o. check, fluid flows from A -> A1 (and/or B -> B1) overcoming the force of spring acting on poppet 4, and fluid is blocked from A1-> A (and/or B1-> B). When, by switching the solenoid operated 4-way directional valve, pressure is made available at, for instance, port B fluid flows B -> B1 and the pilot piston 2, shifting from its central position, forces poppet 4, on service line A, to open and permit flow A1 -> A. The valve housing 1 is phosphatate coated.



3 TECHNICAL DATA

Maximum rec. flow rate	140 l/min
Maximum nominal pressure	35 MPa (350 bar)
Pressure drops	see 4
Pilot area ratio piston/poppet	approx 6
Installation and dimensions	see 5
Mass	approx 2,2 kg

Piloting pressure:

To shift the pilot piston and to open the check in A the piloting pressure must be, at B:

$$Pp=Pb=\frac{Pa1+Pm-Pa}{6}+Pa$$

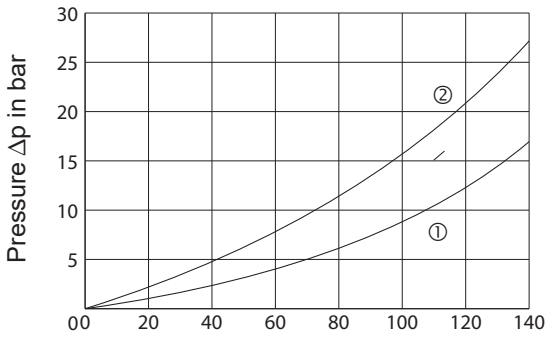
or to open the check in B:

$$Pp=Pa=\frac{Pb1+Pm-Pb}{6}+Pb$$

where: Pp = piloting pressure; Pb1= pressure in B1
Pa = pressure in A; Pb = pressure in B;
Pm = check valve opening pressure (spring) Pa1= pressure in A1;

4 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves AM5-CP-AB in standard configuration, with mineral oil at 36 cSt and at 50°C.



① A->A1
B->B1

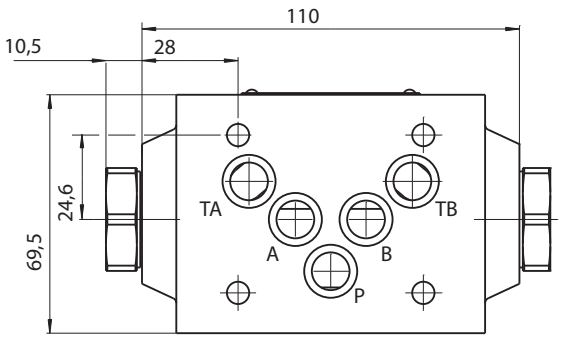
② A1->A
B1->B

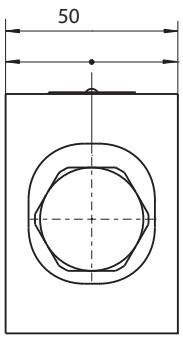
5 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM5-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

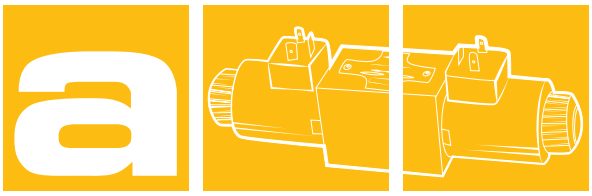
6 INSTALLATION DIMENSIONS

Seals:
5 x QR14S 12,42 x 1,68 - 25092800





All stackable valves AM5-CP-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height (50mm). Leakage between valve and mounting surface is prevented by the positive compression on their seats of seals (of OR type or Quadring type).



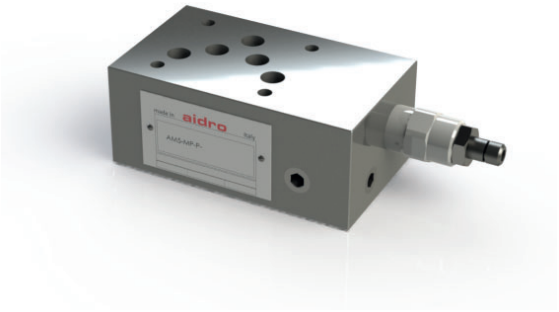
STACKABLE VALVES PILOT OPERATED

AM5-MP-*

100 l/min 32 MPa (320 bar)

1 DESCRIPTION

Stackable pressure relief valve pilot operated. The valve is made with a steel body combined with a pressure relief cartridge valve pilot operated for a stable pressure control.
The body of the valve is phosphate coated. The cartridge valve is zinc coated.
The pressure can be set in different pressure ranges.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)
AM5	-	MP	-		/		-		-		/	10

(1) AM5: stackable valve CETOP 05 - Pressure 32 MPa (320 bar)

(2) MP: pressure relief-pilot operated (hydraulically)

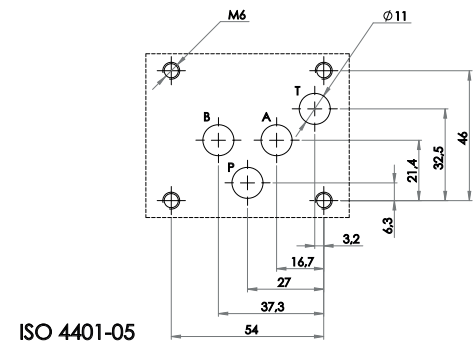
(3) Service lines where the controls operates:
P : relief on P and discharge to T
A : relief on A and discharge to T
B: relief on B and discharge to T
BA: indipendent relief on B and on A and discharge to T
AB: relief on A and B with crossed discharge

(4) Pressure adjustment ranges:
6,3 from 10 to 70 bar
12,5 from 10 to 140 bar
20 from 20 to 210 bar
32 from 20 to 320 bar

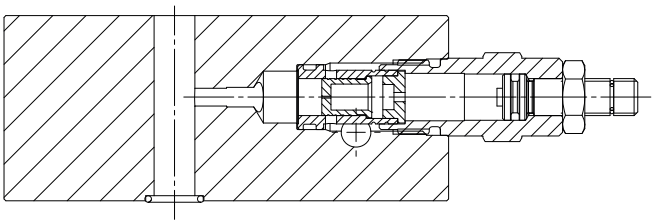
(5) pressure adjustment range for relief on A (only for models AM5-MP-BA or for relief on B for models AM5-MP-AB)

(6) code reserved for special variants (materials, seals,surface treatments, etc.)
M: hand knob

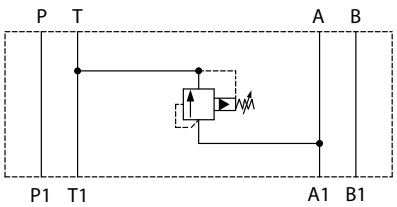
(7) Design number (progressive) of the valves



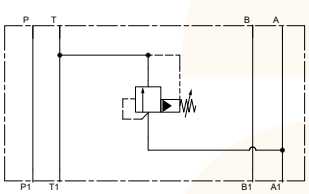
ISO 4401-05



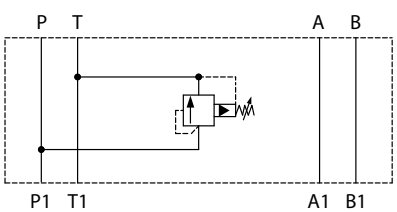
AM5-MP-A



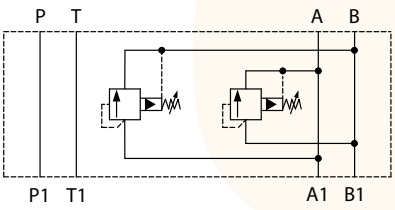
AM5-MP-B



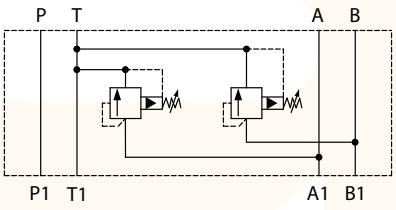
AM5-MP-P

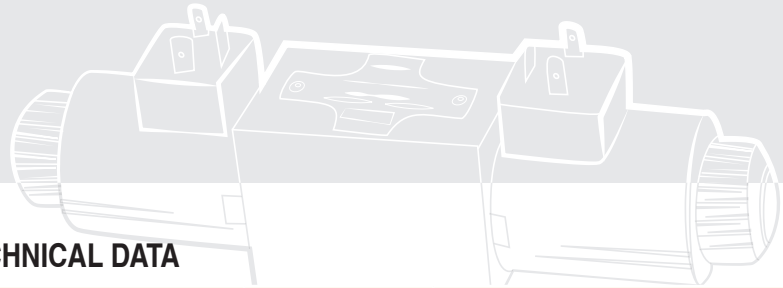


AM5-MP-AB



AM5-MP-BA





aidro
Desktop Metal Company

3 TECHNICAL DATA

Maximum rec. flow rate	100 l/min
Maximum nominal pressure	32 MPa (320 bar)
Pressure relief curves	see 4
Installation and dimensions	see 5
mass:	
AM5-MP-P	approx 2,7 Kg
AM5-MP-AB	approx 3,6 Kg

Adjustment of the relief pressure:

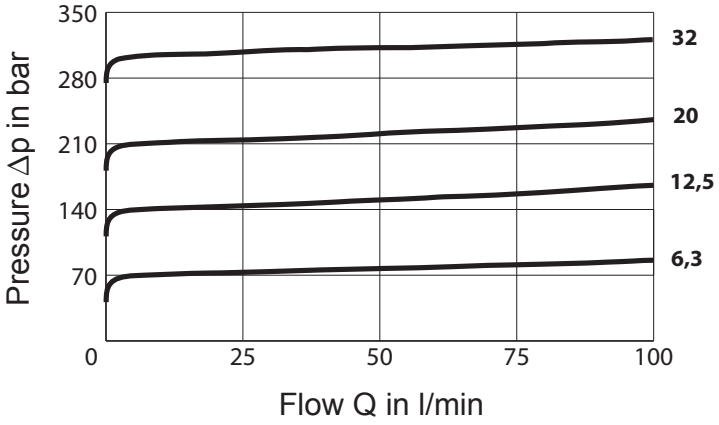
Relief pressure is reached when the axial hydraulic forces on piston equal the force of spring; the value of the relief pressure can be therefore changed, within the limits of the chosen adjustment range, by changing the compression of spring. To increase the relief pressure, turn clock wise the adjustment screw ch.5 ▯, after having unlocked its nut ch.17.
The pressure gradient is approx:

6,3 : 20 bar/turn
12,5 : 40 bar/turn
20 : 63 bar/turn
32 : 100 bar/turn

When the required level of pressure is reached, lock the nut.

4 TYPICAL DIAGRAMS

Typical Δp-Q curves for valves AM5-CP-AB in standard configuration, with mineral oil at 36 cSt and at 50°C.

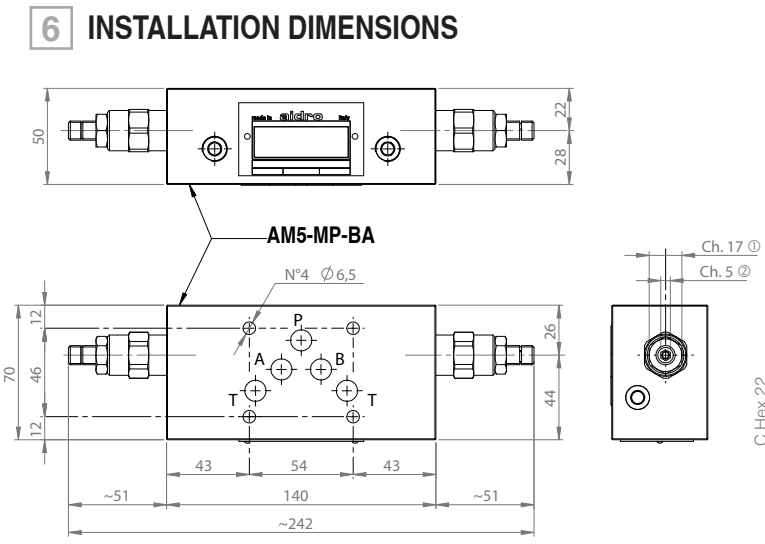


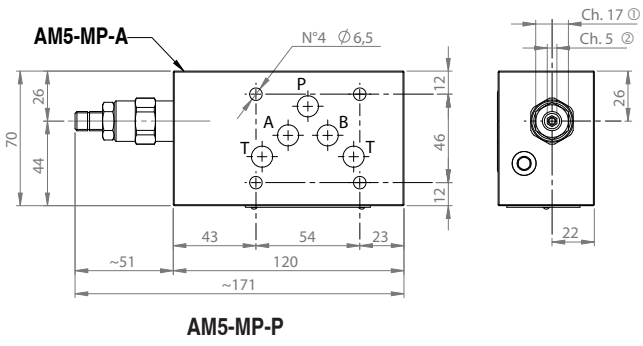
5 HYDRAULIC FLUIDS

Seals and materials used on standard valves AM5-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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

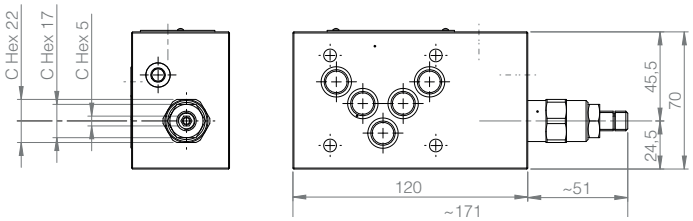
All stackable valves AM5-MP-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page) and for valves height (50mm). Leakage between valve and mounting surface is prevented by the positive compression on their seats of 5 seals (OR 2050).

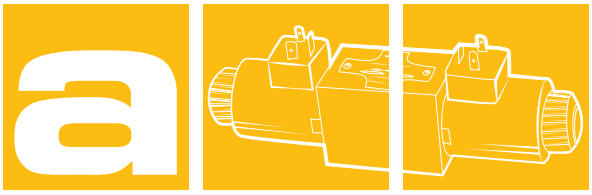
6 INSTALLATION DIMENSIONS





AM5-MP-P





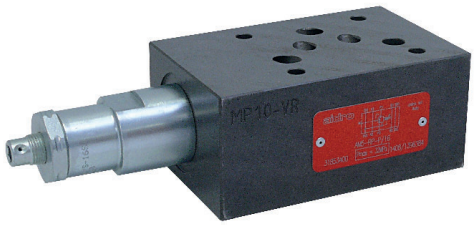
STACKABLE VALVES PRESSURE REDUCING

AM5-RP-*

100 l/min 32 MPa (320 bar)

1 DESCRIPTION

Stackable pressure reducing valve pilot operated. The valve is made with a steel body combined with a pressure relief valve.
The body of the valve is phosphate coated.
The cartridge valve is zinc coated supplied with protective cap.
The pressure can be set in different pressure ranges.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
AM5	-	RP	-		/		-		/	20

(1) AM5 : stackable valve CETOP 05 - Pressure 32 MPa (320 bar)

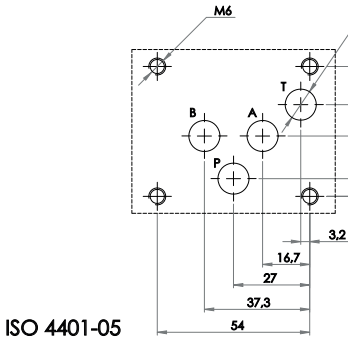
(2) RP : pressure reducing, pilot operated

(3) Lines where the control operates
P : relief on P and discharge to T
A : relief on A and discharge to T
B : relief on A and discharge to T

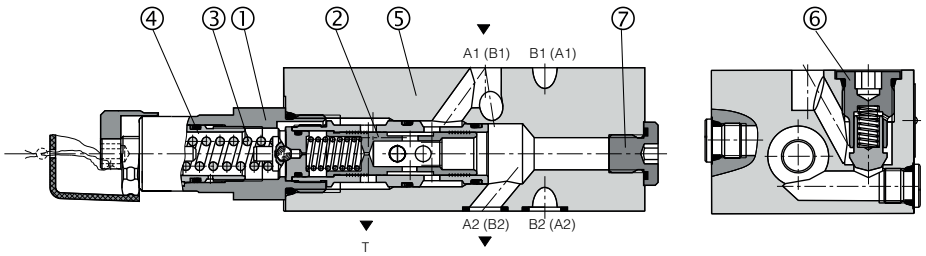
(4) controlled pressure adjustment ranges :
6,3: from 0,5 to 7 MPa (from 5 to 70 bar)
16: from 1 to 16 MPa (from 10 to 160 bar)
20: from 1,6 to 2,1 MPa (from 16 to 210 bar)

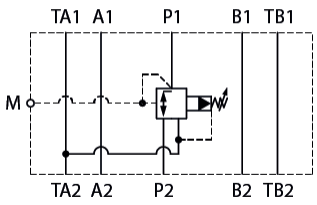
(5) Code reserved for special variants
V: adjustment with knob

(6) Design number (progressive) of the valves

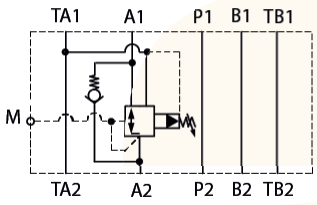


ISO 4401-05

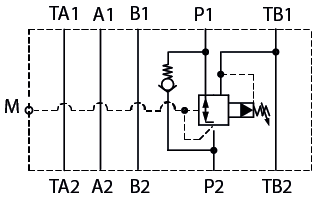




AM5-RP-P



AM5-RP-A



AM5-RP-B

All valves type AM5-RP-* reduce pressure P of the solenoid valve as follows:
On version P, the valve constantly reduce pressure at the settled value On version A, the pressure is reduced in direction A->A1 while the return is free On version B, the pressure is reduced in direction B->B1 while the return is free All valves type AM5-RP-* have a 1/4" BSP manometer port (M) for the direct reading of the reduced pressure.

3 TECHNICAL DATA

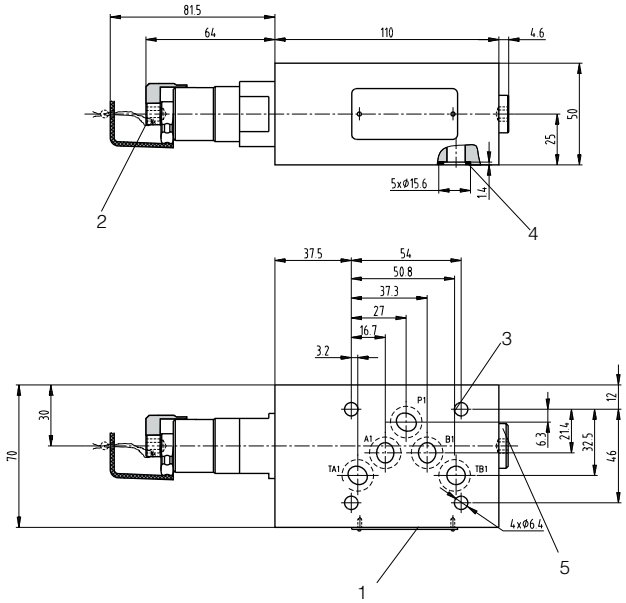
Maximum rec. flow rate on regulated line	80 l/min
Maximum input pressure	32 MPa (320 bar)
Maximum rec. flow rate on free lines	100 l/min
Pilot flow rate	0,7 l/min
mass	
3,2 kg	Model A,B
2,85 kg	Model P

Adjustment of the pressure:

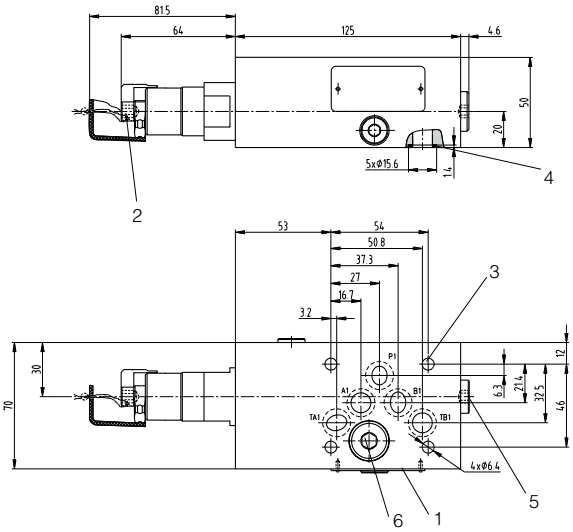
Reduced pressure is obtained by throttling the flow on spool which is balanced, on one side, by the reduced pressure and, on the other side, by the positioning spring and by the pilot pressure. Pilot pressure is established by the action of spring on the pilot valve. The value of the reduced pressure is changed by changing the compression of spring. To increase the value of the reduced pressure, turn clockwise acting on adjustment element 2 (C hex 6 mm), after having unlocked its retaining nut (C hex 27 mm).

4 INSTALLATION DIMENSIONS (mm)

AM5-RP-A/*



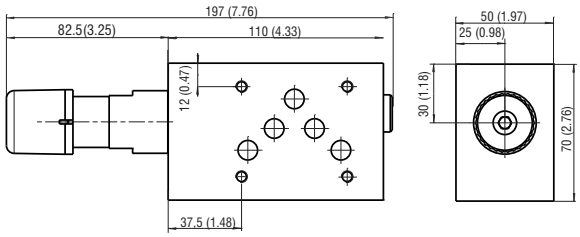
AM5-RP-B/*



5 HYDRAULIC FLUIDS

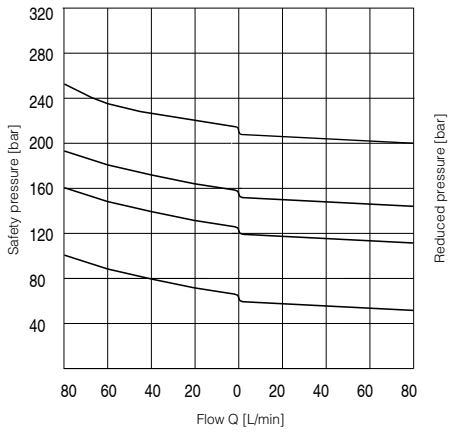
Seals and materials used on standard valves AM5-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

AM5-RP-P/*

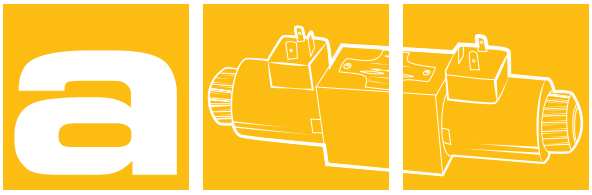


6 TYPICAL DIAGRAMS

measured at ν= 36 cSt and 50°C



All stackable valves AM5-RP-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height (50 mm). Leakage between valve and mounting surface is prevented by the positive compression on their seats of 5 seals type Quad-Ring (12.42 x 1.69 mm)



MONOBLOCK WITH MULTIPLE SECTIONS ISO 05

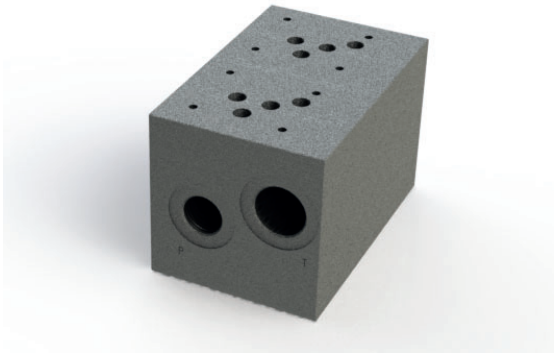
MR-5-*G

120 l/min (300 bar)

1 DESCRIPTION

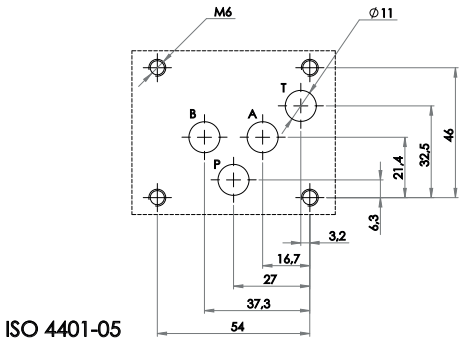
- Ports A and B (1/2" BSP) on the sides
- P and T lines with ports (3/4" and 1" BSP) on the two rear sides
- Parallel connections P and T

Monoblocks with multiple sections from 1 to 8, for hydraulic 4 ways operated valves ISO 05 with parallel internal connections P and T. The utility ports A and B are positioned, in pairs, laterally to the valve assembly face.



2 ORDERING CODE

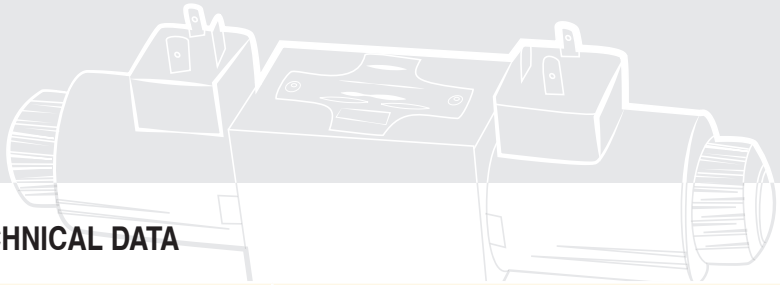
(1)		(2)		(3)	(4)
MR	-	5	-		G



ISO 4401-05

Type	Number of stations 03	Q max recommended (*) l/min
MRK-5-1 G	1	120 - 120
MRK-5-2 G	2	120 - 120
MRK-5-3 G	3	100 - 120
MRK-5-4 G	4	100 - 120
MRK-5-5 G	5	100 - 120
MRK-5-6 G	6	100 - 120
MRK-5-7 G	7	80 - 120
MRK-5-8 G	8	80 - 120

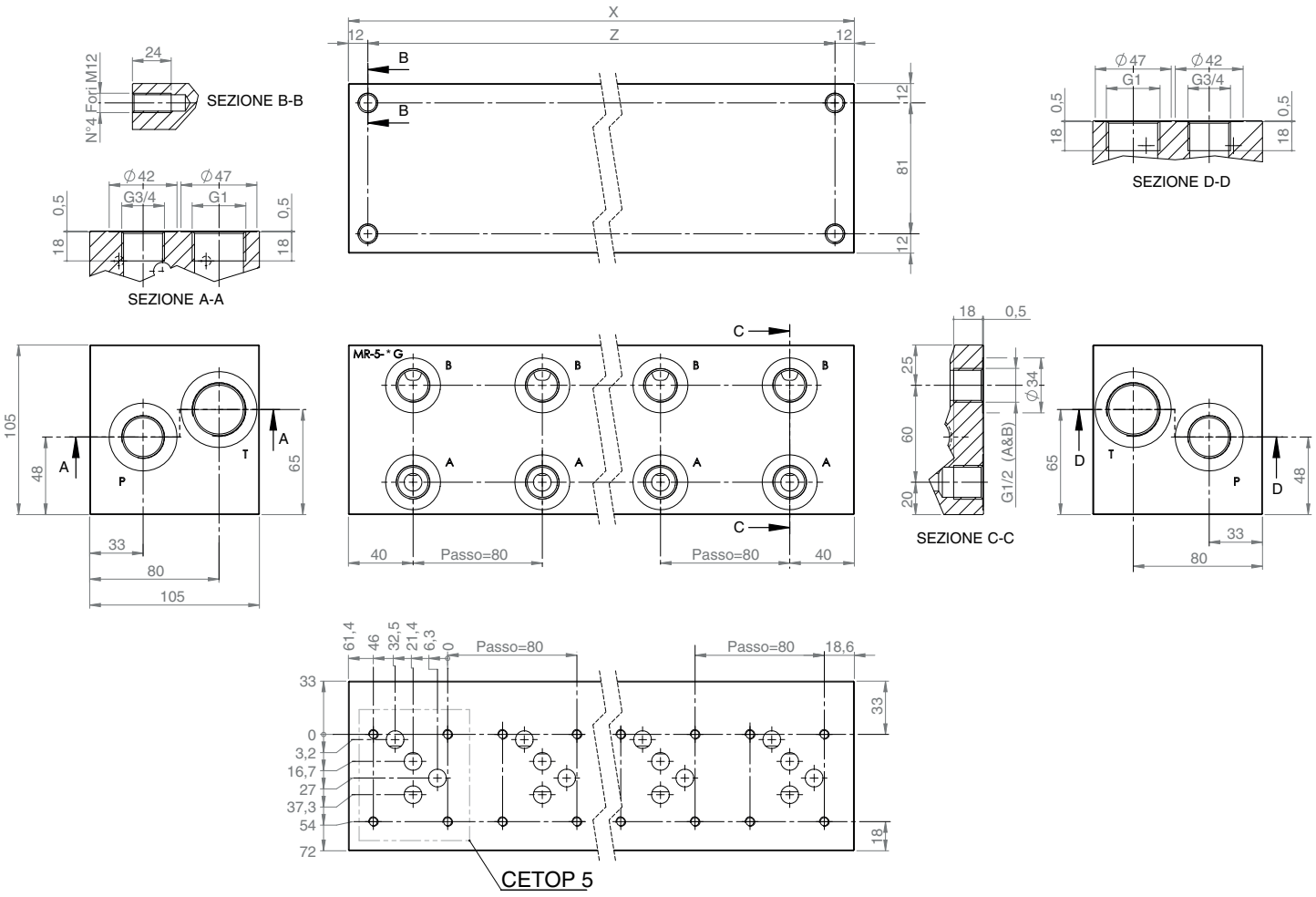
Type	X (mm)	Z (mm)	mass (kg)
MRK-5-1 G	80	56	5,37
MRK-5-2 G	160	136	11,30
MRK-5-3 G	240	216	17,00
MRK-5-4 G	320	296	22,70
MRK-5-5 G	400	376	28,5
MRK-5-6 G	480	456	34,00
MRK-5-7 G	560	536	39,90
MRK-5-8 G	640	616	45,60



3 TECHNICAL DATA

Material	Cast Iron GG 25
Coating:	Manganese phosphating
Pressure allowed in the ports	P, A, B and T = 300 bar
Incoming flow, maximum recommended	From 80 to 120 l/min, decreasing with the rise of the number of sections.
Connecting ports	Standard female cylindrical BSP thread with maximum rugosity of a surface Ra 1,6 for the fitting of connections. A and B 1/2" BSP - one pair per section. P 3/4" BSP and T 1" BSP - one pair on each rear side of a monoblock; it allows, if necessary, to double supply (P) or double outlet (T); close the unused ports. (*) If both pairs of ports P and T are used, maximum recommended Q values can be increased.
Installation:	4 mounting holes threaded M 12 on the rear side
Mounting surface of the valve	
Planarity of the surface	0,01/100
Rugosity:	Ra 0,8

4 INSTALLATION DIMENSION



MONOBLOCK WITH MULTIPLE SECTIONS ISO 05

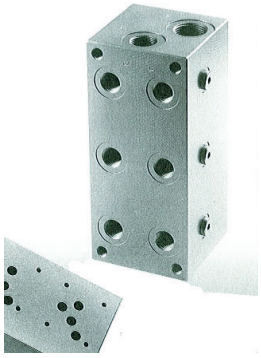
MRK-5-*G

120 l/min (300 bar)

1 DESCRIPTION

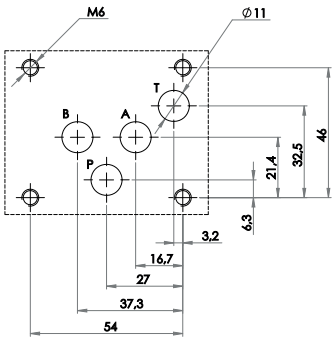
- Ports A and B (1/2" BSP) on the back
- P (3/4" BSP) and T (1" BSP) lines with ports on the two rear sides
- Parallel connections P and T

Monoblocks with multiple sections from 2 to 8, for hydraulic 4 ways operated valves ISO 05 with parallel internal connections P and T. Ports A and B are positioned, in pairs, on the back side of the block respect to the valve assembly face.



2 ORDERING CODE

(1)		(2)		(3)		(4)
MRK	-	5	-		-	G



ISO 4401-05

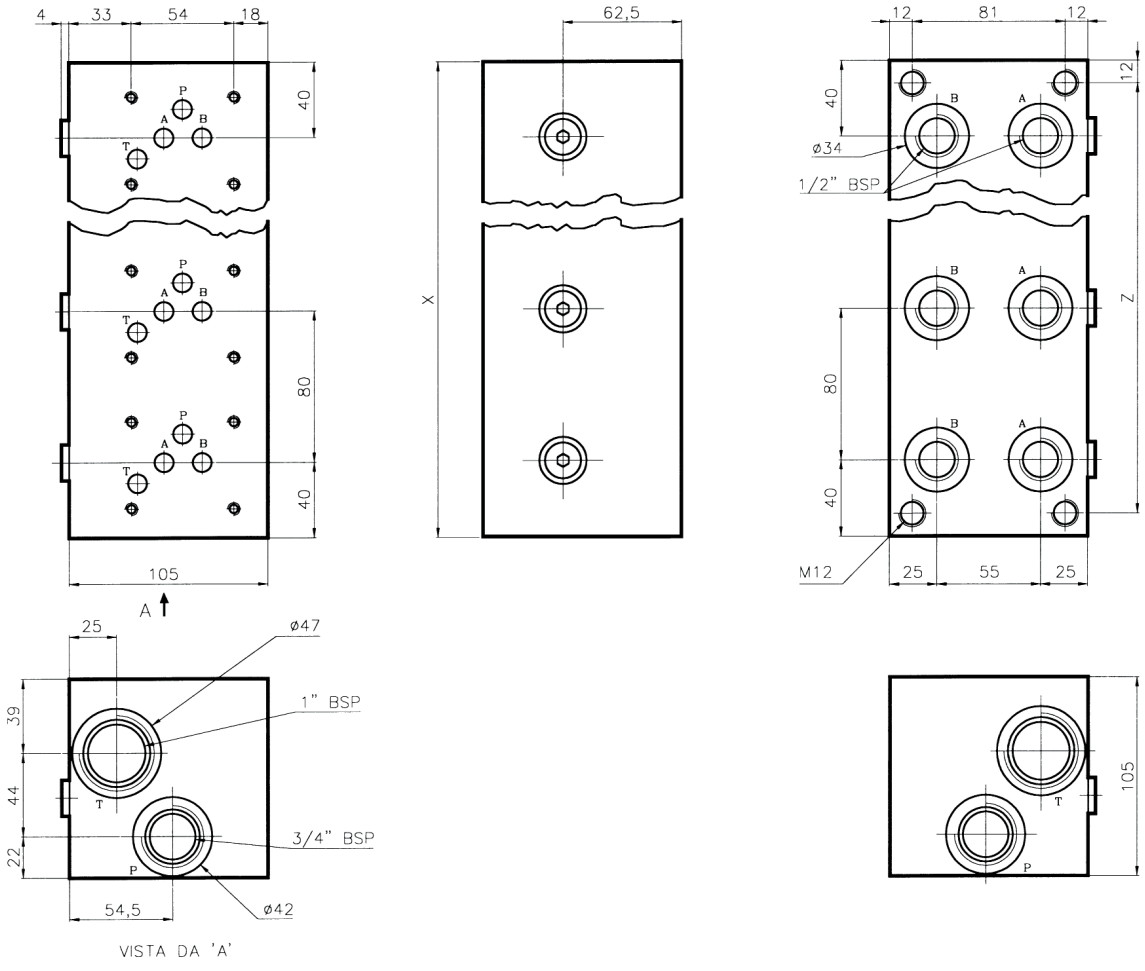
Type	Number of stations 03	Q max recommended (*) l/min
MRK-5-2 G	2	120
MRK-5-3 G	3	100
MRK-5-4 G	4	100
MRK-5-5 G	5	100
MRK-5-6 G	6	100
MRK-5-7 G	7	80
MRK-5-8 G	8	80

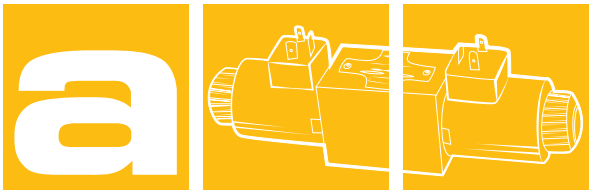
Type	X (mm)	Z (mm)	mass (kg)
MR-5-2 G	160	136	11,30
MR-5-3 G	240	216	17,00
MR-5-4 G	320	296	22,70
MR-5-5 G	400	376	28,5
MR-5-6 G	480	456	34,00
MR-5-7 G	560	536	39,90
MR-5-8 G	640	616	45,60

3 TECHNICAL DATA

Material	Cast Iron GG 25
Coating:	Manganese phosphating
Pressure allowed in the ports	P, A, B and T = 300 bar
Incoming flow, maximum recommended	From 80 to 120 l/min, decreasing with the rise of the number of sections.
Connecting ports	Standard female cylindrical BSP threads with maximum rugosity of a surface Ra 1,6 for the fitting of connections. A and B ports 1/2" BSP - one pair per section. P 3/4" BSP and T 1" BSP - one pair on each rear side of a monoblock; it allows, if needed, to double supply (P) or double outlet (T); close the unused ports. (*) If both pairs of ports P and T are used, maximum recommended Q values can be increased.
Installation:	4 mounting holes threaded M 12 on the rear side
Mounting surface of the valve	
Planarity of the surface	0,01/100
Rugosity:	Ra 0,8
Auxiliary ports:	On the side of monoblock there are auxiliary ports threaded 1/4" BSP, connected to the line A (one per each section). Monoblocks are sold with these ports closed by plugs with cylindric thread, with hexagon socket for 6 mm key.

4 INSTALLATION DIMENSION





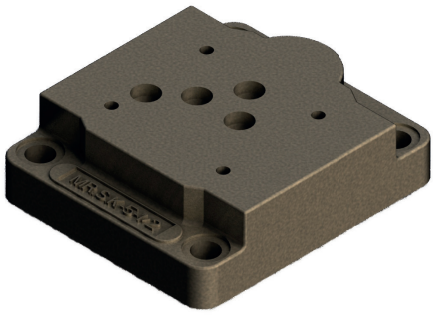
MONOBLOCK SINGLE SECTION ISO 05 - BOTTOM PORTS

MRSK-5

100 l/min 30 MPa (300 bar)

1 DESCRIPTION

MRSK-5 is a basic CETOP 5 baseplate useful for the connection of a single cetop section with A, B, P, T ports which are located in the bottom.
The plate is in cast iron phosphate coated.



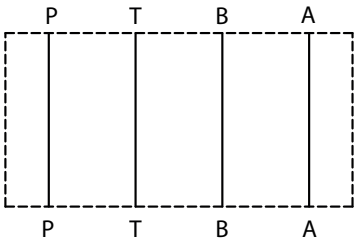
2 ORDERING CODE

(1)		(2)		(3)
MRSK	-	5	-	

(1) MRSK: Base plate single section and bottom ports

(2) 5: CETOP 05: size 12 with G 1/2" threads

(3) size:
12: ports with G 1/2" threads
34: ports with G 3/4" threads

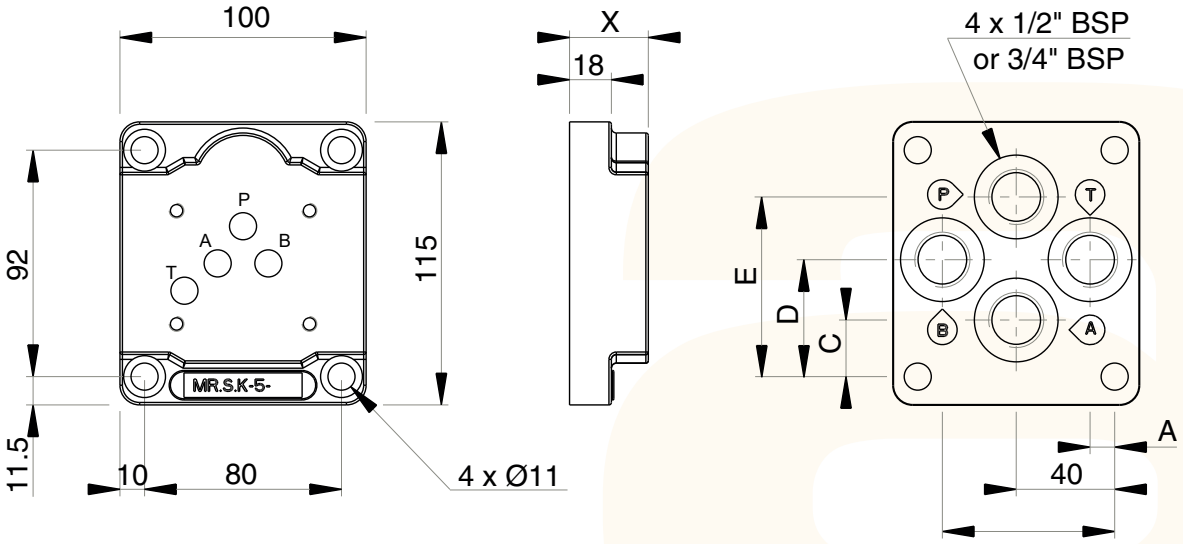


3 TECHNICAL DATA

Material:	Cast Iron
Coating	Phosphated
Max pressure	30 MPa (300 bar)
Max flow rate	100 l/min (1/2") 120 l/min (3/4")
Mass	1,90 kg (1/2") 1,70 kg (3/4")

Stations	X	A	B	C	D	E
1/2"	32	10	70	23	47.5	73
3/4"	31	9	71	21	48	75

4 INSTALLATION DIMENSIONS



REGENERATIVE MODULAR VALVE

AM5-RGT

80 l/min – 21 MPa (210 bar)

1 DESCRIPTION

The regenerative function of this valve provides consist in a increase of the actuator (differential cylinder) exit speed as shown in the diagram. When used with a cylinder with a 2:1 ratio of the operating surfaces the exit and re-entry speeds will be equal. The standard surface treatment of the body is phosphate coating, valves are zinc plated. Optional Zinc-Nickel coating (720h) is available



2 ORDERING CODE

(1)		(2)	(3)		(4)		(5)		(6)
AM3	-	RGT		/		-		/	10

(1) Stackable valve CETOP 05 - Pressure 210 bar

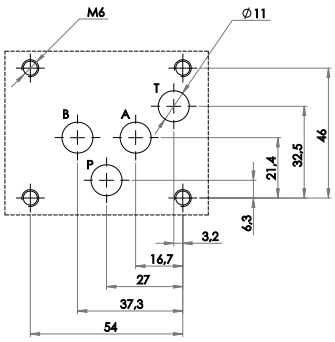
(2) RGT: regenerative circuit

(3) Regeneration flow
no designation (standard): flow from B to P

(4) Check valve opening (cracking) pressure (Pm)
no designation (standard): 0,3 MPa (3 bar)
5: 0,05 MPa (0,5 bar)
10: 0,1 MPa (1 bar)
25: 0,25 MPa (2,5 bar)

(5) Code reserved for option and variants:
V: Viton seals

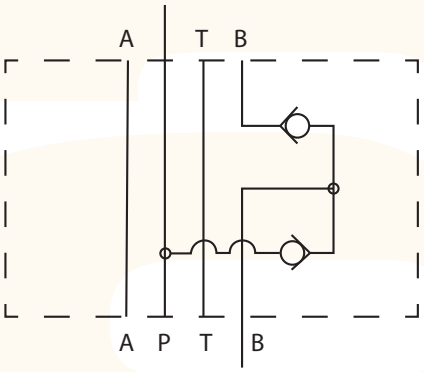
(6) Design number (progressive) of the valve

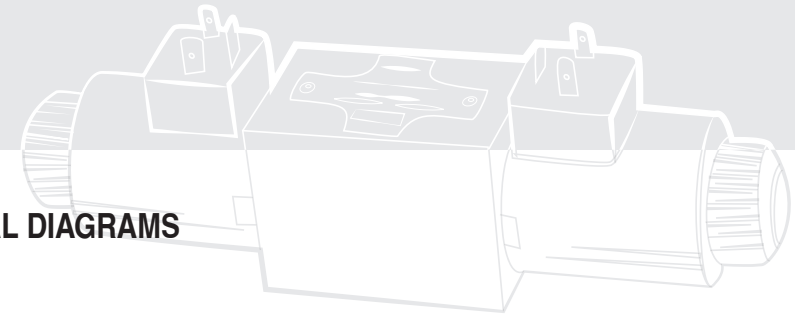


ISO 4401-05

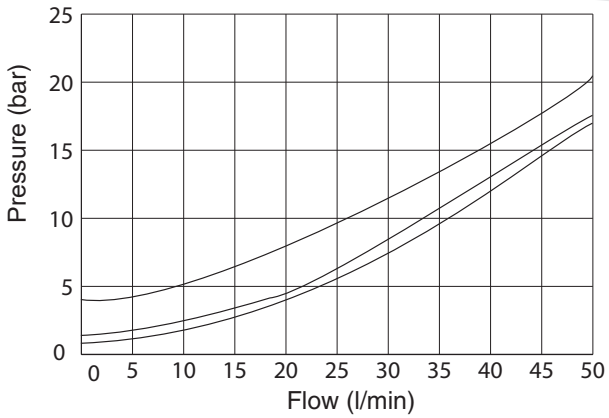
3 TECHNICAL DATA

Maximum rec. Flow rate	80 l/min
Maximum nominal pressure	21 MPa (210 bar)
Pressure curves	See 4
Installation dimensions	see 5
Weight	Approx. 1.8 kgs

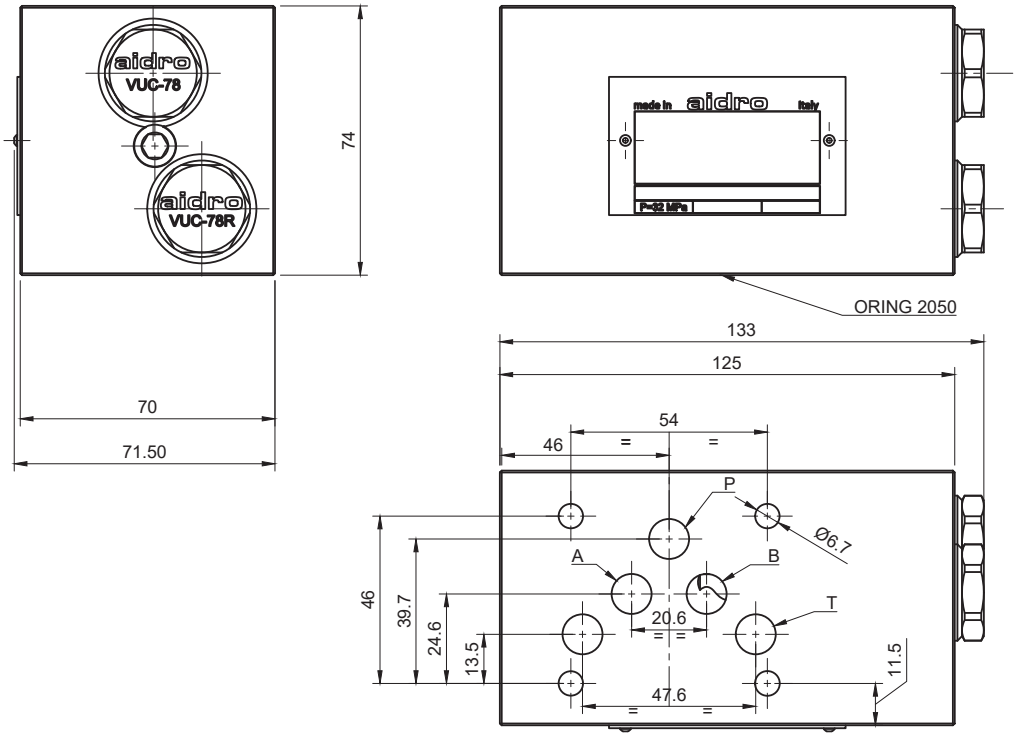




4 TYPICAL DIAGRAMS



5 INSTALLATION DIMENSIONS



6 HYDRAULICS FLUID

Seals and materials used on standard valves AM5-RGT are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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 cS

ISO 05 PLATE

BM5-G

120 l/min 21 MPa (210 bar)

1 DESCRIPTION

BM5-G is a multi functional CETOP 5 manifold useful to combine many options. It has a standard cavity 7/8" 16 UNF where is possible to install a pressure relief valve, direct operated or pilot operated or proportional. It is possible to have also a by-pass function integrated in the manifold.



2 ORDERING CODE

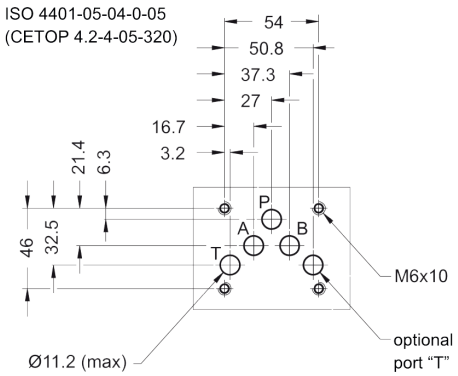
(1)		(2)		(3)		(4)
BM	-	5	-	G	/	*

(1) BM: Multi function base plate

(2) 5: CETOP 5

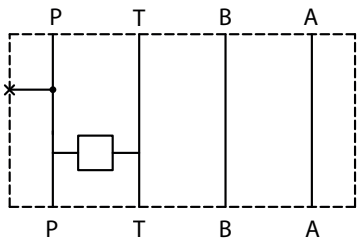
(3) G: Ports with G1/2" threads

(4) *: Different options see 5

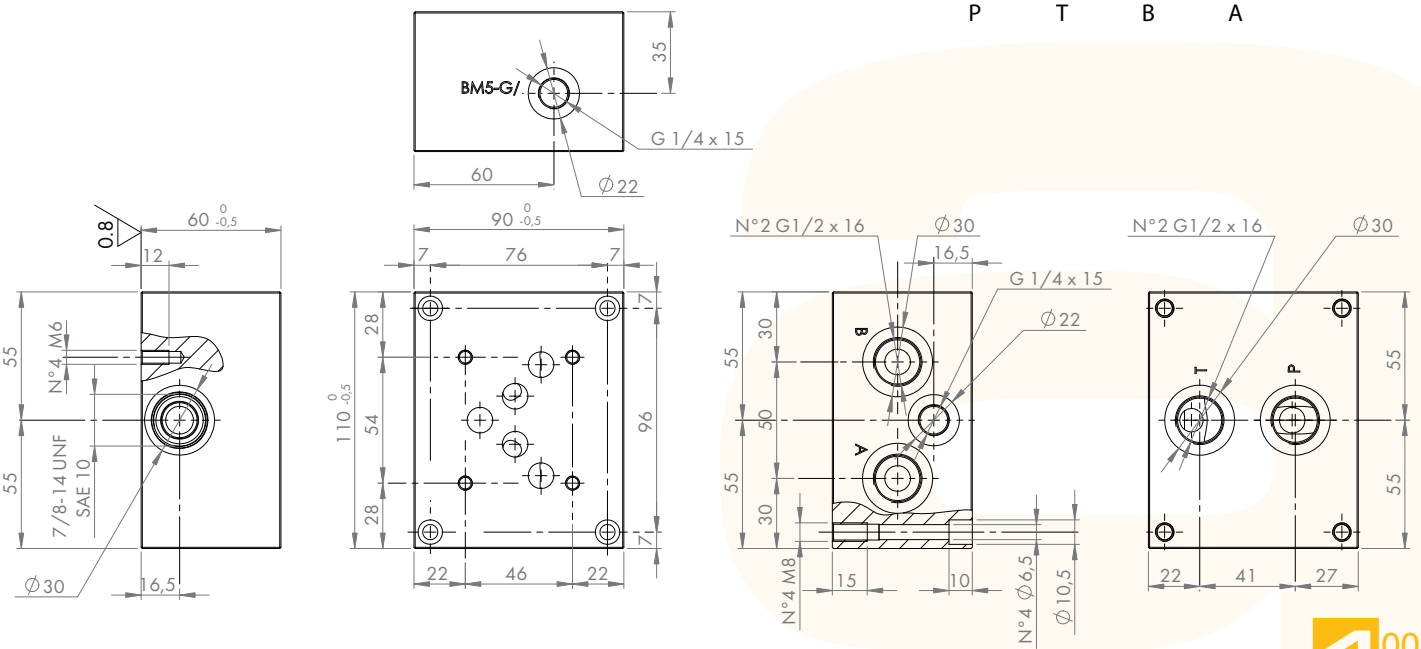


3 TECHNICAL DATA

Material:	Aluminium alloy
Coating	black anodizing
Max pressure	210 bar
Max flow rate	120 l/min
Mass	1,7 Kg



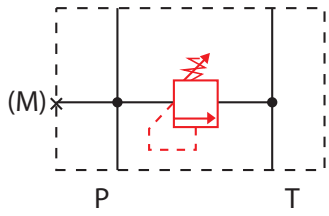
4 INSTALLATION DIMENSIONS



5 OPTIONS

RELIEF VALVE, DIRECTLY OPERATED

Example ordering code: BM5-G/20

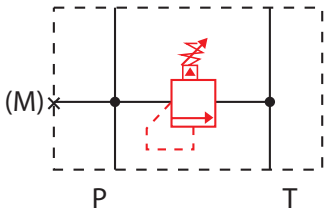


16: Pressure setting 50-116 bar

20: Pressure setting 110-210 bar

RELIEF VALVE, PILOT OPERATED

Example ordering code: BM5-G/P20

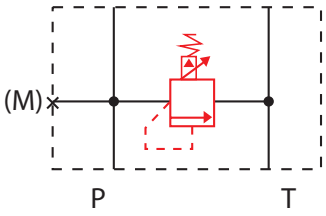


16: Pressure setting 50-116 bar

20: Pressure setting 110-210 bar

RELIEF VALVE, ELECTRICALLY PROPORTIONAL PILOT OPERATED

Example ordering code: BM5-G/PR20



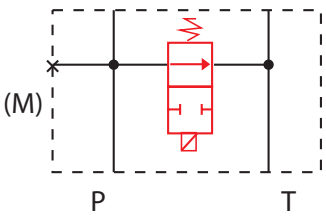
PR12: Pressure up to 120 bar

PR21: Pressure up to 210 bar

(*) for more details about proportional valve see datasheet PMO*-78

BY-PASS ELECTRICALLY OPERATED VALVE

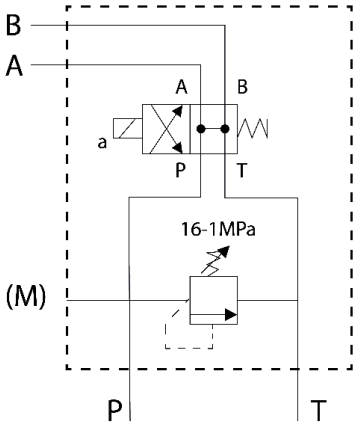
Example ordering code: BM5-G/NO

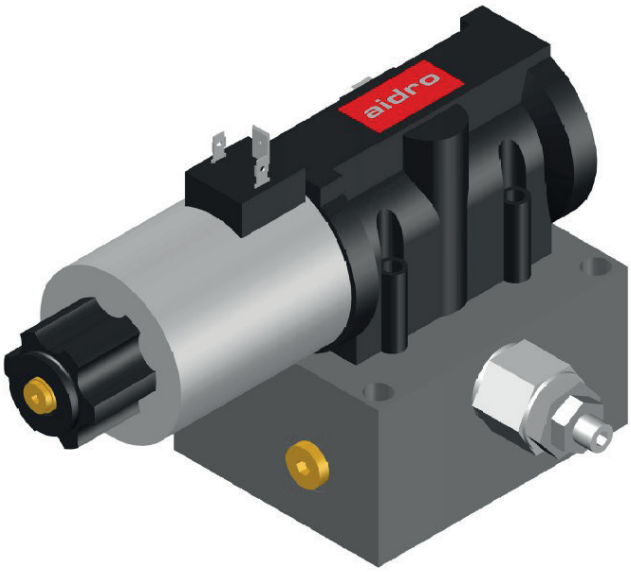


NO: Normally open

NC: Normally closed

6 EXAMPLE OF HYDRAULIC CIRCUIT

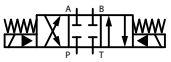


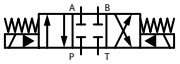


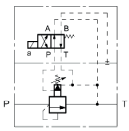


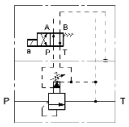
SUMMARY

5 CETOP 07-08

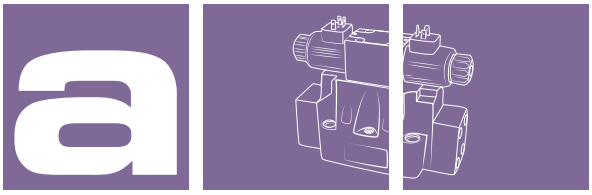
4/2 and 4/3 DIRECTIONAL CONTROL VALVES PILOT OPERATED
HD7-*

0001

4/2 and 4/3 WAY DIRECTIONAL CONTROL VALVES PILOT OPERATED
HD8-*

0006

PRESSURE RELIEF VALVE WITH UNLOADING AND PRESSURE SELECTION
GMG*-*/40

0011

PRESSURE RELIEF VALVE WITH UNLOADING AND PRESSURE SELECTION
GMG*-*/60

0014

aidro
Desktop Metal Company



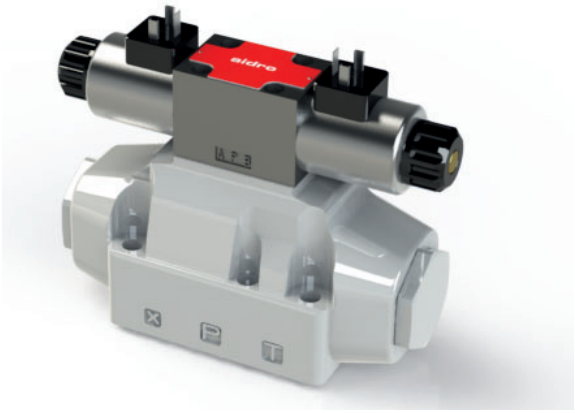
4/2 and 4/3 DIRECTIONAL CONTROL VALVES PILOT OPERATED

HD7-*

350 l/min 32 MPa (320 bar)

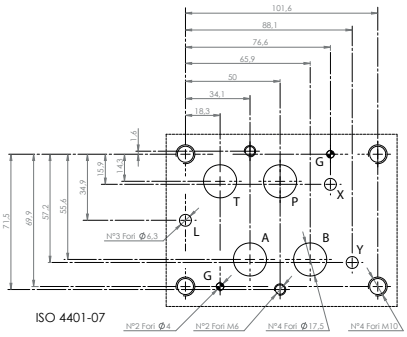
1 DESCRIPTION

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 an 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

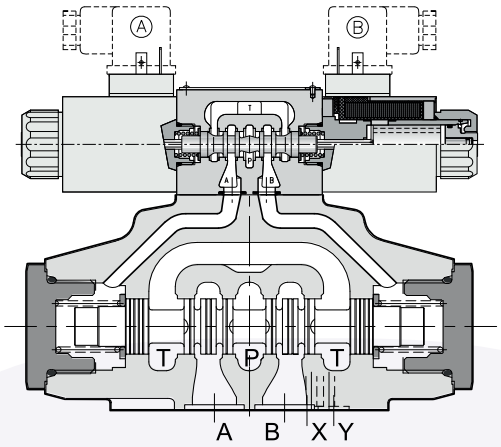
(1)		(2)		(3)		(4)	(5)		(6)		(7)
HD7	-		-		/			-		/	50



(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

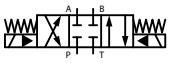
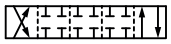
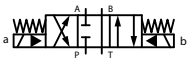
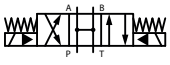
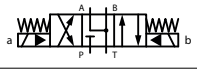
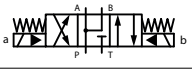
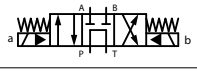
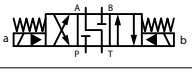
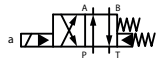
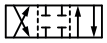
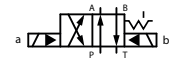
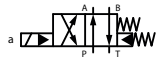
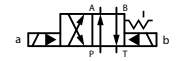
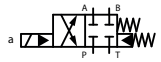
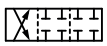
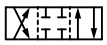
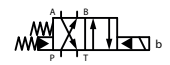
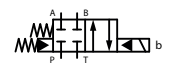
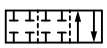
The HD7-ES solenoid operated - hydropiloted valves are consisting of an HD3-ES type solenoid operated directional control valve (see data sheet HD3-ES) that operates a 4-way hydropiloted control valve with a connection surface in accordance with the CETOP standards. They are available in various configurations 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.



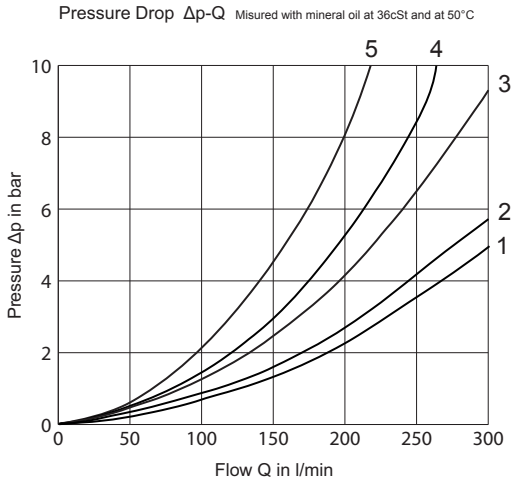
3 TECHNICAL DATA

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

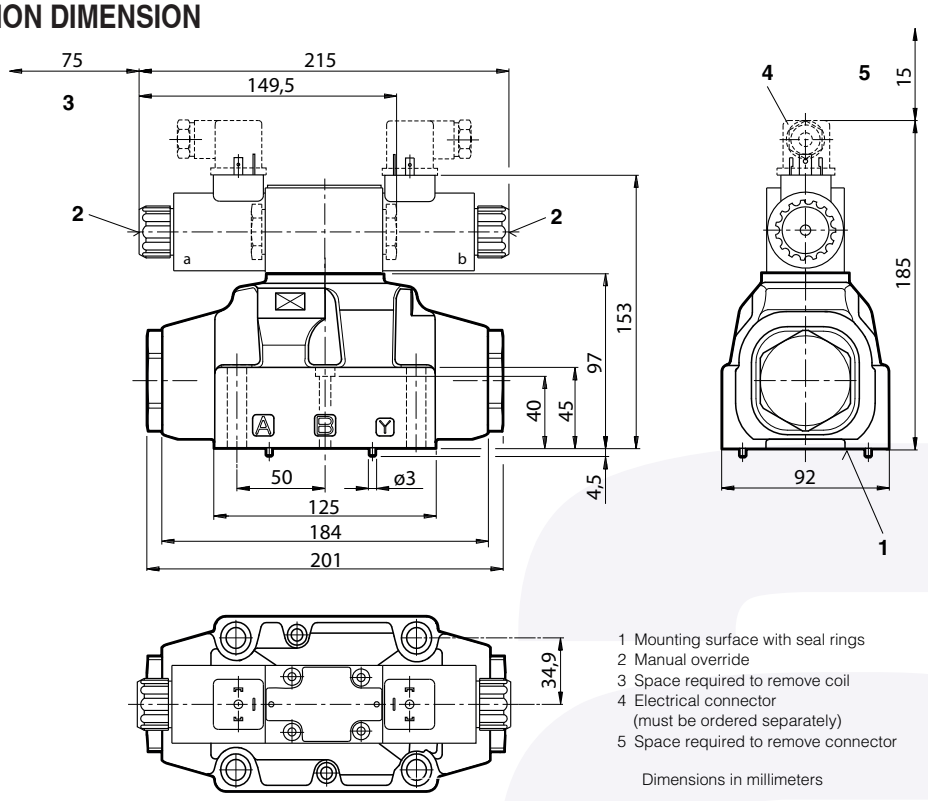
1C			77C		
0C			56C		
3C			8C		
4C			76C		
Two positions with return spring			Two positions with mechanical detent on pilot valve		
1LL			1N		
0LL			0N		
1ML					
1LLb					
0LLb					
1MLb					

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 Energized	5	5	1	2	6*
3C	De-energized Energized	1	1	4 1	4 2	
4C	De-energized Energized	6	6	3	4	6
67C	De-energized Energized	1	4 5	2	3	
77C	De-energized Energized	1	1	2	4 2	6°
55C	De-energized Energized	6	6	3	4	6
56C	De-energized Energized	6	6	4	3	
3SC	Energized	1	1	2	3	
8C	De-energized Energized	4° 5	4 5	2	3	
76C	De-energized Energized	1	1	3 1	3	
65C	De-energized Energized	4 5	1	2	3	
1LL,OLL,1ML	De-energized Energized	1	1	2	3	
1N,ON	Energized	1	1	2	3	

6 INSTALLATION DIMENSION



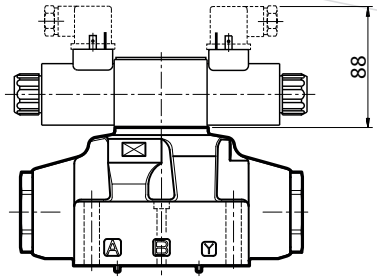
1 Mounting surface with seal rings
2 Manual override
3 Space required to remove coil
4 Electrical connector
(must be ordered separately)
5 Space required to remove connector

Dimensions in millimeters

Single valve fastening:	4 bolts M10 x 60 * * Bolts is not supplied 2 bolts M6 x 60 *
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)

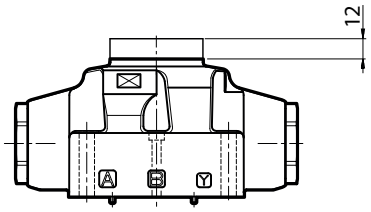
7 TYPE OF COMMAND

Solenoid control: HD7-ES
The valve is supplied with a pilot solenoid valve type HD3-ES.



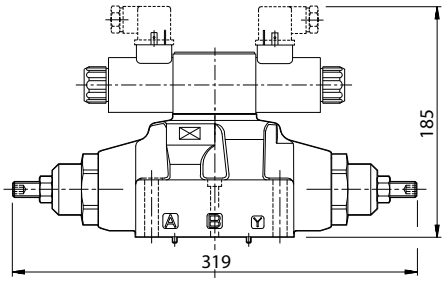
Hydraulic control: HD7-HH
The valve is supplied as main body.

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

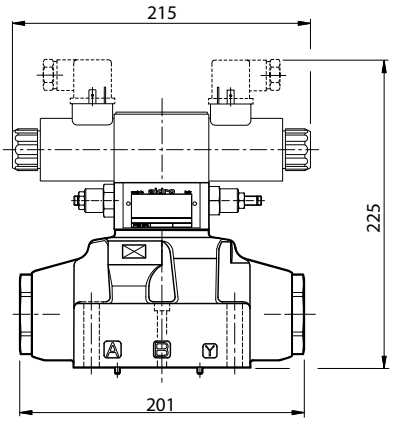


8 CONTROLS

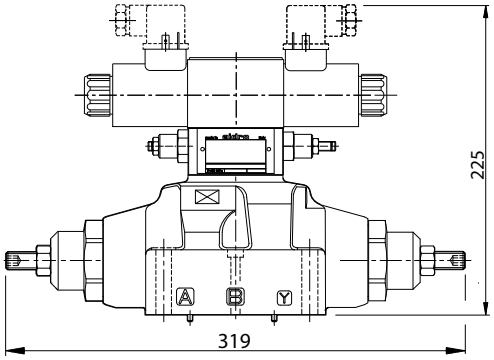
Control of the main spool stroke: C
It is possible to introduce special stroke controls in the heads of the hydropiloted valve so as to vary the maximum spool stroke. This solution allows control of the flow rate from the pump to the actuator and from the actuator to the outlet, obtaining a double adjustable 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.

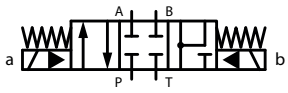


Control of the main spool stroke and shifting speed: G
It is possible to have the valve fitted with both the spool stroke device and the piloting flow rate control device. Add the letter **G** to the identification code to request this solution.

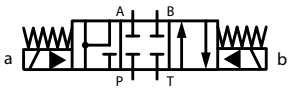


9 SPECIAL CONFIGURATION

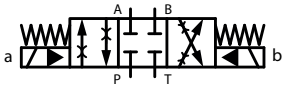
Solenoid valves with special spools
Besides the standard configurations (see pages 2 and 3), we can develop, on request, connection diagrams with special spools for a wide range of applications: consult our technical department for their identification, feasibility and operating limits.



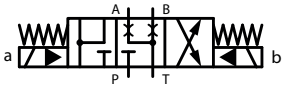
19C



18C

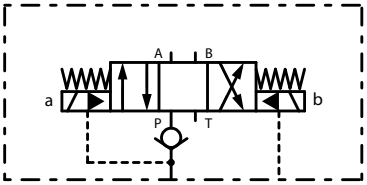


1SC



38C

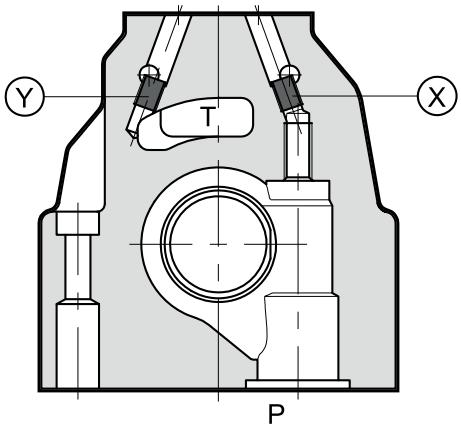
Check valve incorporated on line P: P
Valve HD7 is available upon request with check valve incorporated on line P. This is particulary useful to obtain the necessary piloting pressure when the main control valve, in the rest position, has line P connected to the T outlet. The cracking pressure is 5 bar.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



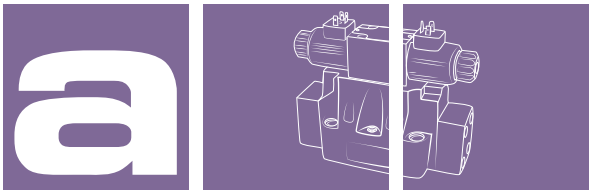
10 PILOT and DRAIN

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



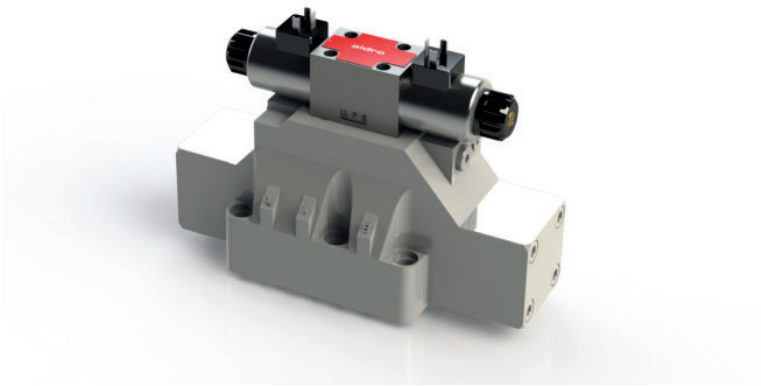
X: plug M6 x 8 for external pilot
Y: plug M6 x 8 for external drain



4/2 and 4/3 WAY DIRECTIONAL CONTROL VALVES PILOT OPERATED
HD8-*
600 l/min 32 MPa (320 bar)

1 DESCRIPTION

Valves HD8-ES are directional control valve pilot operated with sub-plate mounting interface acc. to ISO 4401-08, DIN 24340 (CETOP 08 - NG25).
The body is made with an 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)
HD8	-		-		/			-		/	40

(1) HD8: 4-way directional control valve CETOP 07 - Pressure 32 MPa (320 bar)

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

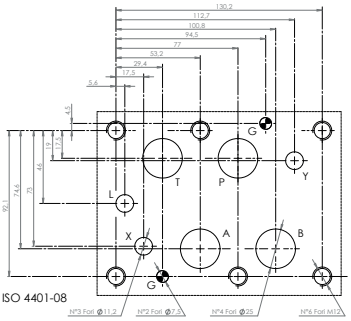
(3)Spool type:
-number is the main spool type
-letter is the solenoid or spring arrangement:
C : 2 solenoids spool is spring centered (3 position)
N : 2 solenoids pilot is detented (2 position)
LL : 1 solenoid (a), spool is spring/hydr. offset (2 position, end to end)
ML : 1 solenoid (a), spool is spring 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

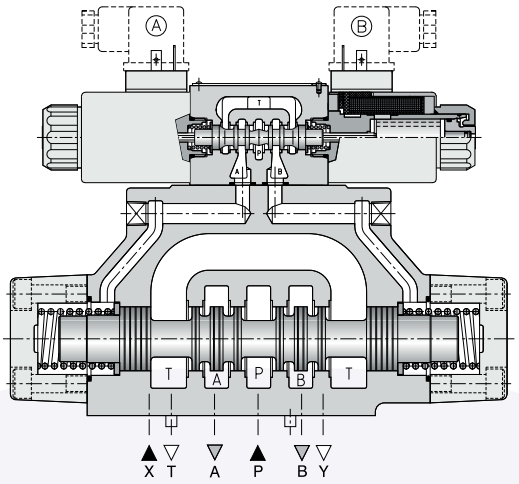
(4) Code reserved for options and variants
C : adjustable limits for main spool stroke
D : double flow control valve to adjust shifting speed
G : adjustable limits and adjustable shifting speed
P : check valve incorporated in P port of the valve

(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



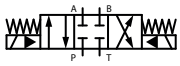
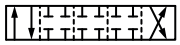
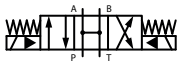
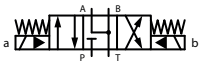
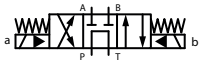
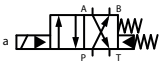
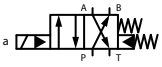
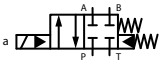
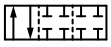
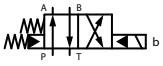
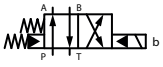
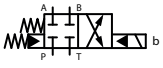
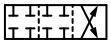
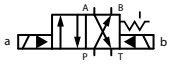
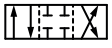
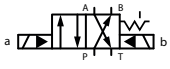


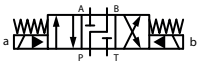
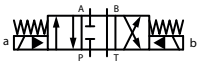
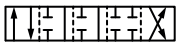
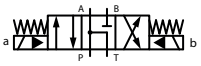
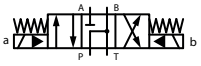
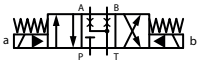
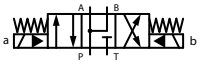
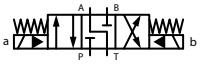
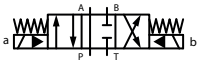
The HD8-ES solenoid operated - hydropiloted valves are consisting of an HD3-ES type solenoid operated directional control valve (see data sheet HD3-ES) that operates a 4-way hydropiloted control valve with a connection surface in accordance with the CETOP standards. They are available in various configurations 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

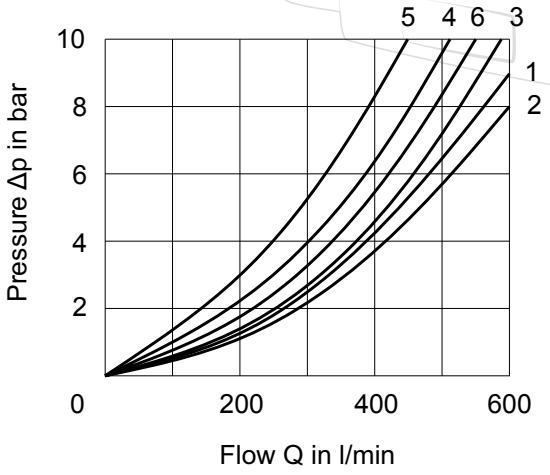
Max. recommended flow (spring centering)	400 l/min
Max. recommended flow (hydraulic centering and hydraulic off set)	600 l/min
Max pressure at P, A, B ports	32 MPa (320 bar)
Max pressure at T port (internal drain)	16 MPa (160 bar)
Max pressure at T port (external drain)	25 MPa (250 bar)
Pilot pressure minimum	0,5 MPa (5 bar)
Pilot pressure Max. recommended	20 MPa (200 bar)
Mass:	
HD8-ES	approx. 15,50 Kg
HD8-HH	approx. 14,00 Kg

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

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

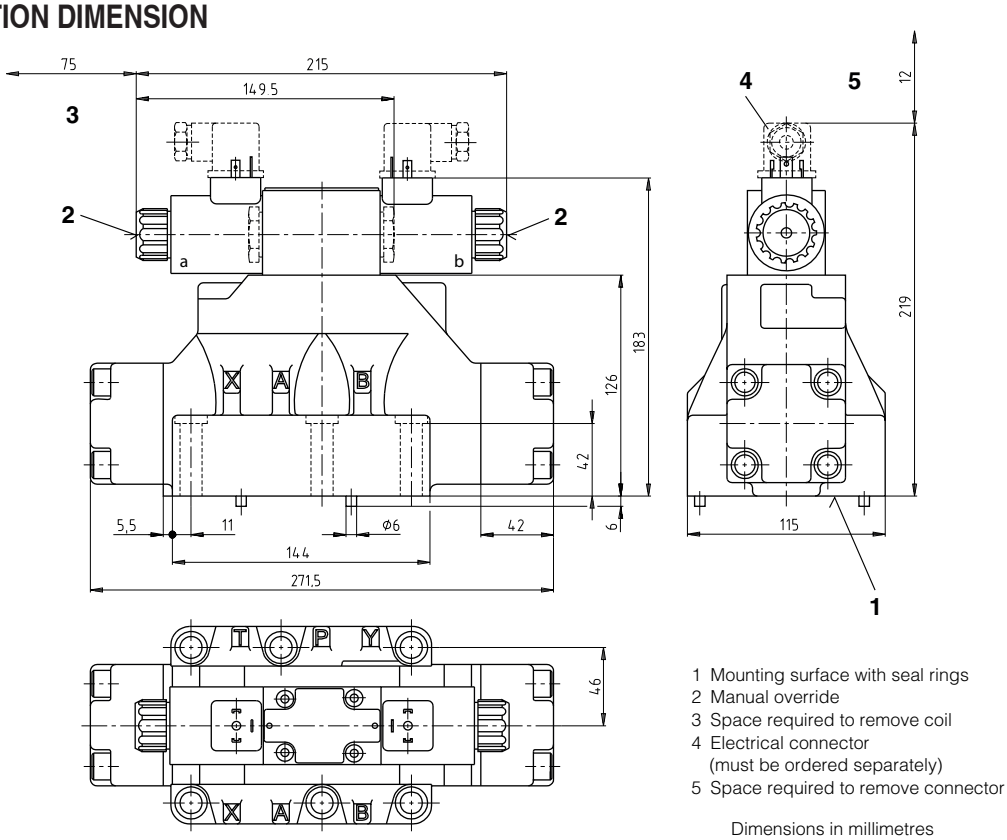
67C		
77C		
55C		
56C		
3SC		
8C		
76C		
65C		

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 Energized	2	2	1	2	6*
3C	De-energized Energized	1	1	4° 1	4° 2	
4C	De-energized Energized	6	6	3	4	5
67C	De-energized Energized	1	4 2	2	3	
77C	De-energized Energized	1	1	2	4 2	
55C	De-energized Energized	6	6	3	4	5°
56C	De-energized Energized	6	6	4	3	5°
3SC	Energized	1	1	2	3	
8C	De-energized Energized	4° 2	4° 2	2	3	
76C	De-energized Energized	1	1	3 1	3	
65C	De-energized Energized	4 2	1	2	3	
1LL,OLL, 1ML	De-energized Energized	1	1	2	3	
1N,ON	Energized	1	1	2	3	

6 INSTALLATION DIMENSION



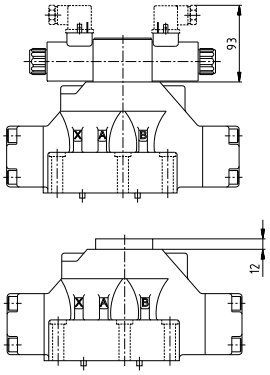
1 Mounting surface with seal rings
2 Manual override
3 Space required to remove coil
4 Electrical connector
(must be ordered separately)
5 Space required to remove connector

Dimensions in millimetres

Single valve fastening:	6 bolts M12 x 60 *
Bolt torque:	69 Nm - bolts A 8.8; 115 Nm - bolts A 12.9
Threads of mounting holes:	M12 x 20
Seal rings:	4 O-rings type 29.82 x 2.62 2 O-rings type 20.24 x 2.62

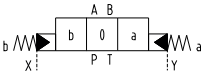
7 TYPE OF COMMAND

Solenoid control: HD8-ES
The valve is supplied with a pilot solenoid valve type HD3-ES.

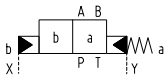


Hydraulic control: HD8-HH
The valve is supplied as main body.

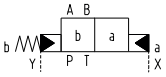
X and Y connections are used for the hydraulic control of the valve.



HD8-HH-*C/E



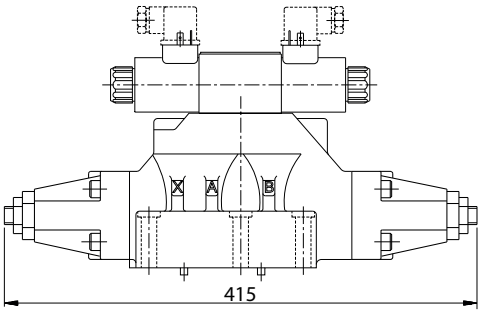
HD8-HH-*LL/E



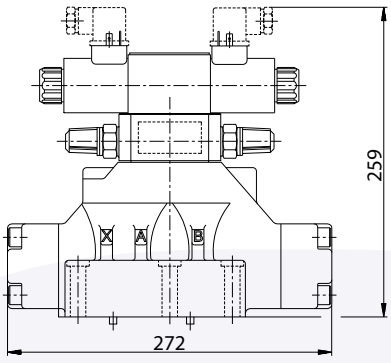
HD8-HH-*LLb/E

8 CONTROLS

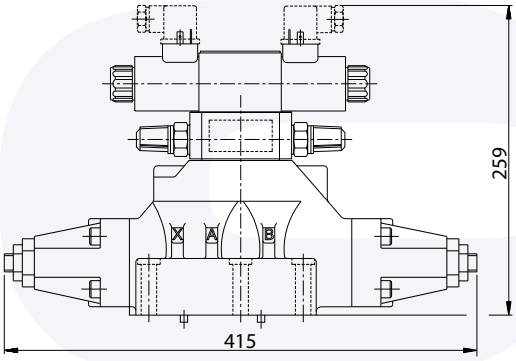
Control of the main spool stroke: C
It is possible to introduce special stroke controls in the heads of the hydropiloted valve so as to vary the maximum spool stroke. This solution allows control of the flow rate from the pump to the actuator and from the actuator to the outlet, obtaining a double adjustable 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.

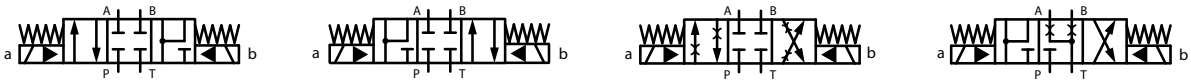


Control of the main spool stroke and shifting speed: G
It is possible to have the valve fitted with both the spool stroke device and the piloting flow rate control device. Add the letter **G** to the identification code to request this solution.



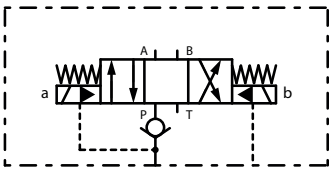
9 SPECIAL CONFIGURATION

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 1SC 38C

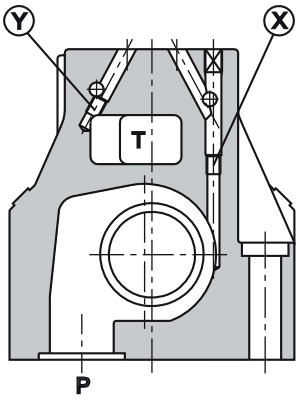
Check valve incorporated on line P: P
Valve HD8 is available upon request with check valve incorporated on line P. This is particulary useful to obtain the necessary piloting pressure when the main control valve, in the rest position, has line P connected to the T outlet. The cracking pressure is 5 bar. Add P to the identification code for this request.



10 PILOT and DRAIN

The HD8 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
HD8-ES-**/*	Internal pilot and external drain	NO	YES
HD8-ES-**/*I	Internal pilot and internal drain	NO	NO
HD8-ES-**/*E	External pilot and external drain	YES	YES
HD8-ES-**/*EI	External pilot and internal drain	YES	NO

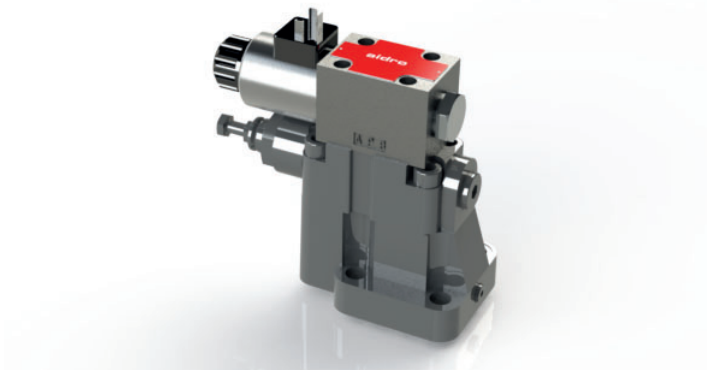


X: plug 1/16 NPT for external pilot
Y: plug M6 x 8 for external drain

PRESSURE RELIEF VALVE WITH UNLOADING AND PRESSURE SELECTION
GMG-*/40
500 l/min 35 MPa (350 bar)

1 DESCRIPTION

Solenoid pressure relief valve with unloading and pressure selection. There are three different sizes for flow rates up to 500 l/min and 6 different configurations which permit a wide range of hydraulic configurations. The pilot valve is a CE-TOP 3 HD3-ES valve.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)
GMG	-		-		-		/		-		-		/	40

(1) GMG : Pressure relief valve pilot operated

(2) Nominal dimensions:
- 10 : CETOP R06 : max flow rate 200 l/min
- 20 : CETOP R08 : max flow rate 400 l/min
- 32 : CETOP R10 : max flow rate 500 l/min

(3) Subplate mounting: H

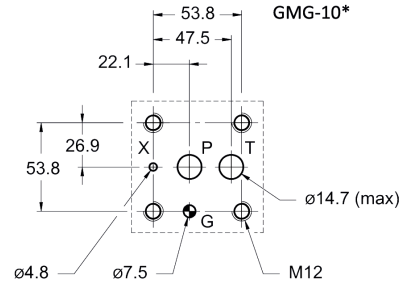
(4) Versions A, B, C, D, G, Z (see 5)

(5) Pressure:
- 20 : 5 - 210 bar
- 32 : 10 - 350 bar

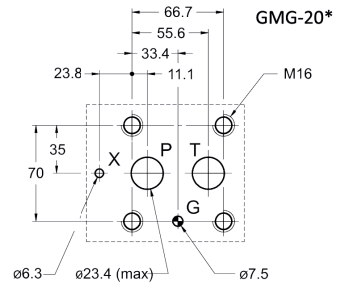
(6) Pressure regulation :
- Standard: screw regulation (no designation)
- M- SicBloc
- M1: hand knob screw regulation

(7) Electric voltage and solenoid coils (DIN 43650-A ISO 4400)
- 012C : coils for V12DC
- 024C : coils for V24DC
- 115A : coils for V110/50 – V 115/60 AC
- 230A : coils for V220/50 – V 230/60 AC

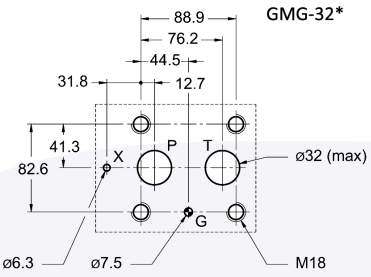
(8) Series number



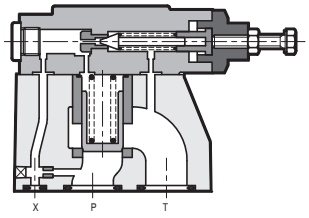
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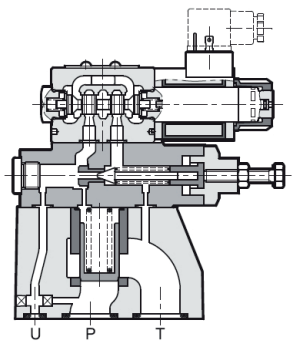
ISO 6264-08-13-*-97 (CETOP 4.4.2-2-R08-350)



ISO 6264-10-17-*-97 (CETOP 4.4.2-2-R10-350)

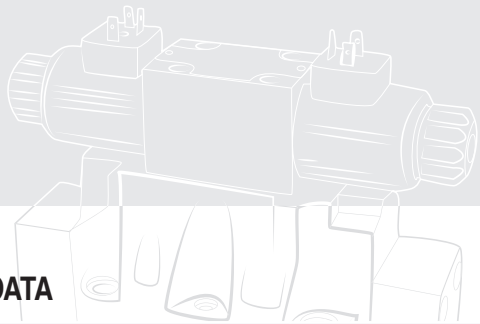


Z version



A/B version

GMG*-/40 are pilot operated pressure relief valves, available in 6 versions and up to 3 selections of pressure values. In order to set the 2nd and 3rd value, a pressure relief valve must be placed between the main body and the solenoid valve. Valves are normally supplied with a hexagonal head adjustment screw (SIC BLOC adjustment knob on the mainpressure control is available upon request)

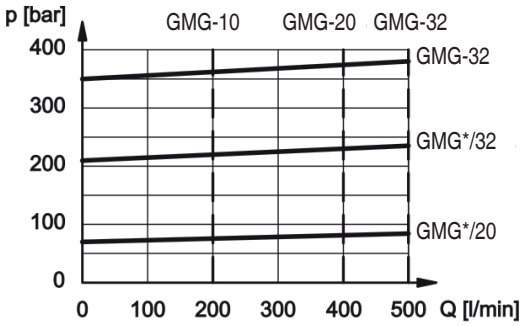


3 TECNICAL DATA

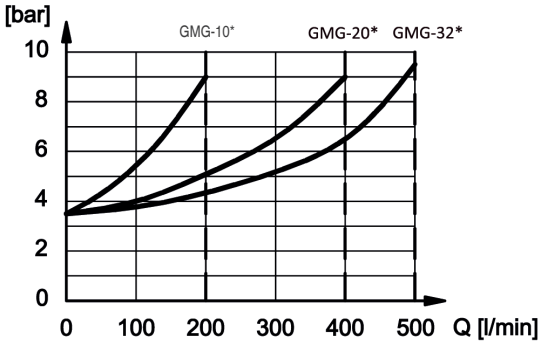
Max. flow	up to 500 l/min	Hydraulic fluids:
Max. nominal pressure	35 MPa (350 bar)	Seals and materials used on standard valves GMG*/40 are fully compatible with hydraulic fluids of mineral base, upgraded with antifoaming and anti oxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.
Ambient T	-20 + 50 °C	
Fluid T range	-20 + 80 °C	
Fluid viscosity range	10 - 400 cSt	
Recommended viscosity	10 cSt - 60 cSt	

4 TYPICAL DIAGRAMS

Typical P-Q curves for valves GMG*/40 are obtained with mineral oil at viscosity 36 cSt at T = 50 °C.

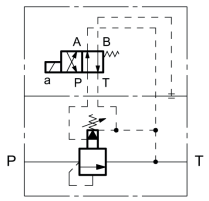


MINIMUM CONTROLLED PRESSURE



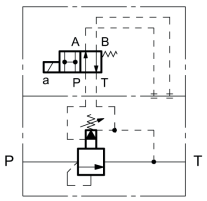
5 VERSIONS

A



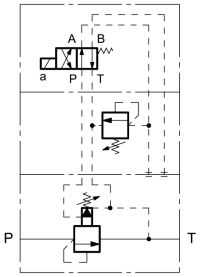
1 pressure setting and unloading with de-energized solenoid

B



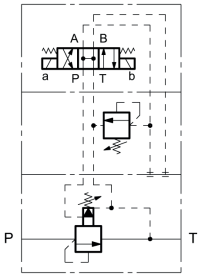
1 pressure setting and unloading with energized solenoid

C



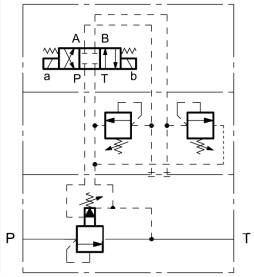
2 pressure settings The highest setting is reached with energized solenoid

D



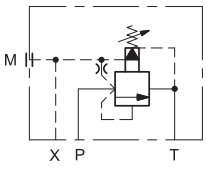
2 pressure settings and unloading with de-energized solenoids

G



3 pressure settings The highest setting is reached with de-energized solenoids

Z



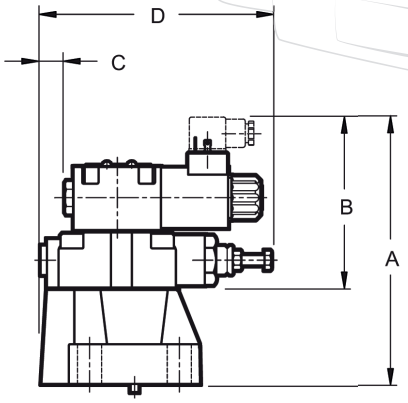
1 pressure setting

6 HYDRAULIC FLUIDS

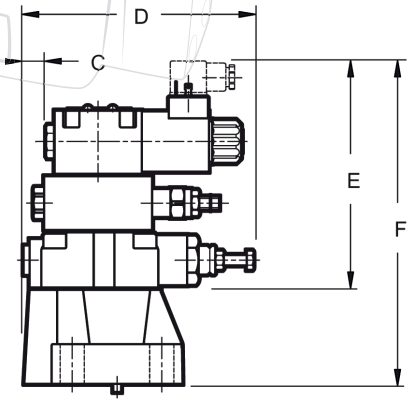
Seals and materials used on standard valves GMG*/40 are fully compatible with hydraulic fluids of mineral base, upgraded with antifoaming and anti oxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

7 INSTALLATION DIMENSIONS (mm)

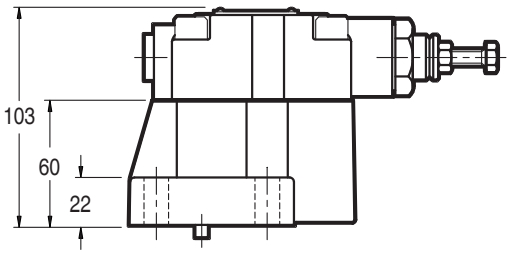
dimentions are in mm



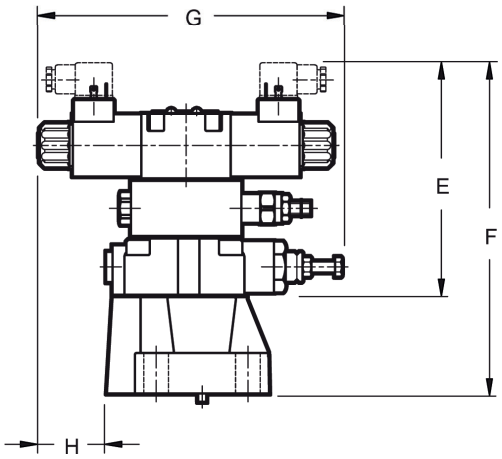
GMG*/A
GMG*/B



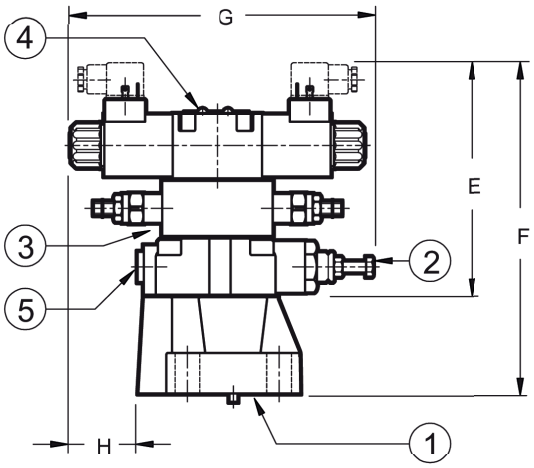
GMG*/C



GMG*/Z



GMG*/D



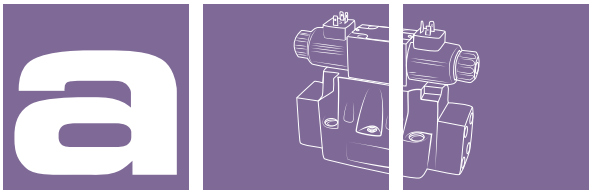
GMG*/G

① - Mounting surface
② - Hexagon head main pressure adjustment screw: spanner 13, rotate clockwise to increase pressure;
③ - Second value pressure adjustment valve. Countersunk hex adjustment screw: spanner 5, rotate clockwise to increase pressure;
④ - CETOP 03 solenoid valve for pressure selection / unloading.
⑤ - Pressure gauge port 3/4 BSP

	A	B	C	D	E	F	G	H
GMG-10*	186	126	22	179	164	226	223	44
GMG-20*	192	126	14	170	164	236	222	52
GMG-32*	206	126	25	180	164	246	221	41

8 FASTENING BOLTS AND SEALING RINGS

	GMG-10*	GMG-20*	GMG-32*
Fastening (4bolts)	M 12x40	M 16x50	M 18x60
Torque	69 Nm	170 Nm	235 Nm
Sealing rings	2 OR type 123 1 OR type 109	2 OR type 3118 1 OR type 109	2 OR type 4137 1 OR type 109



PRESSURE RELIEF VALVE WITH UNLOADING AND PRESSURE SELECTION

GMG*-*/60

400 l/min 35 MPa (350 bar)

1 DESCRIPTION

Solenoid pressure relief valve with unloading and pressure selection. There are two different sizes for flow rates up to 400 l/min and 5 different configurations which permit a wide range of hydraulic configurations. The pilot valve is a CETOP 3 HD3-ES valve.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)
GMG	-		-		/		-		-		/	60

(1) GMG: Pressure relief valve pilot operated

(2) Nominal dimensions
- 5: max flow rate 250 l/min
- 7: max flow rate 400 l/min

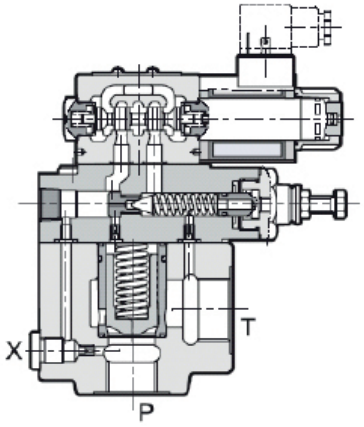
(3) Versions: A, B, C, D, G, Z (see 5)

(4) Pressure adjustment range
- 3: up to 70 bar
- 5: up to 210 bar
- 7: up to 350 bar

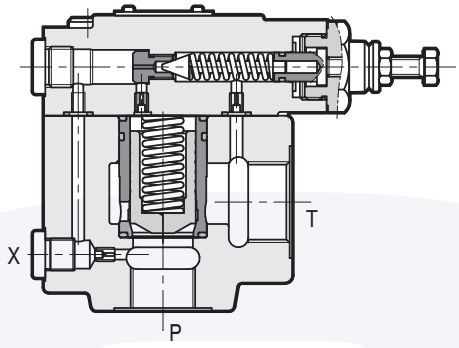
(5) Pressure regulation
- Standard - screw regulation (no designation)
- M - SICBLOC knob available on the main pressure control
- M1: hand knob screw regulation

(6) Electric voltage and solenoid coils (DIN 43650-A ISO 4400)
- 012C: coil(s) for V12DC
- 024C: coil(s) for V24DC
- 115A: coil(s) for V110/50 – V 115/60 AC
- 230A: coil(s) for V220/50 – V 230/60 AC

(7) Series number



C-D-G versions



Z version

GMG*-/60 are pilot operated pressure relief valves, available in 2 versions and up to 3 selections of pressure values. In order to set the 2nd and 3rd value, a pressure relief valve must be placed between the main body and the solenoid valve. Valves are normally supplied with a hexagonal head adjustment screw (SICBLOC adjustment knob on the mainpressure control is available upon request)

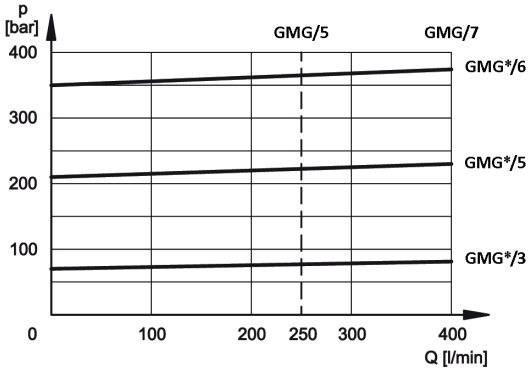
3 TECNICAL DATA

Max. flow	up to 400	Hydraulic fluids:
Max. nominal pressure	35 MPa (350 bar)	Seals and materials used on standard valves GMG*/60 are fully compatible with hydraulic 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.
Ambient T	-20 + 50 °C	
Fluid T range	-20 + 80 °C	
Fluid viscosity range	10 - 400 cSt	
Recommended viscosity	10 cSt - 60 cSt	

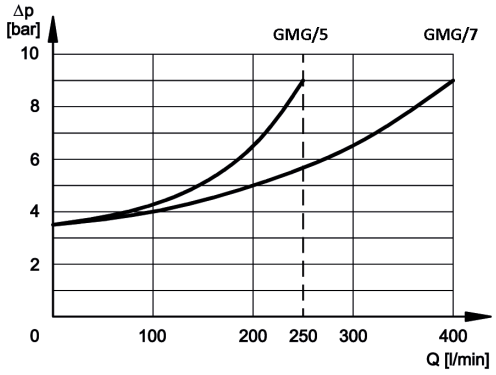
4 TYPICAL DIAGRAMS

Typical P-Q curves for valves GMG*/60 are obtained with mineral oil at viscosity 36 cSt at T = 50 °C.

ADJUSTMENT

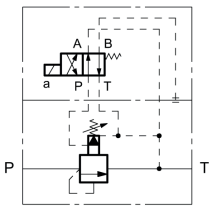


MINIMUM CONTROLLED PRESSURE



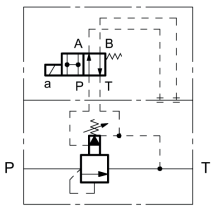
5 VERSIONS

A



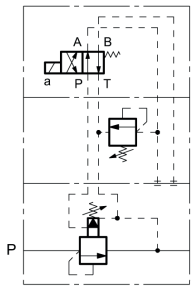
1 pressure setting and unloading with de-energized solenoid

B



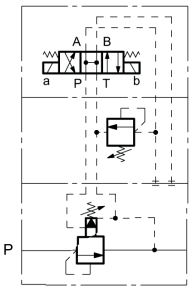
1 pressure setting and unloading with energized solenoid

C



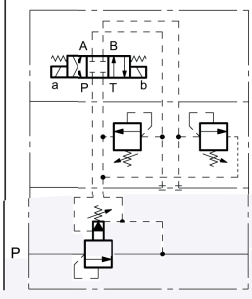
2 pressure settings The highest setting is reached with energized solenoid

D



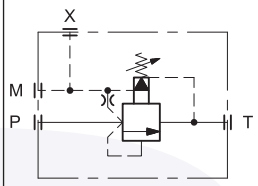
2 pressure settings and unloading with de-energized solenoids

G



3 pressure settings The highest setting is reached with de-energized solenoids

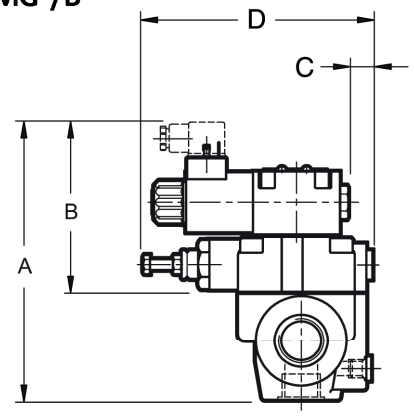
Z



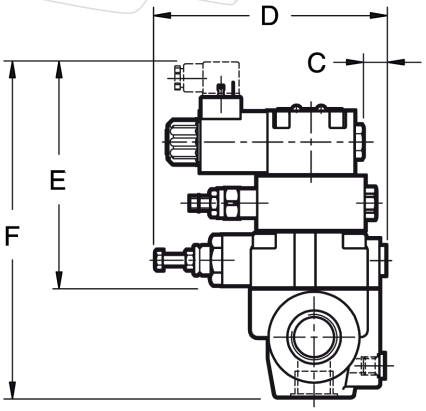
1 pressure setting

6 INSTALLATION DIMENSIONS

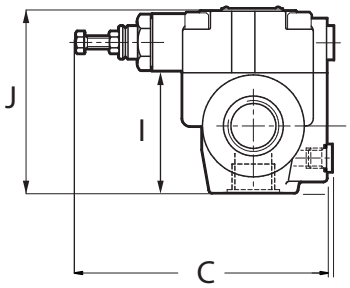
GMG*/A
GMG*/B



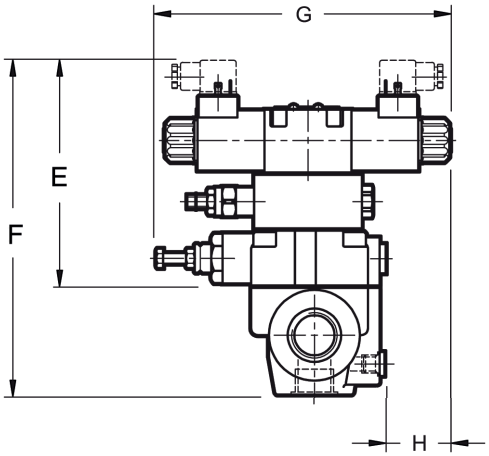
GMG*/C



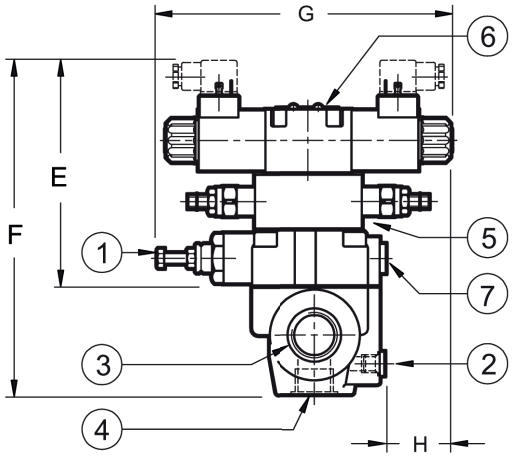
GMG*/Z



GMG*/D



GMG*/G



① - Hexagon head main pressure adjustment screw: spanner 13, rotate clockwise to increase pressure;
② - Remote piloting port X 1/4 BSP;
③ - Outlet port T: GMG5* - 1" BSP
GMG7* - 1" 1/2 BSP

④ - Pressure port P: GMG5* - 3/4" BSP
GMG7* - 1" 1/4 BSP
⑤ - Second value pressure adjustment valve. Countersunk hex adjustment screw: spanner 5, rotate clockwise to increase pressure;
⑥ - CETOP 03 solenoid valve for pressure selection / unloading.

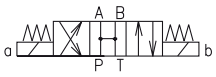
	A	B	C	D	E	F	G	H	I	J
GMG-5*	186	126	22	179	164	226	223	44	80	123
GMG-7*	192	126	14	170	164	236	222	52	102	145

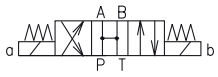
7 HYDRAULIC FLUIDS

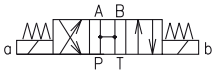
Seals and materials used on standard valves GMG*/60 are fully compatible with hydraulic fluids of mineral base, upgraded with antifoaming and anti oxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from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

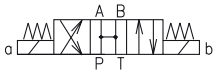
SUMMARY

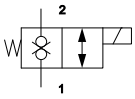
6 ATEX

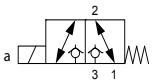
DIRECTIONAL CONTROL VALVES– CETOP 03 Ex proof II 2 GD, Ex d IIIC T5
HD3-EX-*/25  0001

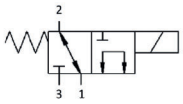
DIRECTIONAL CONTROL VALVES– CETOP 03 Ex proof II 2 GD, Ex d IIIC T5
HD3-AMEX/25  0005

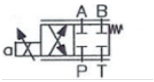
DIRECTIONAL CONTROL VALVES– CETOP 03 Ex proof II 2 GD, Ex d IIIC T5
HD3-EX/30  0008

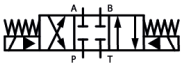
DIRECTIONAL CONTROL VALVES– CETOP 03 Ex proof II 2 GD, Ex d IIIC T5
HD3-AMEX/30  0012

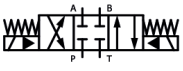
HYDRAULIC SCREW-IN VALVES Ex proof II 2 GD, Ex d IIIC T5
EVX-*-C5/25  0015

HYDRAULIC SCREW-IN VALVES Ex proof II 2 GD, Ex d IIIC T5
EVX-06-D5  0017

EXPLOSION PROOF SOLENOID II 2 GD Ex IIIC T5
EVX-34-213  0019

PROPORTIONAL 4-WAY CONTROL VALVES CETOP 03 Ex - proof II 2 GD, Ex d IIIC T5
HD3-PX*/25  0021

DIRECTIONAL CONTROL VALVES CETOP 05 Ex - proof II 2 GD, EEx d IIIC T5
HD5-EX*/40  0025

DIRECTIONAL CONTROL VALVES CETOP 05 Ex - proof II 2 GD, EEx d IIIC T5
HD5-EX/50  0029

aidro
Desktop Metal Company

ATEX

DIRECTIONAL CONTROL VALVES– CETOP 03 Ex proof II 2 GD, Ex db IIC T5 Gb, Ex tb IIIC T100 C Db IP66/67

HD3-EX-*/25

40 l/min 25 MPa (250 bar)

1 DESCRIPTION

Valves HD3-EX are ATEX directional control valve solenoid operated with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03).
The design of the body is an high quality five chamber casting. The valve is available with ATEX metallic DC and AC solenoids. In the standard version, the valve housing is phosphated for 240 h salt spray protection acc. to ISO 9227 . Enhanced surface protection for specific applications is available (ISO 9227, 520 h salt spray).



2 ORDERING CODE

(1)		(2)		(3)	(4)		(5)		(6)		(7)		(8)
HD3	-	EX	-			-				-		/	25

(1) HD3 : 4-way directional valve Cetop 03 – Pressure 25 Mpa (250 bar)

(2) EX : electrically controlled, Ex-proof solenoid

(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)
N : 2 solenoids spool is detented (2 position) see 9
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)

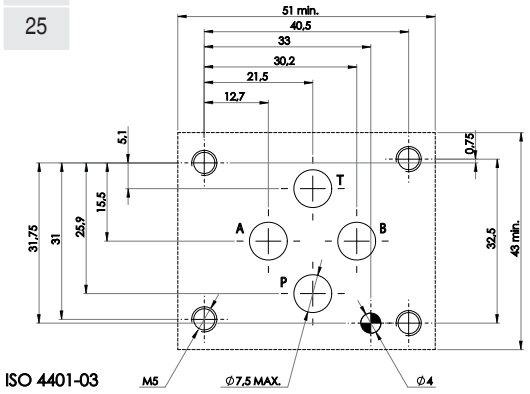
(4) b: only for LL, ML, LM sol. b installed (instead of sol. a)

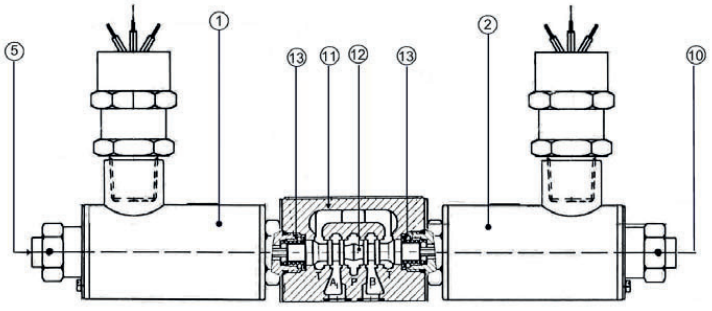
(5) Code reserved for option and variants
3S-**: calibrated orifice on P port, see 10
ZN: zinc nichel plated valve, see 11

(6) Electric voltage and solenoid coils
012C: coil(s) for V12DC
024C: coil(s) for V24DC
110A: coil(s) for V110/50 – V115/60 AC
230A: coil(s) for V220/50 – V230/60 AC

(7) Cable length options:
-no designation: 3m (standard)
-6: 6m
-10: 10m
-16: 16m
-20: 20m
-25:25m

(8) Design number of the valves Atex solenoid for G and D





The spool 12 shifts into the valve body 11 subject to the action of springs 13 and solenoids 2. Spool 12, depending from its shape and its position in the valve body, opens and/ or closes passages between P, A, B and T ports, thus controlling the direction of the hydraulic flow.

3 TECHNICAL DATA

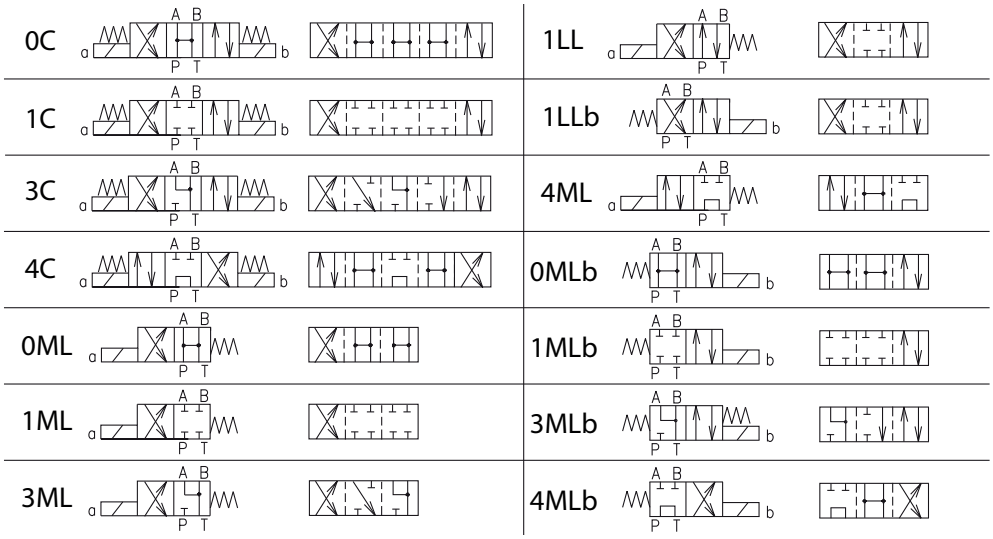
Nominal flow	32 l/min
Maximum rec. flow rate	40 l/min
Maximum nominal pressure (P,A,B)	25 MPa (250 bar)
Maximum pressure at T port	25 MPa (250 bar)
Pressure drops	See 5
Protection to DIN 40050	IP 67
Duty cycle	100%
Service life	≥ 10^7 cycles
Dimensions and Installation	see 6
Mass	Approx 2,6 / 3,7 kg

Electric Characteristics:

Valves type HD3-EX-* are operated by solenoid that are energized:
- directly from a D.C. voltage supply:
  - V 12 DC = 012 C
  - V 24 DC = 024 C
- by the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply:
  - V 110/50-V 115/60 = 110 A
  - V 220/50-V 230/60 = 230 A

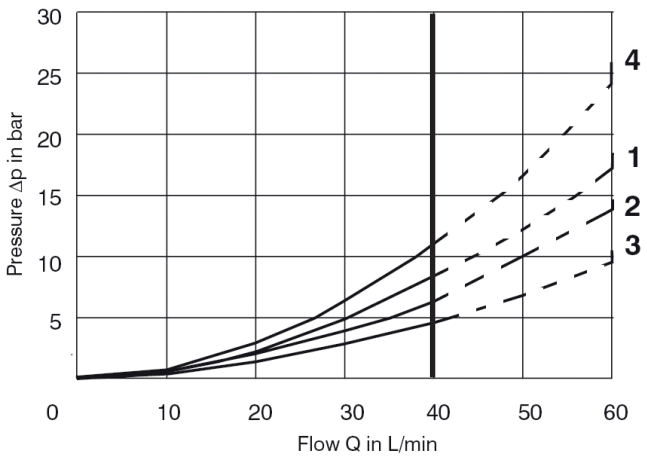
Other voltages are available.
Permissible supply voltage variation: + 5%.
Ex-proof solenoid according to ATEX 94/9/EC, Ⓔx II 2GD, class Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67 see 7
Power consumption: max 11 w.
Currents are, at nominal voltage and at 25°C:
V12DC = 0,92A V115AC = approx 0,1A
V24DC = 0,46A V230AC = approx 0,05A

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



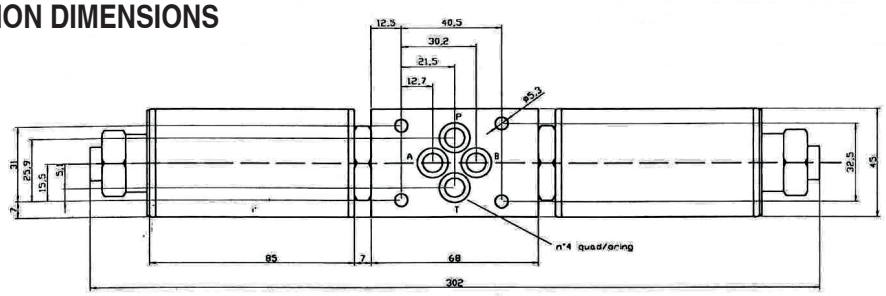
Spools, springs and solenoids combinatio permit to obtain almost every type of ports (P, A, B, T) connection and sequence. For almost all types of solenoids/springs combination and for all type of spools (with the exceptions of spool 4), when solenoid "a" is energized, hydraulic connections are P-> B 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.

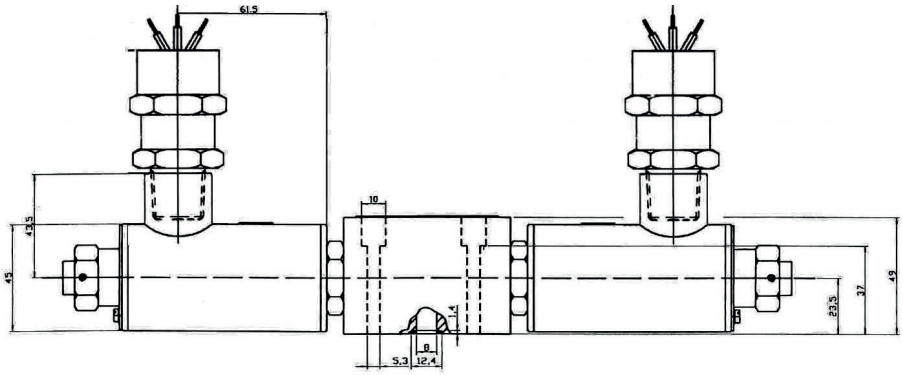
5 TYPICAL DIAGRAMS



	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	-

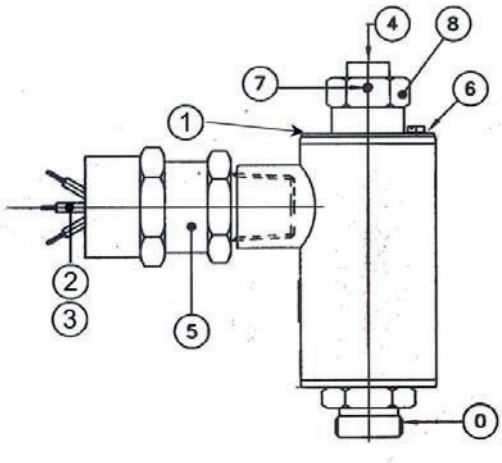
6 INSTALLATION DIMENSIONS





All valves HD3-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page) and for valves height. When assembled to its mounting plate valve HD3-* must be fastened with 4 bolts M5 X 45 mm (or M5 x ** 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 9,25x1,68x1,68.

7 EXPLOSION PROOF SOLENOID GMA-6/HD SERIES 271 GD



Atex Certificates :
INERIS 05ATEX0028X/02 for Gas and Dust

0: Ex proof solenoid according to ATEX 94/9/EC.
II 2GD Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67.
Solenoid outside surfaces are zinc-nickel plated, with 7µm minimum thickness
1: Solenoid label indicates supply voltage, protection class Ex d, certification number by INERIS and maximum absorbed power.
2: 3-wires cable, according to CEI 20-22, of standard length of 3 m, is fastened to the coil and locked by cable gland.
3: Wires have 1,5 mm² section; earth connection wire is green-yellow.
Electric connection must be in accordance with Ex-proof norm ATEX.
4: Manual override operation is by pushing the extended pin.
5: Normalised cable gland –torque 8 Nm ± 1 – device has threaded attachment ½" conical – ISO 7/1
6: Earth connection screw
7: Threaded plug (socket hexagon 1,5 mm)to lock the retaining coil nut
8: Nut for retaining the coil –torque 6 Nm ± 1 – hexagon 24 mm.

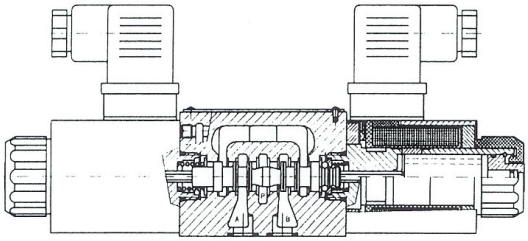
Conformity of unit to the norms is not granted if coil is used separately from its electromagnetic tube.

8 HYDRAULIC FLUIDS

Seals and materials used on standard valves HD3-* are fully compatible with hydraulic fluids of mineral oil 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.

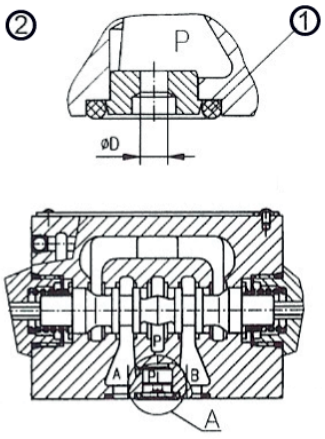
9 VERSION “N”: MECHANICAL DETENT ON SPOOL

Solenoid valves with detent typically are 2 position, 2 solenoid, no spring valve where the spool is kept at the extreme ends of its stroke by a mechanical device. This permits that solenoids are energized by short time current pulses and that the spool remains at its position regardless of forces due to hydrodynamics or gravitational/inertial effects (vibrations).



10 VERSION “3S*”: CALIBRATED ORIFICE ON P PORT

Option “3S*” is rappresented by elements fl, 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 fiP value, the flow rate entering the solenoid valve. Those elements have the following orifice diameter:
3S – 10 Ø D = 1 mm
3S – 20 Ø D = 2 mm
3S – 25 Ø D = 2,5 mm
and are kept sealed on the P port of the valve by an OR fi of 9,25x1,78 mm sizes (example OR 110 – 2037).



11 VERSION “ZN”: ZINC NICHEL PLATED

Solenoid valves according to “ZN” version have central body nichel trivalent plated and protected against every type of corrosion due to saline ambiance or other aggressive chemicals. Zinc thickness are on the valve body: 10-15 µm.

12 VERSION S1/S4: EXPLOSION PROOF POSITION SENSORS

Solenoid valves with spool position sensors are equipped with a proximity sensor able to transform the spool position into an electric signal. It can be used with directional control valves with one or two solenoids. It’s possible to have the two different versions, normally open and normally closed sensor. This option is mandatory in “safe” application, where an electric signal of positive valves spool (displacement) position is needed. In both S1 and S4 version each coil han one sensor applied; this means that with bistable valves sensors are applied on both sides. For different versions ask our sales department.

ATEX

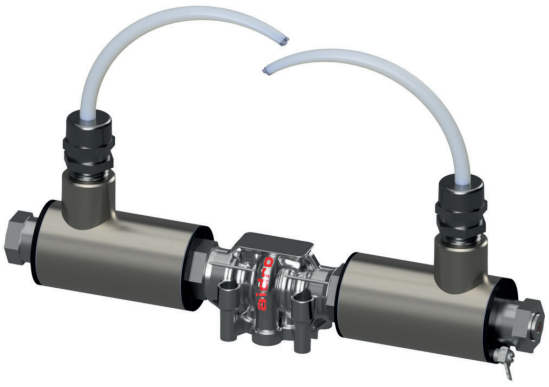
STAINLESS STEEL DIRECTIONAL CONTROL VALVES– CETOP 03 Ex proof II 2 GD, Ex db IIC T5 Gb, Ex tb IIIC T100 C Db IP66/67

HD3-AMEX/25

40 l/min 25 MPa (250 bar)

1 DESCRIPTION

Valves HD3-AMEX/25 are ATEX directional control valve solenoid operated with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03).
The design of the body is an high quality five chamber type. The valve is available with ATEX metallic DC and AC solenoids. In the standard version, the valve housing is phosphated for 240 h salt spray protection acc. to ISO 9227 . Enhanced surface protection for specific applications is available (ISO 9227, 520 h salt spray).



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
HD3	-	AMEX	-		-		-		/	25

(1) HD3 : 4-way directional valve Cetop 03 – Pressure 25 Mpa (250 bar)

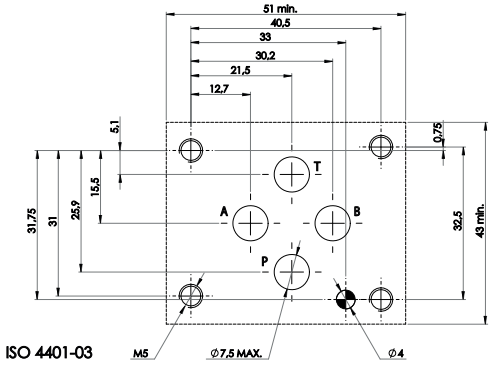
(2) AMEX : electrically controlled, Ex-proof solenoid, stainless steel body

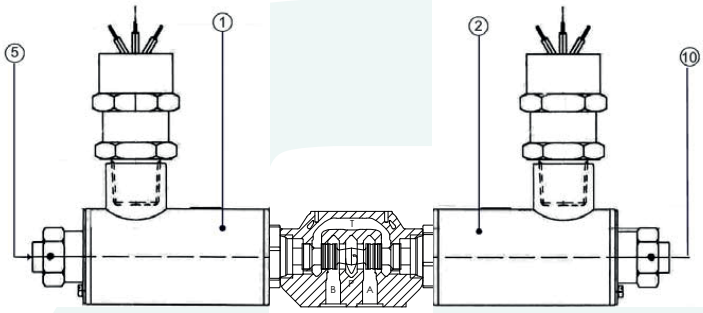
(3) Spool type (see 4):
-number is the main spool type
-letter is the solenoid or spring arrangement:
C : 2 solenoids spool is spring centered (3 position)
N : 2 solenoids spool is detented (2 position) see 9
LL : 1 solenoid (a), spool is spring offset (2 position, end to end)
ML: 1 solenoid (a), spool is spring offset (2 position, middle to end)
LM: 1 solenoid (a), spool is spring offset (2 position, end to middle)
b: only for LL, ML, LM sol. b installed (instead of sol. a)

(4) Code reserved for option and variants

(5) Electric voltage and solenoid coils
012C: coil(s) for V12DC
024C: coil(s) for V24DC
110A: coil(s) for V110/50 – V115/60 AC
230A: coil(s) for V220/50 – V230/60 AC

(6) Design number of the valves Atex solenoid for G and D





The spool shifts into the valve body subject to the action of springs and solenoids 2. Spool, depending from its shape and its position in the valve body, opens and/ or closes passages between P, A, B and T ports, thus controlling the direction of the hydraulic flow.

3 TECHNICAL DATA

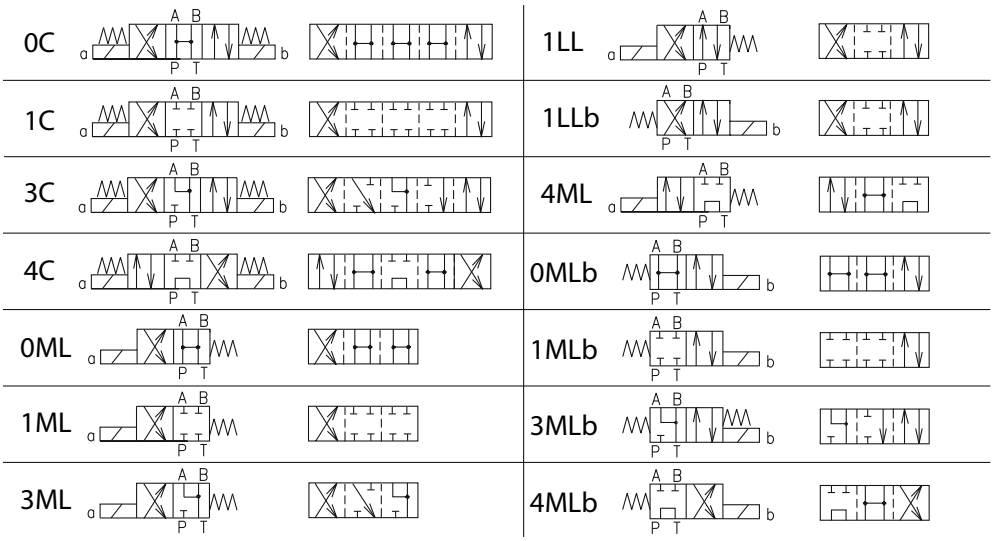
Nominal flow	32 l/min
Maximum rec. flow rate	40 l/min
Maximum nominal pressure (P,A,B)	25 MPa (250 bar)
Maximum pressure at T port	25 MPa (250 bar)
Pressure drops	See 5
Protection to DIN 40050	IP 67
Duty cycle	100%
Service life	> 10^7 cycles
Dimensions and Installation	see 6
Mass	Approx 2,6 / 3,7 kg

Electric Characteristics:

Valves type HD3-AMEX-* are operated by solenoid that are energized:
- directly from a D.C. voltage supply:
  V 12 DC = 012 C V 24 DC = 024 C
- by the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply:
  V 110/50-V 115/60 = 110 A V 220/50-V 230/60 = 230 A

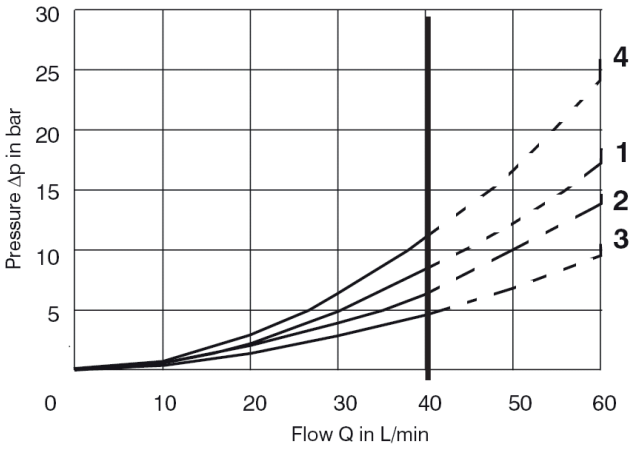
Other voltages are available.
Permissible supply voltage variation: + 5%.
Ex-proof solenoid according to ATEX 94/9/EC, Ex II 2GD, class Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67see 7
Power consumption: max 11 w.
Currents are, at nominal voltage and at 25°C:
V12DC = 0,92A V115AC = approx 0,1A V24DC = 0,46A V230AC = approx 0,05A

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



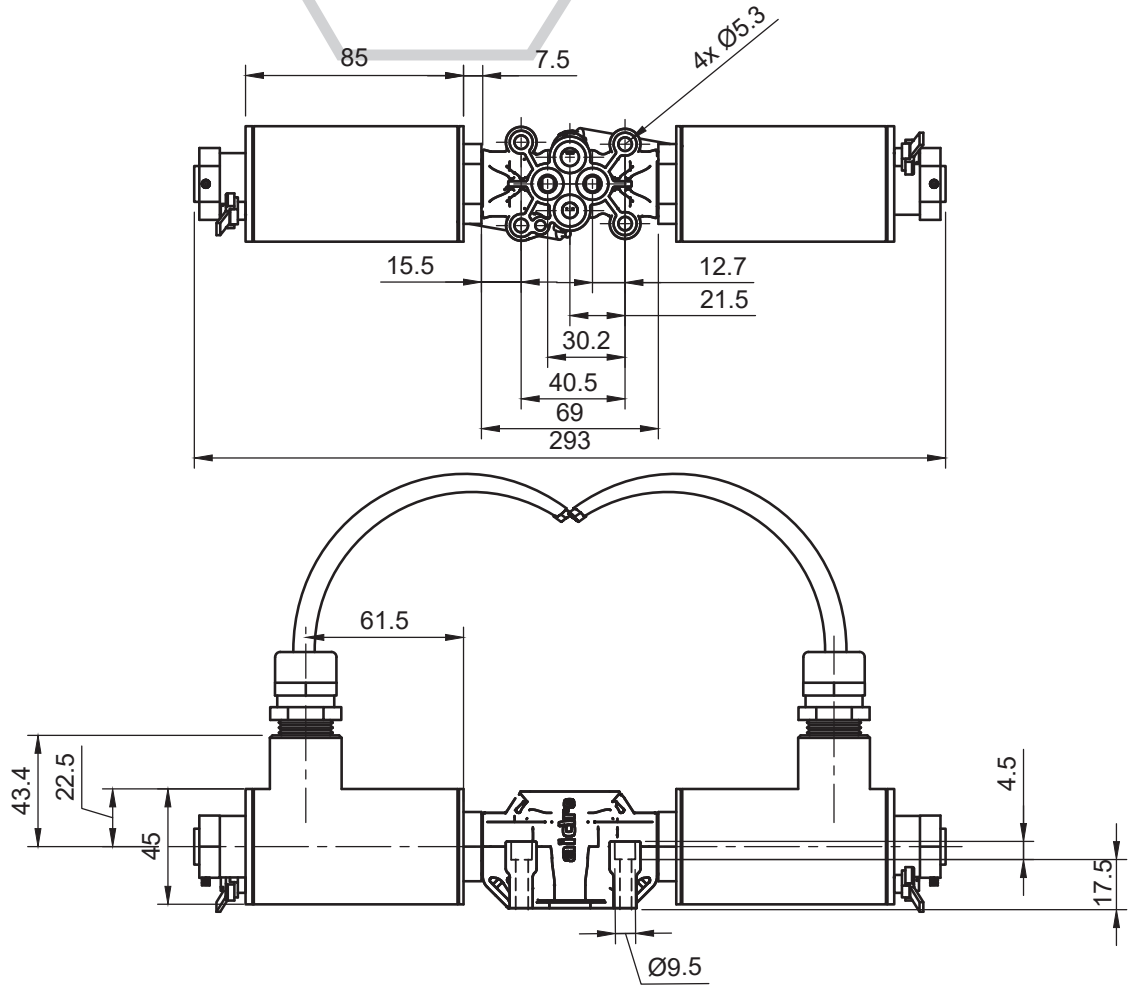
Spools, springs and solenoids combinatio permit to obtain almost every type of ports (P, A, B, T) connection and sequence. For almost all types of solenoids/springs combination and for all type of spools (with the exceptions of spool 4), when solenoid “a” is energized, hydraulic connections are P-> B 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.

5 TYPICAL DIAGRAMS

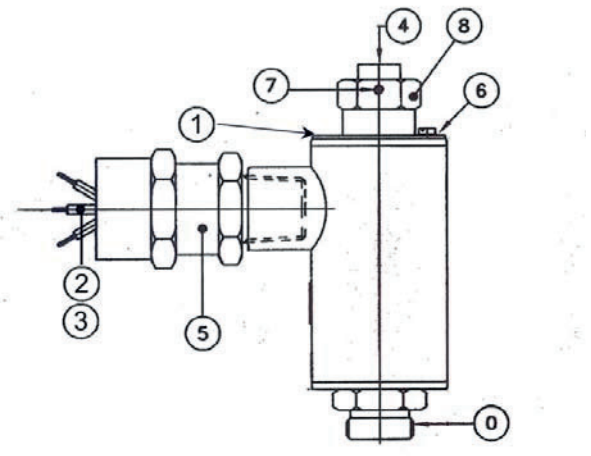


	P-A	P-B	A-T	B-T	P-T
1C	2	2	2	2	-
4C	4	4	4	4	2
0C	2	2	3	3	2
3C	2	2	3	3	-
1LL	3	3	4	4	-
1LLb	3	3	4	4	-
1ML	-	2	2	-	-
4ML	4	-	-	4	2
0ML	2	-	-	3	2
3ML	2	-	-	2	-

6 INSTALLATION DIMENSION



7 EXPLOSION PROOF SOLENOID GMA-6/HD SERIES 271 GD



0: Ex proof solenoid according to ATEX 94/9/EC.
II 2GD Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67.
Solenoid outside surfaces are zinc-nickel plated, with 7µm minimum thickness
1: Solenoid label indicates supply voltage, protection class Ex d, certification number by INERIS and maximum absorbed power.
2: 3-wires cable, according to CEI 20-22, of standard length of 3 m, is fastened to the coil and locked by cable gland.
3: Wires have 1,5 mm^2 section; earth connection wire is green-yellow.
Electric connection must be in accordance with Ex-proof norm ATEX.
4: Manual override operation is by pushing the extended pin.
5: Normalised cable gland –torque 8 Nm ± 1 – device has threaded attachment ½" conical – ISO 7/1
6: Earth connection screw
7: Threaded plug (socket hexagon 1,5 mm)to lock the retaining coil nut
8: Nut for retaining the coil –torque 6 Nm ± 1 – hexagon 24 mm.

Conformity of unit to the norms is not granted if coil is used separately from its electromagnetic tube.

Atex Certificates :
INERIS 05ATEX0028X/02 for Gas and Dust

ATEX

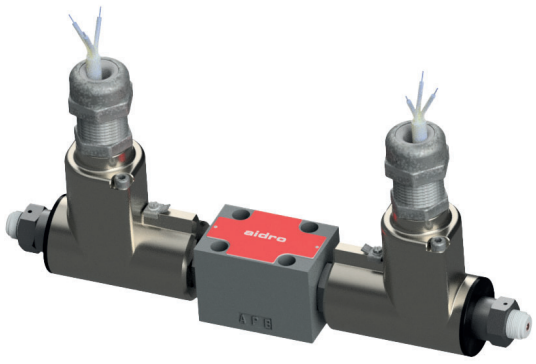
DIRECTIONAL CONTROL VALVES– CETOP 03 proof II 2 GD, Ex db IIC T5 Gb, Ex tb IIIC T100 C Db IP66/67

HD3-EX/30

50 l/min 35 MPa (350 bar)

1 DESCRIPTION

Valves HD3-EX/30 are ATEX directional control valve solenoid operated with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03).
The design of the body is an high quality five chamber casting. The valve is available with ATEX metallic DC and AC solenoids. In the standard version, the valve housing is phosphated for 240 h salt spray protection acc. to ISO 9227 . Enhanced surface protection for specific applications is available (ISO 9227, 520 h salt spray).
Ex-proof solenoids are zinc-nickel coated.



2 ORDERING CODE

(1)		(2)		(3)	(4)		(5)		(6)		(7)	(8)		(9)
HD3	-	EX	-			-		-		-			/	

(1) HD3 : 4-way directional valve Cetop 03 – Pressure 35 Mpa (350 bar)

(2) EX : electrically controlled, Ex-proof solenoid

(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)
N : 2 solenoids spool is detented (2 position) see 9
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) b: only for LL, ML, LM sol. b installed (instead of sol. a)

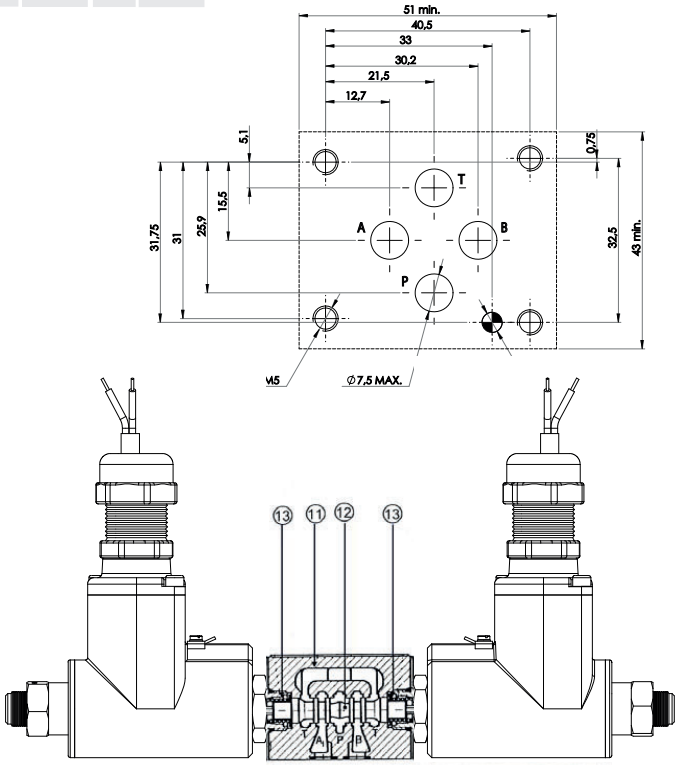
(5) Code reserved for option and variants
3S-**: calibrated orifice on P port, see 10
ZN: zinc-nickel plated valve, see 11

(6) Cable and cable glands options:
no designation: with cable and cable gland

(7) Electric voltage and solenoid coils
012C: coil(s) for V12DC
024C: coil(s) for V24DC
110A: coil(s) for V110/50 – V115/60 AC
230A: coil(s) for V220/50 – V230/60 AC

(8) Cable length options:
-no designation: 3m (standard)
-6: 6m
-10: 10m
-16: 16m
-20: 20m
-25:25m

(9) Design number of the valves Atex solenoid for G and D with detachable cable gland

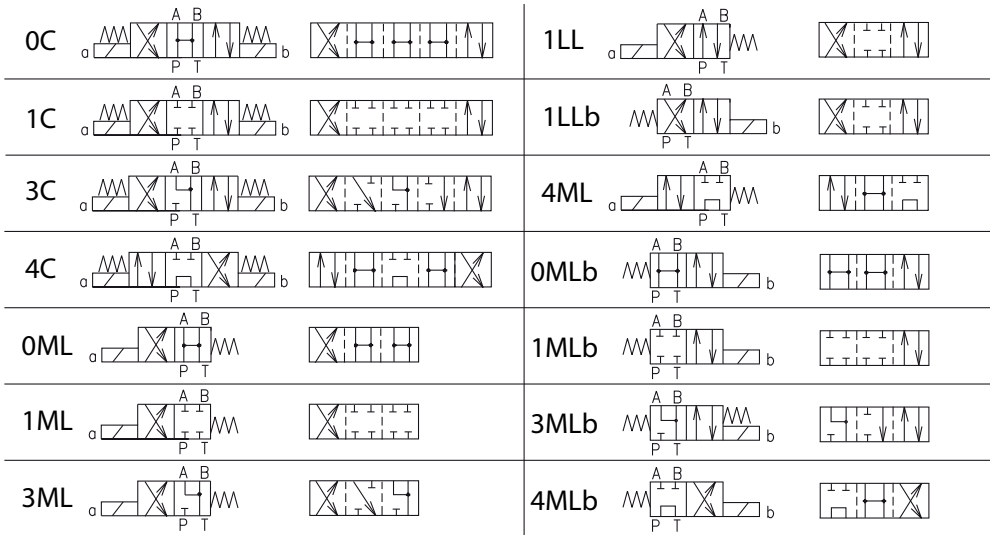


The spool 12 shifts into the valve body 11 subject to the action of springs 13 and solenoids 2. Spool 12, depending from its shape and its position in the valve body, opens and/ or closes passages between P, A, B and T ports, thus controlling the direction of the hydraulic flow.

3 TECHNICAL DATA

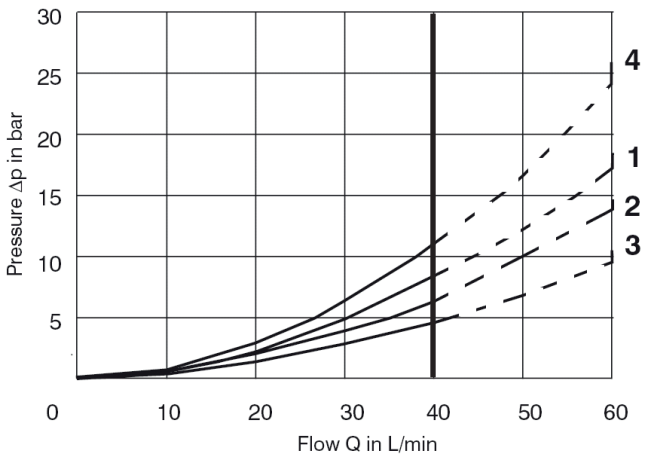
Nominal flow	32 l/min	Electric Characteristics:
Maximum rec. flow rate	40 l/min	Valves type HD3-EX-* are operated by solenoid that are energized: • directly from a D.C. voltage supply: V 12 DC = 012 C V 24 DC = 024 C • by the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply: V 110/50-V 115/60 = 110 A V 220/50-V 230/60 = 230 A Other voltages are available. Permissible supply voltage variation: + 5%. Ex-proof solenoid according to ATEX 94/9/EC, Ⓔx II 2GD, Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67 – see 7 Power consumption: max 11 w. Currents are, at nominal voltage and at 25°C: V12DC = 0,92A V115AC = approx 0,1A V24DC = 0,46A V230AC = approx 0,05A
Maximum nominal pressure (P,A,B)	32 MPa (320 bar)	
Maximum pressure at T port	32 MPa (320 bar)	
Pressure drops	See 5	
Protection to DIN 40050	IP 67	
Duty cycle	100%	
Service life	≥ 10^7 cycles	
Dimensions and Installation	see 6	
Mass	Approx 2,6 / 3,7 kg	

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



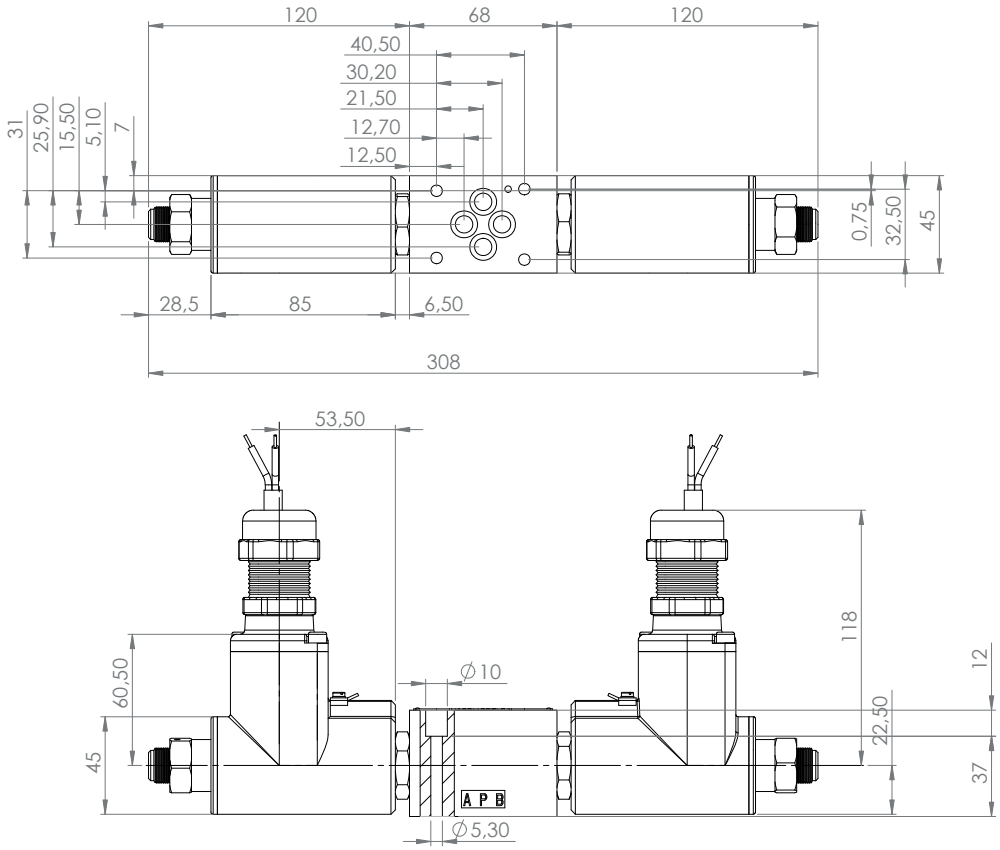
Spools, springs and solenoids combinatio permit to obtain almost every type of ports (P, A, B, T) connection and sequence. For almost all types of solenoids/springs combination and for all type of spools (with the exceptions of spool 4), when solenoid “a” is energized, hydraulic connections are P-> B 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.

5 TYPICAL DIAGRAMS



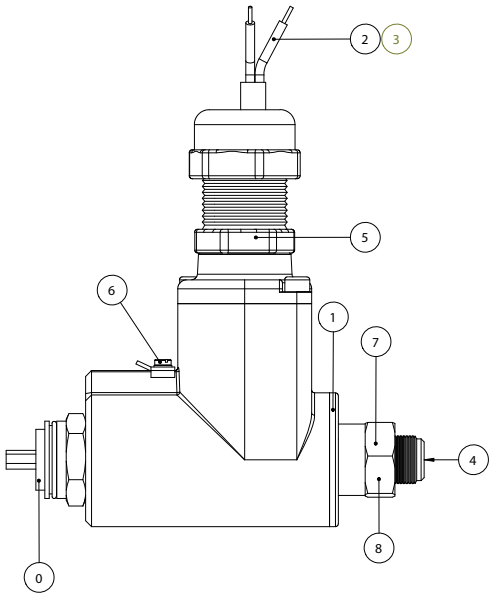
	P-A	P-B	A-T	B-T	P-T
1C	2	2	2	2	-
4C	4	4	4	4	2
0C	2	2	3	3	2
3C	2	2	3	3	-
1LL	3	3	4	4	-
1LLb	3	3	4	4	-
1ML	-	2	2	-	-
4ML	4	-	-	4	2
0ML	2	-	-	3	2
3ML	2	-	-	2	-

6 INSTALLATION DIMENSIONS



All valves HD3-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page) and for valves height. When assembled to its mounting plate valve HD3-* must be fastened with 4 bolts M5 X 45 mm (or M5 x ** 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 9,25x1,68x1,68.

7 EXPLOSION PROOF SOLENOID SERIES 455 GD



Atex Certificates :
EUROFINS EPT 17 ATEX 2768X

0: Ex proof solenoid according to ATEX 2014/34/EU.
II 2GD Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67.
Solenoid outside surfaces are zinc-nickel plated, with 7 µm minimum thickness
1: Solenoid label indicates supply voltage, protection class Ex d, certification number by INERIS and maximum absorbed power.
2: 3-wires cable, according to CEI 20-22, of standard length of 1,5 m, is fastened to the coil and locked by cable gland.
3: Wires have 1,5 mm2 section; earth connection wire is green-yellow.
Electric connection must be in accordance with Ex-proof norm ATEX.
4: Manual override operation is by pushing the extended pin.
5: Normalised cable gland –torque 8 Nm + 1 – device has threaded attachment ½" conical – ISO 7/1
6: Earth connection screw
7: Threaded plug (socket hexagon 1,5 mm)to lock the retaining coil nut
8: Nut for retaining the coil –torque 6 Nm + 1 – hexagon 24 mm.

Conformity of unit to the norms is not granted if coil is used separately from its electromagnetic tube.

8 HYDRAULIC FLUIDS

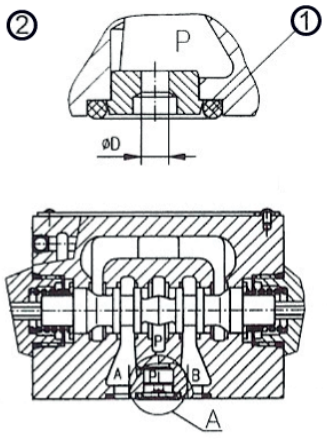
Seals and materials used on standard valves HD3-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and anti-oxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from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

9 VERSION “N”: MECHANICAL DETENT ON SPOOL

Solenoid valves with detent typically are 2 position, 2 solenoid, nospring valve where the spool is kept at the extreme ends of its stroke by a mechanical device. This permits that solenoids are energized by short time current pulses and that the spool remains at its position regardless of forces due to hydrodynamics or gravitational/inertial effects (vibrations).

10 VERSION “3S*”: CALIBRATED ORIFICE ON P PORT

Option “3S*” is rappresented by elements fl, 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 fiP value, the flow rate entering the solenoid valve. Those elements have the following orifice diameter:
3S – 10 fl Ø D = 1 mm
3S – 20 fl Ø D = 2 mm
3S – 25 fl Ø D = 2,5 mm
and are kept sealed on the P port of the valve by an OR fi of 9,25x1,78 mm sizes (example OR 110 – 2037).



11 VERSION “ZN”: ANTICORROSION OPTION

Solenoid valves according to “ZN” version have central body zinc-nickel plated and protected against every type of corrosion due to saline ambiance or other aggressive chemicals. Zinc thickness are on the valve body: 10-15 µm.

12 VERSION S1/S4: EXPLOSION PROOF POSITION SENSORS

Solenoid valves with spool position sensors are equipped with a proximity sensor able to transform the spool position into an electric signal. It can be used with directional control valves with one or two solenoids. It’s possible to have the two different versions, normally open and normally closed sensor. This option is mandatory in “safe” application, where an electric signal of positive valves spool (displacement) position is needed. In both S1 and S4 version each coil han one sensor applied; this means that with bistable valves sensors are applied on both sides. For different versions ask our sales department.

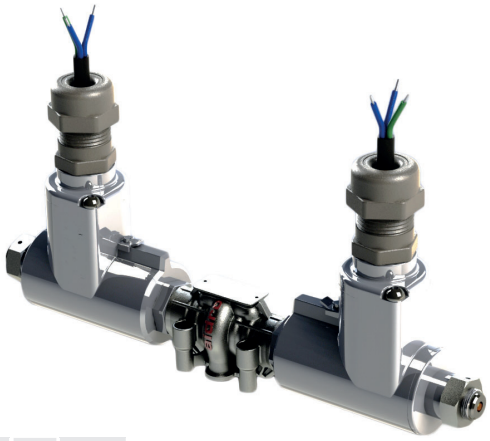
STAINLESS STEEL DIRECTIONAL CONTROL VALVES– CETOP 03 proof II 2 GD, Ex db IIC T5 Gb, Ex tb IIIC T100 C Db IP66/67

HD3-AMEX/30

50 l/min 35 MPa (350 bar)

1 DESCRIPTION

Valves HD3-AMEX/30 are ATEX directional control valve solenoid operated with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03) with stainless steel body .
The design of the body is optimized with metal 3D printing process.
The valve is available with ATEX metallic DC and AC solenoids.



2 ORDERING CODE

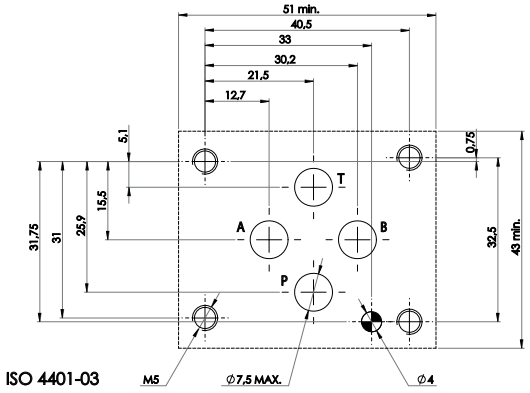
(1)		(2)		(3)	(4)		(5)		(6)		(7)		(8)		(9)
HD3	-	AMEX	-			-		-		-		-		/	30

(1) HD3 : 4-way directional valve Cetop 03 – Pressure 35 MPa (350 bar)

(2) AMEX : electrically controlled, Ex-proof solenoid, stainless steel body

(3) Spool type body (see 4):
-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 spool is detented (2 position) see 9
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) b: only for LL, ML, LM sol. b installed (instead of sol. a)



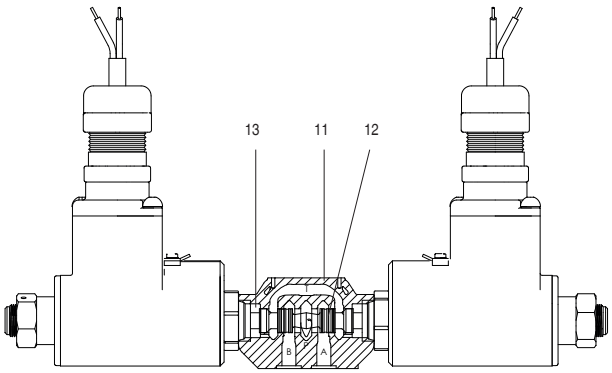
(5) Code reserved for option and variants
3S-**: calibrated orifice on P port, see 10

(6) Cable and cable gland options:
No designation: with cable and cable gland

(7) Electric voltage and solenoid coils
012C: coil(s) for V12DC
024C: coil(s) for V24DC
110A: coil(s) for V110/50 – V115/60 AC
230A: coil(s) for V220/50 – V230/60 AC

(8) Cable length options:
-no designation: 3m (standard)
-6: 6m
-10: 10m
-16: 16m
-20: 20m
-25: 25m

(9) Design number of the valves Atex solenoid for G and D



The spool 12 shifts into the valve body 11 subject to the action of springs 13 and solenoids 2. Spool 12, depending from its shape and its position in the valve body, opens and/ or closes passages between P, A, B and T ports, thus controlling the direction of the hydraulic flow.

3 TECHNICAL DATA

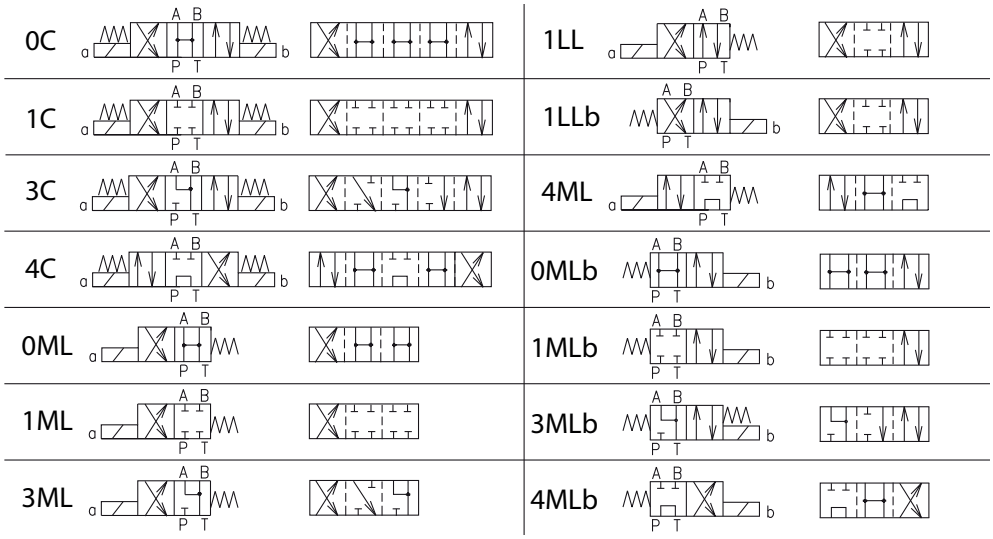
Nominal flow	32 l/min
Maximum rec. flow rate	50 l/min
Maximum nominal pressure (P,A,B)	35 MPa (350 bar)
Maximum pressure at T port	35 MPa (350 bar)
Pressure drops	See 5
Protection to DIN 40050	IP 67
Duty cycle	100%
Service life	≥ 10^7 cycles
Dimensions and Installation	see 6
Mass	Approx 2,6 / 3,7 kg

Electric Characteristics:

Valves type HD3-EX-* are operated by solenoid that are energized:
- directly from a D.C. voltage supply:
  V 12 DC = 012 C
  V 24 DC = 024 C
- by the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply:
  V 110/50-V 115/60 = 110 A
  V 220/50-V 230/60 = 230 A

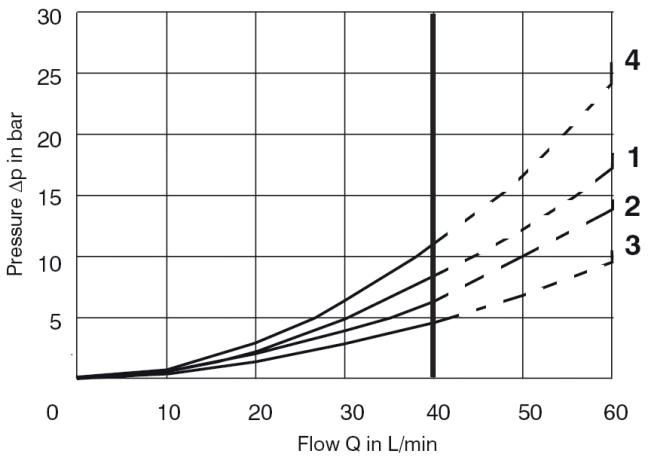
Other voltages are available.
Permissible supply voltage variation: + 5%.
Ex-proof solenoid according to ATEX 2014/34/EU, Ex II 2GD, class Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67– see 7
Power consumption: max 11 w.
Currents are, at nominal voltage and at 25°C:
V12DC = 0,92A V115AC = approx 0,1A
V24DC = 0,46A V230AC = approx 0,05A
Ex db IIC T5 Gb and Ex tb IIIC T100 C Db

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



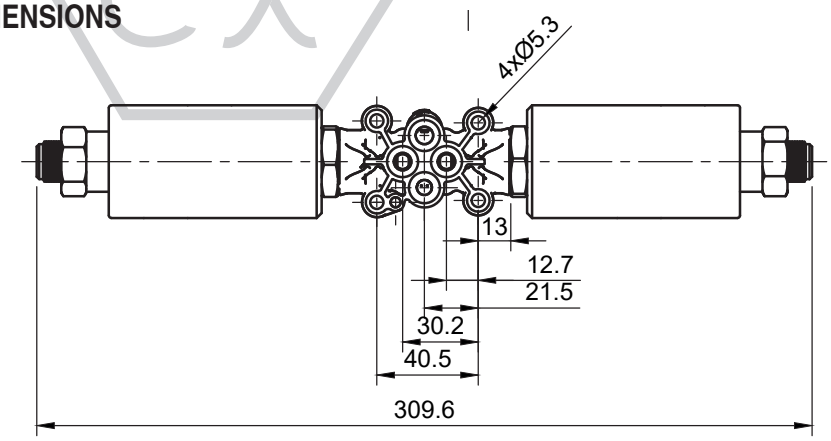
Spools, springs and solenoids combinatio permit to obtain almost every type of ports (P, A, B, T) connection and sequence. For almost all types of solenoids/springs combination and for all type of spools (with the exceptions of spool 4), when solenoid “a” is energized, hydraulic connections are P-> B 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.

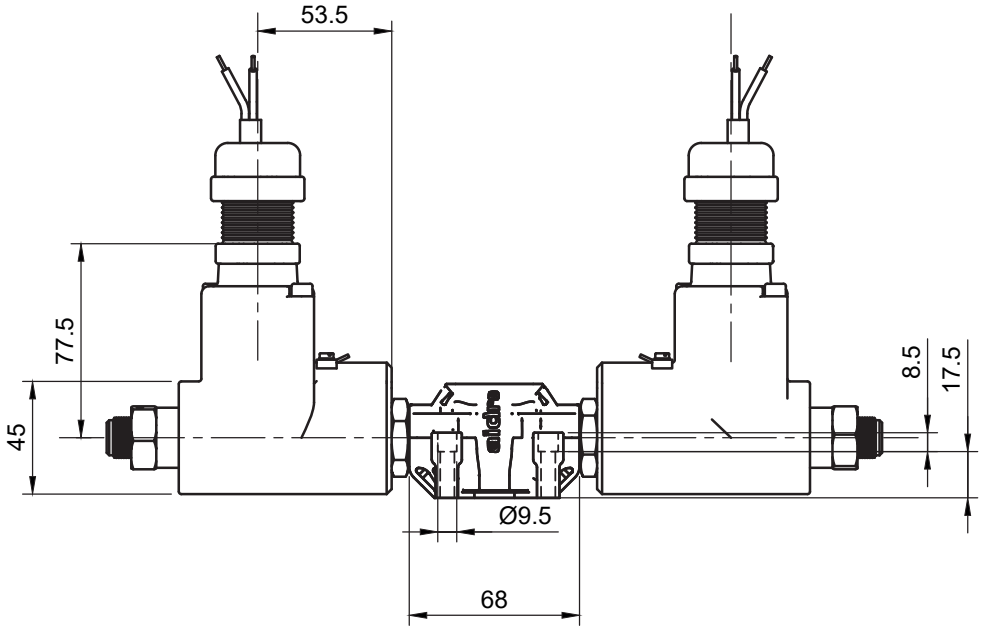
5 TYPICAL DIAGRAMS



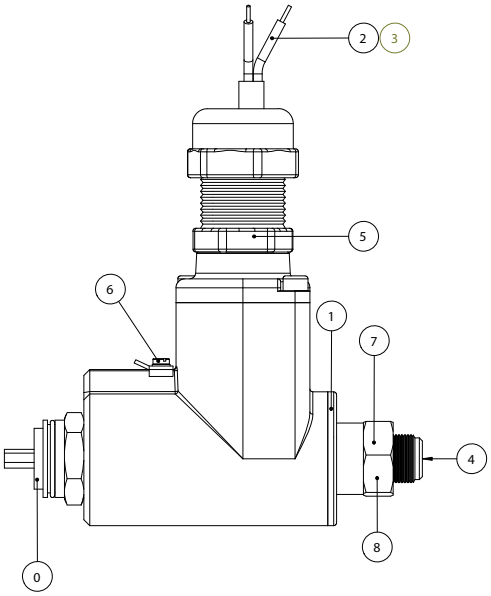
	P-A	P-B	A-T	B-T	P-T
1C	2	2	2	2	-
4C	4	4	4	4	2
0C	2	2	3	3	2
3C	2	2	3	3	-
1LL	3	3	4	4	-
1LLb	3	3	4	4	-
1ML	-	2	2	-	-
4ML	4	-	-	4	2
0ML	2	-	-	3	2
3ML	2	-	-	2	-

6 INSTALLATION DIMENSIONS





7 EXPLOSION PROOF SOLENOID SERIES 455 GD



0: Ex proof solenoid according to ATEX 2014/34/EU.
II 2GD Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67.
Solenoid outside surfaces are zinc-nickel plated, with 7 µm minimum thickness
1: Solenoid label indicates supply voltage, protection class Ex d, certification number by INERIS and maximum absorbed power.
2: 3-wires cable, according to CEI 20-22, of standard length of 1,5 m, is fastened to the coil and locked by cable gland.
3: Wires have 1,5 mm2 section; earth connection wire is green-yellow.
Electric connection must be in accordance with Ex-proof norm ATEX.
4: Manual override operation is by pushing the extended pin.
5: Normalised cable gland –torque 8 Nm + 1 – device has threaded attachment ½" conical – ISO 7/1
6: Earth connection screw
7: Threaded plug (socket hexagon 1,5 mm)to lock the retaining coil nut
8: Nut for retaining the coil –torque 6 Nm + 1 – hexagon 24 mm.

Conformity of unit to the norms is not granted if coil is used separately from its electromagnetic tube.

Atex Certificates :
EUROFINS EPT 17 ATEX 2768X

HYDRAULIC SCREW-IN VALVES ⟨Ex⟩ proof II 2 GD, Ex db IIC T5 Gb & Ex tb IIIC T100 C Db

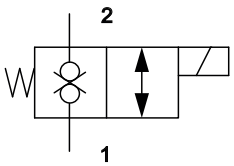
EVX-*-C5/25

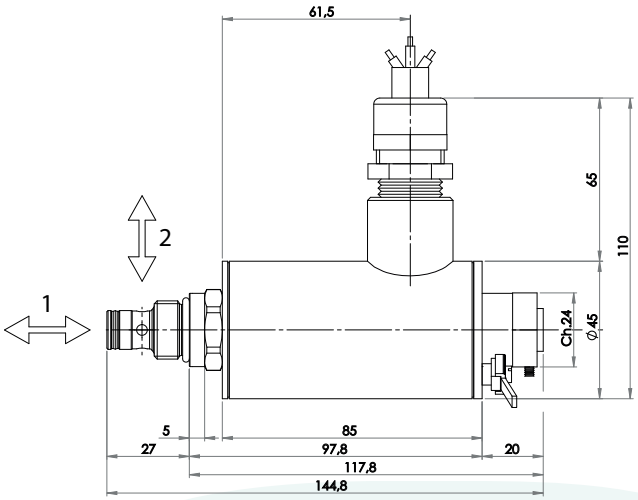
25 l/min 25 MPa (250 bar)

1 DESCRIPTION

Valves EVX-*-C5 are ATEX directional control valve in cartridge style poppet type. It is suitable for 2 way metric cavity M22 x 1,5 or cavity SAE 08 . The valve is available with ATEX metallic DC and AC solenoids. The coil is Zinc-nichel coated for an enhanced surface protection (ISO 9227, 520 h salt spray).
Protection according to IEC 144: Class IP67- External surfaces zinc-nickel coated (min. thickness 7 micron)
Connection: 3,5 mm^2 wire cable (CEI 20-22), length 3 m already connected to coil. Electrical connection must be accordance to Ex-proof norm ATEX. Earth connection both internal, with yellow-green wire in the cable,and external with a minimum 4mm^2 cable fastened to earth screw.







2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
EVX	-		-	C5	-		-		/	25

(1) EVX: Ex-proof solenoid operated screw-in poppet valve

(2) Size:
06: metric cavity M22x1,5 See 5
34: SAE 08 cavity 3/4" 16 UNF See 5

(3) C5: two way type

(4) Coils:
012C: 12V DC-0,92A
024C: 24V DC-0,46A
115A: 115V AC-0,10A
230A: 230V AC-0,05A

(5) Cable lenght :
no designation: standard 3m cable
5: 5m
10: 10m
16: 16m
20: 20m

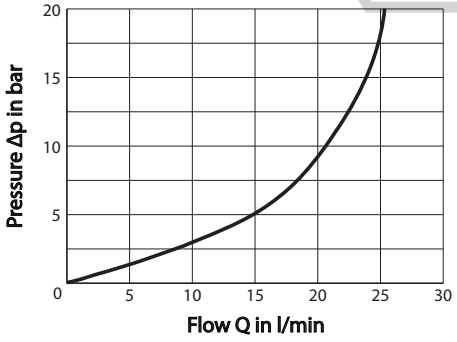
(6) /25: Design number of the valves Atex solenoid for G and D

3 TECHNICAL DATA

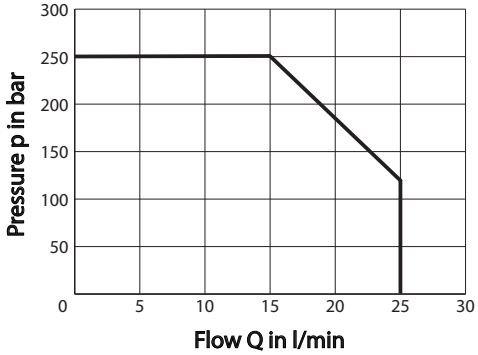
Suitable for standard cavity:	M22 x 1,5 or SAE 08
Solenoids according to ATEX 94/9/CE and conform to EN 50281-1-1	
ATEX code/class:	II 2 GD Ex d III C T5
Certificate:	INERIS 05ATEX0028X/02
Max. operating pressure:	250 bar
Max. flow rate:	25 l/min
Duty cycle:	100%
Materials:	Steel body, poppet in tempered and grinded steel
Mass	1,40 kg (coil included)

4 TYPICAL DIAGRAMS

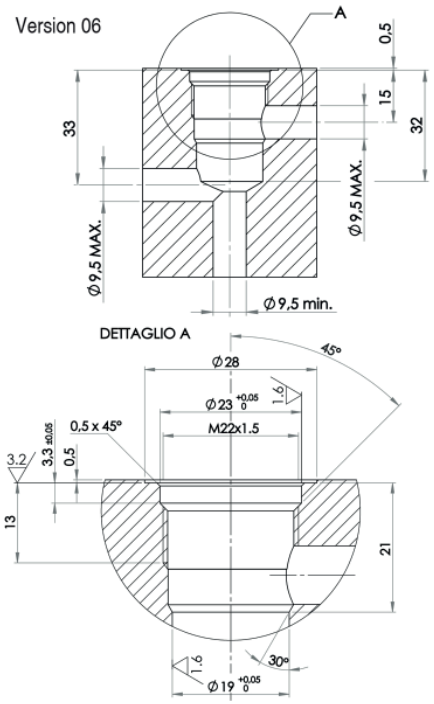
Typical Δp-Q curves for valves EVX-*-C5 in standard configuration, with mineral oil at 26 cSt and 50 °C

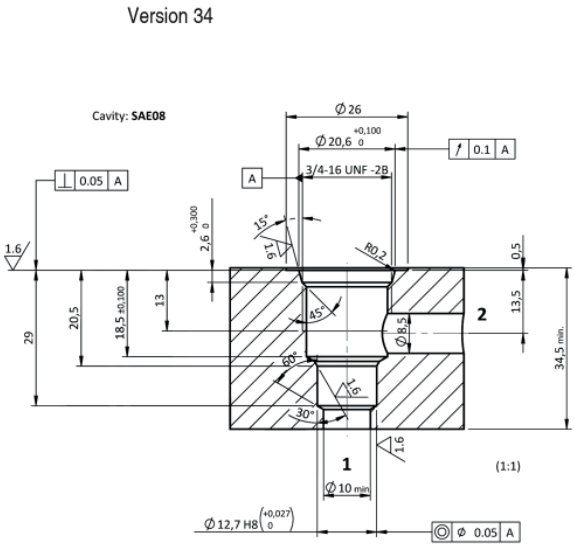


Typical p-Q curves of operating limits for maximum hydraulic power transferred by valves EVX-*-C5

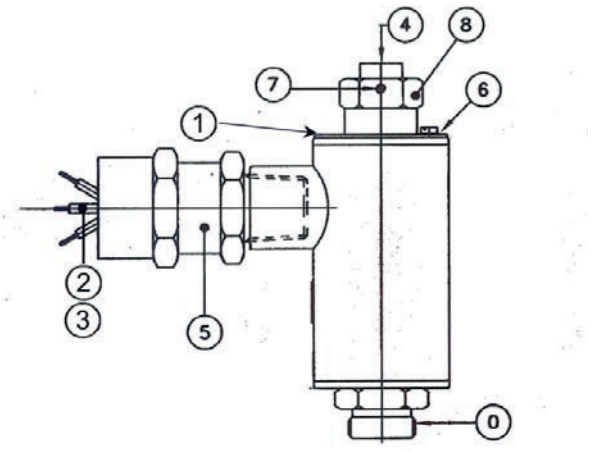


5 INSTALLATION DIMENSIONS (mm)





6 EXPLOSION PROOF SOLENOID GMA-6/HD SERIES 271 GD



Atex Certificates :
INERIS 05ATEX0028X/02 for Gas and Dust

0: Ex proof solenoid according to ATEX 94/9/EC.
II 2GD Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67.
Solenoid outside surfaces are zinc-nickel plated, with 7µm minimum thickness
1: Solenoid label indicates supply voltage, protection class Ex d, certification number by INERIS and maximum absorbed power.
2: 3-wires cable, according to CEI 20-22, of standard length of 3 m, is fastened to the coil and locked by cable gland.
3: Wires have 1,5 mm² section; earth connection wire is green-yellow.
Electric connection must be in accordance with Ex-proof norm ATEX.
4: Manual override operation is by pushing the extended pin.
5: Normalised cable gland –torque 8 Nm ± 1 – device has threaded attachment ½" conical – ISO 7/1
6: Earth connection screw
7: Threaded plug (socket hexagon 1,5 mm)to lock the retaining coil nut
8: Nut for retaining the coil –torque 6 Nm ± 1 – hexagon 24 mm.

Conformity of unit to the norms is not granted if coil is used separately from its electromagnetic tube.

HYDRAULIC SCREW-IN VALVES Ex proof II 2 GD, Ex db IIC T5 Gb, Ex tb IIIC T100 C Db IP66/67

EVX-06-D5

25 l/min 25 MPa (250 bar)

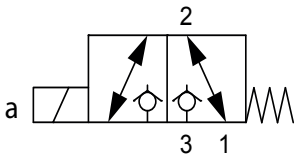
1 DESCRIPTION

Valves EVX-06-D5 are ATEX directional control valve in cartridge style poppet type. It is suitable for a 3 way metric cavity M22 x 1,5.
The valve is available with ATEX metallic DC and AC solenoids. The coil is Zinc-nichel coated for an enhanced surface protection (ISO 9227, 520 h salt spray).Protection according to IEC 144: Class IP67- External surfaces nickel coated (min. thickness 7 micorn)
Connection: 3X1,5mm² wire cable (CEI 20-22), length 3 m already connected to coil. Electrical connection must be accordance to Ex-proof norm ATEX. Earth connection both internal, with yellow-green wire in the cable, and external with a minimum 4mm² cablefastened to earth screw.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
EVX	-	06	-	D5	-		-		/	25



(1) EVX: Ex-proof solenoid operated screw-in poppet valve

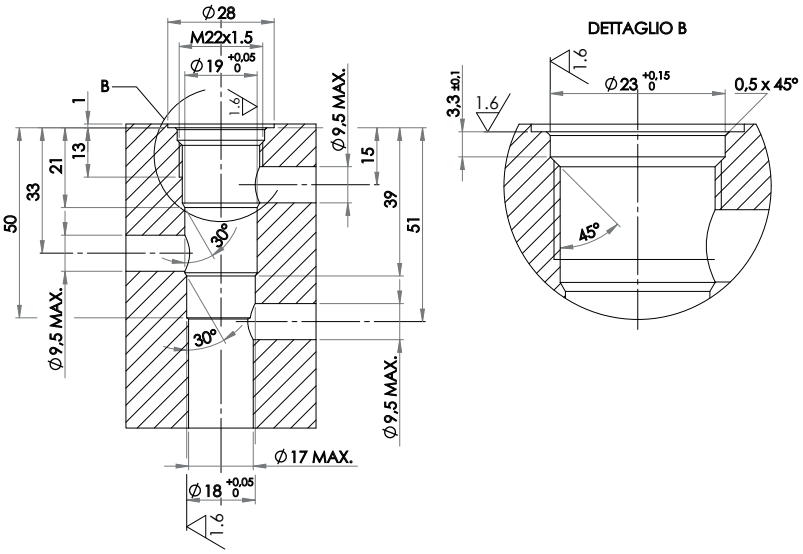
(2) 06: normal port size

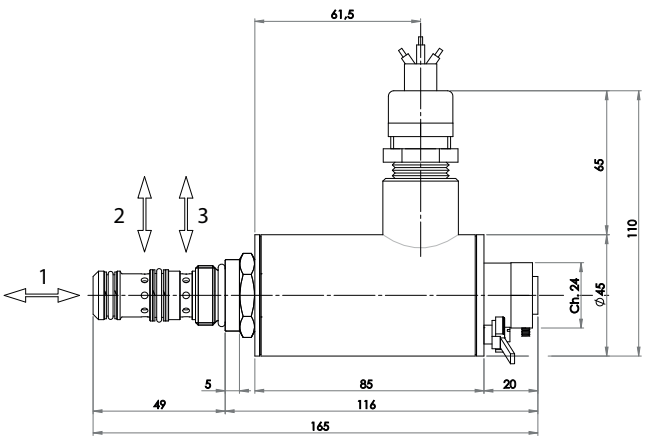
(3) D5: three way type

(4) Coils:
012C: 12V DC-0,92A
024C: 24V DC-0,46A
115A: 115V AC-0,10A
230A: 230V AC-0,05A

(5) Lenght cable :
no designation: standard 3 m cable
5: 5m
10: 10m
16: 16m
20: 20m

(6) /25: Design number of the valves Atex solenoid for G and D



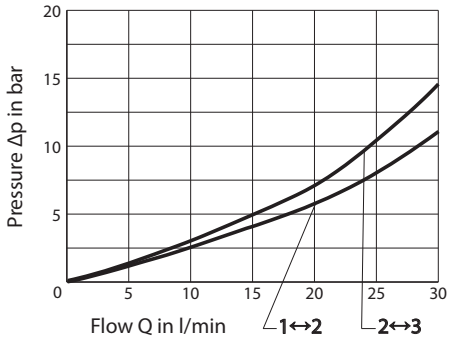


3 TECHNICAL DATA

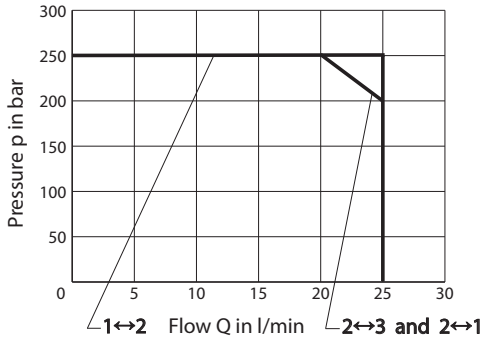
Suitable for standard cavity:	M22 x 1,5
Solenoids according to ATEX 94/9/CE and conform to EN 50281-1-1 EN 60079-0:2012/A11:2013 EN 60079-1:2014 EN 60079-31:2014	
ATEX code/class:	II 2 GD Ex db T5 Gb & Ex tb T 100 C° Db
Certificate:	INERIS 05ATEX0028X/01 (on request)
Max. operating pressure:	250 bar
Max. flow rate:	25 l/min
Duty cycle:	100%
Materials:	Steel body, poppet in tempered and grinded steel
Mass	1,45 kg (coil included)

4 TYPICAL DIAGRAMS

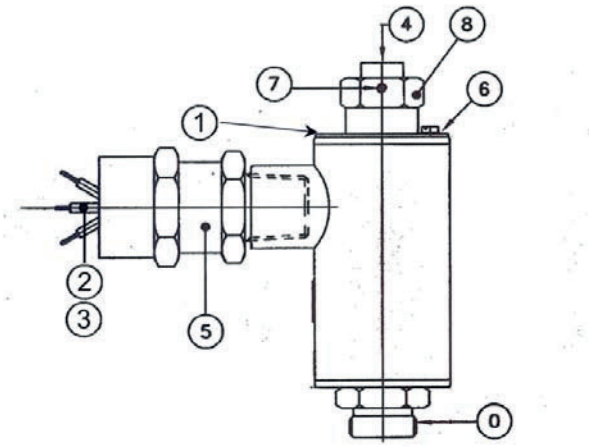
Typical Δp-Q curves for valves EVX-06-D5 in standard configuration, with mineral oil at 26cSt and 50 °C



Typical p-Q curves of operating limits for maximum hydraulic power transferred by valves EVX-06-D5. Input voltage 10% less than nominal rate.



5 EXPLOSION PROOF SOLENOID GMA-6/HD SERIES 271 GD



Atex Certificates :
INERIS 05ATEX0028X/02 for Gas and Dust

0: Ex proof solenoid according to ATEX 94/9/EC.
II 2GD Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67.
Solenoid outside surfaces are zinc-nickel plated, with 7µm minimum thickness
1: Solenoid label indicates supply voltage, protection class Ex d, certification number by INERIS and maximum absorbed power.
2: 3-wires cable, according to CEI 20-22, of standard length of 3 m, is fastened to the coil and locked by cable gland.
3: Wires have 1,5 mm^2 section; earth connection wire is green-yellow.
Electric connection must be in accordance with Ex-proof norm ATEX.
4: Manual override operation is by pushing the extended pin.
5: Normalised cable gland –torque 8 Nm ± 1 – device has threaded attachment ½" conical – ISO 7/1
6: Earth connection screw
7: Threaded plug (socket hexagon 1,5 mm)to lock the retaining coil nut
8: Nut for retaining the coil –torque 6 Nm ± 1 – hexagon 24 mm.

Conformity of unit to the norms is not granted if coil is used separately from its electromagnetic tube.

ATEX

HYDRAULIC SREW-IN VALVES PROOF II 2 GD, Ex db IIC T5 Gb and Ex tb IIIC T 100 C Db IP66/67

EVX-34-213*/25

25 l/min 25 MPa (250 bar)

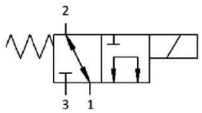
1 DESCRIPTION

Valves EVX-34-213 are ATEX directional control valve in cartridge style poppet type. It is suitable for a 3 way metric cavity 3/4"-16 UNF.
The valve is available with ATEX metallic DC and AC solenoids. The coil is zinc-nichel coated for an enhanced surface protection (ISO 9227, 520 h salt spray).Protection according to IEC 144: Class IP67- External surfaces nickel coated (min. thickness 7 micorn)
Connection: 3X1,5mm^2 wire cable (CEI 20-22). Electrical connection must be accordance to Ex-proof norm ATEX. Earth connection both internal, with yellow-green wire in the cable, and external with a minimum 4mm^2 cable fastened to earth screw.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
EVX	-	34	-	213	-		-		/	25



(1) EVX: Ex-proof solenoid operated screw-in poppet valve

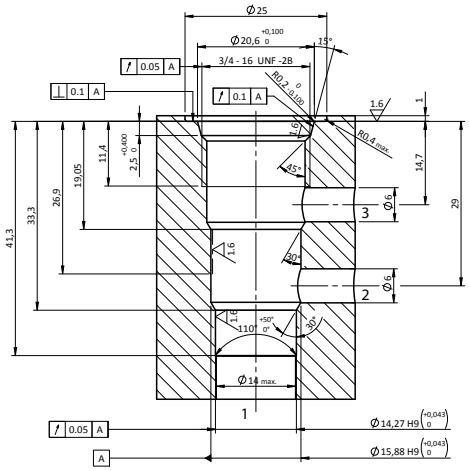
(2) 34: Cavity 3/4-16 UNF

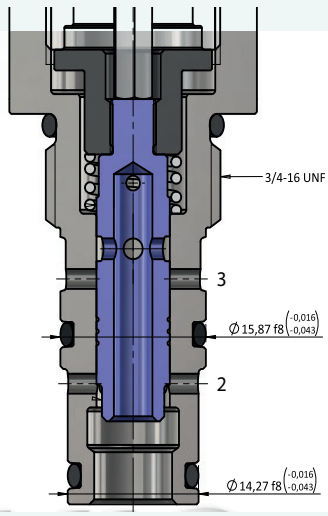
(3) 213: spool type

(4) Coils:
012C: 12V DC-0,92A
024C: 24V DC-0,46A
115A: 115V AC-0,10A
230A: 230V AC-0,05A

(5) cable lenght :
no designation: standard 3m cable
5: 5m
10: 10m
16: 16m
20: 20m

(6) /25: Design number of the valves Atex solenoid for G and D





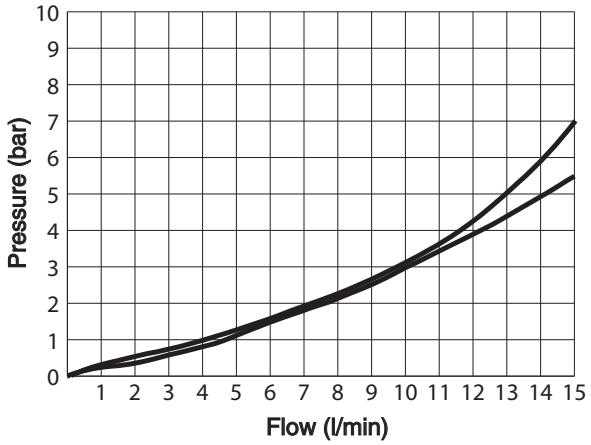
0019

3 TECHNICAL DATA

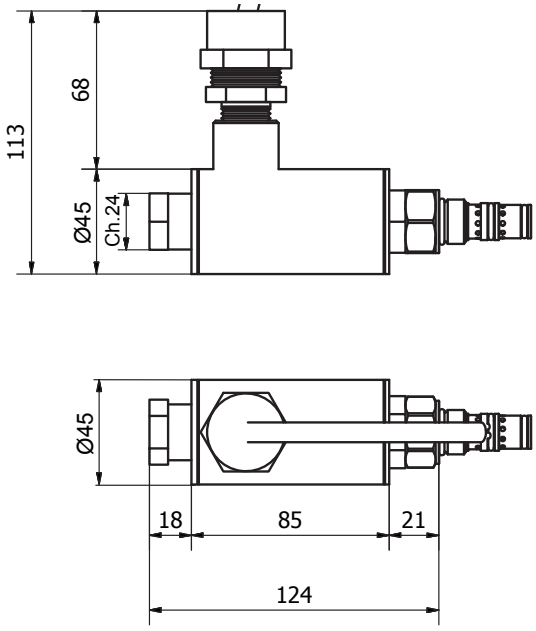
Suitable for standard cavity:	3/4-16 UNF
Solenoids according to ATEX 94/9/CE and conform to EN 50281-1-1; EN 60079-0: 2012/A11:2013; EN 60079-1: 2014; EN 60079-31: 2014	
ATEX code/class:	II 2 GD Ex d IIIC T5
Certificate:	INERIS 05ATEX0028X/01 (on request)
Max. operating pressure:	250 bar
Max. flow rate:	25 l/min
Duty cycle:	100%
Materials:	Steel body, poppet in tempered and grinded steel
Mass	1,45 kg (coil included)

4 TYPICAL DIAGRAMS

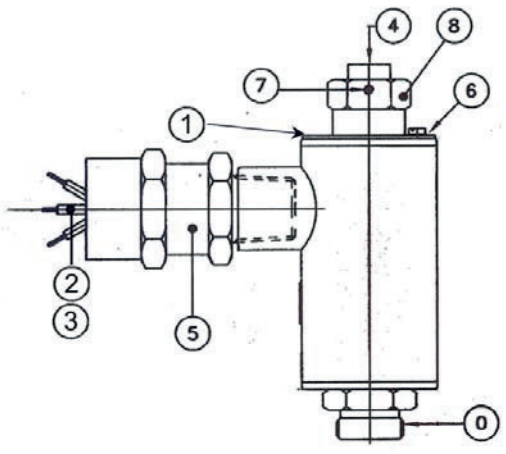
TYPICAL Δp-Q curves for valves EVX-34-213-024C in standard configuration, with mineral oil at 26cSt and 50°C



5 INSTALLATION DIMENSIONS (mm)



6 EXPLOSION PROOF SOLENOID GMA-6/HD SERIES 271 GD



Atex Certificates :
INERIS 05ATEX0028X/02 for Gas and Dust

0: Ex proof solenoid according to ATEX 94/9/EC.
II 2GD Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67.
Solenoid outside surfaces are zinc-nickel plated, with 7 minimum thickness
1: Solenoid label indicates supply voltage, protection class Exd, certification number by INERIS and maximum absorbed power.
2: 3-wires cable, according to CEI 20-22, of standard length of 1,5 m, is fastened to the coil and locked by cable gland.
3: Wires have 1,5 mm2 section; earth connection wire is green-yellow.
Electric connection must be in accordance with Ex-proof norm ATEX.
4: Manual override operation is by pushing the extended pin.
5: Normalised cable gland –torque 8 Nm + 1 – device has threaded attachment ½" conical – ISO 7/1
6: Earth connection screw
7: Threaded plug (socket hexagon 1,5 mm)to lock the retaining coil nut
8: Nut for retaining the coil –torque 6 Nm + 1 – hexagon 24 mm.

Conformity of unit to the norms is not granted if coil is used separately from its electromagnetic tube.

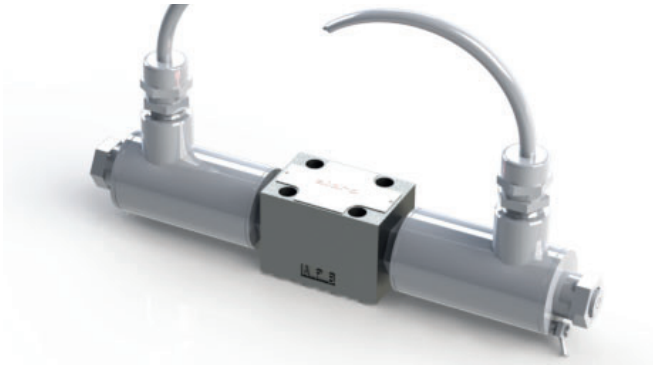
ATEX

PROPORTIONAL 4-WAY CONTROL VALVES Ex - proof II 2 GD, Ex db T5 Gb & Ex tb T100 C Db

HD3-PX-*25

32 l/min 25 MPa (250 bar)

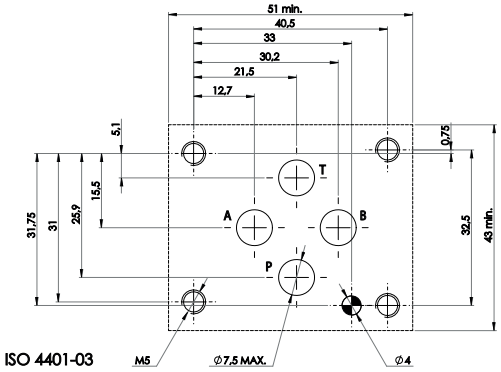
1 DESCRIPTION



Valves HD3-PX are ATEX proportional directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03).
The design of the body is an high quality five chamber casting.
The valve is available with ATEX metallic DC and AC solenoids. In the standard version, the valve housing is phosphated for 240 h salt spray protection acc. to ISO 9227 . Enhanced surface protection for specific applications is available (ISO 9227, 520 h salt spray).

2 ORDERING CODE

(1)		(2)		(3)	(4)		(5)		(6)		(7)
HD3	-	PX	-			-		-		/	25

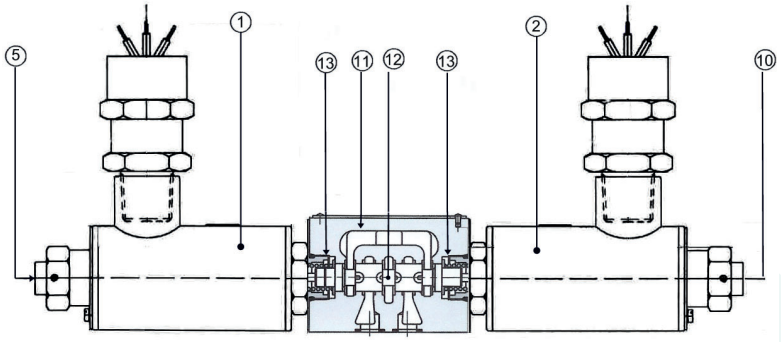


(1) HD3: : 4-way directional valve Cetop 03 – Pressure 25 Mpa (250 bar)

(2) PX : Proportional electric control, Ex-proof solenoid (see 7)

(3) Functional spool type (see 5)
- number:
  1 : closed center (P, A, B, T blocked)
  3 : P blocked, A, B, T connected
- spool nominal flow:
  P : 32 l/min with fiP = 1 Mpa (10 bar) (PA+BT or PB+AT)
  R : 16 l/min with fiP = 1 Mpa (10 bar) (PA+BT or PB+AT)
  05 : 05 l/min with fiP = 1 Mpa (10 bar) (PA+BT or PB+AT)
  D : differential Qb = 2Qa: 32/16 l/min with fiP = 1 Mpa (10 bar)

(4) Solenoids and springs arrangements (see 5)
  C : 2 sol., spool is springs centered
  ML : 1 sol. (“a”) spool is centered + 1 end position
  MLb : 1 sol. (“b”) spool is centered + 1 end position



(5) Options and variants
  ZN : zinc nichel plated valves (see 10)

(6) Type of coil(s) and supply voltages (see 7)
  R2 : standard V12DC (R=11,3 Ωfl)
  R4 : standard V24DC (R=45,3 Ωfl)

(7) Design number (progressive) of the valve.

The spool 12 shifts in to the valves body 11 subject to the action of springs 13 and proportional solenoids 1 and 2. Spool 12, depending from its shape and its position in the valves body 11, opens and/or closes passages between P, A, B, T ports, thus controlling the direction and the rate of the hydraulic flow. Solenoids 1 and 2 and are energized by electric current flowing-in through cables; in case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins, located at the end of the solenoids and accessible through the retaining nuts.

3 TECHNICAL DATA

Nominal flow rates	5, 16, 32 l/min
Maximum nominal pressure (P,A,B)	25 Mpa (250 bar)
Maximum pressure at T port	25 Mpa (250 bar)
Maximum rec. Pressure drops	5 Mpa (50 bar) (see 5)
Protection to DIN 40050	IP 67
Duty cycle	100%
Service life	> 10^7 cycles
Dimensions and installation	(see 8)
Mass	Approx 2,6 / 3,7 kg

Electric characteristics:

Valves type HD3-PX-* are valves operated by Ex-proof proportional solenoids ATEX qualified for class Ex tb IIIC T5 Db IP66/67 & Ex db IIC T5 Gb

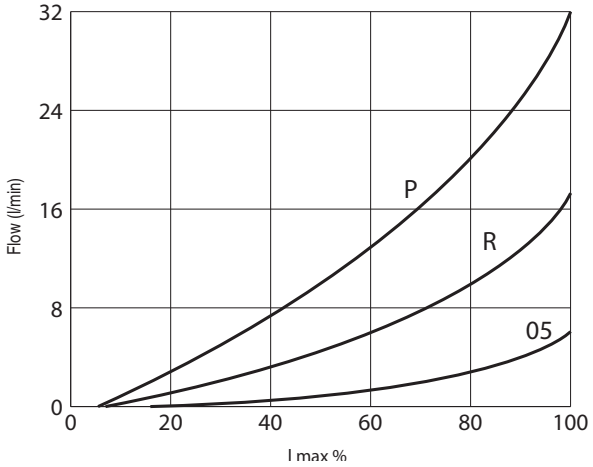
On valves type HD3-PX-*, the max permissible power consumption on each solenoid is 11w and, therefore, the currents to solenoids have to be limited to:

- **I max = 0,92 A for coils R2 (R=11,3)**
- **I max = 0,46 A for coils R4 (R=45,3)**

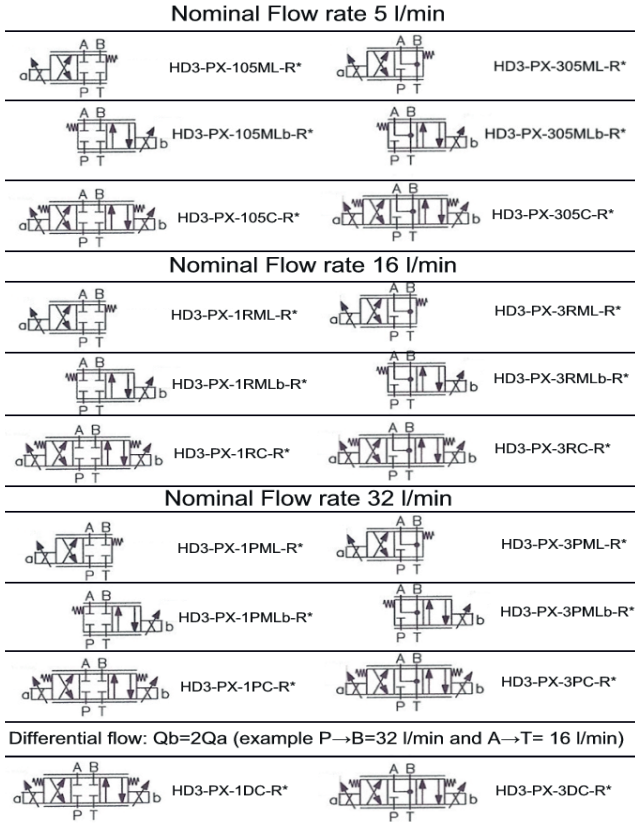
Currents to hydraulic proportional valves are normally supplied by an electronic driver based on PWM mode of operation, capable of full control of min and max values of current – see 14.

4 TYPICAL DIAGRAMS

Typical flow curves of valves HD3–PX-* in standard configuration measured with mineral oil at 36 cSt and at 50°C at ΔP=01 Mpa (10 bar) for flow P -> B, A -> T

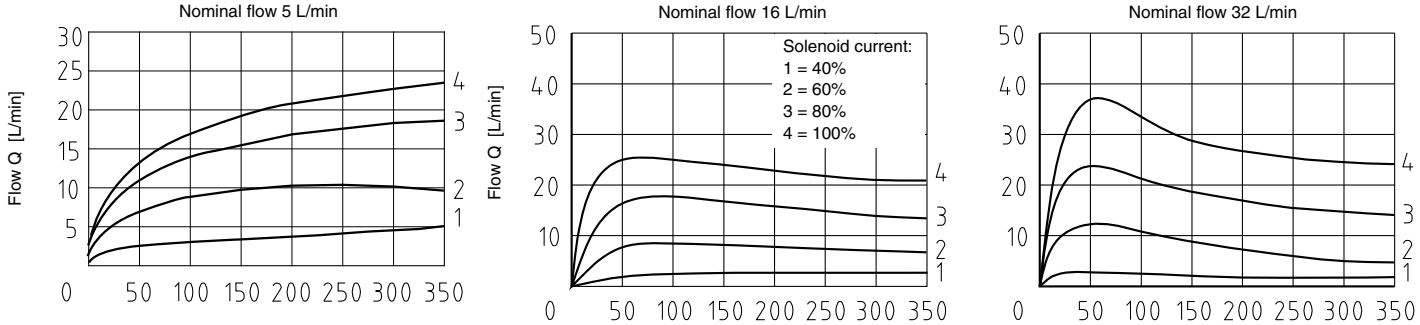


5 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

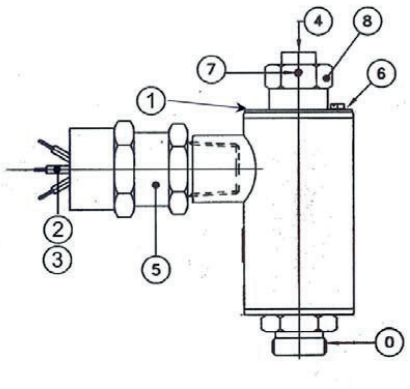


6 FLOW RATES AND PRESSURE DIFFERENTIAL

For a given ΔP on a given valve the flow rates are proportional to the driving current (see 4); for a given driving current on a given valve, the flow rates increase with the increasing of the ΔP up to certain limits. Typical limit curves are:

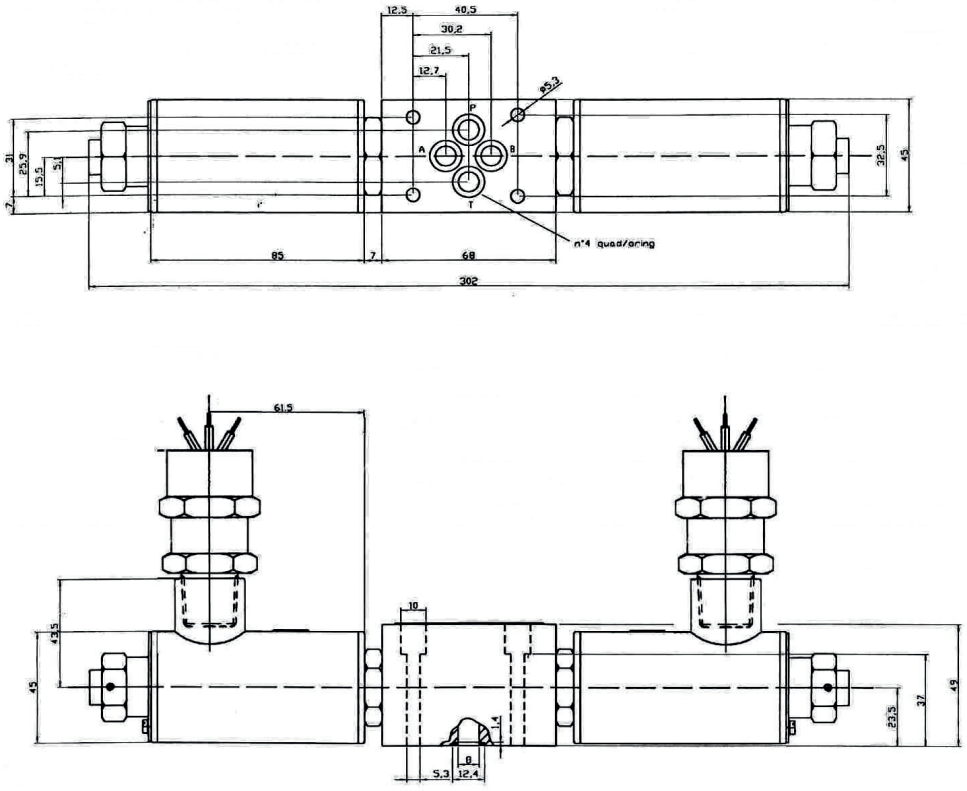


7 EXPLOSION PROOF SOLENOID TYPE GMA-6/PX SERIES 271



0: Ex proof solenoid according to ATEX 94/9/CE.
Class Ex db T5 Gb & Ex tb T 100 °C Db IP 68/67
Solenoid outside surfaces are nickel plated, with 7 □ minimum thickness
1: Solenoid label indicates supply voltage, protection class EExd, certification number by INERIS and maximum power.
2: 3-wires cable, according to CEI 20-22, of standard length of 1,5 m, is fastened to the coil and locked by cable gland 5.
3: Wires have 1,5 mm2 section; earth connection wire is green-yellow.
Electric connection must be in accordance with Ex-proof norm ATEX.
4: Manual override operation is by pushing the extended pin.
5: Normalised cable gland –torque 8 Nm + 1 – device has threaded attachment ½" conical – ISO 7/1
6: Earth connection screw
7: Threaded plug (socket hexagon 1,5 mm)to lock the retaining coil nut □
8: Nut for retaining the coil –torque 6 Nm + 1 – hexagon 24 mm.
Conformity of unit to the norms is not granted if coil is used separately from its electromagnetic tube.

8 INSTALLATION DIMENSIONS (mm)



All valves HD3-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page) and for valves height. When assembled to its mounting plate valve HD3-* must be fastened with 4 bolts M5 X 45 mm (or M5 x ** according to the number of modules) tightened at 8 Nm torque. Of special interest is the mounting of pressure compensator modules with HD3-P proportional valves – see 15. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of QUAD/O Ring type 9,25x1,68x1,68.

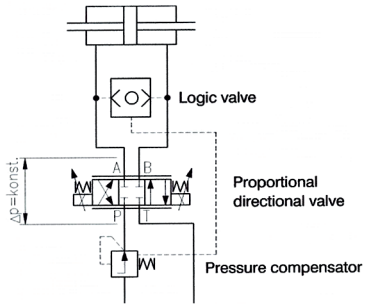
9 HYDRAULIC FLUIDS

Seals and materials used on standard valves HD3-* are fully compatible with hydraulic fluids of mineral oil 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.

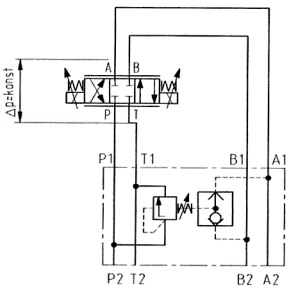
10 VERSION "ZN": ZINC NICHEL PLATED

Solenoid valves according to "ZN" version have central body zinc-nickel plated and protected against every type of corrosion due to saline ambiance or other aggressive chemicals. Zinc thickness are on the valve body: 10-15 µm.

11 PRESSURE COMPENSATOR MODULES



AM3-PC-P



AM3-LS-P

2-way pressure compensator for meter-in application type AM3-PCP – see table AM-391. When using the 2-way pressure compensators in meter-in application, shown in the circuit diagram, a constant pressure difference across the metering edge of the proportional direction valve is held. In this case, the pressure variations due to loading changes, as well as pump pressure changes, are compensated. That means that a pressure change cannot result in flow increase. 3-way pressure compensator type AM3-LS-P is able to operate as "load sensing" device, by discharging at T port, at the same pressure of the user, the flow that exceeds the flow rates required by the controlled opening of the proportional 4-way valve.

ATEX

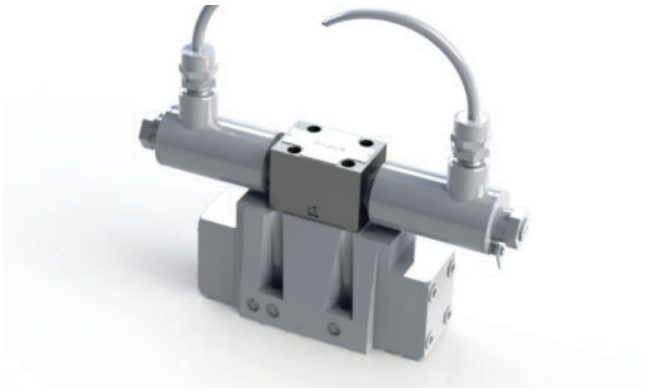
DIRECTIONAL CONTROL VALVES Ex - proof II 2 GD, Ex db IIC T5 GB, EX TB IIIC T5 DB IP 66/67

HD5-EX*/40

150 l/min 32 MPa (320 bar)

1 DESCRIPTION

HD5-EX-** Ex proof electrically are pilot operated 4 way valves of size ISO 05 with mounting surface according to Cetop 4.2-4 P05-320
Characteristics of the Ex proof, electrically operated, pilot valve type HD3-EX-** are described on Aidro table HD-3EX rev.



2 ORDERING CODE

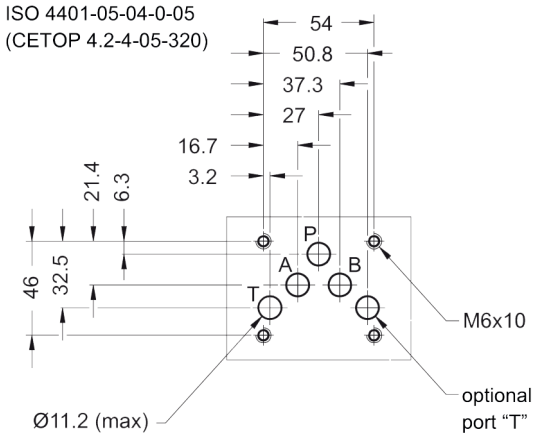
(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)
HD5	-	EX	-		-		-		-		-		-		/	40

(1) HD5: 4-way directional control valve Cetop 05- Pressure 32 MPa (320 bar)

(2) Variants:
EX: electrically controlled, EX Proof ATEX
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)
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, Ml, LM see also functional symbols

(4) Location of X and Y ports.
no designation: standard, according to CETOP 4.2-4 P05-320
R05: according to CETOP 4.2-4R05-320 and ISO/ CD 4401-05



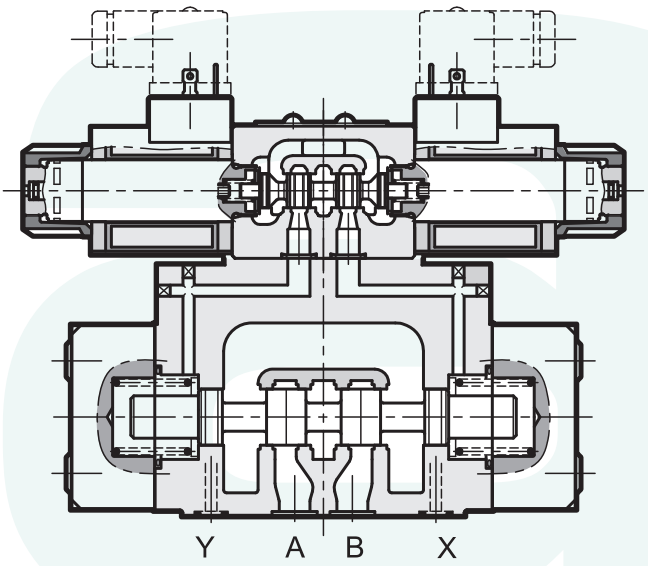
(5) Code reserved for options and variants (see 8)
C: adjustable limits for main spool stroke
D: double flow control valve to adjust shifting speed
G: adjustable limits and adjustable shifting speed
5S-**: calibrated orifice on P port

(6) Pilot and drain arrangement
no designation: internal pilot and external drain (standard)
I : internal pilot and internal drain
E: external pilot and external drain

(7) Cable length

(8) Electric voltage and solenoid coils
012C : coils for V12DC
024C : coils for V24DC
115A : coils for V110/50 - V 115/60 AC
230A : coils for V220/50 - V 230/60 AC
See also electric characteristics

(9) Design number (progressive) of the valves



3 TECHNICAL DATA

max recommended flow (spring centering)	150 l/min
Maximum pressure (P,A,B)	32 MPa (320 bar)
Maximum pressure at T port (internal drain)	16 MPa (160 bar)
Maximum pressure at T port (external drain)	25 MPa (250 bar)
Pilot pressure minimum	0,5 MPa (5 bar)
Pilot pressure maximum recommended	20 MPa (200 bar)
Dimensions and installation	see 6
Mass	Approx 9,00/10,2 kg

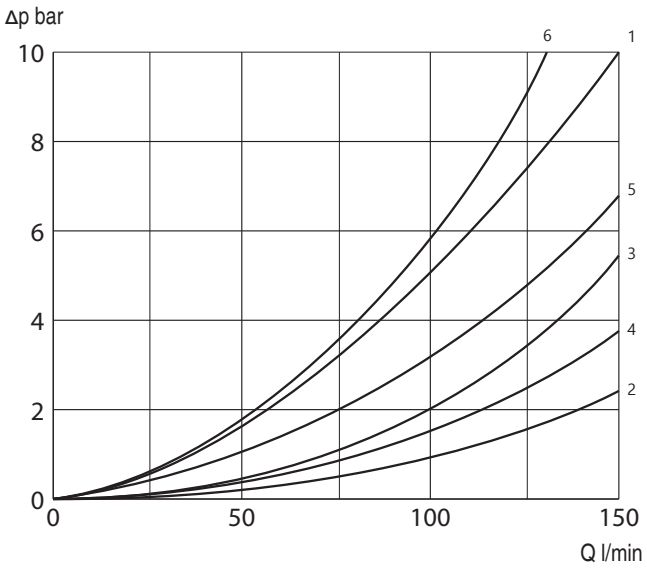
Note:

When valves HD5-EX-** are made with internal pilot and internal drain ("I" configuration), ports X and Y are not used and valves can be installed on normal 05 surface mounting plates according to ISO 4401-05.

4 PRESSURE DROP

Δp-Q

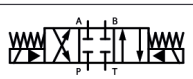
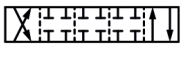
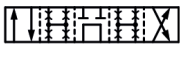
Measured at v= 166 SUS (35 mm²/s) and t= 122 °F (50 °C)



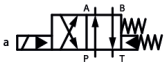
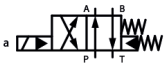
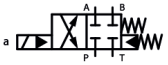
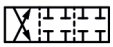
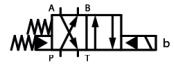
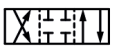
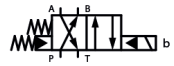
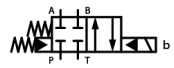
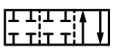
See reference table 7

5 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

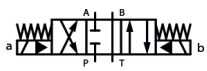
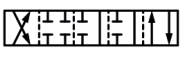
Three positions with spring centering

1C		
0C		
3C		
4C		

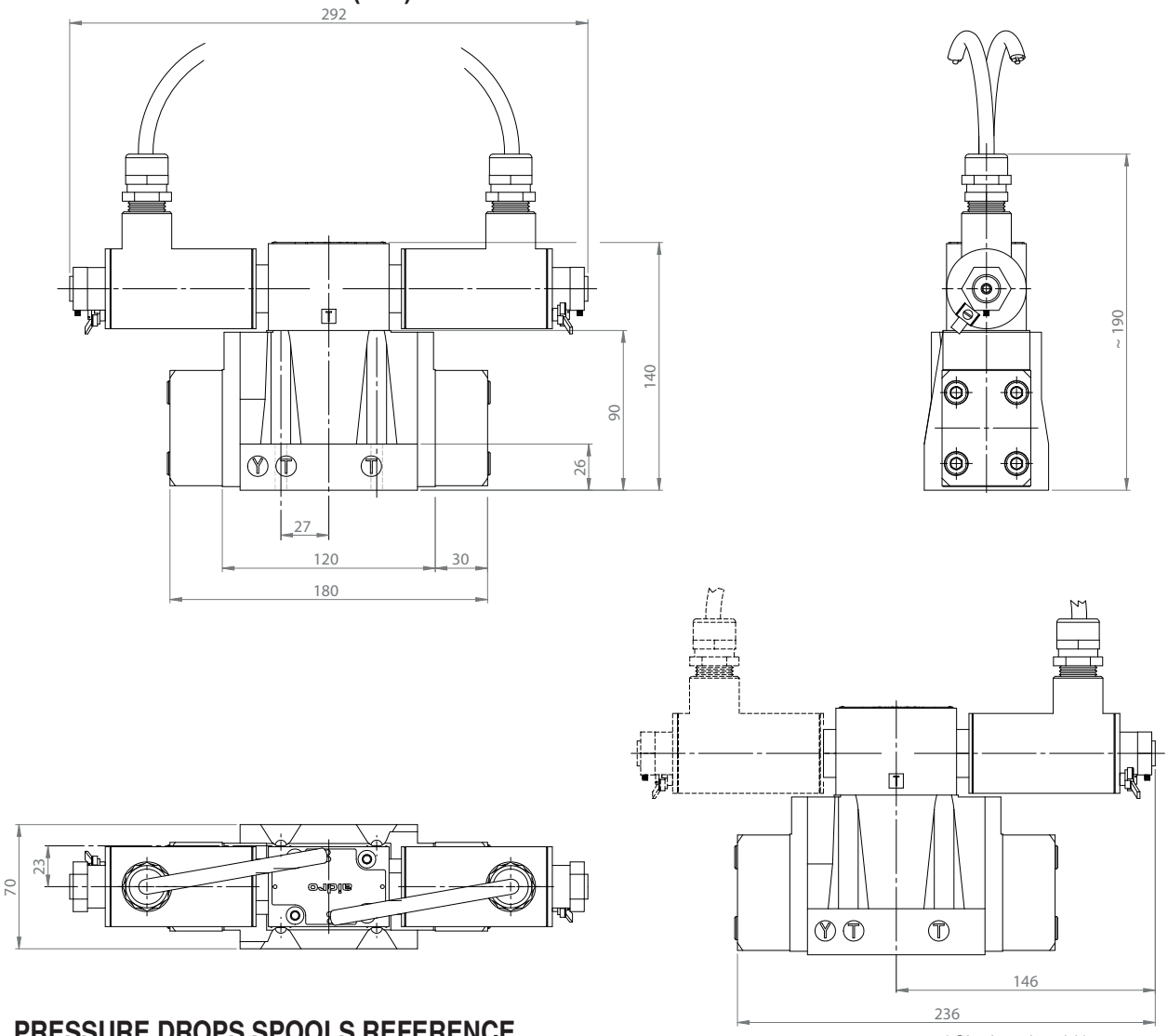
Two positions with return spring

1LL		
0LL		
1ML		
1LLb		
0LLb		
1MLb		

Three positions with spring centering - special sopols

77C		
56C		
8C		
76C		

6 INSTALLATION DIMENSIONS (mm)



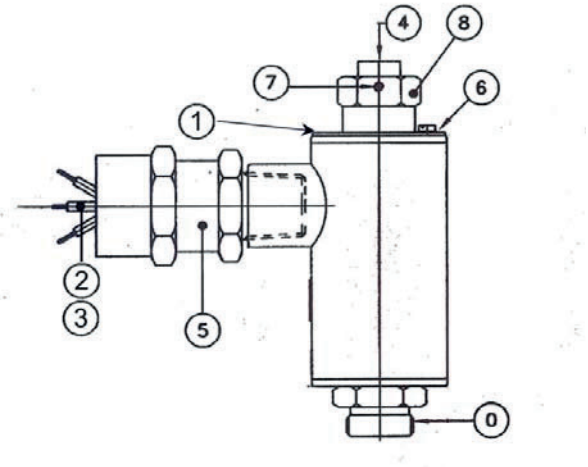
(Single solenoid)

7 PRESSURE DROPS SPOOLS REFERENCE

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 Energized	5	5	1	2	6*
3C	De-energized Energized	1	1	4• 1	4° 2	
4C	De-energized Energized	6	6	3	4	6
1LL,0LL	De-energized	1			3	
1ML	Energized		1	2		
77C	De-energized Energized	1	1	2	4 2	
56C	De-energized Energized	6	6	4	3	6•
8C	De-energized Energized	4• 5	4° 5	2	3	
76C	De-energized Energized	1	1	3 1	3	

* A-B blocked
• B blocked
° A blocked

8 EXPLOSION PROOF SOLENOID GMA-6/HD SERIES 271 GD



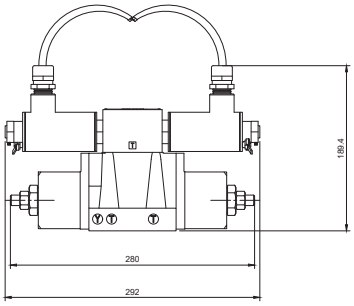
0: Ex proof solenoid according to ATEX 94/9/EC.
II 2GD Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67.
Solenoid outside surfaces are zinc-nickel plated, with 7µm minimum thickness
1: Solenoid label indicates supply voltage, protection class Exd, certification number by INERIS and maximum absorbed power.
2: 3-wires cable, according to CEI 20-22, of standard length of 3 m, is fastened to the coil and locked by cable gland.
3: Wires have 1,5 mm2 section; earth connection wire is green-yellow.
Electric connection must be in accordance with Ex-proof norm ATEX.
4: Manual override operation is by pushing the extended pin.
5: Normalised cable gland –torque 8 Nm + 1 – device has threaded attachment ½" conical – ISO 7/1
6: Earth connection screw
7: Threaded plug (socket hexagon 1,5 mm)to lock the retaining coil nut
8: Nut for retaining the coil –torque 6 Nm + 1 – hexagon 24 mm.

Conformity of unit to the norms is not granted if coil is used separately from its electromagnetic tube.

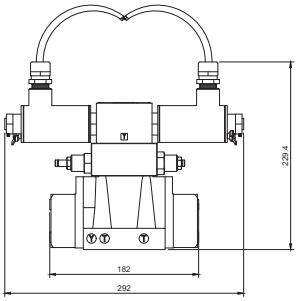
Atex Certificates :
INERIS 05ATEX0028X/02 for Gas and Dust

9 OPTIONS AND VARIANTS

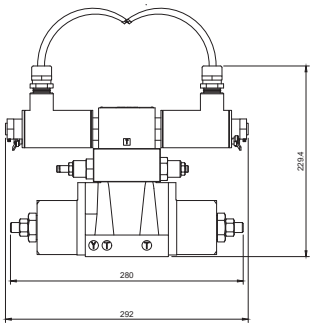
Control of the main spool stroke: C
It is possible to introduce special stroke controls in the heads of the hydropiloted valve so as to vary the maximum spool stroke. This solution allows control of the flow rate from the pump to the actuator and from the actuator to the outlet, obtaining a double adjustable 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.



ATEX

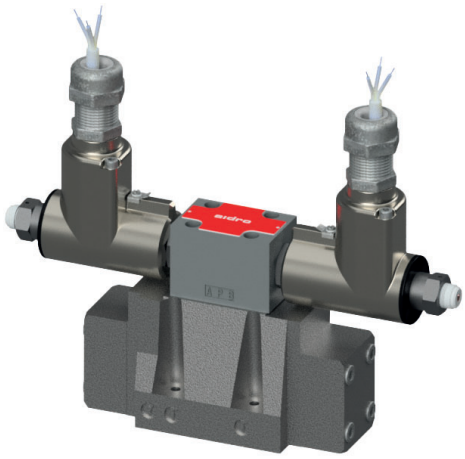
DIRECTIONAL CONTROL VALVES Ex - proof II 2 GD, Ex db IIC T5 Gb, Ex tb IIIC T5 Db IP 66/67

HD5-EX/50

150 l/min 35 MPa (350 bar)

1 DESCRIPTION

HD5-EX/50 Ex proof electrically are pilot operated 4 way valves of size ISO 05 with mounting surface according to Cetop 4.2-4 P05-320
Characteristics of the Ex proof, electrically operated, pilot valve type HD3-EX/30 are described on Aidro table HD3-EX/30.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)
HD5	-	EX	-		-		-		-		-		/	50

(1) HD5: 4-way directional control valve Cetop 05- Pressure 35 MPa (350 bar)

(2) Variants:
EX: electrically controlled, EX Proof ATEX
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)
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

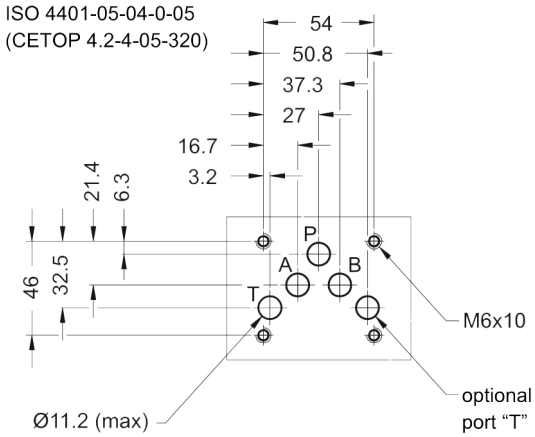
(4) Location of X and Y ports.
no designation: standard, according to CETOP 4.2-4 P05-320
R05: according to CETOP 4.2-4R05-320 and ISO/ CD 4401-05

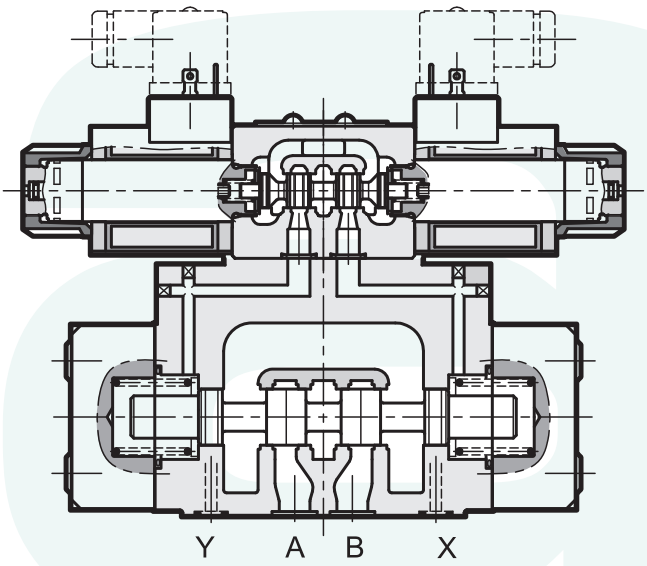
(5) Code reserved for options and variants (see 8)
C: adjustable limits for main spool stroke
D: double flow control valve to adjust shifting speed
G: adjustable limits and adjustable shifting speed

(6) Pilot and drain arrangement
no designation: internal pilot and external drain (standard)
I : internal pilot and internal drain
E: external pilot and external drain

(7) Electric voltage and solenoid coils
012C : coils for V12DC
024C : coils for V24DC
115A : coils for V110/50 - V 115/60 AC
230A : coils for V220/50 - V 230/60 AC
See also electric characteristics

(8) Design number (progressive) of the valves





0029

3 TECHNICAL DATA

max recommended flow (spring centering)	150 l/min
Maximum pressure (P,A,B)	32 MPa (320 bar)
Maximum pressure at T port (internal drain)	16 MPa (160 bar)
Maximum pressure at T port (external drain)	25 MPa (250 bar)
Pilot pressure minimum	0,5 MPa (5 bar)
Pilot pressure maximum recommended	20 MPa (200 bar)
Dimensions and installation	see 6
Mass	Approx 9,00/10,2 kg

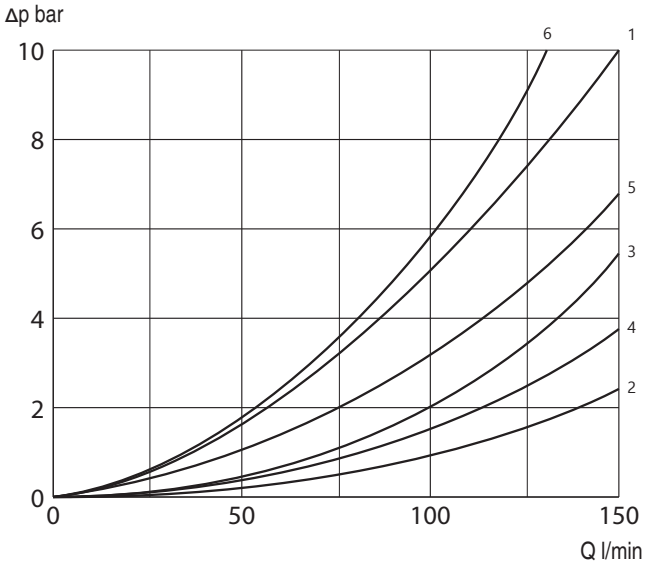
Note:

When valves HD5-EX-** are made with internal pilot and internal drain ("I" configuration), ports X and Y are not used and valves can be installed on normal 05 surface mounting plates according to ISO 4401-05.

4 PRESSURE DROP

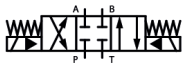
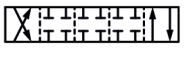
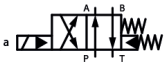
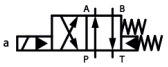
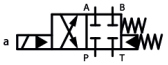
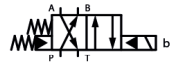
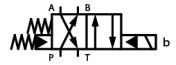
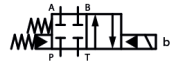
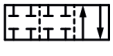
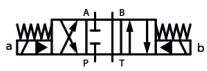
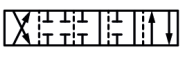
Δp-Q

Measured at v= 166 SUS (35 mm²/s) and t= 122 °F (50 °C)

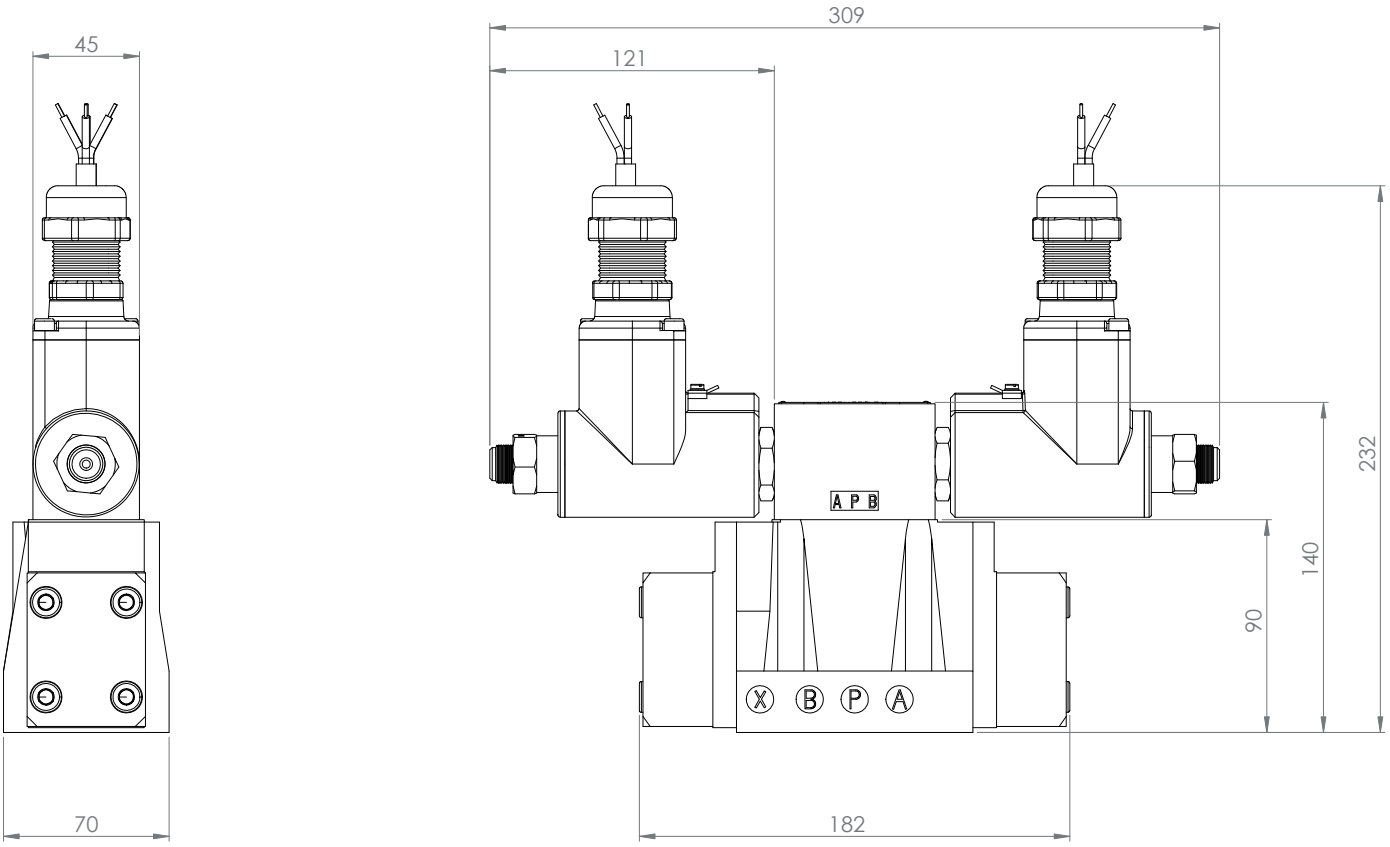


See reference table 7

5 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES

Three positions with spring centering		
1C		
0C		
3C		
4C		
Two positions with return spring		
1LL		
0LL		
1ML		
1LLb		
0LLb		
1MLb		
Three positions with spring centering - special sopols		
77C		
56C		
8C		
76C		

6 INSTALLATION DIMENSIONS (mm)

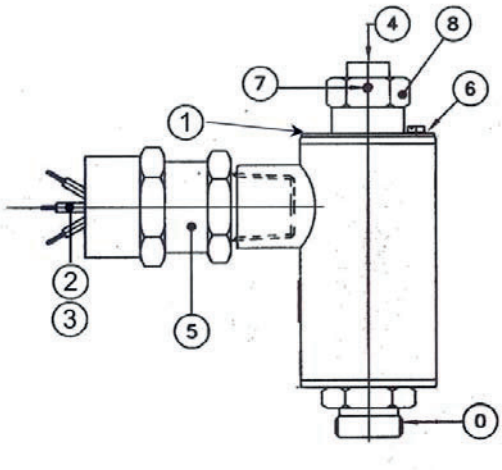


7 PRESSURE DROPS SPOOLS REFERENCE

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 Energized	5	5	1	2	6*
3C	De-energized Energized	1	1	4• 1	4° 2	
4C	De-energized Energized	6	6	3	4	6
1LL,0LL	De-energized	1			3	
1ML	Energized		1	2		
77C	De-energized Energized	1	1	2	4 2	
56C	De-energized Energized	6	6	4	3	6•
8C	De-energized Energized	4• 5	4° 5	2	3	
76C	De-energized Energized	1	1	3 1	3	

* A-B blocked
• B blocked
° A blocked

8 EXPLOSION PROOF SOLENOID GMA-6/HD SERIES 271 GD



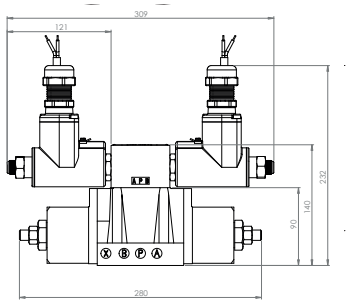
0: Ex proof solenoid according to ATEX 94/9/EC.
II 2GD Ex db IIC T5 Gb, Ex tb IIIC T100 °C Db IP66/67.
Solenoid outside surfaces are zinc-nickel plated, with 7µm minimum thickness
1: Solenoid label indicates supply voltage, protection class Exd, certification number by INERIS and maximum absorbed power.
2: 3-wires cable, according to CEI 20-22, of standard length of 3 m, is fastened to the coil and locked by cable gland.
3: Wires have 1,5 mm2 section; earth connection wire is green-yellow. Electric connection must be in accordance with Ex-proof norm ATEX.
4: Manual override operation is by pushing the extended pin.
5: Normalised cable gland –torque 8 Nm + 1 – device has threaded attachment ½" conical – ISO 7/1
6: Earth connection screw
7: Threaded plug (socket hexagon 1,5 mm)to lock the retaining coil nut
8: Nut for retaining the coil –torque 6 Nm + 1 – hexagon 24 mm.

Conformity of unit to the norms is not granted if coil is used separately from its electromagnetic tube.

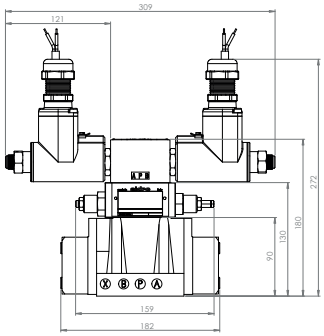
Atex Certificates :
INERIS 05ATEX0028X/02 for Gas and Dust

9 OPTIONS AND VARIANTS

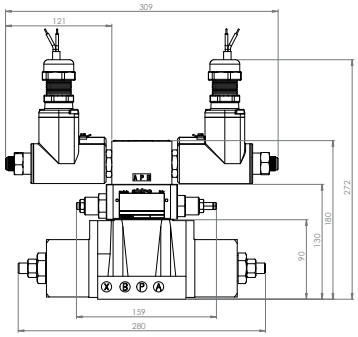
Control of the main spool stroke: C
It is possible to introduce special stroke controls in the heads of the hydropiloted valve so as to vary the maximum spool stroke. This solution allows control of the flow rate from the pump to the actuator and from the actuator to the outlet, obtaining a double adjustable 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.

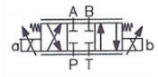


Control of the main spool stroke and shifting speed: G
It is possible to have the valve fitted with both the spool stroke device and the piloting flow rate control device. Add the letter **G** to the identification code to request this solution.

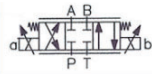


SUMMARY

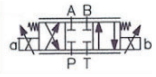
7 PROPORTIONAL VALVE

PROPORTIONAL 4-WAY CONTROL VALVES SOLENOID OPERATED
HD2-PS-*


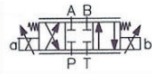
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PROPORTIONAL 4-WAY CONTROL VALVES SOLENOID OPERATED
HD3-PS-*


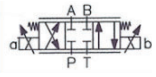
0004

PROPORTIONAL 4-WAY CONTROL VALVES PILOTED OPERATED
HD3-PS8


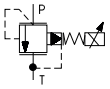
0007

PROPORTIONAL 4-WAY CONTROL VALVES SOLENOID OPERATED
IN STAINLESS STEEL
HD3-AMPS


0009

PROPORTIONAL 4-WAY CONTROL VALVES SOLENOID OPERATED
HD5-PS-*


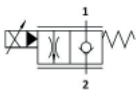
0011

PILOT OPERATED PRESSURE RELIEF VALVE
PMO*-78/*


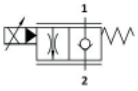
0014

DIRECT OPERATED PRESSURE REDUCING VALVE
PRO-M24.*

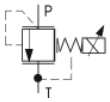

0016

DIRECT OPERATED FLOW CONTROL VALVE
PFC-34-03-*


0018

DIRECT OPERATED FLOW CONTROL VALVE
PFC-78.*


0020

CETOP 03 PRESSURE CONTROL VALVE WITH PROPORTIONAL CONTROL
HD3-PMO


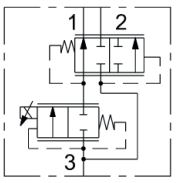
0022

UNIVERSAL ELECTRONIC DRIVER
UED-*
0026

UNIVERSAL ELECTRONIC DRIVER
UED-KA
0030

PROPORTIONAL 3 WAY PRESSURE COMPENSATED PRIORITY TYPE FLOW REGULATOR

PFP3-78-*



0033

aidro
Desktop Metal Company

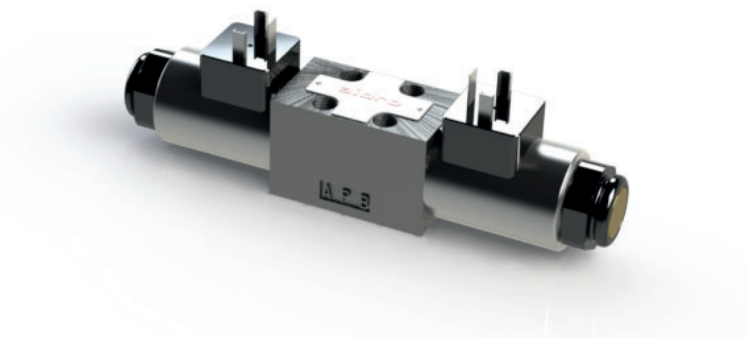
PROPORTIONAL 4-WAY CONTROL VALVES SOLENOID OPERATED

HD2-PS-*

20 l/min 32 MPa (320 bar)

1 DESCRIPTION

Valves HD2-PS are proportional directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03).
The design of the body is an high quality five chamber casting. The valve is available with different spools able to control different flow ranges. In the standard version, the valve housing is phosphated for 240 h salt spray protection acc. to ISO 9227.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
HD2	-	PS	-		-		-		/	10

(1) HD2: 4-way directional valve Cetop 02 – Pressure 32 Mpa (320 bar)

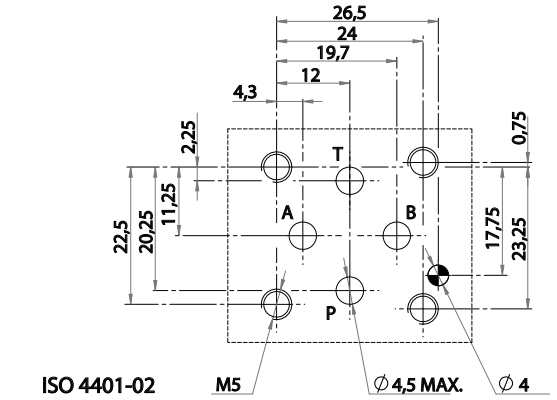
(2) PS : Proportional electric control

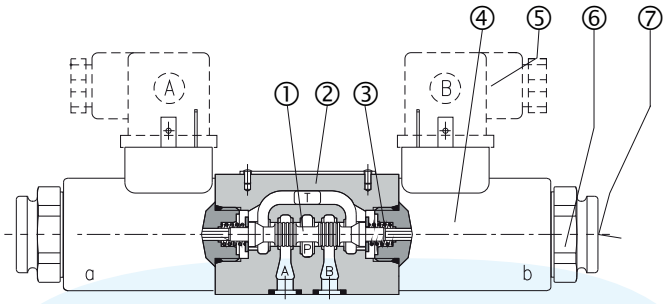
(3) Functional spool type (see 4):
-number is the main spool type
1: closed center (P, A, B, T blocked)
3: P blocked, A, B, T connected
-spool nominal flow
P : 12 l/min with fiP = 1 MPa (10 bar) (PA+BT or PB+AT)
R : 8 l/min with fiP = 1 MPa (10 bar) (PA+BT or PB+AT)
04 : 04 l/min with ΔP = 1 Mpa (10 bar) (PA+BT or PB+AT)
D : differential Qb = 2Qa: 8/4 l/min with ΔP = 1 Mpa (10 bar))
-letter is the solenoid or spring arrangement:
C : 2 solenoids, spool is springs centred
ML : 1 solenoid (“a”) spool is centred + 1 end position
MLb : 1 solenoid (“b”) spool is centred + 1 end position

(4) Options and variants:
K : extended manual overrides (see 7)
AK : extended manual overrides with air bleeding valves
ZC : zinc plated valves (see 8)

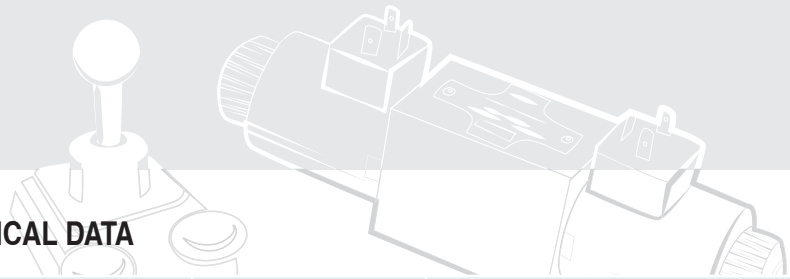
(5) Type of coil and supply voltages
R2 : R= 5 Ω standard for V12DC;fl
R4 : R=21 Ω standard for V24DC;fl

(6) Design number (progressive) of the valve.





The spool 12 shifts in to the valves body 11 subject to the action of springs 13 and proportional solenoid 1. Spool 12, depending from its shape and its position in the valves body 11, opens and/or closes passages between P, A, B, T ports, thus controlling the direction and the rate of the hydraulic flow. Solenoid 1 is energized by electric current flowing-in through cables; in case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins 5, located at the end of the solenoids and accessible through the retaining nuts 10.



3 TECHNICAL DATA

Nominal flow rates	4, 8, 12 l/min
Maximum nominal pressure (P,A,B)	32 MPa (320 bar)
Maximum pressure at T port	16 MPa (160 bar)
Maximum rec. Pressure drops	10 MPa (100 bar) see 8
Protection DIN 40050	IP 67
Duty cycle	100%
Service life	≥ 10^7 cycles
Installation and Dimensions	(see 10)
Mass	Approx 1,0 / 1,4 kg.

Electric Characteristics:

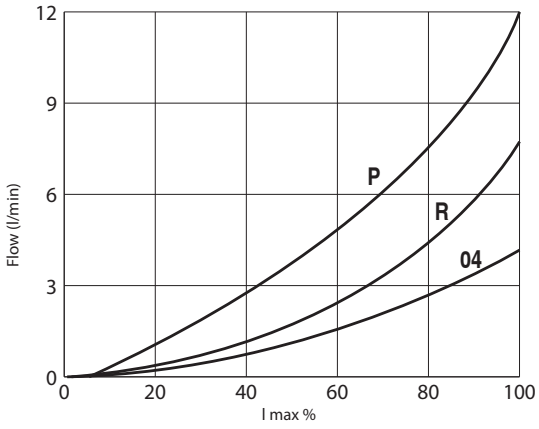
Valves type HD2-PS-* are operated by proportional solenoids.
The values of nominal max. current are:
for coils type R2 (5 Ω): I max = 1,7 A
R4 (21 Ω): I max = 0,8 A
Currents to hydraulic proportional valves are normally supplied by an electronic driver based on PWM mode of operation, capable of full control of min and max values of current for drivers type UED-M15

4 SPOOL IDENTIFICATION & NOMINAL FLOW RATE

Nominal Flow rate 4 l/min	
HD2-PS-104ML-R*	HD2-PS-304ML-R*
HD2-PS-104MLb-R*	HD2-PS-304MLb-R*
HD2-PS-104C-R*	HD2-PS-304C-R*
Nominal Flow rate 8 l/min	
HD2-PS-1RML-R*	HD2-PS-3RML-R*
HD2-PS-1RMLb-R*	HD2-PS-3RMLb-R*
HD2-PS-1RC-R*	HD2-PS-3RC-R*
Nominal Flow rate 12 l/min	
HD2-PS-1PML-R*	HD2-PS-3PML-R*
HD2-PS-1PMLb-R*	HD2-PS-3PMLb-R*
HD2-PS-1PC-R*	HD2-PS-3PC-R*
Differential flow: Qb=2Qa (example P→B=8 l/min and A→T= 4 l/min)	
HD2-PS-1DC-R*	HD2-PS-3DC-R*

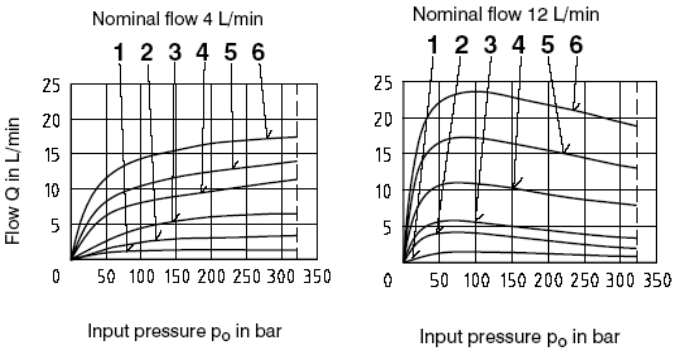
5 TYPICAL DIAGRAMS

Typical flow curves of valves HD2 – PS - *, with spools type P, R, 04 – see 1, in standard configuration measured with mineral oil at 36 cSt and at 50°C at ΔP=01 Mpa (10 bar) for flow P → B A → T



6 FLOW RATES AND PRESSURE DIFFERENTIAL

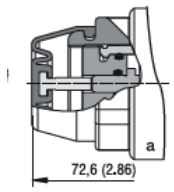
For a given ΔP on a given valve the flow rates are proportional to the driving current (see 4); for a given driving current on a given valve, the flow rates increase with the increasing of the ΔP up to certain limits.
Typical limit curves are:



Solenoid current:
1 = 50%
2 = 60%
3 = 70%
4 = 80%
5 = 90%
6 =100%

7 VERSION “K”: EXTENDED EMERGENCY PIN

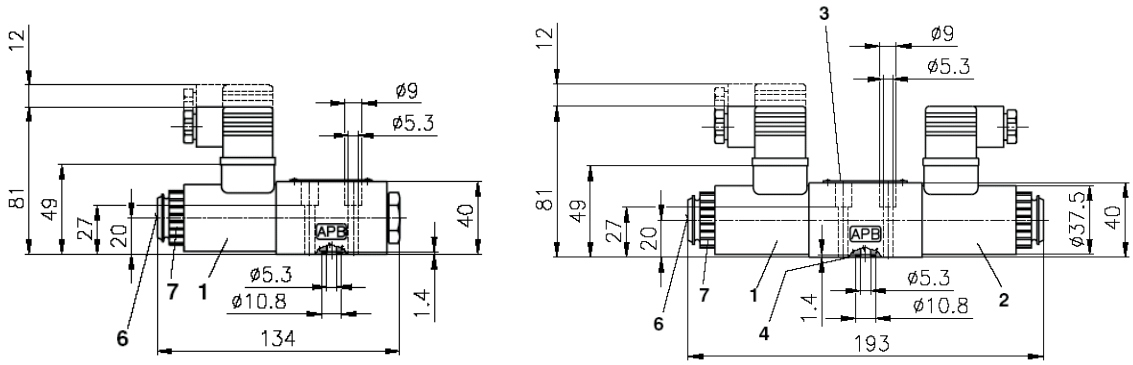
Solenoid valves according to “K” version have extended emergency actuator pins protruding from the solenoid shape, that permit a quick and easy “Hand operation” of the valves, without the need of any tool. The actuator pin and the end of the solenoid are protected by a flexible rubber cap that makes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

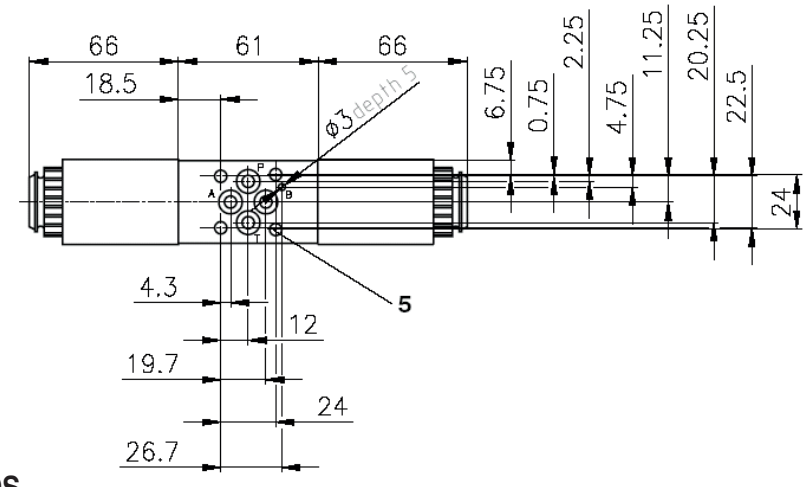


8 VERSION “ZC”: ZINC PLATED VALVES

Solenoid valves according to “ZC” version have central body zinc plated and protected against every type of corrosion due to saline ambiance or other aggressive chemicals. Zinc thickness are on the valve body: 10-15 µm; and 8/12 µm on solenoids.

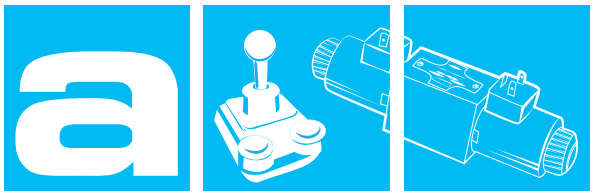
9 INSTALLATION DIMENSIONS (mm)





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 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.



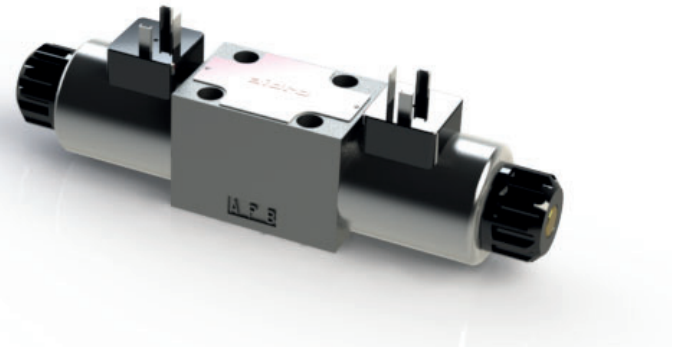
PROPORTIONAL 4-WAY CONTROL VALVES SOLENOID OPERATED

HD3-PS-*

32 l/min 32 MPa (320 bar)

1 DESCRIPTION

Valves HD3-PS are proportional directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03).
The design of the body is an high quality five chamber casting. The valve is available with different spools able to control different flow ranges. In the standard version, the valve housing is phosphated for 240 h salt spray protection acc. to ISO 9227.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
HD3	-	PS	-		-		-		/	10

(1) 4-way directional valve CETOP 03 – Pressure 32 MPa (320 bar)

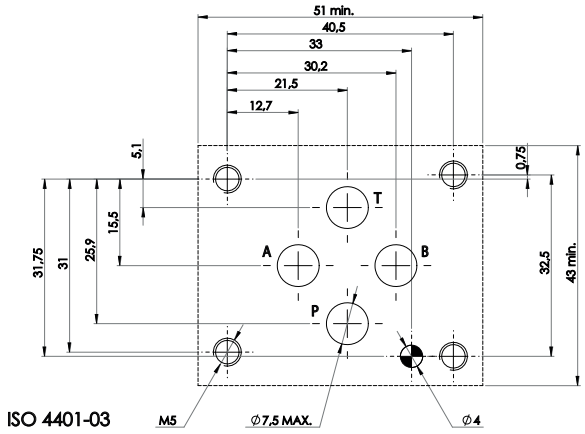
(2) PS : Proportional electric control

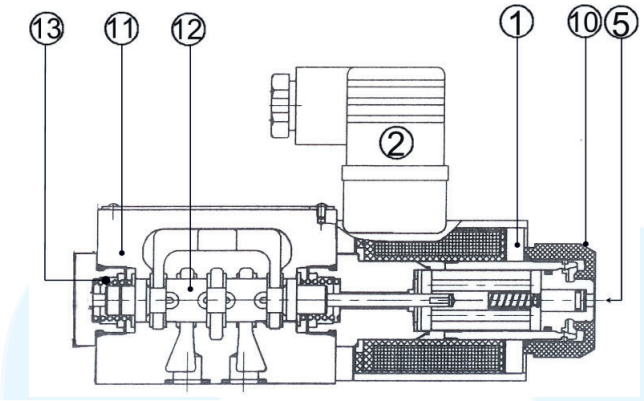
(3) Functional spool type (see 4):
-number is the main spool type
1: closed center (P, A, B, T blocked)
3: P blocked, A, B, T connected
-spool nominal flow
P : 32 l/min with ΔP = 1 MPa (10 bar) (PA+BT or PB+AT)
R : 16 l/min with ΔP = 1 MPa (10 bar) (PA+BT or PB+AT)
05 : 05 l/min with ΔP = 1 MPa (10 bar) (PA+BT or PB+AT)
D : differential Qb = 2Qa: 32/16 l/min with fiP = 1 MPa (10 bar)
-letter is the solenoid or spring arrangement:
C : 2 solenoids, spool is springs centred
ML : 1 solenoid (“a”) spool is centred + 1 end position
MLb : 1 solenoid (“b”) spool is centred + 1 end position

(4) Options and variants:
K : extended manual overrides (see 7)
AK : extended manual overrides with air bleeding valves (see 8)
ZC : zinc plated valves (see 9)

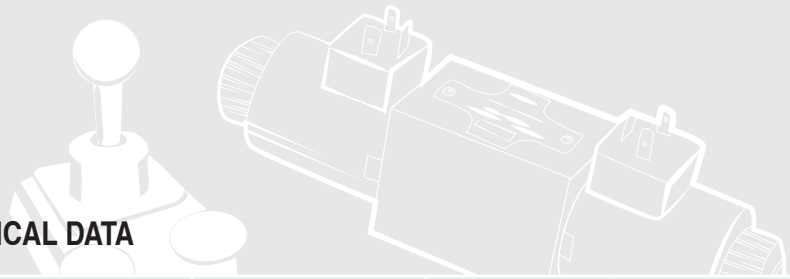
(5) Type of coil and supply voltages
R2 : R= 2,3 fl standard for V12DC; R3 : R= 4,5 fl
R4 : R=13,4 fl standard for V24DC; R5 : R=18,6 fl

(6) Design number (progressive) of the valve.





The spool 12 shifts in to the valves body 11 subject to the action of springs 13 and proportional solenoid 1. Spool 12, depending from its shape and its position in the valves body 11, opens and/or closes passages between P, A, B, T ports, thus controlling the direction and the rate of the hydraulic flow. Solenoid 1 is energized by electric current flowing-in through cables; in case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins 5, located at the end of the solenoids and accessible through the retaining nuts 10.



3 TECHNICAL DATA

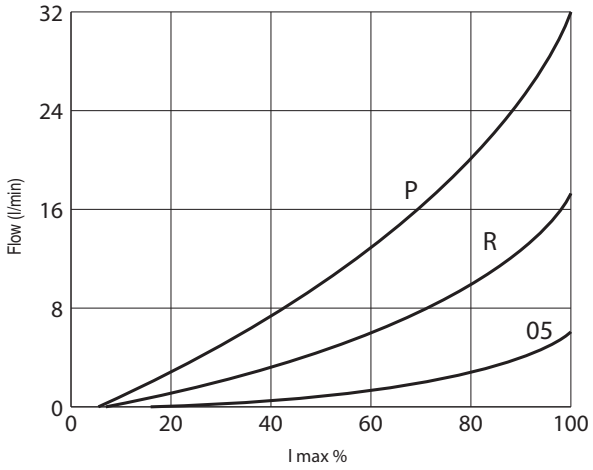
Nominal flow rates	5, 16, 32 l/min	Electric Characteristics:
Maximum nominal pressure (P,A,B)	32 MPa (320 bar)	Valves type HD3-PS-* are operated by proportional solenoids that are rated for an average max power of 13,5 w. The values of nominal max. current are: for coils type R2 (2,3 Ω): I max = 2,4 A R3 (4,5 Ω): I max = 1,7 A R4 (13,4 Ω): I max = 1,0 A R5 (18,6 Ω): I max = 0,85 A Currents to hydraulic proportional valves are normally supplied by an electronic driver based on PWM mode of operation, capable of full control of min and max values of current for drivers type UED-*
Maximum pressure at T port	16 MPa (160 bar)	
Maximum rec. Pressure drops	10 MPa (100 bar) see 8	
Protection DIN 40050	IP 67	
Duty cycle	100%	
Service life	≥ 10^7 cycles	
Installation and Dimensions	(see 10)	
Mass	Approx 1,6 / 2,1 kg.	

4 SPOOL IDENTIFICATION AND NOMINAL FLOW RATE

Nominal Flow rate 5 l/min	
HD3-PS-105ML-R*	HD3-PS-305ML-R*
HD3-PS-105MLb-R*	HD3-PS-305MLb-R*
HD3-PS-105C-R*	HD3-PS-305C-R*
Nominal Flow rate 16 l/min	
HD3-PS-1RML-R*	HD3-PS-3RML-R*
HD3-PS-1RMLb-R*	HD3-PS-3RMLb-R*
HD3-PS-1RC-R*	HD3-PS-3RC-R*
Nominal Flow rate 32 l/min	
HD3-PS-1PML-R*	HD3-PS-3PML-R*
HD3-PS-1PMLb-R*	HD3-PS-3PMLb-R*
HD3-PS-1PC-R*	HD3-PS-3PC-R*
Differential flow: Qb=2Qa (example P→B=32 l/min and A→T= 16 l/min)	
HD3-PS-1DC-R*	HD3-PS-3DC-R*

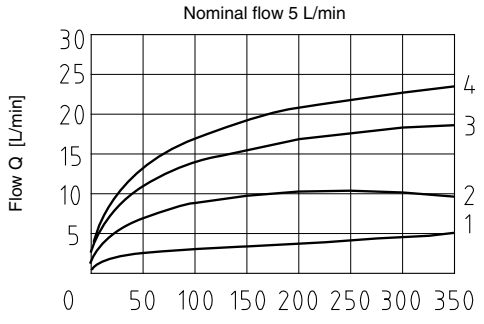
5 TYPICAL DIAGRAMS

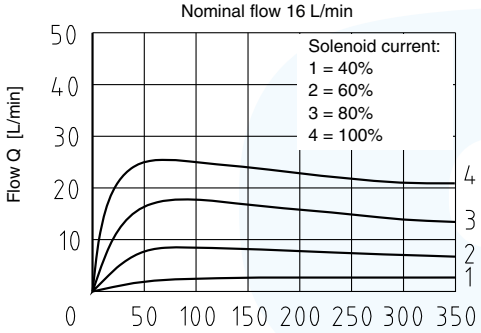
Typical flow curves of valves HD3–PS-*, with spools type P, R, 05, in standard configuration measured with mineral oil at 36 cSt and at 50°C at ΔP=01 MPa (10 bar) for flow P->B A -> T

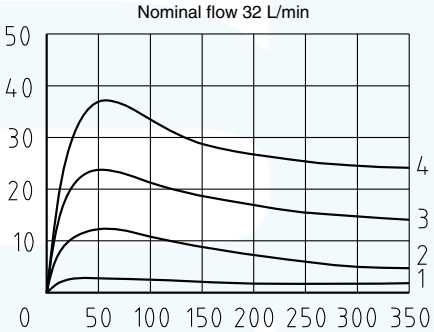


6 FLOW RATES AND PRESSURE DIFFERENTIAL

For a given ΔP on a given valve the flow rates are proportional to the driving current; for a given driving current on a given valve, the flow rates increase with the increasing of the ΔP up to certain limits. Typical limit curves are:

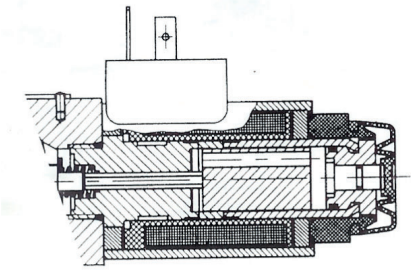






7 VERSION “K”: EXTENDED EMERGENCY PIN

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.



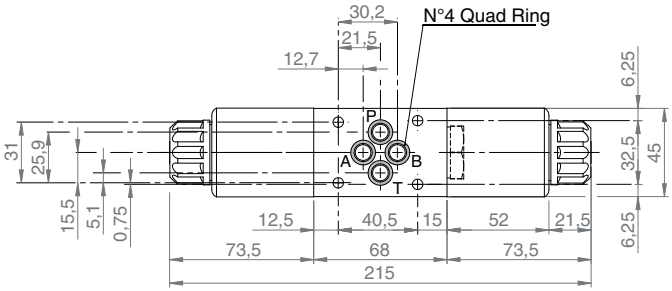
8 VERSION “AK”: EXTENDED PIN AND AIR VALVES

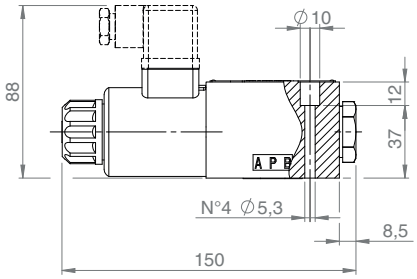
Proportional valves according to “AK” version have extended emergency actuator pins that incorporate air bleeding valves, to purge air from the solenoid tube for a simplified start-up of the system. The actuator pin and the end of the solenoid are protected by a flexible rubber cap that makes easy operation and protects from moisture and water splashes.

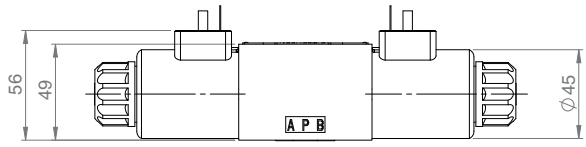
9 VERSION “ZC”: ZINC PLATED VALVES

Solenoid valves according to “ZC” version have central body zinc plated and protected against every type of corrosion due to saline ambiance or other aggressive chemicals. Zinc thickness are on the valve body: 10-15 □m; and 8/12 □m on solenoids.

10 INSTALLATION DIMENSIONS (mm)







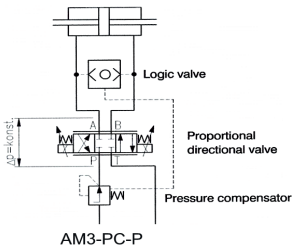
All valves HD3-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page) and for valves height. When assembled to its mounting plate valve HD3-* must be fastened with 4 bolts M5 X 45 mm (or M5 x ** according to the number of modules) tightened at 8 Nm torque. Of special interest is the mounting of pressure compensator modules with HD3-PS8 proportional valves. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of QUAD/O Ring type 9,25x1,68x1,68.

11 HYDRAULIC FLUIDS

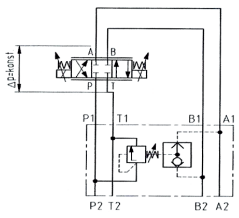
Seals and materials used on standard valves HD3-* are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and anti-oxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from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

12 PRESSURE COMPENSATOR MODULES

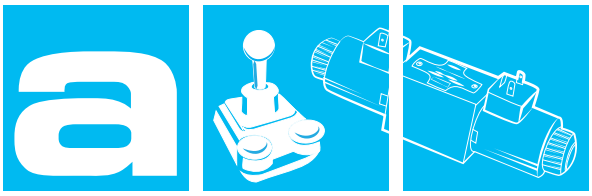
2-way pressure compensator for meter-in application type AM3-PCP – see table AM-391. When using the 2-way pressure compensators in meter-in application, shown in the circuit diagram, a constant pressure difference across the metering edge of the proportional direction valve is held. In this case, the pressure variations due to loading changes, as well as pump pressure changes, are compensated. That means that a pressure change cannot result in flow increase. 3-way pressure compensator type AM3-LS-P is able to operate as “load sensing” device, by ischarging at T port, at the same pressure of the user, the flow that exceeds the flow rates required by the controlled opening of the proportional 4-way valve.



AM3-PC-P



AM3-LS-P



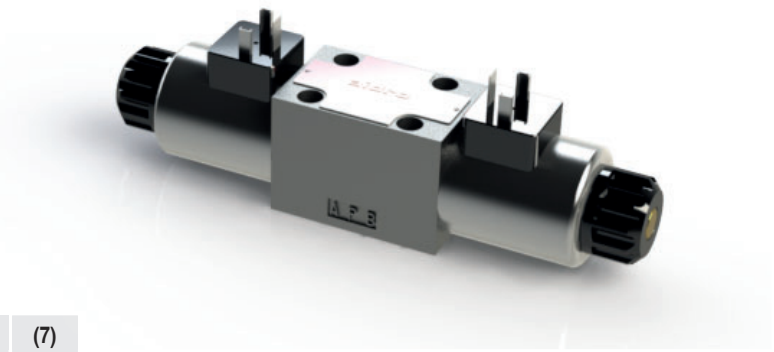
PROPORTIONAL 4-WAY CONTROL VALVES PILOTED OPERATED

HD3-PS8

140 l/min 35 MPa (350 bar)

1 DESCRIPTION

Valves HD3-PS8 are piloted proportional directional control valves with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 03). The design of the body is an high quality five chambers casting with piloted spool enabling high hydraulic power and fast, accurate control of the valve. In the standard version the valve housing is phosphated for 240h salt spray protection acc. to ISO 9227



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)	(6)		(7)
HD3	-	PS8	-		-		-			/	10

(1) 4-way directional valve CETOP 03 – Pressure 35 MPa (350 bar)

(2) PS8 : Proportional electric control pilot operated

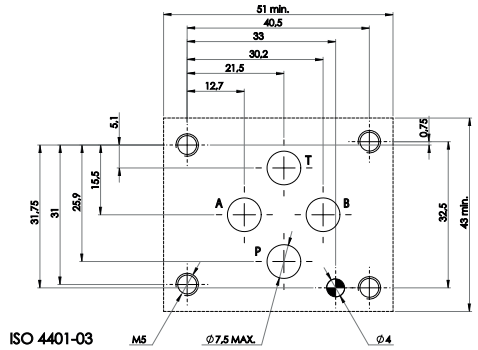
(3) Functional spool type (see 4):
-number is the main spool type
1: closed center (P, A, B, T blocked)
3: P blocked, A, B, T connected
-letter is the solenoid or spring arrangement:
C : 2 solenoids, spool is springs centred
MLb : 1 solenoid (“b”) spool is centred + 1 end position

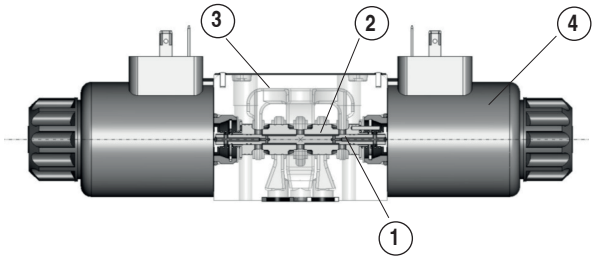
(4) Options and variants:
K : extended manual overrides (see 7)
ZC : zinc plated valves

(5) Type of coil and supply voltages
R2 : R= 2,3 Ω standard for V12DC; R3 : R= 4,5 Ω
R4 : R=13,4 Ω standard for V24DC; R5 : R=18,6 Ω

(6) Coil connection:
No designation: DIN 43650-A ISO 4400
AMPX: Amp Junior Timer axial
D: Deutsch DT04-2P

(7) Design number (progressive) of the valve.





The control spool 1, subject to the action of the proportional actuators 4, shift in the main spool 2 enabling pilot control of the main spool itself. The main spool 2, depending from its shape, opens and/or closes passages between P,A,B,T ports. In case of electric cut offs the spool can be manually shifted by acting on the emergency pins located at the end of the actuator and accessible through the retaining nuts.

3 TECHNICAL DATA

Nominal flow rates	140 l/min
Maximum nominal pressure (P,A,B)	35 MPa (350 bar)
Maximum pressure at T port	21 MPa (210 bar)
Maximum rec. Pressure drops	1 MPa (10 bar) see 5
Protection DIN 40050	IP 67
Duty cycle	100%
Service life	> 10^7 cycles
Installation and Dimensions	(see 6)
Mass	Approx 1,6 / 2,4 kg

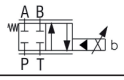
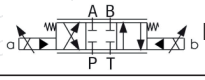
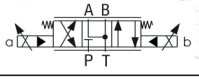
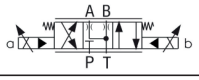
Electric Characteristics:

Valves type HD3-PS8-* are operated by proportional solenoids that are rated for an average max power of 13,5 w. The values of nominal max. current are:
for coils type R2 (2,3 Ω): I max = 2,4 A R3 (4,5 Ω): I max = 1,7 A
R4 (13,4 Ω): I max = 1,0 A R5 (18,6 Ω): I max = 0,85 A

Currents to hydraulic proportional valves are normally supplied by an electronic driver based on PWM mode of operation, capable of full control of min and max values of current for drivers type UED-*

⚠ Differential pressure between “P” and “T” channel must always be kept in condition that “P” channel pressure exceed pressure in “T” channel (P>T)

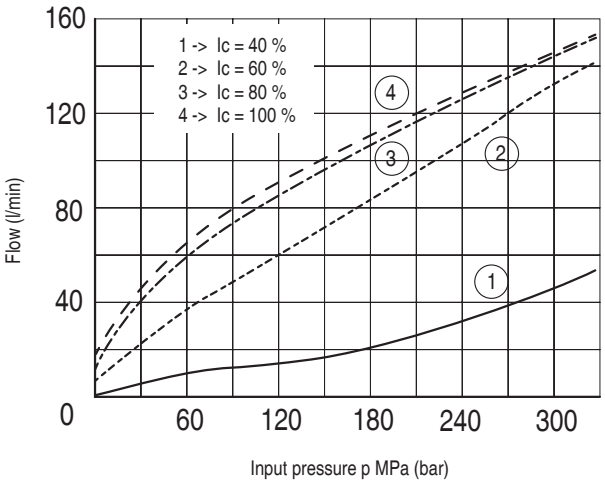
4 SPOOL IDENTIFICATION AND NOMINAL FLOW RATE

 HD3-PS8-MLb	 HD3-PS8-1C	 HD3-PS8-3C	 HD3-PS8-3Cs

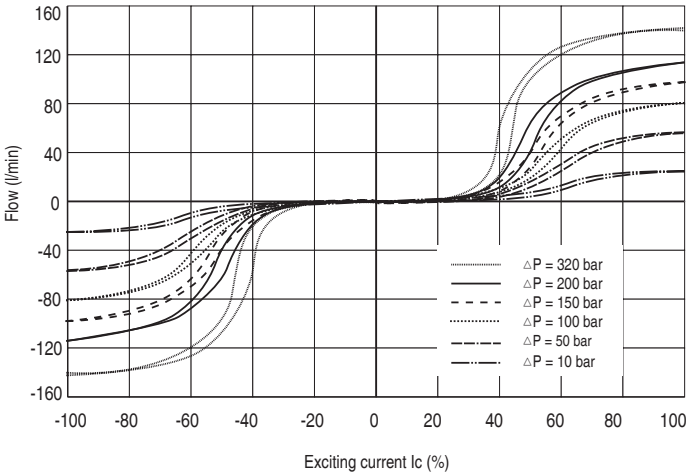
5 TYPICAL DIAGRAMS

Typical flow curves of valves HD3–PS8-*, in standard configuration measured with mineral oil at 32 cSt and at 50°C.

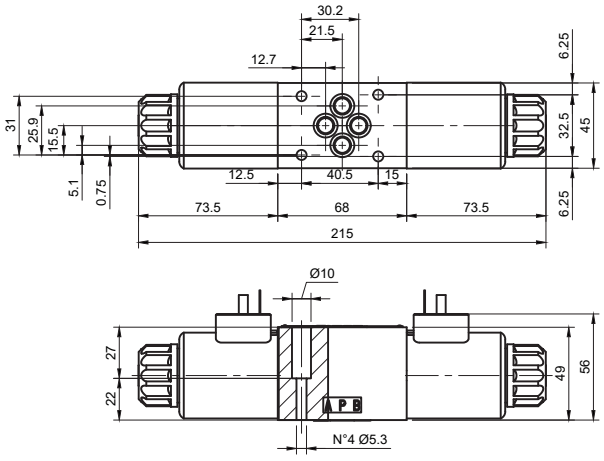
Operating limits
P->A/B->T or P->B/A->T

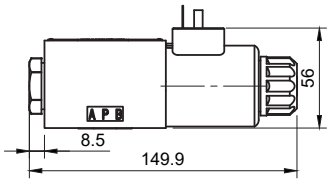


Regulated Flow
△p= 01 MPa (10bar)



6 INSTALLATION DIMENSIONS (mm)

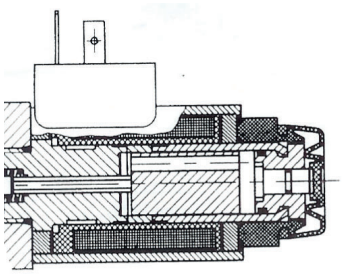




All valves HDS-PS8-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page) and for valves height. When assembled to its mounting plate valve HDS-PS8-* must be fastened with 4 bolts M5 X 30 mm (or M5 x ** according to the number of modules) tightened at 8 Nm torque. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of QUAD/O Ring type 9,25x1,68x1,68.

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.



PROPORTIONAL 4-WAY CONTROL VALVES SOLENOID OPERATED IN STAINLESS STEEL

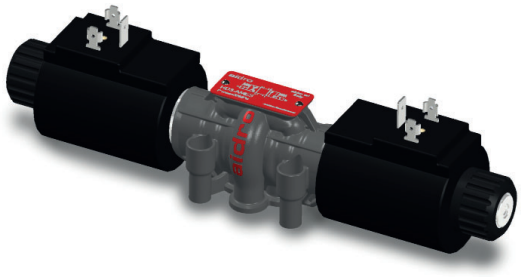
HD3-AMPS

32 l/min 32 MPa (320 bar)

AISI316L for body and AISI430 for solenoid

1 DESCRIPTION

Valves HD3-AMPS are proportional directional control valve with subplate mounting interface according to ISO 4401, DIN 24340 (CETOP 03).
The body has a five chamber design, manufactured by Additive Manufacturing technology with stainless steel for high performance and low pressure drops. The valve is available with several spools in order to control different flow ranges.



2 ORDERING CODE

(1)		(2)		(3)	(4)	(5)		(6)		(7)
HD3	-	PS	-				-		-	10

(1) 4-way directional valve CETOP 03 – Pressure 32 MPa (320 bar)

(2) PS : Proportional electric control

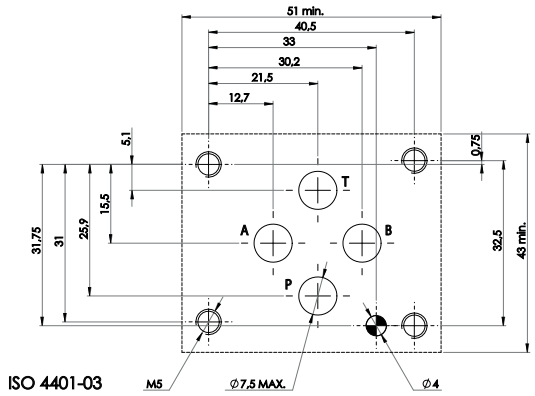
(3) Functional spool type (see 4):
-number is the main spool type
1: closed center (P, A, B, T blocked)
3: P blocked, A, B, T connected

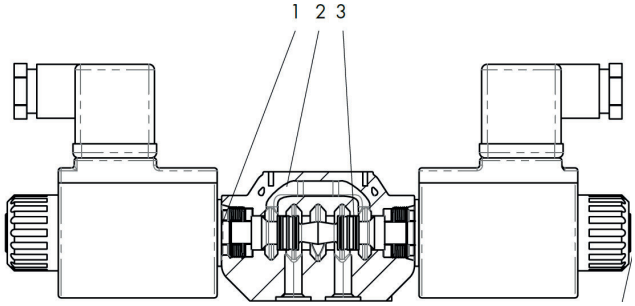
(4) spool nominal flow
P : 32 l/min with ΔP = 1 MPa (10 bar) (PA+BT or PB+AT)
R : 16 l/min with ΔP = 1 MPa (10 bar) (PA+BT or PB+AT)
05 : 05 l/min with ΔP = 1 MPa (10 bar) (PA+BT or PB+AT)
D : differential Qb = 2Qa: 32/16 l/min with fiΔP = 1 MPa (10 bar)

(5) letter is the solenoid or spring arrangement:
C : 2 solenoids, spool is springs centred
ML : 1 solenoid ("a") spool is centred + 1 end position
MLb : 1 solenoid ("b") spool is centred + 1 end position

(6) Type of coil and supply voltages
R2 : R= 4,35 Ω standard for V12D
R4 : R=11,4 Ω standard for V24DC

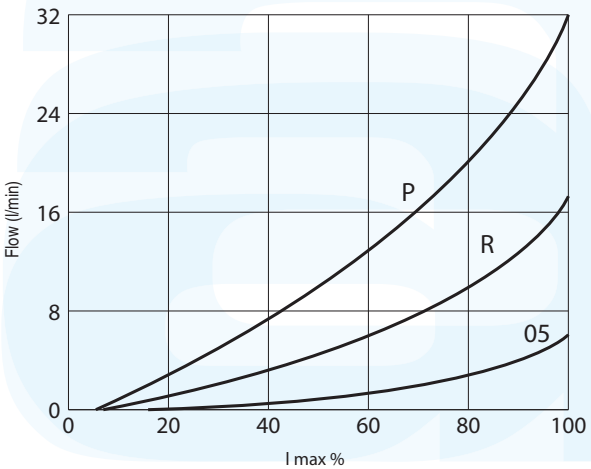
(7) Design number (progressive) of the valve.





3 TYPICAL DIAGRAMS

Typical flow curves of valves HD3-AMPS, with spools type P, R, 05, in standard configuration measured with mineral oil at 36 cSt and at 50°C at ΔP=01 MPa (10 bar) for flow P->B A -> T



The spool 3 shifts in to the valve body 2 subject to the action of springs and proportional solenoid 1. Spool 3, depending from its shape and its position in the valves body 2, opens and/or closes passages between P, A, B, T ports, thus controlling the direction and the rate of the hydraulic flow. Solenoid 1 is energized by electric current flowing-in through cables; in case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins, located at the end of the solenoids and accessible through the retaining nuts.

4 TECHNICAL DATA

Nominal flow rates	5, 16, 32 l/min
Maximum nominal pressure (P,A,B)	35 MPa (350 bar)
Maximum pressure at T port	21 MPa (2100 bar)
Maximum rec. Pressure drops	10 MPa (100 bar)
Protection DIN 40050	IP 65 (IP 69)
Duty cycle	100%
Service life	≥ 10^7 cycles
Installation and Dimensions	(see 6)
Mass	Approx 1,6 / 2,1 kg.

Electric Characteristics:

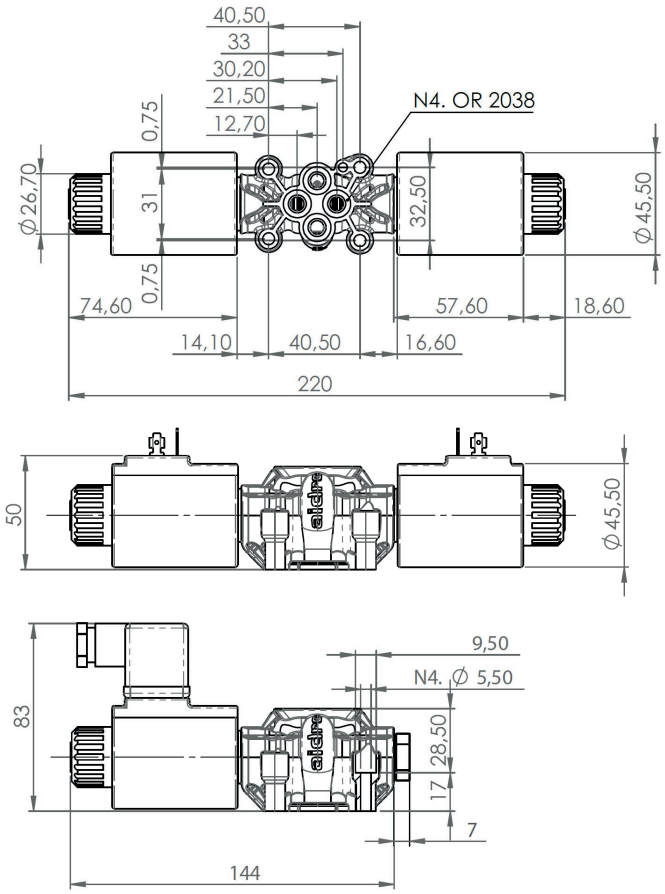
Valves type HD3-AMPS are operated by proportional solenoids that are rated for an average max power of 13,5 W. The values of nominal max. current are:
for coils type R2 (4,35 Ω): I max = 2,4 A
R4 (11,4 Ω): I max = 1,0 A

Currents to hydraulic proportional valves are normally supplied by an electronic driver based on PWM mode of operation, capable of full control of min and max values of current for drivers type UED-*

5 SPOOL IDENTIFICATION AND NOMINAL FLOW RATE

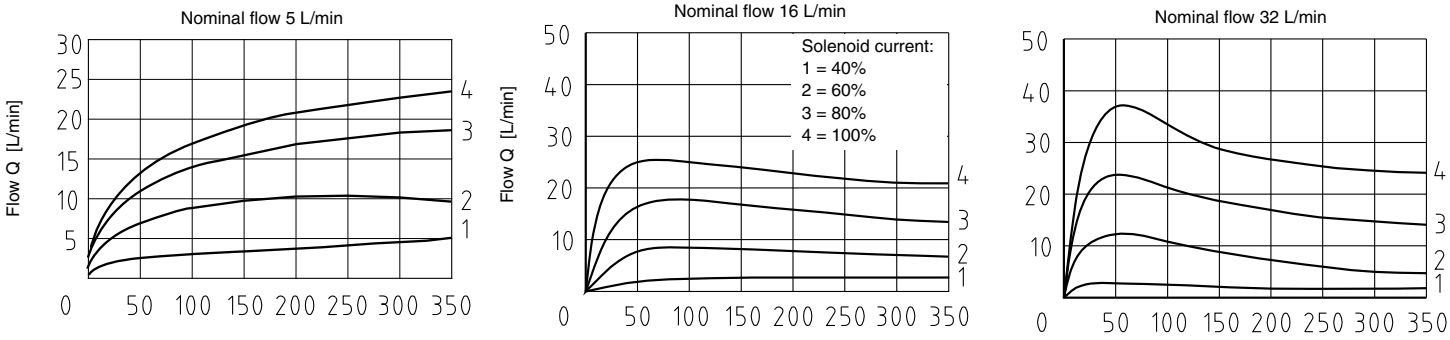
Nominal Flow rate 5 l/min			
HD3-AMPS-105ML-R		HD3-AMPS-305ML-R*	
HD3-AMPS-105MLb-R*		HD3-AMPS-305MLb-R*	
HD3-AMPS-105C-R*		HD3-AMPS-305C-R*	
Nominal Flow rate 16 l/min			
HD3-AMPS-1RML-R*		HD3-AMPS-3RML-R*	
HD3-AMPS-1RMLb-R*		HD3-AMPS-3RMLb-R*	
HD3-AMPS-1RC-R*		HD3-AMPS-3RC-R*	
Nominal Flow rate 32 l/min			
HD3-AMPS-1PML-R*		HD3-AMPS-3PML-R*	
HD3-AMPS-1PMLb-R*		HD3-AMPS-3PMLb-R*	
HD3-AMPS-1PC-R*		HD3-AMPS-3PC-R*	
Differential flow: Qb=2Qa (example P→B=32 l/min and A→T= 16 l/min)			
HD3-AMPS-1DC-R*		HD3-AMPS-3DC-R*	

6 INSTALLATION DIMENSIONS (mm)



7 FLOW RATES AND PRESSURE DIFFERENTIAL

For a given ΔP on a given valve the flow rates are proportional to the driving current; for a given driving current on a given valve, the flow rates increase with the increasing of the ΔP up to certain limits. Typical limit curves are:



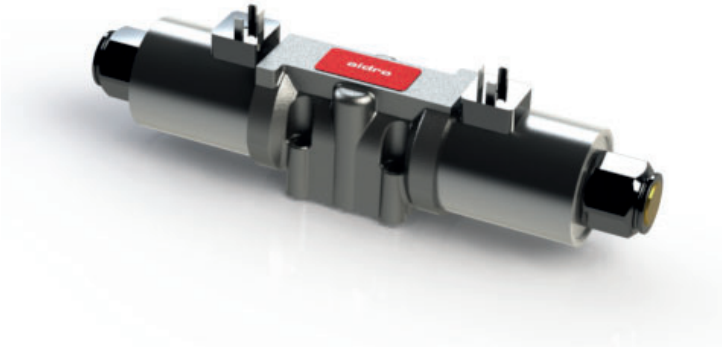
PROPORTIONAL 4-WAY CONTROL VALVES SOLENOID OPERATED

HD5-PS-*

63 l/min 32 MPa (320 bar)

1 DESCRIPTION

Valves HD5-PS are proportional directional control valve with subplate mounting interface acc. to ISO 4401, DIN 24340 (CETOP 05). The design of the body is an high quality five chamber casting. The valve is available with different spools able to control different flow ranges. In the standard version, the valve housing is phosphated for 240 h salt spray protection acc. to ISO 9227.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
HD5	-	PS	-		-				/	10

(1) HD5 : 4-way directional valve CETOP 05 – Pressure 32 MPa (320 bar)

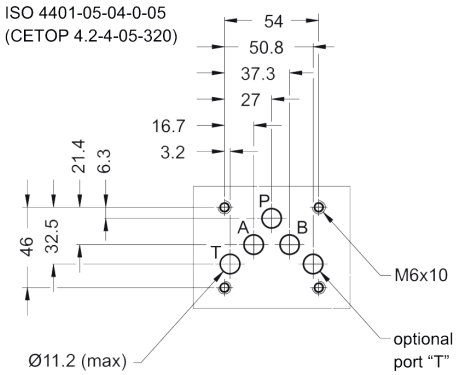
(2) PS : Proportional electric control

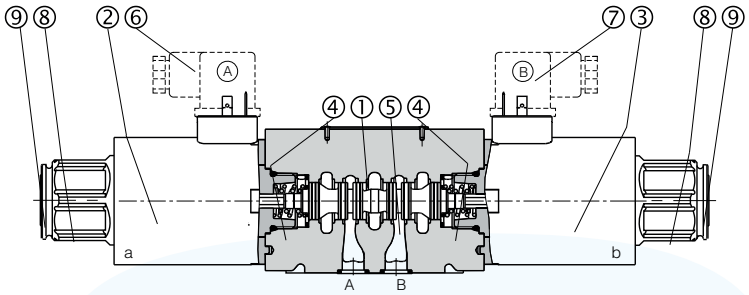
(3) Functional spool type (see 4)
- -number is the main spool type
  - 1: closed center (P, A, B, T blocked)
  - 3: P blocked, A, B, T connected
- -spool nominal flow
  - P: 63 l/min with ΔP = 1 MPa (10 bar) (PA+BT or PB+AT)
  - R: 32 l/min with ΔP = 1 MPa (10 bar) (PA+BT or PB+AT)
  - D: differential Qb = 2Qa: 63/32 l/min with ΔP = 1 MPa (10 bar)
- -solenoid and springs arrangements
  - C : 2 solenoid, spool is springs centred
  - ML : 1 solenoid (“a”) spool is centred + 1 end position
  - MLb : 1 solenoid (“b”) spool is centred + 1 end position

(4) Options and variants:
- K : extended manual overrides(see 7)
- AK : extended manual overrides with air bleeding valves (see 8)
- ZC : zinc plated valves (see 9)

(5) Type of coils and supply voltages
- R1 : R= 3,78 Ω
- R2 : R= 4,7 Ω standard for V12DC;
- R4 : R=13,9 Ω standard for V24DC;

(6) Design number (progressive) of the valve.





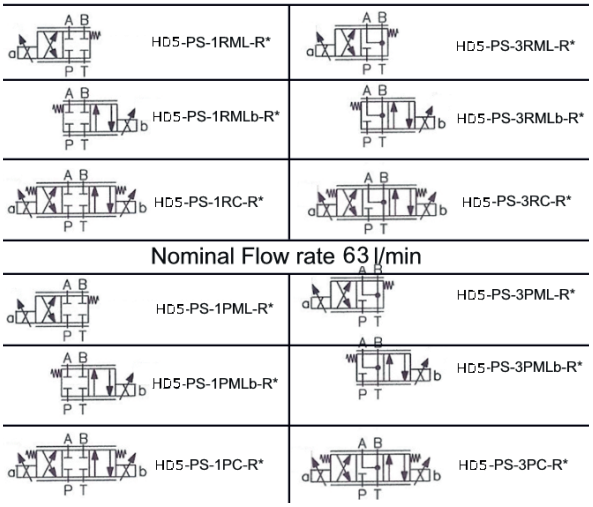
The spool 1 shifts in to the valves body 5 subject to the action of springs 4 and proportional solenoid 2 and 3. Spool 1, depending from its shape and its position in the valves body, opens and/or closes passages between P, A, B, T ports, thus controlling the direction and the rate of the hydraulic flow. Solenoid 2 and 3 is energized by electric current flowing-in through cables; in case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins, located at the end of the solenoids and accessible through the retaining nuts.

3 TECHNICAL DATA

Nominal flow rates	32, 63 l/min	Electric Characteristics:
Maximum nominal pressure (P,A,B)	32 MPa (320 bar)	Valves type HD5-PS-* are operated by proportional solenoids that are rated for an average max power of 13,5 W. The values of nominal max. current are: for coils type R1 (3,78 Ω): I max = 2,4 A R2 (4,7 Ω): I max = 1,9 A R4 (13,9 Ω): I max = 1,1 A Currents to hydraulic proportional valves are normally supplied by an electronic driver based on PWM mode of operation, capable of full control of min and max values of current for drivers type UED-*
Maximum pressure at T port	21 MPa (210 bar)	
Maximum rec. Pressure drops	10 MPa (100 bar) (see 6)	
Protection DIN 40050	IP 67	
Duty cycle	100%	
Service life	≥ 10^7 cycles	
Installation and Dimensions	(see 10)	
Mass	Approx 4,3 / 5,8 kg.	

4 SPOOL IDENTIFICATION AND NOMINAL FLOW RATE

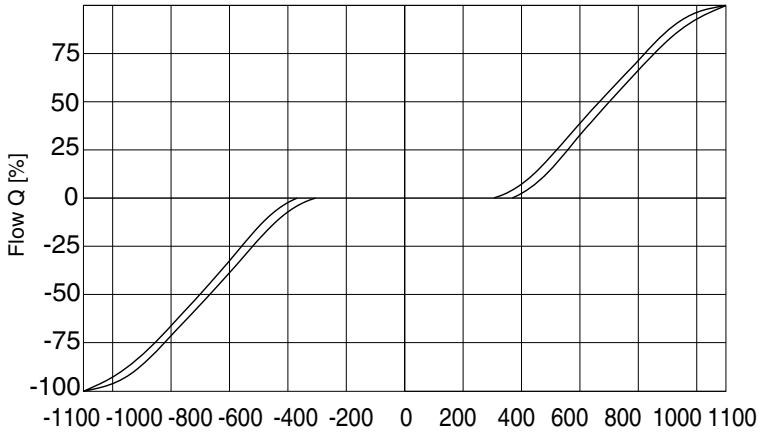
Nominal Flow rate 32 l/min



Nominal Flow rate 63 l/min

5 TYPICAL DIAGRAMS

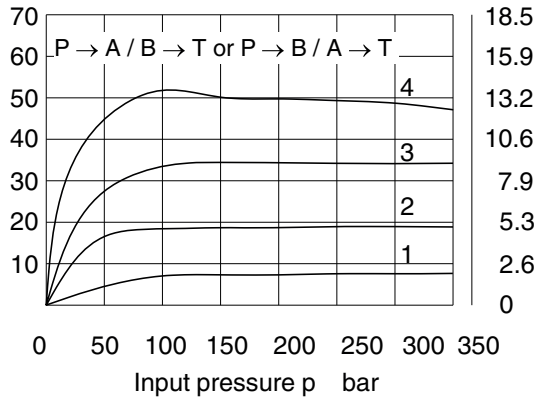
Measured at Δp = 10 bar ν = 32 mm ^{2}/s (156 SUS),



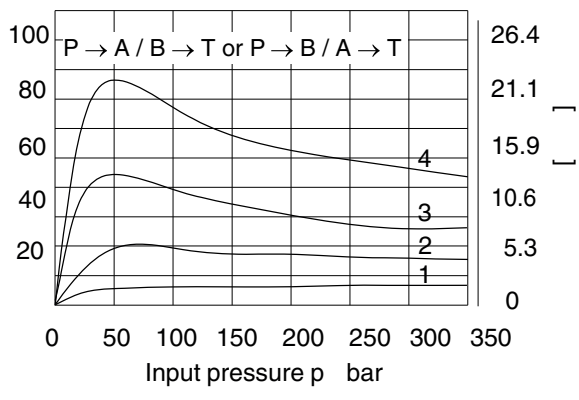
6 FLOW RATES AND PRESSURE DIFFERENTIAL

For a given ΔP on a given valve the flow rates are proportional to the driving current; for a given driving current on a given alve, the flow rates increase with the increasing of the ΔP up to certain limits. Typical limit curves are:

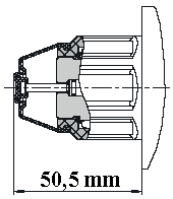
Nominal flow 32l/min



Nominal flow 63l/min



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.

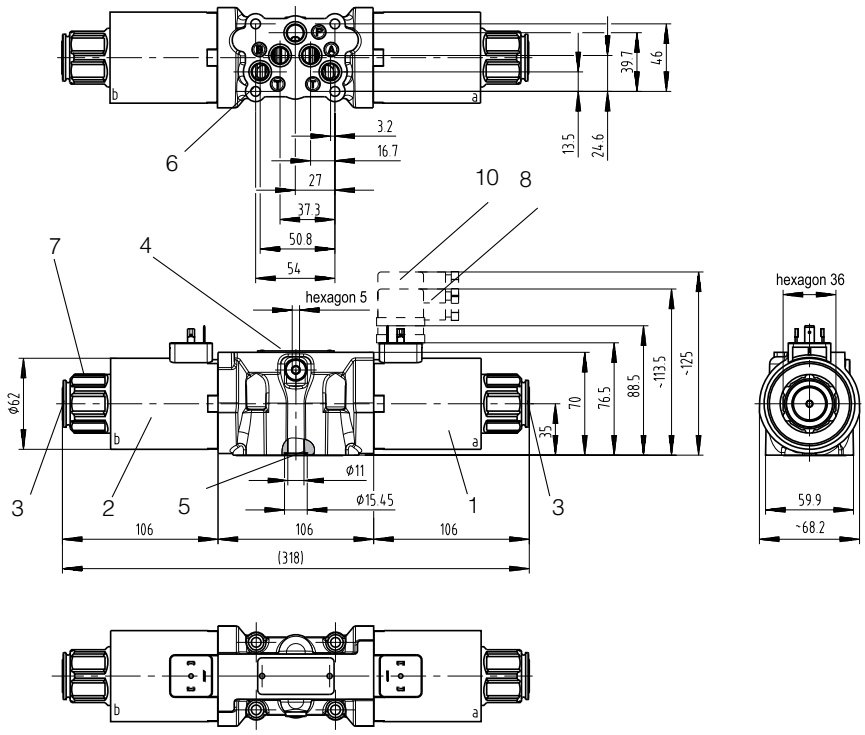
8 VERSION “AK”: EXTENDED PIN AND VALVE AIR BLEEDING

Proportional valves according to “AK” version have extended emergency actuator pins that incorporate air bleeding valves, to purge air from the solenoid tube for a simplified start-up of the system. 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.

9 VERSION “ZC”: ZINC PLATED VALVES

Solenoid valves according to “ZC” version have central body zinc plated and protected against every type of corrosion due to saline ambiance or other aggressive chemicals. Zinc thickness are on the valve body: 10-15 µm; and 8/12 µm on solenoids.

10 INSTALLATION DIMENSIONS (mm)



All valves HD5-PS-* conform with ISO and CETOP specifications for mounting surface dimensions (see also front page) and for valves height. When assembled to its mounting plate, valve HD5-ES-* must be fastened with 4 fixing bolts (socket head screws to ISO 4762) M6 x 40 mm (or M6 x * according to the number of modules) of class 12,9 (ISO898) tightened at 12 Nm torque. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 5 seals of Quad-Ring type 12,42 x 1,68 x 1,68 mm.

11 HYDRAULIC FLUIDS

Seals and materials used on standard valves HD5-* are fully compatible with hydraulic fluids of mineral oil 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.

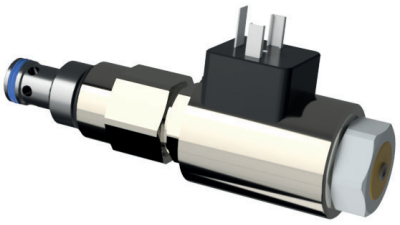
PILOT OPERATED PRESSURE RELIEF VALVE

PMO*-78/*

60 l/min 35 MPa (350 bar)

1 DESCRIPTION

Proportional pressure relief valve in cavity 7/8" 14 UNF.
The valve is available in two configurations: standard, where with no current there is no pressure in the system, and positive where with no current you have the desired pressure in the system.



2 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)
PMO	*	-	78	/		-		-	

(1) PMO : Proportional pressure relief valve

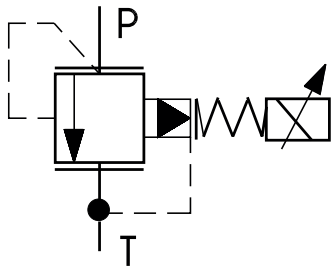
(2) Function:
no designation : Standard (relief 0 bar with 0 current)
P: Positive (relief 180 bar with 0 current)

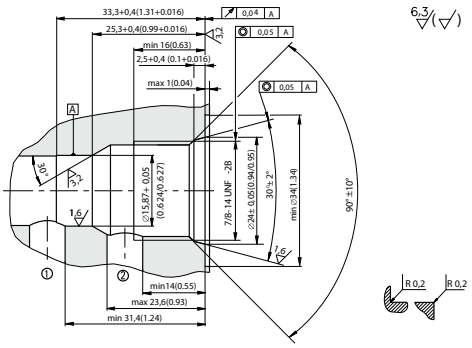
(3) 78: cavity SAE10 (7/8" 14 UNF)

(4) Pressure range:
12: up to 120 bar (1740 PSI)
21: up to 210 bar (3046 PSI)
35: up to 350 bar (5076 PSI)

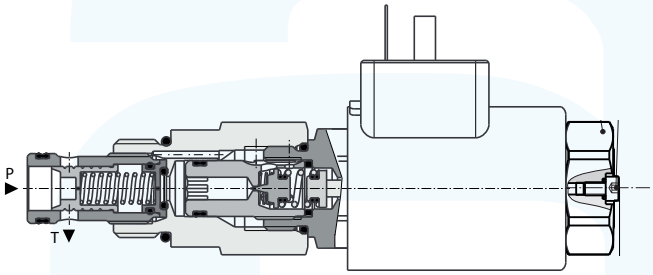
(5) Electric voltage and solenoid coils
012CDR: coil(s) for V12DC with quenching diode
024CDR: coil(s) for V24DC with quenching diode
012C: coil(s) for V12DC
024C: coil(s) for V24DC

(6) Coil connection
no designation : DIN 43650-A ISO 4400
AMP: Amp Junior Timer
D: Deutsch DT04-2P
DR: quenching diode
DRD: quenching diode, deutsch connector

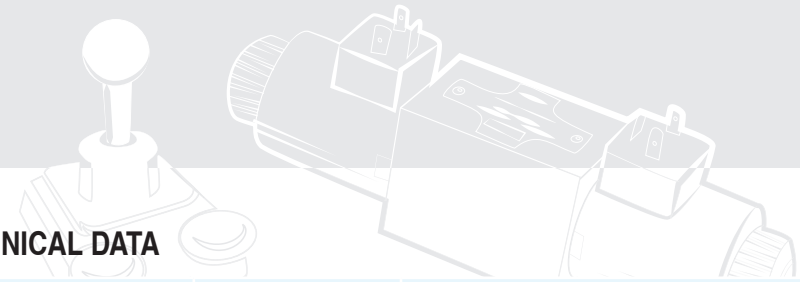




The valve is designed for continuos regulation of pressure in the circuit. It is pilot operated from a pilot stage. The increase/decrease of the pressure P in the system is proportional to the energizing current at solenoid. For a self bleeding of the valve it is recommended to install the valve in vertical position with coil on the bottom. If it is not possible, it is necessary to act on the bleeding screw in order to assure a proper function of the valve.



0014



3 TECHNICAL DATA

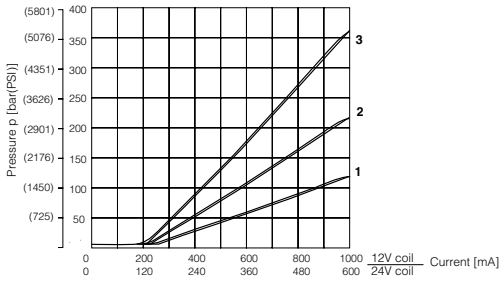
Nominal flow	50 l/min	Electric charateristics:
Maximum rec. flow rate	50 l/min	Valve type PMO*.78 are operated by solenoid that are energized from a D.C. voltage supply: V 12 DC = 012C V 24 DC = 024C With an appropriate electrical driver in order to control the input current at the valve Coils have an integrated quenching diode and their characteristics are: V 12 DC - limit current 1,0 A - 6,5 Ohm V 24 DC - limit current 0,6 A - 20,8 Ohm
Maximum nominal pressure	35 MPa (350 bar)	
Optimal dither control	250 Hz	
Valve Hysteresis	<5 %	
Protection	IP 67	
Duty cycle	100%	
Installation and dimension	(see 5)	
Valve Body	Steel	
Mass	0,58 kg	
Note: pressure in T line influences valve performances		

4 TYPICAL DIAGRAMS

Typical P-Q curves for valves PMO*.78 in standard configuration, with mineral oil at ν=32 mm²/s and at T=40°C.

p-I Chart Measured at ν = 32 mm²/s (156 SUS)

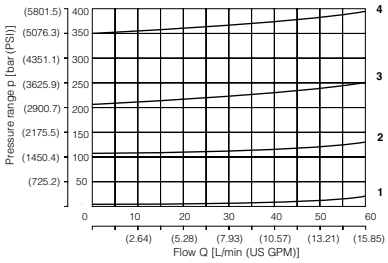
p = f (I), Q= 5 L/min (1.321 GPM)



3	Pressure range 35
2	Pressure range 21
1	Presseure range 12

Attention:
The proportional pressure relief valve is not mechanically protected and it does not perform the relief valve function.

p-Q Chart Measured at ν = 32 mm²/s (156 SUS)

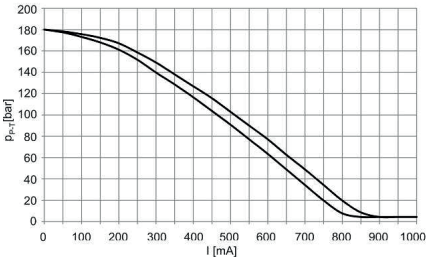


4	Pressure range 35
3	Pressure range 21
2	Presseure range 12
1	Min. pressure (range 35)

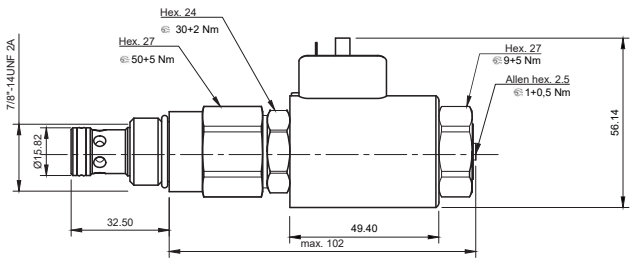
PMOP.78 pressure setting

p-I Characteristics

Valve performance flow 5 dm3/min, direction P-T



5 INSTALLATION DIMENSIONS (mm)



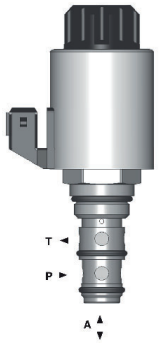
6 HYDRAULIC FLUIDS

Seals and materials used on standard valves PMO*.78 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.

DIRECT OPERATED PRESSURE REDUCING VALVE
PRO-M24.*
40 l/min 9 MPa (90 bar)

1 DESCRIPTION

Proportional pressure reducing valve direct operated in cavity M24 x 1,5. The valve is available in different pressure ranges and its robust design permits a stable and reliable functioning.
Valves are normally supplied with coils with integrated quenching diode in order to protect the electronics connected with the valve.



2 ORDERING CODE

(1)		(2)		(3)		(4)	(5)
PRO	-	M24	/		-		

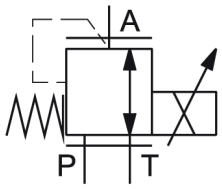
(1) PRO:Proportional pressure reducing valve direct operated

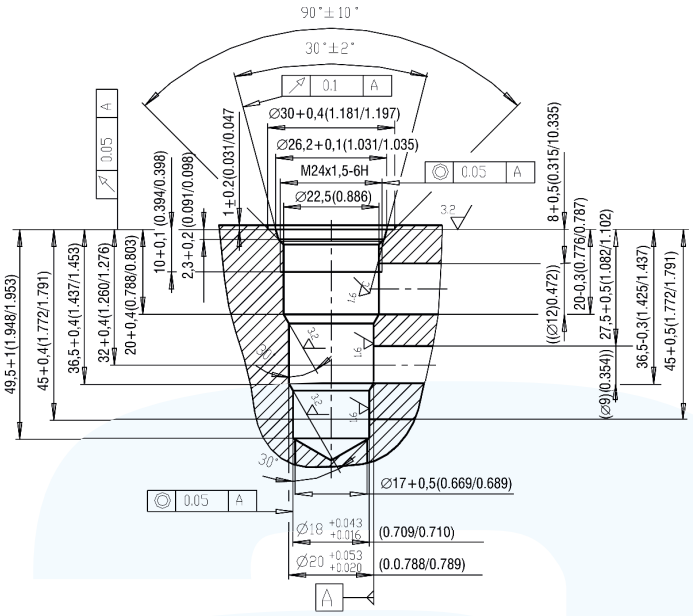
(2) M24:metric cavity M24x1,5 (see drawing)

(3) Max. reducing pressure
- 18 bar
- 20 bar
- 30 bar
- 80 bar

(4) Electric voltage and solenoid coils
- 012C: coil(s) for V12DC with quenching diode
- 024C: coil(s) for V24DC with quenching diode

(5) Coil connection:
- AMP: Amp Junior Timer
- D: Deutsch DT04-2P





The valve is designed for continuos regulation of pressure in the circuit. It is direct operated. The increase/decrease of the pressure P in the system is proportional to the energizing current at solenoid. The reduced pressure is defined by coil current as shownon the static pressure characteristic.

3 TECHNICAL DATA

Nominal flow	40 l/min
Maximum nominal pressure	9 MPa (90 bar)
Optimal PWM freq.	150 Hz
Protection	IP 67 or IP69K (Deutsch)
Duty cycle	100%
Installation and dimension	(see 5)
Valve Body	Steel
Mass	0,4 kg

Electric characters:

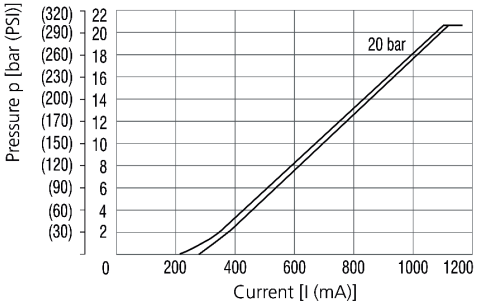
Valve type PRO-M24 are operated by solenoid that are energized from a D.C. voltage supply
V 12 DC = 012C
V 24 DC = 024C
with an appropriate electrical driver in order to control the input current at the valve

Coils have an integrated quenching diode and their characteristics are:
V 12 DC - limit current 1,5 A - 5,0 Ohm
V 24 DC - limit current 1,0 A - 13,4 Ohm

4 TYPICAL DIAGRAMS

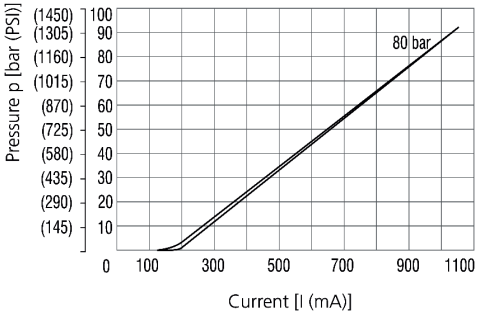
Reduced pressure related to control signal

Port A, range 0 - 20 bar (290 PSI), Q = 0 lpm (GPM)
Port P, inlet pressure 50 bar (730 PSI)



Reduced pressure related to control signal

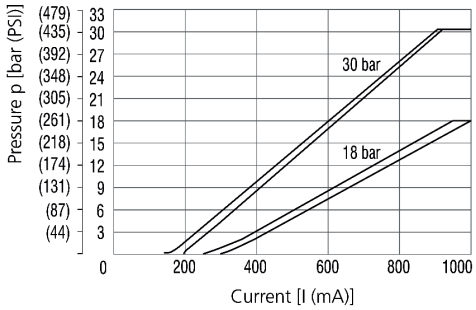
Port A, range 0 - 80 bar (1160 PSI), Q = 0 lpm (GPM)
Port P, inlet pressure 90 bar (1305 PSI)



Reduced pressure related to control signal

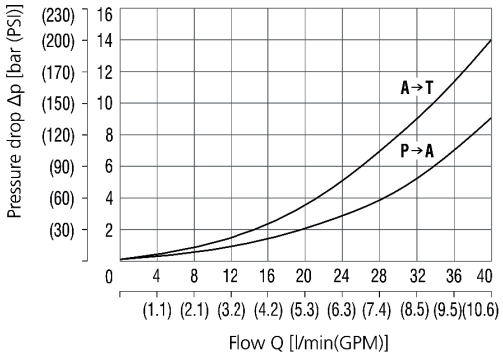
Port A, range 0 - 18 bar (260 PSI), Q = 0 lpm (GPM)
Port P, inlet pressure 50 bar (730 PSI)

Port A, range 0 - 30 bar (435 PSI), Q = 0 lpm (GPM)
Port P, inlet pressure 50 bar (730 PSI)



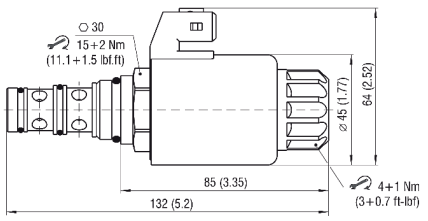
Pressure drop related to flow rate

A-T, Valve coil de-energized (relieving function)
P-A, Valve coil energized (reducing function)

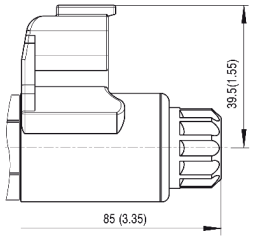


5 INSTALLATION DIMENSIONS (mm)

AMP Junior Timer - IP67

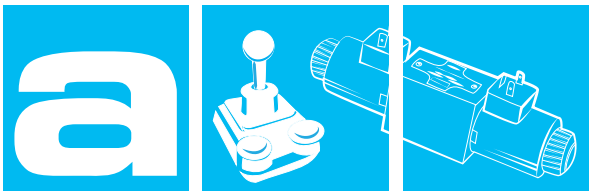


Deutsch DT04-2P - IP69K



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves PRO-78 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.

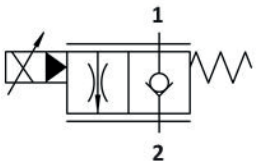


DIRECT OPERATED FLOW CONTROL VALVE
PFC-34-03-*
30 l/min - 250 bar

1 DESCRIPTION

The PFC-34 is a proportional solenoid operated, two-way, poppet-type, normally closed, screw-in hydraulic cartridge valve in cavity 3/4"-16 UNF for low leakage blocking and load-holding applications. When de-energized, the valve operates as a check valve and allows flow from 2 to 1, while blocking flow from 1 to 2. When energized, the 1 to 2 flow path is opened: flow is directly proportional to the current applied to the coil.





2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)
PFC	-	34	-	03	-		-	

(1) PFC: proportional flow control valve

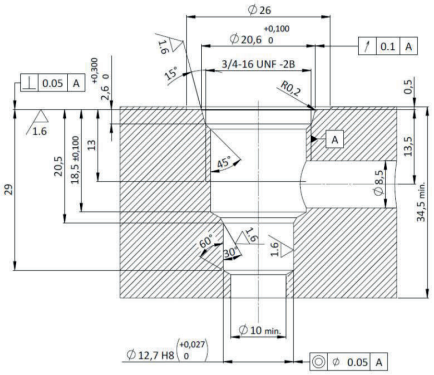
(2) 34: cavity SAE08 (3/4"-16 UNF)

(3) 03: without manual override

(4) Electric voltage and solenoid coils (see table 5):
0000: no coil
012C coil for V12DC
024C coil for V24DC

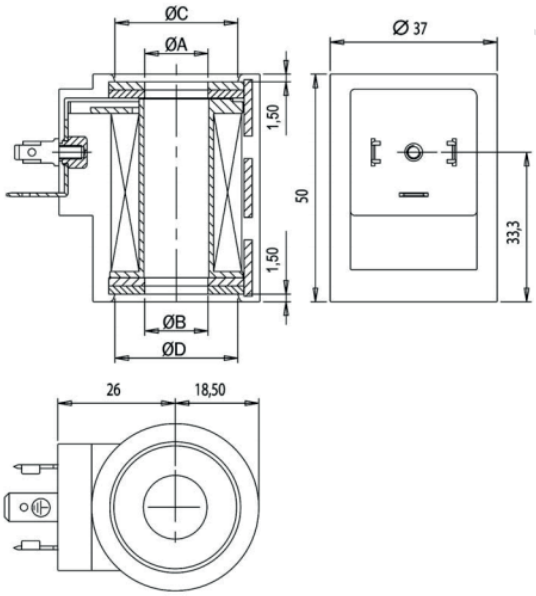
(5) Options for coil connection:
No designation: standard connection ISO4400/DIN 43650/A
AMP: AMP Junior
C: flying leads

(6) Design number (progressive) of the valve.



3 TECHNICAL DATA

Nominal flow	30 l/min	Electric characters:	
Maximum rec. flow rate	30 l/min	Valve type PFC-34-03-* are operated by solenoid that are energized from a D.C. voltage supply: V 12 DC = 012C V 24 DC = 024C With an appropriate electrical driver in order to control the input current at the valve	
Maximum nominal pressure	25 MPa (250 bar)		
Optimal dither control	250 Hz		
Valve Hysteresis	<5 %		
Protection	IP 67		
Duty cycle	100%		
Installation and dimension	(see 5)		
Valve Body	Steel		
Mass	0,150 kg		
Note: pressure in T line influences valve performances			



4 COILS DIMENSIONS

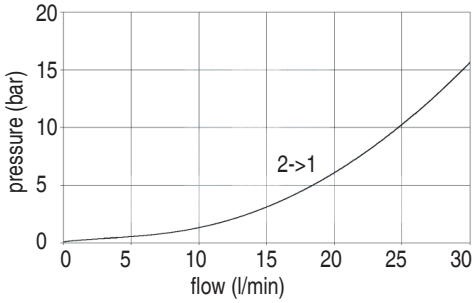
	DIN	FL	AMP
ØA	16,1	16,1	16,1
ØB	16,1	16,1	16,1
ØC	20	20	20
ØD	20	20	20

5 COILS TYPE C38 (Ø 16 mm - 26 w: 35 VA)

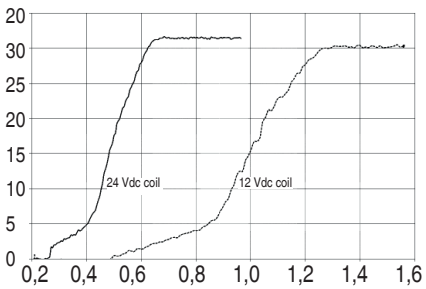
Coils ISO/DIN	voltage DC/RAC	nominal current (A)	resistence 20 C ( )	nominal power (W)	insulation class
C38-012C	V 12 DC	1,55	7,7	18,6	F
C38-024C	V 24 DC	0,8	31	19	

6 TYPICAL DIAGRAMS

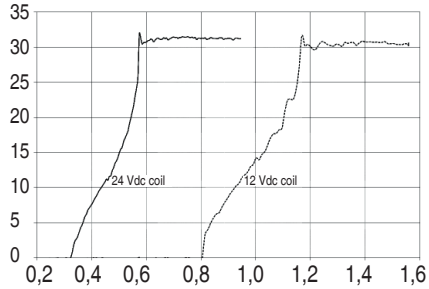
p - Q Chart



p - I Chart
Δp = 15 bar

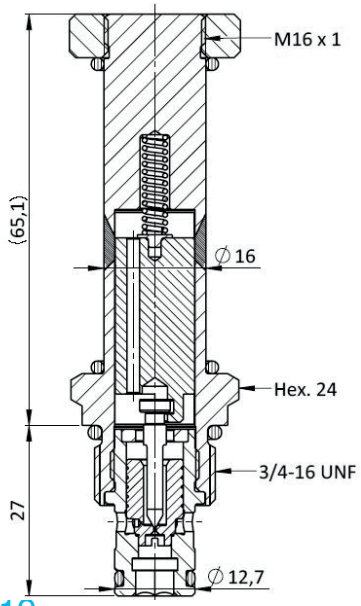


p - I Chart
Δp = 250 bar



Note: The performance chart illustrates flow handling capacity 2 to 1(energized with max current @24Vdc). p/Q curves are recorded at TOil = 40°C and 46 cSt.

7 INSTALLATION DIMENSION



8 HYDRAULIC FLUIDS

Seals and materials used on standard valves PFC-34-03-* 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.

DIRECT OPERATED FLOW CONTROL VALVE
PFC-78-*
100 l/min - 350 bar

1 DESCRIPTION

The PFC-78 is a proportional solenoid operated, two-way, poppet-type, normally closed, piloted, screw-in hydraulic cartridge valve in cavity 3/4"-16 UNF for low leakage blocking and load-holding applications. When de-energized, the valve operates as a check valve and allows flow from 2 to 1, while blocking flow from 1 to 2. When energized, the 1 to 2 flow path is opened: flow is directly proportional to the current applied to the coil.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)
PFC	-	78	-		-		-	

(1) PFC: proportional flow control valve

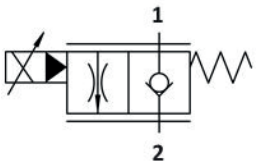
(2) 78: cavity SAE10 (7/8"-14 UNF)

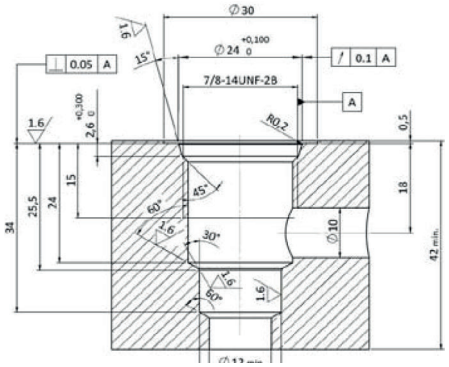
(3) 03: without manual override
05: screw manual override

(4) Electric voltage and solenoid coils (see table 5):
0000: no coil
012C coil for V12DC
024C coil for V24DC

(5) Options for coil connection:
No designation: standard connection ISO4400/DIN 43650/A
AMP: AMP Junior
C: flying leads

(6) Design number (progressive) of the valve.





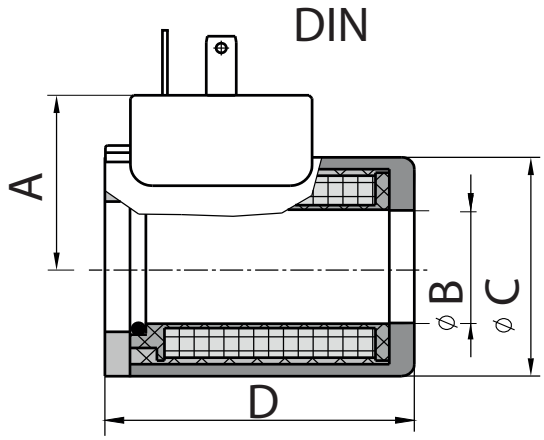
3 TECHNICAL DATA

Nominal flow 2→1 with △p=35 bar	70 l/min
Maximum rec. flow rate	100 l/min
Maximum nominal pressure	100 MPa (350 bar)
Optimal dither control	70 Hz
Valve Hysteresis	<5 %
Protection	IP 67
Duty cycle	100%
Installation and dimension	(see 5)
Valve Body	Steel
Mass	0,3 kg
Note: pressure in T line influences valve performances	

Electric characters:

Valve type PFC-78-* are operated by solenoid that are energized from a D.C.
voltage supply:
V 12 DC = 012C
V 24 DC = 024C
With an appropriate electrical driver in order to control the input current at the valve

4 COILS DIMENSIONS



	DIN	FL	AMP
ØA	16,1	16,1	16,1
ØB	16,1	16,1	16,1
ØC	20	20	20
ØD	20	20	20

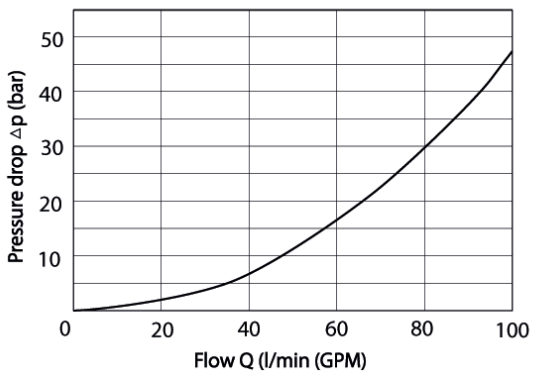
5 COILS TYPE BO2 (Ø 19 mm)

Coils ISO/DIN	voltage DC/RAC	nominal current (A)	resistance 20 C ( )	nominal power (W)	insulation class
BO2-12R2	12	1,7	4,68	20	F
BO2-24R4	24	0,8	20,6	19	

6 TYPICAL DIAGRAMS

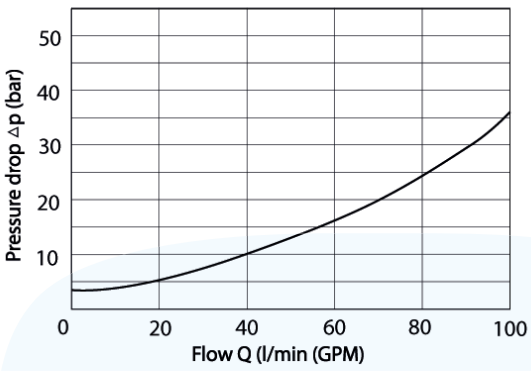
Pressure drop related to flow rate

Flow direction 2 -> 1, Control current I_c =1,25 I_{max}



Pressure drop related to flow rate

Flow direction 2 -> 1, Control current I_c = 0 mA



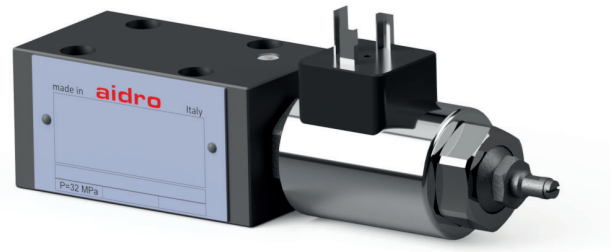
7 HYDRAULIC FLUIDS

Seals and materials used on standard valves PFC-78-* 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.

PRESSURE CONTROL VALVE WITH PROPORTIONAL CONTROL
HD3-PMO
1,5 l/min – 35 Mpa (350 bar)

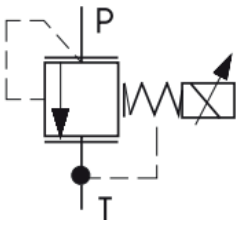
1 DESCRIPTION

The HD3-PMO is a direct operated pressure control valve with electric proportional control. Its typical use is as pilot control of two-stages valves or for pressure control in hydraulic circuits.
Air bleeding is necessary prior valve usage. Cartridge is zinc plated and the body is phosphate coated. Optional Zinc-Nickel coating (720h) is available.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)	(7)	(8)		(9)
HD3	-	PMO	-	34	/		-		-				/	10

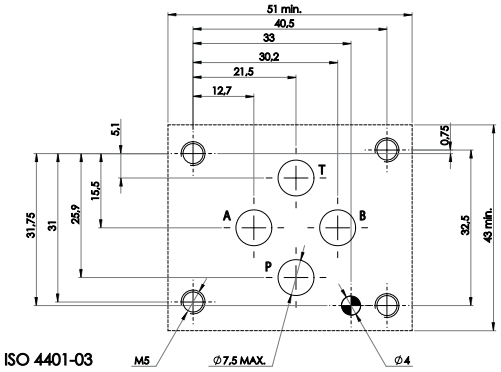


(1) Stackable pressure control valve CETOP 03 - Pressure 350 bar

(2) PMO: proportional pressure relief

(3) Cavity:
34: SAE 08 (3/4" 16 UNF)

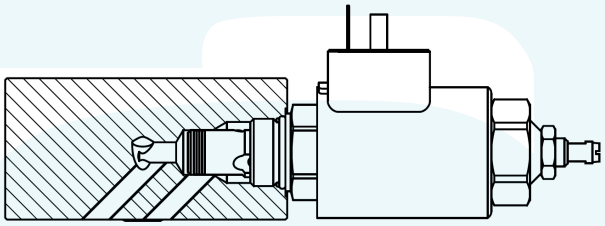
(4) Pressure range:
3: up to 3,0 Mpa (30 bar)
6,3: up to 6,0 Mpa (60 bar)
12: up to 12 Mpa (120 bar)
20: up to 20 Mpa (200 bar)
35: up to 35 Mpa (350 bar)



(5) Code reserved for option and variants:
V: Viton seals
ZN: Zinc-nickel coating (720h)

(6) Electric voltage and solenoid coil
012C: coil for V12DC
024C: coil for V24DC

(7) Coil connection (see)
No designation: DIN 43650-A ISO 4400
AMP: Amp Junior Timer (vertical configuration)
AMPX: Amp Junior Timer (axial configuration)
D: Deutsch



(8) Quenching diode option
no designation (standard): no quenching diode
DR: quenching diode

(9) Design number (progressive) of the valve

0022

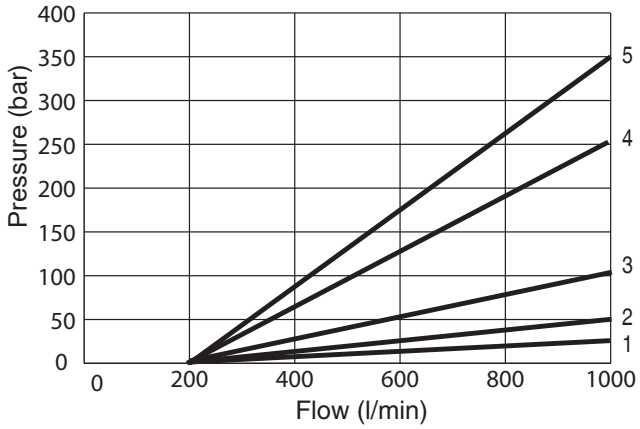
3 TECHNICAL DATA

Maximum rec. Flow rate	1.5l/min	Electric characters:
Maximum nominal pressure	35 MPa (350 bar)	Valve type HD3-PMO are operated by a solenoid that is energized from a DC voltage supply: V12DC = 012C V24DC = 024C
Optimal dither control	250 Hz	
Valve Hysteresis	<5 %	
Protection	IP65/IP67/IP69K (depending on connector used)	
Duty cycle	100%	
Installation and dimension	(see 5)	
Valve Body	Steel	
Cartridge body	Steel	
Weight	Approx. 1,7 kg	

Note: back pressure in T-channel automatically increases the set cracking pressure of the valve in a ratio of 1:1

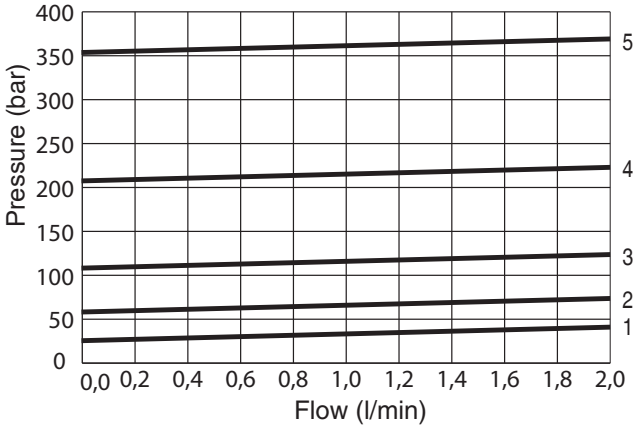
4 TYPICAL DIAGRAMS

Relief pressure related to control signal
Q=0,2 l/min (0,05 GPM), pressure in port T=0 bar, PWM 160Hz



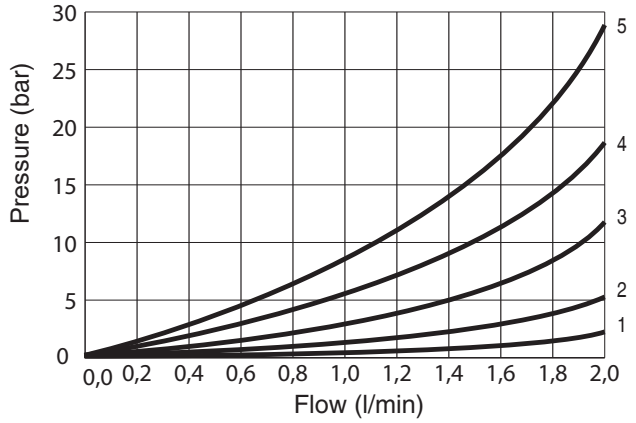
PRESSURE RANGE	3	6	12	21	35
	1	2	3	4	5

Relief pressure related to flow rate

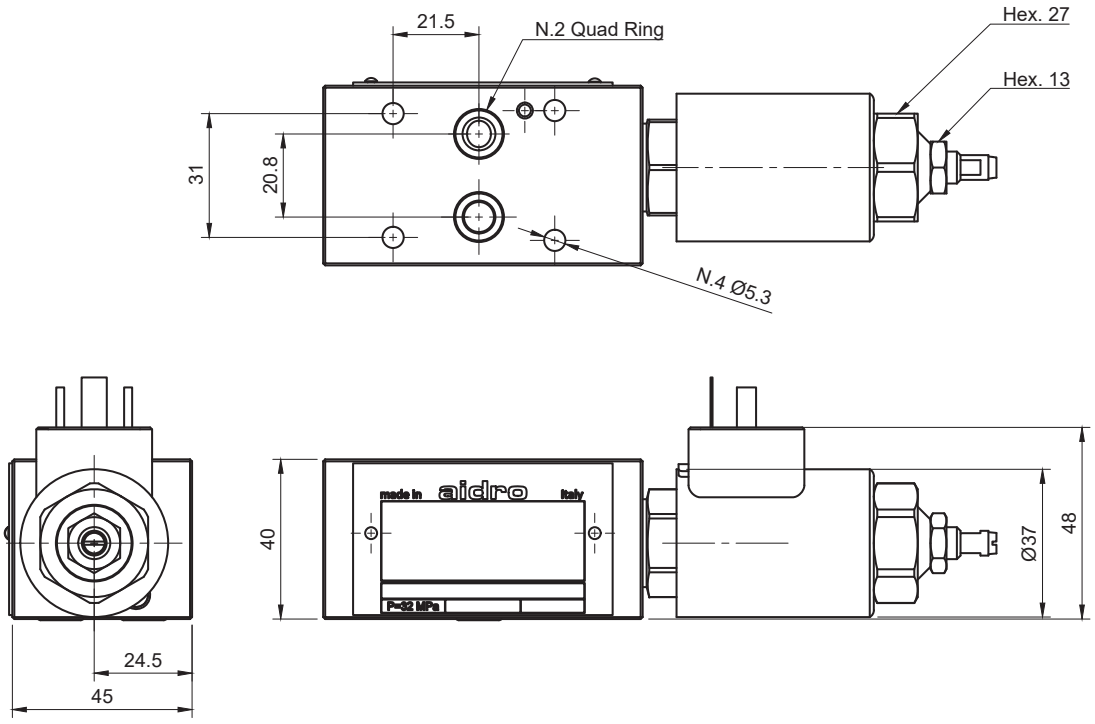


PRESSURE RANGE	3	6	12	21	35
	1	2	3	4	5

Pressure drop related to flow rate
0% of control current, P-T direction



5 INSTALLATION DIMENSIONS



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves HD3-PMO 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.

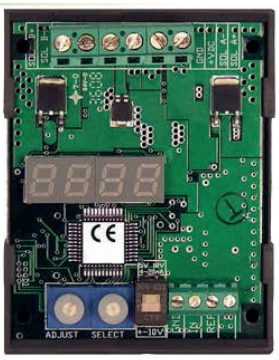
PROPORTIONAL VALVE

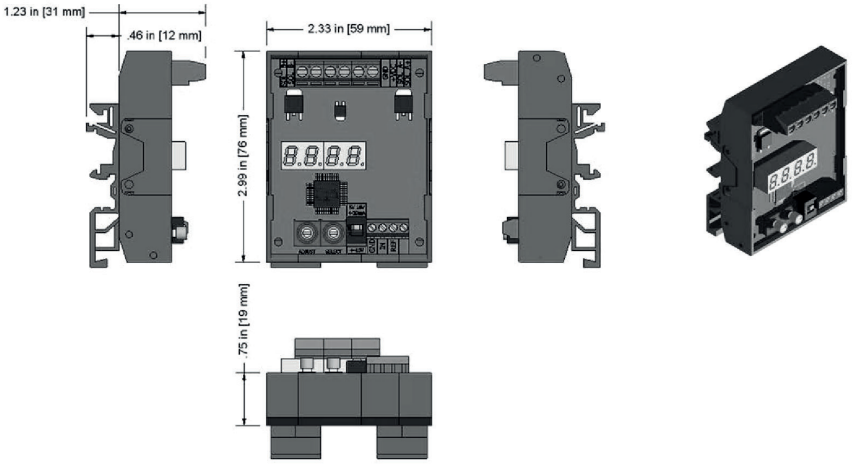
UNIVERSAL ELECTRONIC DRIVER
UED-*
for solenoid operated proportional valves

1 DESCRIPTION

The driver controls one or two solenoids of a proportional valve. Its construction permits an easy assembly directly on the DIN rail of the electric cabinet. By the use of two selectors it is possible to easily configure all the parameters without the need of special tools or programming devices.
A 4 digit led display shows all the necessary informations.

- Microcontroller design
- Independent adjustments (ramp up - ramp down)
- 4 digit led display
- Display and adjust actual values (current&voltage)
- Easy access to the menu setup
- Wide ramp time range
- Simple control with analog input, locally supplied reference voltage
- No heat sink required
- Electronic limiting circuit/short circuit proof
- Reverse polarity, command input protection
- Load can be connected and disconnected live





2 ORDERING CODE

(1)		(2)
UED	-	

(1) UED: Universal Electric Driver for Proportional valves
(2) Configuration:
S: for single solenoid proportional valves
D: for double solenoid proportional valves

3 SET UP PROCEDURE

Available input selection UED-S	Available input selection UED-D
	DIP Switch in ON/UP position
“in” :10 -->(0 to 10V) ** default	“in” :10 -->(0 to 10V) ** default
“in” :5 --> (0 to 5V)	“in” :5 --> (0 to 5V)
“in” :420 --> (4 to 20 mA)	“in” :420 --> (4 to 20 mA)
	DIP Switch in OFF/Down position
	“in” : -10 -->(-10 to 10V)

(1) At power up, the display will show either the output current signal or the input signal (Default display setting shows the output signal). The decimal point will be flashing.
(2) Rotate SELECT to enter the set-up mode. Parameter abbreviation is indicated on the display
(3) When you reach the setting you want to modify, when the desired setting to be modified is selected, rotate ADJUST up or down to the desired value.
(4) To modify another setting, rotate SELECT again and repeat.
(5) The Driver is fully functional during the set-up procedure with any adjustments effective immediately.
(6) In order to write the new settings in the memory and return to normal mode of operation, rotate „SELECT“ until the display shows „SR“ and then rotate „ADJUST“ from 0 to 1 or wait for 100 seconds.
(7) If you do not want to save the new settings you have just modified, you must disconnect the Driver from the power supply before the end of the 100 seconds to restore precious settings.
(8) After saving parameters to memory, the decimal point will be flashing and the Driver display will be back showing either the output current signal or input signal depending on your „di“ selection.
(9) To start over completely, you can restore the factory settings by rotating SELECT to rFP and then rotate ADJUST up past 10 for the display to reset (NOTE for Step 9: you may have to adjust your Input Signal Setting again if you reset to factory settings.)

4 TECHNICAL DATA

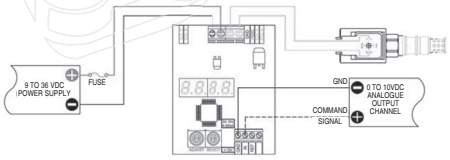
Operating voltage:	9-36 V DC
Maximum output current:	3,00 A
Input signal:	0-5 V; 0-10V; 4-20 mA
Maximum ramp time:	99,5 s
Linearity:	40-450 Hz
Operating Temperature:	-40 .. 80 °C
Mounting:	DIN rail (open)

5 SETTING RANGES

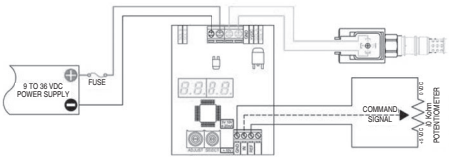
Parameter	Description	Adjustable Range
Hi *	HIGH, Maximum Current Output	0,20 - 3,00 A
Lo *	LOW, Minimum Current Output (see note 1)	0,00 - 2,99 A
rUP *	RAMP UP, Time for Output to increase from min to max	0,0 - 99,5 s
rdn *	RAMP DOWN, Time for Output to decrease from max to min	0,0 - 99,5 s
Cdb	COMMAND DEADBAND, Output disabled if command signal is less then deadband	0 - 5 %
JC	JOYSTICK CALIBRATION / INPUT OFFSET COMPENSATION, midpoint between a and b at 50%	40 - 50 - 60%
dFr	DITHER FREQUENCY	40 - 450 Hz
in	INPUT SIGNAL SELECTION: 5 - Voltage signal 20 - Voltage signal 420 - Current signal	 0 - 5 V 0 - 10 V 4 - 20 mA
di	DISPLAYED SIGNAL FOR TROUBLESHOOTING: 0 - Command signal [V] or [mA] 1 - Output signal [A] **Flashing decimal point is an indicator for present display mode** - Fast flashing decimal point, several flashes per second indicates di=0 - Slow flashing decimal point, 1 per second indicates di=1 - No flashing decimal point or no decimal point indicates display in SETTING/ADJUST	
SA	SAVE SETTINGS	
rFP	RESET FACTORY PARAMETERS (see note 2)	
Err	ERROR DETECTION STATE, short circuit, reverse polarity protection and detection: 0 - Error 0 - No errors 1 - Error 1 - Overcurrent in driver likely due to short circuit in Solenoid 2 - Error 2 - Current exceeding 20 mA in 4-20 mA input mode	
CLr	CLEAR ERROR, clear driver or error state (see note 2)	
NOTE 1	When adjusting the HI and LO parameters, note the HI parameter value cannot be adjusted below the LO parameter value as well the LO parameter value cannot exceed the HI parameter value.	
NOTE 2	Adjust Parameter value up past 9 to operate this command setting	
NOTE 3	* in UED-D parameter will be aHi or bHi (as example) when a solenoid or b solenoid is configured	

6 SCHEMATIC UED-S

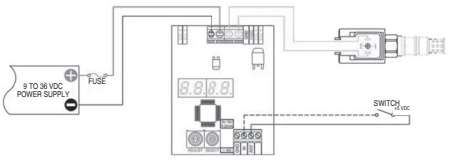
1) EXTERNAL INPUT SIGNAL CONNECTION
(in" set to "10")



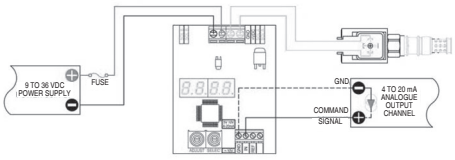
2) POTENTIOMETER CONNECTION
(in" set to "5")



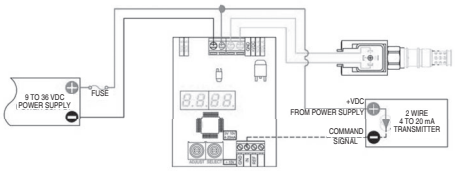
3) RAMP UP & DOWN ONLY OPERATION
(in" set to "5")



4) EXTERNAL INPUT SIGNAL CONNECTION 4-20 mA
(in" set to "420")



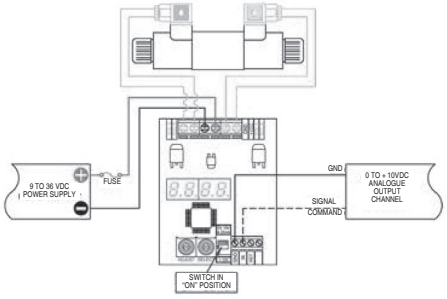
5) TWO WIRE TRANSMITTER INPUT CONNECTION 4-20 mA
(in" set to "420")



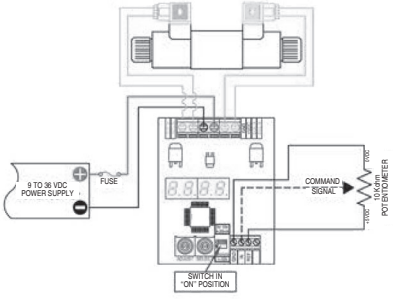
Note: for "0 to 5 VDC" and "0 to 10 VDC" command imput drivers, it is recommended to use indipendent negative conductors for power supply and analogue output channel (PLC/PC) to mantain command signal accuracy due to voltage drop on long cable runs.

7 SCHEMATIC UED-D

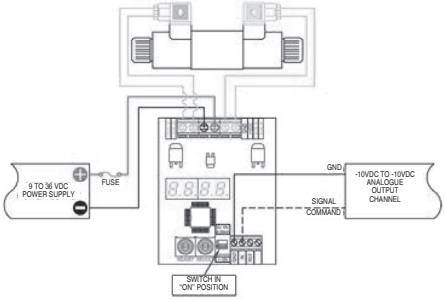
1) EXTERNAL INPUT SIGNAL CONNECTION
("in" set to "10")



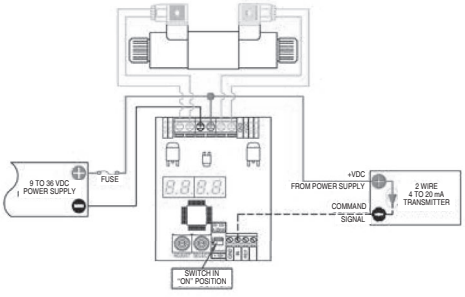
2) POTENTIOMETER CONNECTION
("in" set to "5")



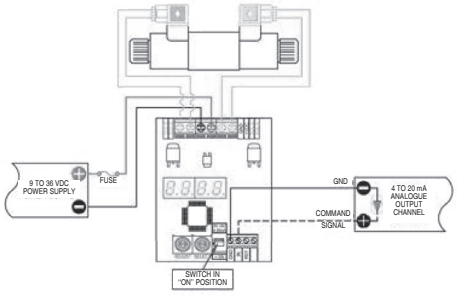
3) EXTERNAL INPUT SIGNAL CONNECTION
("in" set to "10")



4) TWO WIRE TRANSMITTER INPUT CONNECTION
("in" set to "420")



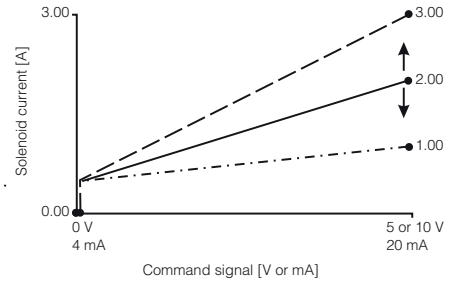
5) EXTERNAL INPUT SIGNAL CONNECTION
("in" set to "420")



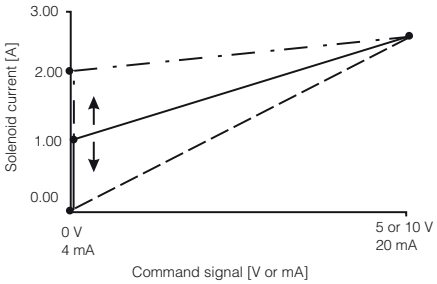
Note: for "0 to 5 VDC" and "0 to 10 VDC" command imput drivers, it is recommended to use indipendent negative conductors for power supply and analogue output channel (PLC/PC) to mantain command signal accuracy due to voltage drop on long cable runs.

8 ADJUSTMENT UED-S

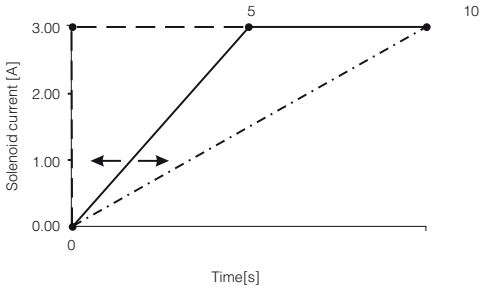
Adjustment of Maximum:
(High) / parameter „Hi“
Maximum Current output 0,20 - 3,00 A



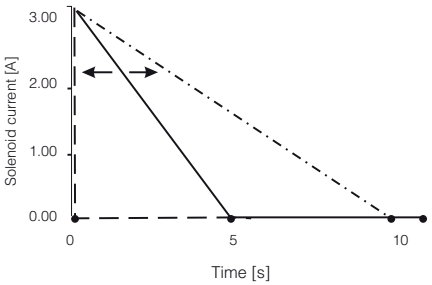
Adjustment of minimum
(Low) / parameter „Lo“
Maximum Current output 0,00 - 2,99 A



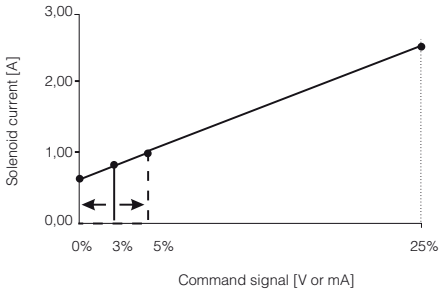
Adjustment Ramp
(Ramp up) / parameter „rUP“
Time for Output to Increase from min to max, 0 -99,5s



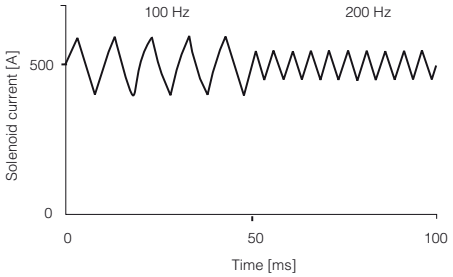
Adjustment Ramp
(Ramp down) / parameter „rdn“
Time for Output to Decrease from max to min 0 - 99,5 s



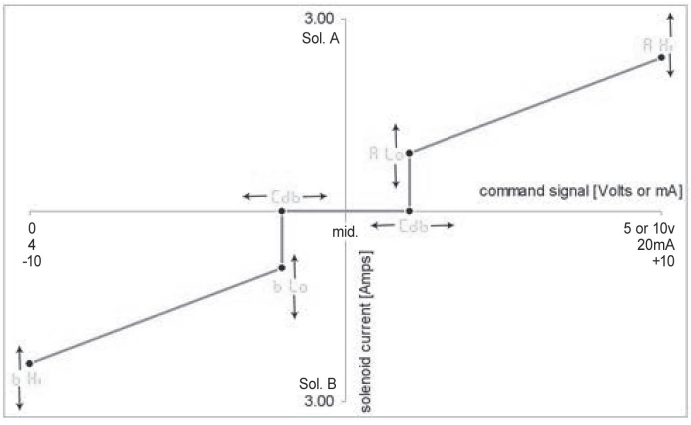
Adjustment (Command deadband) /parameter„Cdb“
Output disabled if command signal less than deadband
0 - 5 % of the maximum Command signal

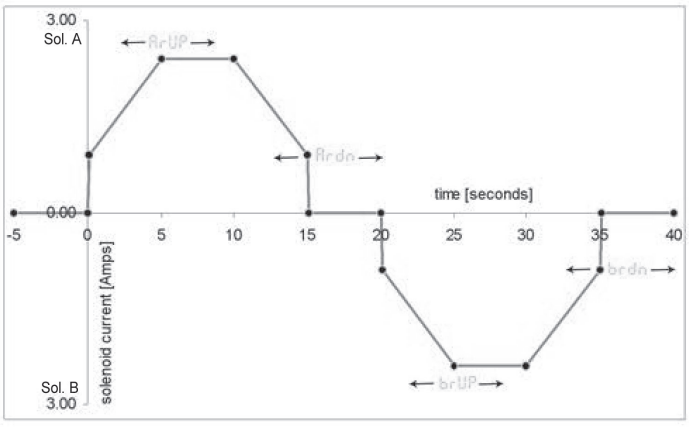


DITHER FREQUENCY / parameter „dFr“
Frequency settable in a range of 40 - 450 Hz



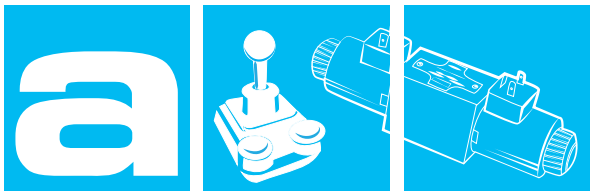
9 ADJUSTMENT UED-D





This product has been designed and tested to meet specific standards outlined in the EMC 2004/108/EC
Emission: EN 61000-6-4:2007
Immunity: EN 61000-6-2: 2005, EN 61000-4-2, EN 61000-4-4, EN 61000 4-6

PROPORTIONAL VALVE



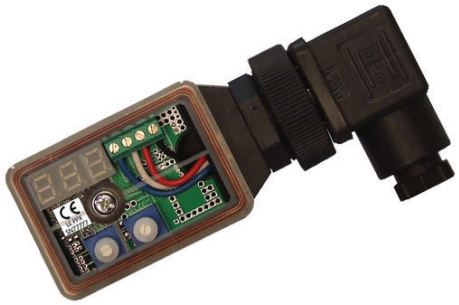
UNIVERSAL ELECTRONIC DRIVER

UED-KA

for solenoid operated proportional valves

1 DESCRIPTION

The driver controls one solenoid of a proportional valve. His construction permits an easy assembly directly on the ISO 4400 connection on the valve. By the use of two selectors it is possible to easily configure all the parameters without the need of special tools or programming devices.
A 3 digit led display shows all the necessaries informations.



2 ORDERING CODE

(1)		(2)
UED	-	KA

3 SET UP PROCEDURE

(1) At power up, the display will show either the output current signal or the input signal (Default display setting shows the output signal). The decimal point will be flashing.

(2) Rotate SELECT to enter the set-up mode. Parameter abbreviation is indicated on the display

(3) When you reach the setting you want to modify, rotate ADJUST up or down to the desired value.

(4) To modify another setting, rotate SELECT again and repeat.

(5) The Driver is fully functional during the set-up procedure with any adjustments effective immediately.

(6) In order to write the new settings in the memory and return to normal mode of operation, rotate „SELECT“ until the display shows „SR“ and then rotate „ADJUST“ from 0 to 1 or wait for 100 seconds.

(7) If you do not want to save the new settings you have just modified, you must disconnect the Driver from the power supply before the end of the 100 seconds to restore precious settings.

(8) After saving parameters to memory, the decimal point will be flashing and the Driver display will be back showing either the output current signal or input signal depending on your „di“ selection.

(9) To start over completely, you can restore the factory settings by rotating SELECT to rFP and then rotate ADJUST up past 10 for the display to reset (NOTE for Step 9: you may have to adjust your Input Signal Setting again if you reset to factory settings.)

4 TECHNICAL DATA

Operating voltage:	9-36 V DC
Maximum output current:	3,00 A
Input signal:	0-5 V; 0-10V; 4-20 mA
Maximum ramp time:	99,5 s
Linearity:	40-450 Hz
Operating Temperature:	-40 .. 75 °C
Protection grade:	IP 65*
Recommended cross section of wires:	0,5 .. 0,75 mm^2
Mounting:	DIN 43650-A/ISO4400 solenoid and cable connector

* A cable with a circular cross section and outside diameter of 4 .. 6 mm should be used for the electronics supply. Only in this way the declared IP protection can be assured.

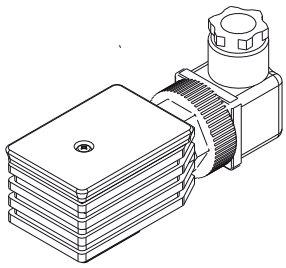
5 KEY FEATURES

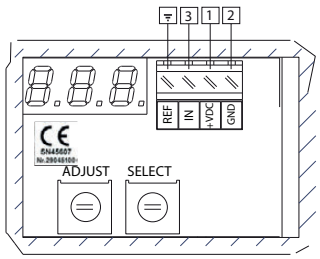
- Microcontroller design
- Independent adjustments (ramp up - ramp down)
- 3 digit led display
- Display and adjust actual values (current&voltage)
- Easy access to the menu setup
- Wide ramp time range
- Simple control with analog input, locally supplied reference voltage
- No heat sink required
- Electronic limiting circuit/short circuit proof
- Reverse polarity, command input protection
- Load can be connected and disconnected live

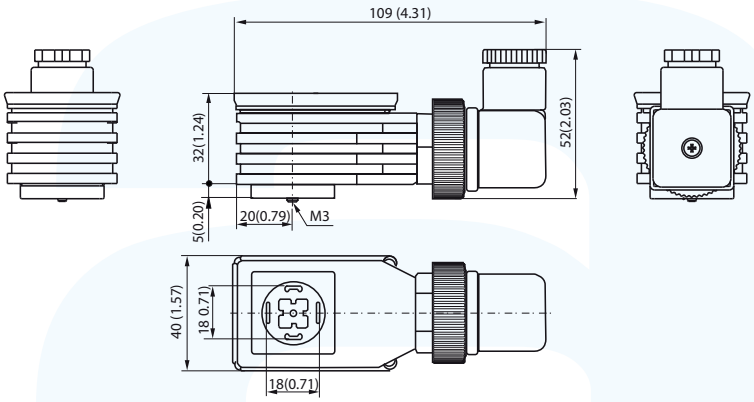
6 SETTING RANGES

Parameter	Description	Adjustable Range
Hi *	HIGH, Maximum Current Output	0,20 - 3,00 A
Lo *	LOW, Minimum Current Output (see note 1)	0,00 - 2,99 A
rUP *	RAMP UP, Time for Output to increase from min to max	0,0 - 99,5 s
rdn *	RAMP DOWN, Time for Output to decrease from max to min	0,0 - 99,5 s
Cdb	COMMAND DEADBAND, Output disabled if command signal is less then deadband	0 - 5 %
dFr	DITHER FREQUENCY	40 - 450 Hz
in	INPUT SIGNAL SELECTION: 5 - Voltage signal 20 - Voltage signal 420 - Current signal	 0 - 5 V 0 - 10 V 4 - 20 mA
di	DISPLAYED SIGNAL FOR TROUBLESHOOTING: 0 - Command signal [V] or [mA] 1 - Output signal [A] **Flashing decimal point is an indicator for present display mode** - Fast flashing decimal point, several flashes per second indicates di=0 - Slow flashing decimal point, 1 per second indicates di=1 - No flashing decimal point or no decimal point indicates display in SETTING/ADJUST	
SA	SAVE SETTINGS	
rFP	RESET FACTORY PARAMETERS (see note 2)	
Err	ERROR DETECTION STATE, short circuit, reverse polarity protection and detection: 0 - Error 0 - No errors 1 - Error 1 - Overcurrent in driver likely due to short circuit in Solenoid 2 - Error 2 - Current exceeding 20 mA in 4-20 mA input mode	
CLr	CLEAR ERROR, clear driver or error state (see note 2)	
NOTE 1	When adjusting the HI and LO parameters, note the HI parameter value cannot be adjusted below the LO parameter value as well the LO parameter value cannot exceed the HI parameter value.	
NOTE 2	Adjust Parameter value up past 9 to operate this command setting	

7 INSTALLATION DIMENSIONS (mm)

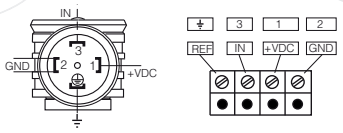


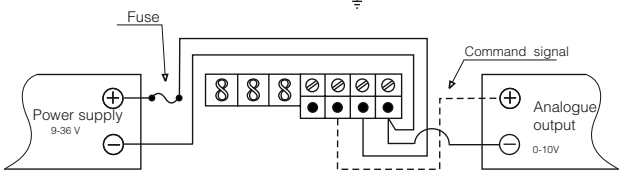




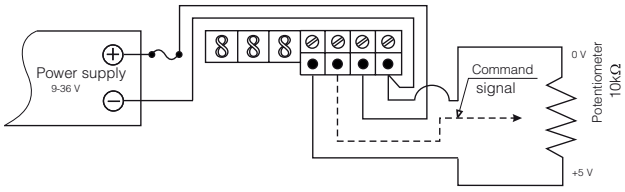
8 SCHEMATICS

1) EXTERNAL INPUT SIGNAL CONNECTION
("in" set to "10")

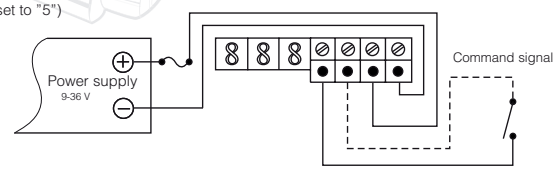




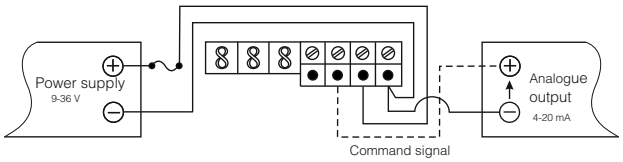
2) POTENTIOMETER CONNECTION
("in" set to "5")



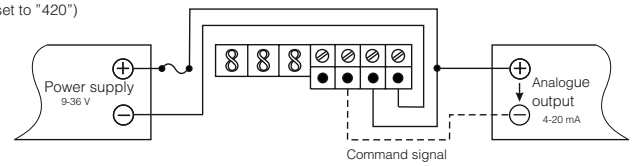
3) RAMP UP & DOWN ONLY OPERATION
("in" set to "5")



4) EXTERNAL INPUT SIGNAL CONNECTION 4-20 mA
("in" set to "420")

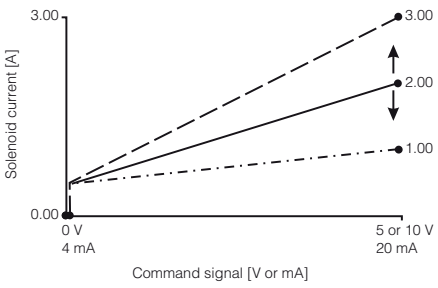


5) TWO WIRE TRANSMITTER INPUT CONNECTION 4-20 mA
("in" set to "420")

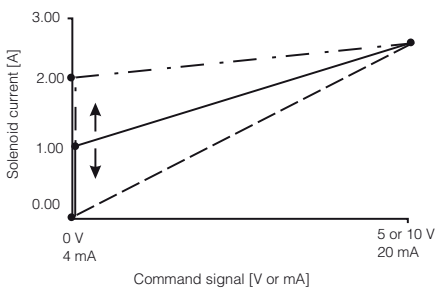


9 ADJUSTMENT

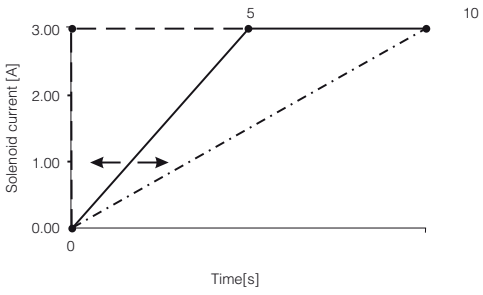
Adjustment of Maximum:
(High) / parameter „Hi"
Maximum Current output 0,20 - 3,00 A



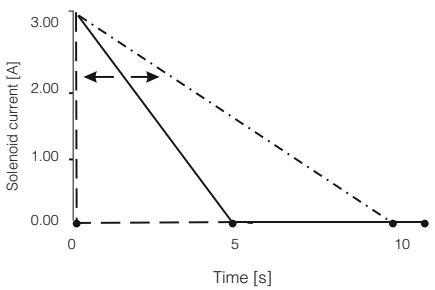
Adjustment of minimum
(Low) / parameter „Lo"
Maximum Current output 0,00 - 2,99 A



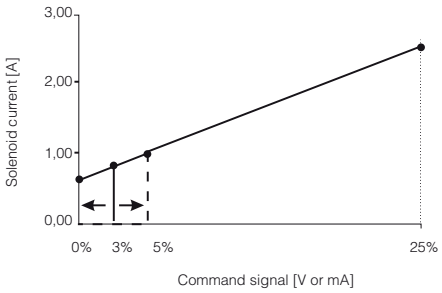
Adjustment Ramp
(Ramp up) / parameter „rUP"
Time for Output to Increase from min to max, 0 -99,5 s



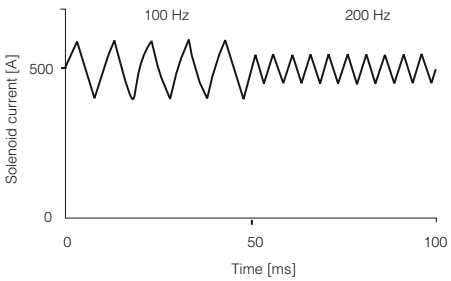
Adjustment Ramp
(Ramp down) / parameter „rdn"
Time for Output to Decrease from max to min - 99,5 s



Adjustment (Command deadband) /parameter„Cdb"
Output disabled if command signal less than deadband
0 - 5 % of the maximum Command signal



DITHER FREQUENCY / parameter „dFr"
Frequency settable in a range of 40 - 450 Hz



PROPORTIONAL VALVE

PROPORTIONAL 3 WAY PRESSURE COMPENSATED PRIORITY TYPE FLOW REGULATOR

PFP3-78-*

25 l/min 25 MPa (250 bar)

1 DESCRIPTION

Proportional 3 way pressure compensated priority type flow regulator, normally closed, spool type. When port 2 is blocked valve acts as a restrictive type 2 way pressure compensated flow regulator. PFP3-78 valve allows flow regulation from 0 to max flow through proportional PWM signal control and flow rate is kept constant out of port 1 regardless of load pressure variations downstream of port 3 and port 2. Port 2 receives excess flow which is normally sent to tank.



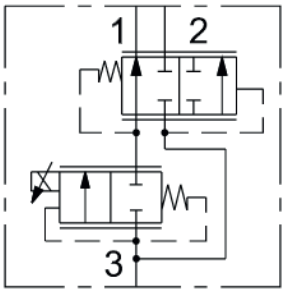
2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)
PFP3	-	78	-		-		-	

(1) PFP3: proportional 3 way flow regulator, priority type

(2) 78: cavity SAE10 (7/8" 14 UNF)

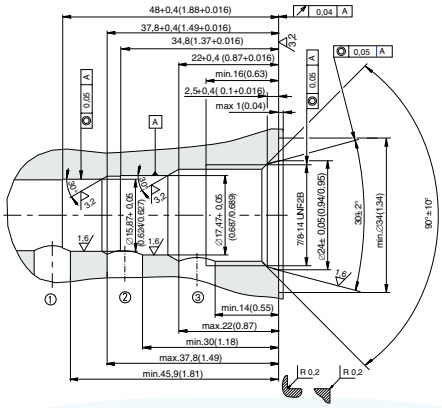
Valves variants:
- 03: screw manual override
- 04: knob manual override
- 05: graduated knob manual override



(4) Options:
- No designation: Zinc trivalent coating (240 salt spray test)
- ZN: Zinc-Nickel coating (520 salt spray test)

(5) Electric voltage and solenoid coils
- 012CDR: coil for V12DC with quenching diode
- 024CDR: coil for V24DC with quenching diode
- 012C: coil for V12DC
- 024C: coil for V24DC

(6) Coil connection
- no designation : DIN 43650-A ISO 4400
- AMP: Amp Junior Timer
- D: Deutsch DT04-2P



3 TECHNICAL DATA

Nominal flow	25 l/min
Maximum rec. flow rate	35 l/min
Maximum nominal pressure	25 MPa (250 bar)
Fluid range temperature	-30°C / +100°C
Optimal dither control	120-140 Hz
Valve Hysteresis	±5 %
Protection	IP 67
Duty cycle	100%
Installation and dimension	(see 5)
Valve Body	Steel
Mass	0,22 kg
Note: pressure in T line influences valve performances	

Electric charateristics:

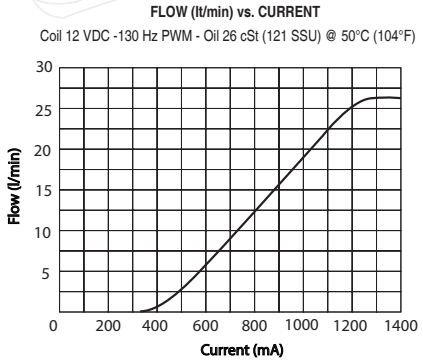
Valve type PFP3-78 are operated by solenoid that are energized from a D.C. voltage supply:
- V 12 DC = 012C
- V 24 DC = 024C

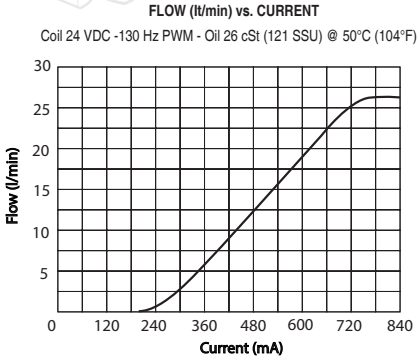
With an appropriate electrical driver in order to control the input current at the valve

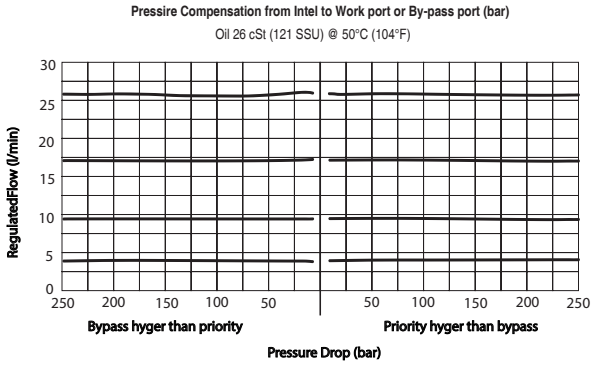
Coils with an integrated quenching diode and their characteristics are:
- V 12 DC - limit current 1,0 A - 6,5 Ohm
- V 24 DC - limit current 0,6 A - 20,8 Ohm

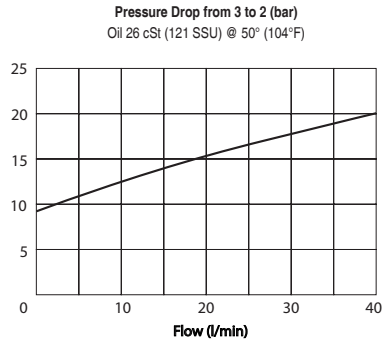
4 TYPICAL DIAGRAMS

Typical P-Q curves for valves PFP3-78 in standard configuration, with mineral oil at ν=32 mm²/s and at T=40°C.

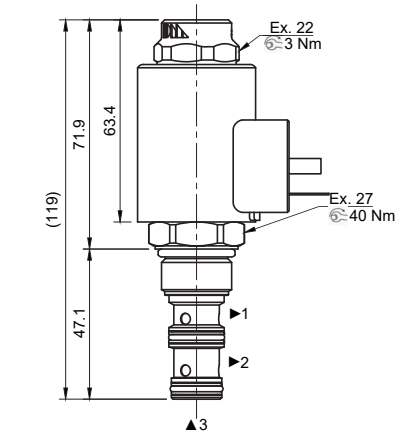


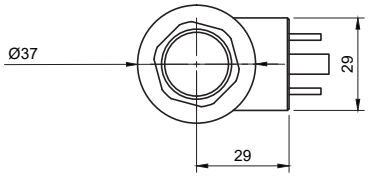






5 INSTALLATION DIMENSIONS (mm)





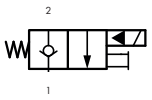
6 HYDRAULIC FLUIDS

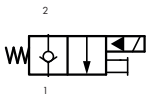
Seals and materials used on standard valves PFP3-78 are fully compatible with hydraulics fluids of mineral base, upgraded with antifoaming and anti oxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

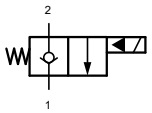
SUMMARY

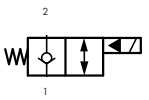
8 CARTRIDGE VALVES SAE8-SAE10

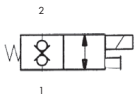
Screw-in Cavity 3/4”-16 UNF

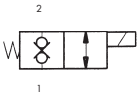
2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED
ONE DIRECTIONAL FLOW
EVSC-34-02  0001

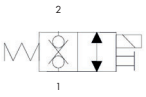
2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED
ONE DIRECTIONAL FLOW
EVSC-34/2-02  0003

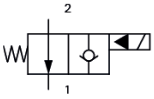
2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED
ONE DIRECTIONAL FLOW
EVC-34-*  0005

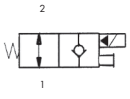
2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED
TWO DIRECTIONS FLOW
EVC2-34-*  0007

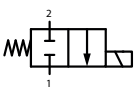
2-WAY DIRECT OPERATED POPPET VALVES, BI-DIRECTIONAL CONTROL
EVD*-34-*  0009

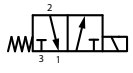
2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED
BI-DIRECTIONAL CONTROL
EVD2-34-*  0011

2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED
BI-DIRECTIONAL CONTROL
EVD2-34/2  0013

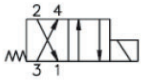
2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY OPEN
ONE DIRECTIONAL FLOW
EVO-34-*  0015

2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY OPEN
BI DIRECTIONAL FLOW
EVO2-34-*  0017

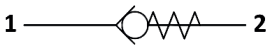
2-WAY SOLENOID OPERATED SPOOL TYPE DIRECTIONAL VALVES
CAVITY 3/4” 16 UNF-SAE 08/2
EV*2*-34-*  0019

3-WAY SOLENOID OPERATED DIRECTIONAL VALVE
CAVITY 3/4” 16 UNF-SAE 08/3
EV*3*-34-*  0022

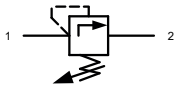
8 CARTRIDGE VALVES SAE8-SAE10

4-WAY SOLENOID OPERATED DIRECTIONAL VALVES
CAVITY 3/4" 16 UNF-SAE 08/4
EV*4*-34-*


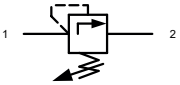
0025

POPPET CHECK VALVE
VUC-34*


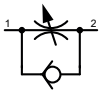
0028

PRESSURE RELIEF-DIRECT ACTING
MO-010


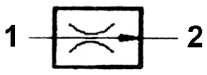
0029

PRESSURE RELIEF-DIRECT ACTING
MO-020


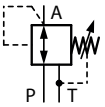
0030

FLOW CONTROL-ADJUSTABLE
FT266/VCF


0031

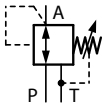
FLOW CONTROL VALVES- PRESSURE COMPENSATED
VQF


0033

PRESSURE REDUCING-ADJUSTABLE
RO-34/*


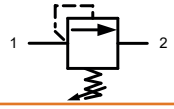
0035

Screw-in Cavity 7/8"-14 UNF

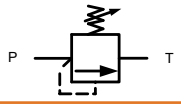
PRESSURE REDUCING-ADJUSTABLE
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0037

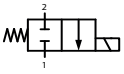
LINE ASSEMBLY BODIES FOR SCREW-IN VALVES
LAB
0039

HYDRAULIC SCREW-IN VALVES PRESSURE RELIEF-DIRECT ACTING
MO-4


0040

HYDRAULIC SCREW-IN VALVES PRESSURE RELIEF-DIRECT ACTING
MO-4L


0042

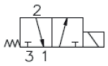
SCREW-IN, 2-WAY SOLENOID OPERATED DIRECTIONAL VALVE
CAVITY 7/8" 14 UNF-SAE 10/2 spool type
EV2*-78-*


0044

aidro
Desktop Metal Company

SCREW-IN,3-WAY SOLENOID OPERATED DIRECTIONAL VALVE
CAVITY 7/8" 14 UNF-SAE 10/3 spool type

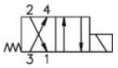
EV3*-78-*



0047

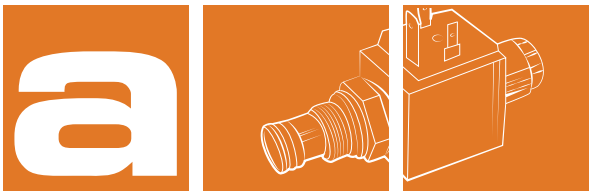
SCREW-IN,4-WAY SOLENOID OPERATED DIRECTIONAL VALVE
CAVITY 7/8" 14 UNF-SAE 10/4 spool type

EV4-*-78-*



0050

aidro
Desktop Metal Company



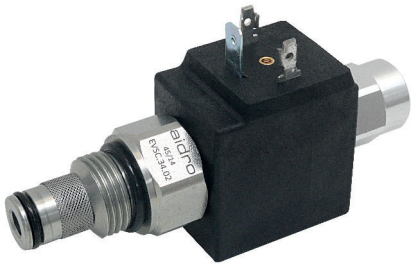
SCREW IN, 2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED, CAVITY 3/4” 16 UNF Ø 12,7 mm ONE DIRECTIONAL FLOW

EVSC-34-02

32 l/min 25 MPa (250 bar)

1 DESCRIPTION

The valve is 2 way NC poppet type and full optional. It is complete with filter, manual override scew type, protection cover for the manual override. With his design, it is possible to use the valve with standard coils suitable for AC and DC current without the need of special connectors with integrated rectifiers.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)
EVSC	-	34	-	02	-		-		-		-	

(1) EVSC : screw in directional solenoid valve with Ø 13 mm solenoid core (see 5), 2 way, 2 position, poppet type, normally closed, one direction flow

(2) 34 : cavity 3/4” 16 UNF (Ø 12,7 mm)

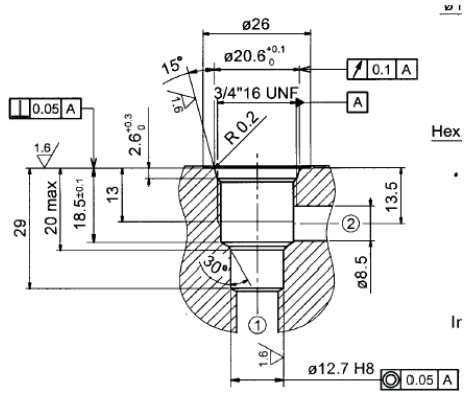
(3) 02 : filter and manual override of screw type

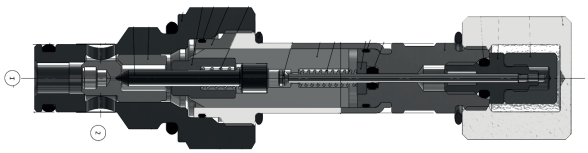
(4) Electric voltage and solenoid coil (see)
- 0000: no coil
- 012C: coil for V 12 DC
- 024C: coil for V 24 DC
- 220R: coil for V 220-230 RAC
- 230/50:coil for V 230/50 AC

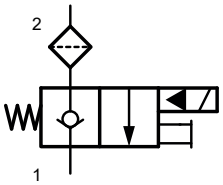
(5) Options for coils connections
- no designation: standard connection ISO 4400 / DIN 43650/A
- C:flying leads
- A: AMP Junior

(6) Options for ISO 4400 / DIN 43650/A connectors
- B9: standard connector, black PG9
- D9:black connector, with diode, PG9
- ES: “energy saving” connector with LED
- R*: rectifier bridge
- L*: LED
- V*: LED + varistor

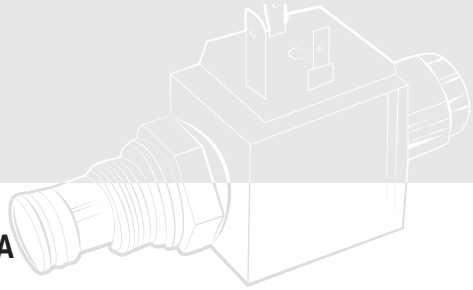
(7) Protective cap on manual override: P







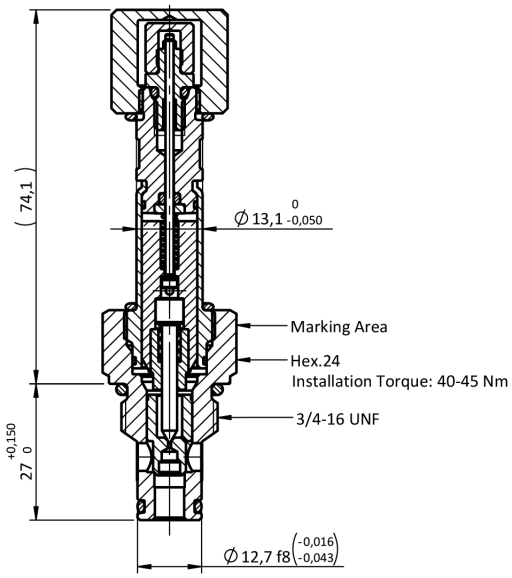
The poppet 7 is pilot operated and it is kept normally closed against its seat 8. When the solenoid is energized, the mobile armature 5 and the pilot pin 17 are shifted and the poppet, unbalanced by pressure, opens permitting flow from 1 to 2.
The manual override 1 is of screw type and permits the valve operation in case of electric failure. The filter 18 (0,25 mm) prevents from dirt and better diffuses the flow around the poppet. The cap 2 protects from shocks the manual override and, if locked, may prevent undue tampering of the valve.



3 TECHNICAL DATA

Max. nominal pressure	25 MPa (250 bar)	Electric Characteristics:
Nominal flow rate	32 l/min	Those solenoid valves are normally equipped by coils type C30, which are energized from DC or AC supply. Coils type C30-***C are DC energized directly from a V***DC supply. Coils type C30-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Solenoids valves type EVSC.34 can also be AC energized, directly from a V***AC supply, by using appropriate C30-***/50 or C30-***/60 coils. Coils type C30 are normally provided for use of ISO 4400 / DIN 43650/A connectors. For coils with different connection to the power supply, see table C30
Max. rec. flow rate	40 l/min	

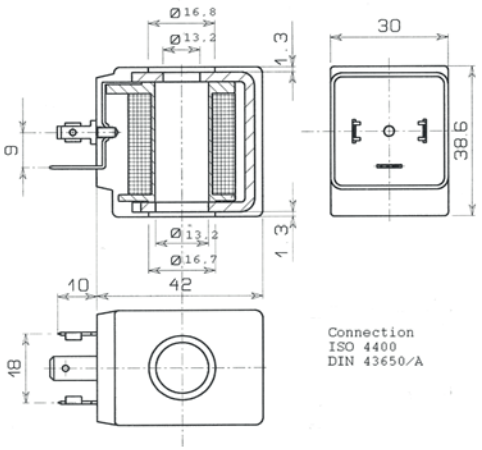
4 INSTALLATION DIMENSIONS (mm)



EVSC.34 valves are to be installed in cavity 3/4" 16 UNF with Ø 12,7 mm. Check the appropriate state and position of the seals supplied with the valve :

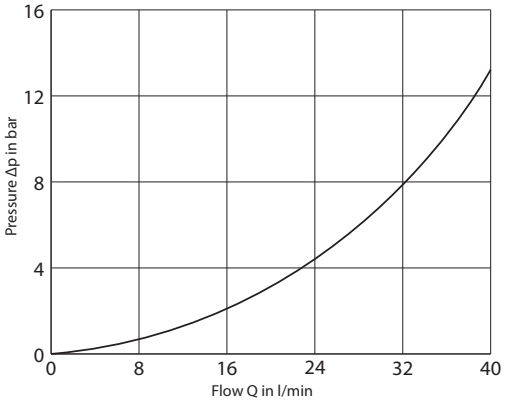
- O-Ring 9,25 x 1,78 with parbak 9,91 x 1,35
- O-Ring 16,36 x 2,20
- 2 x O-Ring 12,42 x 1,78

Screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24mm hexagon.



5 TYPICAL DIAGRAMS

(measured at ν= 46 cSt and 40°C)



6 CONNECTORS

Standard coils are compatible with KA-132 connectors; for some functions (R* = bridge rectifier; L*= LED , etc.) the voltage has to be specified:

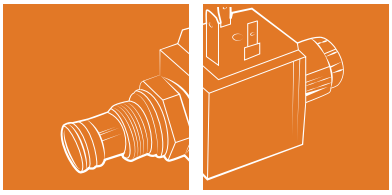
1 = V12 - V24 2 = V115 3= V230

The "energy saving" connectors (option ES) save current consumption to less than 50% of the nominal and strongly reduce warming up of the coils.

7 COILS TYPE C30 (Ø 13mm)

Coils	voltage DC/RAC	nominal current (A)	resistence 20 C (Ω)	nominal power (W)	insulation class
C30-012C	V 12 DC	1,55	7,7	18,6	F
C30-024C	V 24 DC	0,8	31	19	
C30-024R	V 24 RAC	0,85	27	18,3	
C30-048C	V 48 DC	0,4	116	19	
C30-048R	V 48 RAC	0,4	106	17,3	
C30-110R	V 110-115 RAC	0,16	600	16	
C30-220R	V 220-230 RAC	0,08	2500	16	
	AC	**(*)**		**(VA) (*)**	
C30-024/50	24V 50 Hz	0,9	5,3	35	F
C30-110/50	110-115V 50 Hz	0,2	108		
C30-230/50	220-230V 50 Hz	0,1	438		
C30-110/60	110-115V 60 Hz	0,3	92		
C30-220/60	220-230V 60 Hz	0,15	375		

(*) Caution : with AC operation, the inrush current can be up to 3-4 times the nominal holding value



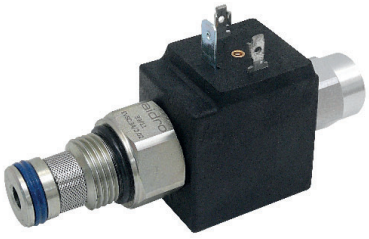
SCREW IN, 2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED, CAVITY 3/4” 16 UNF Ø 15,87 mm ONE DIRECTIONAL FLOW

EVSC-34/2-02

32 l/min 25 MPa (250 bar)

1 DESCRIPTION

The valve is 2 way NC poppet type and full optional. It is complete with filter, manual override scew type, protection cover for the manual override. With his design, it is possible to use the valve with standard coils suitable for AC and DC current without the need of special connectors with integrated rectifiers. This valve has a special design with a 3/4” 16 UNF thread but with a 15,87 mm nose thus permits a lower pressure drop. A special dual seal ring on the nose permits an efficient and reliable sealing system.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)
EVSC	-	34	/	2	-	02	-		-		-		-	

(1) EVSC : screw in directional solenoid valve, valve with Ø 13 mm solenoid core (see 4), 2 way, 2 position, poppet type, normally closed, one direction flow
fl
(2) 34 : cavity 3/4” 16 UNF

(3) 2 : with Ø 15,87 mm (see 4)

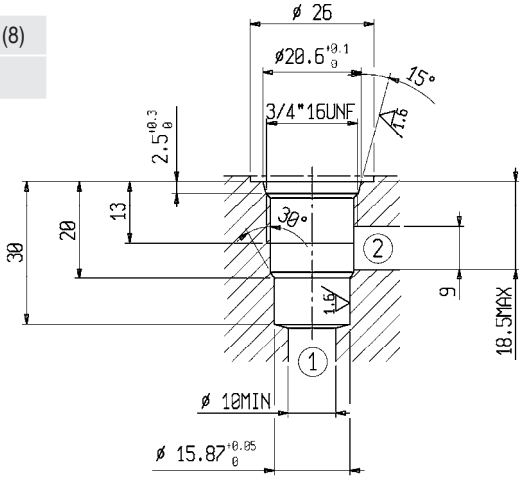
(4) 02 : filter and manual override

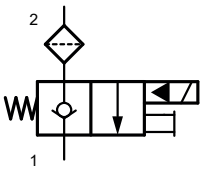
(5) Electric voltage and solenoid coil (see 3, see 7)
0000: no coil
012C: coil for V 12 DC
024C: coil for V 12 DC
220R: coil for V 220-230 RAC
230/50: coil for V 230/50 AC

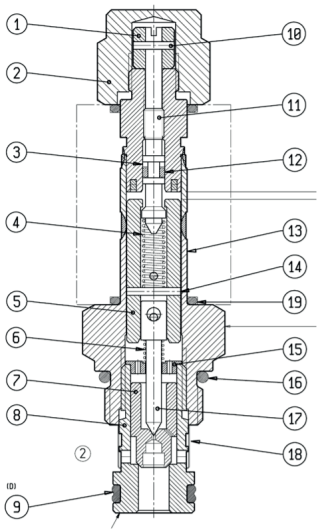
(6) Options for coils connections
no designation: standard connection ISO 4400 / DIN 43650/A
C: flying leads
A: AMP Junior

(7) Options for ISO 4400 / DIN 43650/A connectors
B9: standard connector, black PG9
D9: black connector, with diode, PG9
ES: “energy saving” connector with LED
R*: rectifier bridge
L*: LED
V*: LED + varistor

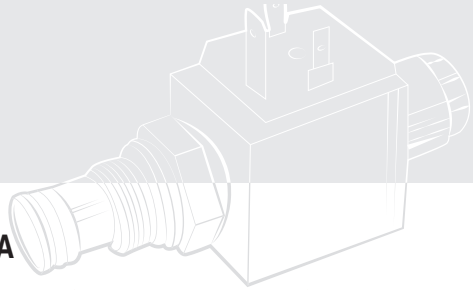
(8) Protective cap on manual override: P







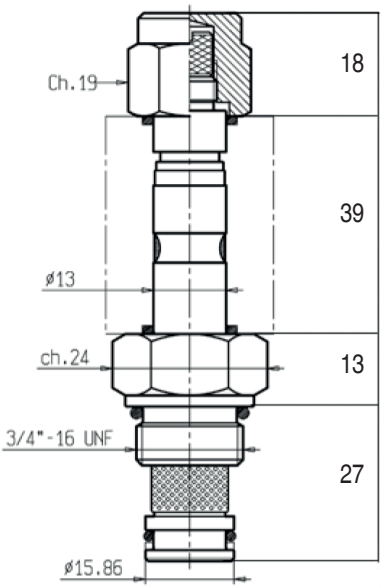
The poppet 7 is pilot operated and it is kept normally closed against its seat 8. When the solenoid is energized, the mobile armature 5 and the pilot pin 17 are shifted and the poppet, unbalanced by pressure, opens permitting flow from 2 to 1.
The manual override 1 is of screw type and permits the valve operation in case of electric failure. The filter 18 (0,25 mm) on way prevents from dirt and better diffuses the flow around the poppet.



3 TECHNICAL DATA

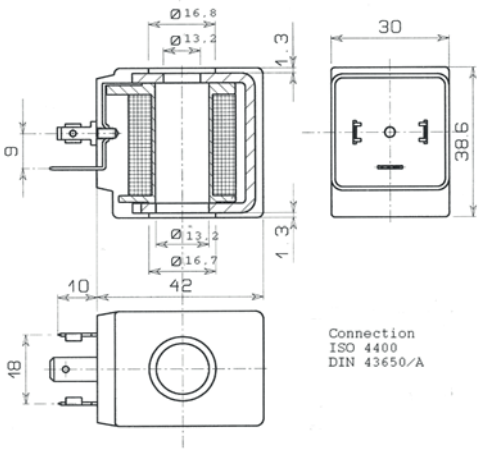
Max. nominal pressure	25 MPa (250 bar)	Electric Characteristics:
Nominal flow rate	32 l/min	Those solenoid valves are normally equipped by coils type C30, which are energized from DC or AC supply (see). Coils type C30-***C are DC energized directly from a V***DC supply. Coils type C30-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Solenoids valves type EVSC.34 can also be AC energized, directly from a V***AC supply, by using appropriate C30-***/50 or C30-***/60 coils (see). Coils type C30 are normally provided for use of ISO 4400 / DIN 43650/A connectors. For coils with different connection to the power supply, see table C30
Max. rec. flow rate	40 l/min	

4 INSTALLATION DIMENSIONS (mm)



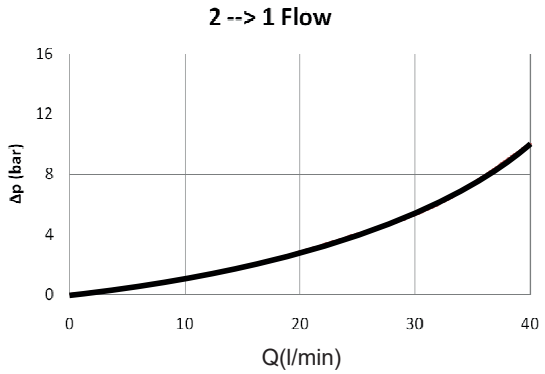
EVSC.34/2 valves are to installed in cavity 3/4" 16 UNF with Ø 15,87 mm. Check the appropriate state and position of the seals supplied with the valve:
- Dual seal 12,7x1,8x3
- O-ring 16,36x2,20
- 2 x O-ring 12,42 x 1,78

Screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24mm hexagon.



5 TYPICAL DIAGRAMS

(measured at ν= 46 cSt and 40°C)



6 CONNECTORS

Standard coils are compatible with KA-132 connectors; for some functions (R*= bridge rectifier ; L*= LED , etc.) the voltage has to be specified :

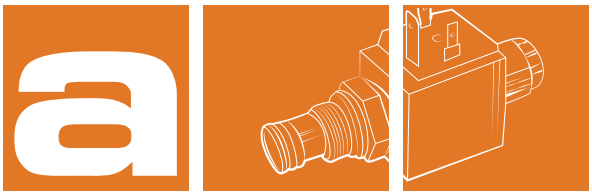
1 = V12, V24 2 = V115 3=V230

The "energy saving" connectors (option ES) save current consumption to less than 50% of the nominal and strongly reduce warming up of the coils.

7 COILS TYPE C30 (Ø 13mm)

			Ω)		
C30-012C	V 12 DC	1,55	7,7	18,6	
C30-024C	V 24 DC	0,8	31	19	
C30-024R	V 24 RAC	0,85	27	18,3	
C30-048C	V 48 DC	0,4	116	19	F
C30-048R	V 48 RAC	0,4	106	17,3	
C30-110R	V 110-115 RAC	0,16	600	16	
C30-220R	V 220-230 RAC	0,08	2500	16	
C30-024/50	24V 50 Hz	0,9	5,3		
C30-110/50	110-115V 50 Hz	0,2	108		
C30-230/50	220-230V 50 Hz	0,1	438	35	F
C30-110/60	110-115V 60 Hz	0,3	92		
C30-220/60	220-230V 60 Hz	0,15	375		

(*) Caution : with AC operation, the inrush current can be up to 3-4 times the nominal holding value



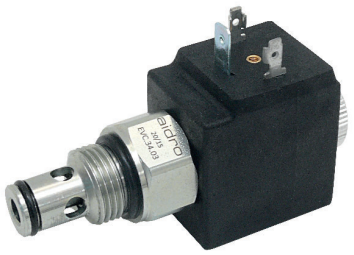
SCREW IN, 2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED, CAVITY 3/4" 16 UNF Ø 12,7 mm ONE DIRECTIONAL FLOW

EVC-34-*

40 l/min 25 MPa (250 bar)

1 DESCRIPTION

The valve is a pilot operated 2 way NC poppet type. It is the basic valve without manual override and filter.
With his design, it is possible to use the valve with standard coils suitable for AC and DC current without the need of special connectors with integrated rectifiers.



2 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)		(7)
EV	C	-	34	-	03	-		-		-	

(1) EV : screw-in directional solenoid valve

(2) C : valve with Ø 13 mm solenoid core (see 4), 2 way, 2 position, poppet type, normally closed, one direction flow

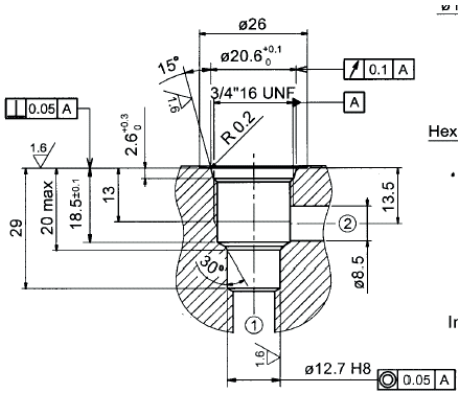
(3) 34 : cavity 3/4 " 16 UNF with Ø 12,7 mm

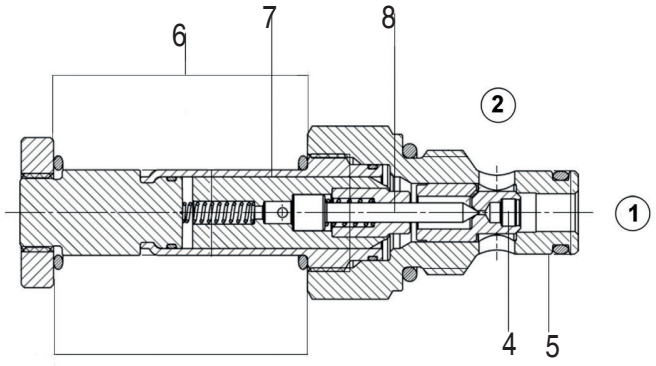
(4) Valves variants
03: without manual override

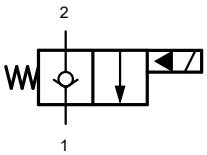
(5) Electric voltage and solenoid coil (see 3, see 7)
0000 : no coil
012C : coil for V12DC
024C : coil for V24DC
220R : coil for V220-230 RAC
230/50 : coil for V230/50 AC

(6) Options for coil connection (see 3)
no designation : standard connection ISO4400/DIN 43650/A
C : flying leads;
A: AMP Junior

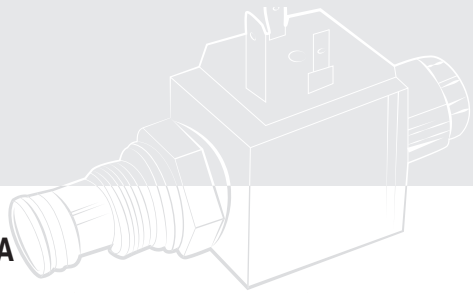
(7) Options for ISO4400/DIN 43650/A connectors(see 6)
B9 : standard connector, black PG9
D9 : black connector, with diode, PG9
ES : "energy saving" connector with LED
R* : rectifier bridge;
L*:LED;
V*:LED+varistor







The poppet 4 is pilot operated and it is kept normally closed against its seat 5. When the solenoid 6 is energized, the mobile armature 7 and the pilot pin 8 are shifted and the poppet, unbalanced by pressure, opens permitting flow from 2 to 1.



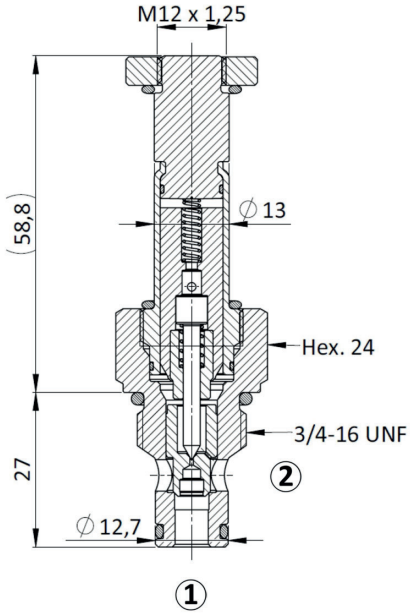
3 TECHNICAL DATA

Max. nominal pressure	25 MPa (250 bar)
Nominal flow rate	32 l/min
Max. rec. flow rate	40 l/min
Dimension and installation	see 4
Duty cycle	ED 100%
Mass (without coil)	0,120 kg

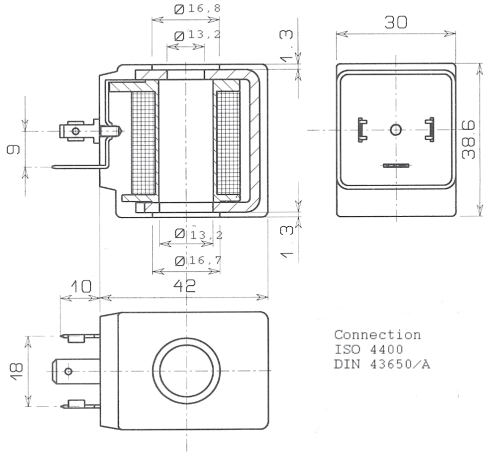
Electric Characteristics:

Those solenoid valves are normally equipped by coils type C30, which are energized from DC or AC supply (see). Coils type C30-***C are DC energized directly from V***DC supply. Coils type C30-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Solenoid valves type EVC.34. can also be AC energized, directly from a V***AC supply, by using appropriate C30-***/50 or C30-***/60 coils. (*) Caution : with AC operation, the inrush current can be up to 3-4 times the nominal holding value. Coils type C30 are normally provided for use of ISO 4400/DIN 43650/A connectors. For coils with different connection to the power supply, see table C30/36.

4 INSTALLATION DIMENSIONS (mm)

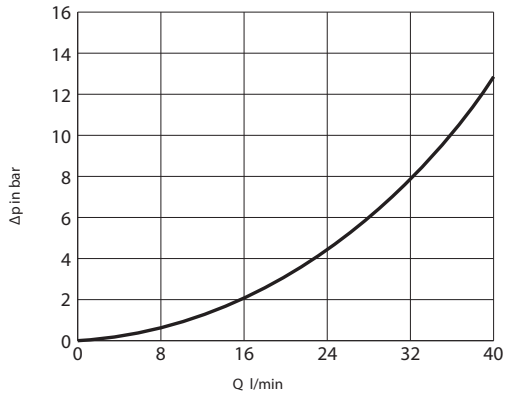


EV*.34 valves are to be installed in cavity 3/4" 16 UNF with Ø 12,7 mm. Check the appropriate state and position of the seals and , screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24 mm hexagon.



5 PRESSURE DROPS

Viscosity 42 cSt at 50°C.



6 CONNECTORS

Standard coils are compatible with KA-132 connectors; for some functions (R* = bridge rectifier, L* = LED, etc.) the voltage has to be specified :

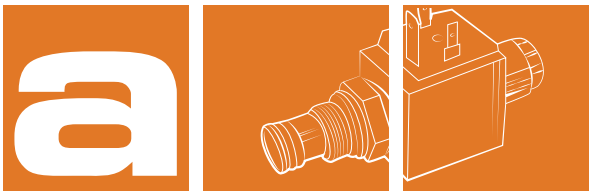
1 = V12, V24 2 = V115 3 = V230

The "energy saving" connectors – option ES – save current consumption to less than 50% of the nominal and strongly reduce warming up of the coils.

7 COILS TYPE C30 (Ø 13mm- 18w: 35 VA)

Coils ISO/DIN	voltage DC/RAC	nominal current (A)	resistence 20 C (ώ)	nominal power (W)	insulation class
C30-012C	V 12 DC	1,55	7,7	18,6	F
C30-024C	V 24 DC	0,8	31	19	
C30-024R	V 24 RAC	0,85	27	18,3	
C30-048C	V 48 DC	0,4	116	19	
C30-048R	V 48 RAC	0,4	106	17,3	
C30-110R	V 110-115 RAC	0,16	600	16	
C30-220R	V 220-230 RAC	0,08	2500	16	
	AC	**(*)**		**(VA) (*)**	
C30-024/50	24V 50 Hz	0,9	5,3	35	F
C30-110/50	110-115V 50 Hz	0,2	108		
C30-230/50	220-230V 50 Hz	0,1	438		
C30-110/60	110-115V 60 Hz	0,3	92		
C30-220/60	220-230V 60 Hz	0,15	375		

(*) Caution : with AC operation, the inrush current can be up to 3-4 times the nominal holding value



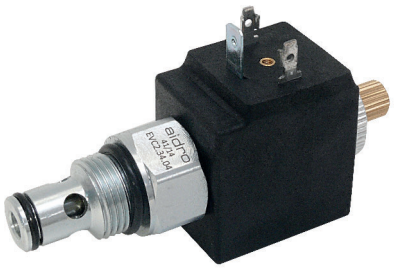
SCREW IN, 2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED, CAVITY 3/4" 16 UNF Ø 12,7 mm TWO DIRECTIONS FLOW

EVC2-34-*

40 l/min 25 MPa (250 bar)

1 DESCRIPTION

The valve is a pilot operated 2 way NC poppet type with bi directional flow. It is available in different configurations. With his design, it is possible to use the valve with standard coils suitable for AC and DC current without the need of special connectors with integrated rectifiers.



2

(1)	(2)		(3)		(4)		(5)		(6)		(7)
EV	C2	-	34	-		-		-		-	

(1) EV : screw-in directional solenoid valve

(2) C2 : valve with Ø 13 mm solenoid core (see 4), 2 way, 2 position, poppet type, normally closed, two directions flow

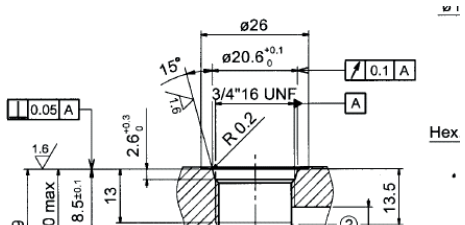
(3) 34 : cavity 3/4 " 16 UNF with Ø 12,7 mm

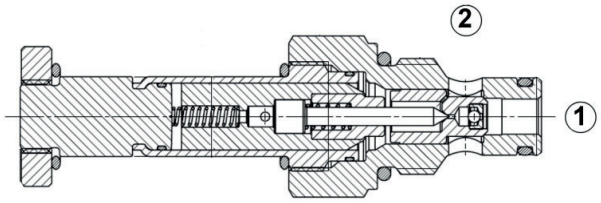
(4) Valves variants
- 01: filter
- 02: filter and manual override
- 03: --
- 04: manual override
- P*: manual override protection

(5) Electric voltage and solenoid coils (see 7)
- 0000: no coil
- 012C: coil for V12DC
- 024C: coil for V24DC
- 220R: coil for V220-230 RAC
- 230/50: coil for V230/50 AC

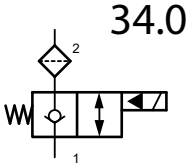
(6) Options for coil connection
- no designation: standard connection ISO4400/DIN 43650/A
- C: flying leads;
- A: AMP Junior

(7) Options for ISO4400/DIN 43650/A connectors
- B9: standard connector, black PG9
- D9: black connector, with diode, PG9
- ES: "energy saving" connector with LED
- R*: rectifier bridge;
- L*:LED;
- V*:LED+varistor

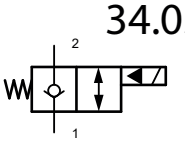




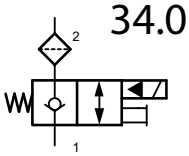
34.01



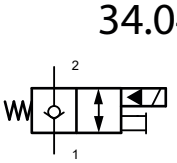
34.03



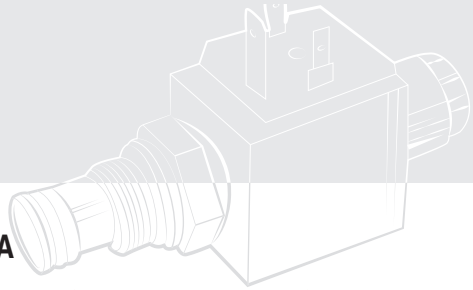
34.02



34.04



The poppet 4 is pilot operated and it is kept normally closed against its seat 5. When the solenoid 6 is energized, the mobile armature 7 and the pilot pin 8 are shifted and the poppet, unbalanced by pressure, opens permitting flow in both directions. The manual override 9 is of screw type and permits the valve operation in case of electric failure.



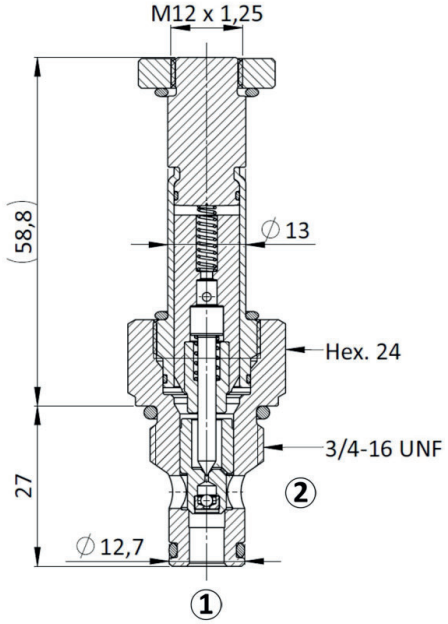
3 TECHNICAL DATA

Max. nominal pressure	25 MPa (250 bar)
Nominal flow rate	32 l/min
Max. rec. flow rate	40 l/min
Dimension and installation	see 4
Duty cycle	ED 100%
Mass (without coil)	0,120 kg

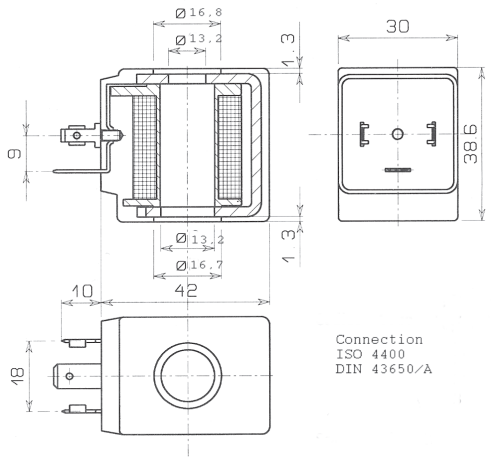
Electric Characteristics:

Those solenoid valves are normally equipped by coils type C30, which are energized from DC or AC supply. Coils type C30-***C are DC energized directly from a V***DC supply. Coils type C30-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Solenoid valves type EVC2.34. can also be AC energized, directly from a V***AC supply, by using appropriate C30-***/50 or C30-***/60 coils.
(*) Caution : with AC operation, the inrush current
can be up to 3-4 times the nominal holding value. Coils type C30 are normally provided for use of ISO 4400/DIN 43650/A connectors. For coils with different connection to the power supply, see table C30/36.

4 INSTALLATION DIMENSIONS (mm)

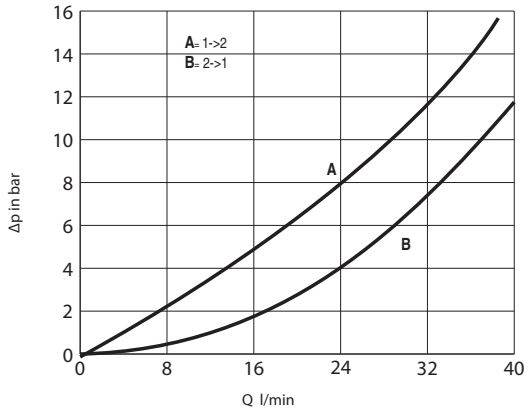


EV*.34 valves are to be installed in cavity 3/4" 16 UNF with Ø 12,7 mm. Check the appropriate state and position of the seals and , screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24 mm hexagon.



5 PRESSURE DROPS

Viscosity 42 cSt at 50°C.



6 CONNECTORS

Standard coils are compatible with KA-132 connectorS; for some functions (R*= bridge rectifier, L*= LED, etc.) the voltage has to be specified :

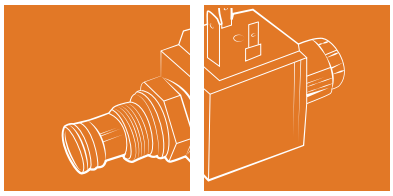
1 = V12, V24 2 = V115 3 = V230

The "energy saving" connectors – option ES – save current consumption to less than 50% of the nominal and strongly reduce warming up of the coils.

7 COILS TYPE C30 (Ø 13mm- 18w: 35 VA)

Coils ISO/DIN	voltage DC/RAC	nominal current (A)	resistence 20 C (ώ)	nominal power (W)	insulation class
C30-012C	V 12 DC	1,55	7,7	18,6	F
C30-024C	V 24 DC	0,8	31	19	
C30-024R	V 24 RAC	0,85	27	18,3	
C30-048C	V 48 DC	0,4	116	19	
C30-048R	V 48 RAC	0,4	106	17,3	
C30-110R	V 110-115 RAC	0,16	600	16	
C30-220R	V 220-230 RAC	0,08	2500	16	
	AC	**(*)**		**(VA) (*)**	
C30-024/50	24V 50 Hz	0,9	5,3	35	F
C30-110/50	110-115V 50 Hz	0,2	108		
C30-230/50	220-230V 50 Hz	0,1	438		
C30-110/60	110-115V 60 Hz	0,3	92		
C30-220/60	220-230V 60 Hz	0,15	375		

(*) Caution : with AC operation, the inrush current can be up to 3-4 times the nominal holding value



SCREW IN, 2-WAY DIRECT OPERATED POPPET VALVES, BI-DIRECTIONAL CONTROL CAVITY 3/4" 16 UNF Ø 12,7 mm

EVD*-34-*

16 l/min 25 MPa (250 bar)

1 DESCRIPTION

The valve is 2 way poppet type direct operated. It is available in normally open and normally close configuration. it is possible to use the valve with standard coils suitable DC or RAC (rectified alternate current) for AC supply.
A special dual seal ring on the nose permits an efficient and reliable sealing system.



2

(1)	(2)	(3)		(4)		(5)		(6)		(7)		(8)
EV	D	*	-	34	-		-		-		-	

(1) EV : screw-in directional solenoid valve

(2) D : valve with Ø 13 mm solenoid core(see 4), 2 way, 2 position, poppet type, bi-directional control

(3) valve configuration:
no designation: normally closed valve
O : normally open valve

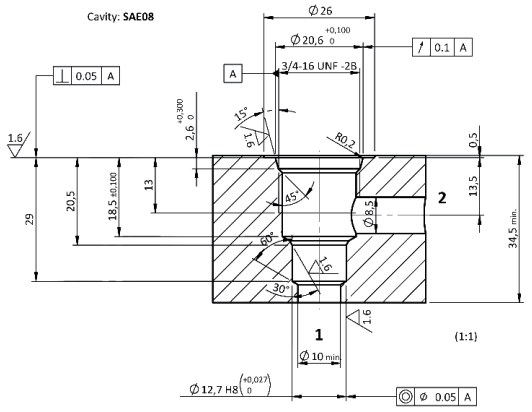
(4) 34 : cavity 3/4 " 16 UNF with Ø 12,7 mm - see A, 6

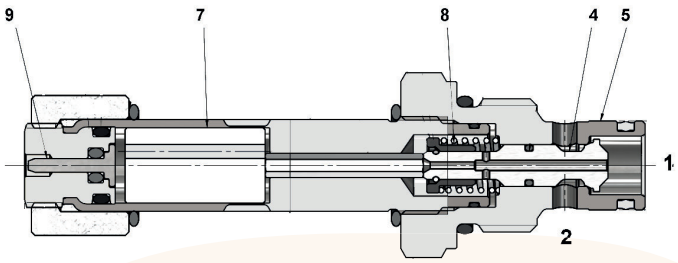
(5) valves variants (see 8)
02 : filter and manual override
03 : standard without manual override
04 : manual override

(6) Electric voltage and solenoid coils (see3, see 7)
0000 : no coil
012C : coil for V12DC
024C : coil for V24DC
220R : coil for V220-230 RAC

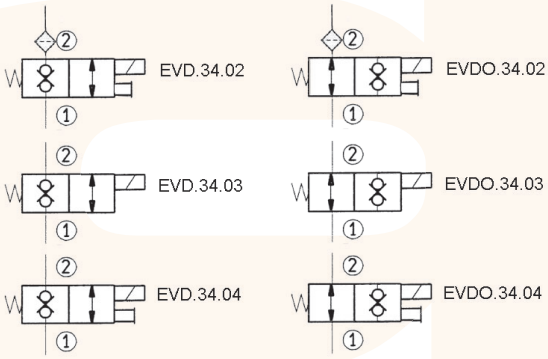
(7) Options for coil connection
no designation : standard connection ISO4400/DIN 43650/A
FL : flying leads;
A : AMP Junior

(8) Options for ISO4400/DIN 43650/A connectors (see 6)
B9 : standard connector, black PG9
D9 : black connector, with diode, PG9
ES : "energy saving" connector with LED
R* : rectifier bridge
L* : LED
V* : LED+varistor





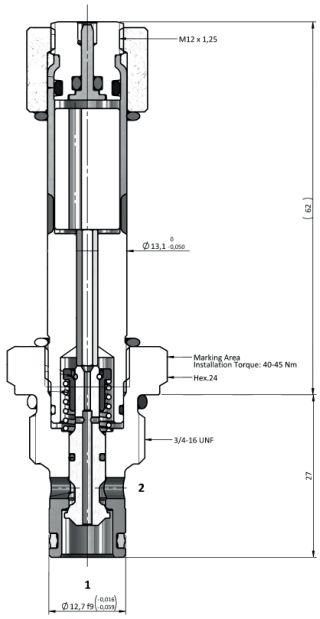
The poppet 4 is balanced by pressure and it is kept normally closed against its seat 5 by spring 8. When the solenoid is energized, the mobile armature 7 moves against spring 8 the poppet 4, thus permitting flow between 2 and 1. The manual override is of the pin type and, when pushed, it permits the valve's operation in case of electric failure .



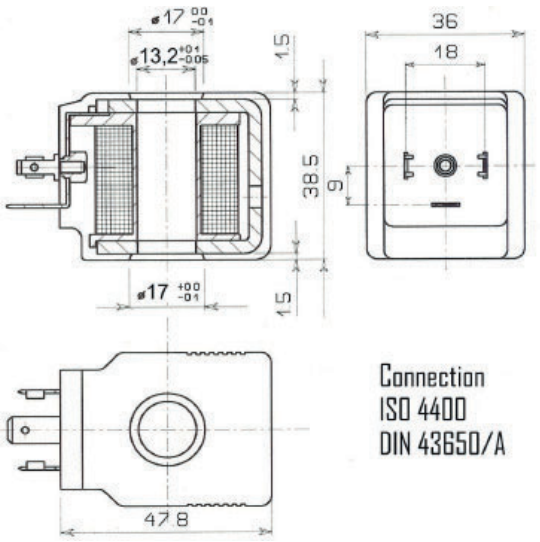
3 TECHNICAL DATA

Max. pressure	25 MPa (250 bar)	Electric Characteristics:
Nominal flow rate	10 l/min	Those solenoid valves are normally equipped by coils type C30, which are energized from DC or AC supply (see ▯). Coils type C30-***C are DC energized directly from a V***DC supply. Coils type C30-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Solenoid valves type EVC2.34. can also be AC energized, directly from a V***AC supply, by using appropriate C30-***/50 or C30-***/60 coils (see ▯). (*) Caution : with AC operation, the inrush current can be up to 3-4 times the nominal holding value. Coils type C30 are normally provided for use of ISO 4400/DIN 43650/A connectors. For coils with different connection to the power supply, see table C30/36.
Max. rec. flow rate	16 l/min	
Dimension and installation	see 4▯	
Duty cycle	ED 100%	
Mass (without coil)	0,120 kg	

4

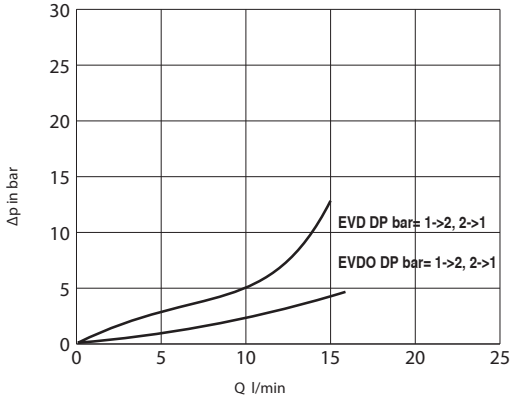


EV*.34 valves are to be installed in cavity 3/4" 16 UNF with Ø 12,7 mm. Check the appropriate state and position of the seals and , screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24 mm hexagon.



5 PRESSURE DROPS

Viscosity 42 cSt at 50°C.



6

Standard coils are compatible with KA-132 connectorS ; for some functions (R* = bridge rectifier, L* = LED, etc.) the voltage has to be specified :

1 = V12, V24 2 = V115 3 = V230

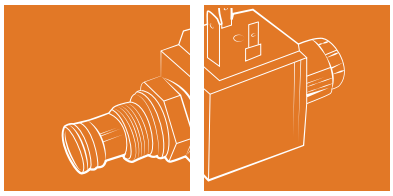
The "energy saving" connectors – option ES – save current consumption to less than 50% of the nominal and strongly reduce warming up of the coils.

7 COILS TYPE C36 (Ø 13mm- 22W)

Coils DIN	voltage DC	nominal current (A)	resistence 20 C (ώ)	nominal power (W)	insulation class
C36-012C	V 12 DC	1,90	6,3	22,8	H
C36-024C	V 24 DC	0,95	25,6	22,5	
C36-024R	V 24 RAC	1,05	20,2	23,0	
C36-048C	V 48 DC	0,47	102	22,6	
C36-110R	V 110-115 RAC	0,23	420	22,9	
C36-220R	V 220-230 RAC	0,11	1720	22,3	

8 VARIANTS

02 : filter (0,25 mm) on way prevents from dirt and better diffuses the flow around the poppet. 02 and 04 : manual override is of pin type. Push the pin to shift the poppet and open (flow between 1 to 2); release the pin to reinstall the condition of normally closed poppet (no flow between 1 to 2).



SCREW IN, 2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED, BI-DIRECTIONAL CONTROL CAVITY 3/4" 16 UNF Ø 12,7 mm

EVD2-34-*

25 l/min 21 MPa (210 bar)

1 DESCRIPTION

The valve is 2 way poppet type direct operated. It is available also with manual override. it is possible to use the valve with standard coils suitable DC or RAC (rectified alternat current) for AC supply.
A special dual seal ring on the nose permits an efficient and reliable sealing system.



2 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)		(7)
EV	D2	-	34	-		-		-		-	

(1) EV : screw-in directional solenoid valve

(2) D2 : valve with Ø 13 mm solenoid core (see 4) , 2 way, 2 position, poppet type, normally closed, BI-directional-control

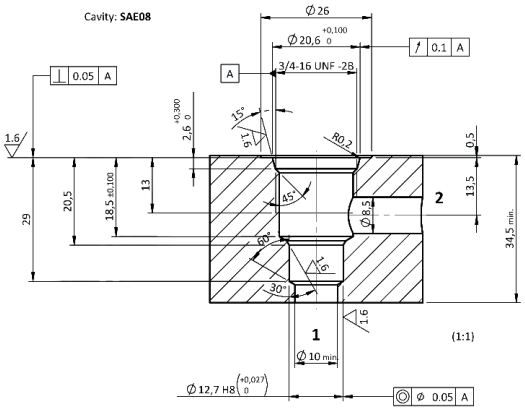
(3) 34 : cavity 3/4 " 16 UNF with Ø 12,7 mm - see A

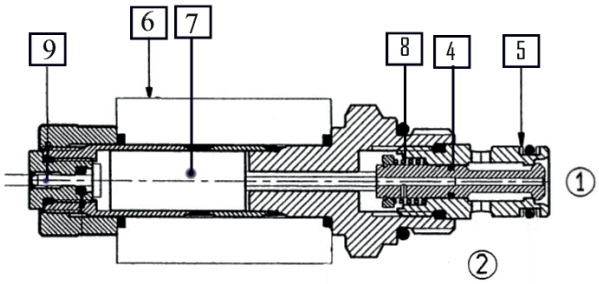
(4) Valves variants (see 8)
- 01:filter
- 02: filter and manual override
- 03: without manual override
- 04: manual override

(5) Electric voltage and solenoid coils (see 3, see 7)
- 0000: no coil
- 012C: coil for V12DC
- 024C: coil for V24DC
- 220R: coil for V220-230 RAC

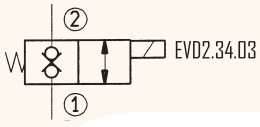
(6) Options for coil connection
- no designation: standard connection ISO4400/DIN 43650/A
- C: flying leads
- A: AMP Junior

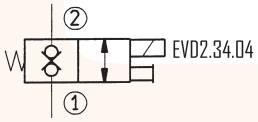
(7) Options for ISO4400/DIN 43650/A connectors
- B9: standard connector, black PG9
- D9: black connector, with diode, PG9
- ES: "energy saving" connector with LED
- R*: rectifier bridge;
- L*:LED;
- V*:LED+varistor

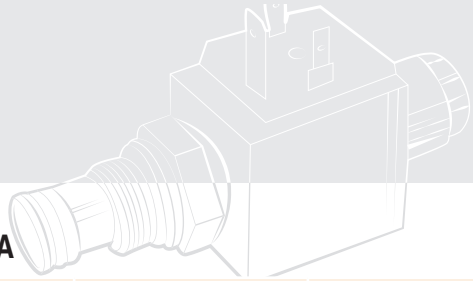




The poppet 4 is balanced by pressure and it is kept normally closed against its seat 5 by spring 8. When the solenoid 6 is energized, the mobile armature 7 moves against spring 8 the poppet 4, thus permitting flow between 2 and 1. The manual override 9 is of the pin type and, when pushed, it permits the valve's operation in case of electric failure.







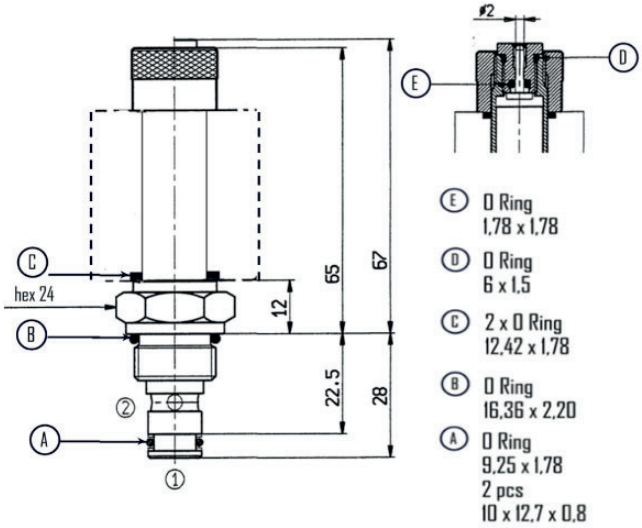
3 TECHNICAL DATA

Max. nominal pressure	21 MPa (210 bar)
Nominal flow rate	16 l/min
Max. rec. flow rate	25 l/min
Dimension and installation	see 4
Duty cycle	ED 100%
Mass (without coil)	0,120 kg

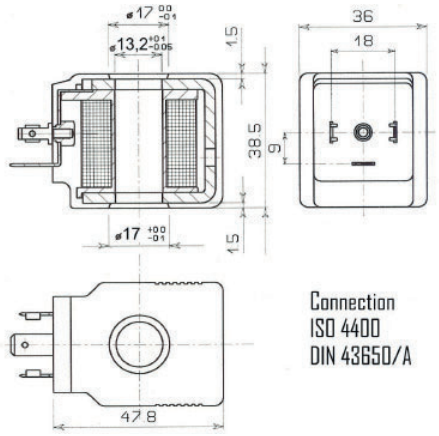
Electric Characteristics:

Those solenoid valves are normally equipped by coils type C36, which are energized from DC or AC supply. Coils type C36-***C are DC energized directly from a V***DC supply. Coils type C36-***R are RAC (Rectifi ed Alternate Current) energized from a V***AC supply, by a full wave bridge rectifi er incorporated in the connector. Coils type C36 are normally provided for use of ISO 4400/DIN 43650/A connectors. For coils with different connection to the power supply, see table C30/36.

4 INSTALLATION DIMENSIONS (mm)

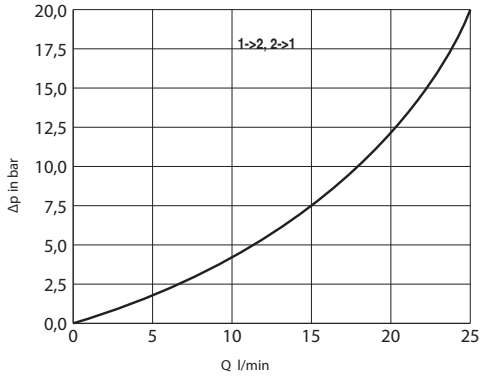


EV*.34 valves are to be installed in cavity 3/4" 16 UNF with Ø 12,7 mm. Check the appropriate state and position of the seals and , screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24 mm hexagon.



5 PRESSURE DROPS

Viscosity 42 cSt at 50°C.



6 CONNECTORS

Standard coils are compatible with KA-132 connectors (see table) ; for some functions (R* = bridge rectifi er, L* = LED, etc.) the voltage has to be specifi ed :

1 = V12, V24 2 = V115 3 = V230

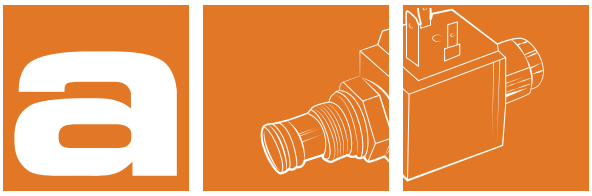
The "energy saving" connectors – option ES – save current consumption to less than 50% of the nominal and strongly reduce warming up of the coils.

7 COILS TYPE C36 (Ø 13mm)

Coils ISO/DIN	voltage DC/RAC	nominal current (A)	resistence 20 C (ώ)	nominal power (W)	insulation class
C36-012C	V 12 DC	1,9	6,3	22,8	H
C36-024C	V 24 DC	0,95	25,6	22,5	
C36-024R	V 24 RAC	1,05	20,2	23,0	
C36-048C	V 48 DC	0,47	102	22,6	
C36-110R	V 110-115 RAC	0,23	420	22,9	
C36-220R	V 220-230 RAC	0,11	1720	22,3	

8 VARIANTS

01 and 02: filter (0,25 mm) on way □ prevents from dirt and better diffuses the flow around the poppet. 02 and 04 : manual override is of pin type. Push the pin to shift the poppet and open (flow between 1 to 2); release the pin to reinstall the condition of normally closed poppet (no flow between 1□and 2).



SCREW IN, 2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY CLOSED, BI-DIRECTIONAL CONTROL CAVITY 3/4" 16 UNF Ø 15,87 mm

EVD2-34/2

25 l/min 21 MPa (210 bar)

1 DESCRIPTION

The valve is 2 way poppet type direct operated. It is available also with manual override. it is possible to use the valve with standard coils suitable DC or RAC (rectified alternat current) for AC supply.
A special dual seal ring on the nose permits an efficient and reliable sealing system.
This valve has a special design with a 3/4" 16 UNF thread but with a 15,87 mm nose thus permits a lower pressure drop.



2 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)		(7)		(8)
EV	D2	-	34	/	2	-		-		-		-	

(1) EV : screw-in directional solenoid valve with Ø 13 mm solenoid core (see 4), 2 way, 2 position

(2) D2 : poppet type, normally closed, BI-directional-control

(3) 34 : cavity 3/4 " 16 UNF

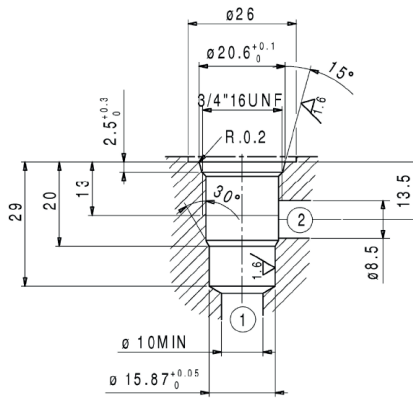
(4) 2: with Ø 15,87 mm nose

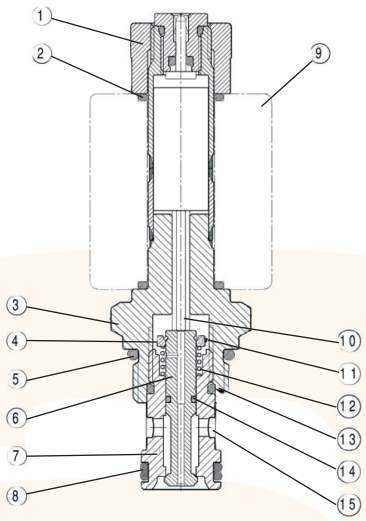
(5) 02: filter and manual override

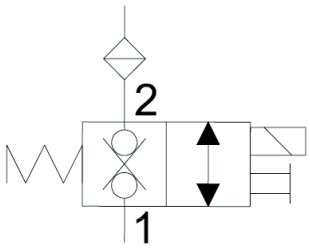
(6) Electric voltage and solenoid coils (see 3, see 6)
- 0000: no coil
- 012C: coil for V12DC
- 024C: coil for V24DC
- 220R: coil for V220-230 RAC

(7) Options for coil connection
- no designation: standard connection ISO4400/DIN 43650/A
- C: flying leads
- A: AMP Junior
- D: deutsch

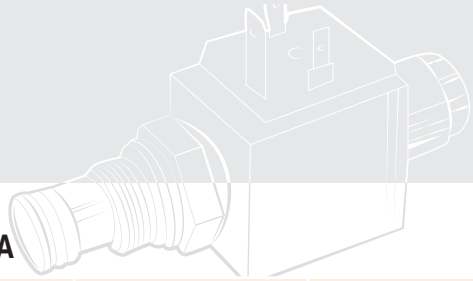
(8) Options for ISO4400/DIN 43650/A connectors
- B9: standard connector, black PG9
- D9: black connector, with diode, PG9
- ES: "energy saving" connector with LED
- R*: rectifier bridge
- L*:LED
- V*:LED+varistor







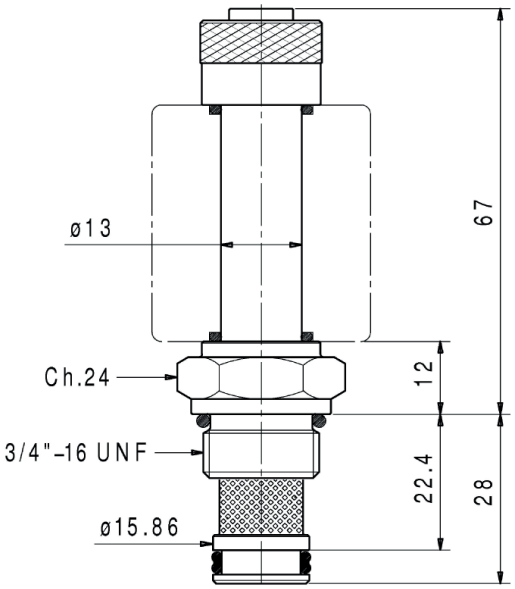
The poppet 6 is balanced by pressure and it is kept normally closed against its seat 7 by spring 12. When the solenoid is energized, the mobile armature moves against spring 12 the poppet 6, thus permitting flow from 2 to 1 and from 1 to 2. The manual override is of the pin type and, when pushed, it permits the valve's operation in case of electric failure. The filter (0,25 mm) on way 2 prevents from dirt and better diffuses the flow around the poppet.



3 TECHNICAL DATA

Max. nominal pressure	21 MPa (210 bar)	Electric Characteristics:
Nominal flow rate	16 l/min	Those solenoid valves are normally equipped by coils type C36, which are energized from DC or AC supply. Coils type C36-***C are DC energized directly from a V***DC supply. Coils type C36-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Coils type C36 are normally provided for use of ISO 4400 / DIN 43650/A connectors. For coils with different connection to the power supply, see table C36
Max. rec. flow rate	25 l/min	
Dimension and installation	see 4	

4 INSTALLATION DIMENSIONS (mm)

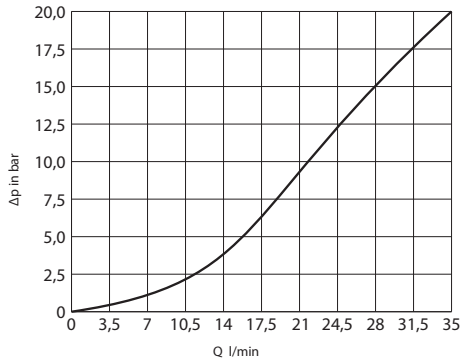


EVD2.34/2 valves are to be installed in cavity 3/4" 16 UNF with Ø 15,87 mm.
Check the appropriate state and position of the seals supplied with the valve:
- Dual seal 12,7x1,8x3
- O-ring 16,36x2,20
- 2 x O-ring 13 x 2

Screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24mm hexagon.

5 PRESSURE DROPS

Measured at 46 cSt and 40°C.

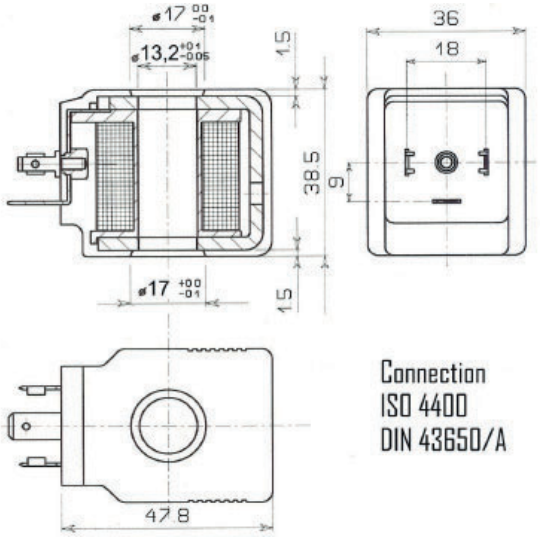


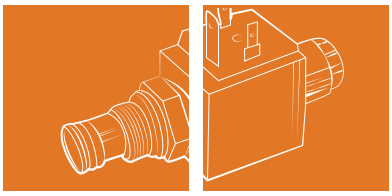
6 COILS TYPE C36 (Ø 13mm)

Coils DIN	voltage DC	nominal current (A)	resistence 20 C (ώ)	nominal power (W)	insulation class
C36-012C	V 12 DC	1,9	6,3	22,8	H
C36-024C	V 24 DC	0,95	25,6	22,5	
C36-024R	V 24 RAC	1,05	20,2	23,0	
C36-048C	V 48 DC	0,47	102	22,6	
C36-110R	V 110-115 RAC	0,23	420	22,9	
C36-220R	V 220-230 RAC	0,11	1720	22,3	

7 CONNECTORS

Standard coils are compatible with KA-132 connectors (see table) ; for some functions (R*= bridge rectifier. L*= LED , etc.) the voltage has to be specified :
1 = V12 - V24 2 = V115 3= V230
The "energy saving" connectors (option ES) save current onsumption to less than 50% of the nominal and strongly reduce warming up of the coils.





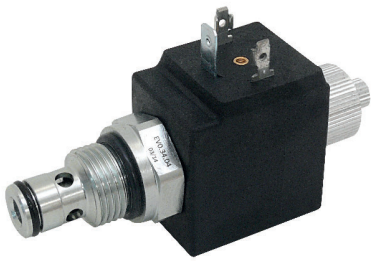
SCREW IN, 2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY OPEN, ONE DIRECTIONAL FLOW CAVITY 3/4" 16 UNF Ø 12,7 mm

EVO-34-*

32 l/min 25 MPa (250 bar)

1 DESCRIPTION

The valve is a pilot operated 2 way NO poppet type. It is available in different configurations. it is possible to use the valve with standard coils suitable DC or RAC (rectified alternat current) for AC supply.



2 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)		(7)
EV	O	-	34	-		-		-		-	

(1)EV : screw-in directional solenoid valve

(2) O : valve with Ø 13 mm solenoid core (see 4), 2 way, 2 position, poppet type, normally open, one direction flow

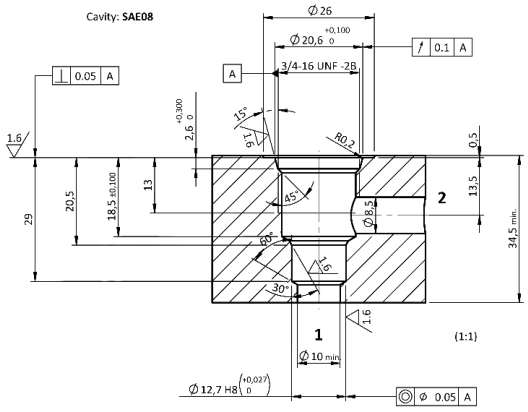
(3) 34 : cavity 3/4 " 16 UNF with Ø 12,7 mm - see A

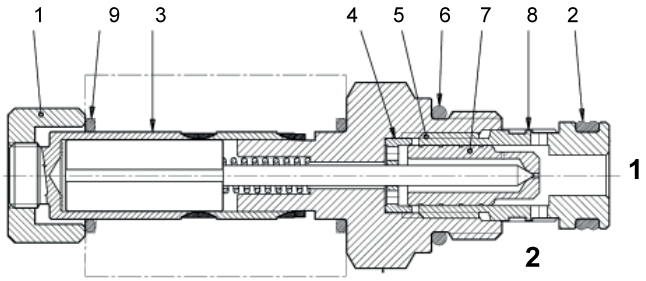
(4) Valves variants (see 8)
- 03 : without manual override
- 04 : manual override

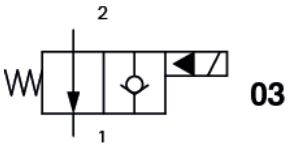
(5) Electric voltage and solenoid coils(see 3, see 6)
- 0000 : no coil
- 012C : coil for V12DC
- 024C : coil for V24DC
- 220R : coil for V220-230 RAC

(6) Options for coil connection (see 3)
- no designation : standard connection ISO4400/DIN 43650/A
- /C : flying leads
- /A: AMP Junior

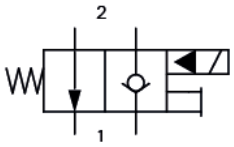
(7) Options for ISO4400/DIN 43650/A connectors (see 7)
- B9 : standard connector, black PG9
- D9 : black connector, with diode, PG9
- ES : "energy saving" connector with LED
- R* : rectifier bridge; L*:LED; V*:LED+varistor





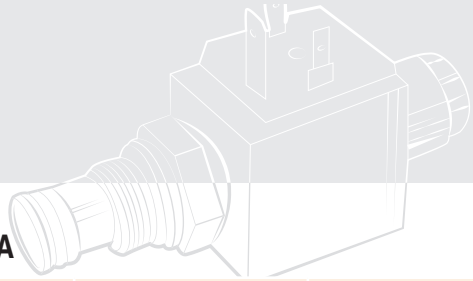


03



04

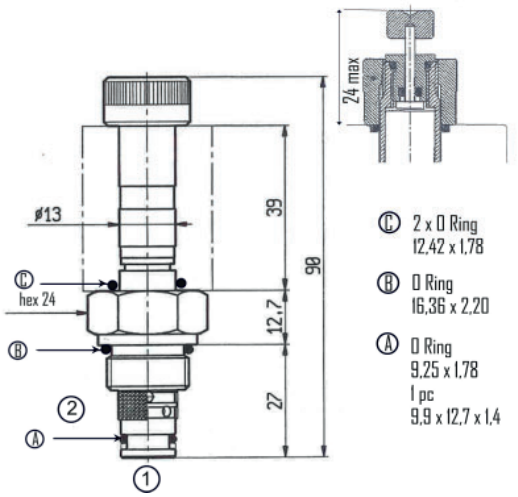
The poppet 4 is pilot operated and it is kept, balanced by pressure, normally open permitting flow from 2 to 1. When the solenoid 6 is energized, the mobile armature 7 and the pilot pin 8 move against the spring and the poppet, closes against its seat 5. The manual override 9, by pushing, permits the valve operation.



3 TECHNICAL DATA

Max. nominal pressure	25 MPa (250 bar)	Electric Characteristics:
Nominal flow rate	20 l/min	Those solenoid valves are normally equipped by coils type C30, which are energized from DC or AC supply. Coils type C30-***C are DC energized directly from a V***DC supply. Coils type C30-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Coils type C30 are normally provided for use of ISO 4400/DIN 43650/A connectors. For coils with different connection to the power supply, see table C30/36.
Max. rec. flow rate	32 l/min	
Dimension and installation	see 4	
Duty cycle	ED100%	
Massb (without coil)	0,120kg	

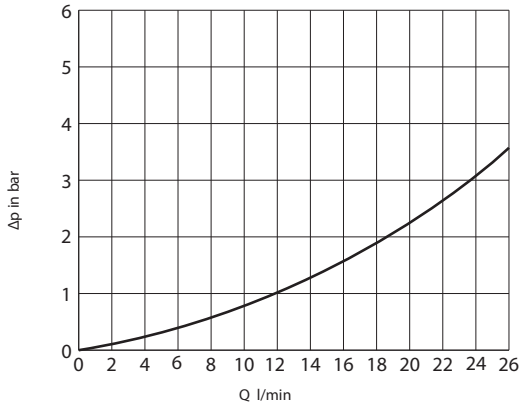
4 INSTALLATION DIMENSIONS (mm)



EV*.34 valves are to be installed in cavity 3/4" 16 UNF with Ø 12,7 mm (see A and 6). Check the appropriate state and position of the seals and , screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24 mm hexagon.

5 PRESSURE DROPS

Viscosity 42 cSt at 50°C.



6 COILS TYPE C30 (Ø 13mm-18w)

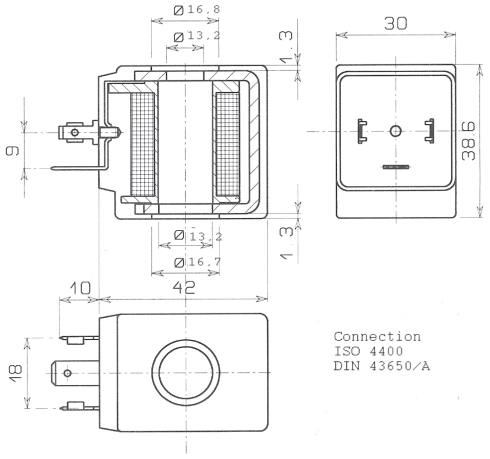
Coils ISO/DIN	voltage DC/RAC	nominal current (A)	resistence 20 C (ώ)	nominal power (W)	insulation class
C30-012C	V 12 DC	1,55	7,7	18,6	F
C30-024C	V 24 DC	0,8	31	19	
C30-024R	V 24 RAC	0,85	27	18,3	
C30-048C	V 48 DC	0,4	116	19	
C30-48R	V48 RAC	0,4	106	17,3	
C30-110R	V 110-115 RAC	0,16	600	16	
C30-220R	V 220-230 RAC	0,08	2500	16	

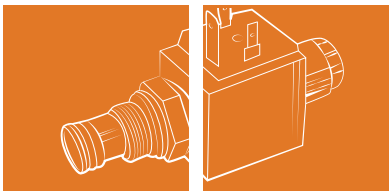
7 CONNECTORS

Standard coils are compatible with KA-132 connectors ; for some functions (R* = bridge rectifier, L* = LED, etc.) the voltage has to be specified :
1 = V12 - V24 2 = V115 3= V230
The "energy saving" connectors – option ES – save current consumption to less than 50% of the nominal and strongly reduce warming up of the coils – see table KA-ES.

8 VARIANTS

01 and 02: filter (0,25 mm) on way 2 prevents from dirt and better diffuses the flow around the poppet. 02 and 04 : manual override is of pushing type. Push to pilot the poppet closed (no flow from 1 to 2); pull to reinstall the condition of normally open poppet (flow from 1 to 2).





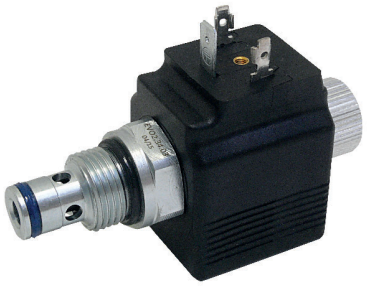
SCREW IN, 2-WAY SOLENOID OPERATED POPPET VALVES NORMALLY OPEN, BI DIRECTIONAL FLOW CAVITY 3/4" 16 UNF Ø 12,7 mm

EVO2-34-*

40 l/min 25 MPa (250 bar)

1 DESCRIPTION

The valve is a pilot operated 2 way NO poppet type. It is available in different configurations. it is possible to use the valve with standard coils suitable DC or RAC (rectified alternat current) for AC supply.
A special dual seal ring on the nose permits an efficient and reliable sealing system.



2 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)		(7)
EV	O2	-	34	-		-		-		-	

(1)EV : screw-in directional solenoid valve

(2) O2 : valve with Ø 13 mm solenoid core (see 4), 2 way, 2 position, poppet type, normally open, two direction flow

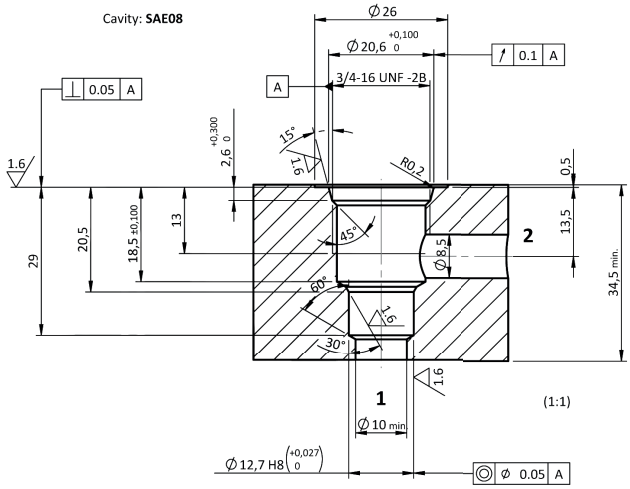
(3) 34 : cavity 3/4 " 16 UNF with Ø 12,7 mm - see A

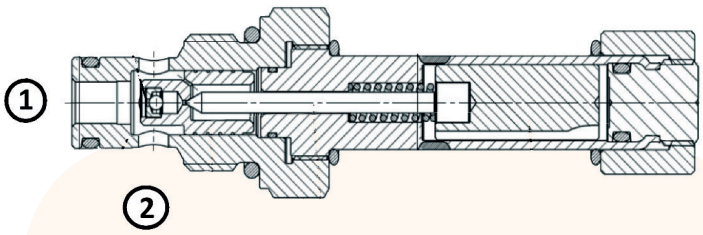
(4) Valves variants (see 8)
- 02 : filter and manual override
- 03 : without manual override
- 04 : manual override

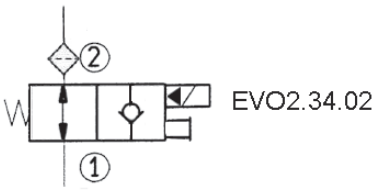
(5) Electric voltage and solenoid coils(see 3, see 6)
- 0000 : no coil
- 012C : coil for V12DC
- 024C : coil for V24DC
- 220R : coil for V220-230 RAC

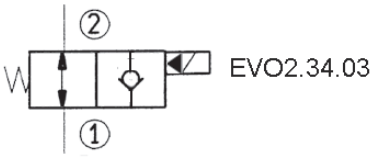
(6) Options for coil connection (see 3)
- no designation : standard connection ISO4400/DIN 43650/A
- C : flying leads
- A: AMP Junior

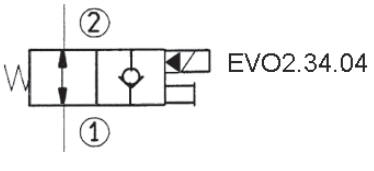
(7) Options for ISO4400/DIN 43650/A connectors (see 7)
- B9 : standard connector, black PG9
- D9 : black connector, with diode, PG9
- ES : "energy saving" connector with LED
- R* : rectifier bridge; L*:LED; V*:LED+varistor



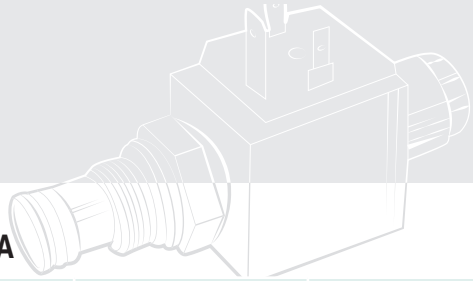








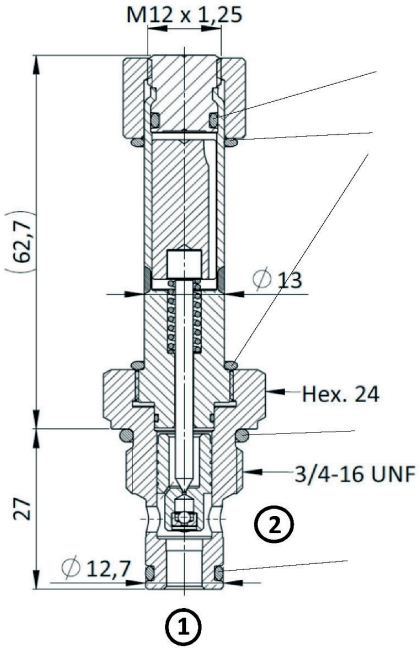
The poppet 4 is pilot operated and it is kept, balanced by pressure, normally open permitting flow from 2 to 1. When the solenoid 6 is energized, the mobile armature 7 and the pilot pin 8 move against the spring and the poppet, closes against its seat 5. The manual override 9, by pushing, permits the valve operation.



3 TECHNICAL DATA

Max. nominal pressure	32 MPa (320 bar)	Electric Characteristics:
Nominal flow rate	32 l/min	Those solenoid valves are normally equipped by coils type C30, which are energized from DC or AC supply (see 6). Coils type C30-***C are DC energized directly from a V***DC supply. Coils type C30-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Coils type C30 are normally provided for use of ISO 4400/DIN 43650/A connectors. For coils with different connection to the power supply, see table C30/36.
Max. rec. flow rate	40 l/min	
Dimension and installation	see 4	
Duty cycle	ED100%	
Massb (without coil)	0,120kg	

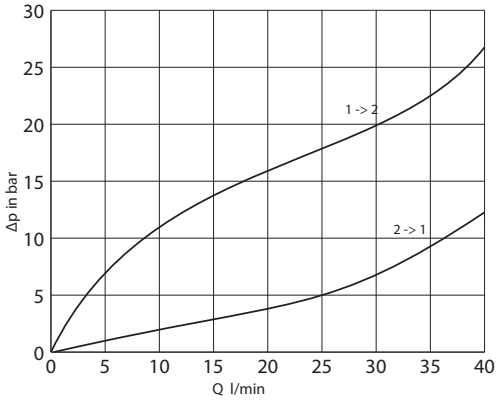
4 INSTALLATION DIMENSIONS (mm)



EV*.34 valves are to be installed in cavity 3/4" 16 UNF with Ø 12,7 mm. Check the appropriate state and position of the seals and , screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24 mm hexagon.

5 PRESSURE DROPS

Viscosity 42 cSt at 50°C.



6 COILS TYPE C30 (Ø 13mm-18w)

Coils ISO/DIN	voltage DC/RAC	nominal current (A)	resistence 20 C (ώ)	nominal power (W)	insulation class
C30-012C	V 12 DC	1,55	7,7	18,6	F
C30-024C	V 24 DC	0,8	31	19	
C30-024R	V 24 RAC	0,85	27	18,3	
C30-048C	V 48 DC	0,4	116	19	
C30-48R	V48 RAC	0,4	106	17,3	
C30-110R	V 110-115 RAC	0,16	600	16	
C30-220R	V 220-230 RAC	0,08	2500	16	

7 CONNECTORS

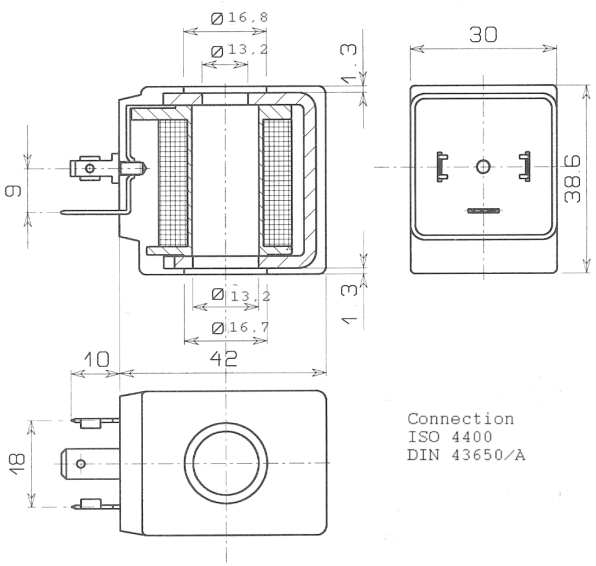
Standard coils are compatible with KA-132 connectors (see table) ; for some functions (R* = bridge rectifier, L* = LED, etc.) the voltage has to be specified :

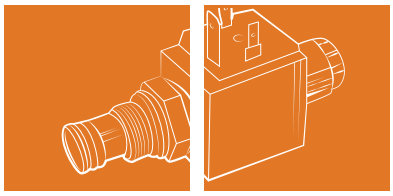
1 = V12 V24 2 = V115 3 = V230

The "energy saving" connectors – option ES – save current consumption to less than 50% of the nominal and strongly reduce warming up of the coils – see table KA-ES.

8 VARIANTS

01 and 02 : filter (0,25 mm) on way □ prevents from dirt and better diffuses the flow around the poppet. 02 and 04 : manual override is of pushing type. Push to pilot the poppet closed (no flow from □ to □); pull to reinstall the condition of normally open poppet (flow from □ to □).





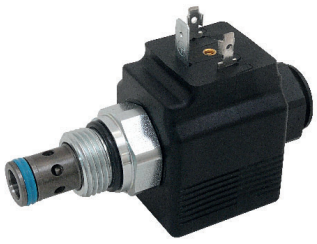
SCREW IN, 2-WAY SOLENOID OPERATED SPOOL TYPE DIRECTIONAL VALVES CAVITY 3/4" 16 UNF-SAE 08/2

EV*2*-34-*

up to 30 l/min, up to 35 MPa (250 bar)

1 DESCRIPTION

Directional control valve 2 way 2 position spool type. Is possible to have this valve in two different version, light line and high performance.
Light line version is available with plastic coils and metallic coils.
High performance version is available only with metallic coils.
The dual seals rings assure an efficient and reliable thightness of the valve.



2 ORDERING CODE

(1)	(2)	(3)	(4)		(5)		(6)		(7)		(8)		(9)
EV		2		-	34	-		-		-		-	

(1) EV: solenoid operated valve

(2) valve type
- L: Light line
- H: High performance

(3) two way valve

(4) Spool type
- C: normally closed
- O: normally open

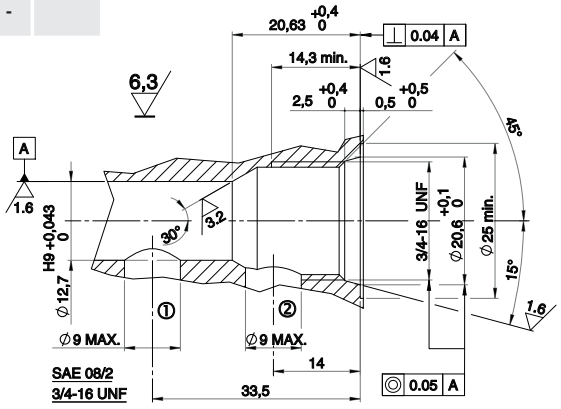
(5) 34: cavity 3/4" UNF (SAE 08/2)

(6) Valves variants (see 6)
- 03: without manual override
- 04: manual override push type (standard)
- 05: manual override screw type

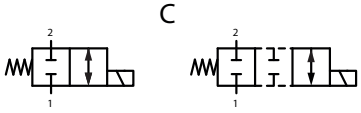
(7) Electric voltage and solenoid coils (see 3, see 8)
- 0000: no coil
- 012C: coil for V12DC
- 024C: coil for V24DC
- 220R: coil for V220-230 RAC

(8) Option for coils connection (see 8)
- no designation: standard connection ISO 4400 / DIN 43650/A
- /C: flying leads;
- /D: Deutsch;
- /A: AMP Junior

(9) options for ISO 4400 / DIN 43650/A connectors (see 7)
- B9: standard connector, black PG9
- D9: black connector, with diode, PG9
- ES: "energy saving" connector with LED
- R*: rectifier bridge;
- L*:LED;
- V*:LED+varistor



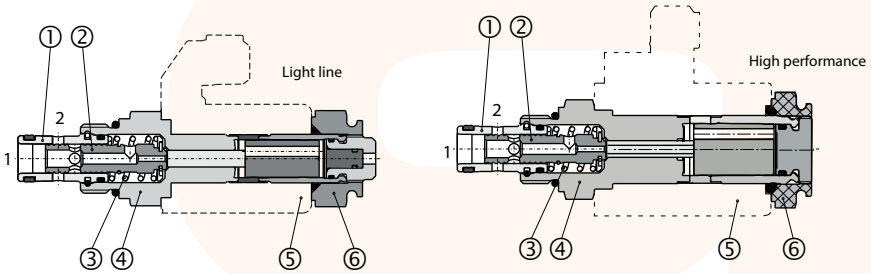
C

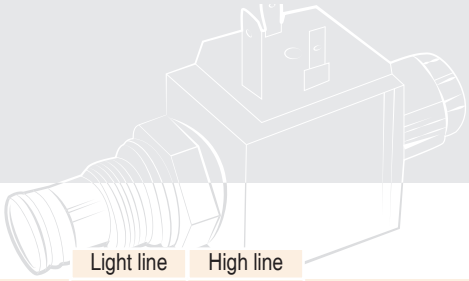


O



Screw-in 2/2 solenoid valves type EV2*.34 are composed by a valve sleeve 1, a control spool 2, a return spring 3, and an actuating assembly 4 that comprises the magnetic parts and the screwing section. An energizing electric solenoid coil 5 is fastened to the assembly by means of a retaining nut 6. When solenoid coils is energized, a magnetic mobile armature shifts and by means of a rod installed inside assembly, moves the control spool which makes hydraulic connections between 1,2 ports.

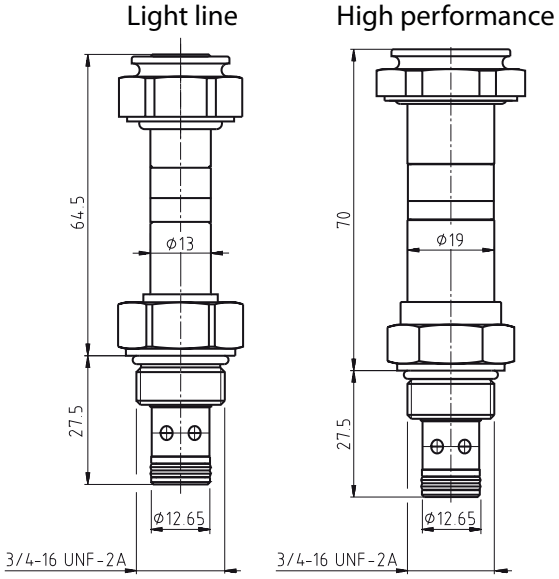




3

	Light line	High line	
Max. nominal pressure	25 MPa (250 bar)	35 MPa (350 bar)	Electric Characteristics:
Nominal flow rate	16 l/min	20l/min	Those solenoid valves are normally equipped by coils type C36, which are energized from DC or AC supply. Coils type C36-***C are DC energized directly from a V***DC supply. Coils type C36-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Coils type C36 are normally provided for use of ISO 4400/DIN 43650/A connectors. For coils with different connection to the power supply, see table C30/36.
Max. rec. flow rate	20 l/min		
Dimension and installation	(see 4)		
Duty cycle	ED100%		
Massb (without coil)	0,20 kg		

4 INSTALLATION DIMENSIONS (mm)



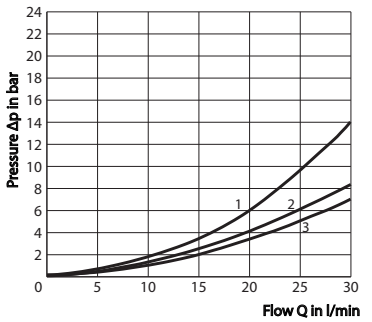
SEALS:
BODY:
1 pcs Dualseal-PU
10,3x12,7x3,1
1 pcs O-ring-NBR
17,0x1,8

SOLENOID AND RETAINING NUT:
1 pcs O-ring-NBR
12,3x2,4
1 pcs O-ring-Viton
20x2,5

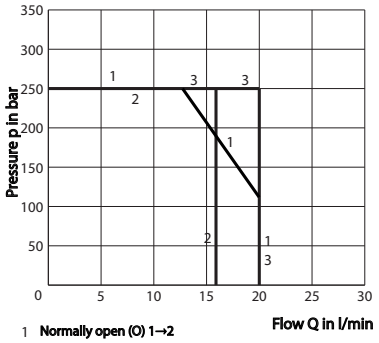
EV2*.34 valves are to be installed in cavity 3/4" 16 UNF. Check the appropriate state and position of the seals, screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24 mm hexagon.

5 TYPICAL DIAGRAMS

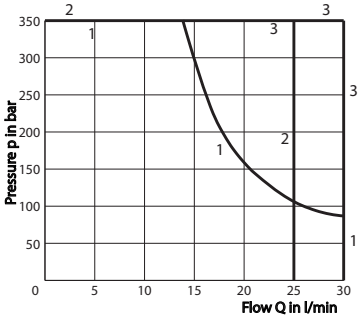
Light line and High performance valve



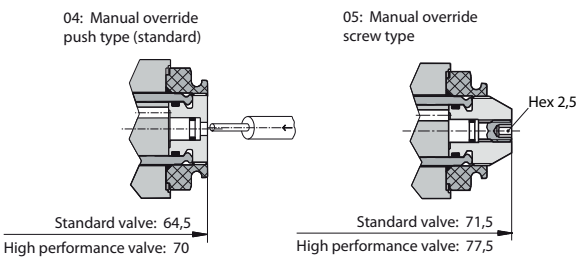
Hydraulic limits of use Light line valve



Hydraulic limits of use High performance valve



6 VARIANTS OF MANUAL OVERRIDE



7

Standard coils are compatible with KA-132 connectors (see table) ; for some functions (R*= bridge rectifier, L*= LED, etc.) the voltage has to be specified :
1 = V12 V24 2 = V115 3 = V230
The "energy saving" connectors – option ES – save current consumption to less than 50% of the nominal and strongly reduce warming up of the coils.

8 COILS type C36L (Ø 13 mm)

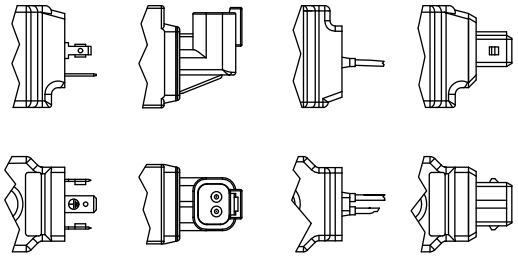
			Ω)		
C36L-012C	V 12 DC	1,9	6,3	22,8	H
C36L-024C	V 24 DC	0,95	25,6	22,5	
C36L-024R	V 24 RAC	1,05	20,2	23	
C36L-048C	V 48 DC	0,47	102	22,6	
C36L-110R	V 110-115 RAC	0,23	420	22,9	
C36L-220R	V 220-230 RAC	0,11	1720	22,3	

9 COILS type B02 (Ø 19 mm) FOR EVH

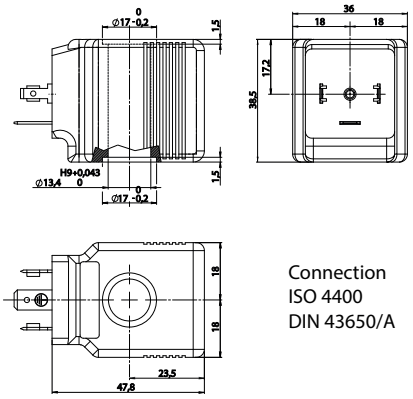
			Ω)		
B02-012C	V 12 DC	2,45	4,9	29	H
B02-024C	V 24 DC	1,15	20,8	28	
B02-110R	V 110-115 RAC	0,24	433	28	
B02-220R	V 220-230 RAC	0,12	1653	28	

CONNECTION OPTIONS

DIN 4365/A-ISO 4400 | DEUTSCH | FLYING LEADS | AMP JUNIOR



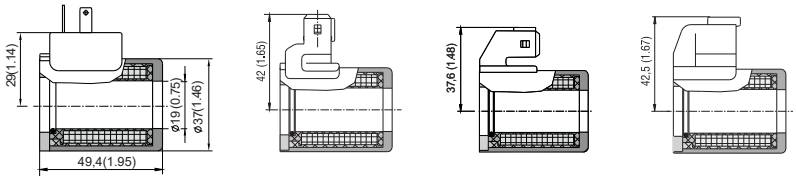
C36L



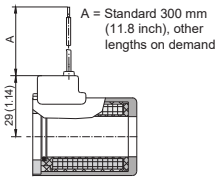
Connection
ISO 4400
DIN 43650/A

B02

DIN 43650/A | AMP | AMPX | DEUTSCH



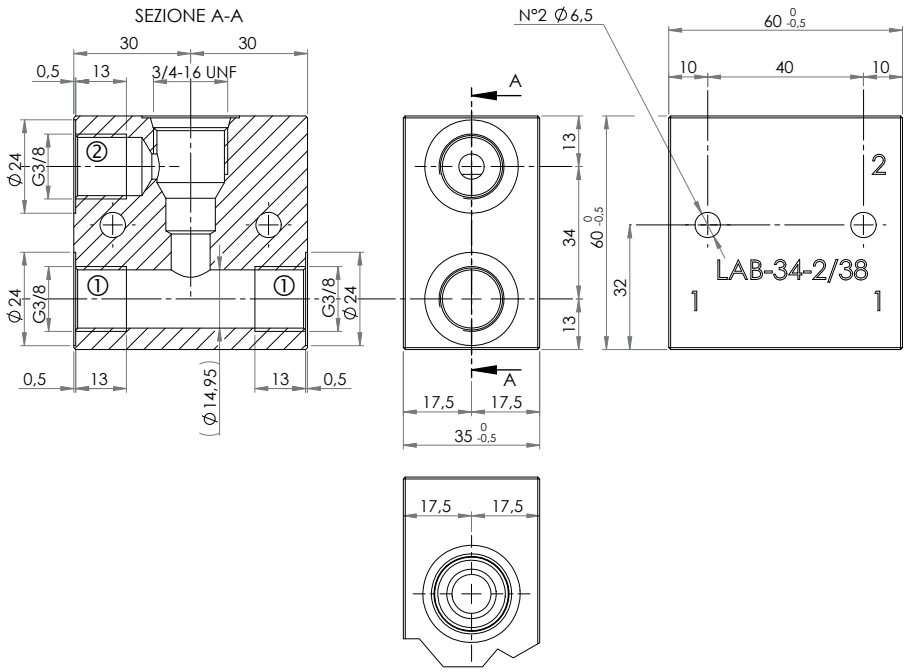
FLYING LEADS

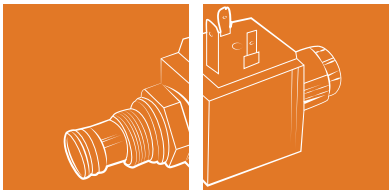


10 LINE ASSEMBLY BODY

LINE ASSEMBLY BODY	PORTS
LAB-34-2/38	3/8" BSP

MATERIAL	MASS
Aluminium Alloy	0,25 kg





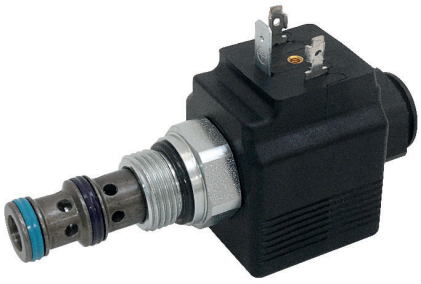
SCREW IN, 3-WAY SOLENOID OPERATED DIRECTIONAL VALVE CAVITY 3/4" 16 UNF-SAE 08/3

EV*3*-34-*

up to 30 l/min, up to 35 MPa (350 bar)

1 DESCRIPTION

Directional control valve 3 way 2 position spool type.
Is possible to have this valve in two different version, light line and high performance.
Light line version is available with plastic coils and metallic coils.
High performance version is available only with metallic coils.
The dual seals rings assure an efficient and reliable thightness of the valve.



2 ORDERING CODE

(1)	(2)	(3)	(4)		(5)		(6)		(7)		(8)		(9)
EV		3		-	34	-		-		-		-	

(1) EV : 3-way solenoid operated spool type

(2) valve type
- L: Light line
- H: High line

(3) three way valve

(4) Spool type
- C: normally closed with open transitory
- C1: normally closed with closed transitory
- O: normally open
- M: normally closed and 3→1 when energized, with open transitory
- M1: normally closed and 3→1 when energized, with closed transitory

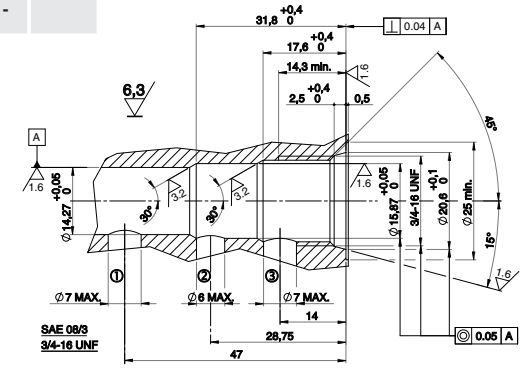
(5) 34: cavity 3/4" 16 UNF

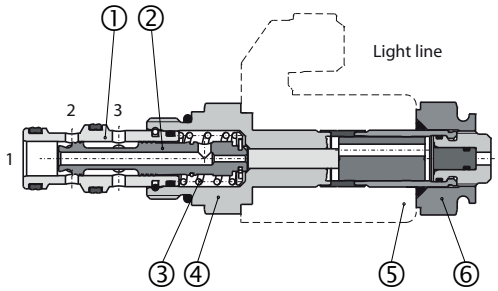
(6) Valves variants (see 6)
- 03: without manual override
- 04: manual override push type (standard)
- 05: manual override screw type

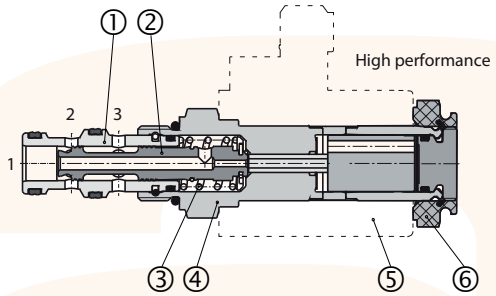
(7) Electric voltage and solenoid coils (see 3, see 8)
- 0000 : no coil
- 012C : coil for V12DC
- 024C : coil for V24DC
- 220R : coil for V220-230 RAC

(8) Options for coil connection (see 8)
- no designation : standard connection ISO4400/DIN43650/A
- C flying leads
- D:Deutsch
- A: AMP Junior

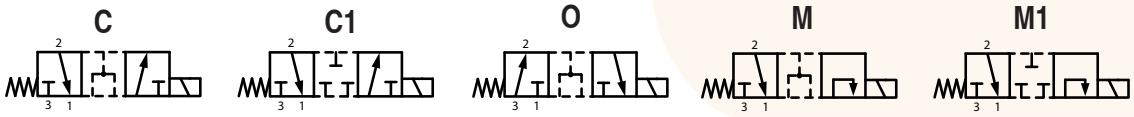
(9) Options for ISO4400/DIN 43650/A connectors (see 7)
- B9: standard connector, black PG9
- D9: black connector, with diode, PG9
- ES: "energy saving" connector with LED
- R*: rectifier bridge; L*:LED; V*:LED+varistor







Screw-in 3/2 solenoid valves type EV3*.34 are composed by a valve sleeve 1, a control spool 2, a return spring 3, and an actuating assembly 4 that comprises the magnetic parts and the screwing section. An energizing electric solenoid coil 5 is fastened to the assembly by means of a retaining nut 6. When solenoid coils is energized, a magnetic mobile armature shifts and by means of a rod installed inside assembly, moves the control spool which makes hydraulic connections between 1,2,3 ports.

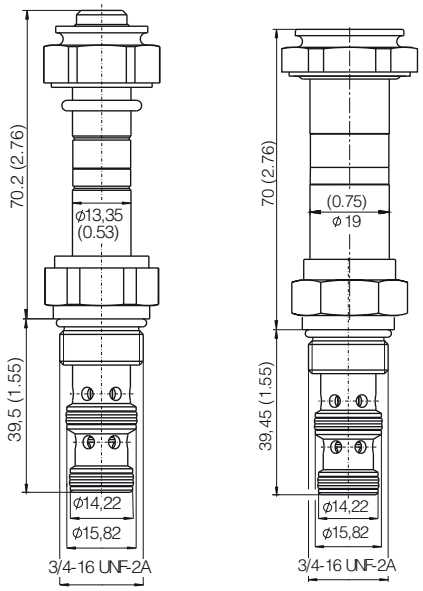


3 TECHNICAL DATA

	Light line	Hight line	Electric Characteristics:
Max. nominal pressure	25 MPa (250 bar)	35 MPa (350 bar)	Those solenoid valves are normally equipped by coils type C36, which are energized from DC or AC supply. Coils type C36-***C are DC energized directly from a V***DC supply. Coils type C36-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Coils type C36 are normally provided for use of ISO 4400/DIN 43650/A connectors. For coils with different connection to the power supply, see table C30/36.
Max. rec. flow rate	20 l/min	30 l/min	
Dimension and installation	see 4		
Duty cycle	ED100%		
Mass (without coil)	0,20 kg		

4 INSTALLATION DIMENSIONS (mm)

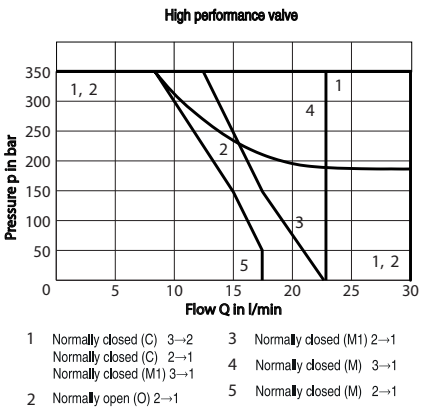
Light line **High performance**



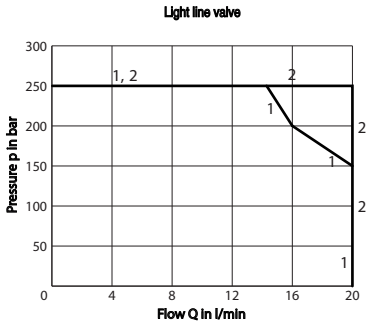
EV3*.34 valves are to be installed in cavity 3/4" 16 UNF. Check the appropriate state and position of the seals, screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24 mm hexagon.

5 TYPICAL DIAGRAMS

Hydraulic limits of use



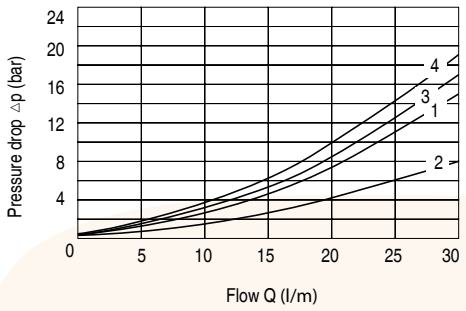
1 Normally closed (C) 3→2
Normally closed (C) 2→1
Normally closed (M1) 3→1
2 Normally open (O) 2→1
3 Normally closed (M1) 2→1
4 Normally closed (M) 3→1
5 Normally closed (M) 2→1



1 Normally open (O) 3→2
2 Normally open (O) 2→1
Normally closed (C) 2→1
Normally closed (C1) 3→2

Pressure drop related to flow rate

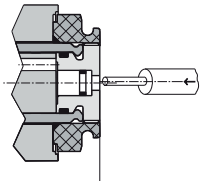
Lightline, High performance



1 Spool C,C1 3→2
Spool M,M1 2→1
2 Spool C 2→1
3 Spool O 3→2
Spool M 3→1
4 Spool C1, O 2→1
Spool M1 3→1

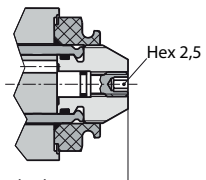
6 VARIANTS OF MANUAL OVERRIDE

04: Manual override
push type (standard)



Standard valve: 64,5
High performance valve: 70

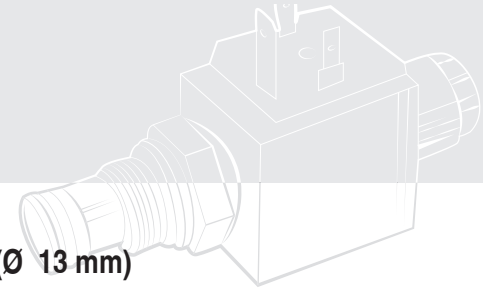
05: Manual override
screw type



Standard valve: 71,5
High performance valve: 77,5

7 CONNECTORS

Standard coils are compatible with KA-132 connectors (see table); for some functions (R* = bridge rectifier, L* = LED, etc.) the voltage has to be specified :
1 = V12, V24 2 = V115 3 = V230
The "energy saving" connectors – option ES – save current consumption to less than 50% of the nominal and strongly reduce warming up of the coils.

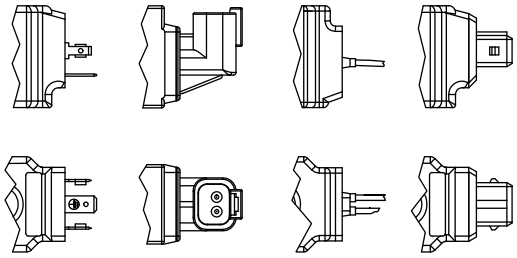


8 COILS type C36 (Ø 13 mm)

Coils DIN	voltage DC	nominal current (A)	resistence 20 C (Ω)	nominal power (W)	insulation class
C36L-012C	V 12 DC	1,9	6,3	22,8	
C36L-024C	V 24 DC	0,95	25,6	22,5	
C36L-024R	V 24 RAC	1,05	20,2	23	
C36L-048C	V 48 DC	0,47	102	22,6	H
C36L-110R	V 110-115 RAC	0,23	420	22,9	
C36L-220R	V 220-230 RAC	0,11	1720	22,3	

CONNECTION OPTIONS

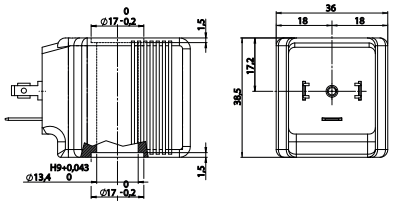
DIN 4365/A-ISO 4400 | DEUTSCH | FLYING LEADS | AMP JUNIOR



9 COILS type B02 (Ø 19 mm) FOR EVH

Coils DIN	voltage (V)	nominal current (A)	resistence 20 C (Ω)	nominal power (W)	insulation class
B02-012C	V 12 DC	2,45	4,9	29	
B02-024C	V 24 DC	1,15	20,8	28	H
B02-110R	V 110-115 RAC	0,24	433	28	
B02-220R	V 220-230 RAC	0,12	1653	28	

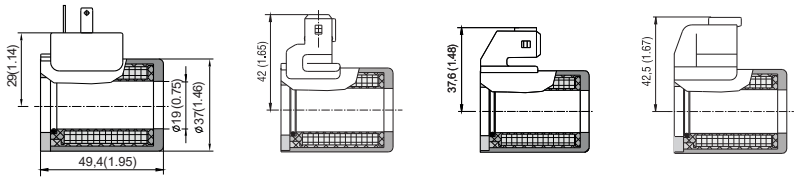
C36L



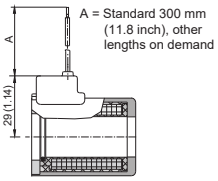
Connection
ISO 4400
DIN 43650/A

B02

DIN 43650/A | AMP | AMPX | DEUTSCH



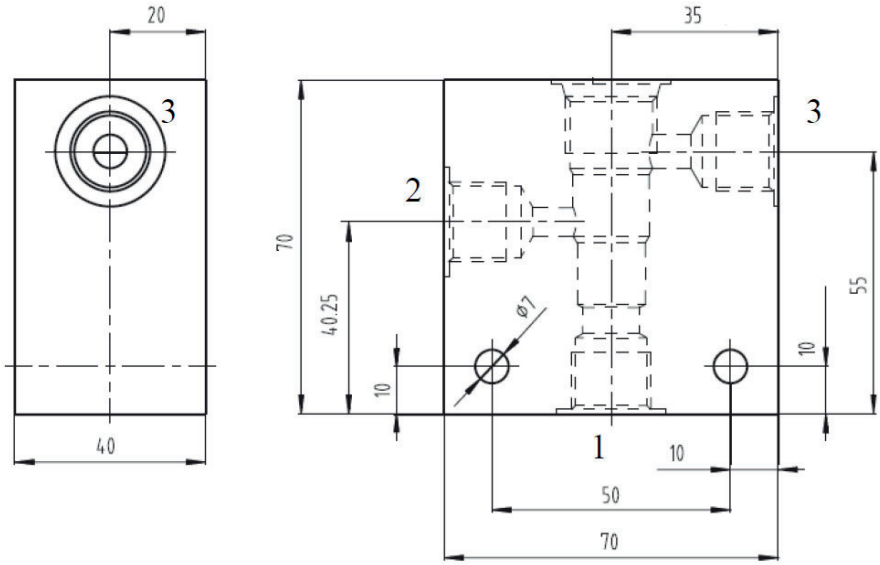
FLYING LEADS

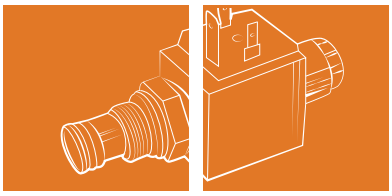


10 LINE ASSEMBLY BODY

LINE ASSEMBLY BODY	PORTS
LAB-34-3/38	3/8" BSP

MATERIAL	MASS
Aluminium Alloy	0,48 kg





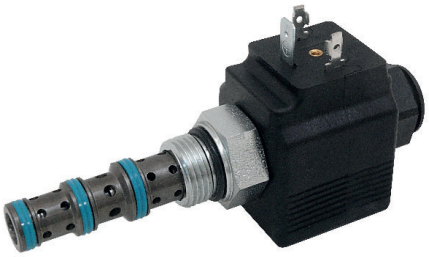
SCREW IN, 4-WAY SOLENOID OPERATED DIRECTIONAL VALVES CAVITY 3/4" 16 UNF-SAE 08/4

EV*4*-34-*

30 l/min 35 MPa (350 bar)

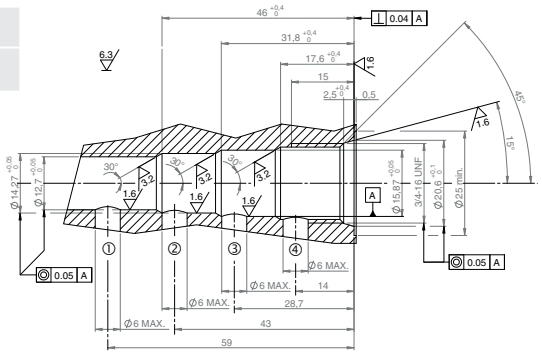
1 DESCRIPTION

Directional control valve 4 way 2 position spool type. It is possible to have this valve in two different versions, light line and high performance. Light line version is available with plastic coils and metallic coils. High performance version is available only with metallic coils. The dual seals rings assure an efficient and reliable thightness of the valve.



2 ORDERING CODE

(1)	(2)	(3)	(4)		(5)		(6)		(7)		(8)		(9)
EV		4		-	34	-		-		-		-	



(1) EV4 : 4-way solenoid operated spool type

(2) valve type
- L: Light line
- H: High performance

(3) four way valve

(4) Spool type
- XP
- PX
- CX
- CP

(5) 34: cavity 3/4" 16 UNF

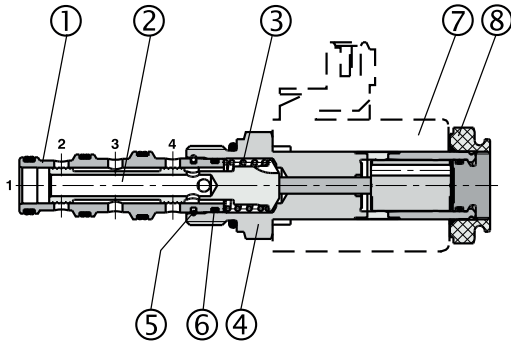
(6) Valves variants (see 5)
- 03 : without manual override
- 04 : manual override push type (standard)
- 05 : manual override screw type

(7) Electric voltage and solenoid coils (see 8)
- 0000 : no coil
- 012C : coil for V12DC
- 024C : coil for V24DC
- 220R : coil for V220-230 RAC

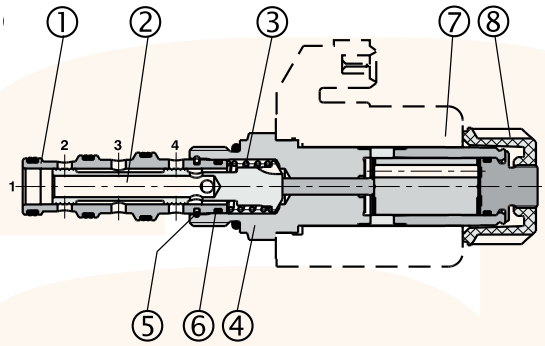
(8) Options for coil connection (see 8)
- no designation: standard connection ISO4400/DIN43650/A
- C: flying leads
- D:Deutsch
- A: AMP Junior

(9) Options for ISO4400/DIN 43650/A connectors (see 7)
- B9 : standard connector, black PG9
- D9 : black connector, with diode, PG9
- ES : "energy saving" connector with LED
- R* : rectifier bridge; L*:LED; V*:LED+varistor

Light line

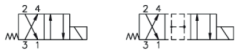


High performance

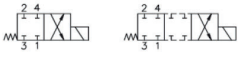


Screw-in 4/2 solenoid valves type EV4**.34 are composed by a valve sleeve 1, a control spool 2, a return spring 3, and an actuating assembly 4 that comprises the magnetic parts and the screwing section. An energizing electric solenoid coil 5 is fastened to the assembly by means of a retaining nut 6. When solenoid coils is energized, a magnetic mobile armature shifts and by means of a rod installed inside assembly, moves the control spool which makes hydraulic connections between 1, 2, 3, 4 ports.

XP



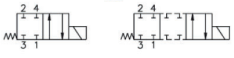
CX



PX



CP



3=P; 1=T 2=A; 4=B

3 TECHNICAL DATA

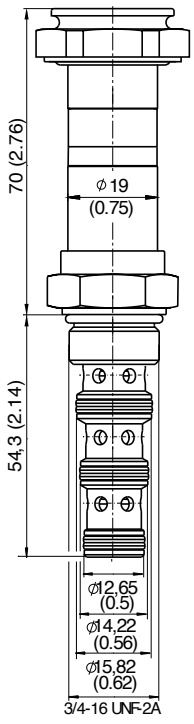
	Light line	High performance
Max. nominal pressure	25 MPa (250 bar)	35 MPa (350 bar)
Nominal flow rate	16 l/min	25 l/min
Max. rec. flow rate	20 l/min	30 l/min
Dimension and installation	see 4	
Duty cycle	ED100%	
Massb (without coil)	0,20 kg	

Electric Characteristics:

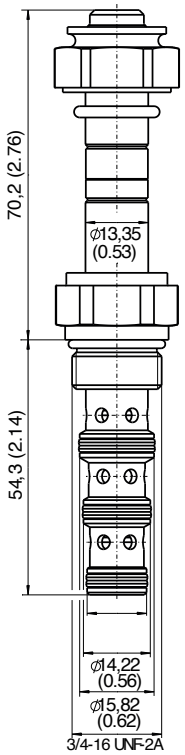
Those solenoid valves are normally equipped by coils type C36, which are energized from DC or AC supply. Coils type C36-***C are DC energized directly from a V***DC supply. Coils type C36-***R are RAC (Rectified Alternate Current) energized from a V***AC supply, by a full wave bridge rectifier incorporated in the connector. Coils type C36 are normally provided for use of ISO 4400/DIN 43650/A connectors. For coils with different connection to the power supply, see table C30/36.

4 INSTALLATION DIMENSIONS (mm)

High performance



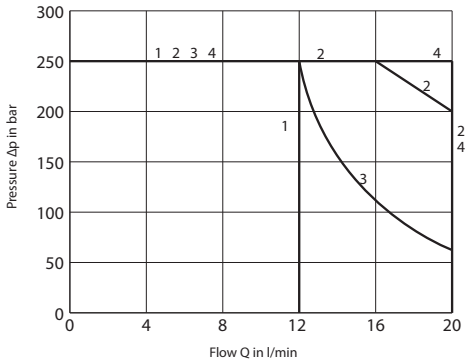
Light line



EV4*.34 valves are to be installed in cavity 3/4" 16 UNF. Check the appropriate state and position of the seals, screw the valve in the cavity and lock it with a torque of about 45 Nm applied on the 24 mm hexagon.

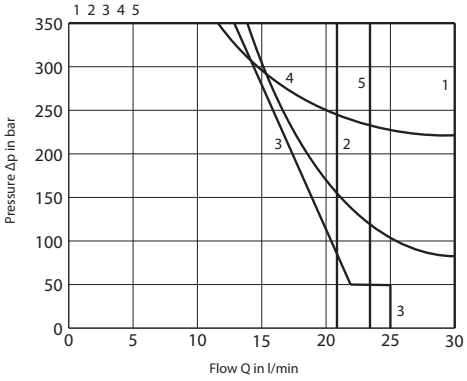
5 TYPICAL DIAGRAMS

Light line



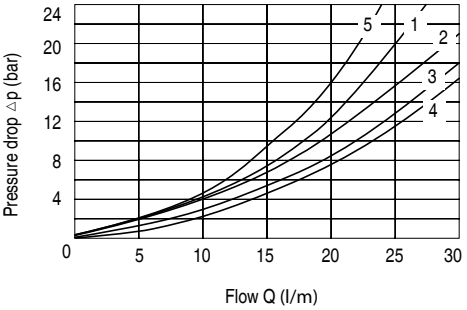
	Connection	Direction
1	CP	3->2, 4->1
2	CX	3->4, 2->1
3	PX	3->2, 4->1
4	PX	3->4, 2->1
4	XP	3->4, 2->1

High performance



	Connection	Direction
1	CX	3->4, 2->1
2	CP	3->2, 4->1
3	PX	3->2, 4->1
4	XP	3->4, 2->1
5	XP	3->2, 4->1
1	PX	3->4, 2->1

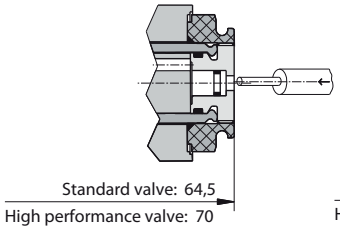
Light line, High performance



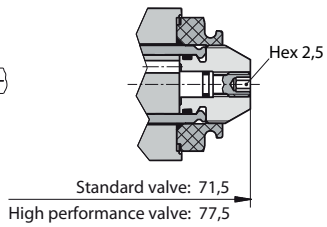
	Connection	Direction
1	CP	4->1
2	XP	3->4, 4->1
3	CX	3->4
4	XP	3->2, 2->1
5	PX	4->1

6 VARIANTS OF MANUAL OVERRIDE

04: Manual override
push type (standard)



05: Manual override
screw type



7 CONNECTORS

Standard coils are compatible with KA-132 connectors; for some functions (R* = bridge rectifier, L*= LED, etc.) the voltage has to be specified :
1 = V12 V24 2 = V115 3 = V230
The "energy saving" connectors – option ES – save current consumption to less than 50% of the nominal and strongly reduce warming up of the coils.

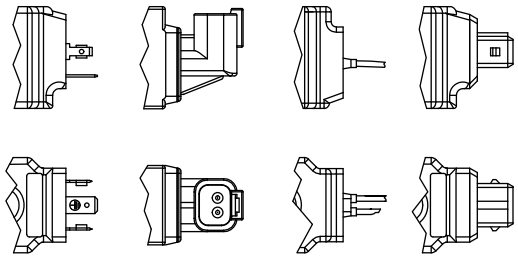


8 COILS type C36 (Ø 13 mm) for EVL4

Coils DIN	voltage DC	nominal current (A)	resistence 20 C (ώ)	nominal power (W)	insulation class
C36L-012C	V 12 DC	1,9	6,3	22,8	H
C36L-024C	V 24 DC	0,95	25,6	22,5	
C36L-024R	V 24 RAC	1,05	20,2	23	
C36L-048C	V 48 DC	0,47	102	22,6	
C36L-110R	V 110-115 RAC	0,23	420	22,9	
C36L-220R	V 220-230 RAC	0,11	1720	22,3	

CONNECTION OPTIONS

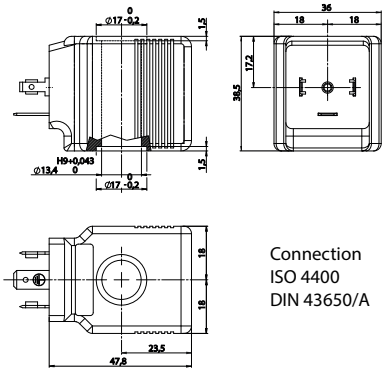
DIN 4365/A-ISO 4400 | DEUTSCH | FLYING LEADS | AMPX JUNIOR



9 COILS type B02 (Ø 19 mm) FOR EVH4

Coils DIN	voltage DC	nominal current (A)	resistence 20 C (ώ)	nominal power (W)	insulation class
B02-012C	V 12 DC	2,45	4,9	29	H
B02-024C	V 24 DC	1,15	20,8	28	
B02-110R	V 110-115 RAC	0,24	433	28	
B02-220R	V 220-230 RAC	0,12	1653	28	

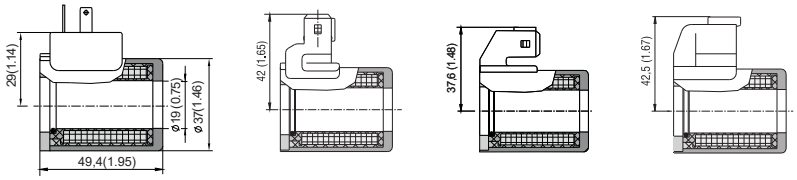
C36L



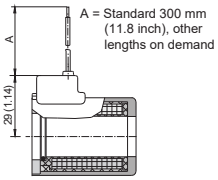
Connection
ISO 4400
DIN 43650/A

B02

DIN 43650/A | AMP | AMPX | DEUTSCH



FLYING LEADS

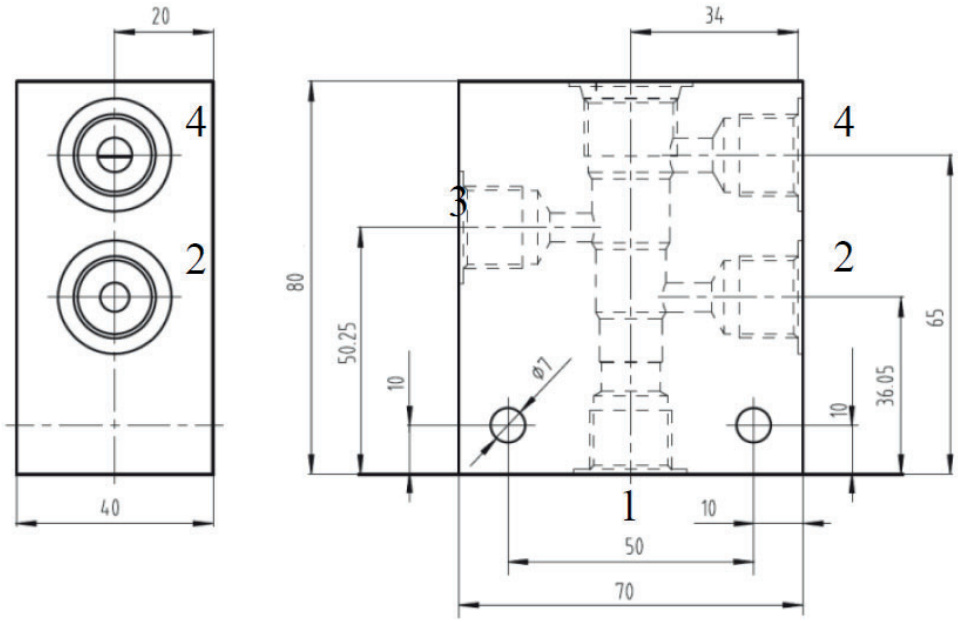


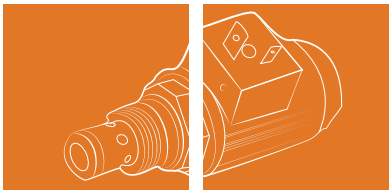
A = Standard 300 mm (11.8 inch), other lengths on demand

10 LINE ASSEMBLY BODY

LINE ASSEMBLY BODY	PORTS
LAB-34-4/38	3/8" BSP

MATERIAL	MASS
Aluminium Alloy	0,54 kg





SCREW IN POPPET CHECK VALVE CAVITY 3/4" 16 UNF

VUC-34*

40 l/min 35 MPa (350 bar)

1 DESCRIPTION

VUC is a poppet check valve in standard cavity 3/4" 16UNF.
The external surface is zinc coated.
The tightess is guarantee by high precision machining parts and by the poppet design.
Different cracking pressure available on demand.



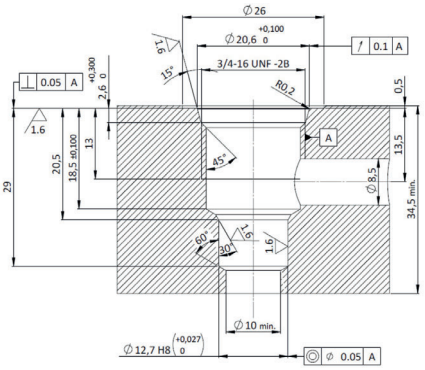
2 ORDERING CODE

(1)		(2)		(3)
VUC	-	34	-	

(1) VUC: check valve

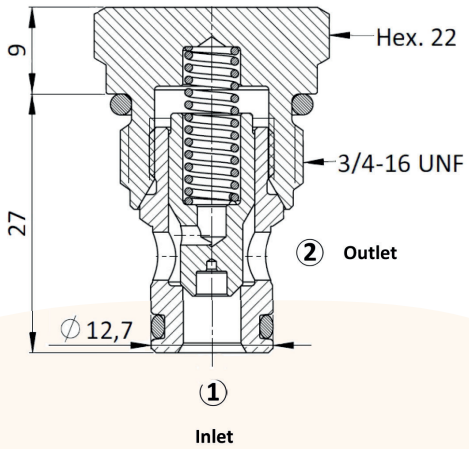
(2) 34: cavity 3/4" 16 UNF (ø 12,7 mm)

(3) Cracking pressure
no designation: 3 bar (standard execution)
1: 8 bar

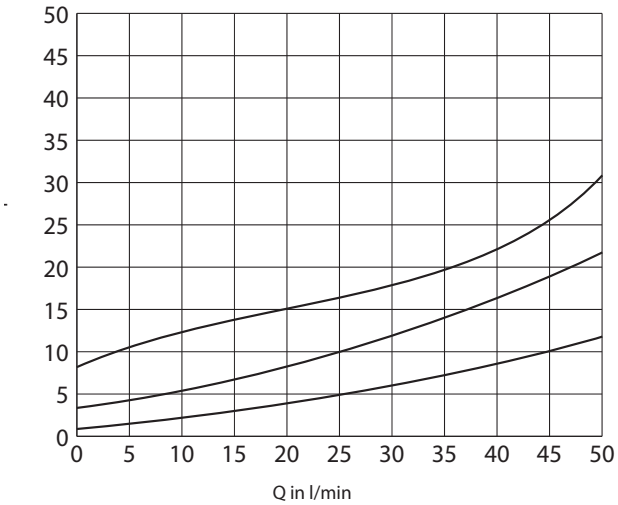


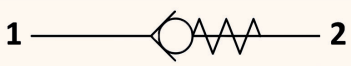
3 TECHNICAL DATA

Maximum flow	40 l/min
Maximum pressure	350 bar (35 MPa)
Installation torque	40-45 Nm
Weight	0,06 Kg



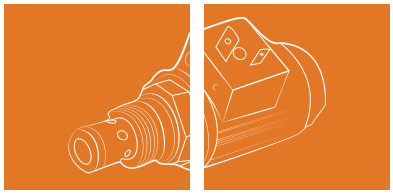
4 TYPICAL DIAGRAMS





Valve is designed as simple lock or load-holding device. Flow is free from 1 to 2 and valve opens against the force of the spring. In the direction 2 -1 the flow is blocked and not permitted. Tightness is assured by high quality poppet made in hardened steel.

8 0028



HYDRAULIC SCREW-IN VALVES PRESSURE RELIEF-DIRECT ACTING

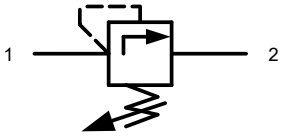
MO-010

16 l/min 25 MPa (250 bar)

1 DESCRIPTION

MO-010 is a direct operated pressure relief valve in standard cavity 3/4" 16UNF.
The external surface is zinc coated. With a single pressure setting is it possible to cover a wide range of regulations. The simple design is perfect for application with low flow rates such as mini power units.





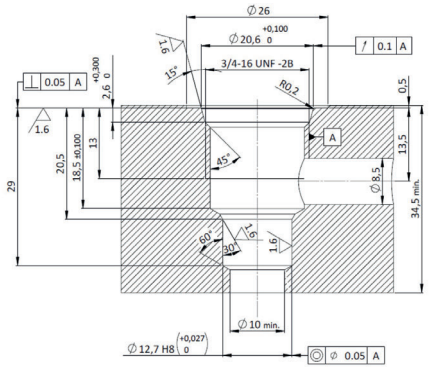
2 ORDERING CODE

(1)		(2)		(3)
MO	-	010	/	25

(1) MO: Direct acting relief valve

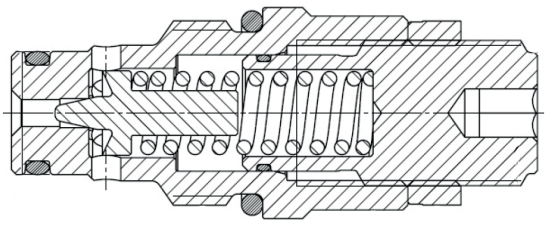
(2) 010: Nominal size (3/4" 16 UNF)

(3) 25: Spring type (setting range 25 to 250 bar)

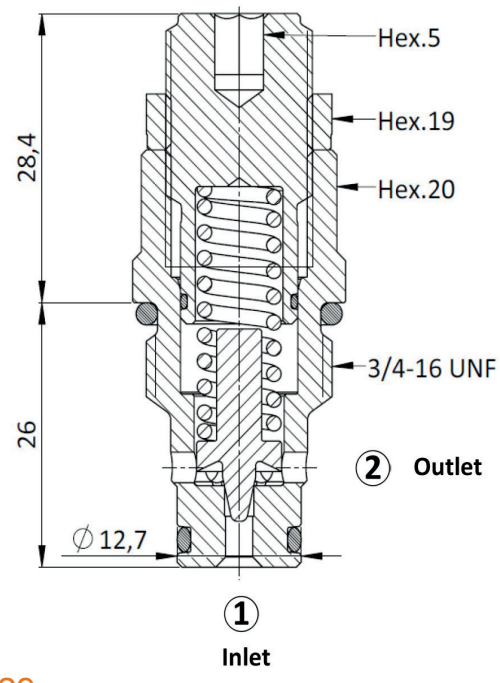


3 TECHNICAL DATA

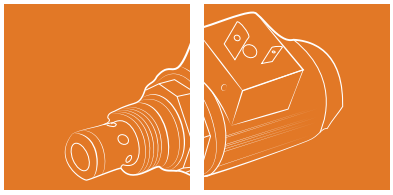
Maximum flow	16 l/min
Maximum pressure	25 MPa (250 bar)
Mass	0,14 Kg



4 INSTALLATION DIMENSIONS



SPARE PARTS	
Position	Description
1	O-Ring Ø 16,36 x 2,20 70 Sh
2	Teflon Ring Ø 9,7 x 12,7 x 1,4
3	O-Ring Ø 9,25 x 1,78 70 Sh



HYDRAULIC SCREW-IN VALVES PRESSURE RELIEF-DIRECT ACTING

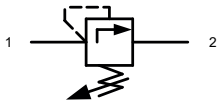
MO-020

25 l/min 35 MPa (350 bar)

1 DESCRIPTION

MO-020 is a direct operated pressure relief valve in standard cavity 3/4" 16UNF.
The external surface is zinc coated.
There are three different pressure settings for a more accurate regulation.





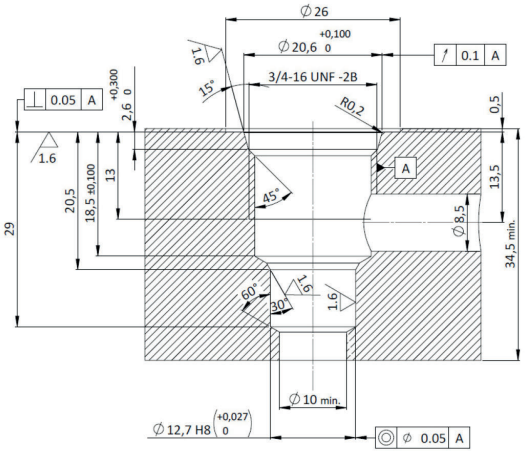
2 ORDERING CODE

(1)		(2)		(3)
MO	-	020	/	

(1) MO: Direct acting relief valve

(2) 020: Nominal size

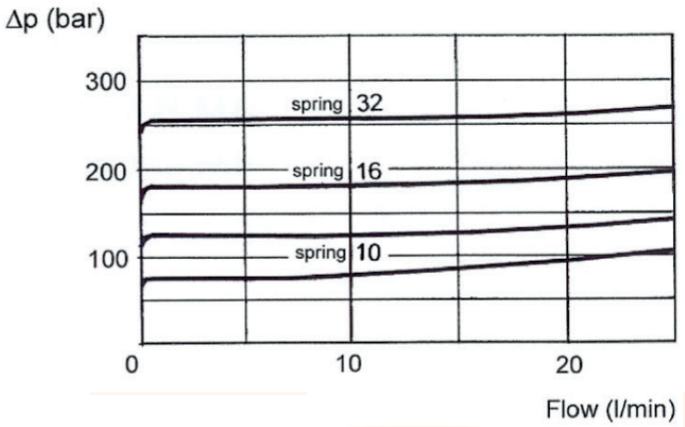
(3) Spring type:
10: setting 32-125bar, increase 15 bar/turn,
20:setting 63-200bar, increase 30 bar/turn,
32: setting 125-350bar, increase 40 bar/turn,



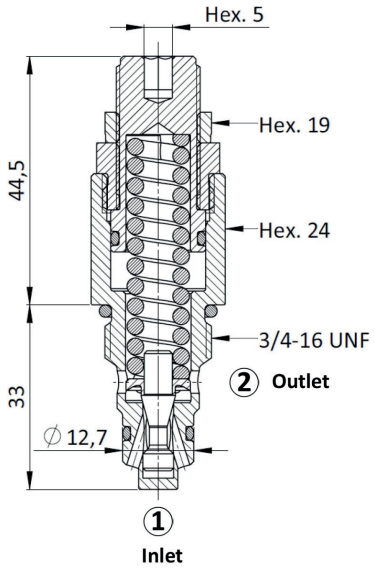
3 TECHNICAL DATA

Maximum flow	25 l/min
Maximum pressure	25 MPa (250 bar)
Mass	0,13 Kg

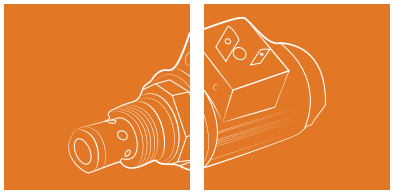
4 TYPICAL DIAGRAMS



5 INSTALLATION DIMENSIONS



SPARE PARTS		
Position	Code	Description
1	ZOR084	O-Ring Ø 16,36 x 2,20 70 Sh
2	0F.A2.001	Teflon Ring Ø 9,7 x 12,7 x 1,4
3	ZOR027	O-Ring Ø 9,25 x 1,78 70 Sh
Inner	ZORO28	O-Ring Ø 14 x 1,78 70 Sh



HYDRAULIC SCREW-IN VALVES FLOW CONTROL-ADJUSTABLE

FT266/VCF

20 l/min 35 MPa (350 bar)

1 DESCRIPTION

It is possible to choose different type of flow regulators in standard cavity 3/4" 16UNF.
FT266/5 has a fine control in one direction. FT266/2 controls both flow directions. In these two models the regulation is made by a precision hand-grip with locking screw.
The model VCF-34 is always a bi-directional flow control valve but suitable for lower flow rates and without hand knob.



2 ORDERING CODE

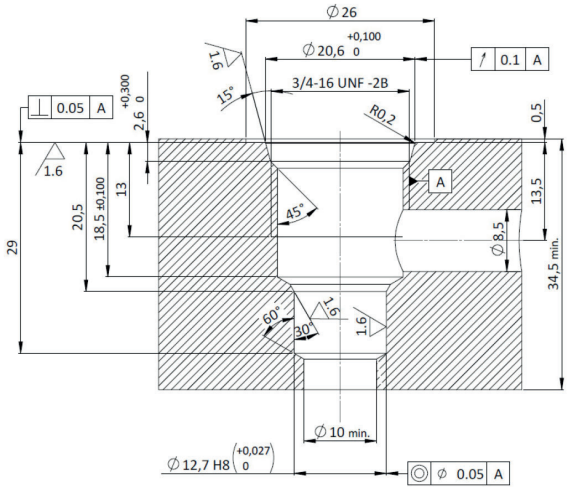
(1)		(2)		(3)		(4)	or			
FT	-		/		-	34		VCF	-	34

(1) FT: Direct acting relief valve

(2) Nominal size
266: 20 l/min- Mass 0,13

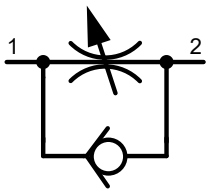
(3) Spring type
2: 20 l/min- Mass 0,13
5: 20 l/min- Mass 0,15

(4) 34: design number (progressive) of the valve



3 TECHNICAL DATA

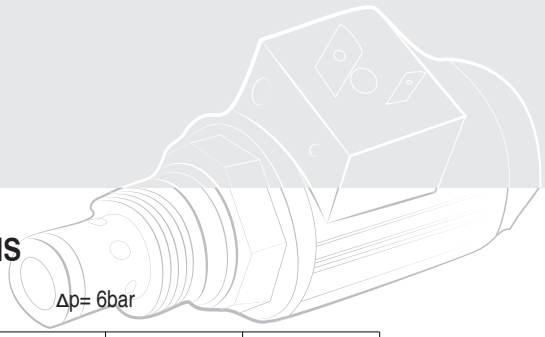
Maximum flow	20 l/min- 16 l/min (VCF-34)
Maximum pressure	35 MPa (350 bar)
Mass	0,15 Kg- 0,13 Kg - 0,12 Kg



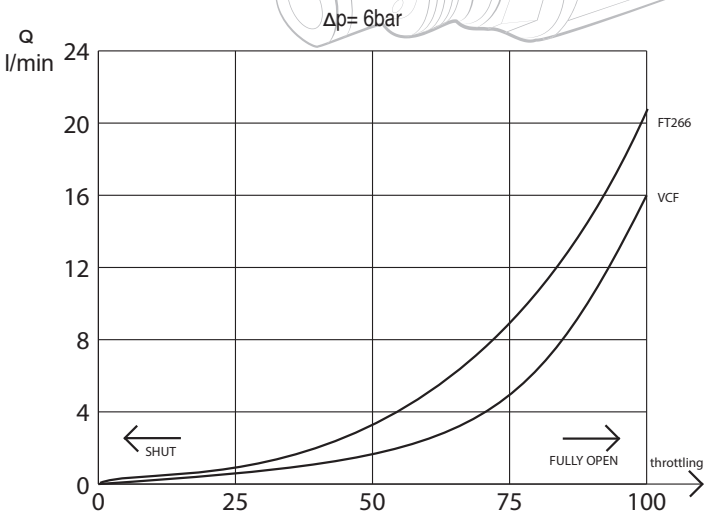
FT266/5



FT266/2
or
VCF-34



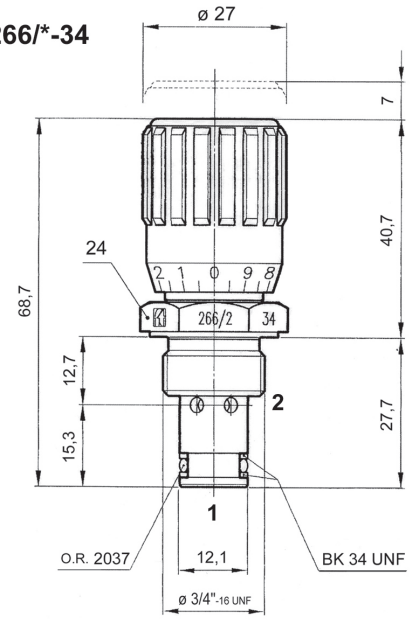
4 TYPICAL DIAGRAMS



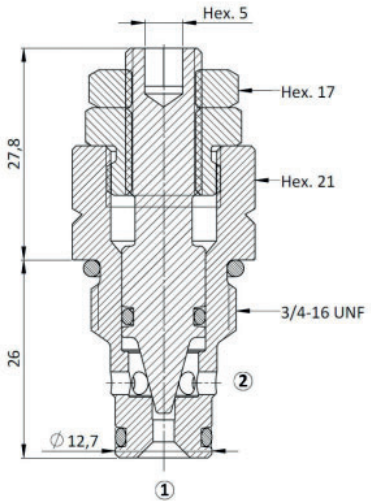
Typical Q curves a different throttling sections and fixed Δp=6 bar for valves FT266/VCF. Standard configuration with mineral oil at 42cSt and 50° C.

5 INSTALLATION DIMENSIONS

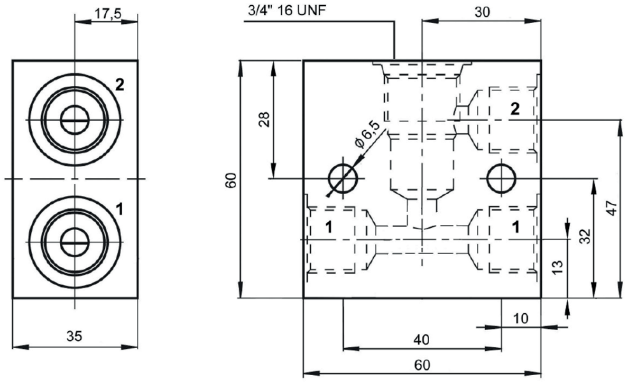
FT266/*-34



VCF-34

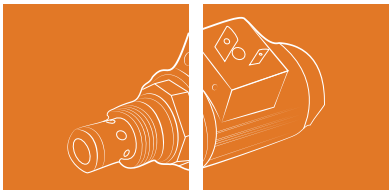


6 LINE ASSEMBLY BODY



Code	Ports
LAB-34-2/14	1/4" BSP
LAB-34-2/38	3/8" BSP
MASS: 0,25 kg	

Suitable for standard 2-way screw-in valves, cavity 3/4" 16 UNF. Designed for in-line assembly, either parallel or in series one, LAB aluminium bodies are supplied with one service port (1) plugged.



HYDRAULIC SCREW-IN FLOW CONTROL VALVES- PRESSURE COMPENSATED

VQF

12 l/min 25 MPa (250 bar)

1 DESCRIPTION

2-way pressure compensated flow control valve Suitable for standard cavity 3/4" 16 UNF Not adjustable type: available in different fixed delivery rates (from 1 to 12 l/min – accuracy: ±10% at 100 bar) Maximum operating pressure: 250 bar Reverse flow through the same regulating orifice, without pressure compensation.
Steel body.
Poppet in hardened and grinded steel.



2 ORDERING CODE

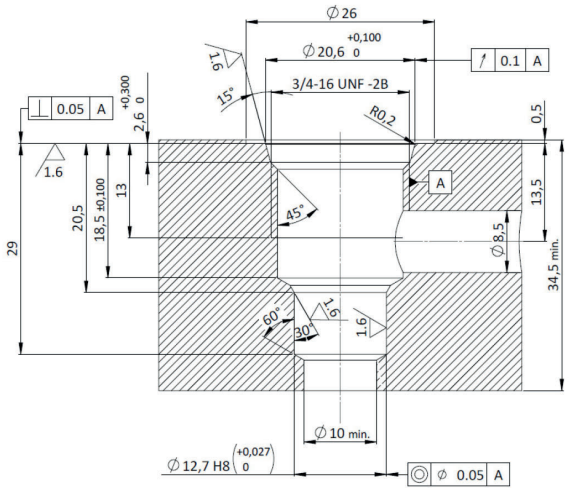
(1)		(2)		(3)
VQF	-	34	/	

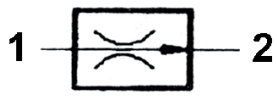
(1) VQF: Pressure compensated flow control valve

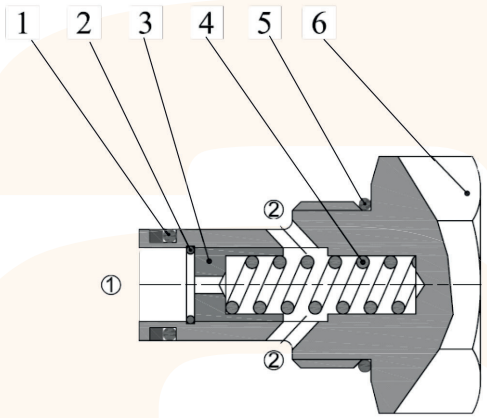
(2) 34: Nominal size

(3) Flow rate:

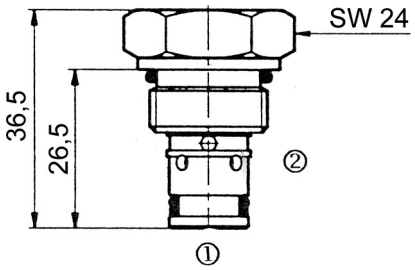
1-1 l/min
2-2 l/min
3-3 l/min
4-4 l/min
5-5 l/min
6-6 l/min
09-9 l/min
12-12 l/min



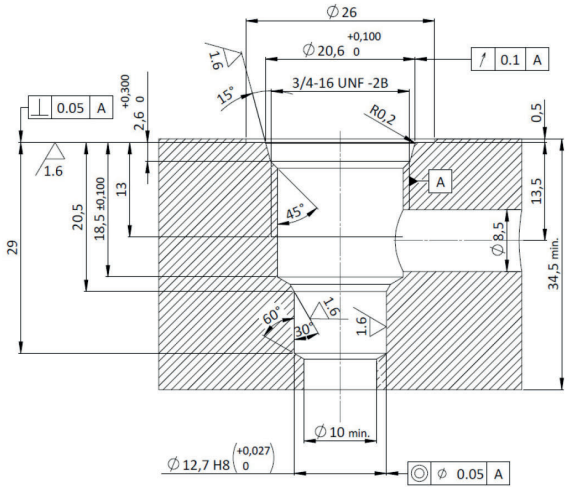




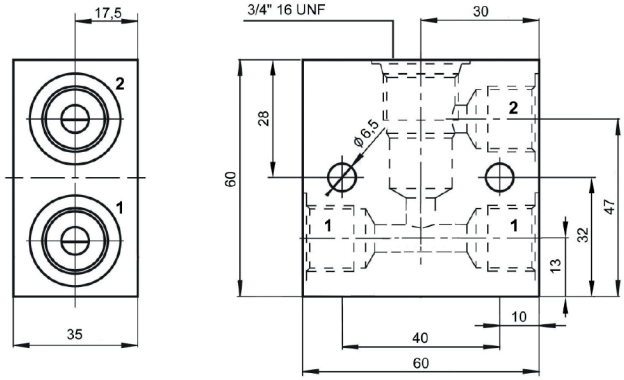
3 INSTALLATION DIMENSIONS



Tightening torque 40-45Nm



4 LINE ASSEMBLY BODY



Code	Ports
LAB-34-2/14	1/4" BSP
LAB-34-2/38	3/8" BSP
MASS: 0,25 kg	

Suitable for standard 2-way screw-in valves, cavity 3/4" 16 UNF. Designed for in-line assembly, either parallel or in series one, LAB aluminium bodies are supplied with one service port (1) plugged.



HYDRAULIC SCREW-IN VALVES PRESSURE REDUCING-ADJUSTABLE

RO-34/*

20 l/min 35 MPa (350 bar)

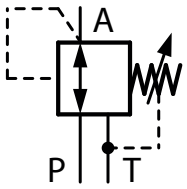
1 DESCRIPTION

Pressure reducing-relief valve in cartridge style with 3/4"-16 UNF industrial common cavity, direct acting, spool type for improved stability throughout flow range. Thanks to the low hysteresis of the valve the response to dynamic pressure changes is rapid and reliable. Body is designed for an accurate pressure control with a limited pressure drop. Standard version of the valve is zinc coated (240h salt spray test) with possibility of Zinc Nickel coating for improved corrosion resistance (520h salt spray).



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)
RO	-	34	/		-		-	



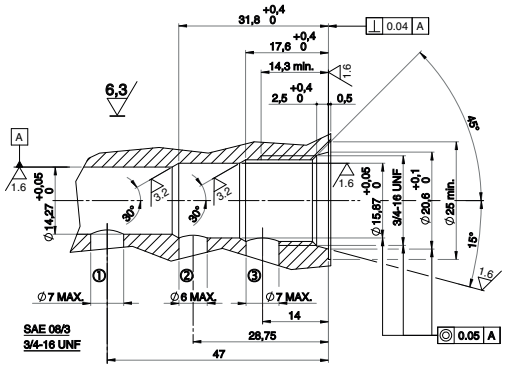
(1) RO: Direct acting pressure reducing-relieving valve

(2) Nominal size
34: 3/4" 16 UNF Cavity

(3) Reduced pressure ranges
- 6,3: 2,0-6,3 MPa (20-63 bar)
- 16: 5,0-16MPa (50-160 bar)
- 21: 10,0-21,0 MPa (100-210 bar)

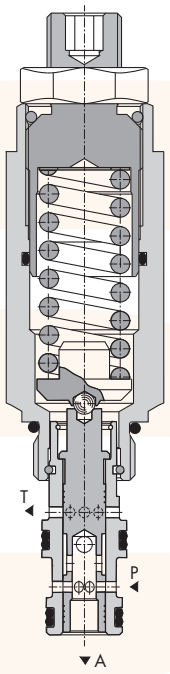
(4) seals
- no designation: NBR seals
- V: Viton seals

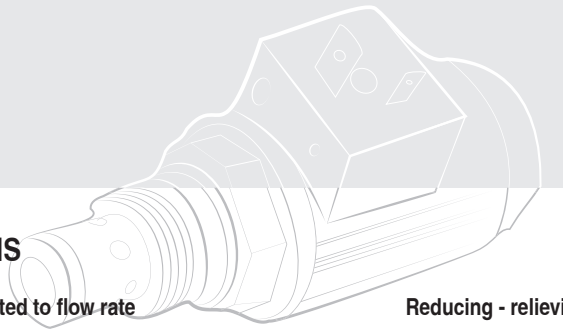
(5) Coating
- no designation: zinc - trivalent coating
- ZN: zinc - nickel (520 h)



3 TECHNICAL DATA

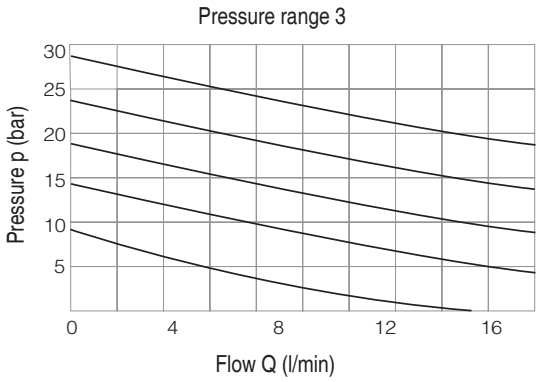
Maximum flow	20 l/min
Maximum pressure	35 MPa (350 bar)
Mass	0,13 Kg



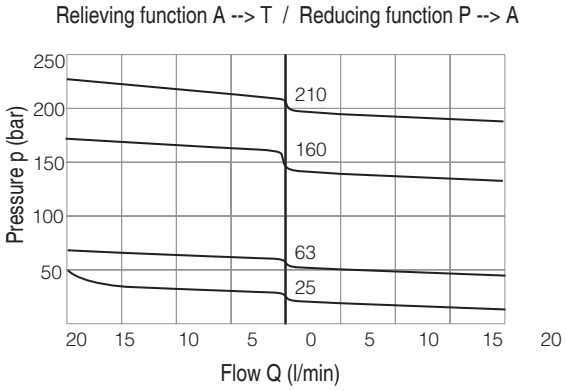


4 TYPICAL DIAGRAMS

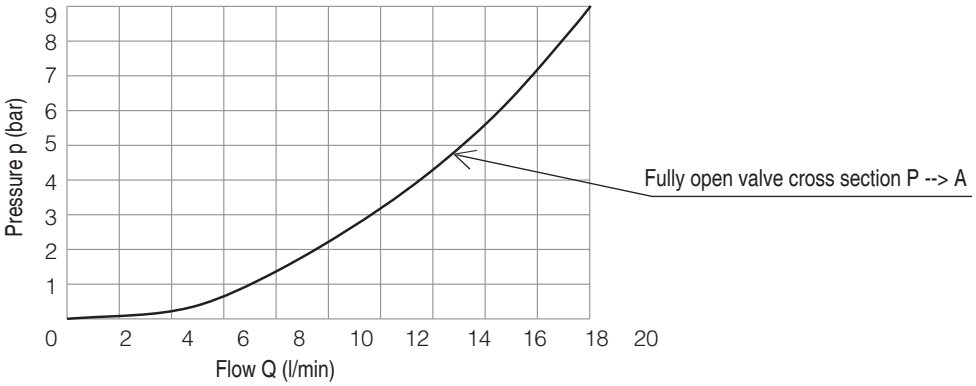
Minimum reducing pressure related to flow rate



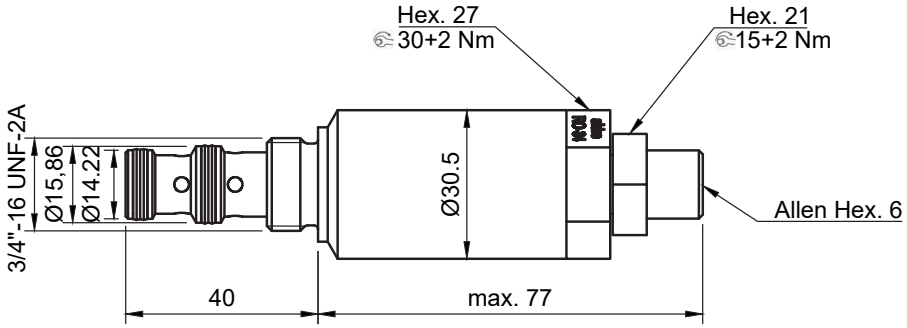
Reducing - relieving pressure related to flow rate



Pressure drop related to flow rate



5 INSTALLATION DIMENSIONS





HYDRAULIC SCREW-IN VALVES PRESSURE REDUCING-ADJUSTABLE

RO-78/*

60 l/min 42 MPa (420 bar)

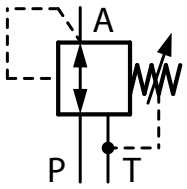
1 DESCRIPTION

Pressure reducing-relief valve in cartridge style with 7/8”-14 UNF industrial common cavity, direct acting, spool type for improved stability throughout flow range. Thanks to the low hysteresis of the valve the response to dynamic pressure changes is rapid and reliable. Body is designed for an accurate pressure control with a limited pressure drop. The valves also acts as a releif valve in case of pressure peaks or shocks in the downstream line. Standard version of the valve is zinc coated (240h salt spray test) with possibility of Zinc Nickel coating for improved corrosion resistance (520h salt spray).



2 ORDERING CODE

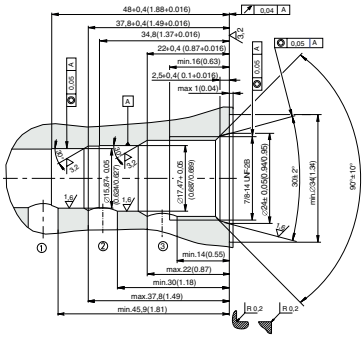
(1)		(2)		(3)		(4)		(5)
RO	-	78	/		-		-	



(1) RO: Direct acting pressure reducing-relieving valve

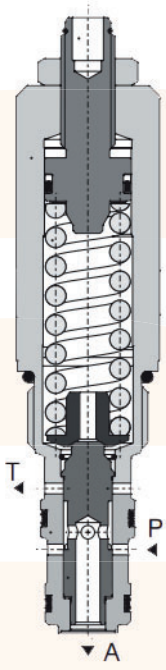
(2) Nominal size
78: 7/8”-14 UNF Cavity

(3) Reduced pressure ranges
- 3: 1,0 - 3,0 MPa (10-30 bar)
- 6,3: 2,0 - 8,0 MPa (20 - 80 bar)
- 11: 3,0 - 11,0 MPa (30 - 110 bar)
- 16: 4,0 - 15,0 MPa (40 - 150 bar)



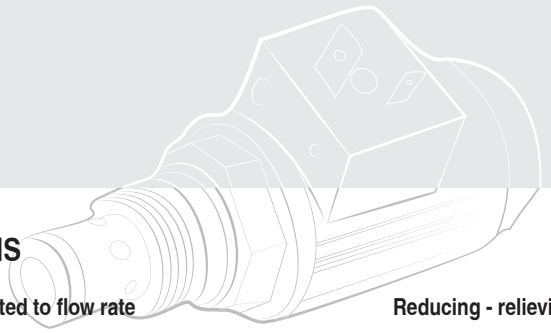
(4) seals
- no designation: NBR seals
- V: Viton seals

(5) Coating
- no designation: zinc - trivalent coating
- ZN: zinc - nickel (520 h)



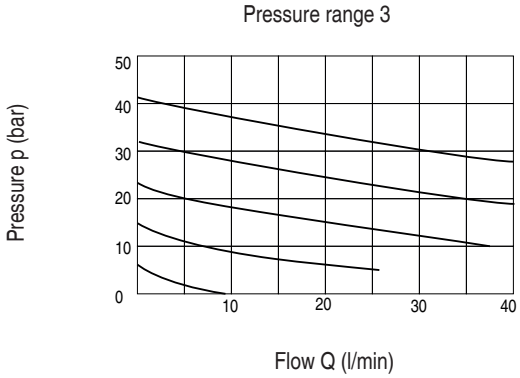
3 TECHNICAL DATA

Maximum flow	60 l/min
Maximum pressure	42 MPa (420 bar)
Mass	0,26 Kg

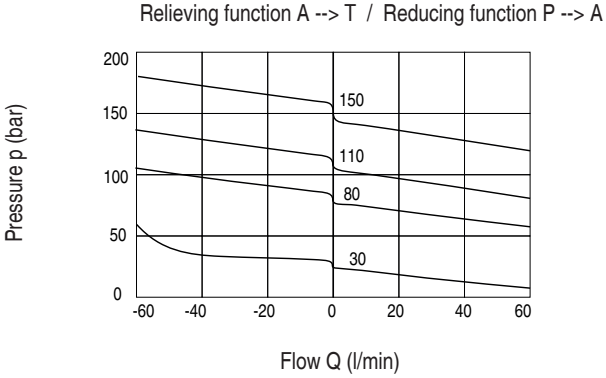


4 TYPICAL DIAGRAMS

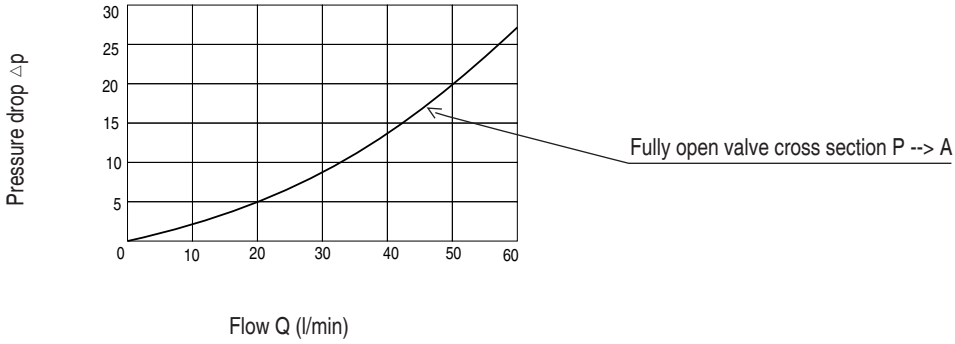
Minimum reducing pressure related to flow rate



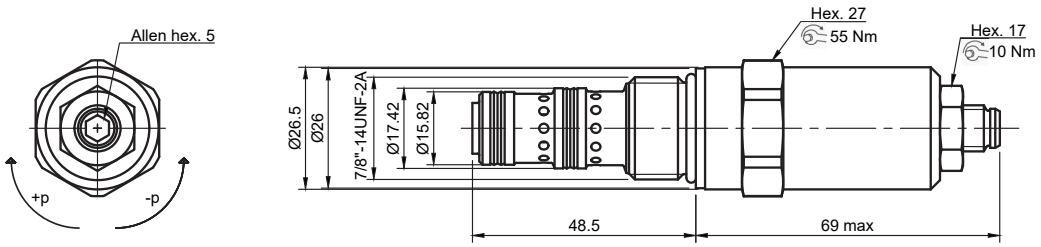
Reducing - relieving pressure related to flow rate

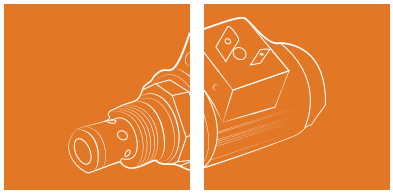


Pressure drop related to flow rate



5 INSTALLATION DIMENSIONS





LINE ASSEMBLY BODIES FOR 2-WAY SCREW-IN VALVES

LAB

35 MPa (350 bar)

1 DESCRIPTION

Suitable for standard 2-way screw-in valves. In-line parallel assembly: all ports connected. In-line series assembly: one port n 1 plugged. Standard execution with plug on port n 1 Material: aluminium Maximum operating pressure: 350 bar Cavity according to UNF standards, BSP ports



2 ORDERING CODE

(1)		(2)		(3)		(4)
LAB	-		-	2	/	

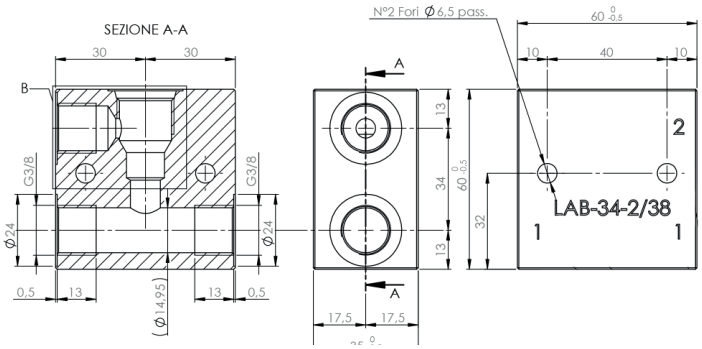
(1) LAB: Line assembly body

(2) Nominal size
- 34: Cavity 3/4"- 16 UNF
- 78: Cavity 7/8" -14 UNF

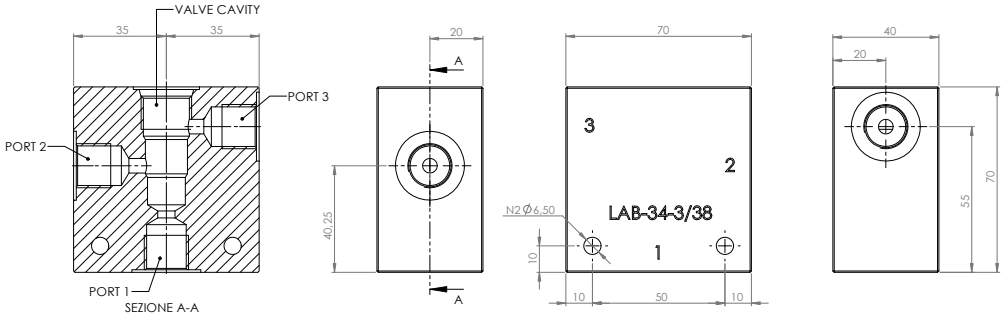
(3) 2: 2-way valves
- 3: 3-way valves
- 4: 4-way valves

(4) Port configuration
- 14: ports 1/4" BSP (LAB-34 only)
- 38: ports 3/8" BSP
- 12: ports 1/2" BSP (LAB-78 only)

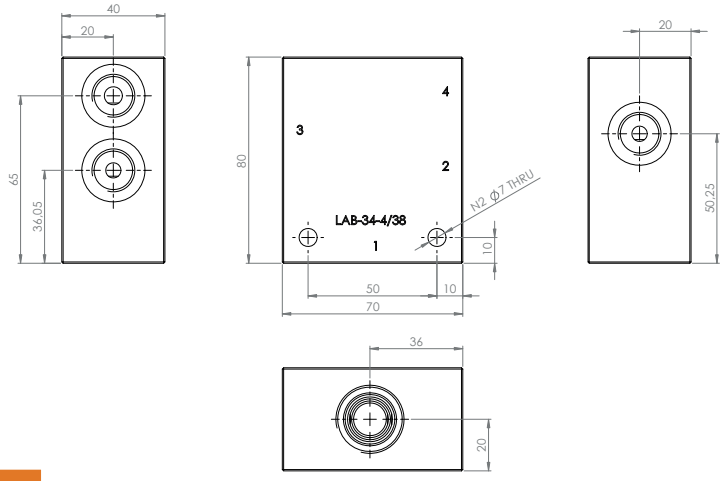
3 LAB-34-2/** Mass: 0,25 kg



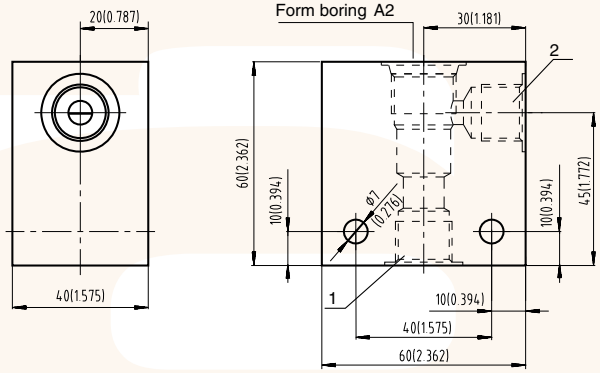
LAB-34-3

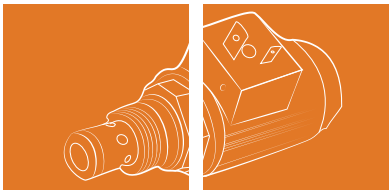


LAB-34-4



4 LAB-78-2/** Mass: 0,37 kg





HYDRAULIC SCREW-IN VALVES PRESSURE RELIEF-DIRECT ACTING

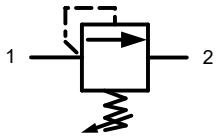
MO-4

50 l/min 35 MPa (350 bar)

1 DESCRIPTION

Suitable for standard cavity 7/8" 14 UNF 2-way direct actiing relief valves Differential area poppet type Fast response and low hysteresis in shutting Maximum operating pressure: 350 bar Maximum flow rate: 50 l/min External parts zinc plated Steel body Poppet in tempered and grinded steel Mass 0,13 kg





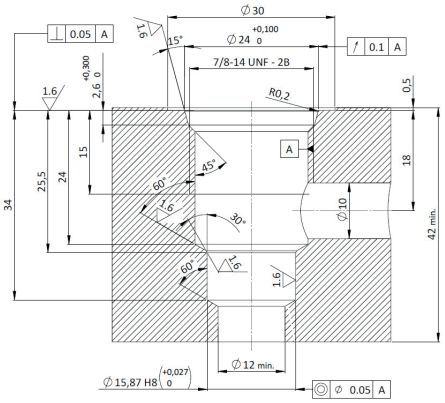
2 ORDERING CODE

(1)		(2)		(3)
MO	-	4	/	

(1) MO: Direct acting relief valve

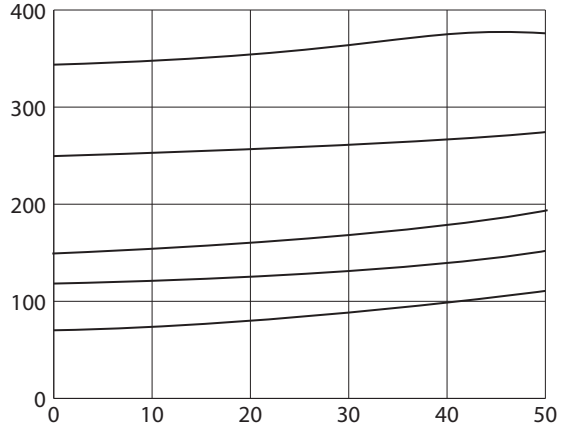
(2) 4: Nominal size

(3) Spring type:
10: setting 20-130 bar, Increase 16,5 bar/turn
16: setting 40-180 bar, Increase 16,5 bar/turn
32: setting 60-350 bar, Increase 51 bar/turn



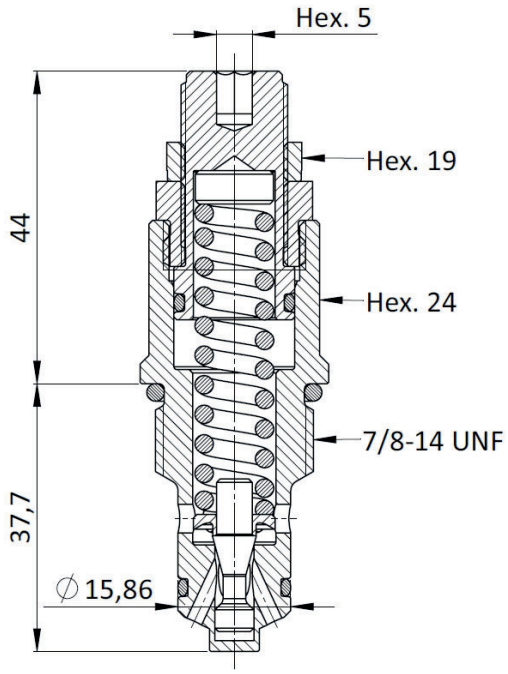
3 TYPICAL DIAGRAMS

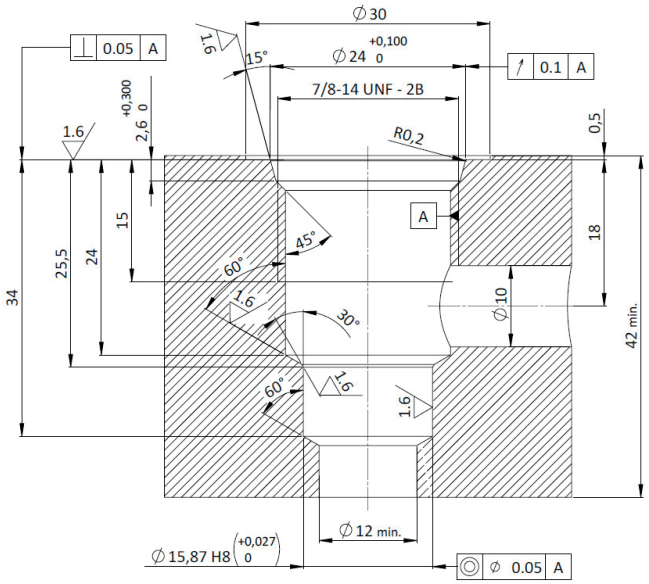
Δp (bar)



After final test the valve are respectively set to 100, 180 and 350 bar (±10%) with 5 l/min flow rate

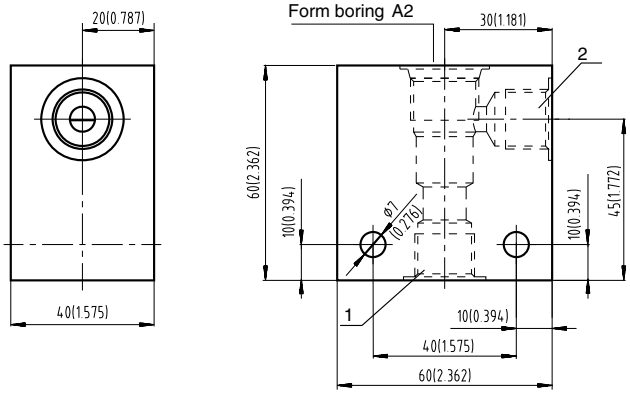
4 INSTALLATION DIMENSIONS





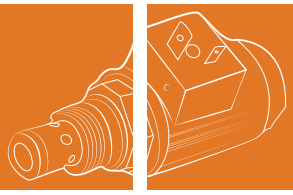
SPARE PARTS		
Position	Code	Description
1	Z0R084	O-Ring Ø 19,18 x 2,46 70Sh
2	0F.A2.001	Teflon Ring Ø 12,8 x 15,86 x 1,4
3	Z0R027	O-Ring Ø 12,42 x 1,78 70 Sh
Inner	Z0R028	O-Ring Ø 19,18 x 2,46 70 Sh

5 LINE ASSEMBLY BODY



Code	Ports
LAB-78-2/38	3/8" BSP
LAB-78-2/12	1/2" BSP
MASS: 0,37 kg	

Suitable for standard 2-way screw-in valves, cavity 7/8" 14 UNF.



HYDRAULIC SCREW-IN VALVES PRESSURE RELIEF-DIRECT ACTING

MO-4L

70 l/min 25 MPa (250 bar)

1 DESCRIPTION

Suitable for standard cavity 7/8" 14 UNF 2-way direct actiing relief valves Differential area poppet type Fast response and low hysteresis in shutting Maximum operating pressure: 250 bar Maximum flow rate: 70 l/min External parts zinc plated Steel body Poppet in tempered and grinded steel Anti vibration system Mass 0,13 kg



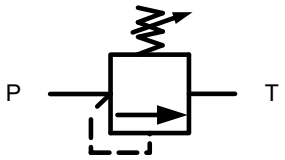
2 ORDERING CODE

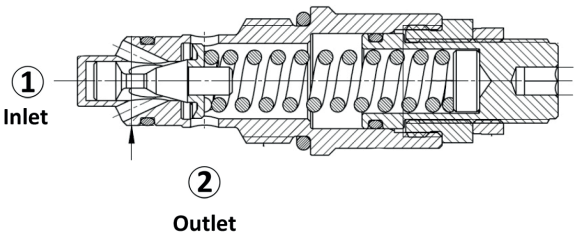
(1)		(2)		(3)
MO	-	4L	/	20

(1) MO: Direct acting relief valve

(2) 4: Nominal size (7/8" 14 UNF)

(3) 20: Spring type, setting 110 to 220 bar increase (bar/turn) 31.5



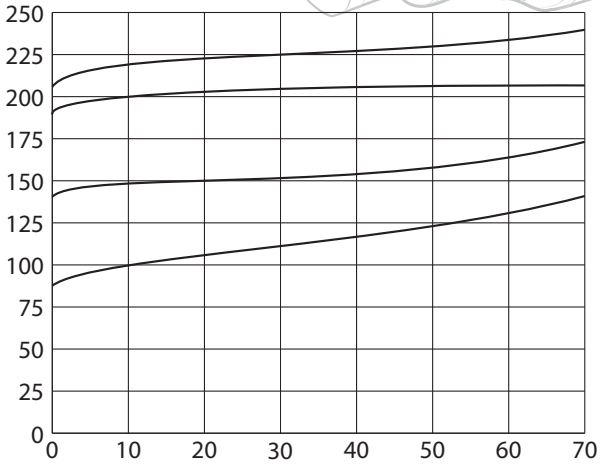


3 TECHNICAL DATA

Max working pressure	250 bar
Max flow	70 l/min
External parts zinc plated	

Normally the poppet (with damping spool) is kept closed by compression spring. When, on P port, pressure exceeds the settled value, poppet is pushed by axial hydraulic forces, overcomes the force of spring, shifts in its cylindrical seat and opens to the pressurized fluid annular passage to T, thus keeping the pressure level at the requested value.

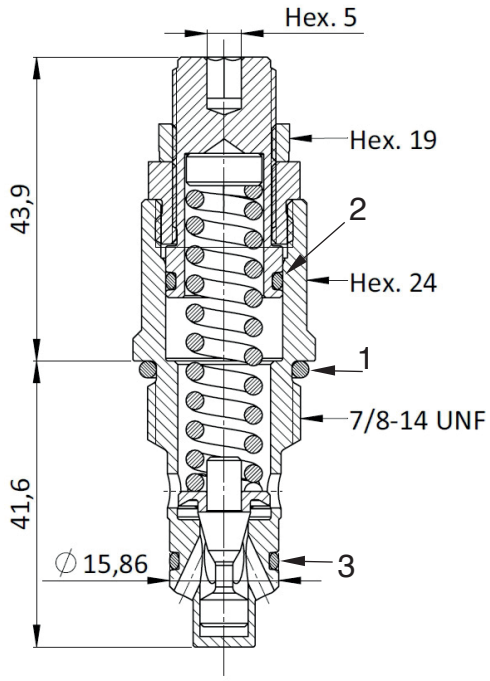
4 TYPICAL DIAGRAMS

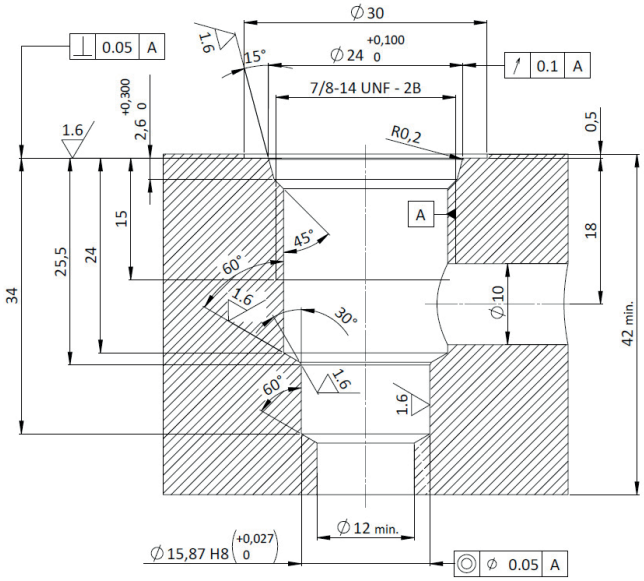


5 ADJUSTMENT OF THE RELIEF PRESSURE

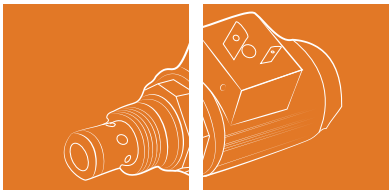
Relief pressure is reached when the axial hydraulic forces on poppet equal the force on spring; The value of the relief pressure can be therefore changed by changing the compression of the spring. To increase the relief pressure, turn clockwise the adjustment nut, after having unlocked the retaining nut.

6 INSTALLATION DIMENSIONS (mm)





SPARE PARTS	
Position	Description
1	O-Ring Ø 19,18 x 2,46 70Sh
2	O-Ring Ø 12,42 x 1,78 70Sh
3	Backup Ring Ø 13 x 15,8 x 0,7



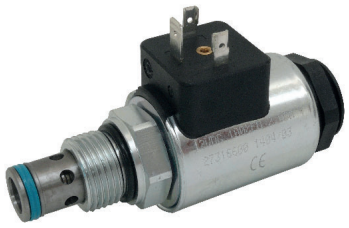
SCREW-IN, 2-WAY SOLENOID OPERATED DIRECTIONAL VALVE CAVITY 7/8” 14 UNF-SAE 10/2 spool type

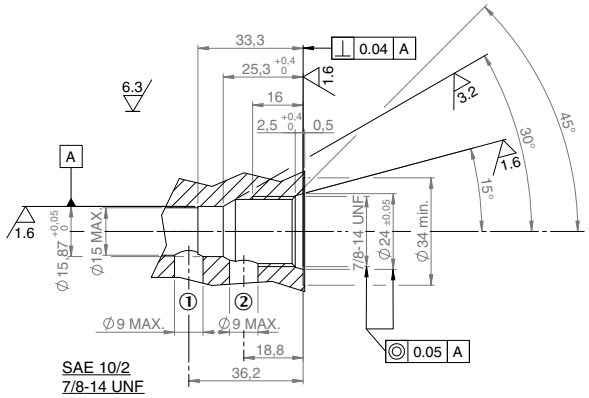
EV2*-78-*

40 l/min 25 MPa (250 bar)

1 DESCRIPTION

Directional control valve 2 way 2 position spool type.
Is possible to have this valve in different spool configurations.On demand a high performance version is available in case of higher flow rates or pressure. The dual seals rings assure an efficient and reliable thightness of the valve.





2 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)		(7)
EV2		-	78	-		-		-		/	

(1) EV2 : 2-way solenoid operated spool type

(2) Spool type
C: normally closed
O: normally open

(3) 78 : cavity 7/8” 14 UNF

(4) Valves variants (see 8)
03: without manual override
04: manual override push type (standard)
05: manual override screw type

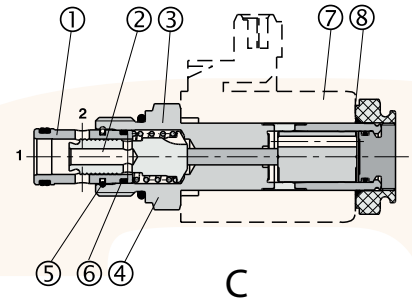
(5) Electric voltage and solenoid coils (see 9)
0000 : no coils
012C : coils for V12DC
024C : coils for V24DC
115A : coils for V110/50 – V 115/60 AC
230A : coils for V220/50 – V 230/60 AC

(6) Options for coil connection
no designation : standard connection ISO4400/DIN43650/A
D:Deutsch;
A: AMP Junior Timer;
AMPX

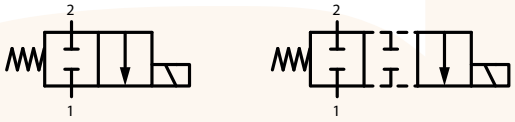
(7) Design number (progressive) of the valves.

Screw-in 2/2 solenoid valves type EV2*.78 are composed by a valve sleeve 1, a control spool 2, a return spring 3, and an actuating assembly 4 that comprises the magnetic parts and the screwing section. An energizing electric solenoid coil 5 is fastened to the assembly by means of a retaining nut 6. When solenoid coils is energized, a magnetic mobile armature shifts and by means of a rod installed inside assembly, moves the control spool which makes hydraulic connections between 1,2 ports.

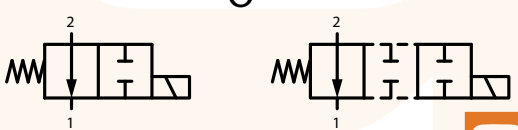
Standard performance



C



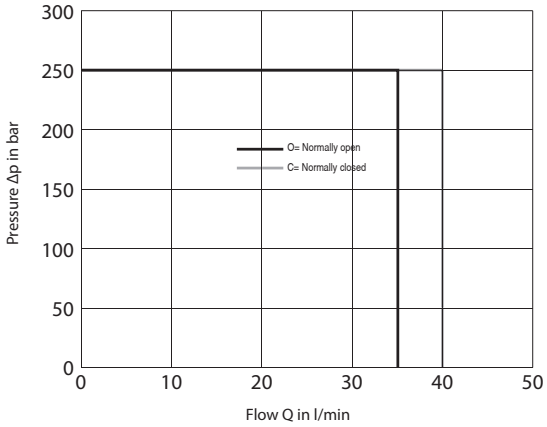
O



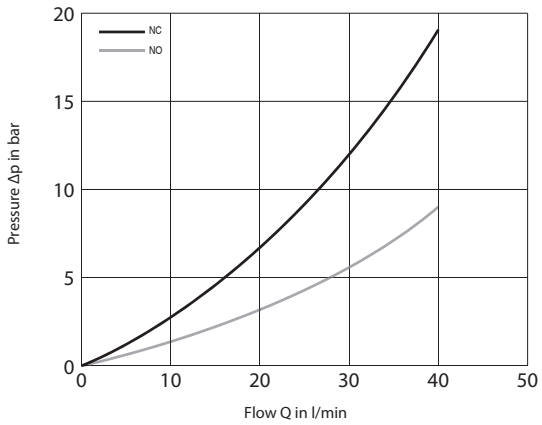
3 TECHNICAL DATA

Nominal flow rate	32 l/min	Electric characteristics:
Maximum rec. flow rate	40 l/min	Those solenoid operated valves are normally equipped by coils type B02, which 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
Maximum pressure	25 MPa (250 bar)	
Installation and dimensions	see 7	
Duty cycle	ED 100%	
Mass (without coil)	0,22 kg	

4 TYPICAL DIAGRAMS



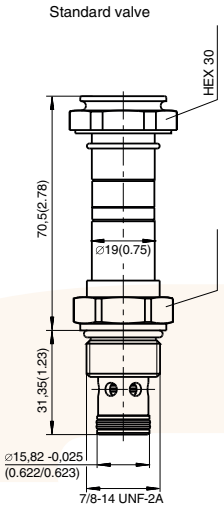
5 HYDRAULIC LIMIT OF USE



6 CONNECTORS

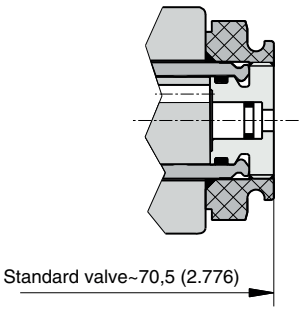
All connectors must conform to ISO 4400 (DIN 43650) and electric circuitry must be able to carry the following rated current values :
V 12 DC = 2,4 A V 115/50 = 0,26 A
V 24 DC = 1,2 A V 230/50 = 0,14 A
Coils with 2 electric pins, conforming with AMP connectors, are only available for DC supply (example of code : B02-012C AMP).

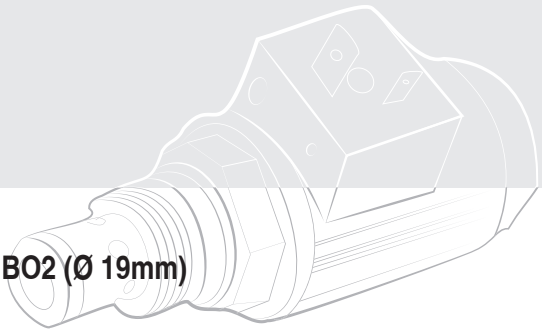
7 INSTALLATION DIMENSIONS



EV2*.78 valves are to be installed in cavity 7/8" 14 UNF . Check the appropriate state and position of the seals, screw the valve in the cavity and lock it with a torque of about 40 Nm applied on the 27 mm hexagon.

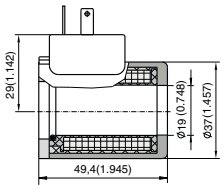
8 VARIANTS OF MANUAL OVERRIDE



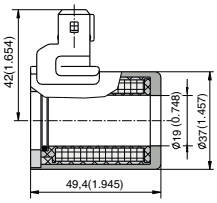


9 COILS TYPE BO2 (Ø 19mm)

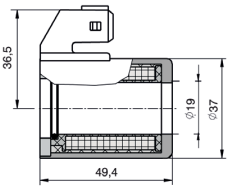
DIN 4365/A-ISO 4400



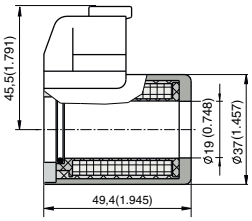
AMP (Amp Junior Timer)



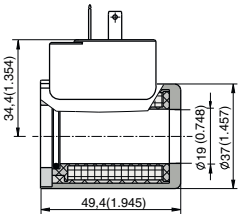
AMPX (Amp Junior Axial)



Deutsch

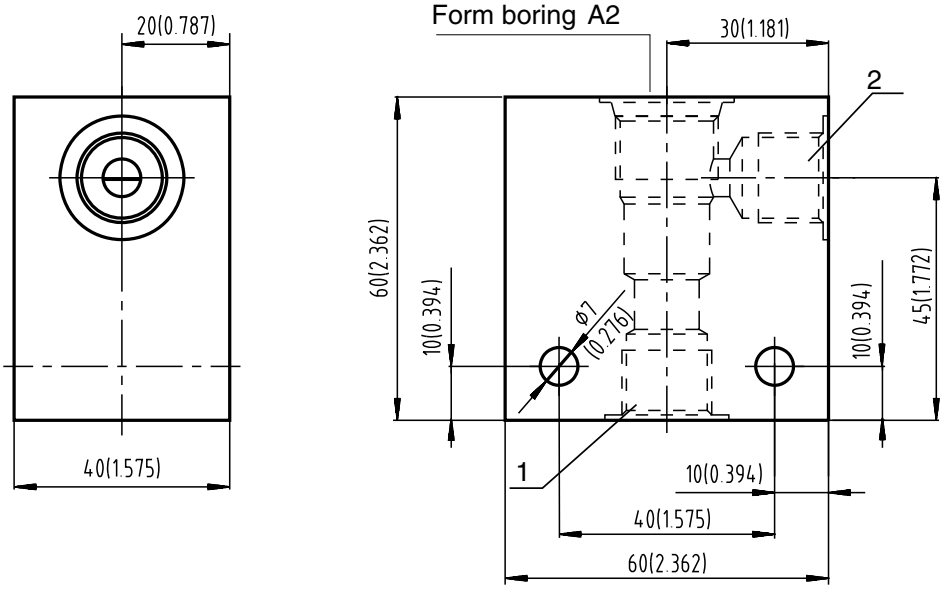


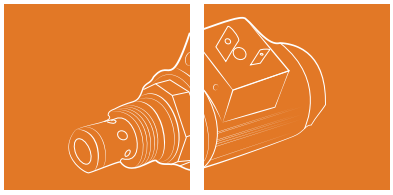
DIN 4365/A-ISO 4400 With Buit-in rectifier



10 LINE ASSEMBLY BODY

LAB-78-2/38, 3/8" BSP, Alluminium Alloy, Mass 0,54 Kg





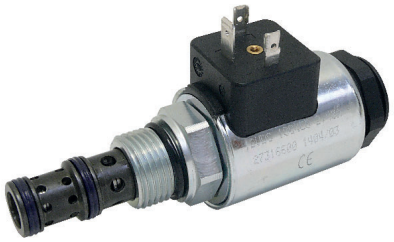
SCREW-IN,3-WAY SOLENOID OPERATED DIRECTIONAL VALVE CAVITY 7/8” 14 UNF-SAE 10/3 spool type

EV3*-78-*

40 l/min 25 MPa (250 bar)

1 DESCRIPTION

Directional control valve 3 way 2 position spool type.
Is possible to have this valve in different spool configurations.On demand a high performance version is available in case of higher flow rates or pressure. The dual seals rings assure an efficient and reliable thightness of the valve.



2 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)		(7)
EV3		-	78	-		-		-		/	

(1) EV3 : 3-way solenoid operated spool type

(2)Spool type
C: normally closed
O: normally open

(3) 78 : cavity 7/8” 14 UNF

(4) Valves variants (see 7)
03: without manual override
04: manual override push type (standard)
05: manual override screw type

(5) Electric voltage and solenoid coils (see 9)
0000 : no coils
012C : coils for V12DC
024C : coils for V24DC
115A : coils for V110/50 – V 115/60 AC
230A : coils for V220/50 – V 230/60 AC

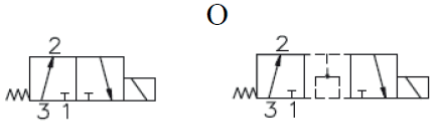
(6) Options for coil connection
no designation : standard connection ISO4400/DIN43650/A
D:Deutsch;
A: AMP Junior Timer;
AMPX

(7) Design number (progressive) of the valves

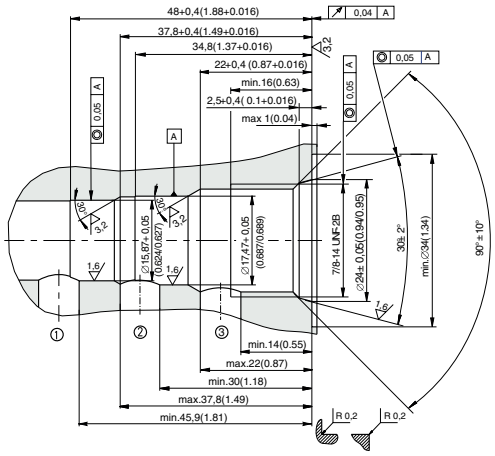
C



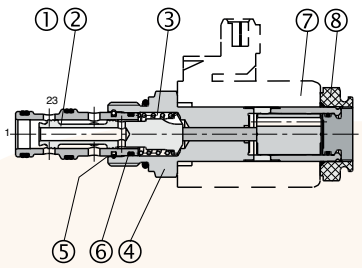
O



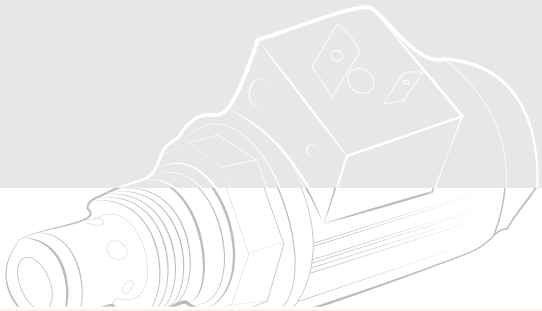
Recommended use of ports: 3=P; 1=T



Standard performance



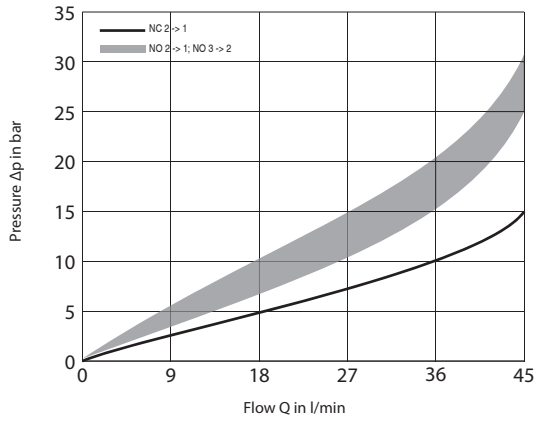
Screw-in 3/2 solenoid valves type EV3*.78 are composed by a valve sleeve 1, a control spool 2, a return spring 3, and an actuating assembly 4 that comprises the magnetic parts and the screwing section. An energizing electric solenoid coil 5 is fastened to the assembly by means of a retaining nut 6. When solenoid coils is energized, a magnetic mobile armature shifts and by means of a rod installed inside assembly, moves the control spool which makes hydraulic connections between 1,2,3 ports.



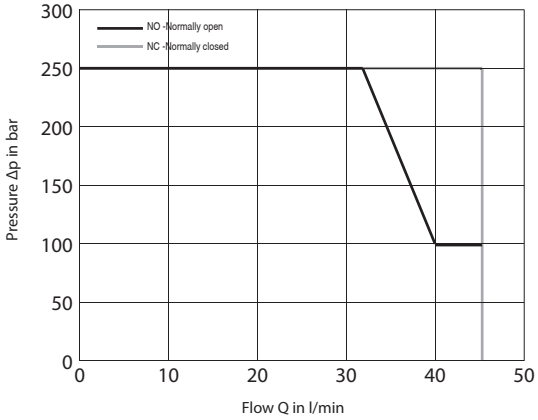
3 TECHNICAL DATA

Nominal flow rate	32 l/min	Electric characteristics:
Maximum rec. flow rate	40 l/min	Those solenoid operated valves are normally equipped by coils type B02, which 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
Maximum pressure	25 MPa (250 bar)	
Installation and dimensions	see 8	
Duty cycle	ED 100%	
Mass (without coil)	0,24 kg	

4 TYPICAL DIAGRAMS



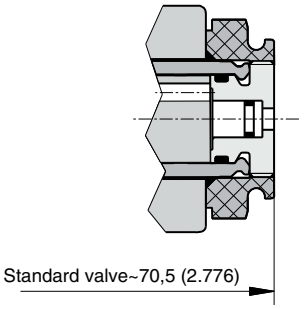
5 HYDRAULIC LIMIT OF USE



6 CONNECTORS

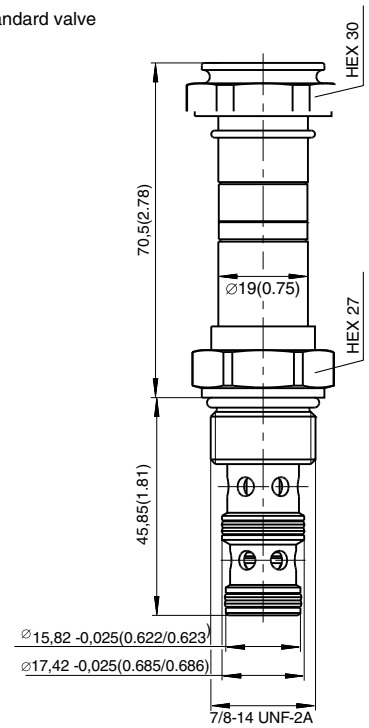
All connectors must conform to ISO 4400 (DIN 43650) and electric circuitry must be able to carry the following rated current values :
V 12 DC = 2,4 A V 115/50 = 0,26 A
V 24 DC = 1,2 A V 230/50 = 0,14 A
Coils with 2 electric pins, conforming with AMP connectors, are only available for DC supply (example of code : B02-012C AMP).

7 VARIANTS OF MANUAL OVERRIDE



8 INSTALLATION DIMENSIONS

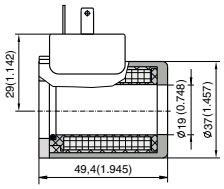
Standard valve



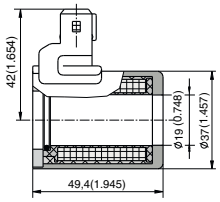
EV3*.78 valves are to be installed in cavity 7/8" 14 UNF . Check the appropriate state and position of the seals, screw the valve in the cavity and lock it with a torque of about 40 Nm applied on the 27 mm hexagon.

9 COILS TYPE B02 (Ø 19mm)

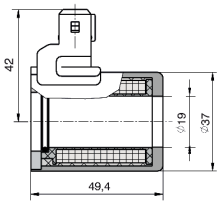
DIN 4365/A-ISO 4400



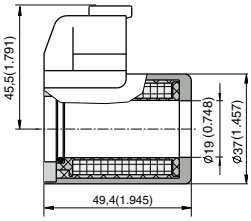
AMP (Amp Junior Timer)



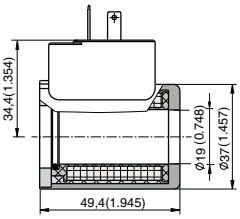
AMPX (Amp Junior Axial)



Deutsch

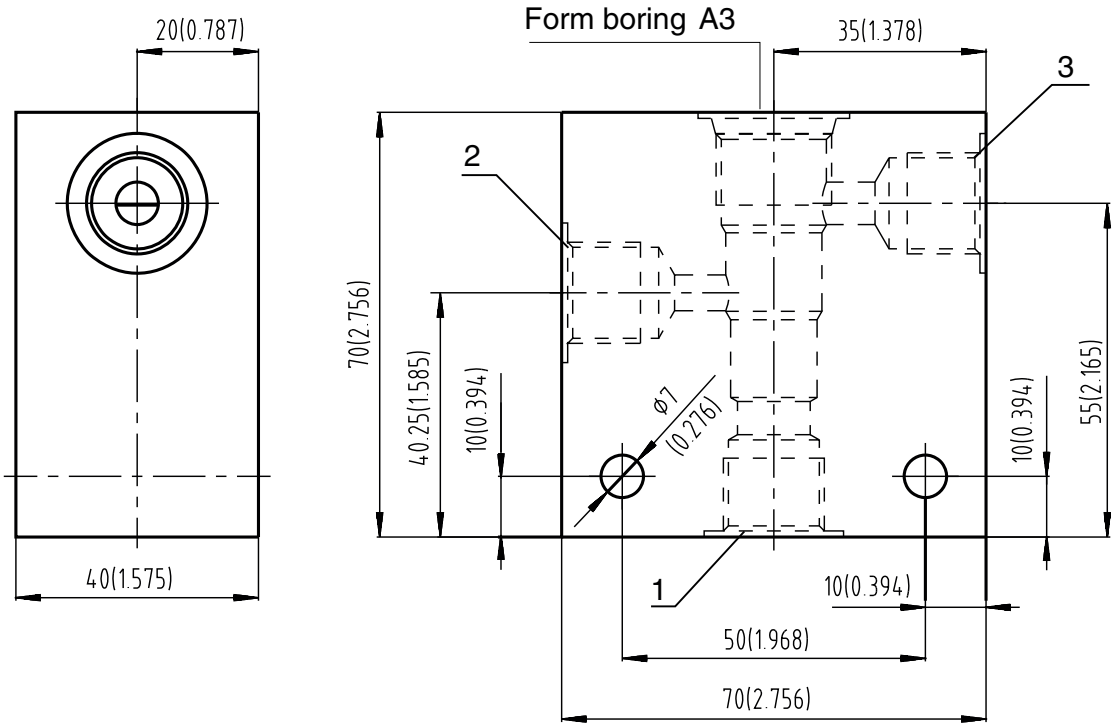


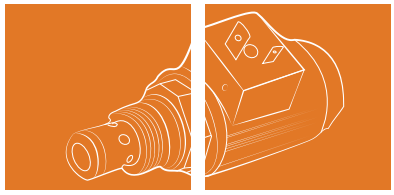
DIN 4365/A-ISO 4400 With Buit-in rectifier



10 LINE ASSEMBLY BODY

LAB-78-3/38, 3/8" BSP, Alluminium Alloy, Mass 0,60 Kg





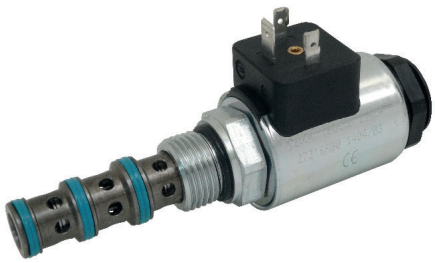
SCREW-IN,4-WAY SOLENOID OPERATED DIRECTIONAL VALVE CAVITY 7/8” 14 UNF-SAE 10/4 spool type

EV4-*-78-*

40 l/min 25 MPa (250 bar)

1 DESCRIPTION

Directional control valve 4 way 2 position spool type.
Is possible to have this valve in different spool configurations.On demand a high performance version is available in case of higher flow rates or pressure.
The dual seals rings assure an efficient and reliable thightness of the valve.



2 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)		(7)
EV4		-	78	-		-		-		/	

(1) EV4 : 4-way solenoid operated spool type

(2)Spool type:
- XP
- CX
- CP

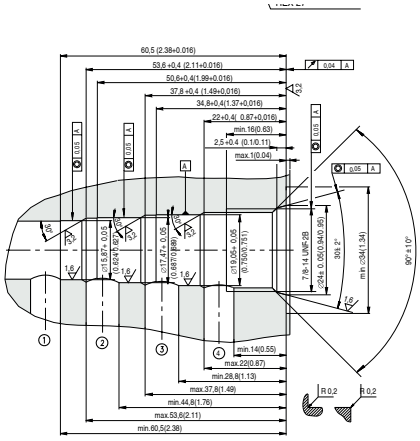
(3) 78 : cavity 7/8” 14 UNF

(4) Valves variants (see 8)
- 03: without manual override
- 04: manual override push type (standard)
- 05: manual override screw type

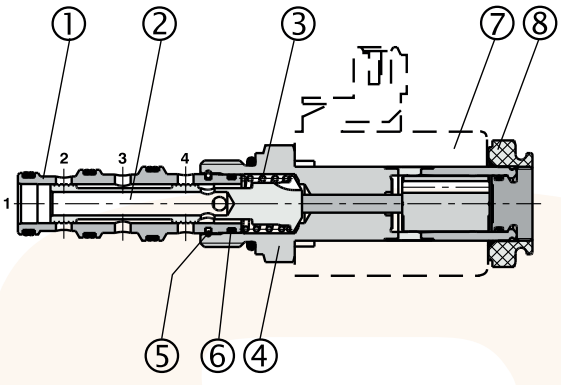
(5) Electric voltage and solenoid coils (see 9)
- 0000 : no coils
- 012C : coils for V12DC
- 024C : coils for V24DC
- 115A : coils for V110/50 – V 115/60 AC
- 230A : coils for V220/50 – V 230/60 AC

(6) Options for coil connection
- no designation : standard connection ISO4400/DIN43650/A
- D:Deutsch;
- A: AMP Junior Timer;
- AMPX

(7) Design number (progressive) of the valves.

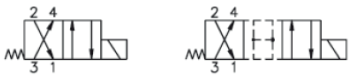


Standard performance

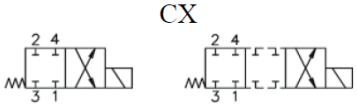


Screw-in 4/2 solenoid valves type EV4**.78 are composed by a valve sleeve 1, a control spool 2, a return spring 3, and an actuating assembly 4 that comprises the magnetic parts and the screwing section. An energizing electric solenoid coil 5 is fastened to the assembly by means of a retaining nut 6. When solenoid coils is energized, a magnetic mobile armature shifts and by means of a rod installed inside assembly, moves the control spool which makes hydraulic connections between 1,2,3,4 ports.

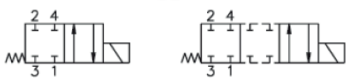
XP



CX



CP

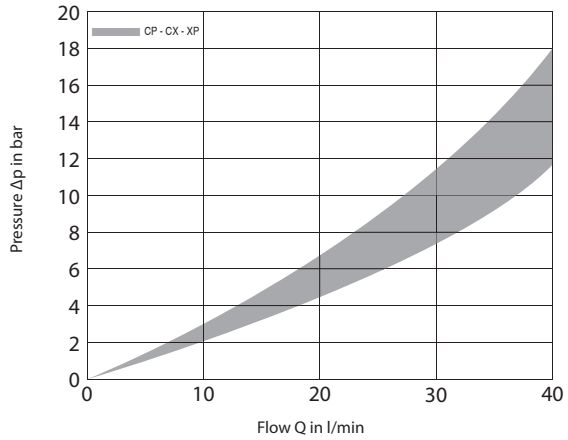


Recommended use of ports
3=P; 1=T 2=A; 4=B

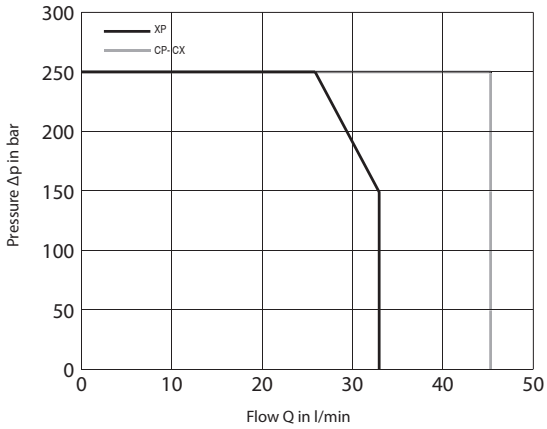
3 TECHNICAL DATA

Nominal flow rate	32 l/min	Electric characteristics:
Maximum rec. flow rate	40 l/min	Those solenoid operated valves are normally equipped by coils type B02, which 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
Maximum pressure	25 MPa (250 bar)	
Installation and dimensions	see 7	
Duty cycle	ED 100%	
Mass (without coil)	0,25 kg	

4 TYPICAL DIAGRAMS



5 HYDRAULIC LIMIT OF USE

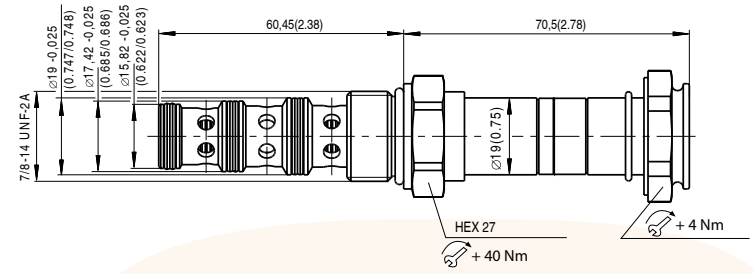


6 CONNECTORS

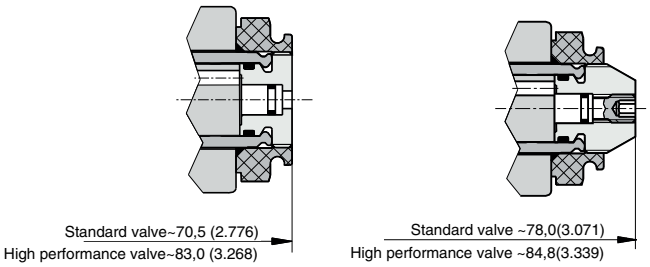
All connectors must conform to ISO 4400 (DIN 43650) and electric circuitry must be able to carry the following rated current values :
V 12 DC = 2,4 A V 115/50 = 0,26 A
V 24 DC = 1,2 A V 230/50 = 0,14 A
Coils with 2 electric pins, conforming with AMP connectors, are only available for DC supply (example of code : B02-012C AMP).

7 INSTALLATION DIMENSIONS

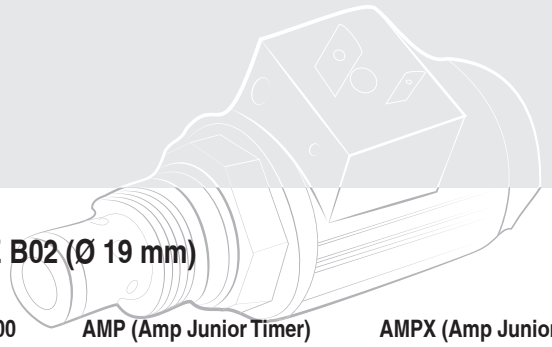
Standard valve



8 VARIANTS OF MANUAL OVERRIDE

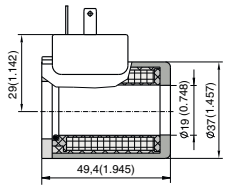


EV4**.78 valves are to be installed in cavity 7/8" 14 UNF. Check the appropriate state and position of the seals, screw the valve in the cavity and lock it with a torque of about 40 Nm applied on the 27 mm hexagon.

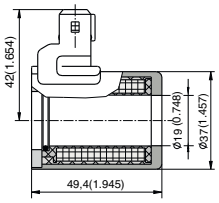


9 COILS TYPE B02 (Ø 19 mm)

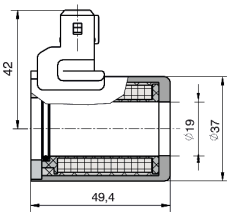
DIN 4365/A-ISO 4400



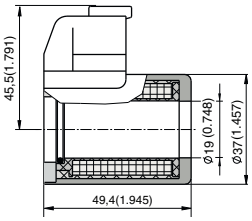
AMP (Amp Junior Timer)



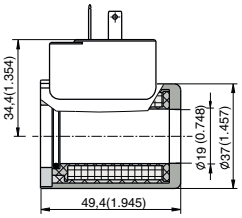
AMPX (Amp Junior Axial)



Deutsch

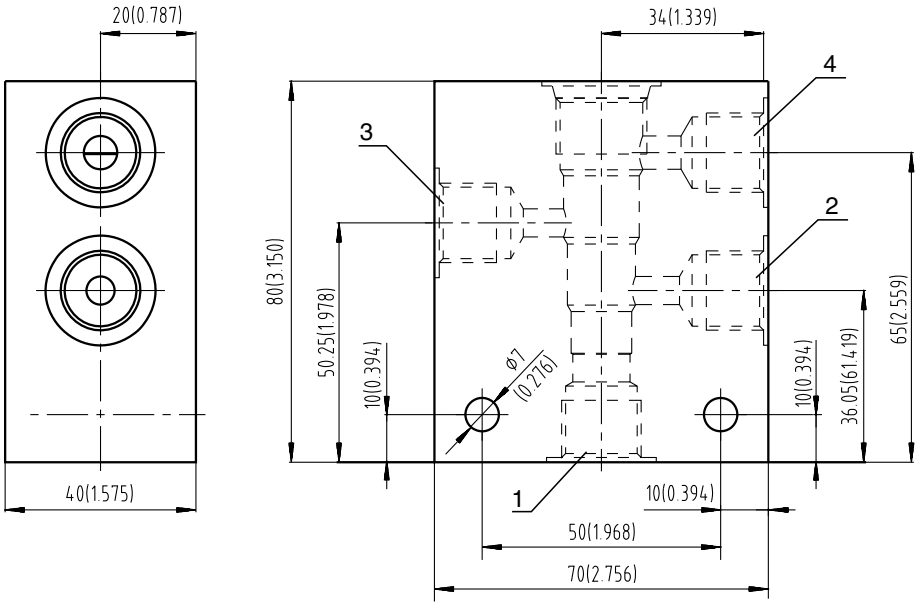


DIN 4365/A-ISO 4400 With Buit-in rectifier



10 LINE ASSEMBLY BODY

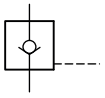
LAB-78-4/38, 3/8" BSP, Alluminium Alloy, Mass 0,71 Kg



SUMMARY

9 IN LINE CONTROL VALVES

IN LINE DIRECTIONAL CONTROL VALVES, CHECK VALVES
FT257/6  0001

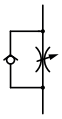
PILOT OPERATED, CHECK VALVES
FT257/7  0002

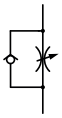
SHUT-OFF VALVES
FT221/1  0003

SHUT-OFF VALVES
FT29*  0004

FLOW CONTROL VALVES
FT251/2-S  0005

FLOW CONTROL VALVES
FT1251/2-01  0006

FLOW CONTROL VALVES
FT251/5  0007

FLOW CONTROL VALVES
FT1251/5-01  0008

aidro
Desktop Metal Company



IN LINE DIRECTIONAL CONTROL VALVES, CHECK VALVES

FT257/6

32 MPa (320 bar)

1 DESCRIPTION

Direct acting check valves, poppet type BSP thread ports for in-line assembly Body, poppet and spring in steel Maximum operating pressure: 320 bar Poppet release pressure: 0,35 bar (different settings available on request) Outer section for easier assembly with hexagonal spanner.



2 ORDERING CODE

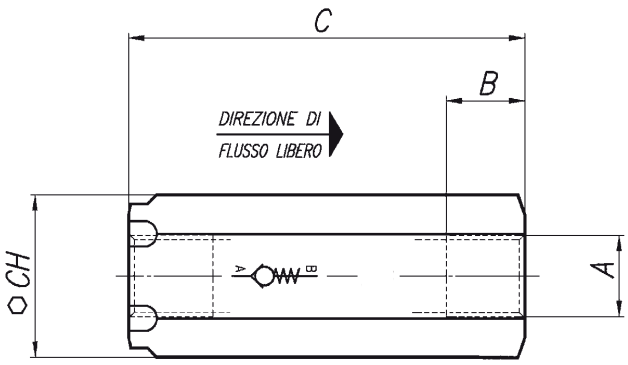
(1)					(2)
FT	257	/	6	-	

(1) FT257/6: check valve

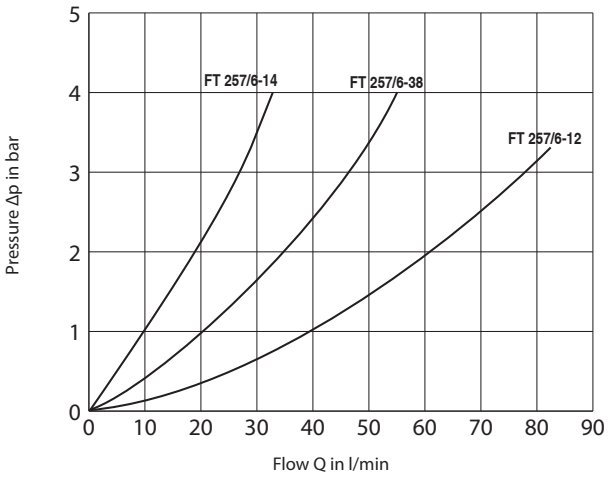
(2) dimensions
- 14: Ports (Ø A) 1/4" BSP, Qmax 16l/min B 12,5 - C 63 - CH 22
- 38: Ports (Ø A) 3/8" BSP, Qmax 30l/min B 12,5 - C 69 - CH 27
- 12: Ports (Ø A) 1/2" BSP, Qmax 60l/min B 12,5 - C 80,5 - CH 32

(subject to technical and dimensional changes without notice)





3 TYPICAL DIAGRAMS



IN LINE CONTROL VALVE

PILOT OPERATED, CHECK VALVES

FT257/7

32 MPa (320 bar)

1 DESCRIPTION

Pilot operated check valves, poppet type BSP thread ports for in-line assembly Pilot port: 1/4" BSP Body, poppet and spring in steel. Maximum operating pressure: 320 bar. Outer section for easier assembly with hexagonal spanner.



2 ORDERING CODE

(1)					(2)
FT	257	/	7	-	

(1) FT257/7: piloto operated check valve

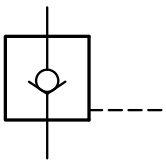
(2) dimensions:

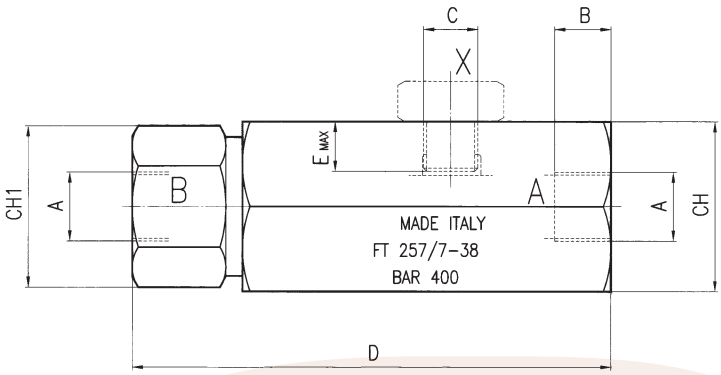
14: Ports (Ø A) 1/4" BSP, Qmax 16l/min- pilot ratio 1/5,3
B 12,5 - D 100 - E 12 - CH 38 - CH1 28

38: Ports (Ø A) 3/8" BSP, Qmax 30l/min- pilot ratio 1/5
B 12,5 - D 115 - E 12 - CH 41 - CH1 34

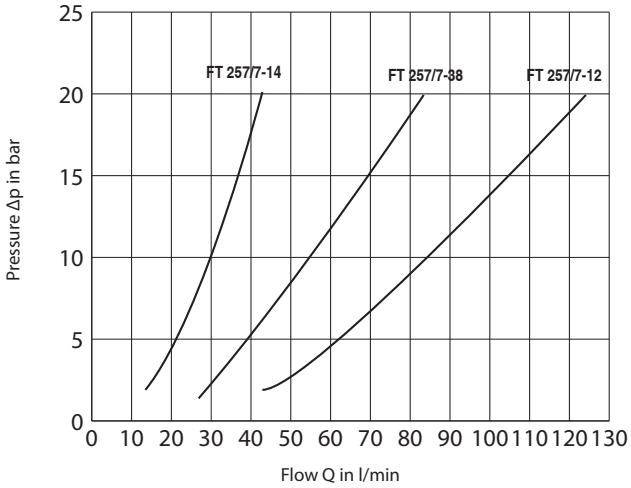
12: Ports (Ø A) 1/2" BSP, Qmax 60l/min- pilot ratio 1/5,3
B 15,5 - D 139 - E 12 - CH 46 CH1 41

(subject to technical and dimensional changes without notice)





3 TYPICAL DIAGRAMS



0002

SHUT-OFF VALVES

FT221/1

50 MPa (500 bar)

1 DESCRIPTION

Shut-off valves, ball type BSP thread ports for in-line assembly Body in steel. Lever and ball in chromium-plated steel Maximum pressure: 500 bar PTFE: ball seals



2 ORDERING CODE

(1)					(2)
FT	221	/	1	-	

(1) FT221/1: shut-off valve

(2) dimensions:

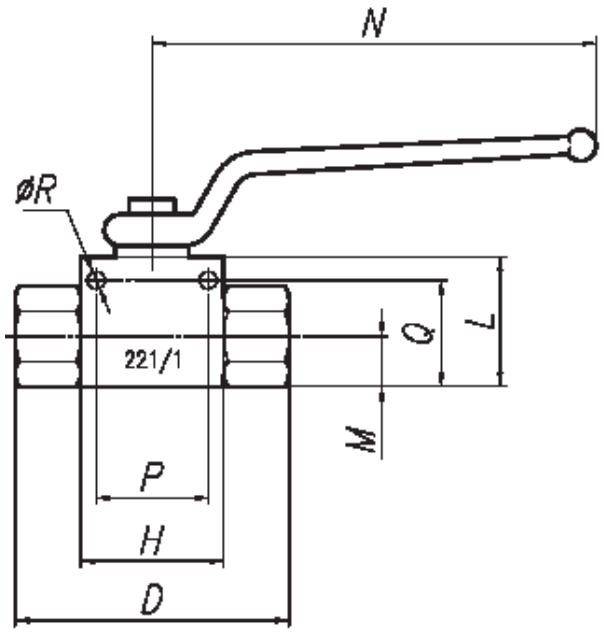
14: Ports (Ø A) 1/4" BSP, Qmax 16l/min
A 49 - B 71 - E 12,5 - F 110 ØL 5,5

38: Ports (Ø A) 3/8" BSP, Qmax 30l/min
A 54 - B 72 - E 17,5 - F 110 ØL 5,5

12: Ports (Ø A) 1/2" BSP, Qmax 60l/min
A 59 - B 83 - E 19 - F 110 - ØL 6,5

(subject to technical and dimensional changes without notice)





IN LINE CONTROL VALVE

SHUT-OFF VALVES

FT29*

40 MPa (400 bar)

1 DESCRIPTION

Shut-off valves, needle type, typically used as shutter for pressure gauge 1%" BSP thread ports for in-line assembly (male-female revolving) Body, in steel Maximum pressure: 400 bar Nitrile O-ring PTFE extrusion-safe ring





2 ORDERING CODE

(1)		(2)
FT	29	

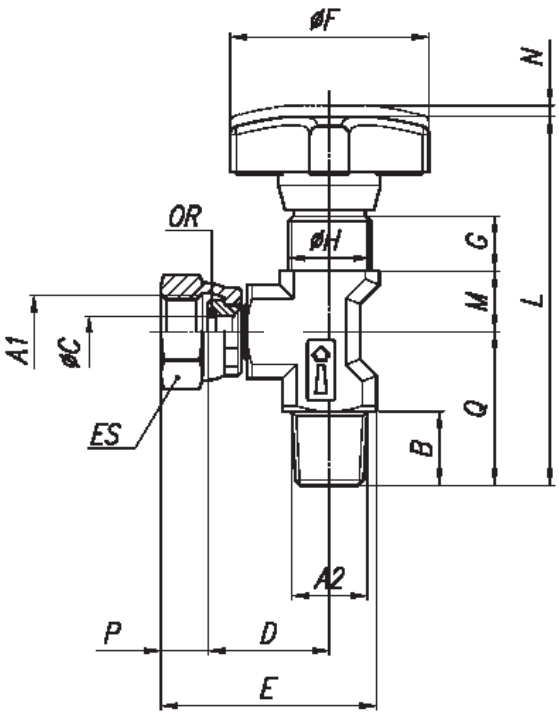
(1) FT29: shut-off valve

(2) orientation:
0: Ports 1/4" BSP, E 61,5 - L 45
1: Ports 1/4" BSP, E 30 - L 66

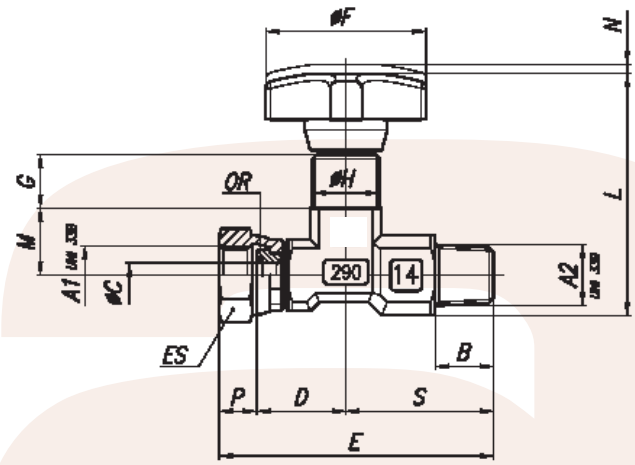
(subject to technical and dimensional changes without notice)



FT 291



FT 290



0004

FLOW CONTROL VALVES

FT251/2-S

50 MPa (500 bar)

1 DESCRIPTION

Flow control valves, needle type 2-way flow control, adjustable BSP thread ports for in-line assembly Steel body, poppet and spring in steel. Maximum operating pressure: 400 bar Adjustment hand-grip with locking screw





2 ORDERING CODE

(1)					(2)		(3)
FT	251	/	2	-	S	-	

(1) FT251/2: flow control valve needle type. Steel body

(2) S: special variant

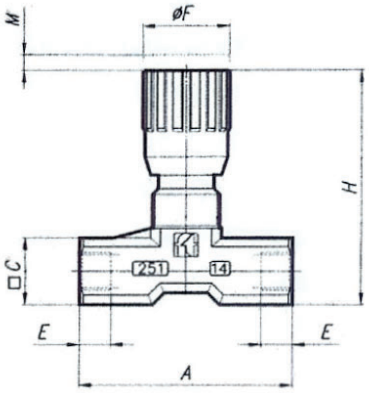
(3) dimensions:

14: Ports 1/4" BSP, Qmax 16 l/min,
A 46 - C 17 - E 12 - ØF 22 - H 61 - M 4,5

38: Ports 3/8" BSP, Qmax 30 l/min,
A 55 - C 22 - E 13 - ØF 27 - H 74 - M 7

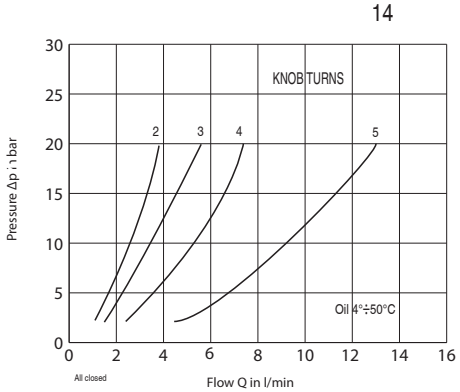
12: Ports 1/2" BSP, Qmax 60 l/min,
A 70 - C 27 - E 16 - ØF 33 - H 85,5 - M 10

(subject to technical and dimensional changes without notice)

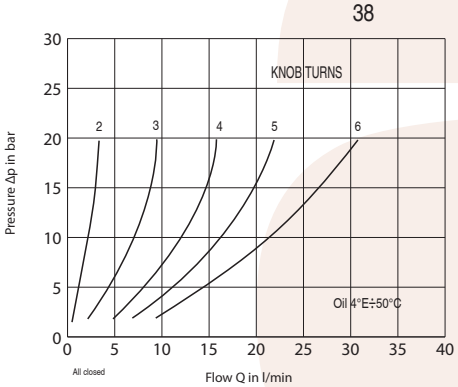


3 TYPICAL DIAGRAMS

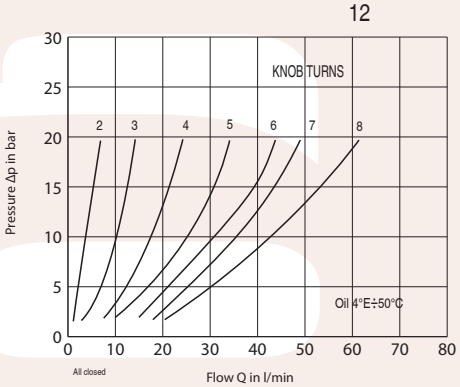
14



38



12



IN LINE CONTROL VALVE

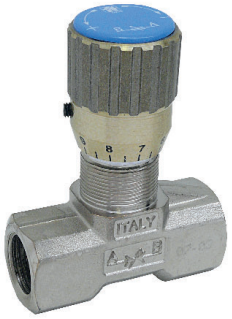
FLOW CONTROL VALVES

FT1251/2-01

21 MPa (210 bar)

1 DESCRIPTION

Flow control valves, needle type 2-way flow control, adjustable. BSP thread ports for in-line assembly. Nickel plated brass body, poppet and spring in stee. Maximum operating pressure: 210 bar. High adjustment accuracy due to its precision hand-grip with locking screw



2 ORDERING CODE

(1)					(2)		(3)
FT	1251	/	2	-	01	-	

(1) FT1251/2: flow control valve needle type. Brass body

(2) 01

(3) dimensions:

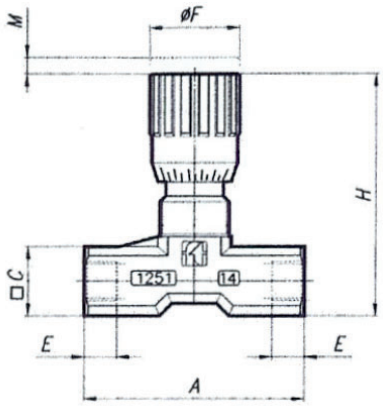
14: Ports 1/4" BSP, Qmax 16l/min,
A 46 - C 17 - E 12 - ØF 22 - H 57 - M 4,5

38: Ports 3/8" BSP, Qmax 30l/min,
A 55 - C 22 - E 13 - ØF 27 - H 69 - M 7

12: Ports 1/2" BSP, Qmax 60l/min,
A 70 - C 27 - E 12 - ØF 33 - H 82 - M 10

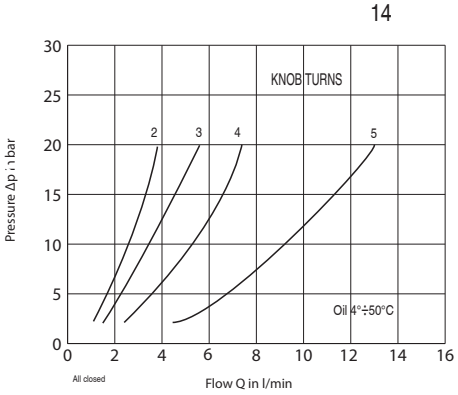
(subject to technical and dimensional changes without notice)



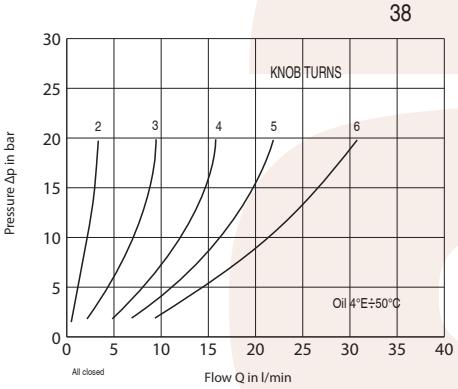


3 TYPICAL DIAGRAMS

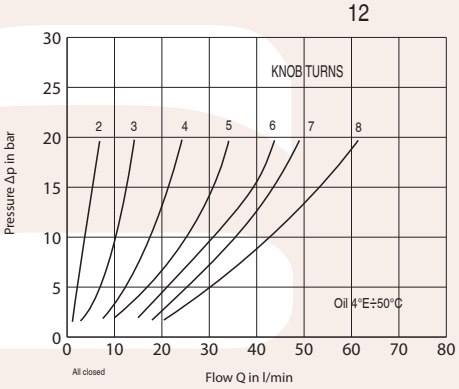
14



38



12



0006

FLOW CONTROL VALVES

FT251/5

50 MPa (500 bar)

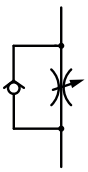
1 DESCRIPTION

Flow control valves, needle type 1-way flow control, adjustable BSP thread ports for in-line assembly. Steel body, poppet and spring in steel. Maximum operating pressure: 400 bar Adjustment hand-grip with locking screw



2 ORDERING CODE

(1)					(3)
FT	251	/	5	-	



(1) FT251/5: 1 way flow control valve needle type, steel body

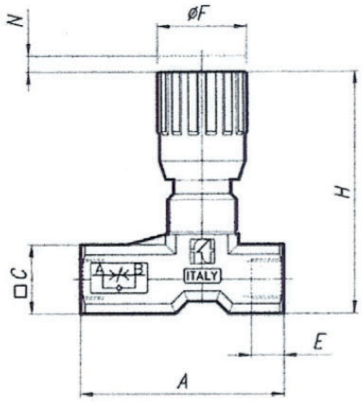
(3) dimensions:

14: Ports 1/4" BSP, Qmax 16 l/min,
A 56 - C 17 - E 12 - ØF 22 - H 61 - M 4,5

38: Ports 3/8" BSP, Qmax 30 l/min,
A 64,5 - C 22 - E 13 - ØF 27 - H 74 - M 7

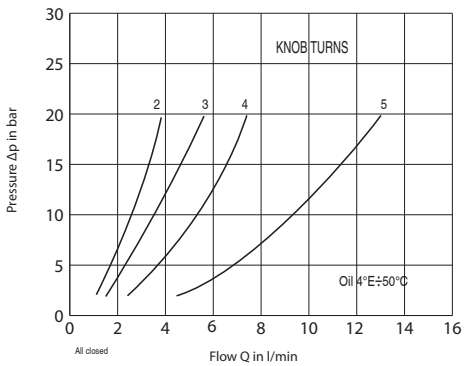
12: Ports 1/2" BSP, Qmax 60 l/min,
A 87 - C 27 - E 16 - ØF 33 - H 85,5 - M 10

(subject to technical and dimensional changes without notice)

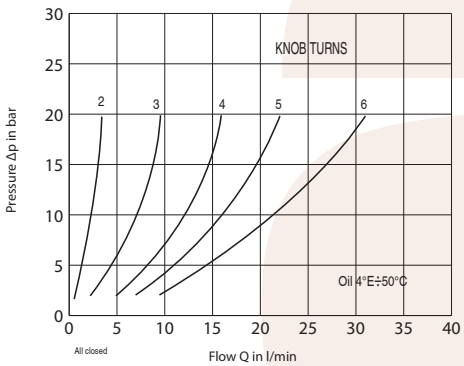


3 TYPICAL DIAGRAMS

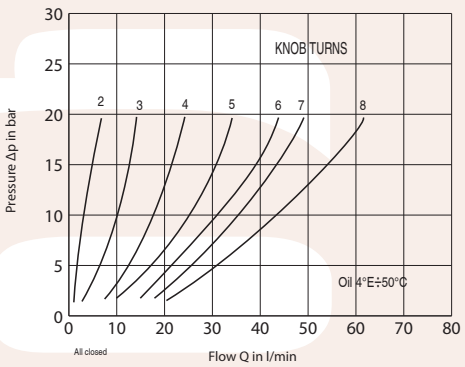
14



38



12



IN LINE CONTROL VALVE

FLOW CONTROL VALVES

FT1251/5-01

21 MPa (210 bar)

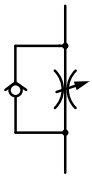
1 DESCRIPTION

Flow control valves, needle type 1-way flow control, adjustable. BSP thread ports for in-line assembly. Nickel plated brass body, poppet and spring in steel Maximum operating pressure: 210 bar. High adjustment accuracy due to its precision hand-grip with locking screw



2 ORDERING CODE

(1)					(2)		(3)
FT	1251	/	5	-	01	-	



(1) FT251/5: 1 way flow control valve needle type, brass body

(2) 01

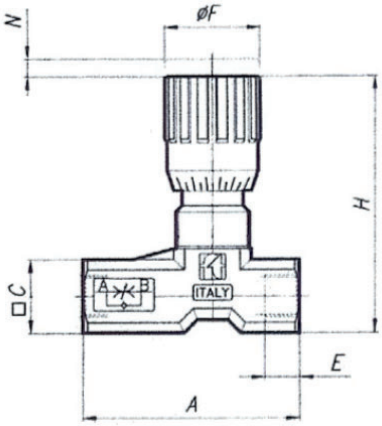
(3) dimensions:

14: Ports 1/4" BSP, Qmax 16 l/min,
A 56 - C 17 - E 12 - ØF 22 - H 61 - M 4,5

38: Ports 3/8" BSP, Qmax 30 l/min,
A 64,5 - C 22 - E 13 - ØF 27 - H 74 - M 7

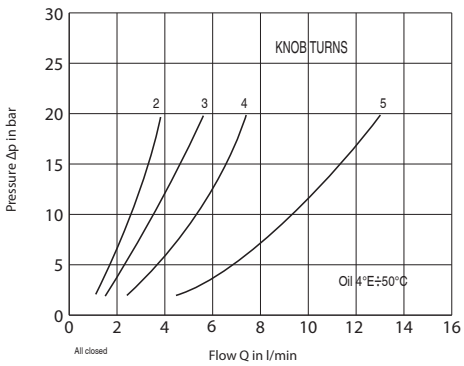
12: Ports 1/2" BSP, Qmax 60 l/min,
A 87 - C 27 - E 16 - ØF 33 - H 85,5 - M 10

(subject to technical and dimensional changes without notice)

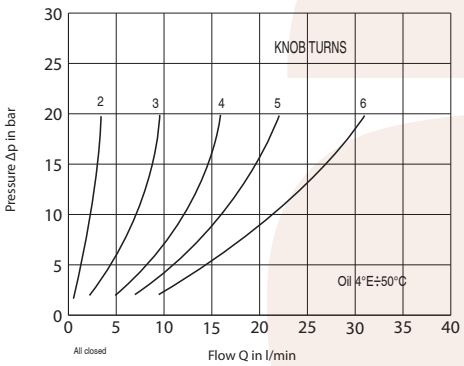


3 TYPICAL DIAGRAMS

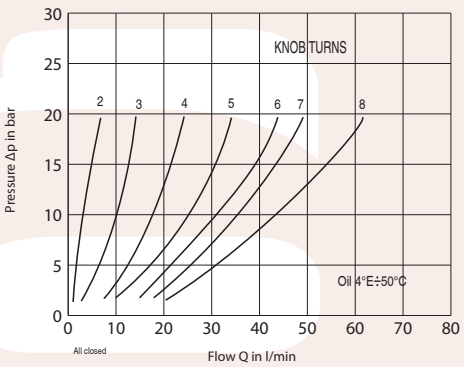
14



38



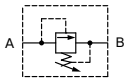
12



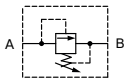
0008

SUMMARY

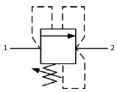
10 VARIOUS SCREW IN CARTRIDGE AND MODULES

MAXIMUM PRESSURE VALVE DIRECT-ACTING
MO-2/**


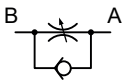
0001

SCREW-IN CARTRIDGE DIRECT-ACTING RELIEF VALVE
MO-3/*


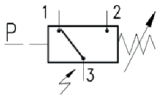
0002

MO-3/*-CC


0004

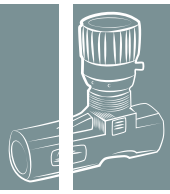
FLOW CONTROL VALVE TYPE
FT243/5-38


0006

PRESSURE SWITCHES
IP*-**


0007

aidro
Desktop Metal Company



MAXIMUM PRESSURE VALVE DIRECT-ACTING

MO-2/**

30 l/min 35 MPa (350 bar)

1 DESCRIPTION

MO-2 is a direct operated pressure relief valve in a special cavity 3/4" 16UNF but with larger nose thus with better performances.
The external surface is zinc coated.
There are three different pressure settings for a more accurate regulation.



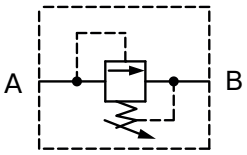
2 ORDERING CODE

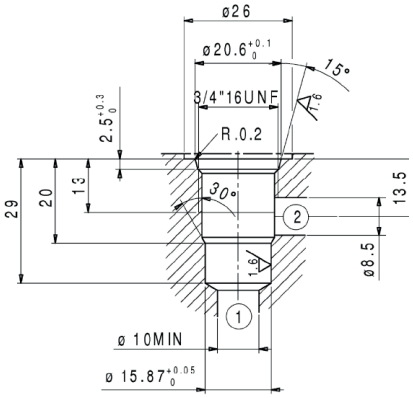
(1)		(2)		(3)
MO	-	2	/	

(1) MO: pressure valve

(2) 2: nominal size

(3) Pressure ranges:
10:min-max operating pressure 20-130bar, 16,5 l/min
20: min-max operating pressure 40-220bar, 25,5 l/min
32: min-max operating pressure 60-350bar, 51 l/min

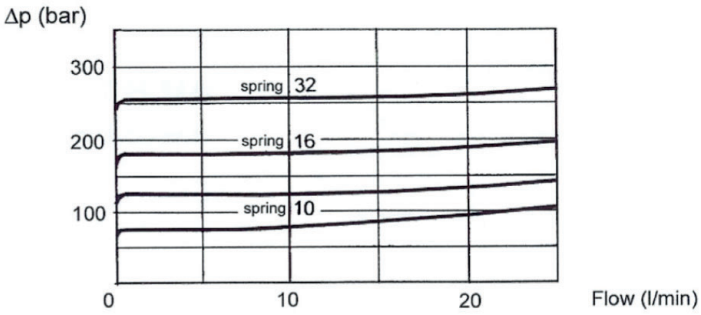




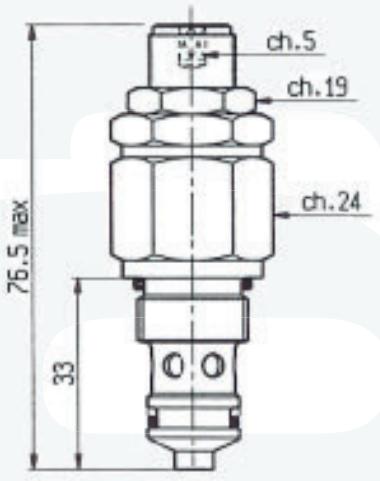
3 TECHNICAL DATA

Maximum nominal pressure	35 MPa 350 bar
Maximum rec. flow rate	30 l/min
Mass	0,13 Kg

4 TYPICAL DIAGRAMS



5 INSTALLATION DIMENSIONS



SCREW-IN CARTRIDGE DIRECT-ACTING RELIEF VALVE

MO-3/*

30 l/min 35 MPa (350 bar)

1 DESCRIPTION

MO-3 is a direct operated pressure relief valve in a special metric cavity M20x1,5.
The external surface is zinc coated.
There are three different pressure settings for a more accurate regulation.
The valve is designed with an anti vibration system



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)		(6)
MO	-	3	/		-		-		/	10

(1) MO: screw-in cartridge relief valve

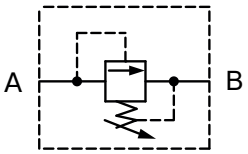
(2) 3: nominal size
nominal flow rate = 0,5 dm³/s (approx 32 l/min)

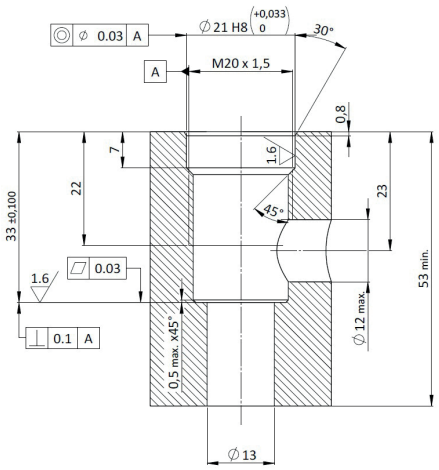
(3) Pressure adjustment ranges:
10: from 2,5 MPa to 12,5 MPa (from 25 to 125 bar)
20: from 4 MPa to 25 MPa (from 40 to 250 bar)
32: from 10 MPa to 32 MPa (from 100 to 320 bar)

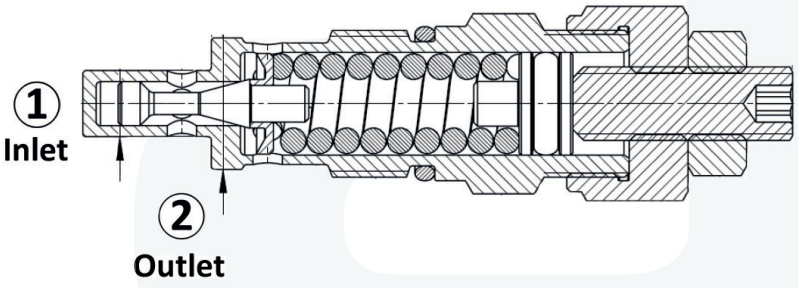
(4) code reserved for variants to the adjustment (knob, handwheel,etc.)

(5) code reserved forspecial variants (materials, seals, surface treatments etc.)

(6) 01: Design number (progressive) of the valve





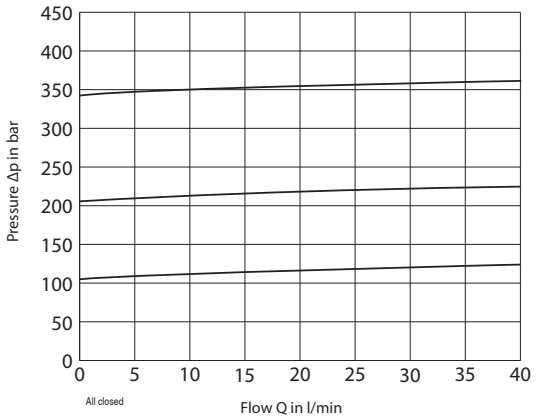


3 TECHNICAL DATA

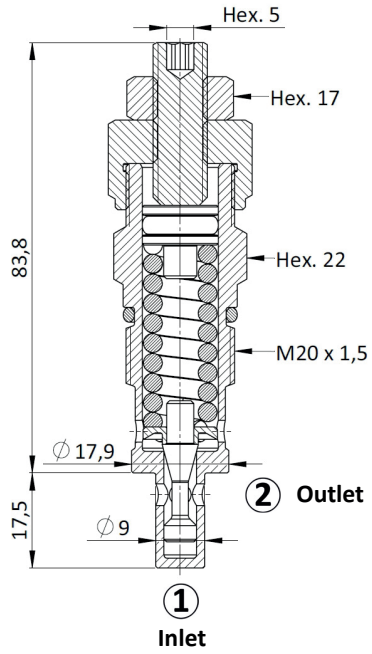
Maximum pressure range	see 2	Adjustment of the relief pressure:
Maximum rec. flow rate	40 l/min	relief pressure is reached when the axial hydraulic forces on piston 3 equal the force of spring 5; the value of the relief pressure can be therefore changed, within the limits of the chosen adjustment range, by changing the compression of spring 5. to increase the relief pressure, turn clock wise the adjustment screw 4 after having unlocked ist nut 6. Fore each pressure adjustment range, the pressure gradient is approx: M0-3/10: 1,6 MPa/mm (24 bar/turn) M0-3/20: 3,2 MPa/mm (48 bar/turn) M0-3/32: 5 MPa/mm (75 bar/turn) when the required level of pressure is reached, lock the nut6. Valve type M0-3/* are normally factory tested and settled, with Q=0,1 dm3/s (6 l/min) at the following pressures. M0-3/10: 10 MPa (100bar) (±10%) M0-3/20: 20 MPa (200bar) (±10%) M0-3/ 32: 32 MPa (320bar) (±5%)
Nominal flow rate	32 l/min	
Pressure relief curves	see 4	
installation and dimensions	see 5	
mass	appron 0,17	

4 TYPICAL DIAGRAMS

Typical curves for valves M0-3/* in standard configuration, with mineral oil at 36 cSt a 50°C



5 INSTALLATION DIMENSIONS



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing 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.

Cartridge valves type M0-3/* must be installed in exactly machined cavities obtained in metallic bodies of strenght suitable to sustain the hydraulic afforts. When installing the valve care must be paid not to dammage seal (OR 121-15,88x2,62-70 Sh) and to screw-in the valve by appling the appropriate torque of approx. 60Nm to the exagonal CH 22.

DIRECT ACTING RELIEF VALVE

MO-3/*-CC

30 l/min 42 MPa (420 bar)

1 DESCRIPTION

MO-3 is a direct operated pressure relief valve in a special metric cavity M20x1,5.
The external surface is zinc coated.
There are five different pressure settings for a more accurate regulation.
The valve is designed with an anti vibration system



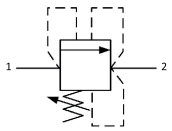
2 ORDERING CODE

(1)		(2)		(3)		(4)	(5)
MO	-	3	/	*	-	CC	*

(1) MO: screw-in cartridge relief valve

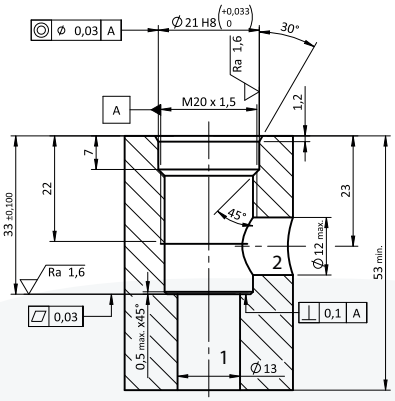
(2) 3: nominal size
nominal flow rate = 0,5 dm³/s (approx 32 l/min)

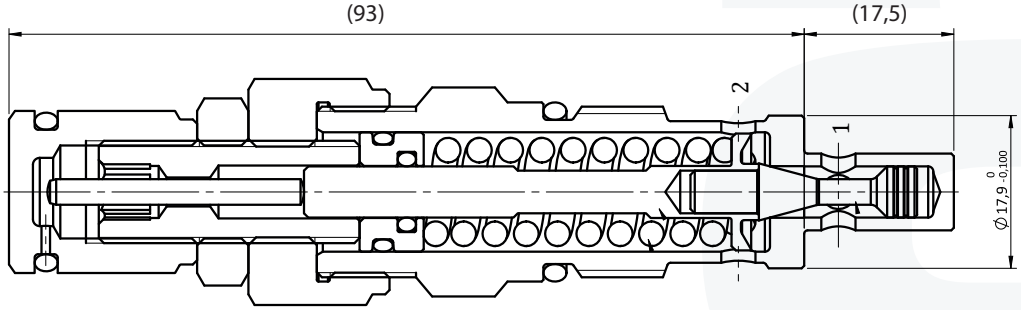
(3) Pressure adjustment ranges:
5: from 0,5 MPa to 5,5 MPa (from 5 to 55 bar); increase 9 bar/turn
10: from 6,5 MPa to 11,0 MPa (from 65 to 110 bar); increase 16 bar/turn
20: from 11,0 MPa to 21,5 MPa (from 11 to 215 bar); increase 37 bar/turn
32: from 21,6 MPa to 35 MPa (from 216 to 350 bar); increase 65 bar/turn
42: from 35,1 MPa to 42 MPa (from 351 to 420 bar); increase 75 bar/turn



(4) CC: pressure compensated version

(5) Design number (progressive) of the valve

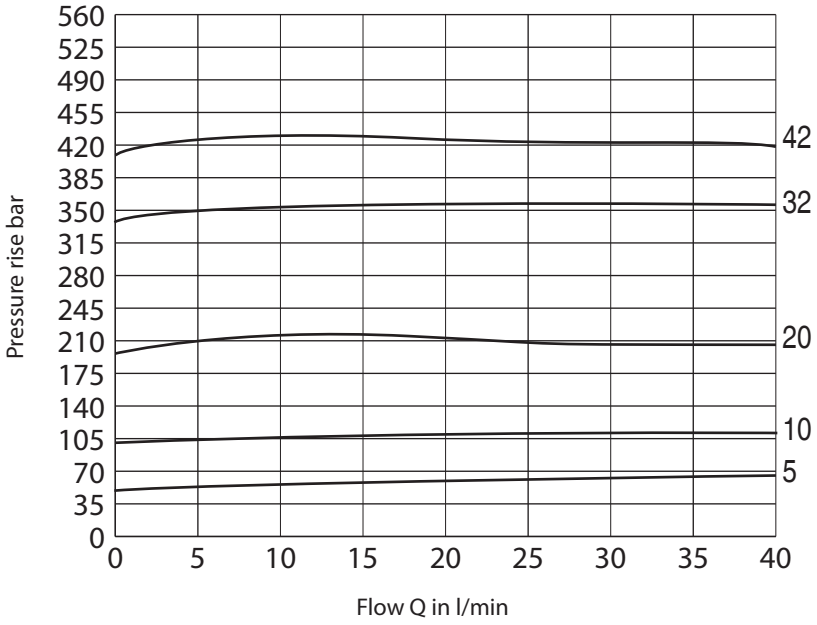




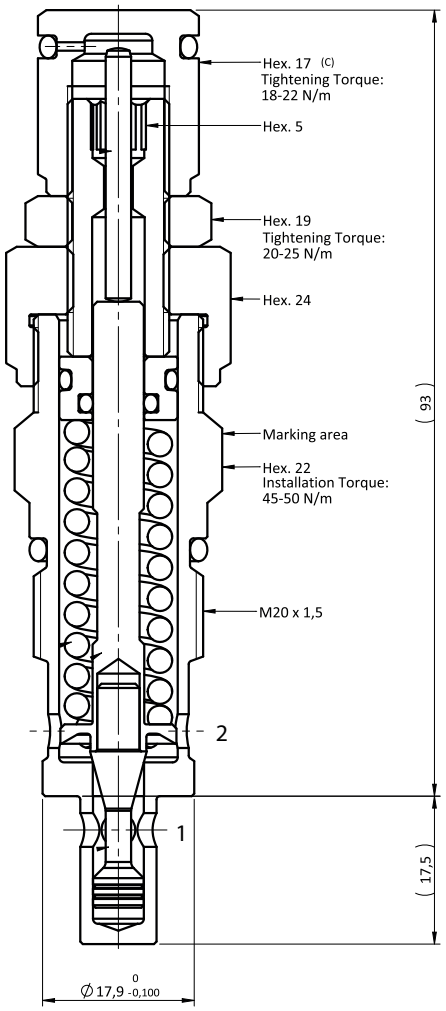
3 TECHNICAL DATA

Pressure setting range	5-420 bar
Nominal pressure setting	/bar $\frac{+5}{-5}$ established @5 l/min
Max internal leakage	1cm3/min@ 80% of nominal pressure setting
installation and dimensions	see 5

4 TYPICAL DIAGRAMS



5 INSTALLATION DIMENSIONS



6 HYDRAULIC FLUIDS

Seals and materials used on standard valves are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing agents. The hydraulic fluid must be kept clean and filtered to ISO 4406 class 17/15/12, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

FLOW CONTROL VALVE TYPE

FT243/5-38

20 l/min 25 MPa (250 bar)

1 DESCRIPTION

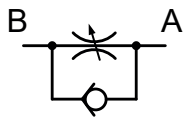
Those valves are to be mounted in very simple cavities M18x1 (see drawing) and give free flow in one direction and adjustable controlled flow on the reverse direction.



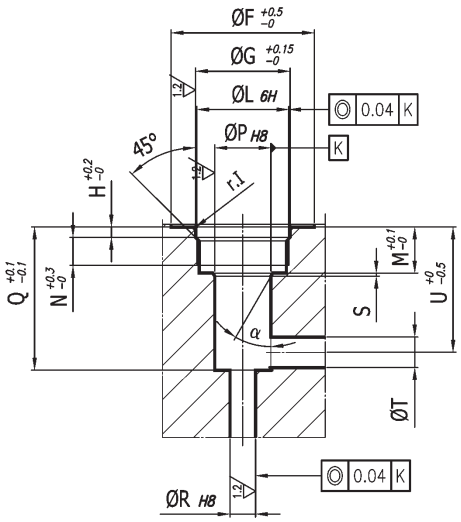
2 ORDERING CODE

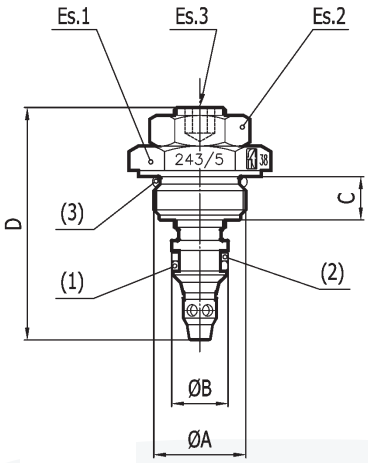
(1)					
FT	243	/	5	-	38

(1) FT243/5: 1 way flow control valve needle type

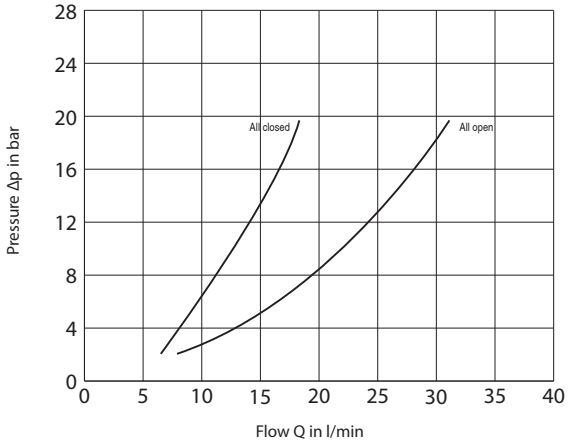


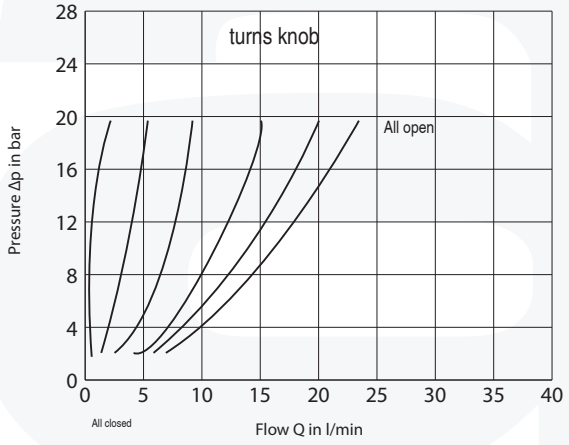
(subject to technical and dimensional changes without notice)

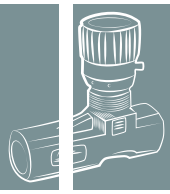




3 TYPICAL DIAGRAMS



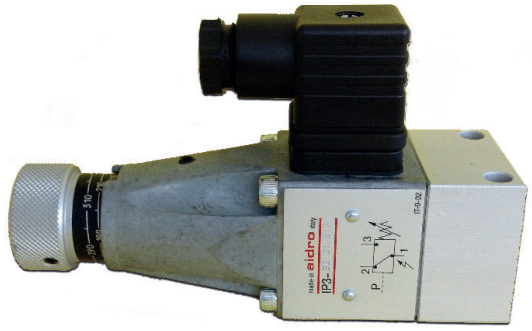




PRESSURE SWITCHES
IP*-**

1 DESCRIPTION

Pressure switches



2 ORDERING CODE

(1)	(2)		(3)		(4)
IP		-		/	

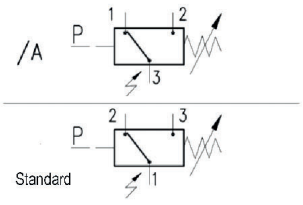
(1) IP : pressure switch

(2) Type of setting adjustment
- 2 : grub screw (see 5)
- 3 : scaled handweel (see 2)

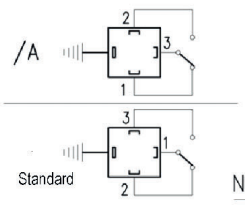
(3) Pressure range
- 3,2 : 6-35 bar (0,6 - 3,5 MPa)
- 16 : 12-160 bar (1,2 - 16,0 MPa)
- 32 : 30-350 bar (3,0 - 35,0 MPa)
- 63 : 50-630 bar (5,0 - 63,0 MPa)

(4) Electrical connection
- no designation : standard
- A : optional

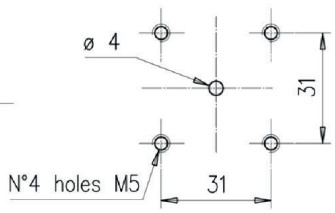
SYMBOL



CONTACTS

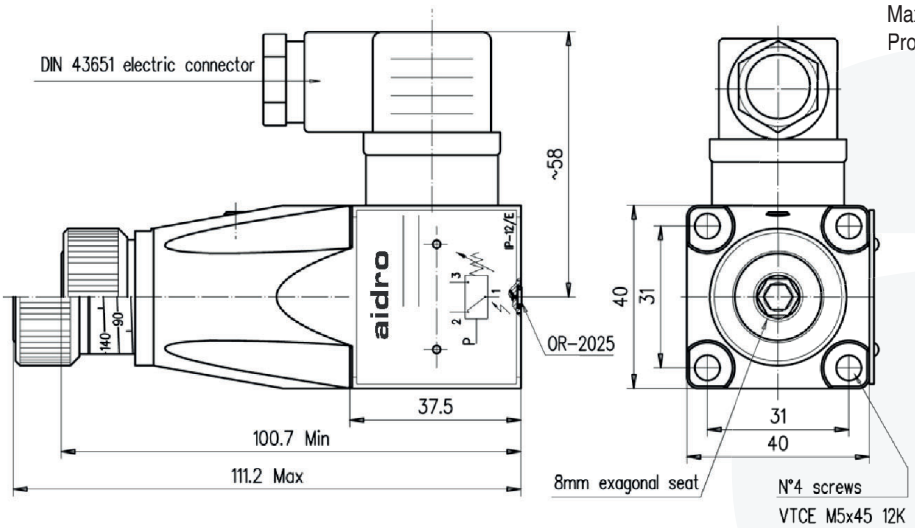


FLANGE INTERFACE

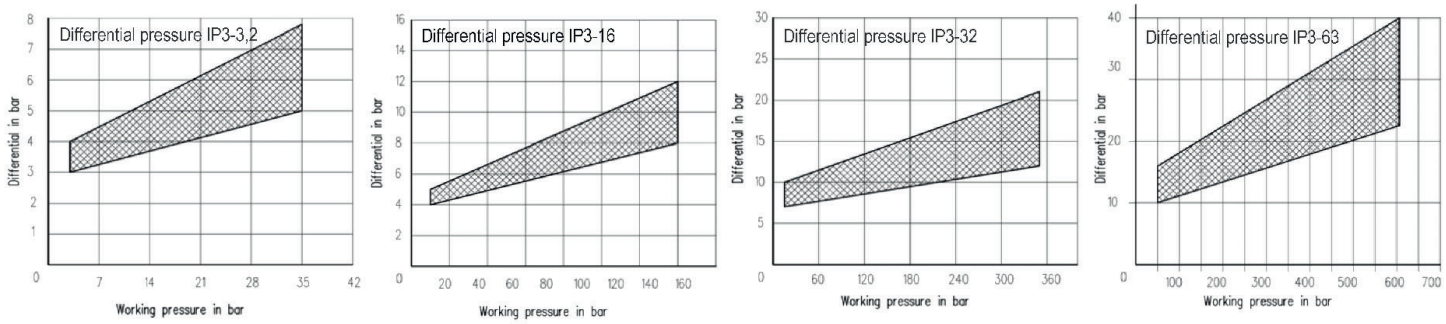


3 TECHNICAL SPECIFICATION FOR PRESSURE SWITCH TYPE IP3

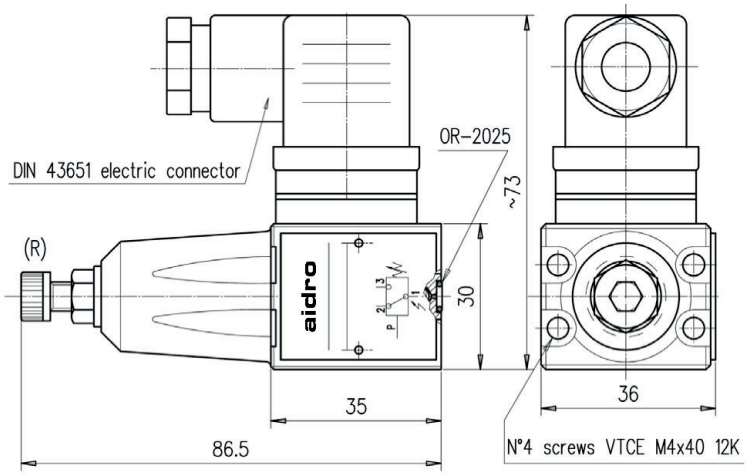
Weight: 0,65 Kg
Maximum error <±1% of setting
Protection: IP-65



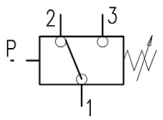
4 TYPICAL DIAGRAMS FOR IP3



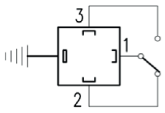
5 TECHNICAL SPECIFICATION FOR PRESSURE SWITCH TYPE IP2



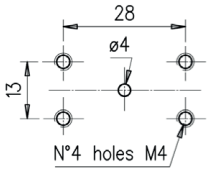
SYMBOL



CONTACTS

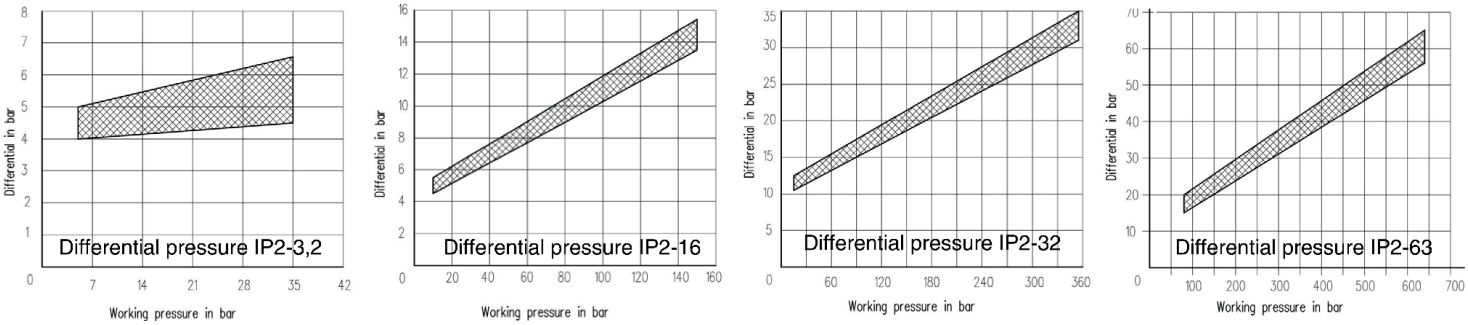


FLANGE INTERFACE



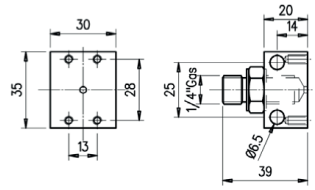
Weight: 0,35 Kg
Maximum error <±1% of setting
Protection: IP-65

6 TYPICAL DIAGRAMS FOR IP2



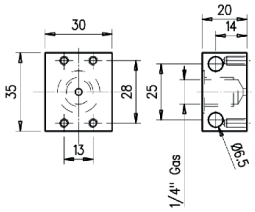
7 ADAPTORS FOR PANEL MOUNTING

APM-14



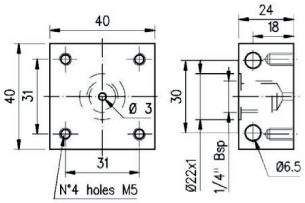
It allows the pressure switch mounting:
- panel-mounted adaptor by using n.2 ø 6.5 holes
- equipped with 1/4" BSP nipple

APH-14



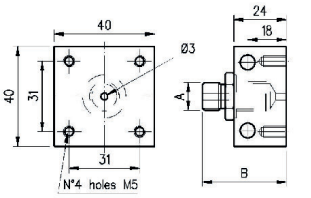
It allows the pressure switch mounting: panel-mounted adaptor by using n.2 ø 6.5 holes.

BFU-14 (Female adaptor)



WEIGHT	0.3 Kg.

BMM-**



TYPE	A	B
BMM-14	1/4" BSP	41
BMM-38	3/8" BSP	45
BMM-12	1/2" BSP	46

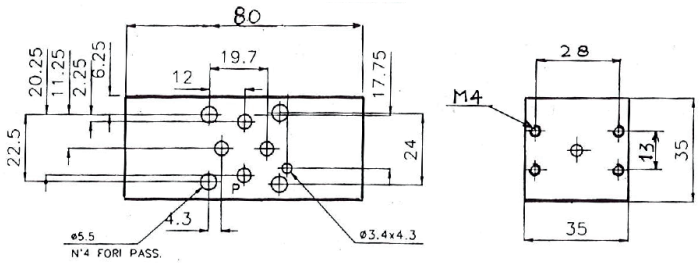
WEIGHT	0.3 Kg.

8 TECHNICAL DATA

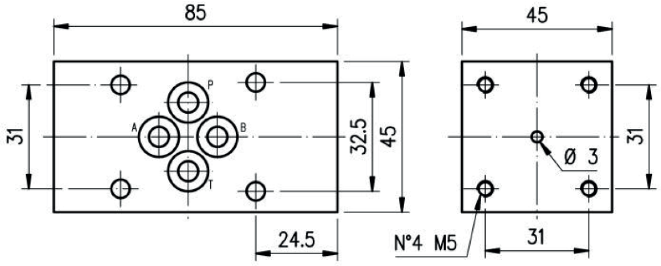
Max voltage (rated load)	125 AC	250 AC	30 DC	150 DC
	7 Amp	5 Amp.	5 Amp.	0,2 Amp
Connection frequency	Max. 120 cycles/min			
Protection	IP-65			
Direct current with inductive load	it is suggested to provide an arching contact			

9 CETOP MOUNTING MODULES

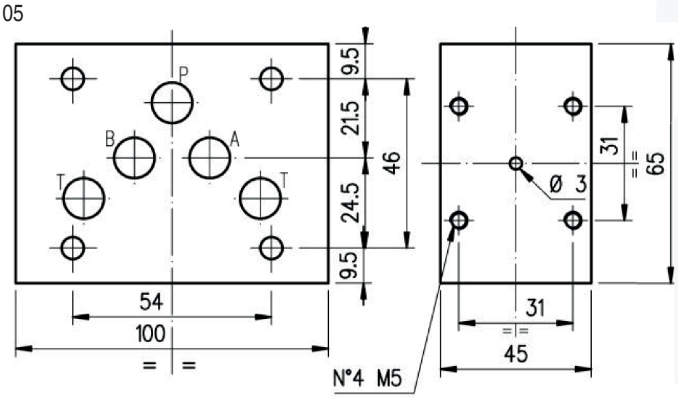
CETOP 02



CETOP 03



CETOP 05



10 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)
AM		-	KO	-		/		/	

(1) AM : stackable valve

(2) Size:
- 2: Cetop 2
- 3: Cetop 3
- 5: Cetop 5

(3) KO: pressure switch module

(4) Line control:
- A: line A
- B: line B
- AB: line AB
- P: line P

(5) pressure range:
- 3,2 : 6-35 bar (0,6 - 3,5 MPa)
- 16 : 12-160 bar (1,2 - 16,0 MPa)
- 32 : 30-350 bar (3,0 - 35,0 MPa)
- 63 : 50-630 bar (5,0 - 63,0 MPa)

(6) design number

Example of ordering code: AM3-KO-AB/16
where:
- AM3-KO=CETOP 03 module
- AB= Pressure switch on lines A and B
- /16= pressure range

SUMMARY

11 POWER PACK

MINI POWER PACK

ASMC 0001

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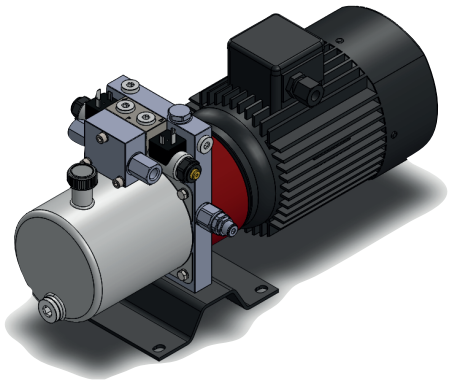
Mini Power Pack

ASMC

15 l/min 20 MPa (200 bar)

1 DESCRIPTION

ASMC are compact power packs designed in order to be flexible and configurable following the hydraulic scheme of the final application.
It is based on the HDF valve series and because of that, it is possible to configure many different functions, with directional valves, pressure and flow control, hand pumps and so on. It is possible to have the power pack with AC or DC motors with different power limits.
On demand is possible to have plastic tanks and also custom configurations. For this special request please ask to our technical department.



2 ORDERING CODE

(1)		(2)		(3)		(4)		(5)
ASMC	-		-		-		/	*

(1) ASMC: Aidro small power pack

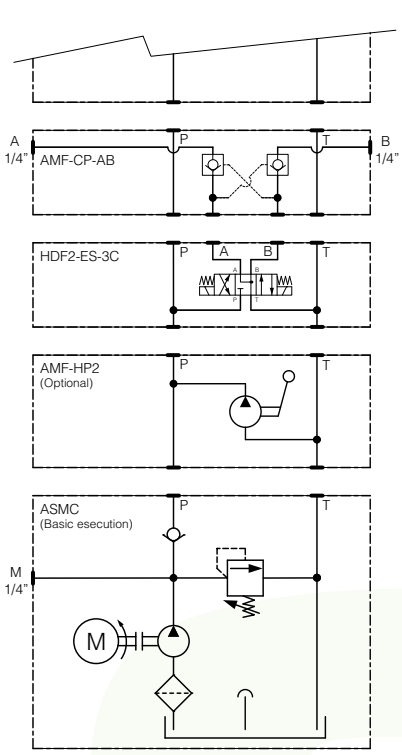
(2) Tank Nominal capacity:
- 02 = 2 l (dm³)
- 04 = 4 l (dm³)
- 08 = 8 l (dm³)
- 10 = 10 l (dm³)

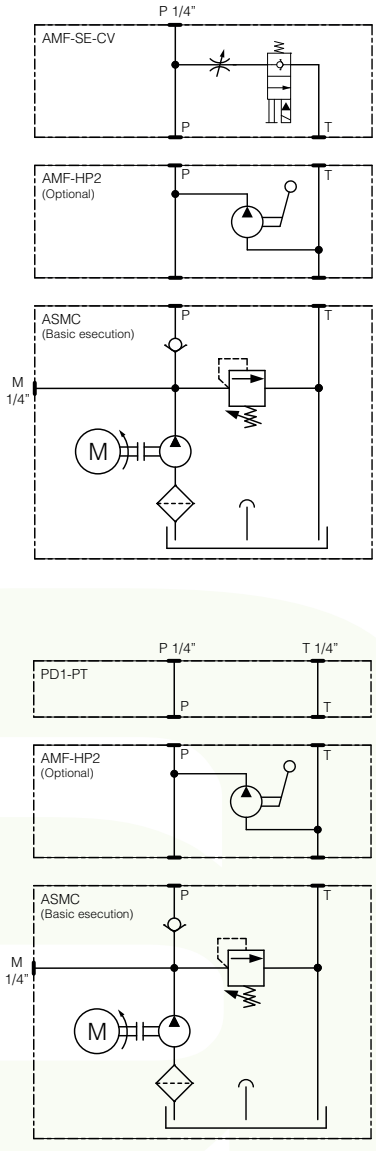
(3) Pump code = displacement:
- 08 = 0,8 cm³/rev
- 12 = 1,2 cm³/rev
- 16 = 1,6 cm³/rev
- 25 = 2,5 cm³/rev
- 36 = 3,6 cm³/rev
- 44 = 4,4 cm³/rev
- 58 = 5,8 cm³/rev

(4) Engine code = combination electric motor/installed power (see 4):
- 055AC3 = 0,55 kW and Three Phase 400V AC
- 075AC3 = 0,75 kW and Three Phase 400V AC
- 110AC3 = 1,10 kW and Three Phase 400V AC
- 055AC1 = 0,55 kW and Mono Phase 230V AC
- 075AC1 = 0,75 kW and Mono Phase 230V AC
- 110AC1 = 1,10 kW and Mono Phase 230V AC
- 120DC24 = 1,20 kW and Direct current 24V DC
- 150DC12 = 1,50 kW and Direct current 12V DC
- 200DC24 = 2,00 kW and Direct current 24V DC

(5) Options: code reserved for identification of the specific hydraulic scheme of the customer

See some examples of combinations and possible hydraulic circuits assembled with Aidro HDF valves





3 TECHNICAL DATA

Protection class motors	IP 55F for AC motors ; IP 43 F for DC motors
Ports	A,B : G 1/4"
Fluids	Hydraulic oils (HL, HLP) to DIN 51524 Oil
Recommended viscosity	20 .. 100 mm2/s
Fluid contamination class	Class 21/18/15 according to ISO 4406 (1999)
Fluid temperature	0 .. +70 °C
Ambient temperature	-25 .. +50 °C

4 COMBINATIONS ELECTRIC MOTOR / INSTALLED POWER

Engine Power \ Motor Type	AC3 [400V]		AC1 [230/50Hz]		DC12 [12V]	DC24 [24V]
055	0,55 kW 1390 rpm		0,55 kW 1370 rpm			
075	0,75 kW 1400 rpm	0,75 kW 2850 rpm	0,75 kW 1410 rpm	0,75 kW 2820 rpm		
110	1,10 kW 2850 rpm		1,10 kW 2845 rpm			
120						1,2 kW 3200 rpm
150					1,50 kW 2400 rpm	
200						2,0 kW 2100 rpm

To define the engine code it is necessary combine the installed power with the electric motor.

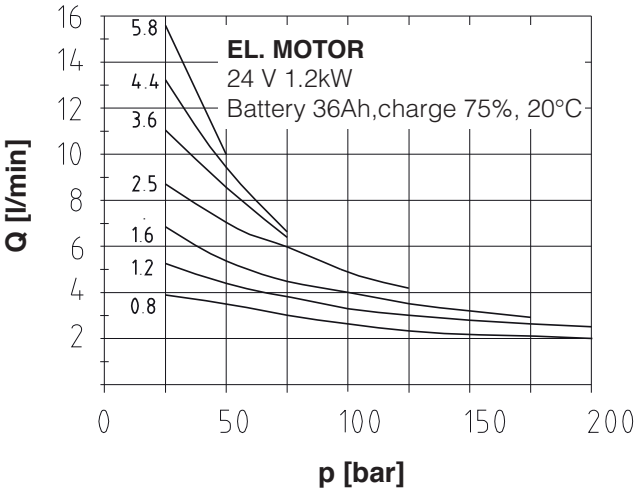
5 COMBINATIONS MOTOR / PUMP for AC motors

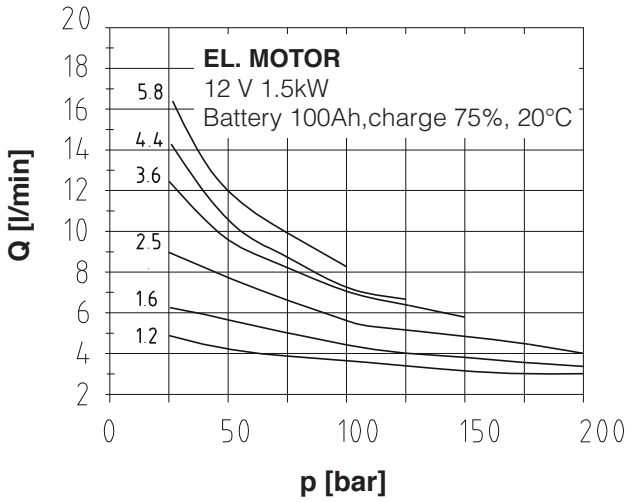
Power pack	Tank nominal capacity (2,4,8,10 l)	Pump code	ENGINE CODE															
			055AC3 1390 rpm		075AC3 1400 rpm		075AC3 2850 rpm		110AC3 2850 rpm		055AC1 1370 rpm		075AC1 1410 rpm		075AC1 2820 rpm		110AC1 2845 rpm	
			bar	l/min	bar	l/min	bar	l/min	bar	l/min	bar	l/min	bar	l/min	bar	l/min	bar	l/min
ASMC		08	200	0,9			180	1,9	200	1,9	200	0,9			185	1,9	200	1,9
ASMC		12	180	1,4	200	1,4	120	2,9	175	2,9	180	1,4	200	1,5	120	2,9	175	2,9
ASMC		16	135	1,9	180	1,9	90	4,0	130	4,0	135	1,9	180	2,0	90	3,9	130	4,0
ASMC		25	85	3,2	115	3,2	55	6,5	80	6,5	85	3,1	115	3,2	55	6,4	85	6,5
ASMC		36	60	4,6	80	4,6	40	9,4	60	9,4	60	4,6	80	4,7	40	9,3	60	9,4
ASMC		44	50	5,6	65	5,7	30	11,5	45	11,5	50	5,6	65	5,7	35	11,4	50	11,5
ASMC		58	35	7,4	50	7,5	25	15,2	35	15,2	35	7,4	50	7,5	25	15,0	35	15,1

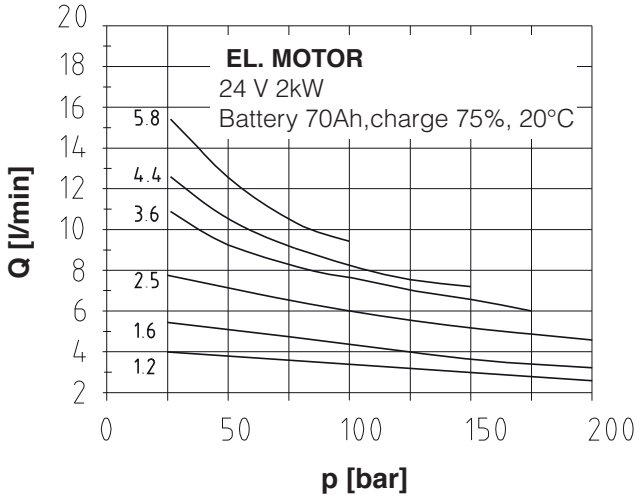
The nominal pressure is the maximum working pressure allowed without time limit.
The maximum pressure is the maximum permissible pressure for a short period of time (max time is 20 sec):
250 bar= Maximum pressure for all pumps, except for pump code 58 which maximum pressure is 200 bar
Example of power pack code: type ASMC, tank by 10 l, pump 2,5 cm^3/rev, engine power 0,55 Kw 400V AC = ASMC-10-25-055AC3

6 COMBINATIONS MOTOR / PUMP for DC motors

Power pack	Tank nominal capacity	Pump code	ENGINE CODE					
			120DC24 3200 rpm		150DC12 2400 rpm		200DC24 2100 rpm	
			bar	l/min	bar	l/min	bar	l/min
ASMC	2-10 l	08-58	0-200	2-16	0-200	3-16	0-200	3-16

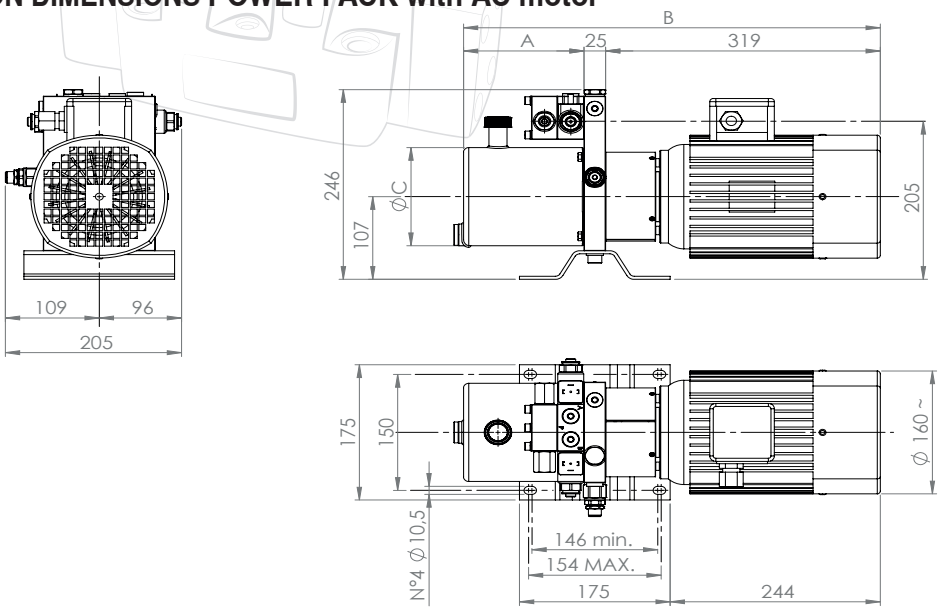






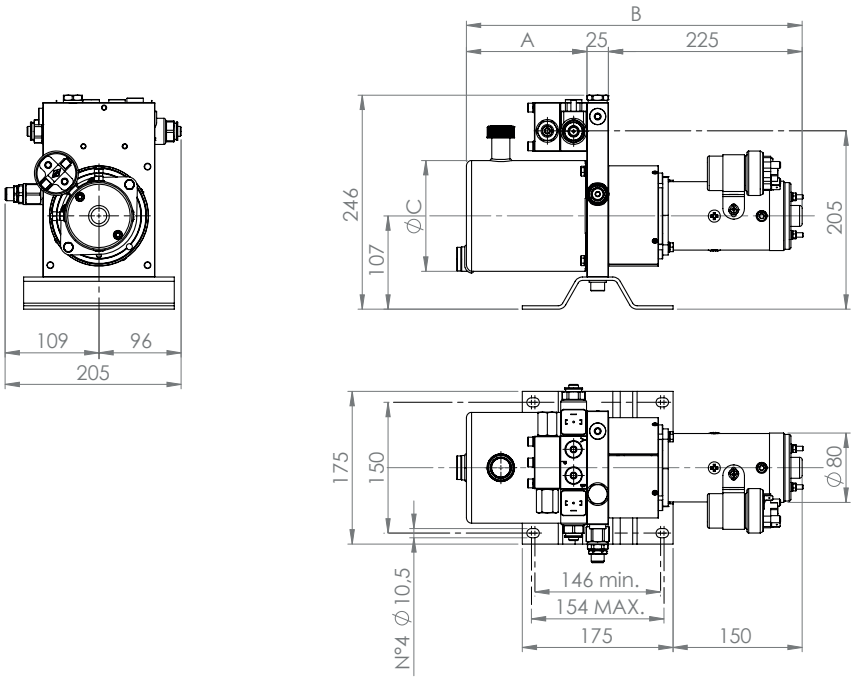
Example of power pack code: type ASMC, tank of 8 l, Pump 1,2 cm³/rev, engine power 1,5 Kw 12V DC = ASMC-08-12-150DC12

7 INSTALLATION DIMENSIONS POWER PACK with AC motor



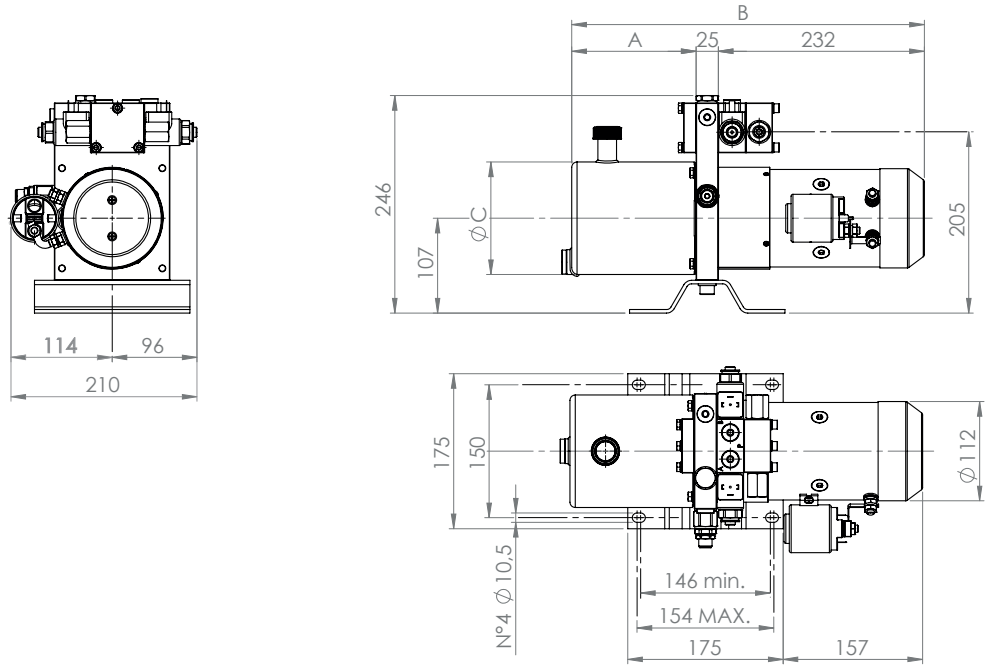
Power Pack	A	B	C
ASMC-02	~240	~584	ø127
ASMC-04	~400	~744	ø127
ASMC-08	~350	~694	ø183
ASMC-10	~430	~774	ø183

8 INSTALLATION DIMENSIONS POWER PACK with 120DC24 motor



Power Pack	A	B	C
ASMC-02	~240	~490	ø127
ASMC-04	~400	~650	ø127

9 INSTALLATION DIMENSIONS POWER PACK with 150DC12 - 200DC24 motor



Power Pack	A	B	C
ASMC-04	~400	~657	ø127
ASMC-08	~350	~607	ø183
ASMC-10	~430	~687	ø183

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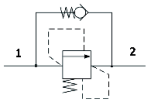
110006

SUMMARY

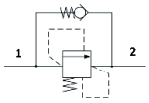
12 VARIOUS

DIAPHRAGM PRESSURE SWITCH WITH SETTING SCREW
A-573-* 0001

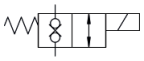
PRESSURE SWITCH WITH SETTING SCREW
A-P27HP-* 0002

SEQUENCE VALVE POPPET TYPE in line mounting type
CPR-LG38/* 

0003

ANTI CAVITATION VALVE POPPET TYPE METRIC CAVITY M18X1,5
CPR-M18/* 

0004

HYBRID SAE CARTRIDGE POPPET TYPE
EVMD.78.** 
0006

GAS CARTRIDGE-DIRECT ACTING-BALL TYPE
CVG14 0008

COIL SERIES
C30 COILS 0009

COIL SERIES
C36 COILS 0010

ON-OFF Coils
BO* COILS 0011

Proportional Coils
BO* PROPORTIONAL COILS 0013

COIL SERIES
C38 COILS 0015

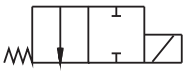
COIL SERIES
C33 COILS 0016

COIL SERIES
C37COILS 0017

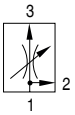
SUMMARY

12 VARIOUS

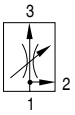
COIL SERIES
C45 COILS 0018

SCREW-IN, 2-WAY SOLENOID OPERATED DIRECTIONAL VALVE CAVITY 7/8” 14 UNF
EVH2O-78/2 -05-024C  0019

EN 175301-803 (EX DIN 43650-A ISO 4400)
K CONNECTOR 0021

3-WAY PRESSURE COMPENSATOR FLOW REGULATOR
QV3-78 

0025

3-WAY PRESSURE COMPENSATOR FLOW REGULATOR
QV3-M27/* 

0027

aidro
Desktop Metal Company

DIAPHRAGM PRESSURE SWITCH WITH SETTING SCREW
A-573-*

1 DESCRIPTION

Screw in diaphragm pressure switch with setting screw.
The body is in steel zinc plated and it is available with different pressure ranges and settings.
A rubber cover cup protects the electric contacts.



2 ORDERING CODE

(1)		(2)	(3)	(4)	(5)	(6)
A-573	-					

(1) A-573: diaphragm pressure switch

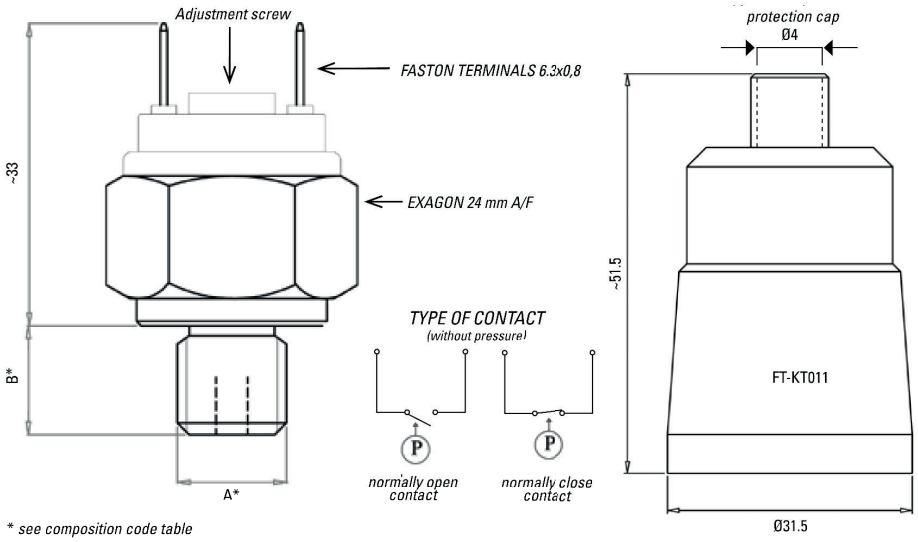
(2) Regulation setting:
- 1: 0,2 - 1 bar
- 2: 0,5 - 2 bar
- 10: 1 - 10 bar
- 20: 10 - 20 bar
- 50: 20 - 50 bar
- 200: 50 - 200 bar
- 300: 20 - 300 bar

(3) preset at (optional):
- 59 bar
- 120 bar

(4) Type of contact
- NO: Normally open
- NC: Normally closed

(5) Thread:
- G18: G1/8”
- G14: G1/4”

(6) Code reserved for special variants
- O: Additional o-ring and body with o-ring groove
- D: pressure setting when system pressure falling
- U: pressure setting when system pressure rising



* see composition code table

3 TECHNICAL DATA

Max current	48V - 0,5 Amp
Maximum pressure	250 bar (25 MPa)
Protection	IP64 with rubber cover cap
Mechanical life	10^6 cycles
Diaphragm	NBR
Body	Zinc plated steel

PRESSURE SWITCH WITH SETTING SCREW
A-P27HP-*

1 DESCRIPTION

Screw in diaphragm pressure switch with setting screw.
The body is in steel zinc plated and it is available with different pressure ranges and settings.
The electrical connection is assured by a DIN connectior with an IP65 protection degree.



2 ORDERING CODE

(1)		(2)	(3)	(4)		(5)
A-P27HP	-				/	

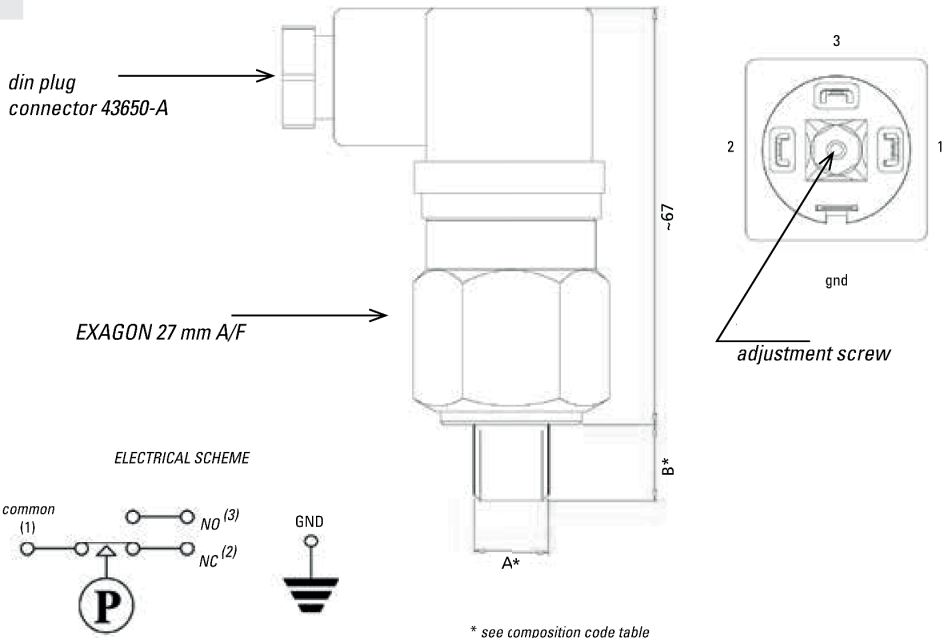
(1) A-P27HP:
piston pressure switch

(2) regulation setting
50:20 - 50 bar
300:20 - 300 bar

(3) Type of contact
NO:Normally open
NC:Normally closed

(4) Thread:
G18:G1/8”
G14:G1/4”

(5) Code reserved for special variants



* see composition code table

3 TECHNICAL DATA

Max current	250 V DC - 0,5 Amp
Maximum pressure	600 bar (60 MPa)
Protection	IP65
Mechanical life	10^6 cycles
Piston	steel
Body	Zinc plated steel
Hysteresis	15% setting point
Tollerance	8% setting point

SEQUENCE VALVE POPPET TYPE in line mounting type
CPR-LG38/*

1 DESCRIPTION

Valve is designed as simple in line valve with relief and anti-cavitation function. When the pressure at the inlet 1 reaches the set value, the poppet starts to open to 2. If there is any load on the side 2, the valve body shifts against a soft spring opening the passage form 2 to 1.



2 ORDERING CODE

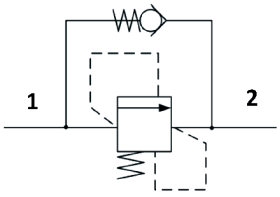
(1)		(2)		(3)		(4)
CPR	-	LG38	/		-	

(1) CPR: Anti-cavitation valve

(2) LG38: In line mounting - G3/8

(3) Pressure range (bar)
- 6,3 :20-70 bar
- 12 :71-130 bar
- 20 :131-210 bar
- 25 :211-280 bar
- 32 :281-350 bar
- 40 :351-420 bar

(4) required pressure setting (bar)



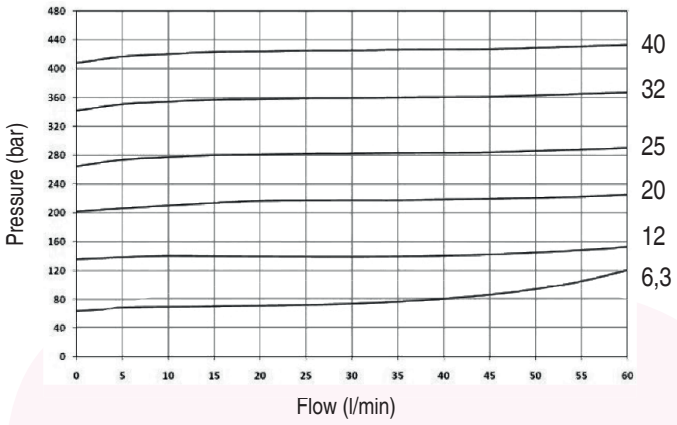
3 TECHNICAL DATA

Max flow	60 l/min
Maximum pressure	420 bar (42 MPa)
Max internal leackage	1,00 cc/min
Cracking pressure	0,5 bar
Weight	0,187 Kg

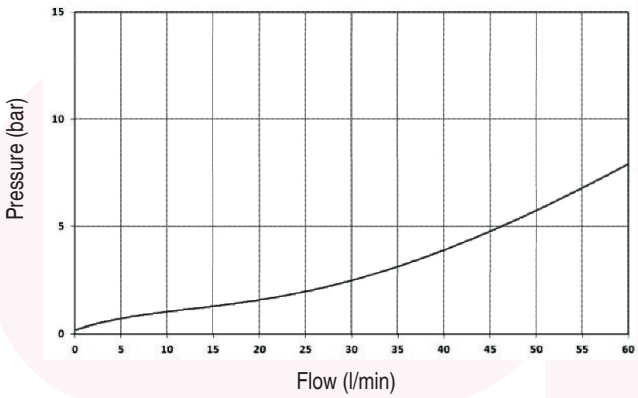
Back pressure on the port 2 is directly additive to the valve setting at a 1:1 ratio

4 TYPICAL DIAGRAMS

Pressure relief function



Anti-Cavitation function

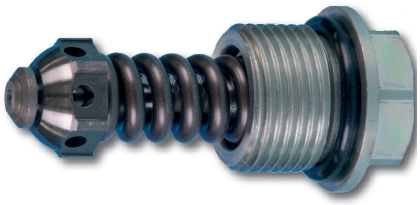


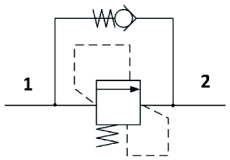
ANTI CAVITATION VALVE POPPET TYPE METRIC CAVITY M18X1,5

CPR-M18/*

1 DESCRIPTION

Valve is designed as simple insert cartridge valve with relief and anti-cavitation function. When the pressure at the inlet 1 reaches the set value, the poppet starts to open to tank 2. If there is any load on the side 2, the valve body shifts against a soft spring opening the passage form 2 to 1.





2 ORDERING CODE

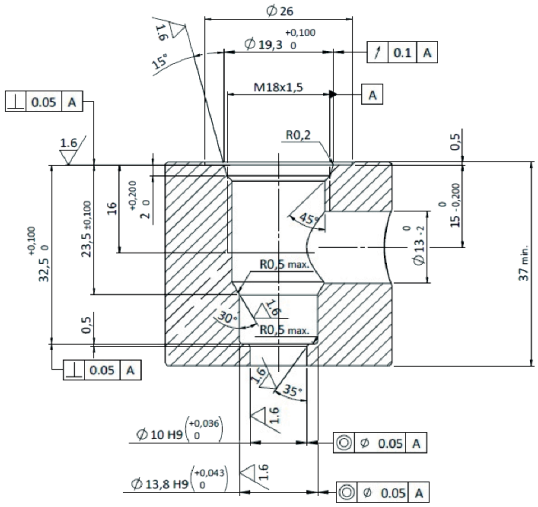
(1)		(2)		(3)		(4)
CPR	-	M18	/		-	

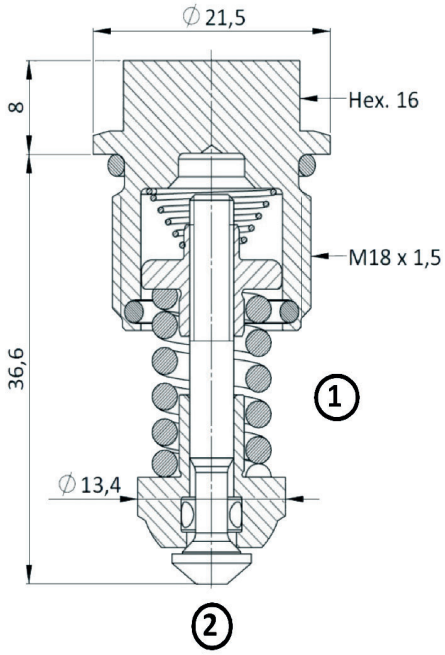
(1) CPR: Anti-cavitation valve

(2) M18: M18 cavity

(3) Pressure range (bar)
- 6,3 :20-70 bar
- 12 :71-130 bar
- 20 :131-210 bar
- 25 :211-280 bar
- 32 :281-350 bar
- 40 :351-420 bar

(4) required pressure setting (bar)





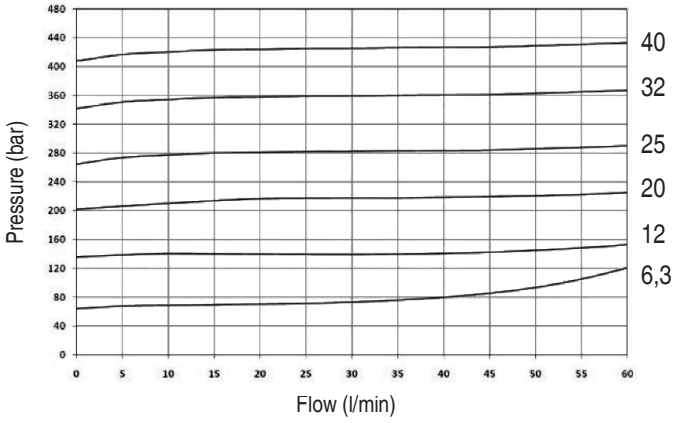
3 TECHNICAL DATA

Maximum flow	60 l/min
Maximum pressure	420 bar (42 Mpa)
Installation torque	35-40 Nm
Weight	0,06 Kg

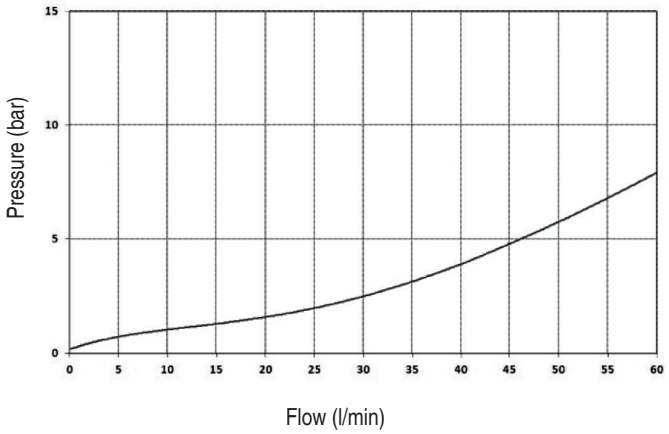
Coining of the cavity is recommended for a proper installation.
Back pressure on the port 2 is directly additive to the valve setting at a 1:1 ratio

4 TYPICAL DIAGRAMS

Pressure relief function



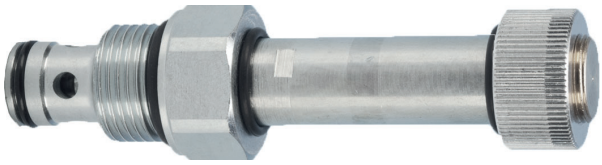
Anti-Cavitation function



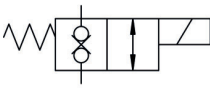
HYBRID SAE CARTRIDGE Poppet Type
EVMD.78.**
35 l/min - 25 MPa (250 bar)

1 DESCRIPTION

Solenoid operated, 2-way 2-positions, normally closed, direct acting poppet type, bi-directional blocking, screw-in cartridge valve. Special design for low leakage in load holding applications. When the coil is de-energized, the EVMD.78.04 blocks flow in both directions. Once the coil is energized, the valve's poppet opens and allows free flow from 1 to 2 and from 2 to 1.
The rigid design using a 1-piece body contributes to minimize the effect of eccentricities in cavity and provides great reliability.
Low pressure drop thanks to optimized flow path.



1



2

2 ORDERING CODE

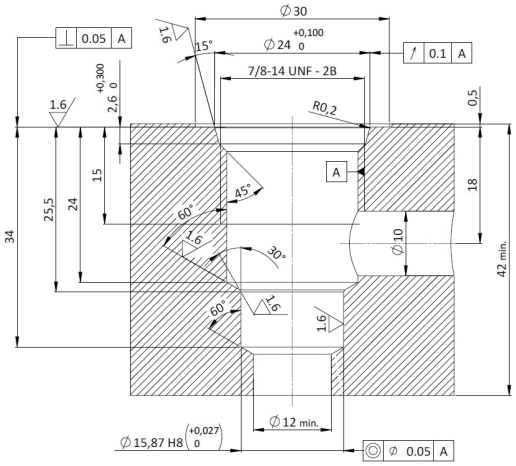
(1)	(2)		(3)		(4)
EVMD	78	-	*	-	*

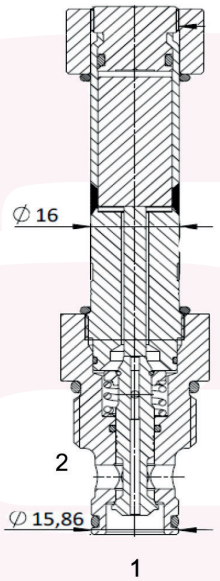
(1) EVMD : screw-in directional solenoid valve, double poppet direct operated

(2) 78: cavity 7/8" 14 UNF

(3) Valves variants
- 03: Without manual override
- 04: Manual override push pin

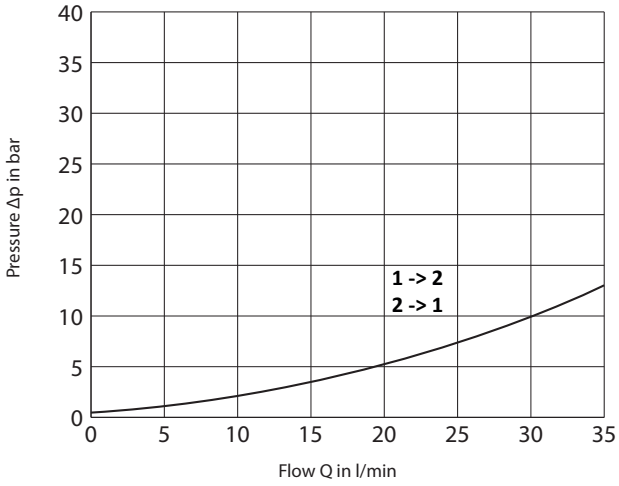
(4) *: Electric voltage and solenoid coils: see 8
- 0000: no coils
- 012C: coils for V12DC
- 024C: coils for V24DC



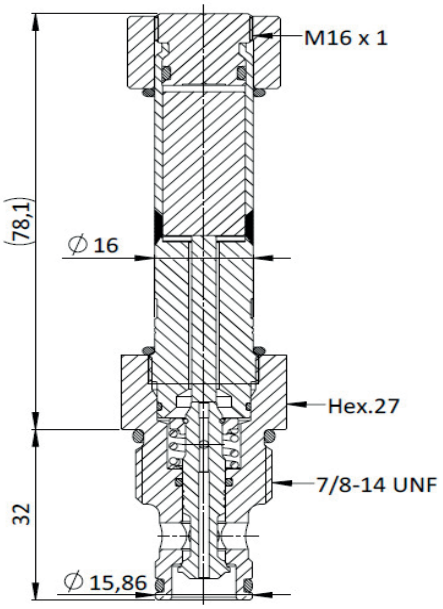


All external surfaces are zinc plated and corrosion-proof.
All valve parts are made of high strength steel. Poppet is hardened and ground to ensure minimal wear and extended service life. Coil seals protect the solenoid system. Manual override option. Industry SAE common cavity.

4 TYPICAL DIAGRAMS



5 INSTALLATION DIMENSIONS (mm)



6 ELECTRIC FEATURES

Those solenoid valves are normally eqipped by coils type C38, wich are energized from DC.

7 INSTALLATION

EVMD.78.04 valves are to be installed in cavity 7/8" 14 UNF

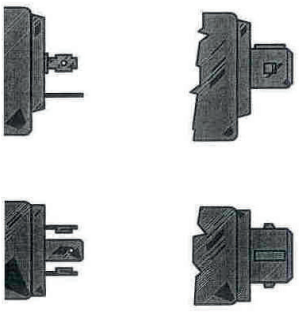
8 COILS type C 38 (Ø 16 mm - 26w)

Coil with ISO/DIN connectors	voltage DC	nominal current [A]	resistance cold [Ω]	nominal power [W]	Insulation class
C38-012C	V12 DC	2,2	5,6	26	H
C38-024C	V24 DC	1,1	22,2	26	

9 CONNECTION OPTIONS

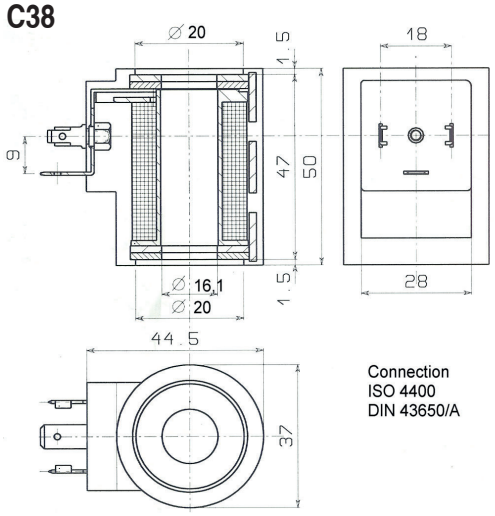
C38/-****
DIN 43650/A-ISO 4400

C38/A-****
AMP JUNIOR



-Class "H" coil as from the IEC 85 standard.
-Class H wire (200 C°)
-Duty cycle ED 100%
-Magnetic circuit encapsulated with thermoplastic resins.
-Standard colour black.
-Metallic parts protected against oxidation.

C38



Connection
ISO 4400
DIN 43650/A

GAS CARTRIDGE-Direct acting-Ball type

CVG14

35 l/min - 35 MPa (350 bar)

1 DESCRIPTION

A screw-in, direct acting, ball type in-line check valve.
Main use is as a blocking or load-holding device.
The CVG14 allows flow passage from port 1 to 2: the cartridge has a fully guided check which is spring-biased closed until sufficient pressure is applied at port 1 to open to 2
The flow is blocked in the opposite direction (2 to 1).





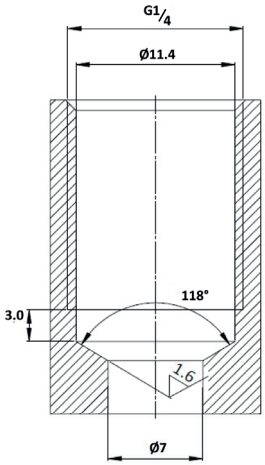
2 ORDERING CODE

(1)	(2)		(3)
CVG	14	-	*

(1) CVG : valve basic code

(2) 14: size G14

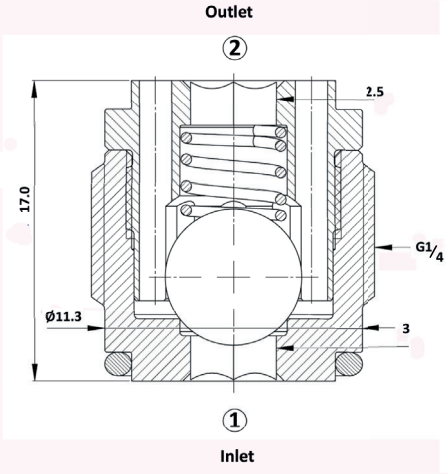
(3)Cracking pressure:
-: standard 0 bar
1: 1 bar
3: 3 bar



3 TECHNICAL DATA

Max flow	20 l/min
Maximum pressure	350 bar (35 MPa)
Max internal leackage	max 4 drops/min 250 bar
Weight	0.013 kg

External surfaces are oxide burnished and corrosion-protected.
All valve parts are made of high strength steel.
Reversed installation is possible (except for size G18) yet not recommended.
Compact size. Gas cavity.



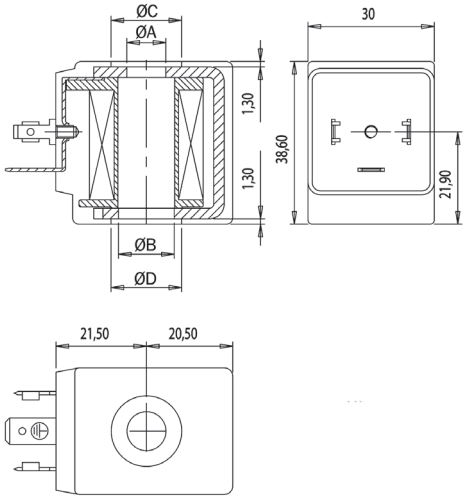
30 mm COIL SERIES

C30 COILS

Ø 13 mm-18 W; 35 VA

1 DESCRIPTION

- Magnetic circuit encapsulated with fibre-glass reinforced nylon.
- Standard colour black.
- Metallic parts protected against oxidation.



2 ORDERING CODE

(1)		(2)		(3)
C30	-		-	

(1) C30 : Coil Type

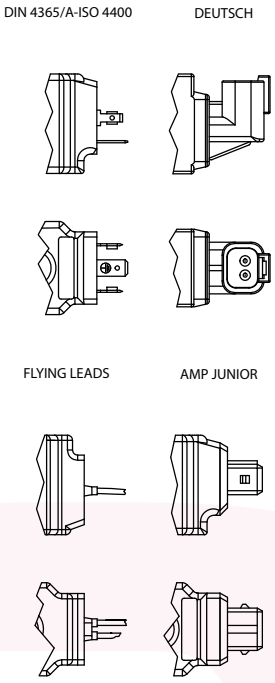
(2) Electric options: See table 5

(3) Connection options: see 4

3 TECHNICAL DATA

Typical nominal voltages	- 12-24VDC - 24-110-220VAC and RAC
Class F coil as from the IEC	85 standard
Class H wire	200°C
Duty cycle	ED 100% code, voltages, currents and power consumption.
see table for coils:	012C, 024C, 048C for VDC 024R, 110R, 220R for RAC (rectified alternate current)
Frequency	024/50, 110/50, 230/50 for AC at 50Hz
	110/60, 220/60 for AC at 60Hz

4 CONNECTION OPTIONS



-no designation: DIN43650/A
-C: flying leads
-A: AMP Junior
-K: Kostal M24x1
-D: Deutsch connection
-ES:“energy saving” connector with LED

5 ELECTRIC OPTIONS/SIZES

Coil with ISO/DIN connector	voltage DC	nominal current (A)	resistance cold (Ω)	nominal power (W)	insulation class	øA (mm)	øC (mm)
C30-012C	V 12 DC	1,55	7,7	18,6	F	13,2	16,8
C30-024C	V 24 DC	0,8	31	19			
C30-024R	V 24 RAC	0,85	27	18,3			
C30-048C	V 48 DC	0,4	116	19			
C30-048R	V 48 RAC	0,4	106	17,3			
C30-110R	V 110-115 RAC	0,16	600	16			
C30-220R	V 220-230 RAC	0,08	2500	16			
	AC	(*)		(VA)			
C30-024/50	24V 50Hz	0,9	5,3	35	F	13,2	16,8
C30-110/50	110-115V 50Hz	0,2	108				
C30-230/50	220-230V 50Hz	0,1	438				
C30-110/60	110-115V 60Hz	0,3	92				
C30-220/60	220-230V 60Hz	0,15	375				

(*) hold valves: on AC coils inrush valves of current and power can reach up to 3,5 times the hold valve.

36 mm COIL SERIES

C36 COILS

Ø 13 mm-22 W

1 DESCRIPTION

- Magnetic circuit encapsulated with thermoplastic resins.
- Standard colour black.
- Metallic parts protected against oxidation.

2 ORDERING CODE

(1)	(2)		(3)		(4)
C36		-		-	

(1) C36: Coil type

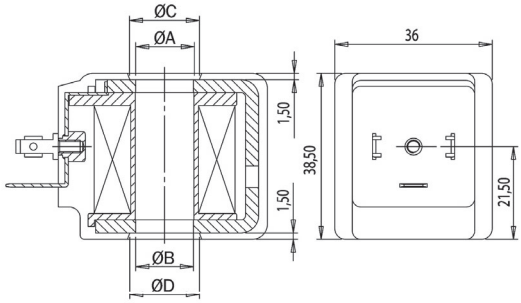
(2) Dimensions
no designation: standard ID
L: wide ID, see table 4

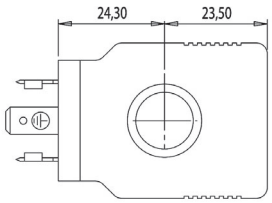
(3) Electric voltages:
-012C
-024C
-024R
-048R
-110R
-220R

(4) Connections:
-no designations: DIN 4365/A
-C: flying leeds
-K: Kostal M27x1
-A: AMP Junior
-D: Deutsch connection
-ES : "energy saving" connector with LED

3 TECHNICAL DATA

Typical nominal voltages	- 12-24VDC - 24-110-220RAC
Class H coil as from the IEC	85 standard
Class H wire	200°C
Duty cycle	ED 100% code, voltages, currents and power consumption.
see table for coils:	012C, 024C, 048C for VDC 024R, 110R, 220R for RAC (rectified alternate current)



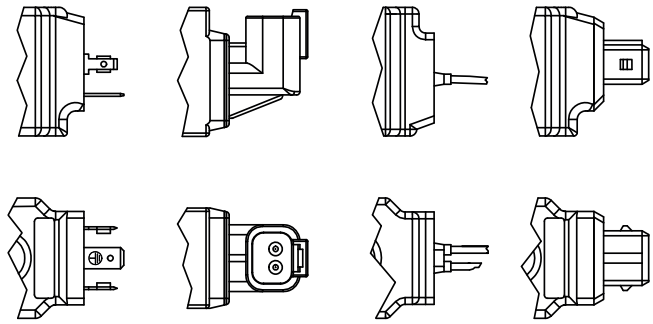


4 INTERNAL DIAMETERS

	øA(mm)	øC(mm)
C36	13,2	17
C36L	14	17

5 CONNECTION OPTIONS

DIN 4365/A-ISO 4400 | DEUTSCH | FLYING LEADS | AMP JUNIOR



6 TECHNICAL DATA

Coil with ISO/DIN connector	voltage DC	nominal current (A)	resistance cold (Ω)	nominal power (W)	insulation class
C36-012C	V 12 DC	1,9	6,3	22,8	H
C36-024C	V 24 DC	0,95	25,6	22,5	
C36-024R	V 24 RAC	1,05	20,2	23	
C36-048C	V 48 DC	0,47	102	22,6	
C36-110R	V 110-115 RAC	0,23	420	22,9	
C36-220R	V 220-230 RAC	0,11	1720	22,3	

ON-OFF Coils

BO* COILS

1 DESCRIPTION

- Magnetic circuit encapsulated with steel housing amplifying the magnetic field
- Standard zinc coated



2 ORDERING CODE

(1)	(2)		(3)		(4)		(5)		(6)
BO		-		-		-		-	

(1) BO: Aidro one-shell coil

(2) Coil size (internal diameter)
- 1: Ø13,4mm
- 2: Ø19mm
- 3: Ø22mm
- 5: Ø31mm

(3) Coating options:
- no designation: standard zinc coating (ISO 9227 - 240 h salt spray)
- ZN: Zinc-Nickel coating (ISO 9227 - 520 h salt spray)

(4) Electric Voltage Options - See table 4

(5) Current control:
- no designation: without diode
- DR: quenching diode

(6) Connection options: see table 5

3 TECHNICAL DATA

Typical nominal voltages	12-24V DC 24-110-220V AC and RAC	
Class F coil as from the IEC	85 standard	
Class H wire	200°C	
Duty cycle	ED 100% code, voltages, currents and power consuption.	
Max. ambient temperature	50°C (122°F)	
Max. winding temperature	155°C (311°F)	
Supply voltage tolerance	10%	
Quenching diode	12V	BZW06-19B (dual Zener diode)
	24 V	BZW06-33B (dual Zener diode)

4 ELECTRIC VOLTAGE OPTIONS

DC	AC
012C	024A
014C	115A
021C	230A
024C	
024R	
027C	
048C	
205C	

Coils type ***R are RAC (Rectified Alternate Current) energized from a AC supply, by a full wave bridge rectifier incorporated in the connector.

5 CONNECTIONS OPTIONS

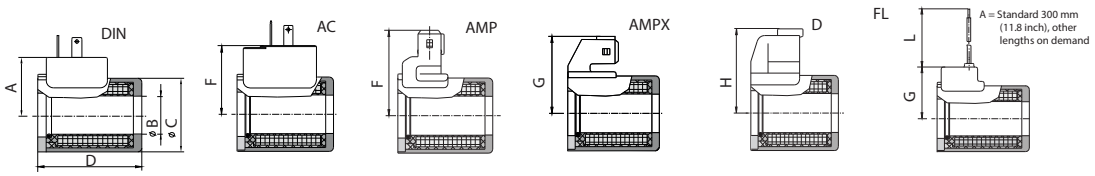
- no designation	DIN 43650
- C	flying leads
- AMP	Amp junior connector
- AMPX	AMP junior connector, axially oriented
- D	Deutsch connector

7 COILS SPECS OVERVIEW

COIL TYPE	Voltage		Nominal Current (A)	Nominal power (W)	Resistance @ 20 C ( )
B01	12	DC	1,83	22,00	6,5
	14	DC	1,57	22,00	8,9
	24	DC	0,92	22,00	26,2
	27	DC	0,80	22,00	33,6
B02	12	DC	2,45	29,00	4,9
	14	DC	1,70	24,00	8,23
	24	DC	1,15	28,00	20,8
	27	DC	0,89	24,00	30,4
	205	DC	0,12	25,00	1653
	115	AC - 50 Hz	0,24	28,00	433
	230	AC - 50 Hz	0,12	28,00	1653
B03	12	DC	2,72	33,00	4,41
	14	DC	2,14	30,00	6,55
	24	DC	1,29	31,00	18,6
	27	DC	1,07	29,00	25,3
	205	DC	0,15	31,00	1400
	115	AC - 50 Hz	0,30	35,00	344
	230	AC - 50 Hz	0,15	35,00	1400
B05	12	DC	3,17	38,00	3,78
	14	DC	2,98	42,00	4,73
	24	DC	1,73	42,00	13,9
	27	DC	1,52	41,00	17,8
	205	DC	0,20	41,00	1027
	120	AC - 60 Hz	0,38	46,00	276
	230	AC - 50 Hz	0,20	46,00	1027

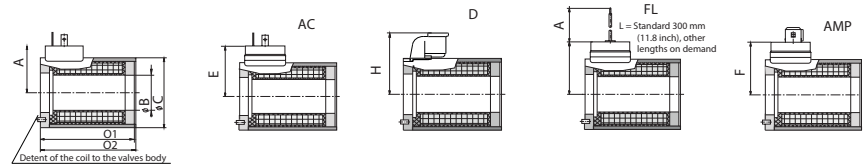
6 SIZE TABLE FOR BO1, BO2 & BO3

					AC	AMP	AMPX	DEUTSCH	FL	
	A(mm)	ØB(mm)	ØC(mm)	D(mm)	E(mm)	F(mm)	G(mm)	H(mm)	G(mm)	L(mm)
BO1	23	13,4	30	41,3	-	-	34,1	39,3	-	-
BO2	29	19	37	49,4	34,4	42	37,6	42,5	29	300
BO3	32,5	22	45	52	38,4	-	41,1	46,3	32,5	300



7 SIZE TABLE FOR BO5

					AC	AMP	AMPX	DEUTSCH	FL	
	A(mm)	ØB(mm)	ØC(mm)	D(mm)	E(mm)	F(mm)	G(mm)	H(mm)	G(mm)	L(mm)
BO5	41,5	31	62	73,2	46,5	48,7	-	52	46,5	300



Proportional Coils

BO* PROPORTIONAL COILS

1 DESCRIPTION

- Magnetic circuit encapsulated with steel housing amplifying the magnetic field
- Standard zinc coated



2 ORDERING CODE

(1)	(2)		(3)	(4)		(5)		(6)		(7)
BO		-			-		-		-	

(1) BO: Aidro one-shell coil:

(2) Coil size (internal diameter)
- 2: Ø19mm
- 3: Ø22mm
- 5: Ø31mm

(3) Electric voltage options (see table 4)
DC:
- -12V
- -24V

(4) Resistance value (see 6)
- -R2
- -R3
- -R4
- -R5

(5) Coating options:
- no designation: standard zinc coating (ISO 9227 - 240 h salt spray)
- -ZN: Zinc-nickel option

(6) Current control:
- no designation: without diode
- DR: quenching diode

(7) Connection options: See table 5

3 TECHNICAL DATA

Typical nominal voltages	- 12-24VDC	
Class F coils as from the IEC	85 standard	
Class H wire	200°C	
Duty cycle	ED 100% code, voltages, currents and power consumption.	
Max. ambient temperature	50°C (122°F)	
Max. winding temperature	155°C (311°F)	
Quenching diode(*)	12V	BZW06-19B (dual Zener diode)
	24V	BZW06-33B (dual Zener diode)

(*): available only on selected coils; please enquiry for further info

4 ELECTRIC VOLTAGE OPTIONS

DC
12V
24V

5 CONNECTIONS OPTIONS

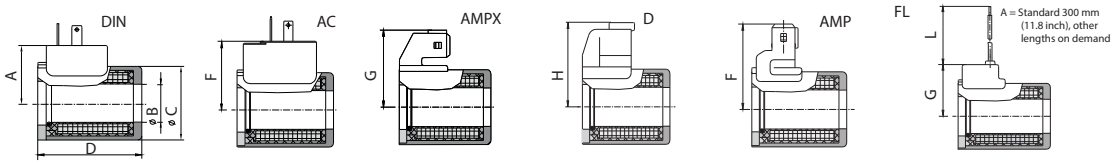
- no designation:	DIN 43650
- AMP:	Amp junior connector
- AMPX:	AMP junior connector, axially oriented
-D:	Deutsch connector

6 TECHNICAL DATA

COIL TYPE		Voltage	Max. Nominal Current (A)	Nominal power (W)	Resistance @ 20 C ( )
BO2	R2	12	1,70	20,00	4,68
	R3	12	2,45	29,00	4,9
	R4	24	0,80	19,00	20,6
	R5	24	1,15	28,00	20,8
BO3	R2	12	2,50	30,00	2,33
	R3	12	2,72	33,00	4,41
	R4	24	1,00	24,00	13,4
	R5	24	1,29	31,00	18,6
BO5	R2	12	1,90	23,00	4,73
	R3	12	3,17	38,00	3,78
	R4	24	1,10	27,00	13,9
	R5	24	1,73	42,00	13,9

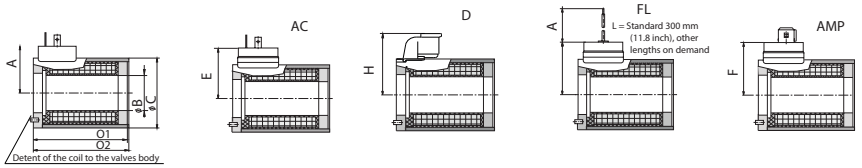
7 SIZE TABLE FOR BO1, BO2 & BO3

					AC	AMP	AMPX	DEUTSCH	FL	
	A(mm)	ØB(mm)	ØC(mm)	D(mm)	E(mm)	F(mm)	G(mm)	H(mm)	G(mm)	L(mm)
BO1	23	13,4	30	41,3	-	-	34,1	39,3	-	-
BO2	29	19	37	49,4	34,4	42	37,6	42,5	29	300
BO3	32,5	22	45	52	38,4	-	41,1	46,3	32,5	300
BO5	41,5	31	62	73,2	46,5	48,7	-	52	46,5	300



8 SIZE TABLE FOR BO5

					AC	AMP	AMPX	DEUTSCH	FL	
	A(mm)	ØB(mm)	ØC(mm)	D(mm)	E(mm)	F(mm)	G(mm)	H(mm)	G(mm)	L(mm)
BO5	41,5	31	62	73,2	46,5	48,7	-	52	46,5	300



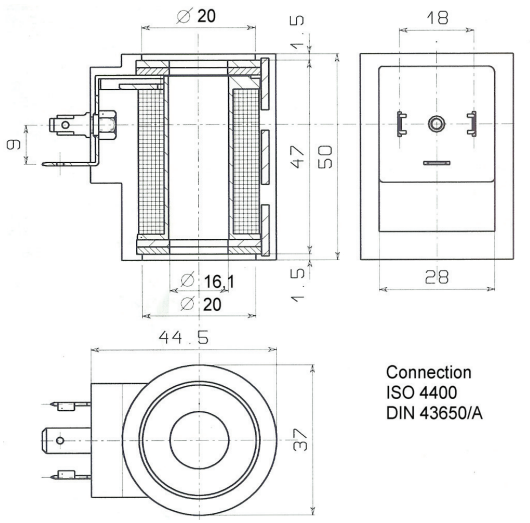
38 mm COIL SERIES

C38 COILS

Ø 16 mm - 26 W

1 DESCRIPTION

- Magnetic circuit encapsulated with thermoplastic resins.
- Standard colour black.
- Metallic parts protected against oxidation.



2 ORDERING CODE

(1)		(2)		(3)
C38	-		-	

(1) C38: Coil type

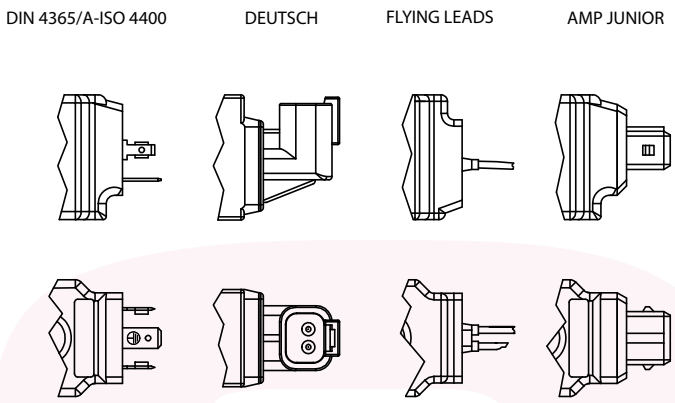
(2) Electric voltages:
- -012C
- -024C
- -024R
- -048R
- -110R
- -220R

(3) Connections:
- -no designations: DIN 43650/A
- -C: flying leeds
- -K: Kostal M27x1
- -A: AMP Junior

3 TECHNICAL DATA

Typical nominal voltages	- 12-24VDC - 24-110-220RAC
Class H coil as from the IEC	85 standard
Class H wire	200°C
Duty cycle	ED 100% code, voltages, currents and power consumption.
see table for coils:	012C, 024C, 048C for VDC 024R, 110R, 220R for RAC (rectified alternate current)

4 CONNECTION OPTIONS



5 TECHNICAL DATA

Coil with ISO/DIN connector	voltage DC	nominal current (A)	resistance cold (Ω)	nominal power (W)	insulation class
C38-012C	V 12 DC	2,2	5,6	26	H
C38-024C	V 24 DC	1,1	22,2	26	
C38-024R	V 24 RAC	1,2	18	26	
C38-048C	V 48 DC	0,5	88	26	
C38-110R	V 110-115 RAC	0,3	380	26	
C38-220R	V 220-230 RAC	0,15	1500	26	

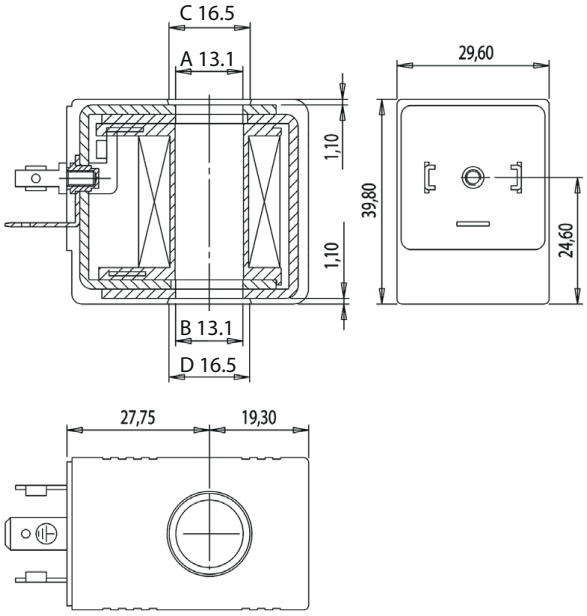
SQUARE COIL SERIES

C33 COILS

Ø 13 mm - 26 W

1 DESCRIPTION

- Magnetic circuit encapsulated with thermoplastic resins.
- Standard colour black.
- Metallic parts protected against oxidation.
- Higher power output compared to C30 coil series with same installing dimensions



2 ORDERING CODE

(1)		(2)		(3)
C33	-		-	

(1) C38: Coil type

(2) Electric voltages:
- -012C
- -024C
- -024R
- -048R
- -110R
- -220R

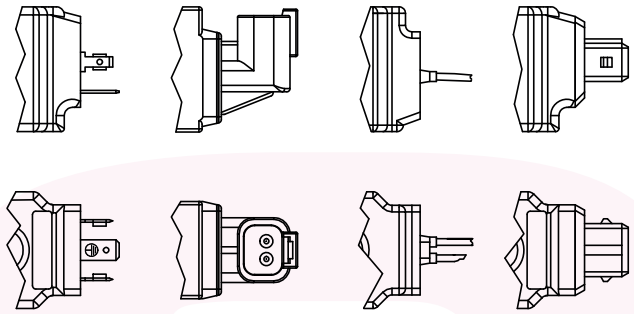
(3) Connections:
- -no designations: DIN 43650/A
- -C: flying leeds
- -K: Kostal M27x1
- -A: AMP Junior

3 TECHNICAL DATA

Typical nominal voltages	- 12-24VDC - 24-110-220-230 VAC
Class H coil as from the IEC	85 standard
Class H wire	200°C
Duty cycle	ED 100% code, voltages, currents and power consumption.
see table for coils:	012C, 024C, 048C for VDC 024R, 110R, 220R for RAC (rectified alternate current)

4 CONNECTION OPTIONS

DIN 4365/A-ISO 4400 | DEUTSCH | FLYING LEADS | AMP JUNIOR



5 TECHNICAL DATA

Coil with ISO/DIN connector	voltage DC	nominal current (A)	resistance cold (Ω)	nominal power (W)	insulation class
C33-012C	V 12 DC	2,2	5,6	26	H
C33-024C	V 24 DC	1,1	22,2	26	
C33-024R	V 24 RAC	1,2	18	26	
C33-048C	V 48 DC	0,5	88	26	
C33-110R	V 110-115 RAC	0,3	380	26	
C33-220R	V 220-230 RAC	0,15	1500	26	

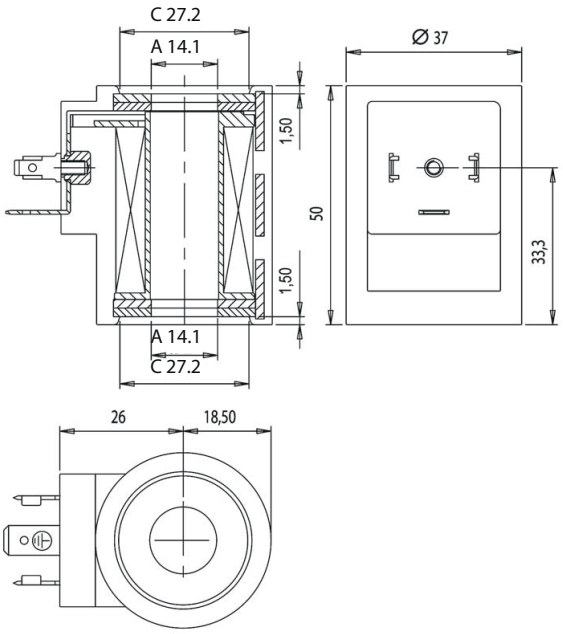
37 mm COIL SERIES

C37 COILS

Ø 14 mm - 30 W

1 DESCRIPTION

- Magnetic circuit encapsulated with thermoplastic resins.
- Standard colour black.
- Metallic parts protected against oxidation.



2 ORDERING CODE

(1)		(2)		(3)
C37	-		-	

(1) C38: Coil type

(2) Electric voltages:
- -012C
- -024C
- -024R
- -048R
- -110R
- -220R

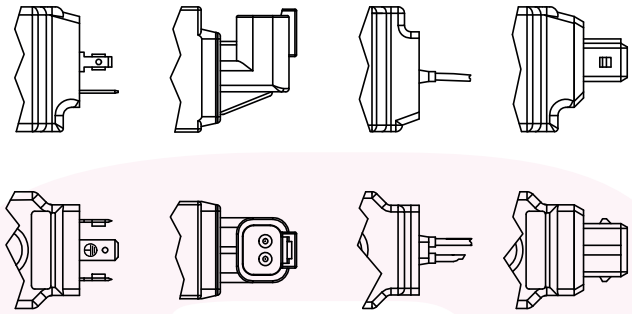
(3) Connections:
- -no designations: DIN 43650/A
- -C: flying leeds
- -K: Kostal M27x1
- -A: AMP Junior

3 TECHNICAL DATA

Typical nominal voltages	- 12-24VDC - 24-110-220RAC
Class H coil as from the IEC	85 standard
Class H wire	200°C
Duty cycle	ED 100% code, voltages, currents and power consumption.
see table for coils:	012C, 024C, 048C for VDC 024R, 110R, 220R for RAC (rectified alternate current)

4 CONNECTION OPTIONS

DIN 4365/A-ISO 4400 | DEUTSCH | FLYING LEADS | AMP JUNIOR



5 TECHNICAL DATA

Coil with ISO/DIN connector	voltage DC	nominal current (A)	resistance cold (Ω)	nominal power (W)	insulation class
C37-012C	V 12 DC	2,5	5,6	30	H
C37-024C	V 24 DC	1,25	22,2	30	
C37-024R	V 24 RAC	1,25	18	30	
C37-048C	V 48 DC	0,625	88	30	
C37-110R	V 110-115 RAC	0,28	380	30	
C37-220R	V 220-230 RAC	0,14	1500	30	

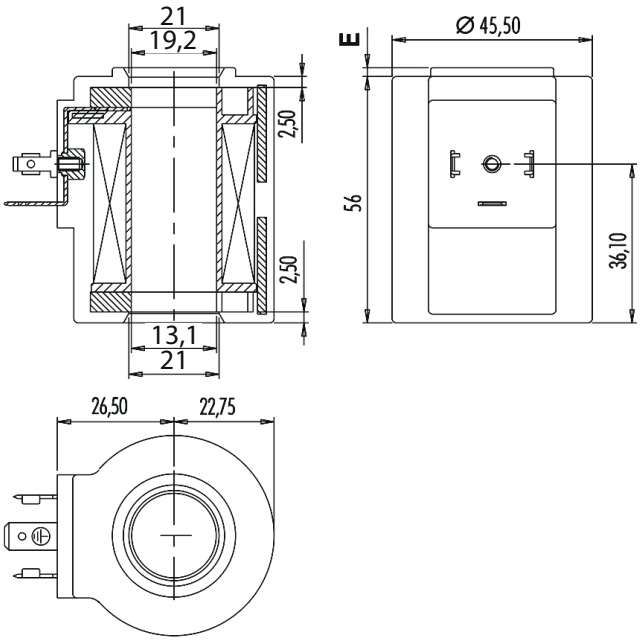
45 mm COIL SERIES

C45 COILS

Ø 19 mm - 33 W

1 DESCRIPTION

- Magnetic circuit encapsulated with thermoplastic resins.
- Standard colour black.
- Metallic parts protected against oxidation.



2 ORDERING CODE

(1)		(2)		(3)
C45	-		-	

(1) C38: Coil type

(2) Electric voltages:
- -012C
- -024C
- -024R
- -048R
- -110R
- -220R

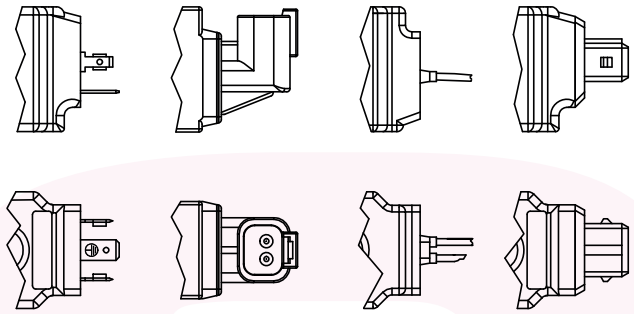
(3) Connections:
- -no designations: DIN 43650/A
- -C: flying leeds
- -K: Kostal M27x1
- -A: AMP Junior

3 TECHNICAL DATA

Typical nominal voltages	- 12-24VDC - 24-110-220-230 VAC
Class H coil as from the IEC	85 standard
Class H wire	200°C
Duty cycle	ED 100% code, voltages, currents and power consumption.
see table for coils:	012C, 024C, 048C for VDC 024R, 110R, 220R for RAC (rectified alternate current)

4 CONNECTION OPTIONS

DIN 4365/A-ISO 4400 | DEUTSCH | FLYING LEADS | AMP JUNIOR



5 TECHNICAL DATA

Coil with ISO/DIN connector	voltage DC	nominal current (A)	resistance cold (Ω)	nominal power (W)	insulation class
C45-012C	V 12 DC	2,75	5,6	33	H
C45-024C	V 24 DC	1,75	22,2	33	
C45-024R	V 24 RAC	1,5	18	36	
C45-048C	V 48 DC	0,68	88	33	
C45-110R	V 110-115 RAC	0,33	380	36	
C45-220R	V 220-230 RAC	0,16	1500	36	

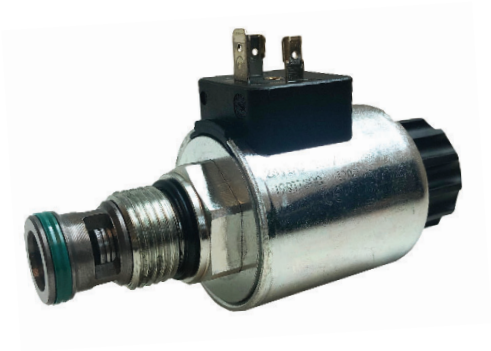
SCREW-IN, 2-WAY SOLENOID OPERATED DIRECTIONAL VALVE CAVITY 7/8” 14 UNF spool type with 19mm nose

EVH2O-78/2 -05-024C

60 l/min 35 MPa (350 bar)

1 DESCRIPTION

Directional control valve 2 way 2 position spool type high performance and high power, ideal for high flows and pressures.
This valve has a special design with a 7/8”14 UNF thread but with a 19mm nose that permits a reduced pressure drop. Valve body is zinc coated. The dual seals rings assure an efficient and reliable thightness of the valve.



2 ORDERING CODE

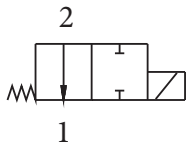
(1)		(2)		(3)		(4)
EVH2O	-	78/2	-	05	-	024C

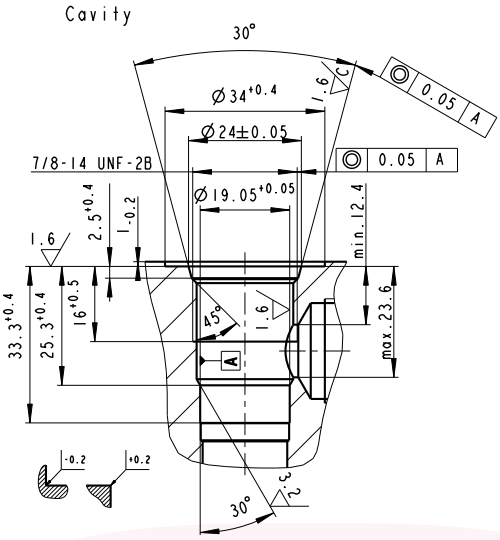
(1) EVH2O : 2-way solenoid operated spool type normally open

(2) 78/2 : cavity 7/8” 14 UNF with 19mm nose

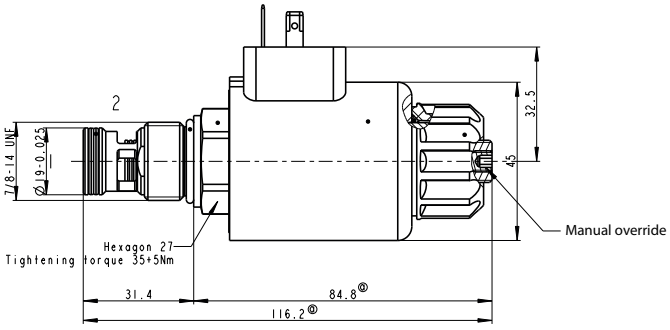
(3) Valves variants
05: manual override (see 7)

(4) Coil type
024C : coils for V24DC with standard connection ISO4400/DIN43650/A





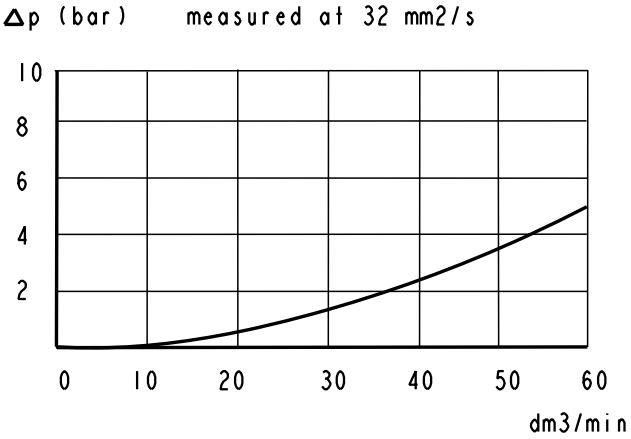
These valves are to be installed in cavity 7/8” 14 UNF with special Ø19mm



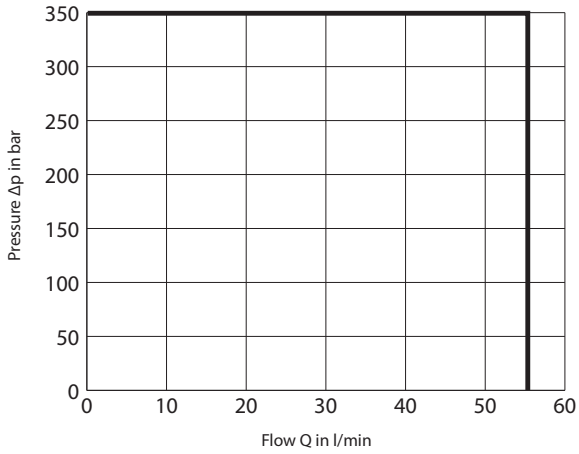
3 TECHNICAL DATA

Max. flow rate	60 l/min	Electric characteristics:
Max. operating pressure	350 bar	Those solenoid operated valves are normally equipped by coils type B03, which are energized: directly from a D.C. voltage supply
Fluid temperature range (NBR)	-30....80 (-22..176) °C	
Fluid temperature range (FPM)	-20....80 (-4..176) °C	V 24 DC = 024C
ambient temperature range	-30....80 (-22..176) °C	
Supply voltage tolerance	24V DC ±10%	
Weight	0,66 kg	

4 PRESSURE DROPS
Valve + body flow direction 1-2



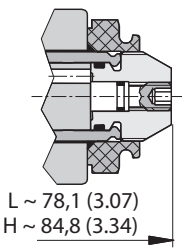
5 TYPICAL DIAGRAMS



6 CONNECTORS

All connectors must conform to ISO 4400 (DIN 43650) and electric circuitry must be able to carry the following rated current values:
V 24 DC = 1,2 A V 230/50 = 0,14 A

7 MANUAL OVERRIDE



EN 175301-803 (EX DIN 43650-A ISO 4400)

K CONNECTOR

1 ORDERING CODE

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
K	*	*	*	*	*	*	*





(1) K:

(2) Connector type (see 7)

A0: 18mm - DIN43650/A 4 Pins
A1: 18mm - DIN43650/A 3 Pins
A3: 18mm - DIN43650/A 3 Pins
B1: 11mm - Industrial/B 3 Pins
C0: 8.0mm - DIN43650/C 4 Pins
C1: 8.0mm - DIN43650/A 3 Pins
D0: 9.4mm - Industrial/C 4 Pins
D1: 9.4mm - Industrial/C 3 Pins
E1: 10mm - DIN43650/B 3 Pins

(3) Number of conductors:

3: 3=2 poles + earth ⏚
4: 4=3 poles + earth ⏚

(4) Earth pos. - Gasket:

(denotes position installed from factory. The connector position can be rotated during installation.)

2: 12 profile
3: 6 profile
5: 12 flat
6: 6 flat
7: 12 not included
8: 6 not included

(5) Internal circuits 6

00: without components
L0: Incandescent light
L3: bipolar led
L4: two bipolar LED
D0: diode & light
D1: diode
D5: diode & LED

T1: Double zener (transil)
T5: Transil & LED
C1: RC Circuit
C5: RC Circuit & LED
S1: Half wave rectifier
S5: Half wave rectifier & LED
R1: Full wave rectifier
R5: Full wave rectifier & LED
P1: 2 colour LED (for switches): PIN 3-Yellow, PIN 2 - green
P2: 2 colour LED (for switches): PIN 3 - Red, PIN 2 - green

(6) Voltage and components description

0: 12-230V without components
1: 12-24V Suppr. lamp or rectifier
2: 115V Suppr. lamp or rectifier
3: 230V Suppr. lamp or rectifier
4: 12-24V Yellow LED
5: 115V Yellow LED
6: 230V Yellow LED
7: 12-24V Red LED
8: 115V Red LED
9: 230V Red LED
A: 12-24V Green LED
B: 115V Green LED
C: 230V Green LED

(7) Connector colour

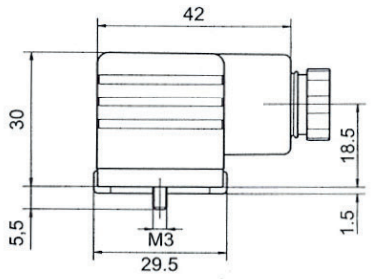
B: Black
A: Grey
T: Transparent
C: White
P: Black 6/6 (selfextinguishing)

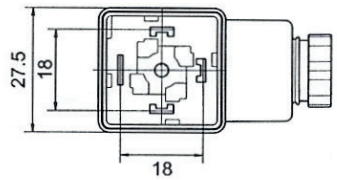
(8) Housing

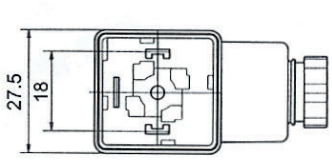
7: Pg7 (Cable entry size in Pg and colour) Black
9: Pg9 (Cable entry size in Pg and colour) Black
1: Pg11 (Cable entry size in Pg and colour) Black
3: 1/2 NPT (Cable entry size in Pg and colour) not included

3 TECHNICAL DATA

Cable entry	PG 9 (6-8 mm) PG11 - 1/2NPTF (8 - 10 mm)
Protection class	IP 65 (mated) IEC 60529
Insulation group	VDE 0110 1/89 - Class C
Working voltage	AC 250 V max. - DC 300 V max. (IEC 664)
Nominal current	10A (max. 16A / 40C°)
Contact resistance	≤ 4 mΩ
Max conductor section	3x1,5 mm² - 4x1,5 mm²
Housing black/grey	Internal circuits 00 - D1 - T1 - S1 - R1
Housing transparent	L0 - L3 - L4 - D0 - D5 - T5 - T5 - S5
Gasket material	NBR
Fixing screw	M3 x 32 (always included)







4 PREFERRED OPTIONS WITH CIRCUIT 00

	PG9	PG11	1/2NPTF	Black	Grey
3+ ⏚	°			KA042000B9	KA042000A9
		°		KA042000B1	KA042000A1
			°	KA042000B3	KA042000A3
2+ ⏚	°			KA132000B9	KA132000A9
		°		KA132000B1	KA132000A1
			°	KA132000B3	KA132000A3

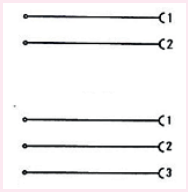
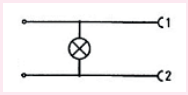
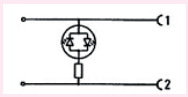
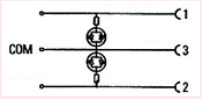
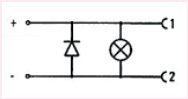
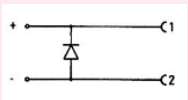
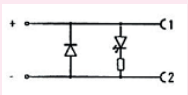
Connectors supplied with NBR profile gasket and earth position H12

5 PREFERRED OPTIONS WITH OTHER CIRCUITS

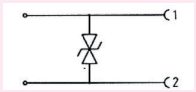
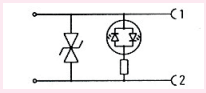
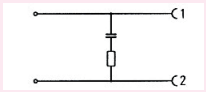
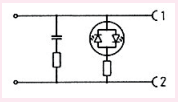
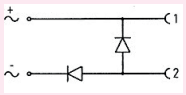
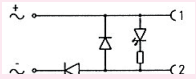
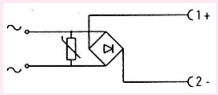
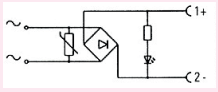
2+ ⏚	24V	115V	230V	L3	T5	R1
Black	°					KA132R11B9
		°				KA132R12B9
			°			KA132R13B9
Transp.	°			KA132L34T9	KA132T54T9	
		°		KA132L35T9		
			°	KA132L36T9		

Connectors supplied with transparent or black housing, PG9 cable entry, NBR profile gasket, yellow LED, earth position H12

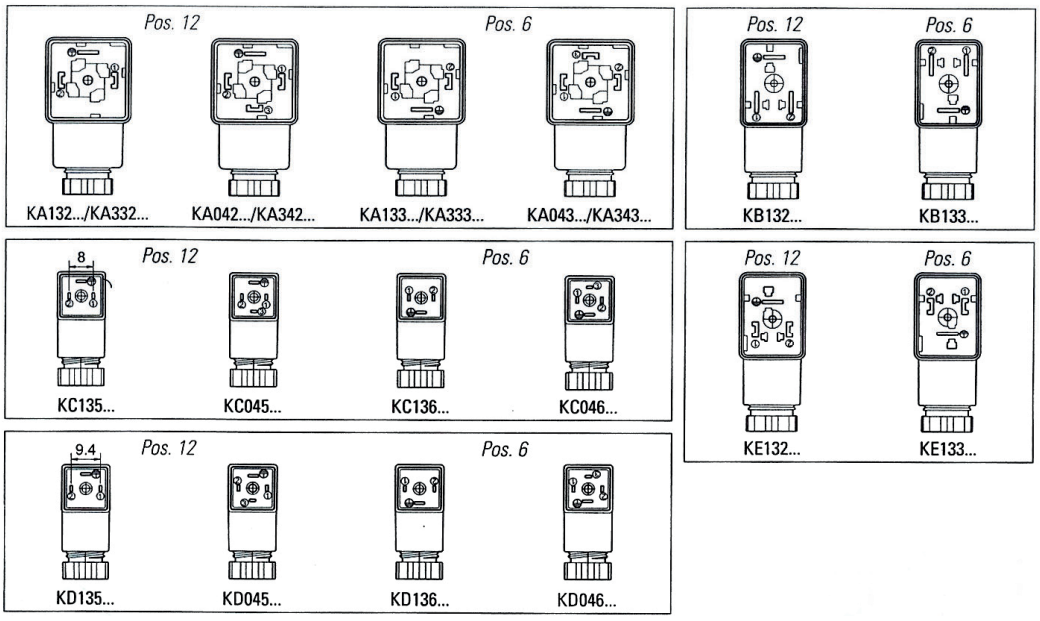
6 INTERNAL CIRCUITS

Input	Circuit diagram	Description	V. nom	Circuit con-sumption I mA	Overvoltage protection Clamping voltage range	Additional notes	Cod.
AC DC		no components	1-250				00
AC DC		Lamp indicator	24	33		filament indicator - no protection	L0
			115	1			
		confirming supply voltage	230	1		Neon indicator - no protection	
AC DC		Bipolar LED indicator	24	10			
			115	8		No protection	L3
		confirming supply voltage	230	5			
AC DC		Dual bipolar LED confirming supply voltage in booth position	24	10+10		no protection	L4
			115	8+8			
			230	5+5			
DC		Light indicator confirming supply voltage plus diode to give overvoltage protection when switching off supply	24	33		Filament lamp - polarity dependent	D0
DC		Diode to give overvoltage protection when swithing off supply	1 - 250			Polarity dependent	D1
DC		LED indicator confirming supply voltage plus diode to give overvoltage protection when swiching off supply	24	10		Polarity dependent	D5

6 INTERNAL CIRCUITS

Input	Circuit diagram	Description	V nom	Circuit con-sumption I mA	Overvoltage protection Range V	Additional notes	Cod
AC DC		Dual zener diode to give overvoltage protection to the source and load	24		34,2-37,8	Polarity independent - improved response time to overvoltages experienced when switching on & off	T1
AC DC		Bipolar LED indicator confirming supply voltage plus dual zener diode to give overvoltage protection to the source and load	24	10	34,2-37,8	Polarity independent - improved response time to overvoltages experienced when switching on & off	T5
AC DC		RC decay circuit to compensate for high energies which are by inductive highly loads	10-230			Available on cable entry versions only. Standard component values: R=100 Ohms C= 0,33 µF 250V	C1
AC DC		Bipolar LED confirming supply voltage plus RC decay circuit to compensate for high energies which are generated by inductive highly loads	115 230	8 5		Available on cable entry versions only. Standard component values: R=100 Ohms C= 0,33 µF 250V	C5
AC DC		Half wave rectifer plus blocking diode to give overvoltage protection when swiching off. Nominal current 1A	1-230			In ac eliminates half cycle	S1
AC DC		Half wave rectifer plus LED confirming supply voltage plus blocking diode to give overvoltage protection when switching off. Nominal current 1A	24	10		In ac eliminates half a cycle	S5
AC		Full wave bridge rectifier plus varistor to protect the device from supply overvoltages. Nominal current 1A	24 115 230		42-52 185-225 351-29	With DC supply the output polarity is maintened independently by the input polarity	R1
AC		Full wave bridge rectifer plus LED confirming supply voltage plus varistor to protect the device from supply overvoltages. Nominal current 1A	24 115 230	10 8 5	42-52 185-225 351-429	With DC supply the output polarity is maintained indipendently by the imput polarity	R5

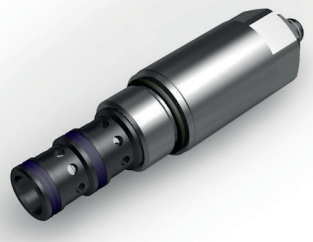
7 TYPES AVAILABLE



3-WAY PRESSURE COMPENSATOR FLOW REGULATOR
QV3-78
50 l/min 35 MPa (350 bar)

1 DESCRIPTION

Cartridge valve designed to keep constant flow rate, regardless of system pressure, from 1 to 3 while excess fluid is discharged through port 2 back to the tank. This valve is designed for speed control of actuators in all applications where a minimum fluctuation of velocity is acceptable during actuator transitories. Regulated flow increased with clockwise rotation of the adjusting screw. When port 2 is blocked the valve acts as a priority flow regulator or a 2-way flow regulator. When flow goes from 3 -> 1 the valve acts as a flow restrictor (pressure compensator spool inactive).



2 ORDERING CODE

(1)		(2)		(3)		(4)
QV3	-	78	/		-	

(1) QV3 : 3-way pressure compensated flow regulator

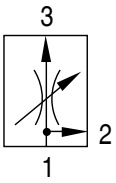
(2) 78: 7/8”-14 UNF (SAE10) cavity

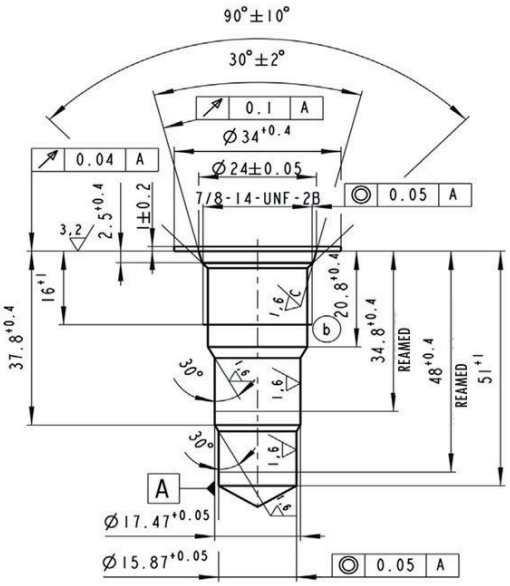
(3) Regulated flow range
- 10: 5-10 l/min
- 14: 6-14 l/min
- 22: 11-22 l/min
- 30 : 17-30 l/min

(4) Options and varians:
- V: viton seals

3 TECHNICAL DATA

Max. flow rate	50 l/min
Max. operating pressure	350 bar
Fluid temperature range (NBR)	-20...+50 °C
Ambient temperature range	-30...+80 °C
Weight	0,24 kg



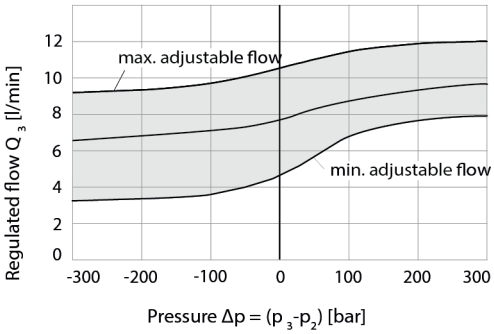


4 TYPICAL DIAGRAMS

Typical regulated flow related to input pressure, measured with mineral oil @ 40 cSt and with Q=50 l/min

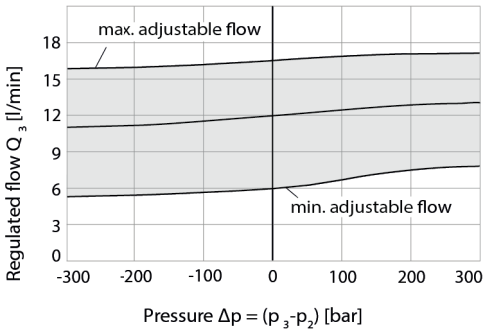
Flow rate 10

By-pass pressure higher than regulated pressure $p_2 > p_3$ | Regulated pressure higher than by-pass pressure $p_3 > p_2$



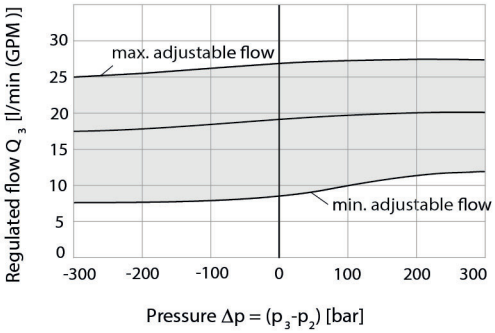
Flow rate 14

By-pass pressure higher than regulated pressure $p_2 > p_3$ | Regulated pressure higher than by-pass pressure $p_3 > p_2$



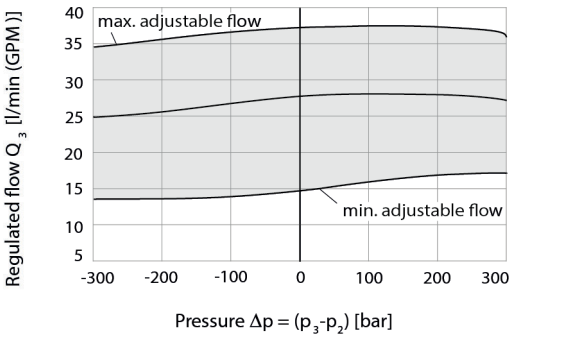
Flow rate 22

By-pass pressure higher than regulated pressure $p_2 > p_3$ | Regulated pressure higher than by-pass pressure $p_3 > p_2$

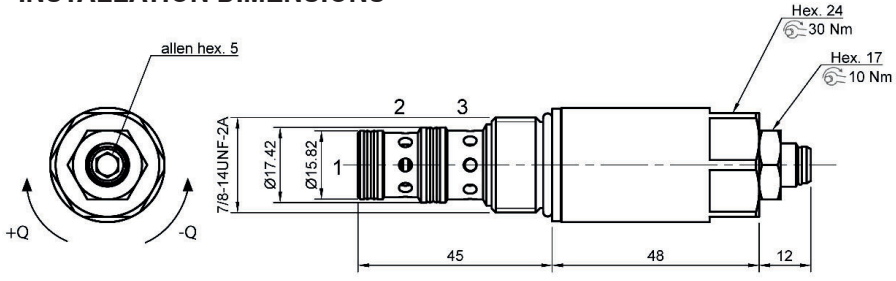


Flow rate 30

By-pass pressure higher than regulated pressure $p_2 > p_3$ | Regulated pressure higher than by-pass pressure $p_3 > p_2$



5 INSTALLATION DIMENSIONS



QV3-M27/*

90 l/min 35 MPa (350 bar)

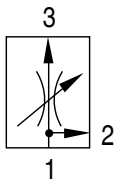
1 DESCRIPTION

Cartridge valve designed to keep constant flow rate, regardless of system pressure, from 1 to 3 while excess fluid is discharged through port 2 back to the tank. This valve is designed for speed control of actuators in all applications where a minimum fluctuation of velocity is acceptable during actuator transitories. Regulated flow increased with clockwise rotation of the adjusting screw. When port 2 is blocked the valve acts as a priority flow regulator or a 2-way flow regulator. When flow goes from 3 -> 1 the valve acts as a flow restrictor (pressure compensator spool inactive). Body of the valve is zinc trivalent coating for enhanced corrosion resistance (240h salt spray).



2 ORDERING CODE

(1)		(2)		(3)		(4)
QV3	-	M27	/		-	

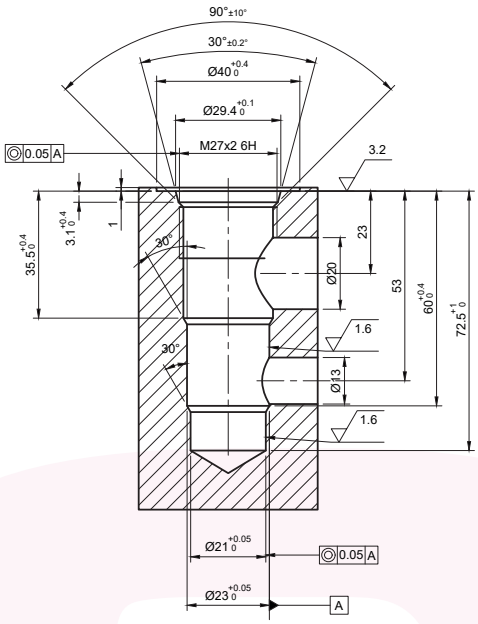


(1) QV3 : 3-way pressure compensated flow regulator

(2) M27: M27x2 cavity

(3) Regulated flow range:
- 40: 4-40 l/min
- 60: 6-60 l/min

(4) Options and varians:
- V: viton seals



3 TECHNICAL DATA

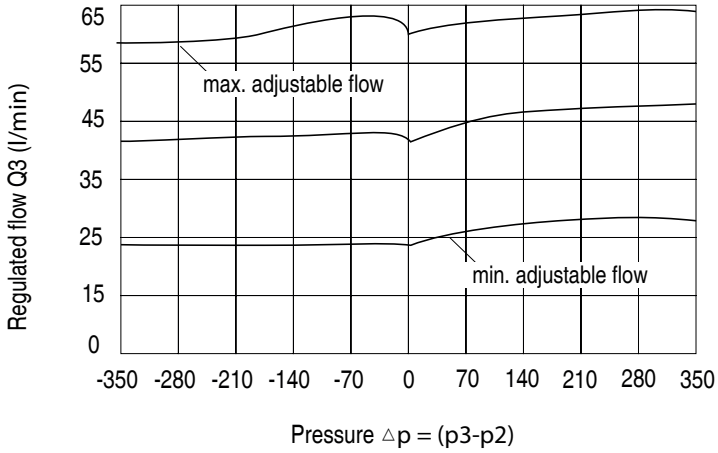
Max. flow rate	90 l/min
Max. operating pressure	350 bar
Fluid temperature range (NBR)	-20...+50 °C
Ambient temperature range	-30...+80 °C
Weight	0,16 kg

4 TYPICAL DIAGRAMS

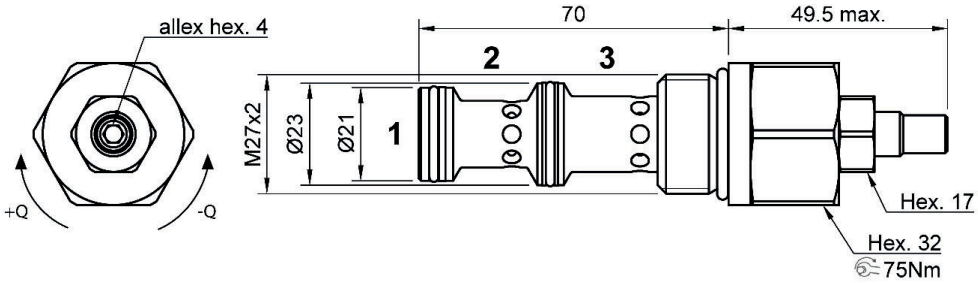
Typical regulated flow related to input pressure, measured with mineral oil @ 40 cSt and with Q=50 l/min

By-pass pressure higher than regulated pressure $p_2 > p_3$

Regulated pressure higher than by-pass pressure $p_3 > p_2$



5 INSTALLATION DIMENSIONS



SUMMARY

13 3D - stainless steel

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED IN STAINLESS STEEL
HD2-AMES 001

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED IN STAINLESS STEEL
HD3-AMES 005

aidro
Desktop Metal Company

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)

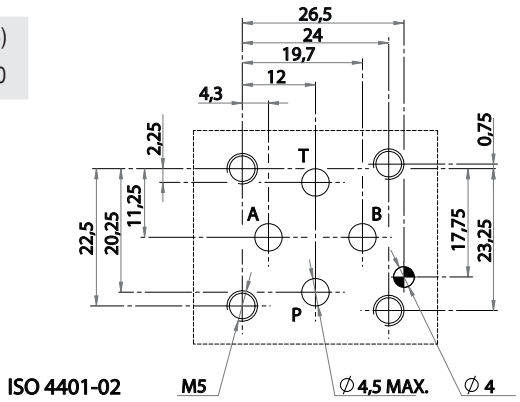
(4) Side options:
b: only for version LL, ML, LM solenoid b installed (instead of solenoid a)

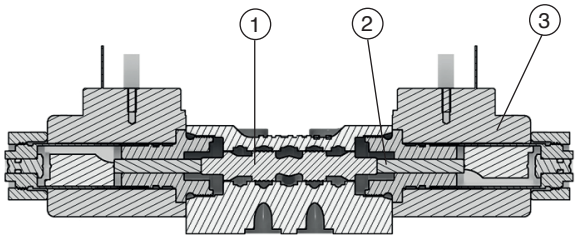
(5) Material options:
174: 17-4 PH body
316: AISI 316L Stainless steel body

(6)Code reserved for option and variants:
K: protuding emergency pins, protected by rubber caps (see 7)
2S*: calibrated orifice on P port (see 8)

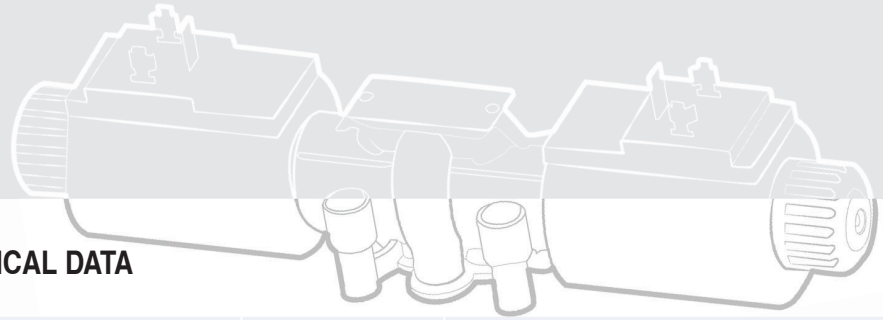
(7) Electric voltage and solenoid coils:
0000: no coils
012C: coils for V12DC
024C: coils for V24DC
220R: coils for V220/50 – V230/60 AC

(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

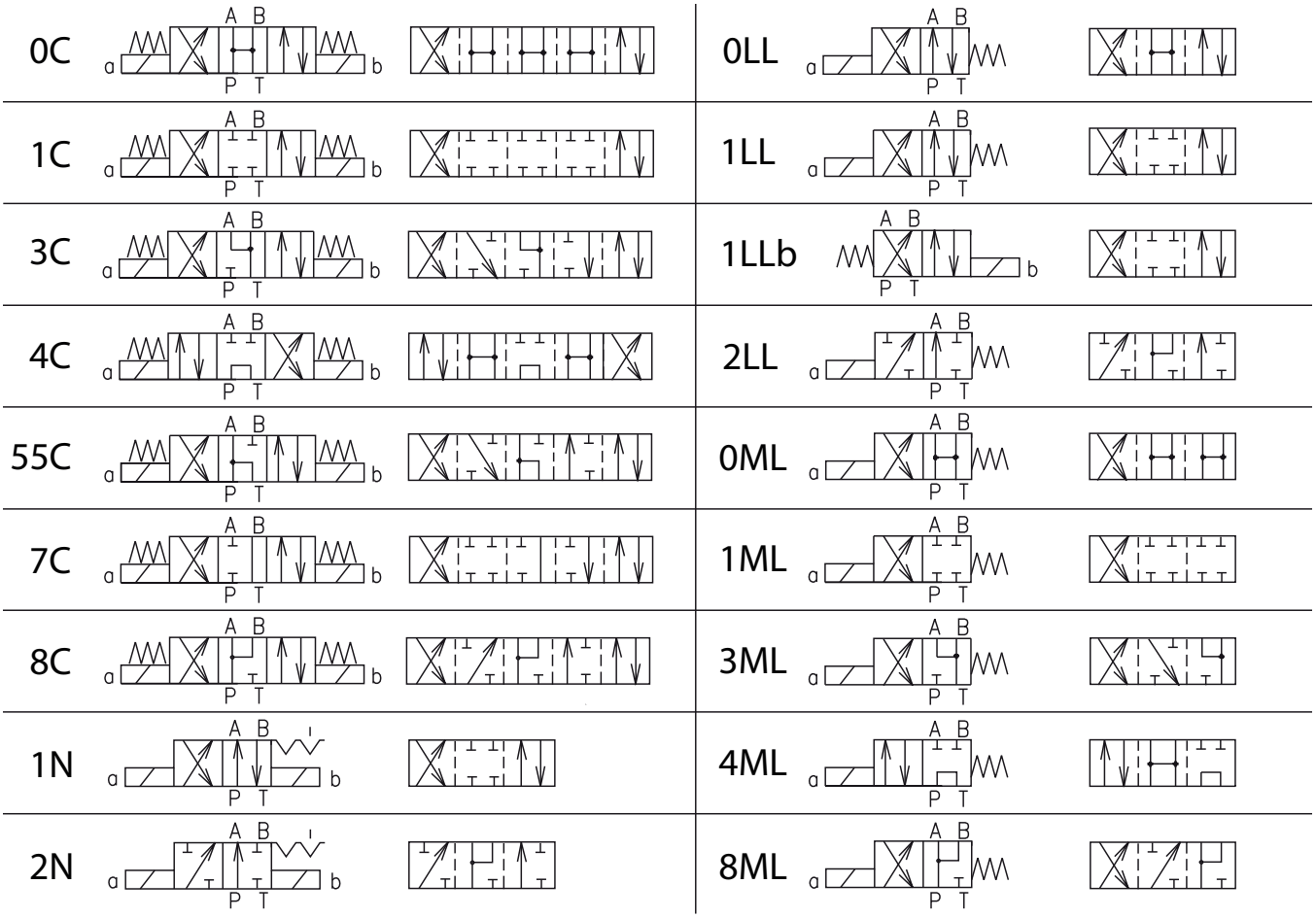
Maximum nominal flow	20 l/min
Maximum rec. flow rate	25 l/min(6)
Maximum nominal pressure (P, A, B)	32 MPa (320 bar)
Maximum pressure at T port	21 MPa (210 bar)
Pressure drops	see 5
Protection to DIN 40050	IP 65
Duty cycle	100%
Service life	$\geq 10^7$ cycles
Installation and dimensions	see 7
Mass	approx 0,63/0,41 kg

Electric characteristics:

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 connectors that incorporate a full wave bridge rectifier, from A.C. voltage supply: V 220/50 (V 230/60)

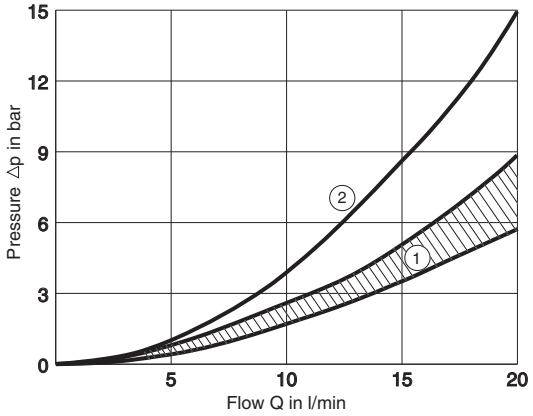
All standard valves are to be fitted with connectors conform to ISO 4400 (DIN 43650) and electric circuitery must be able to carry the following rated current values:
V 12 DC = 2,4 A
V 24 DC = 1,2 A
V 220 R = 0,08 A
Permissable supply voltage variation: +5% -10%

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



5 TYPICAL DIAGRAMS

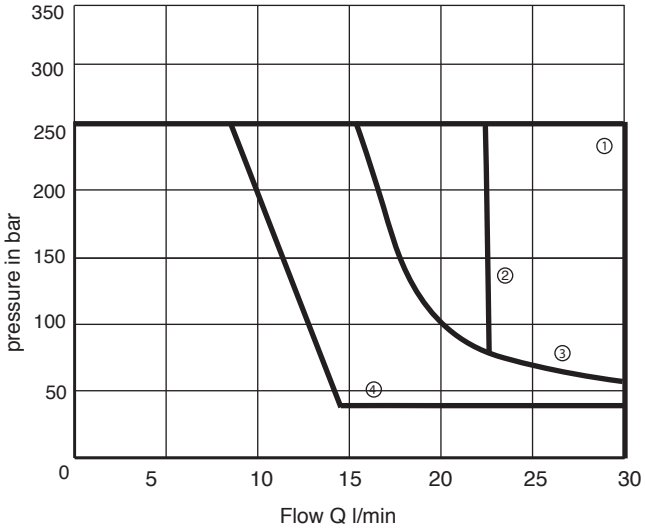
Typical Δp-Q curves for valves HD2-AMES-* in standard configuration, with mineral oil at 36 cSt and at 50°C for flow P -> A/B, A/B -> T



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

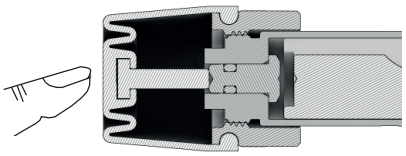
6 HYDRAULIC LIMITS OF USE

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



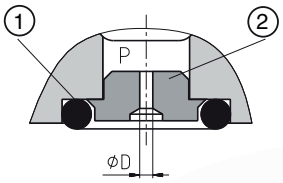
① Spools: 1C, 1MC, OC, OML
② Spools: 1CC, 1CCb
③ Spools: 3C, 3MC
④ Spools: 4C, 4ML

7 VERSION "K": EXTENDED EMERGENCY PIN



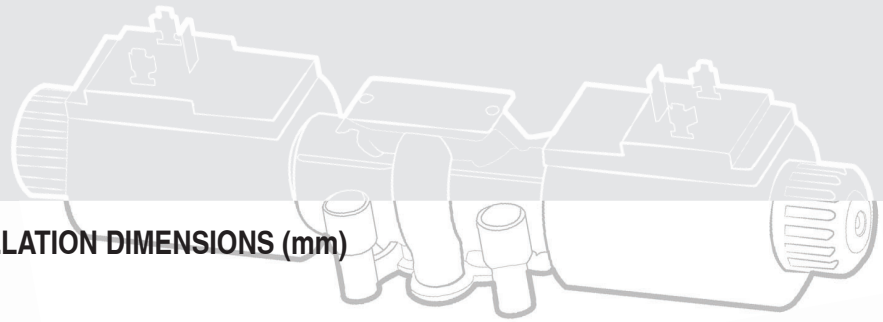
Solenoid valves according to "K" version have extended emergency actuator pins protuding from the solenoid shape, that permit a quick and easy "Hand operation" of the valves, without the need of any tool.
The actuator pin and the end of the solenoid are protected by a flexible rubber cap that makes easy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

8 OPTIONS

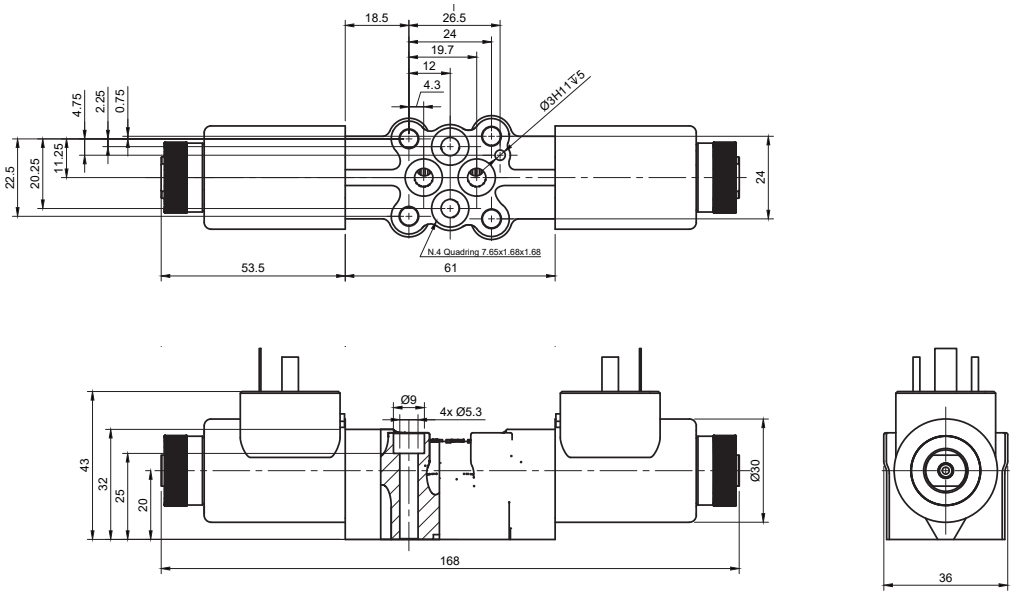


OPTION S CALIBRATED ORIFICE ON P PORT

Option "S" is rappresented 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 Δp 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 raccomended viscosity range from 10 cSt to 60 cSt.

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED IN STAINLESS STEEL

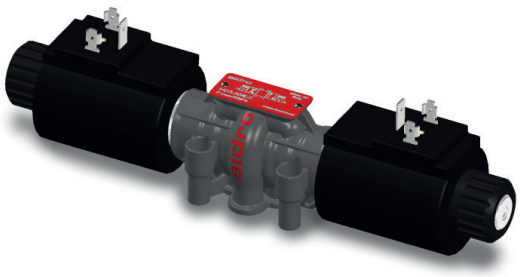
HD3-AMES-*/10

AISI316L for body and AISI430 for solenoid

80 l/min - 35 MPa (350 bar)

1 DESCRIPTION

Valves HD3-AMES are directional control valve with subplate mounting interface according to ISO 4401, DIN 24340 (CETOP 03).
The design of the body is a five chamber, manufactured by Additive Manufacturing technology for high performance and low pressure drops.
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)
HD3	-	AMES	-		-		-			/	10

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

(2) AMES: Produced by Additive Manufacturing - Electrically controlled

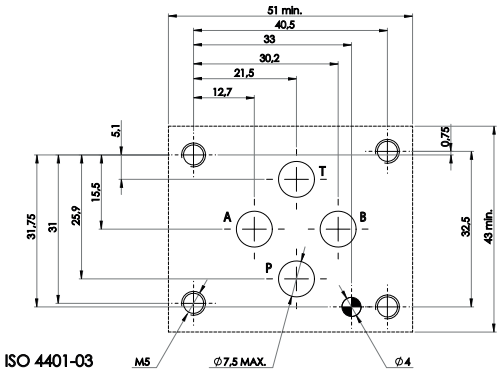
(3) Spool type (see 4):
-number is the main spool type
-letter is the solenoid or spring arrangement:
C : 2 solenoids, spool is spring centered (3 position)
LL : 1 solenoid, spool is spring offset (2 position)
ML : 1 solenoid, spool is spring centered (2 position)

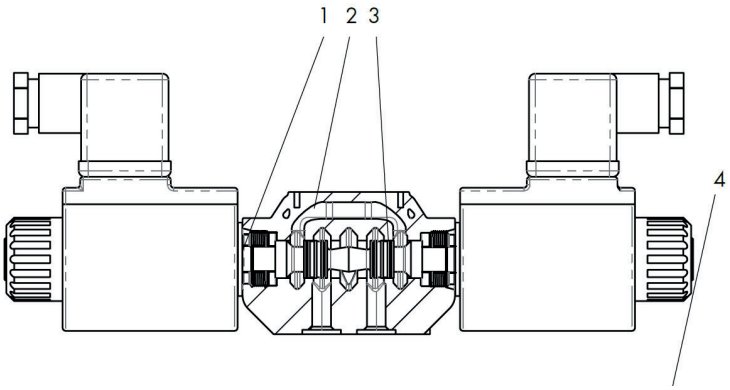
(4) Code reserved for option and variants

(5) Electric voltage and solenoid coils: see 10
012C: coils for V12DC
024C: coils for V24DC
Other voltages are available

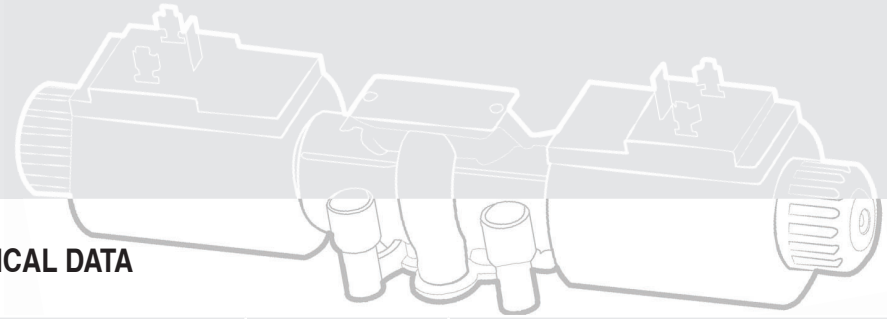
(6) Coil connection
no designation: DIN 43650-A ISO 4400
AMP: Amp Junior Timer
D: Deutsch
(AMP and Deutsch connect are only available for DC supply voltage up to 48V)

(7) Design number (progressive) of the valves





The spool 3 shifts into the valve body 2 subject to operation of solenoid and reaction of spring. Spool 3 depending on its configuration and position in the valve body 2, opens and/ or closes passages between P,A,B and T ports, thus controlling the direction of the hydraulic flow.



3 TECHNICAL DATA

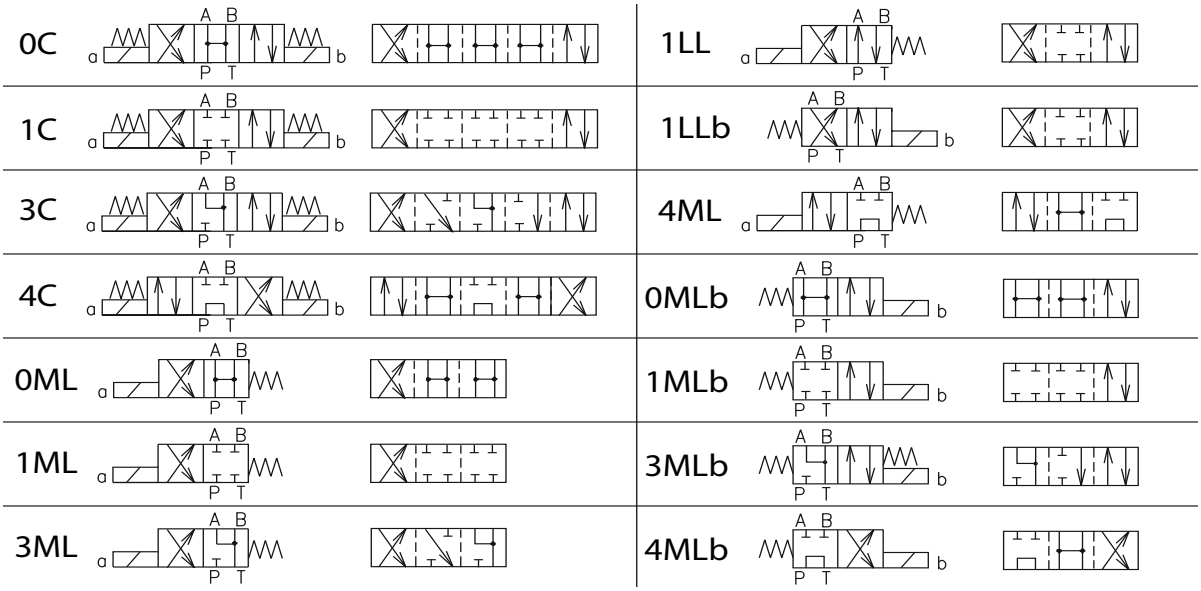
Nominal flow	60 l/min
Maximum rec. flow rate	80 l/min
Maximum nominal pressure (P, A, B)	32 MPa (320 bar)
Maximum pressure at T port	16 MPa (160 bar)
Pressure drops	see 5
Protection to DIN 40050	IP 65
Duty cycle	100%
Installation and dimensions	see 8
Protection AMP and Deutsch	IP69 - IP69k
Mass	0,53 / 0,68 kg

Electric characteristics:

Valve type HD3-AMES are operated by solenoid that are energized :
directly from a D.C. voltage supply
V 12 DC = 012C
V 24 DC = 024C
Other voltage supply are possible
3 pin connectors must conform to ISO 4400 (DIN 43650)

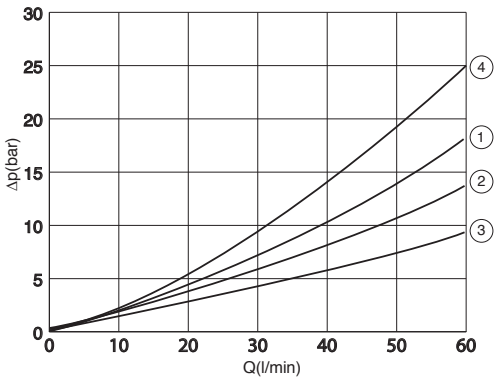
Permissible supply voltage variation : +5% -10%

4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSITORIES



5 TYPICAL DIAGRAMS

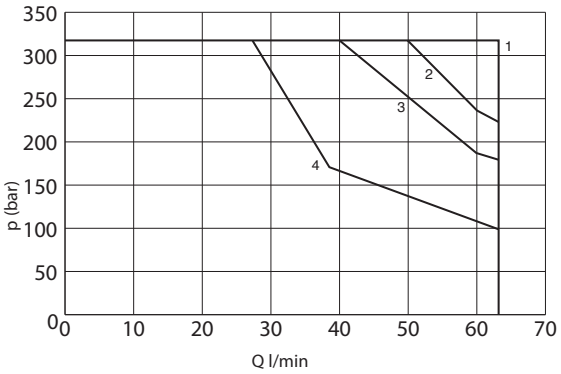
Typical Δp-Q curves for valves HD3-AMES in standard configuration, with mineral oil at ν=32 mm²/s and T=40°C



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

6 HYDRAULIC LIMIT OF USE

Δp-Q characteristics limits for safe use of HD3-AMES-* solenoid operated valves. Measured at ν = 32mm²/s and T = 40°C

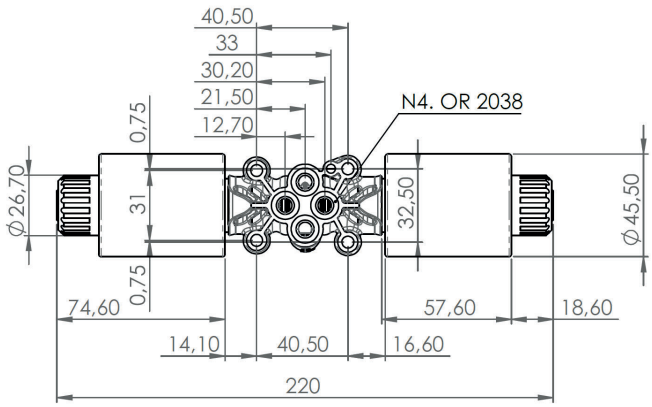


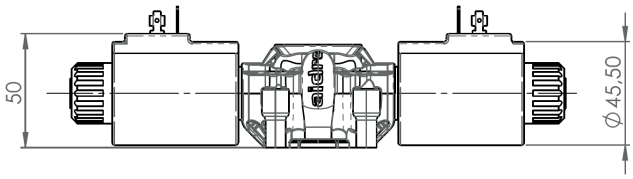
Spool	Curve
1C	1
4C	4
0C	4
3C	2
1LL	3
3ML	2
4ML	4
1ML	1
0ML	4
1MLb	1
1LLb	3
4MLb	4
0MLb	4
3MLb	2

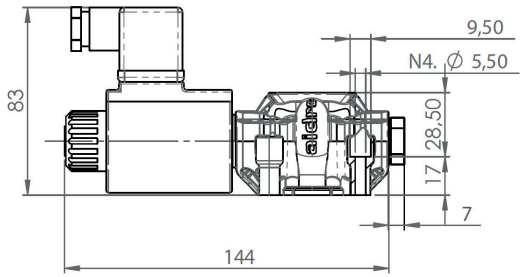
7 HYDRAULIC FLUID

Seals and materials used on standard valves HD3-AMES* 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.

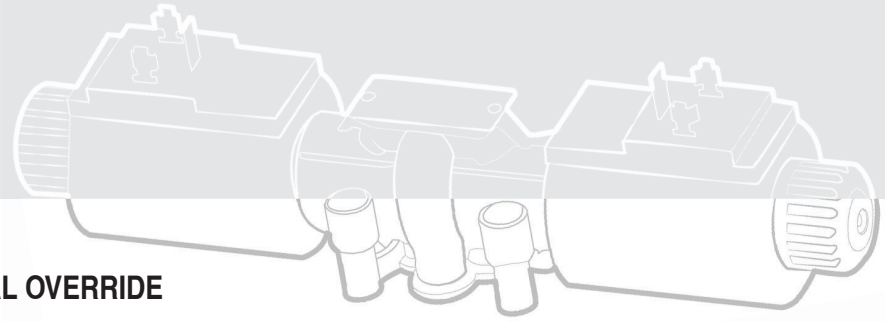
8 INSTALLATION DIMENSIONS (mm)







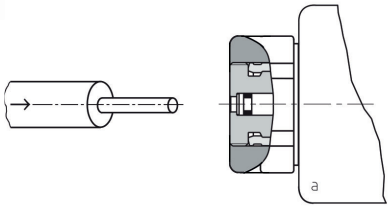
All valves HD3-AMES-* conform with ISO and CETOP specifications for mounting surface dimensions and for valves height. When assembled to its mounting plate valve HD3-* must be fastened with 4 bolts M5x25 (or M5x** according to the number of modules) tightened at 8 Nm torque. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of O Ring type 9,25x1,78



9 MANUAL OVERRIDE

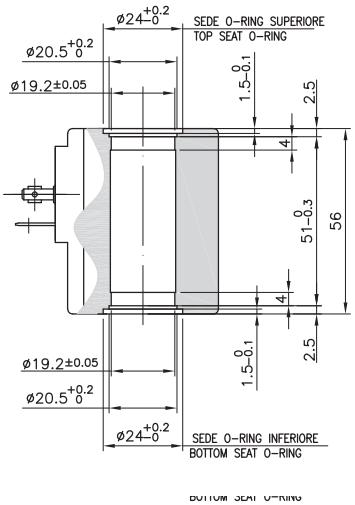
In case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins, located at the end of the solenoids and accessible through the retaining nuts.

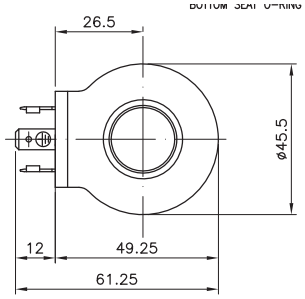
Standard model of the manual override



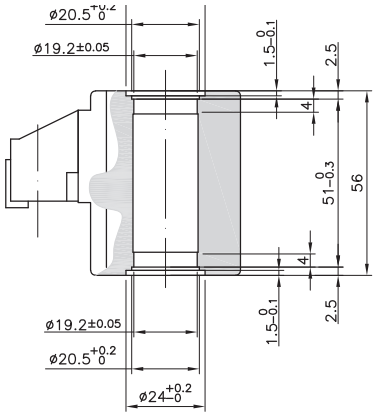
10 STANDARD COILS

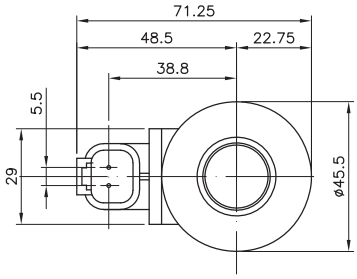
C45 DIN 43650



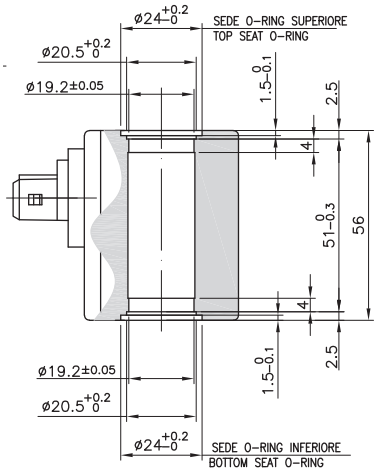


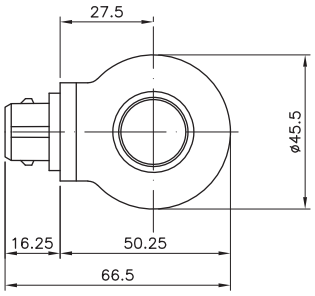
C45 Deutsch



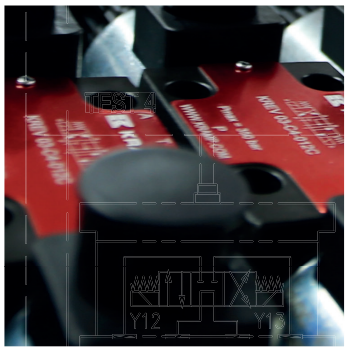


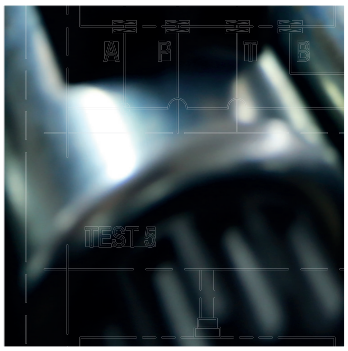
C45 Amp Junior Timer











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