DIRECTIONAL CONTROL VALVES CETOP 5

INTRODUCTION

The directional control valves NG10 designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 05 - 04 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-05), and can be used in all fields on account of their excellent capacity and pressure specifications.

The use of solenoids with wet armatures means that the construction is extremely functional and safe completely dispensing with need for dynamic seals. The solenoid dust cover is screwed directly onto the valve casing whilst the coil is kept in position by a ring nut.

Great care has been taken in the design and the production of the ducts and the improvement of the spools has allowed relatively high flow rates to be accommodated with minimal pressure drops (Δp). The operation of the directional valves can be electrical, pneumatic, oleodynamic, mechanical or lever operated .

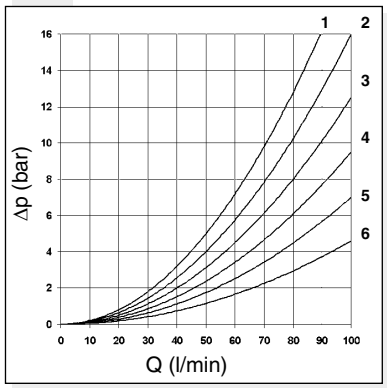
The centring position is achieved by means of calibrated length springs which, once the action of impulse is over, return the spool to the centre or end travel position.

The solenoids constructed with protection class in accordance with DIN 40050 standards are available in either direct current (IP65) or alternating current (IP66) with different voltage and frequencies.

All types of electrical controls can be fitted, on request, with different types of manual emergency controls. The electrical supply takes place through connectors meeting DIN 43650 ISO 4400 standards; connectors are also available with built in rectifier or pilot lights.

The valves are designed for use with DIN 51524 standard hydraulic mineral oils and it is recommended that filters should be fitted to ensure a maximum contamination level of class 10 in accordance with NAS 1638, $\beta_{25} \geq 75$.

PRESSURE DROPS



The diagram at the side show the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm^2/s at 40°C; the tests have been carried out at a fluid temperature of 40°C.

For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

$$\Delta p1 = \Delta p \times (Q1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, $\Delta p1$ will be the value of the losses for the flow rate Q1 that is used.

Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
01	2	2	5	5	
02	3	3	6	6	3
03	2	2	6	6	
04	3	3	4	4	1
05	3	3	5	5	
06	2	2	5	5	
66	2	2	5	5	
07		1	5		
10	3	3	5	5	
11	4			5	
	Curve No.				

Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
22		4	5		
14	3	3	6	6	2
15	2	2	4	5	
16	2	2	4	5	
17	3	3			
19	3	3	4	5	
20	3	3	4	5	
21	3	3			
28	3	3	6	6	2
	Curve No.				

1

ORDERING CODE

AD	Directional valve
5	CETOP 5/NG10
*	Type of operator (tab.1)
**	Spools (see tables Cap. I • 35)
*	Mounting type (tab. 2)
*	Voltage / Specification (tab. 3)
**	Variants (tab. 4)
2	Serial No.

TAB.1 - TYPE OF OPERATOR

E	Electrical
D	Direct mechanical
O	Oleo-pneumatic
L	Lever

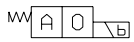
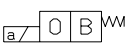
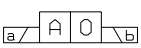
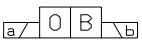
TAB.3 - VOLTAGE / SPECIFICATION

Operator	Voltage Specs.	Description	Note
E	A	24V/50Hz	AC Voltage ** (Technical data see page I • 40)
	B	48V/50Hz*	
	J	115V/50Hz - 120V/60Hz	
	Y	230V/50Hz - 240V/60Hz	
	E	240V/50Hz*	
	F	24V/60Hz*	
	K	Without AC coils	
	L	12V	DC Voltage ** (Technical data see page I • 40)
	M	24V	
	N	48V*	
	P	110V*	
	Z	102V* 115Vac/50Hz 120Vac/60Hz with rectifier	
	X	205V* 230Vac/50Hz 240Vac/60Hz with rectifier	
	W	Without DC coils	
D	Z	standard	—
O	Z	standard	—
L	Z	valve with lever	—
	X	valve without lever	—

* Special voltage

** Voltage codes are not stamped on the plate, their are readable on the coils.

TAB.2 - MOUNTING

STANDARD	
C	
D	
E	
F	
SPECIALS (WITH PRICE INCREASING)	
G	
H	
I	
L	
M	

• **Mounting type D** is only for valves with detent

• In case of **mounting D** with detent a maximum supply time of 2 sec is needed (only for AC coils).

• The springs for the version with detent (mounting **D**) are different from those for standard versions.

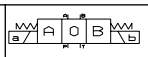
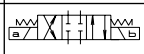
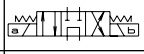
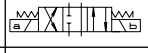
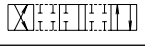
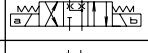
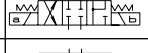
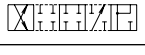
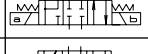
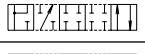
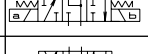
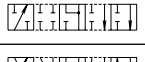
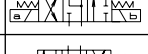
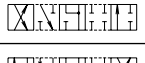
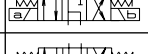
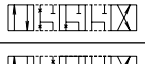
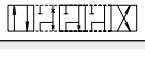
TAB.4 - VARIANTS

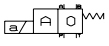
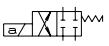
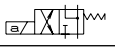
VARIANT	CODE	♦	PAGE
No variant (without connectors)	S1(*)		
Viton	SV(*)		
Emergency button	ES(*)		Cap. I • 40
Preset for microswitch - (E/F/G/H only) see below note ◊	M1(*)	♦	Cap. I • 36 - Cap. I • 39
Rotary emergency button	P2(*)		Cap. I • 40
Marine version (AD.5.O..)	H1	♦	
Spool movement speed control (VDC only) with ø 0.5 mm diameter orifice	5S(*)	♦	Cap. I • 37
Spool movement speed control (VDC only) with ø 0.6 mm diameter orifice	6S(*)	♦	Cap. I • 37
Spool movement speed control (VDC only) with ø 0.7 mm diameter orifice	7S(*)	♦	Cap. I • 37
Spool movement speed control (VDC only) with ø 0.8 mm diameter orifice	8S(*)	♦	Cap. I • 37
External draining solenoid (electrically operated only)	S5(*)	♦	Cap. I • 37
Microswitch+ Detent (for lever operation)	MD	♦	
Detent for lever control	D1	♦	

◊ = Maximum counter-pressure on T port: 4 bar - Microswitch type MK code 1319098 must be ordered separately.

♦ = Variant codes stamped on the plate

(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, Cap. I • 20.

TWO SOLENOIDS, SPRING CENTRED "C" MOUNTING			
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
05		+	
66		+	
06		+	
07*		+	
08*		+	
10*		+	
22*		+	
11*		+	
12*		+	
13*		+	
14*		-	
28*		-	

ONE SOLENOID, SIDE A "E" MOUNTING			
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
05		+	
66		+	
06		+	
08*		+	
10*		+	
12*		+	
15		-	
16		+	
17		+	
14*		-	
28*		-	

ATTENTION

(*) Spool with price increasing

- With spools **15** / **16** / **17** only the mounting **E** / **F** are possible
- **19** / **20** / **21** spool not planned for **AD5E...J***
- For lever operated the spools used are different.
Available spools for this kind of valve see AD5L..

ONE SOLENOID, SIDE B "F" MOUNTING			
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
05		+	
66		+	
06		+	
08*		+	
10*		+	
22*		+	
12*		+	
13*		+	
07*		+	
15		-	
16		+	
17		+	
14*		-	
28*		-	

TWO SOLENOIDS "D" MOUNTING			
Spool type		Covering	Transient position
19*		-	
20*		+	
21*		+	

1

A max. counter-pressure of 4 bar at T is permitted for the variant with a microswitch (**MS**).

Max. pressure ports P/A/B	350 bar
Max. pressure port T (DC coil) see note (*)	250 bar
Max. pressure port T (AC coil)	160 bar
Max. flow	100 l/min
Max. excitation frequency	3 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter $ß_{25} \geq 75$
Weight (with one DC solenoid)	4 Kg
Weight (with two DC solenoids)	5,1 Kg
Weight (with one AC solenoid)	3,5 Kg
Weight (with two AC solenoids)	4,3 Kg

(*) Pressure dynamic allowed for 1 million of cycles.

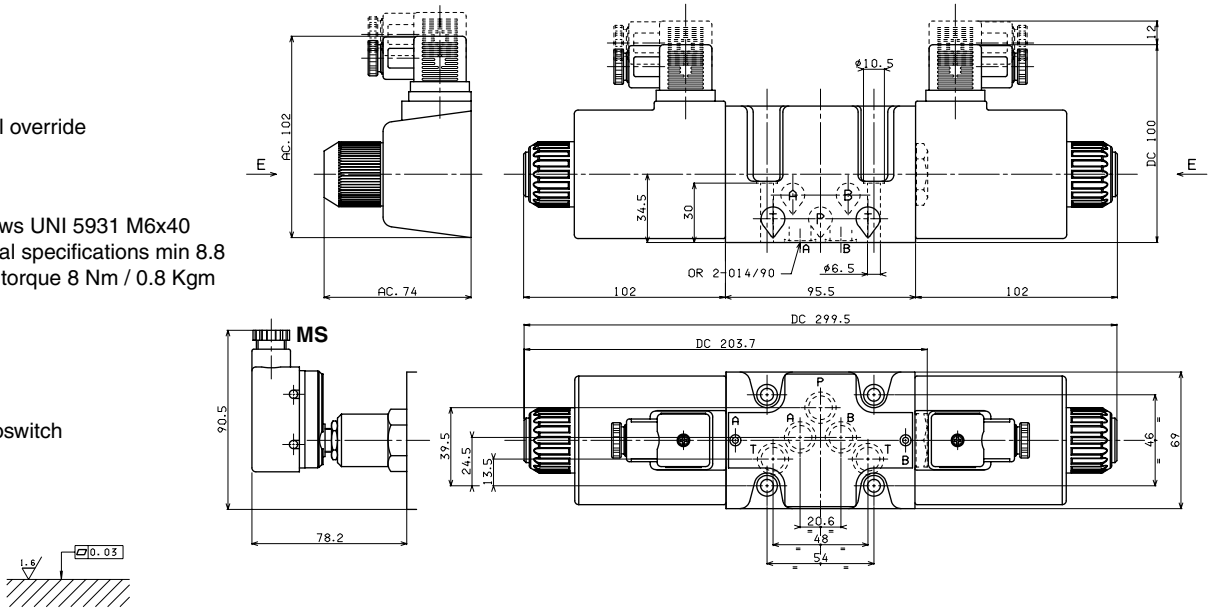
OVERALL DIMENSIONS

E = Manual override

Fixing screws UNI 5931 M6x40
with material specifications min 8.8
Tightening torque 8 Nm / 0.8 Kgm

MS = Microswitch

Support plane specifications



LIMITS OF USE (MOUNTING C-E-F)S

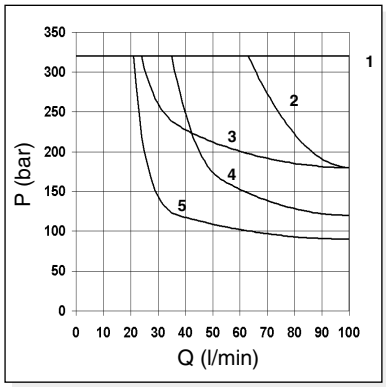
The tests have been carried out with solenoids at operating temperature and a voltage 10% less than rated voltage with a fluid temperature of 40°C. The fluid used was a mineral oil with a viscosity of 46 mm²/s at 40°C.
The values in the diagram refer to tests carried out with the oil flow in two directions simultaneously T = 2 bar (e.g. from P to A and the same time B to P).

In the cases where valves 4/2 and 4/3 were used with the flow in one direction only, the limits of use could have variations which may even be negative. Rest time: the values are indicative and depend on the following parameters: hydraulic circuit, fluid used and variations in hydraulic scales (pressure P, flow Q, temperature T).

Direct current	:	Energizing	60 ÷ 95 ms.	Alternating current:	Energizing	12 ÷ 30 ms.
		De-energizing	25 ÷ 70 ms.		De- energizing	10 ÷ 55 ms.

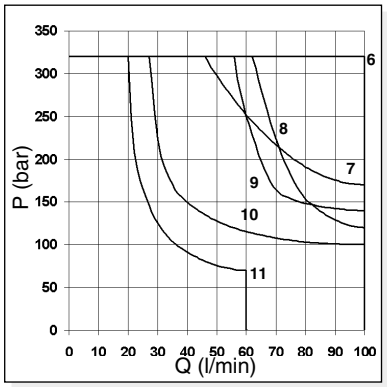
NOTE: The operating limits shown are valid for mountings C, E, F.

DIRECT CURRENT SOLENOIDS (DC)



Spool type	DC	AC
01	1	8
02	1	6
03	2	7
04	4	10
05	1	6
06 - 66	3	9
14-28	5	11
15	3	10
16	1	6
	Curves	

ALTERNATING CURRENT SOLENOIDS (AC)



AD5E...J* VALVES WITH SPOOL MOVEMENT SPEED CONTROL VARIANT J*

Valves type AD5E... with spool movement speed control.
These ON-OFF type valves are used when a lower spool movement speed than usual for conventional solenoid valves is required to prevent impacts which could adversely affect the smooth running of the system. The system consists of reducing the transfer section for the fluid from one solenoid to the other by means of calibrated orifice.

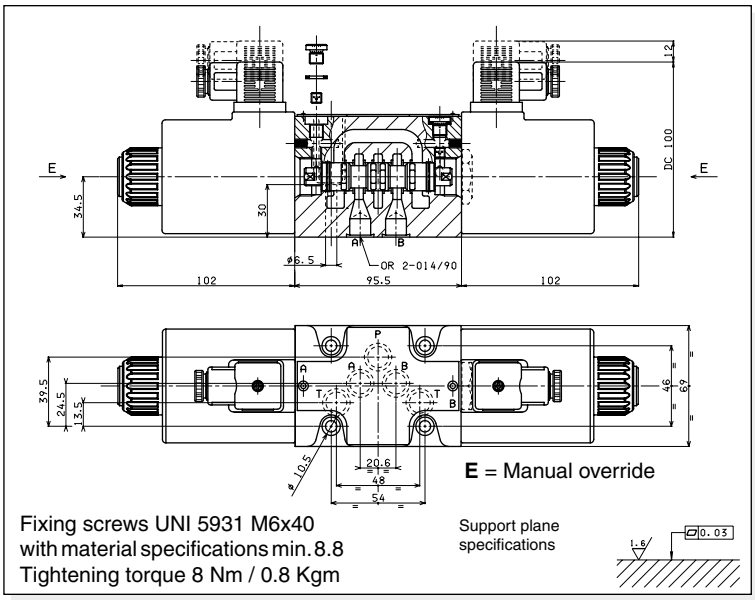
- This version can only be used with a direct current (DC) and also involves a **reduction in the limits of use so that we suggest to always test the valve in your application**.
- To order AD5J* version valves, specify the orifices code.
- The operation is linked to a minimum counter-pressure on the T line (1 bar min.)
- The switching time referred to the spool travel detected by a LVDT transducer can vary for the NG10 valve a minimum of 200 to a maximum of 400 ms depending on 5 fundamental variables:

1) Diameter of the calibrated orifice (see table)
2) Hydraulic power for clearance referring to flow and pressure values through the valve
3) Spool type
4) Oil viscosity and temperature
5) Counter-pressure at T line

- **Possible mounting: C / E / F / G / H**
- **19 / 20 / 21 spools not planned for AD5E...J***

Max. pressure ports P/A/B	320 bar
Max. pressure port T - see note (*)	250 bar
Max. flow	100 l/min
Max excitation frequency	2 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Weight with one DC solenoid	3,6 Kg
Weight with two DC solenoids	4,5 Kg

(*) Pressure dynamic allowed for 2 millions of cycles.



CALIBRATED ORIFICE AVAILABLE		
ø (mm)	**M6x6**	**Code**
0.5	M89.10.0031	**5S** (J5+S1)*
0.6	M89.10.0026	**6S** (J6+S1)*
0.7	M89.10.0032	**7S** (J7+S1)*
0.8	M89.10.0033	**8S** (J8+S1)*

* Old code

EAD5E...J$ - 00/2000/e

AD5E...Q5 VALVES WITH EXTERNAL DRAINING SOLENOID - VARIANT Q5

Valves type AD5E...Q5 with external draining solenoid.

This involves valves with solenoid drainage chambers separated by line T in the CETOP 5 interface distinguished by the letter L. This solution makes it possible to operate with a maximum counter-pressure at T up to 320 bar using only 12.9 material fixing screws to ensure the maximum safety of the solenoid valve fixing and use of an additional drain. This version can be used for direct current (DC) and alternating current (AC), but involves a reduction in the limits of usage depending on the pressure at T.

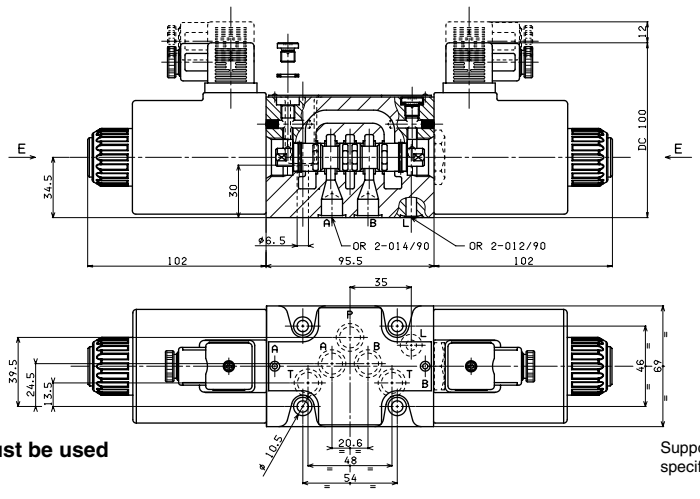
- **Mounting possible: C / D / E / F / G / H / I / L / M**
- **For subplate see BSH531..**

Max. pressure ports P/A/B/T	320 bar
Max. pressure port L (DC coils) see note (*)	250 bar
Max. pressure port L (AC coils)	160 bar
Max. flow	100 l/min
Max. excitation frequency	2 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Weight with one DC solenoid	3,6 Kg
Weight with two DC solenoids	4,5 Kg
Weight with one AC solenoid	3,5 Kg
Weight with two AC solenoids	4,3 Kg

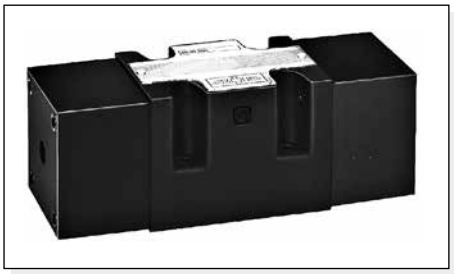
(*) Pressure dynamic allowed for 2 millions of cycles.

OVERALL DIMENSIONS

EAD5E...Q5 - 02/2000/e



AD5O... OLEO-PNEUMATIC OPERATION TYPE VALVES CETOP 5

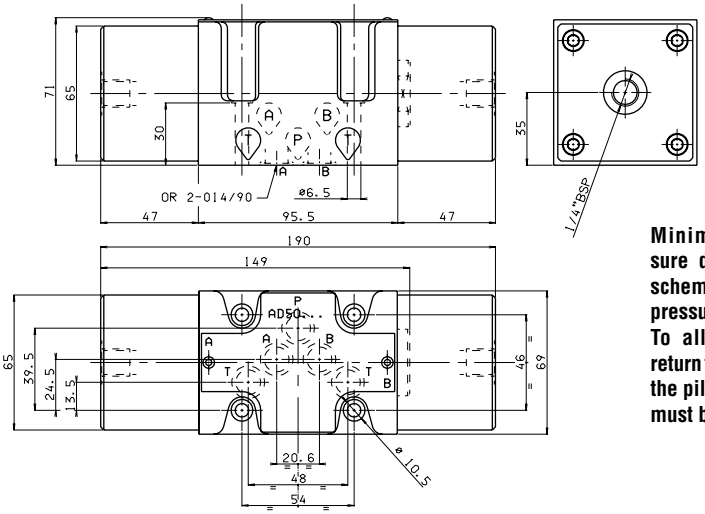


Max. pressure ports P/A/B	320 bar
Max. pressure port T	160 bar
Max. flow	100 l/min
Min. operating pressure	4 + [0.027 x (pt*)] bar - see note
Max. operating pressure	200 bar
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in according with NAS 1638 with filter $\beta_{25} \geq 75$
Weight (single pilot)	4,1 Kg
Weight (twin pilot)	5,4 Kg

- **Possible mounting:**
  Hydraulic control:
  C / D / E / F / G / H / I / L / M
  Pneumatic control:
  I / L / M
- Ordering code see Cap. I • 34

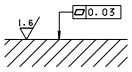
(**pt***) = Pressure at port T

OVERALL DIMENSIONS



Fixing screws UNI 5931 M6x40
with material specifications min. 8.8
Tightening torque 8 Nm / 0.8 Kgm

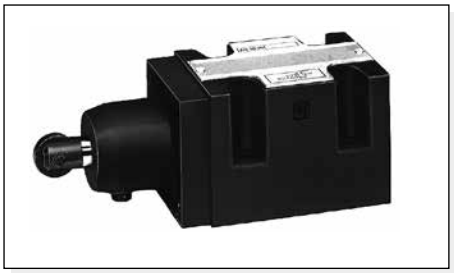
Support plane specifications



Minimum pilot pressure depends on spool scheme, flow rate and pressure.
To allow the spool to return to nautral position, the pilot pressure must be below 2 bar.

EAD5O - 02/2000/e

AD5D... DIRECT MECHANICALLY OPERATED TYPE VALVES CETOP 5

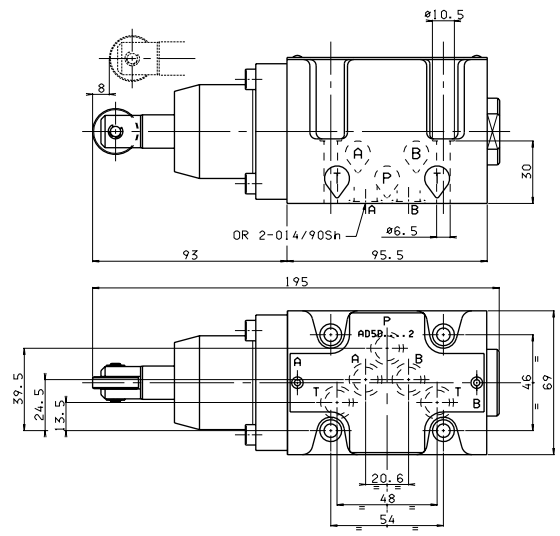


Max. pressure ports P/A/B	320 bar
Max. pressure port T	20 bar
Max. flow	100 l/min
Operating force - see note (*)	8 Kg - see note (**)
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$
Weight	3,8 Kg

- Possible mounting:
  E / F / G / H
- Ordering code see Cap. I • 34
- Notes:
  (*) In the absence of counter-pressure at port T

(**)10 Kg with a pressure of 20 bar at T

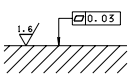
OVERALL DIMENSIONS



Stroke	8 mm
Extra stroke	2 mm
Working stroke	4 mm

Fixing screws UNI 5931 M6x40
with material specifications min. 8.8
Tightening torque 8 Nm / 0.8 Kgm

Support plane specifications



EAD5D - 03/2000/e

AD5L... LEVER OPERATED TYPE VALVES
CETOP 5

Max. pressure ports P/A/B	320 bar
Max. pressure port T	160 bar
Max. flow	100 l/min
Lever angle	2 x 15°
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter $ß_{25}≥75$
Weight	4,7 Kg
Weight with M1 variant	5,35 Kg

AD5L...	
ORDERING CODE	CAP. I • 34
STANDARD SPOOLS	CAP. I • 35

• Completely different spools are used for these (lever operated) valves than for all other types of operation (e.g. electrical, mechanical, pneumatic operation, ...)

• Available spools: 01 / 02 / 03 / 04 / 05 / 06 / 66 / 07 / 22 / 13 / 15 / 16 / 17 (for hydraulic symbols see Cap. I • 35).

• Microswitch type MK code 1319098 must be ordered separately.

• Possible mounting: **C / E / F** *(with mounting "F" and spools "15-16-17" the lever is on side "B")*

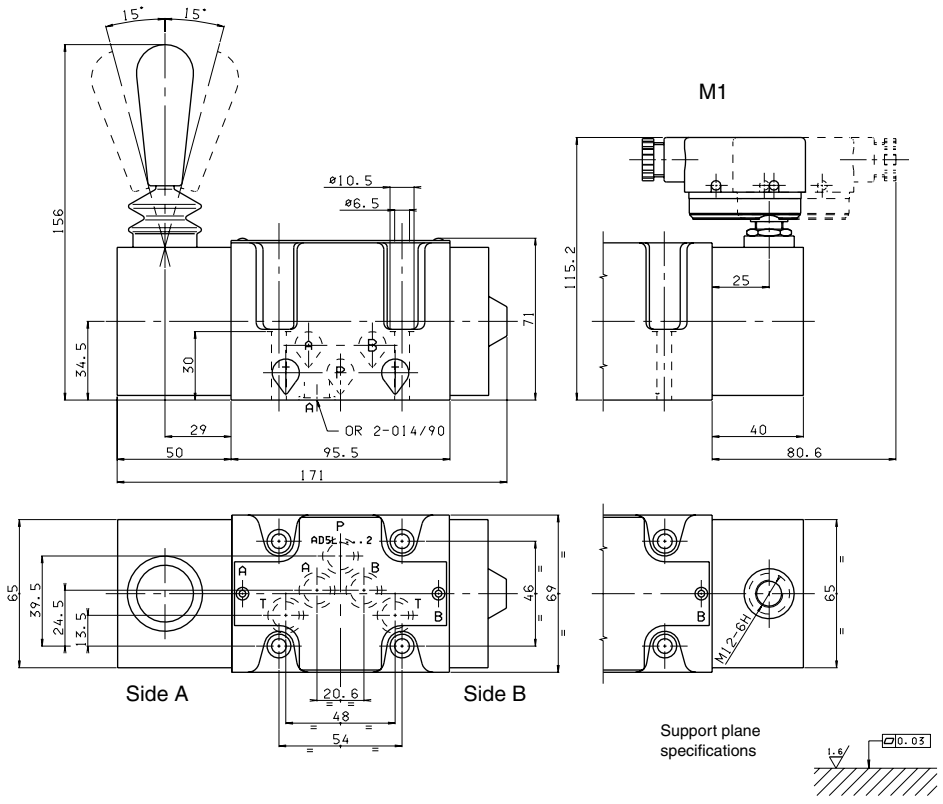
• There is no **D** type mounting

• The variant **D1** specifies the detent (mechanical connection) for lever operation

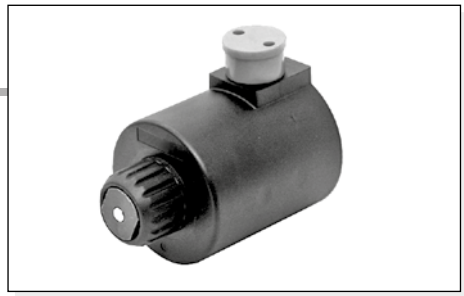
1

OVERALL DIMENSIONS

M1 = Microswitch



Fixing screws UNI 5931 M6x40
with material specifications min. 8.8
Tightening torque 8 Nm / 0.8 Kgm



"A16" DC COILS FOR CETOP 5

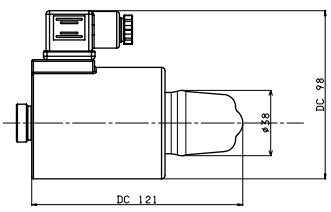
Type of protection (in relation to the connector used)	IP 65
Number of cycles	18.000/h
Supply tolerance	±10%
Ambient temperature	-30°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	H
Weight	0,9 Kg

VOLTAGE (V)	MAX WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°C)	RATED POWER (W)	RESISTANCE AT 20°C (OHM) ±7%
12V	106°C	45	3.2
24V	113°C	45	12.4
48V*	-	45	-
102V(*)(**)	-	45	-
110V(*)(**)	118°C	45	268
205V(*)(**)	-	45	-
* Special voltages			

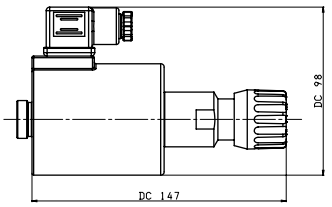
** The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms.

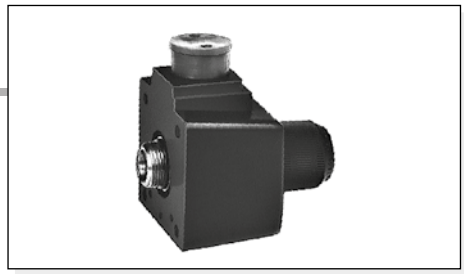
EMERGENCY (COILS WITH HIRSCHMANN CONNECTION)

MANUAL WITHOUT CONNECTOR (ES)
MANUAL WITH CONNECTOR (E1)



ROTARY WITHOUT CONNECTOR (P2)
ROTARY WITH CONNECTOR (P1)





"K16" AC SOLENOIDS FOR CETOP 5

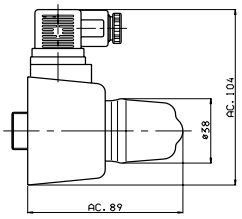
Type of protection (in relation to the connector used)	IP 66
Number of cycles	18.000/h
Supply tolerance	+10% / -10%
Ambient temperature	-54°C ÷ 60°C
Duty cycle	100% ED
Max. pressure static	210 bar
Insulation class wire	H
Weight	0,8 Kg

VOLTAGE (V)	MAX. WINDING TEMPERATURE (AMBIENT TEMPERATURE25°C)	RATED POWER(VA)	IN RUSH CURRENT (VA)	RESISTANCE AT 20°C (OHM) ±10%
24V/50Hz	134°C	124	454	0.56
24V/60Hz*	115°C	103.5	440	0.55
48V/50Hz*	134°C	113	453	2.10
115V/50Hz-120V/60Hz(*)(**)	121°C - 138°C	121-101	471-487	10.8
230V/50Hz-240V/60Hz(*)(**)	121°C - 138°C	120-101	478-485	43.0
240V/50Hz(*)(**)	134°C	120	456	47.39
* Special voltage				

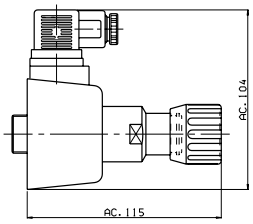
** The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms.

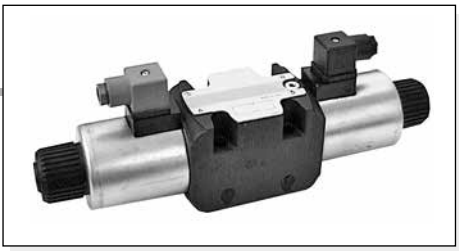
EMERGENCY (COILS WITH HIRSCHMANN CONNECTION)

MANUAL WITHOUT CONNECTOR (ES)
MANUAL WITH CONNECTOR (E1)



ROTARY WITHOUT CONNECTOR (P2)
ROTAN ROTARY WITH CONNECTOR (P1)





ADP5E... DIRECTIONAL CONTROL CETOP 5

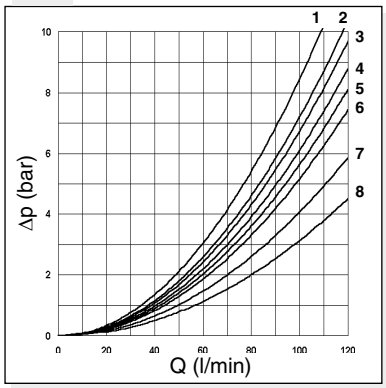
HIGH PERFORMANCES SOLENOID OPERATED VALVES

ADP5E...	
"D19" DC SOLENOIDS	CAP. I • 43
STANDARD CONNECTORS	CAP. I • 20

The NG10 directional control valves are designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 05 - 04 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-05). The use of solenoids with wet armatures allows an extremely safe construction completely dispensing with the need for dynamic seal. The solenoid tube is screwed directly onto the valve casing whilst the coil is kept in position by a ring nut. Great care has been taken over the design and production of the ducts and the improvement of the spools allows relatively high flow rates to be accommodated for its size with minimal pressure drops (Δp). The operation of the directional valve is electrical. The centring is achieved by means of calibrated length springs which, once the impulse is over, immediately reposition the spool in the neutral position. The solenoids, constructed with a protection class of IP66 in accordance with BS 5490 standards, are available in direct current form and different voltage. The electrical controls are equipped with an emergency manual control inserted in the tube.
The ADP.5.E.. valve has certain design features which allow it to "manage" a hydraulic power equal to Q = 120l/min with a P = 320 bar, maintaining a considerable safety margin. These features can be summarized as follows:
- Solenoid D19 with an optimum ratio between the power absorbed (42W) and the magnetic force
- Diameter of the spool 18 mm, with carefully designed geometry improved to compensate for the flow forces
- Compact graphite cast iron valve casing with high mechanical resistance
- Different springs, improved according to the features of the spool

The electrical supply connectors meet DIN 43650 ISO 4400 standards; connectors are also available with built in rectifiers or pilot lights.
The recommended fluids are hydraulic mineral based oils in accordance with DIN 51524 and it is recommended that filters should be fitted to ensure a maximum contamination level of class 10 in accordance with NAS 1638, $ß_{25} \geq 75$.
For other fluids please contact our technical department.
• The solenoids are in DC voltage only

PRESSURE DROPS



The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C. For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

$$\Delta p1 = \Delta p \times (Q1/Q)^2$$

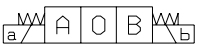
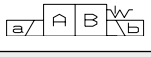
where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, Δp1 will be the value of the losses for the flow rate Q1 that is used.

Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
01	4	4	7	7	
02	6	6	8	8	7
03	3	3	8	8	
04	4	4	2	2	3
05	6	6	6	6	
66	4	4	8	7	
06	4	4	7	8	
14	6	4	8	6	2
15-19	2	2	5	5	
16-20	1	1	2	2	
28	4	6	6	8	2
	Curve No.				

ORDERING CODE

ADP	High performances directional control valve
5	CETOP 5/NG10
E	Electrical operator
**	Spools (Table next page)
*	Mounting (table 1)
*	Voltage (table 2)
**	Variants (table 3)
1	Serial No.

TAB.1 - MOUNTING

C	
E	
F	
D*	

(*) Valve with detent

TAB.3 - VARIANTS

VARIANT	CODE
No variant (without connectors)	S1(*)
Viton	SV(*)
Rotary emergency button	P2(*)
Adjustable spool movement speed control	4S(*)
With solenoid chamber external drainage (Y)	S5(*)
Spool movement speed control (VDC only) with ø 0.5 mm Ø orifice	5S(*)
Spool movement speed control VDC only) with ø 0.8 mm Ø orifice	8S(*)
Other variants available on request	

(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, c Cap. I • 20.

TAB.2 - TYPE E CONTROL

DC VOLTAGE **

L	12V
M	24V
N	48V*
P	110V*
Z	102V*
X	205V*
W	Without DC coils

115Vac/50Hz 120Vac/60Hz with rectifier

230Vac/50Hz 240Vac/60Hz with rectifier

Voltage codes are not stamped on the plate, their are readable on the coils.

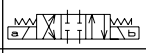
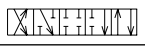
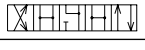
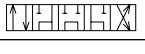
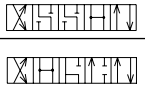
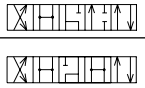
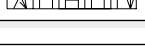
* Special voltage
** Technical data see Cap. I • 43

1

STANDARD SPOOLS

* SPOOLS WITH PRICE INCREASING

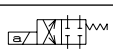
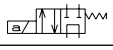
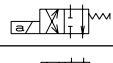
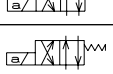
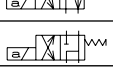
TWO SOLENOIDS, SPRING CENTRED "C MOUNTING"

Spool type		Covering	Transient position
01		+	
02		-	
03		-	
04*		-	
05		-	
66		-	
06		-	
14*		-	
28*		-	

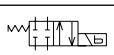
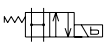
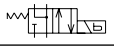
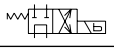
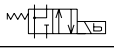
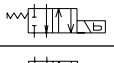
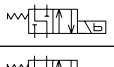
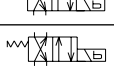
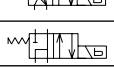
TWO SOLENOIDS "D MOUNTING"

Spool type		Covering	Transient position
19*		-	
20*		+	

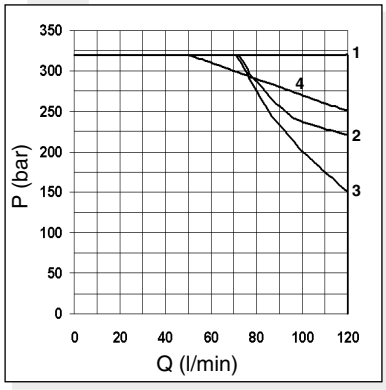
ONE SOLENOID, SIDE A "E MOUNTING"

Spool type		Covering	Transient position
01		+	
02		-	
03		-	
04*		-	
05		-	
66		-	
06		-	
14*		-	
15		-	
16		+	
28*		-	

ONE SOLENOID, SIDE B "F MOUNTING"

Spool type		Covering	Transient position
01		+	
02		-	
03		-	
04*		-	
05		-	
66		-	
06		-	
14*		-	
15		-	
16		+	
28*		-	

LIMITS OF USE (MOUNTING C-E-F)



Spool type	n° curves
01	1
02	1
03	2
04	1
05	1
66	1
06	1
14	3
15	1
16	1
28	3
19	4
20	4

The tests have been carried out with solenoids at operating temperature and a voltage 10% less than rated voltage with a fluid temperature of 50°C.

The fluid used was a mineral oil with a viscosity of 46 mm²/s at 40°C.

The values in the diagram refer to tests carried out with the oil flow in two directions simultaneously (e.g. from P to A and at the same time B to T).

In the cases where valves 4/2 and 4/3 were used with the flow in one direction only, the limits of use could have variations which may even be negative.

The tests were carried out with a counter-pressure of 2 bar at T.

ADP5E... HIGH PERFORMANCES SOLENOID OPERATED VALVE CETOP 5

ADP.5.E... 4S variant - These ON-OFF type valves are used when a lower spool movement speed is required than it is generally available with a conventional solenoid valve in order to avoid those shocks which might otherwise compromise proper system operation. This is obtained by forcing the fluid to pass through the gap which exists between the screw thread and the M8x1 tapped thread, restricting in this way the transfer cross section between the 2 solenoid chambers. Using this variant may entail a reduction in the operational limits according to the spool used, up to the complete blocking of the change over itself. The valve operation depends on the presence of a minimum back pressure on the T line (min. 1 bar). The change over time referred to the spool stroke depends on 4 main variables:

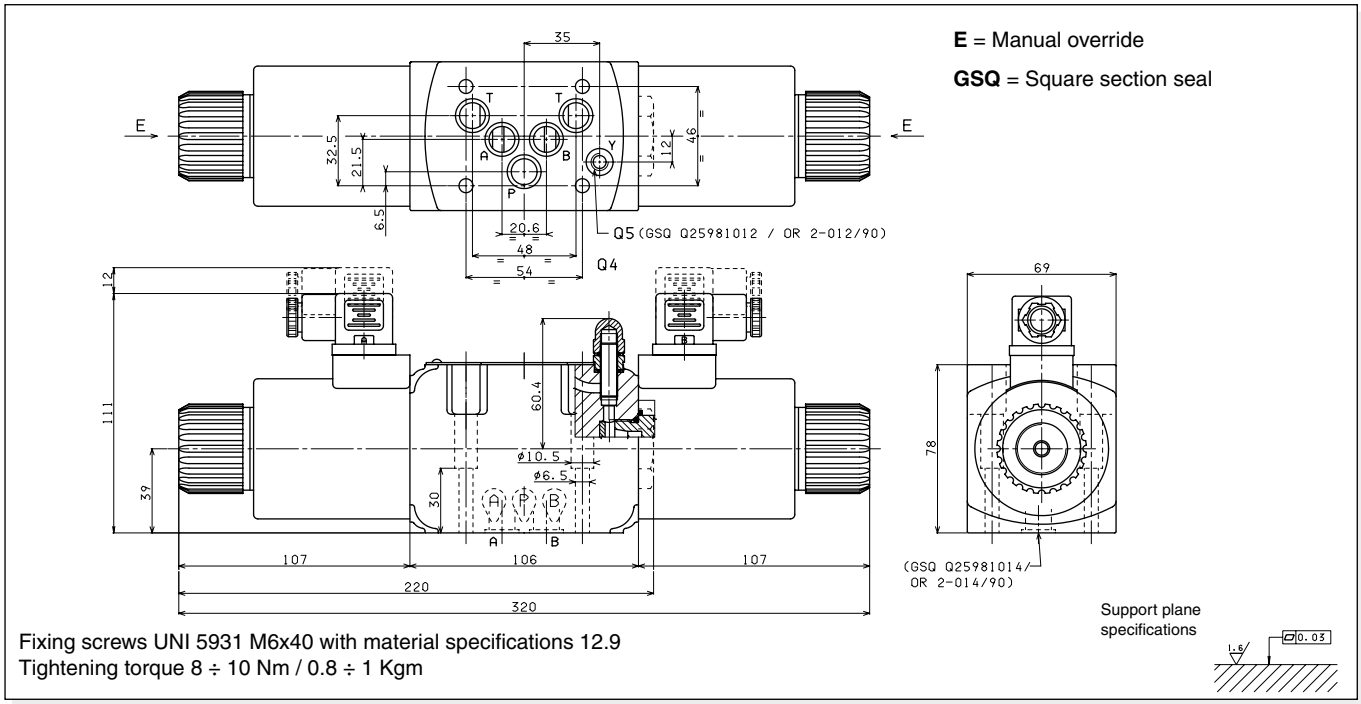
- Applicable hydraulic power, related to the flow rate and pressure drop across the valve;
- Spool type (system configuration);
- Oil viscosity and temperature;
- Back pressure on T.

Max. operating pressure: ports P/A/B	350 bar
Max. operating pressure: port T (*)	250 bar
Max. flow	120 l/min
Max. excitation frequency	3 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter $ß_{25} \geq 75$
Weight with one DC solenoid	5 Kg
Weight with two DC solenoids	6,5 Kg

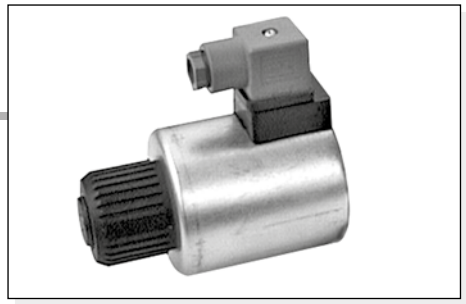
(*) Pressure dynamic allowed for 2 millions of cycles

Pressure on port T valid in case Y is blocked (no external drainage). Normally the external drainaged is blocked with a plug S.T.E.I M6x6 UNI 5923

ADP.5.E... S5 variant - These are valves with solenoid chambers drainage separated from the T line, obtained on CETOP RO5 interface and characterized by the letter Y. This solution allows operation with up to 320 bar max. back pressure on the T line while using only 12.9 material fixing screws to ensure maximum solenoid valve mounting safety and supplementary drainage.



Fixing screws UNI 5931 M6x40 with material specifications 12.9
Tightening torque 8 ÷ 10 Nm / 0.8 ÷ 1 Kgm

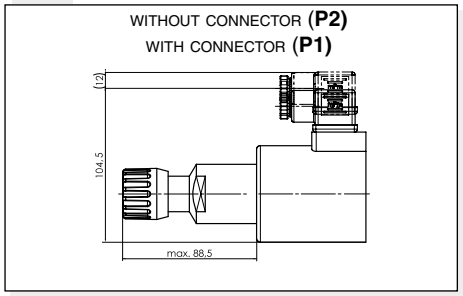


"D19" DC SOLENOIDS

Type of protection (in relation to the connector used)	IP 66
Number of cycle	18.000/h
Supply tolerance	±10%
Ambient temperature	-54°C ÷ 60°C
Duty cycle	100% ED
Max static pressure	210 bar
Insulation class wire	H
Weight	1,63 Kg

ROTARY EMERGENCY

WITHOUT CONNECTOR **(P2)**
WITH CONNECTOR **(P1)**



VOLTAGE (V)	MAX WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°C)	RATED POWER (W)	RESISTANCE AT 20°C (OHM) ±10%
12V	105°C	42	3.43
24V	105°C	42	13.71
48V*	105°C	42	55
102V(*)(**)	105°C	42	248
110V(*)(**)	105°C	42	288
205V(*)(**)	105°C	42	1000

* Special voltage

** The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms.

ADP5V... WITH PROXIMITY SENSOR LVDT CETOP 5

ADP5V...	
"D19" DC SOLENOIDS	CAP. I • 44
STANDARD CONNECTORS	CAP. I • 20
L.V.D.T.	CAP. I • 22

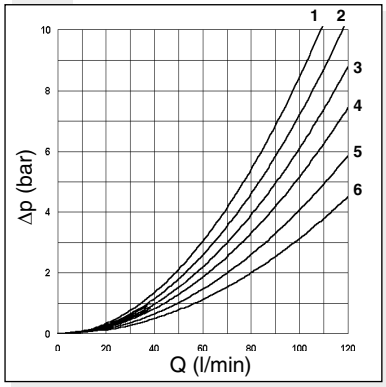
The NG10 directional control valves are designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 05 - 04 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-05).

The single solenoid directional valves type ADP5V are used in applications where the monitoring of the position of the spool inside the valve is requested to manage the machine safety cycles in according with the accident prevention legislation. These directional valves are equipped with an horizontal positioned inductive sensor on the opposite side of the solenoid, which is capable of providing the first movement of the valve when the passage of a minimum flow is allowed. Integrated in safety systems, these valves intercept actuator movements that could be dangerous for the operators and for the machine.

Max. operating pressure: ports P/A/B	350 bar
Max. operating pressure: port T (*)	250 bar
Max. flow	120 l/min
Max. excitation frequency	3 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$
Type of protection (in relation to connector used)	IP 66
Weight	6,2 Kg

(*) Pressure dynamic allowed for 2 millions of cycles

PRESSURE DROPS



The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C. For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

$$\Delta p1 = \Delta p \times (Q1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, Δp1 will be the value of the losses for the flow rate Q1 that is used.

Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
01	3	3	5	5	
02	4	4	6	6	5
66	3	3	6	5	
06	3	3	5	6	
16	1	1	2	2	
	Curve No.				

ORDERING CODE

ADP	High performances directional control valve
5	CETOP 5/NG10
V	Directional valve with single solenoid and LVDT proximity sensor
***	Spool and mounting (table 1)
*	Voltage (table 2)
**	Variants (table 3)
2	Serial No.

TAB.2 - DC VOLTAGE **

L 12V
M 24V
N 48V*
P 110V*
Z 102V*
X 205V*
W Senza bobina né connettori

115Vac/50Hz 120Vac/60Hz with rectifier

230Vac/50Hz 240Vac/60Hz with rectifier

Voltage codes are not stamped on the plate, their are readable on the coils.

* Special voltage
** Technical data see Cap. I • 45

TAB1 - STANDARD SPOOL FOR ADP5V

E / F MOUNTING POSSIBLE

Spool type		Covering	Transient position
01E		+	
01F		+	
02E		-	
02F		-	
66E		-	
06F		-	
16E		+	
16F		+	
32E		+	

TAB.3 - VARIANTS

VARIANTS	CODE
No variant (without connectors)	S1(*)
Rotary emergency button	P2(*)
Without proximity connector LVDT	S3
Without coils and proximity connector	S4
With solenoid chamber external drainage (Y)	
Other variants available on request.	

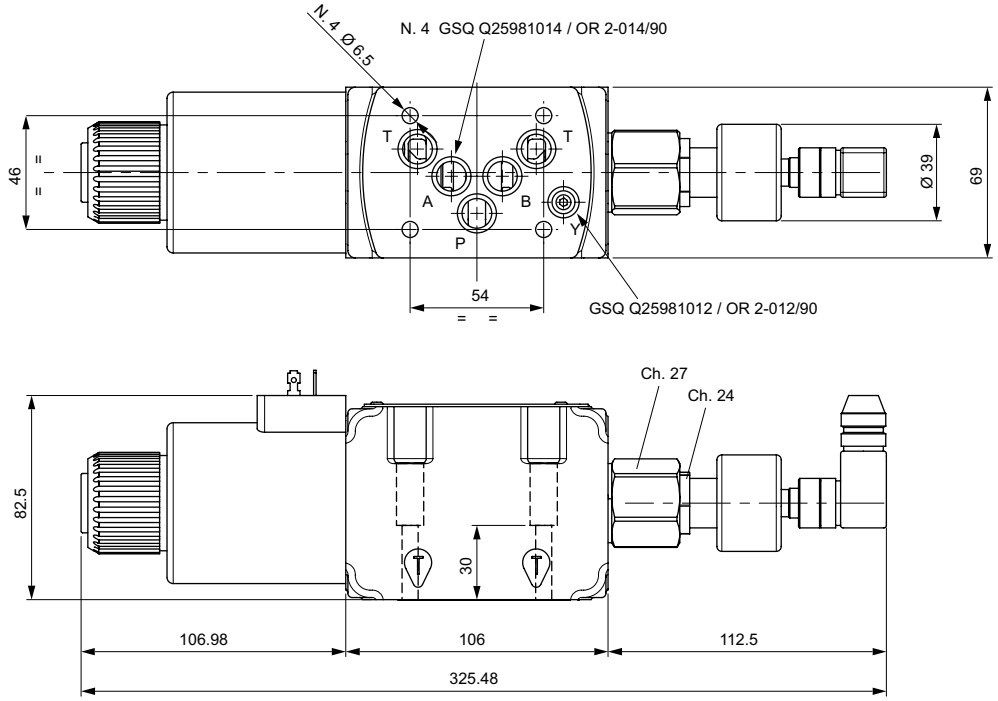
(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, Cap. I • 20.

CE registered mark for industrial environment with reference to the electro-magnetic compatibility.
European norms:
- EN50082-2 general safety norm - industrial environment
- EN 50081-1 emission general norm - residential environment

OVERALL DIMENSIONS

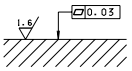
E = Manual override

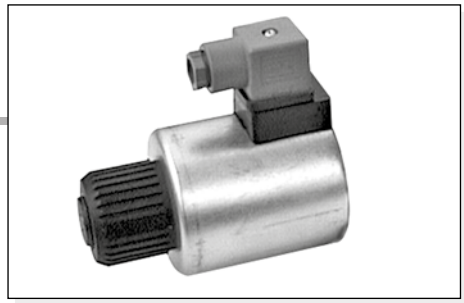
GSQ = Square section seal



Fixing screws UNI 5931 M6x40
with material specifications 12.9
Tightening torque
8 ÷ 10 Nm / 0.8 ÷ 1 Kgm

Support plane specifications





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Duty cycle	100% ED
Max static pressure	210 bar
Insulation class wire	H
Weight	1,63 Kg

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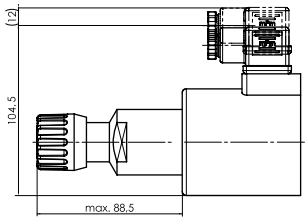

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