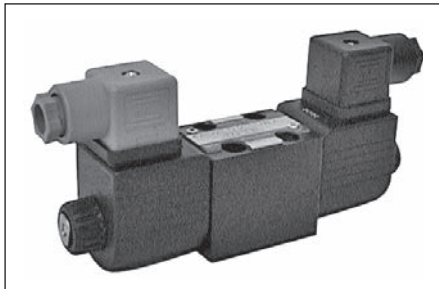
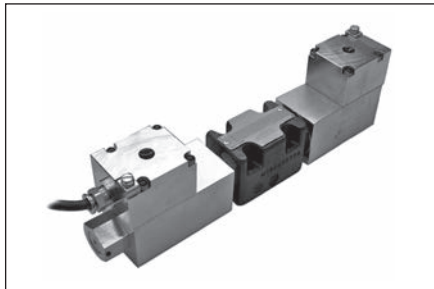


CETOP 2/NG04



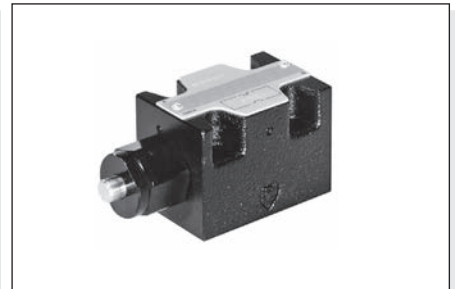
CETOP 2/NG04	CAP. I • 2
AD2E...	CAP. I • 4
"A09" DC COILS	CAP. I • 4

ATEX 2014/34/UE DIRECTIVE



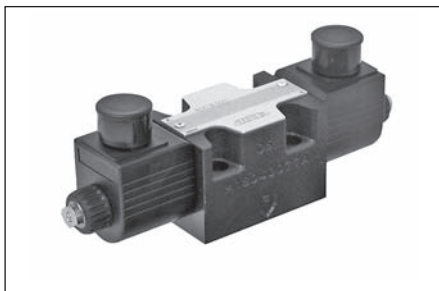
ATEX 2014/34/UE DIRECTIVE	CAP. I • 23
AD3XD...	CAP. I • 25
AD3XG...	CAP. I • 29

AUTOMATIC RECIPROCATING VALVES



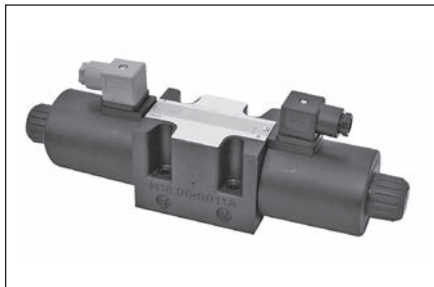
AD3I...	CAP. I • 46
AD5I...	CAP. I • 47
AD3RI...	CAP. I • 48
AD5RI...	CAP. I • 49

CETOP 3/NG06



ADC3...	CAP. I • 5
"A09" DC COILS	CAP. I • 7

CETOP 5/NG10



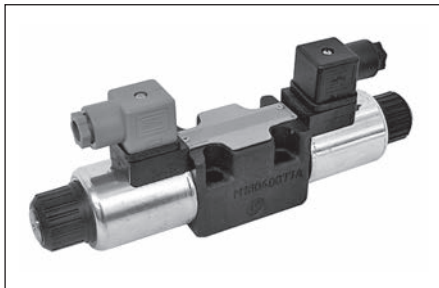
CETOP 5/NG10	CAP. I • 33
AD5E...	CAP. I • 36
AD5E...J* AND AD5E...Q5	CAP. I • 37
AD5O... AND AD5D...	CAP. I • 38
AD5L...	CAP. I • 39
"A16" DC COILS	CAP. I • 40
"K16" AC SOLENOIDS	CAP. I • 41

PILOTED VALVES AND SUBPLATE MOUNTING



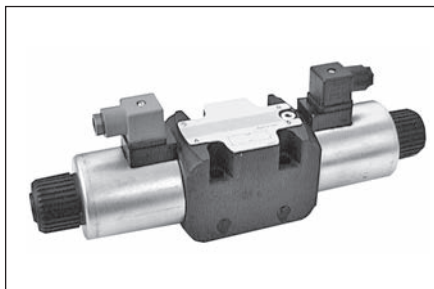
ADPH5...	CAP. I • 50
ADH5...	CAP. I • 53
BSH5...	CAP. I • 56
ADH7...	CAP. I • 57
BSH7...	CAP. I • 60
ADH8...	CAP. I • 62
BSH8...	CAP. I • 65

CETOP 3



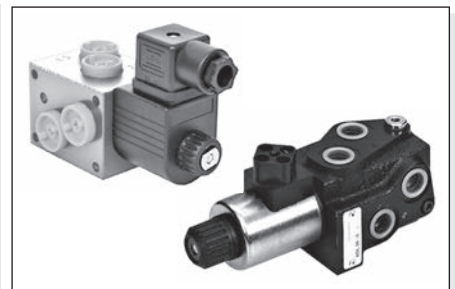
CETOP 3/NG06	CAP. I • 8
AD3E...	CAP. I • 11
AD3E...J*	CAP. I • 12
AD3V...	CAP. I • 14
AD3L...	CAP. I • 15
CETOP 3 OTHER OPERATORS	CAP. I • 16
AD3P... AND AD3O...	CAP. I • 17
AD3M... AND AD3D...	CAP. I • 18
"D15" DC COILS	CAP. I • 19
"B14" AC SOLENOIDS	CAP. I • 19
STANDARD CONNECTORS	CAP. I • 20
"LE" VARIANTS FOR ADC3/AD3	CAP. I • 21
LVDT	CAP. I • 22

CETOP 5/NG10 HIGH PERFORMANCES



ADP5E...	CAP. I • 41
"D19" DC SOLENOIDS	CAP. I • 41
ADP5V...	CAP. I • 43
"D19" DC SOLENOIDS	CAP. I • 45

FLOW DIVERSION VALVES



CDL046... "OEM MACHINERY"	CAP. I • 66
CDL066... "OEM MACHINERY"	CAP. I • 68
ADL066... "OEM MACHINERY"	CAP. I • 69
BDL066... "OEM MACHINERY"	CAP. I • 70
CDL106... "OEM MACHINERY"	CAP. I • 71
ADL106... "OEM MACHINERY"	CAP. I • 72
"A09" AND "D15" DC COILS	CAP. I • 73
"40W" AND "A16" DC COILS	CAP. I • 74



CETOP 2/NG04

AD2E...	CAP. I • 4
"A09" DC COILS	CAP. I • 4
STANDARD CONNECTORS	CAP. I • 20

DIRECTIONAL CONTROL VALVES CETOP 2/NG4

The directional control valves NG4 are designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 02 - 01 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-02), and are the smallest on the market in their category whilst still featuring excellent performance.

The use of solenoids with wet armatures ensures quiet operation, means that dynamic seals are no longer required and important levels of counter-pressure are accepted on the return line. The solenoid's tube is screwed at valve body directly, while a locking ring nut seal the coil in right position.

The cast body with a great care in the design and production of the ducts of the 5 chambers have made it possible to improve the spools allowing relatively high flow rate with low pressure drops (Δp).

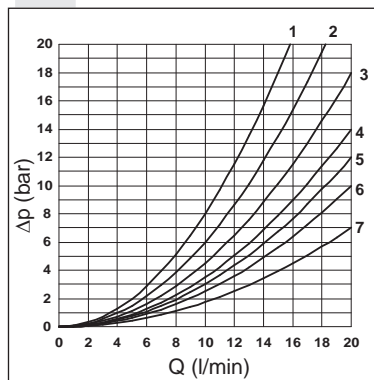
The spool rest positions are obtained by means of springs which centre it when there is no electrical impulse. The solenoids are constructed to DIN 40050 standards and are supplied by means of DIN 43650 ISO 4400 standard connectors which, suitably assembled, ensure a protection class of IP 65.

The solenoid coils are normally arranged for DIN 43650 ISO 4400 type connectors (standard version). On request, could be available the following coil connection variants: AMP Junior connections; flying leads connections, with or without integrated diode; Deutsch connections with bidirectional integrated diode.

The supply may be in either DC or AC form (with the use of a connector and rectifier) in most common voltage.

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



Spool type	Connections				
	P → A	P → B	A → T	B → T	P → T
01	4	4	6	6	
02	6	6	7	7	5
03	4	4	7	7	
04	1	1	2	2	3
05	6	6	4	4	
66	5	5	5	7	
06	5	5	7	5	
15	4	4	4	4	
16	5	5	6	6	
20*	5	5	6	6	

Curve No.

* = with energized spool

The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral based 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:

$$\Delta p_1 = \Delta p \times (Q_1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, Δp_1 will be the value of the losses for the flow rate Q₁ that is used.

ORDERING CODE

AD	Directional valve
2	CETOP 2/NG4
E	Electrical operator
**	Spool (tables next page)
*	Mounting (table 1 next page)
*	Voltage (table 2 next page)
**	Variants (table 3 next page)
3	Serial No.

DIRECTIONAL CONTROL VALVES CETOP 2/NG4

TAB. 1 MOUNTING

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

TAB.3 - VARIANTS

VARIANT	CODE
No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2(*)(**)
AMP Junior connection	AJ(*)
Solenoid with flying leads (250 mm)	FL
Solenoid with flying leads (130 mm) integrated diode	LD
Deutsch connection with bidir. diode	CX
Coil 8W (only 24V)	8W
Other variants available on request.	

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

(**) P2 Emergency tightening torque max. 6÷9 Nm / 0.6 ÷ 0.9 Kgm with CH n. 22

TAB.2 - A09 (27 W) COIL

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

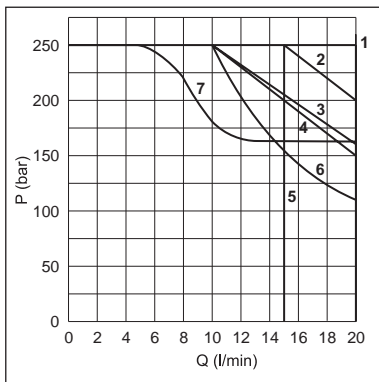
Without DC coils

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

- Mounting type **D** is only for solenoid valves with detent
- In case of mounting **D** with detent, the supply to solenoid must be longer than 100 ms.
- The AMP Junior coil, the Deutsch coil with bidirectional diode and the coil with flying leads (with or without diode) coils are available in 12V or 24V DC voltage only.

* Special voltage
** Technical data see page CAP. I • 4

LIMITS OF USE (MOUNTING C-E-F)



Spool Type	
01	1
02	3
03	1
04	4
05	1
66	1
06	1
15	1(7*)
16	2(6*)
20	5

(6*) = 16 spool used as 2 or 3 way, follow the curve n°4
(7*) = with 8W coil

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 refers 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 case of valve 4/2 or 4/3 used with flow in one direction only, the limits of use could have variations which may even be negative.

Medium switching times Energizing: 20 ms
De-energizing: 40 ms

Tests have been carried out by spool normally closed with flow of 10 l/min at 125 bar and a 100% supply, warm standard coil and without any electronic components. These values are indicative and depend on the following parameters: the hydraulic circuit, the fluid used and the variation of pressure, flow and temperature.

NOTE: Limits of use are available for C, E, F mounting.

STANDARD SPOOLS

TWO SOLENOIDS, SPRING CENTRED "C" MOUNTING			
Spool Type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
05		+	
66		+	
06		+	

ONE SOLENOID, SIDE A "E" MOUNTING

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

ONE SOLENOID, SIDE B "F" MOUNTING

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

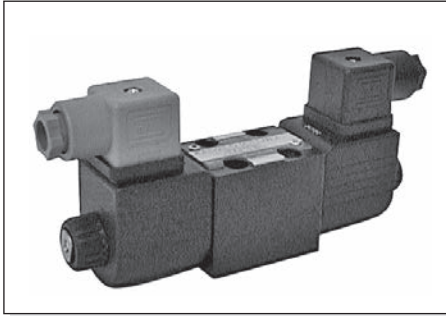
TWO SOLENOIDS "D" MOUNTING

Spool Type		Covering	Transient position
20*		+	

* SPOOLS WITH PRICE INCREASING

AD2E... DIRECTIONAL CONTROL SOLENOID OPERATED VALVES CETOP 2/NG4

1

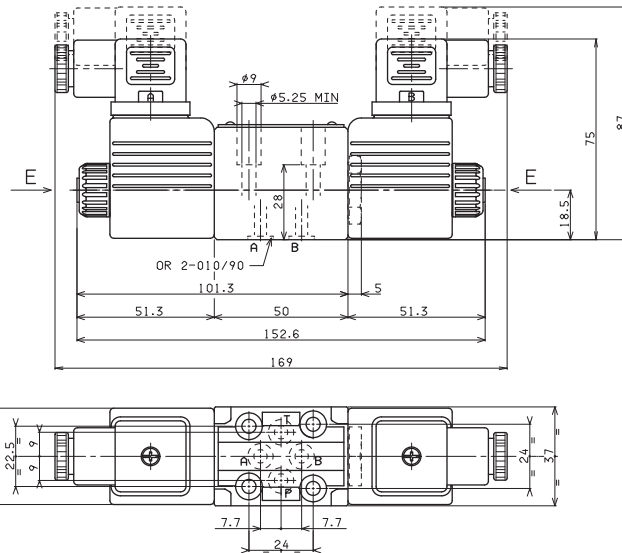
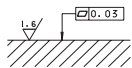


Max. pressure ports P/A/B	250 bar
Max pressure port T (dynamic)	250 bar
Max flow	20 l/min
Max excitation frequency	3 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm ² /s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max contamination level	class 10 in accordance with NAS 1638 with filter β ₂₅ ≥ 75
Weight with one DC solenoid	0,88 Kg
Weight with two DC solenoids	1,1 Kg

E = Manual override

Screws with material specifications min. 8.8 recommended - UNI 5931
Tightening torque of screws M5x35 = 5 Nm / 0.5 Kgm.

Support plane specifications

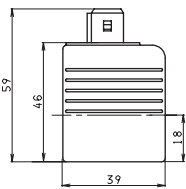


DC COILS A09

Type of protection (in relation to connector used)	IP 65
Number of cycle	18.000/h
Supply tolerance	±10%
Ambient temperature	-30°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	H
Weight	0,215 Kg

• The AMP Junior coil, the Deutsch coil with bidirectional diode and the coil with flying leads (with or without diode) coils are available in 12V or 24V DC voltage only.

AMP JUNIOR (AJ)

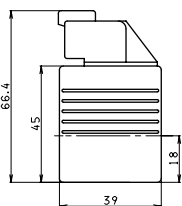


VOLTAGE (V)	MAX WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°C)	RATED POWER (W)	RESISTANCE AT 20°C (OHM) ±7%
12V	123°C	27	5.3
24V	123°C	27	21.3
48V*	123°C	27	85.3
102V*(**)	123°C	27	392
110V*(**)	123°C	27	448
205V*(**)	123°C	27	1577

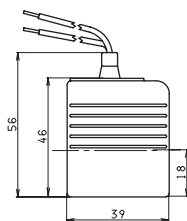
* Special voltages

** The european low voltage directive is applied to electrical 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 resistance less than 0.1 ohms.

DEUTSCH COIL WITH BIDIR. DIODE (CX) DT04 - 2P

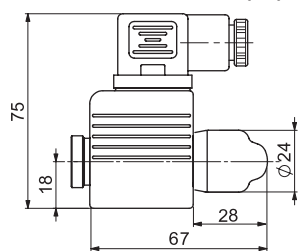


FLYING LEADS (FL) LEADS WITH DIODE (LD)

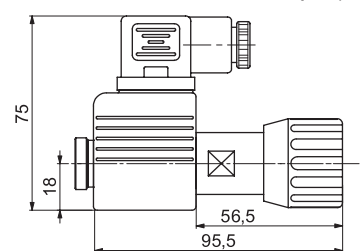


EMERGENCY (COILS WITH HIRSCHMANN CONNECTION)

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



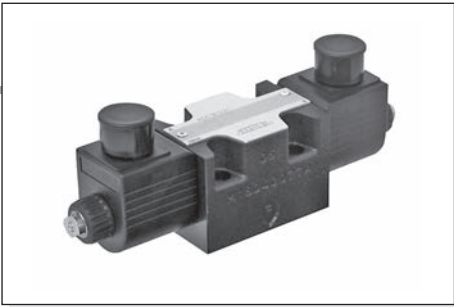
ROTARY WITHOUT CONNECTOR (P2*)
ROTAN ROTARY WITH CONNECTOR (P1*)



(*) Emergency tightening torque max. 6÷9 Nm / 0.6 ÷ 0.9 Kgm with CH n. 22

ADC3... DIRECTIONAL CONTROL VALVES CETOP 3

SOLENOID OPERATED WITH REDUCED OVERALL SIZE



ADC3E...

"A09" DC COILS	CAP. I • 7
STANDARD CONNECTORS	CAP. I • 20

The NG6 directional control valves are designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 03 - 02 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-03).

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 casting whilst the coil is kept in position by a ring nut.

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. To improve the valve performance, different springs are used for each spool.

The solenoids, constructed with a protection class of IP65 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.

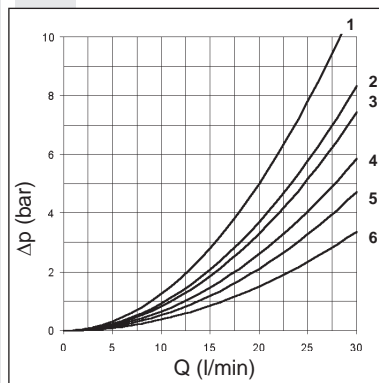
The ADC3 valve uses shorter solenoids than the standard AD.3.E to reduce the overall dimensions.

The solenoid coils are normally arranged for DIN 43650 ISO 4400 type connectors (standard version). On request, could be available the following coil connection variants: AMP Junior connections; flying leads connections, with or without integrated diode; Deutsch connections with bidirectional integrated diode.

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, $\beta_{25} \geq 75$.

Max. pressure ports P/A/B/T	250 bar
Max flow	30 l/min
Max excitation frequency	3 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm ² /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 with one DC solenoid	1,25 Kg
Weight with two DC solenoids	1,5 Kg

PRESSURE DROPS



Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
01	4	4	4	4	
02	6	6	6	6	6
03	4	4	6	6	
04	3	3	2	2	5
15E-16E	6	3	1	5	
15F-16F	3	6	5	1	
	Curve No.				

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:

$$\Delta p_1 = \Delta p \times (Q_1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, Δp_1 will be the value of the losses for the flow rate Q₁ that is used.

ADC3... SOLENOID OPERATED WITH REDUCED OVERALL SIZE CETOP 3/NG6

1

ORDERING CODE

ADC	Directional valve
3	CETOP 3/NG6
E	Electrical operator
**	Spool (tables at the side)
*	Mounting (table 1)
*	Voltage (table 2)
**	Variants (table 3)
1	Serial No.

TAB.1 - MOUNTING

STANDARD	
C	
E	
F	
SPECIALS (WITH PRICE INCREASING)	
G	
H	

STANDARD SPOOL

TWO SOLENOIDS, SPRING CENTRED "C" MOUNTING			
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	

ONE SOLENOID, SIDE A "E" MOUNTING

Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
15		-	
16		+	

ONE SOLENOID, SIDE B "F" MOUNTING

Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
15		-	
16		+	

TAB.2 - A09 (27 W) COIL

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

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

• The AMP Junior coil, the Deutsch coil with bidirectional diode and the coil with flying leads (with or without diode) coils are available in 12V or 24V DC voltage only.

* Special voltage
** Technical data see page CAP. I • 7

TAB.3 - VARIANTS

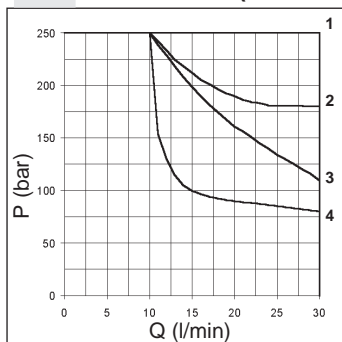
Variant	Code
No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2 (*) (**)
Rotary emergency button (180°)	R5 (*) (**)
Variant with lever for emergency button	LF(*)
AMP Junior connection	AJ(*)
Coil with flying leads (250 mm)	FL
Coil with flying leads (130 mm) with diode	LD
Deutsch connection with bidirectional diode	CX

Other variants available on request.

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

(**) **P2 and R5 Emergency** tightening torque max. **6÷9 Nm / 0.6 ÷ 0.9 Kgm** with CH n. 22

LIMITS OF USE (MOUNTING C-E-F)



Spool type	n° curve
01	2
02	1
03	3
04	3
15	4
16	1(4*)

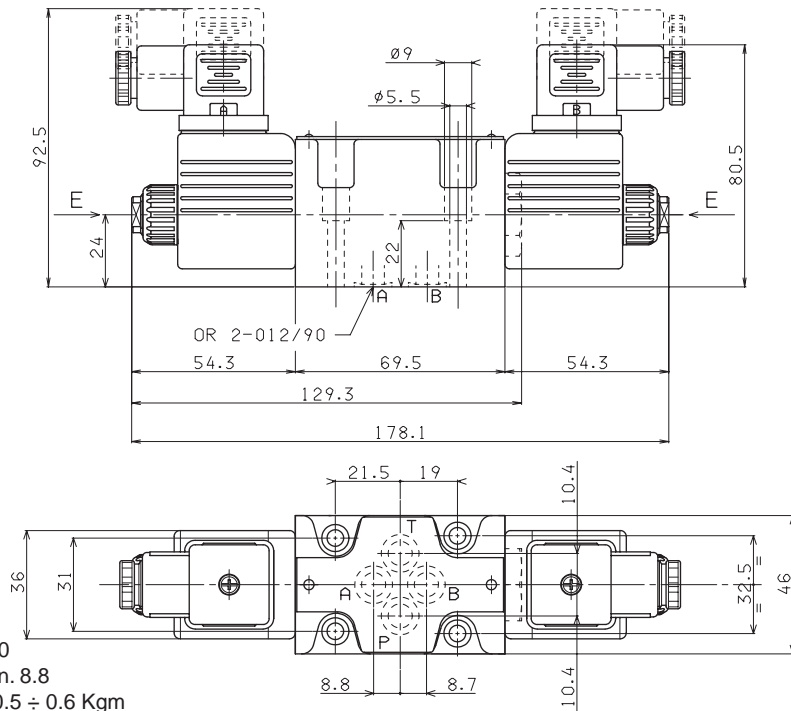
(4*) = 16 spools used for 3 way valve, follow the curve n°4

The tests have been carried out with solenoids 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 degrees 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 are used with the flow in one direction only, the limits of use could have variations which may even be negative (See curve No 4 and Spool No 16). The tests were carried out with a counter-pressure of 2 bar at T port.

ADC3... SOLENOID OPERATED WITH REDUCED OVERALL SIZE CETOP 3/NG6

OVERALL DIMENSIONS



1



A09 DC COILS

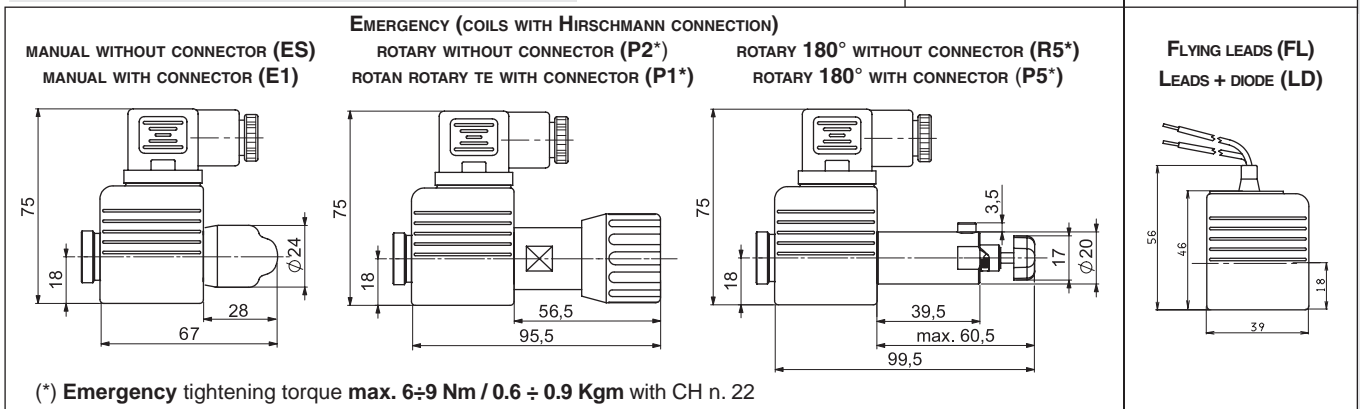
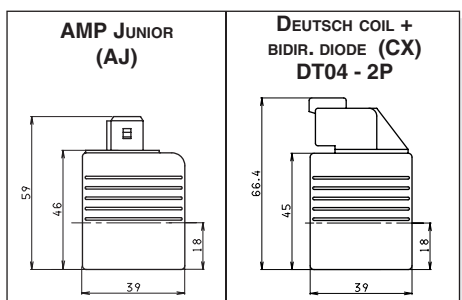
Type of protection (in relation to connector used)	IP 65
Number of cycle	18.000/h
Supply tolerance	±10%
Ambient temperature	-30°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	H
Weight	0,215 Kg

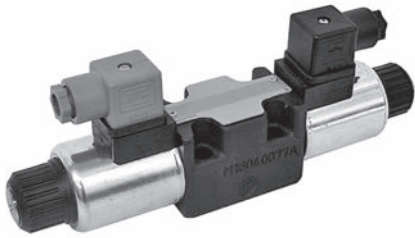
• The AMP Junior coil, the Deutsch coil with bidirectional diode and the coil with flying leads (with or without diode) coils are available in 12V or 24V DC voltage only.

VOLTAGE (V)	MAX WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°C)	RATED POWER (W)	RESISTANCE AT 20°C (OHM) ±7%
12V	123°C	27	5.3
24V	123°C	27	21.3
48V*	123°C	27	85.3
102V(**)**	123°C	27	392
110V(**)**	123°C	27	448
205V(**)**	123°C	27	1577

* Special voltages

** The european low voltage directive is applied to electrical 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 resistance less than 0.1 ohms.





CETOP 3/NG06

STANDARD SPOOLS	CAP. I • 10
AD3E...	CAP. I • 11
AD3E...J*	CAP. I • 12
AD3E...KJ	CAP. I • 13
AD3V...	CAP. I • 14
AD3L...	CAP. I • 15
OTHER OPERATOR	CAP. I • 16
AD3P...	CAP. I • 17
AD3O...	CAP. I • 17
AD3M...	CAP. I • 18
AD3D...	CAP. I • 18
"D15" DC COILS	CAP. I • 19
"B14" AC SOLENOIDS	CAP. I • 19
STANDARD CONNECTORS	CAP. I • 20
"LE" VARIANTS	CAP. I • 21
L.V.D.T.	CAP. I • 22

DIRECTIONAL CONTROL VALVES CETOP 3/NG6

INTRODUCTION

The directional control valves NG6 are designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 03 - 02 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-03), and can be used in all fields on account of their high flow rate and pressure capacities combined with compact overall dimensions.

The use of solenoids with wet armatures allows a very practical, safe construction completely dispensing with dynamic seals; the solenoid tube is screwed directly onto the valve chest whilst the coil is kept in position by means of a lock nut.

The special, precise construction of the ports and the improvement of the spools enables relatively high flow rates to be accommodated with a minimal pressure drop (Δp).

The operation of the directional valves may be electrical, pneumatic, oleodynamic, mechanical or lever.

The centre position is obtained by means of calibrated length springs which reposition the spool in the centre or end of travel position once the action of the impulse is over.

The solenoids are constructed with a protection class of IP66 to DIN 40050 standards and are available in either AC or DC form in different voltage and frequencies.

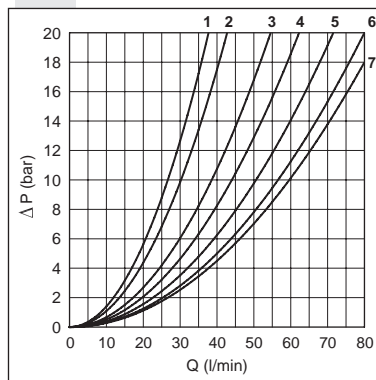
The new type DC coil "D15", of cause their high performance, allows to increasing the limits of use respect to last series.

All types of electrical control are available, on request, with different types of manual emergency controls.

The solenoid coils are normally arranged for DIN 43650 ISO 4400 type connectors; is available on request these variant coils: with AMP Junior connections, with AMP junior and integrated diode, with Deutsch DT04-2P connections or solenoid with flying leads. Connectors with built in rectifiers or pilot lights are also available.

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 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:

$$\Delta p_1 = \Delta p \times (Q_1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, Δp_1 will be the value of the losses for the flow rate Q_1 that is used.

Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
01	5	5	5	5	
02	7	7	7	7	6
03	5	5	6	6	
04	2	2	2	2	4
44	1	1	2	2	3
05	7	7	5	5	
06	5	5	7	5	
66	5	5	5	7	
07		2	6		
08	6	6			
09		5		5	

Curve No.

Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
10	5	5	5	5	
11	5			5	
22		5	5		
12		5		6	
13		5	6	6	
14	4	3	3	3	4
28	3	4	3	3	4
15-19*	5	5	6	6	
16	5	5	4	4	
17-21*	3	4			
20*	4	4	4	4	

Curve No.

(*) Value with energized solenoid

DIRECTIONAL CONTROL VALVES CETOP 3/NG6

ORDERING CODE

AD	Directional valve
3	CETOP 3/NG6
E	Type of operator For other operator see next pages
**	Spool see page Cap. I • 10
*	Mounting type (table 1)
*	Voltage (table 2)
**	Variants (table 3)
*	Serial No.
3 = Standard	
4 = Only for RS - R6 - KJ - 7J variants	

TAB.2 - VOLTAGE

AC SOLENOID B14 **	
A	24V/50-60 Hz
B	48V/50-60 Hz
J	115V/50Hz - 120V/60Hz
Y	230V/50Hz - 240V/60Hz
K	AC without coils
Other voltages available on request.	
DC COIL D15 (30W) **	
L	12V
M	24V
V	28V*
N	48V*
Z	102V*
P	110V*
X	205V*
W	DC without 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.

TAB.1- MOUNTING

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

• AMP Junior coils (with or without diode) and coils with flying leads and coils type Deutsch, are available in 12V or 24V DC voltage only.

• The coil with eCoat protection (RS variant) is available in 12V, 24V, 28V or 110V DC voltage only.

* Special voltage

** Technical data see page Cap. I • 19

• **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).

TAB.3 - VARIANTS

VARIANT	CODE	◆	PAGE
No variant (without connectors)	S1(*)		
Viton	SV (*)		
Emergency control lever for directional control valves type ADC3 and AD3E	LE-LF-AX-CE(*)	◆	Cap. I • 21
Emergency button	ES(*)		Cap. I • 19
Rotary emergency button	P2(*)		Cap. I • 19
Rotary emergency button (180°)	R5(*)		Cap. I • 19
Preset for microswitch (E/F/G/H mounting only) (see below note ◆)	M1(*)	◆	Cap. I • 11 - Cap. I • 15
5 micron clearance	SQ(*)	◆	
Spool movement speed control (only VDC) with ø 0.3 mm orifice	3S(*)	◆	Cap. I • 12
Spool movement speed control (only VDC) with ø 0.4 mm orifice	JS(*)	◆	Cap. I • 12
Spool movement speed control (only VDC) with ø 0.5 mm orifice	5S(*)	◆	Cap. I • 12
Spool movement speed control (only VDC) with ø 0.6 mm orifice	6S(*)	◆	Cap. I • 12
AMP Junior coil - for 12V or 24V DC voltage only	AJ(*)		Cap. I • 19
AMP Junior coil and integrated diode - for 12V or 24V DC voltage only	AD(*)		Cap. I • 19
Coil with flying leads (175 mm) - for 12V or 24V DC voltage only	SL		Cap. I • 19
Hirschmann coil eCoat surface treatment - for 12V, 24V, 28V or 110V DC voltage only	RS(*)		Cap. I • 19
Deutsch DT04-2P connection eCoat surface treatment - for 12V, 24V DC voltage only	R6		Cap. I • 19
High corrosion resistance valve - Hirschmann connector	KJ		Cap. I • 13
High corrosion resistance valve - Deutsch DT04-2P connector - for 12V, 24V DC voltage only	7J		Cap. I • 13
Deutsch DT04-2P coil - for 12V or 24V DC voltage only	CZ		Cap. I • 19

Other variants available on request.

◆ = Maximum counter-pressure on T port: 8 bar - Microswitch type MK code 1319098 must be ordered separately.

◆ = Variant codes stamped on the plate

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

DIRECTIONAL CONTROL VALVES STANDARD SPOOLS CETOP 3/NG6

TWO SOLENOIDS, SPRING CENTRED "C" MOUNTING			
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
44*		-	
05		+	
66		+	
06		+	
07*		+	
08*		+	
09*		+	
10*		+	
22*		+	
11*		+	
12*		+	
13*		+	
14*		-	
28*		-	

ONE SOLENOID, SIDE A "E" MOUNTING			
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
44*		-	
05		+	
66		+	
06		+	
08*		+	
10*		+	
12*		+	
15		-	
16		+	
17		+	
14*		-	
28*		-	

NOTE

(*) Spool with price increasing

• With spools 15 / 16 / 17 only mounting E / F are possible

• 16 / 19 / 20 / 21 spool not planned for AD3E...J*

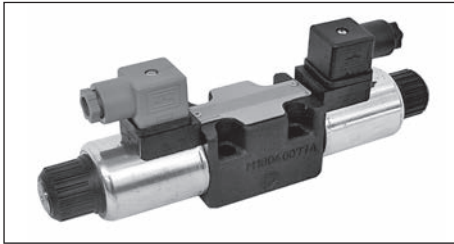
• For lever operated the spools used are different.
Available spools for this kind of valve see AD3L..

ONE SOLENOID, SIDE B "F" MOUNTING			
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
44*		-	
05		+	
66		+	
06		+	
08*		+	
09*		+	
10*		+	
22*		+	
12*		+	
13*		+	
07*		+	
15		-	
16		+	
17		+	
14*		-	
28*		-	

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

AD3E... DIRECTIONAL CONTROL VALVES SOLENOID OPERATED CETOP 3/NG6

1



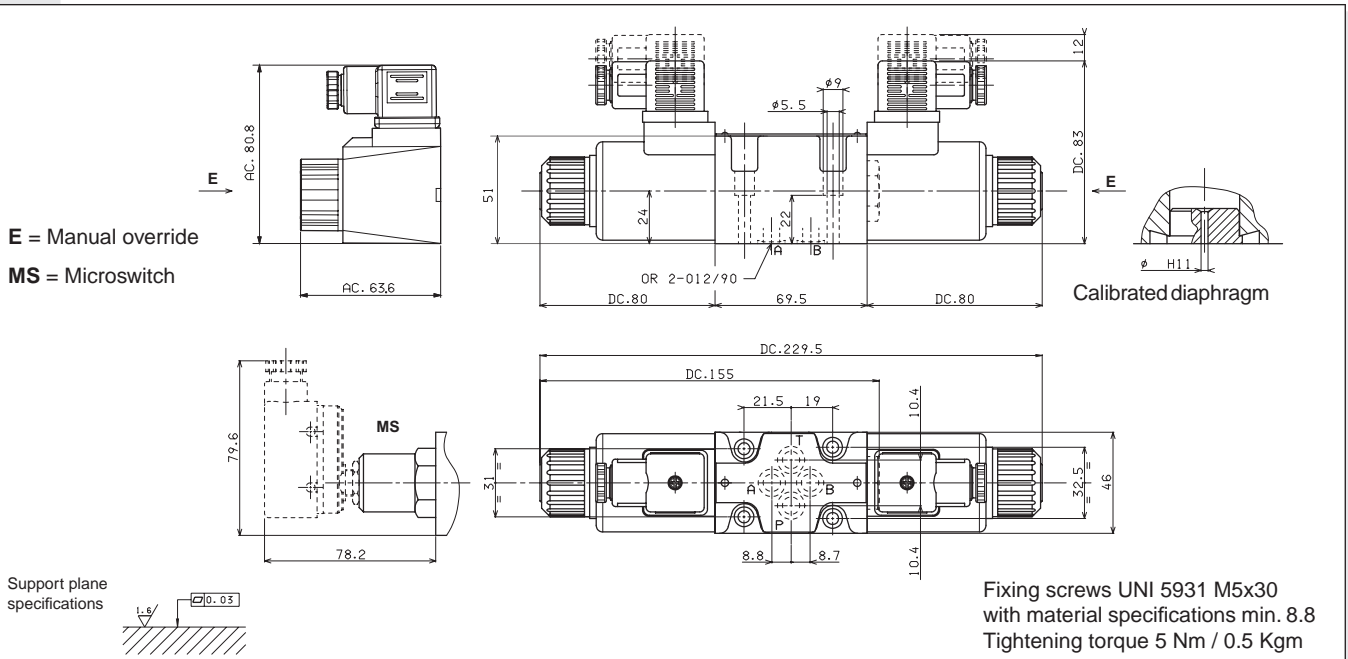
A max. counter-pressure of 8 bar at T is permitted for the variant with a microswitch (M1).
 (1) DC: Dynamic pressure allowed on P for 1 million of cycles.
 (2) DC: Dynamic pressure allowed for 2 millions of cycles.
 AC: Dynamic pressure allowed for 350.000 of cycles.
 For dynamic pressure of 100 bar are allowed 1 million cycles.

Max. pressure port P/A/B (1)	350 bar
Max. pressure port T (for DC) (2)	250 bar
Max. pressure port T (for AC) (2)	160 bar
Max. flow	80 l/min
Max. excitation frequency	3 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm ² /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 β ₂₅ ≥ 75
Weight with one DC solenoid	1,65 Kg
Weight with two DC solenoids	2 Kg
Weight with one AC solenoid	1,31 Kg
Weight with two AC solenoids	1,72 Kg

CALIBRATED DIAPHRAGMS (3)	
Ø mm	Code
blind	M52.05.0023/4
0.5	M52.05.0023/1
0.6	M52.05.0023/6
0.7	M52.05.0023/8
0.8	M52.05.0023
1.0	M52.05.0023/2
1.2	M52.05.0023/3
1.5	M52.05.0023/7
2.0	M52.05.0023/10
2.2	M52.05.0023/9
2.5	M52.05.0023/5

(3) For high differential pressure please contact our technical department.

OVERALL DIMENSIONS



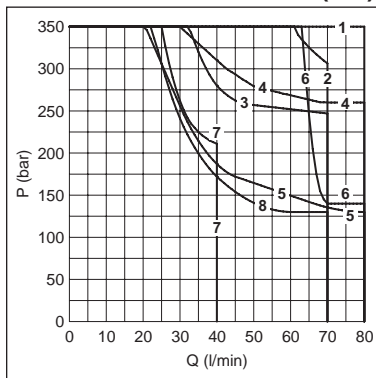
LIMITS OF USE (MOUNTING C-E-F)

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 refers 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 T). In the case 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 times: the values are indicative and depend on following parameters: hydraulic circuit, fluid used and variations in hydraulic scales (pressure P, flow Q, temperature T). The limit of use for AC solenoids were detected with 50 Hz power.

Direct current:	Energizing	30 ÷ 50 ms.	Alternating current:	Energizing	8 ÷ 30 ms.
	De-energizing	10 ÷ 30 ms.		De-energizing	15 ÷ 55 ms.

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

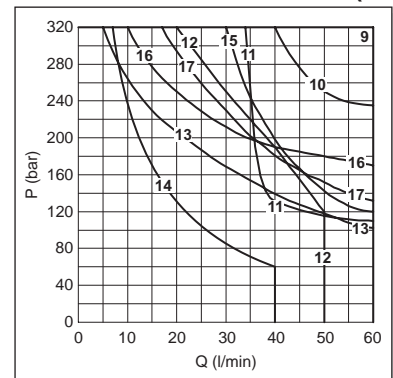
DIRECT CURRENT SOLENOIDS (DC)



Spool type	Solenoids	
	DC	AC
01	1	9
02	1	9
03	3	10
04	2	15
44	1	9
05	1	16
06-66	5	13
11-22	4	17
14-28	7	12
15	8	14
16	6	11

Curves

ALTERNATING CURRENT SOLENOIDS (AC)



AD3E...J* VALVES WITH SPOOL MOVEMENT SPEED CONTROL VARIANT J*

Valves type AD3E...J* with spool movement speed control

These ON-OFF type valves are used 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 consist of reducing the transfer section for the fluid from one solenoid to the other by means of calibrated orifices.

- 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 AD3...J* version valves, specify the orifices code.
- The operation is linked to a minimum counter-pressure on T line (1 bar min.)

- The switching time referred to the spool travel detected by a LVDT transducer can vary for the NG6 valve from a minimum of 100 to a maximum of 300 ms depending on 5 fundamental variables:

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

Max. pressure ports P/A/B	320 bar
Max. pressure port T (*)	250 bar
Max. flow	30 l/min
Max. excitation frequency	2 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm ² /s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Weight with one DC solenoid	1,65 Kg
Weight with two solenoids DC solenoids	2 Kg

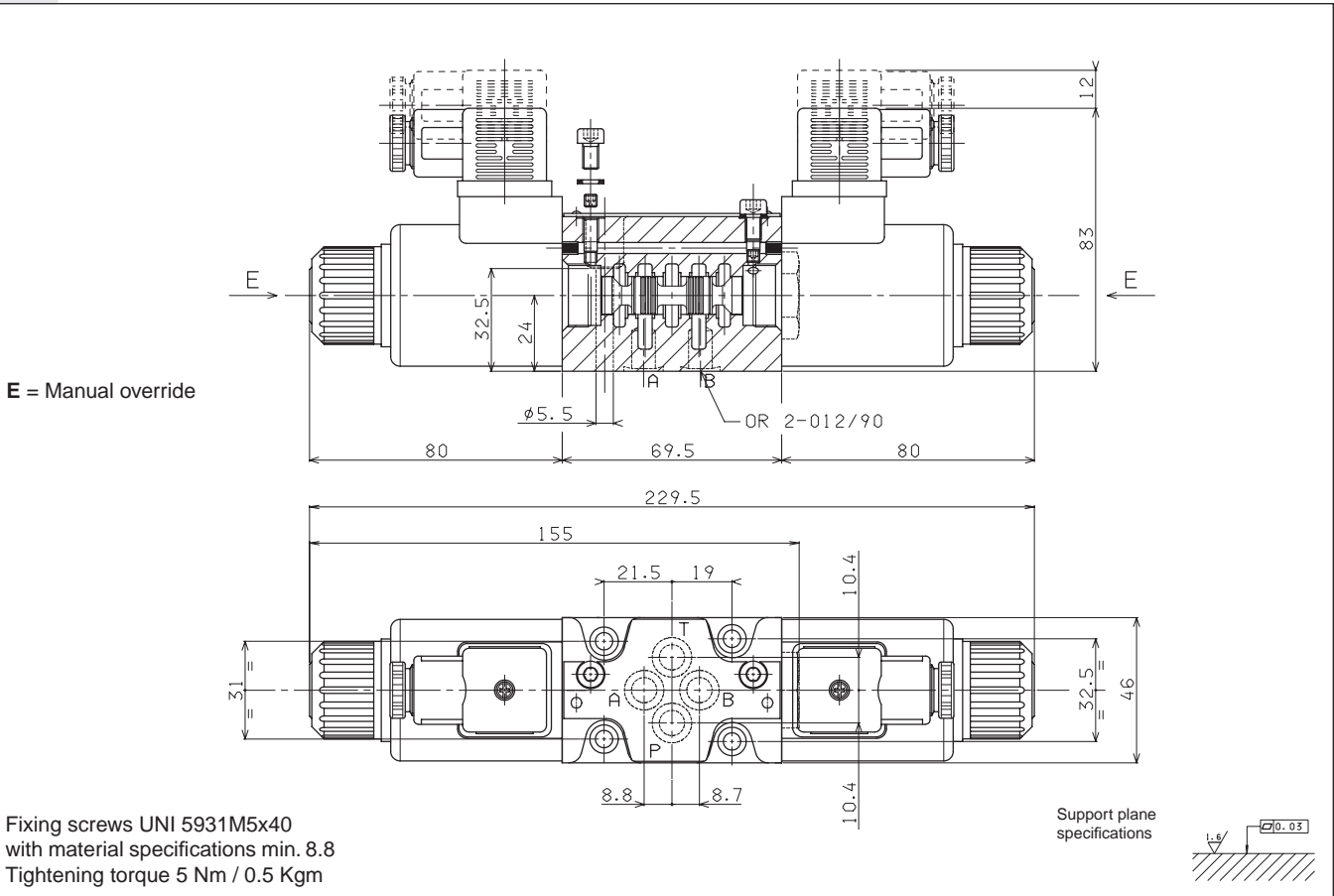
(*) Pressure dynamic allowed for 2 millions of cycles.

CALIBRATED ORIFICES AVAILABLE		
ø (mm)	M4x4	Code
0.3	M89.10.0028	3S (J3+S1)*
0.4	M89.10.0029	JS (J4+S1)*
0.5	M89.10.0006	5S (J5+S1)*
0.6	M89.10.0030	6S (J6+S1)*

* Old code

- Possible mountings: C / E / F / G / H
- 16 / 19 / 20 / 21 spools not planned for AD3E...J*

OVERALL DIMENSIONS



AD3E...KJ / 7J HIGH CORROSION RESISTANCE

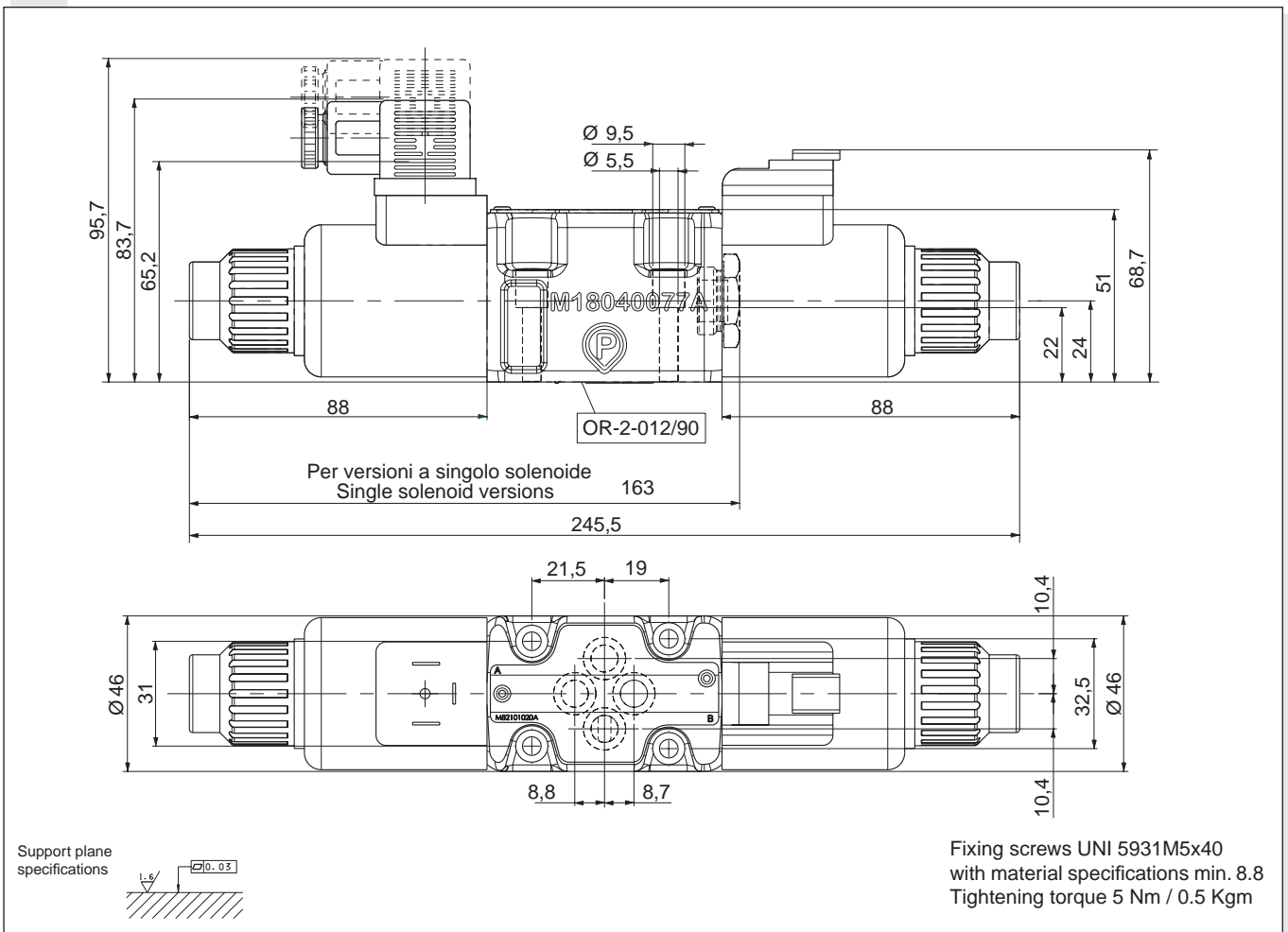
1

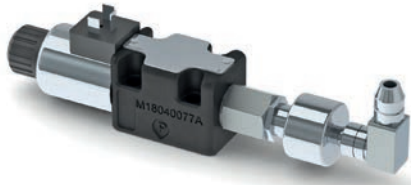


AD3EJ..	
"D15" DC COILS	CAP. I • 19
STANDARD CONNECTORS	CAP. I • 20

- This variant has a Zinc-Nickel surface treatment on metallic parts for a higher corrosion resistance
- Coil windings are sealed and outer metal housing has eCoat surface treatment
- The complete valve withstand more than 700 hours exposure of Salt Spray Test (test performer according to UNI EN ISO 9227 and evaluation according to UNI EN ISO10289).
- The plastic blind retainer is assembled as standard to protect the end surface of solenoid tube

OVERALL DIMENSIONS





AD3V...

"D15" DC COILS	CAP. I • 19
STANDARD CONNECTORS	CAP. I • 20
LVDT	CAP. I • 22

AD3V... CETOP 3/NG6 WITH PROXIMITY SENSOR LVDT

The single solenoid directional valves type AD.3.V 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 accordance 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 dynamic (**)	250 bar
Max. flow	60 l/min
Max. excitation frequency	3 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm ² /s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Type of protection (in relation to connector used)	IP 66
Weight	1,7 Kg

(*) Dynamic pressure allowed on P for 800.000 cycles.
(**) Pressure dynamic allowed for 2 millions of cycles.

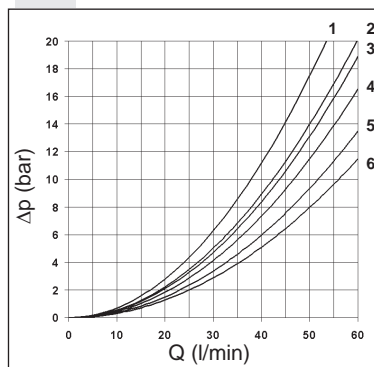
- Possible mountings: E / F / H
- The valve is supplied with DC solenoid only

ORDERING CODE

AD	Directional control valve
3	CETOP 3/NG6
V	Directional valve with single solenoid and LVDT proximity sensor
***	Spool and mounting (table 1)
*	Voltage (table 2)
**	Variants (table 3)
3	Serial No.

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

PRESSURE DROPS



Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
01	5	5	5	5	
02	6	6	6	6	5
06	5	5	6	5	
16	5	5	4	4	
17	1	3			
66	5	5	5	6	
32	1	1	2	2	

Curves No.

The diagram at side shows the Δp curves for spool in 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.

TAB.2 - VOLTAGE

D15 COIL (30W) **

L	12V	115Vac/50Hz 120Vac/60Hz with rectifier
M	24V	
V	28V*	230Vac/50Hz 240Vac/60Hz with rectifier
N	48V*	
Z	102V*	
P	110V*	Without DC coils and connectors
R	205V*	
W	Without DC coils and connectors	

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

- * Special voltage
- ** Technical data see Cap. I • 19

TAB1 - STANDARD SPOOLS FOR AD3V

POSSIBLE MOUNTING: E / F / H

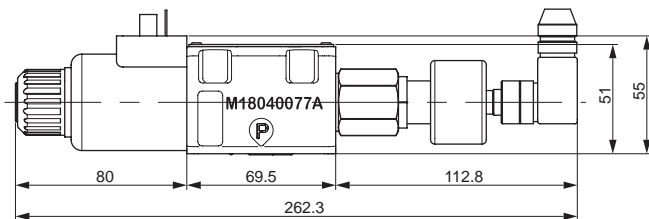
Spool type	Covering	Transient position
01E	+	
01F	+	
02E	-	
06H*	+	
16E	+	
17F	+	
66F	+	
32E	+	

(*) Spool with price increasing

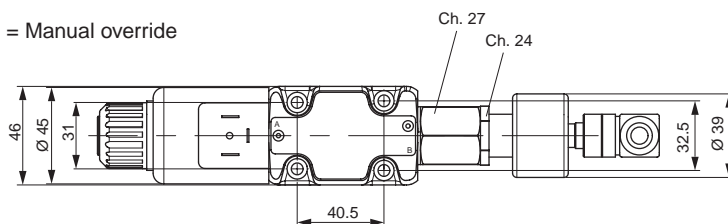
TAB.3 - VARIANTS

No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Without proximity connector LVDT	S3
Without coils and proximity connector	S4
AMP Junior coil	AJ(*)
AMP Junior coil and integrated diode	AD(*)
Coil with flying leads (175mm)	SL
Deutsch DT04-2P Coil type	CZ
Other variants available on request.	

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

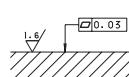


E = Manual override



Fixing screws UNI 5931 M5x30
with material specifications min. 8.8
Tightening torque 5 Nm / 0.5 Kgm

Support plane specifications



AD3L... LEVER OPERATED CETOP 3/NG6



Max. pressure ports P/A/B	320 bar
Max. pressure port T	160 bar
Max. flow	60 l/min
Lever angle	2 x 17°
Fluid viscosity	10 ÷ 500 mm ² /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 β ₂₅ ≥ 75
Weight	1,2 Kg
Weight M1 variant	1,8 Kg

AD3L...

STANDARD SPOOLS

CAP. I • 10

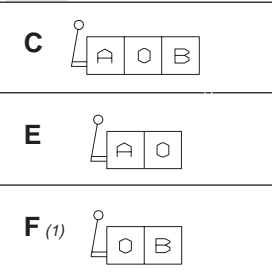
ORDERING CODE

- AD** Directional valve
- 3** CETOP 3/NG6
- L** Lever operation
- **** Spool type (see table 1)
Spool symbol see CAP. I • 10
- *** Mounting type (see table 2)
- *** Z = Valve with lever
X = Valve without lever
- *** Variants (see table 3)
- 4** Serial No.

TABLE 1 - SPOOLS TYPE

• Available spools:
01 / 02 / 03 / 04 / 05 / 06 / 06
13 / 15 / 16 / 17

TABLE 2 - MOUNTING TYPE



(1) For spools 15-16-17 the lever is mounted on site B

OVERALL DIMENSIONS

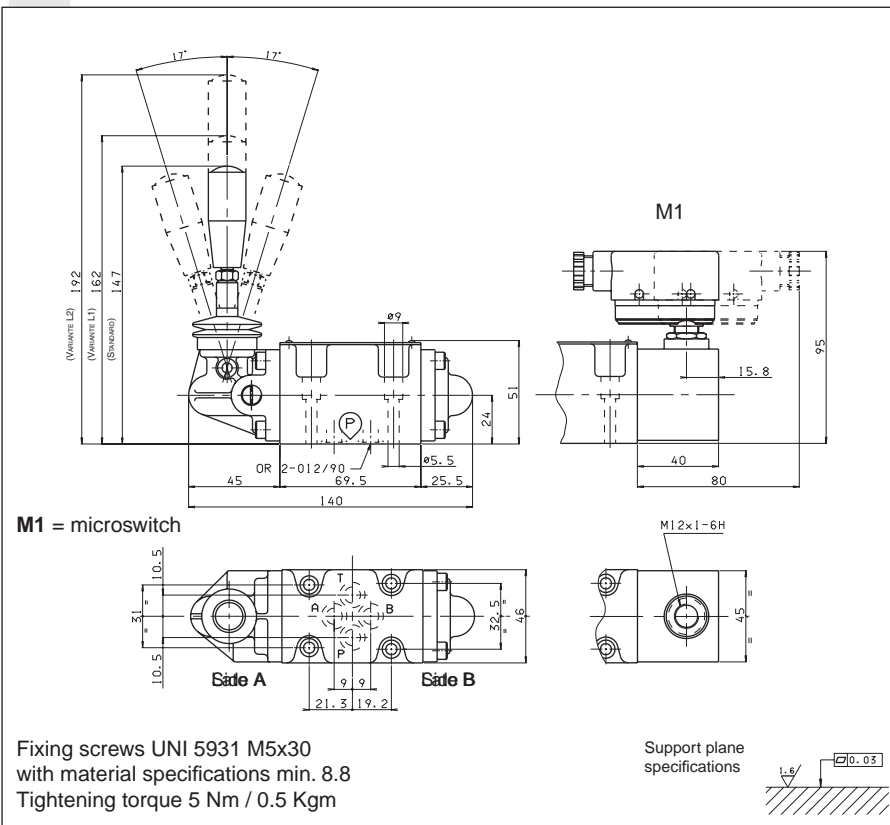
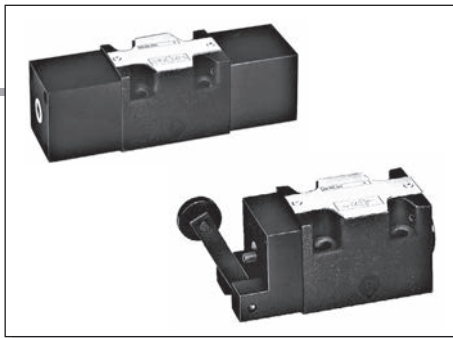


TABLE 3 - VARIANTS TABLE

VARIANTS	CODE (♦)
No variant	00
Viton	V1
Preset for microswitch Microswitch type MK code 1319098 can be ordered separately.	M1 (♦)
With detent (*) (mechanical connection) (Springs are different from those for standard versions)	D1 (♦)
Preset for microswitch + Detent (*)	MD (♦)
Lever length 162 mm	L1
Lever length 192 mm	L2
♦ Variant codes stamped on the plate	
(*) max. 150.000 cycles.	



ALTRI COMANDI

STANDARD SPOOLS	CAP. I • 10
AD3P...	CAP. I • 17
AD3O...	CAP. I • 17
AD3M...	CAP. I • 18
AD3D...	CAP. I • 18

DIRECTIONAL CONTROL VALVES

OTHER OPERATOR CETOP 3/NG6

INTRODUCTION

The directional control valves NG6 are designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 03 - 02 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-03), and can be used in all fields on account of their high flow rate and pressure capacities combined with compact overall dimensions.

The use of solenoids with wet armatures allows a very practical, safe construction completely dispensing with dynamic seals; the solenoid tube is screwed directly onto the valve chest whilst the coil is kept in position by means of a lock nut.

The special, precise construction of the ports and the improvement of the spools enables relatively high flow rates to be accommodated with a minimal pressure drop (Δp).

The centre position is obtained by means of calibrated length springs which reposition the spool in the centre or end of travel position once the action of the impulse is over.

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, $\beta_{25} \geq 75$.

ORDERING CODE

AD	Directional valve
3	CETOP 3/NG06
*	Type of operator P = Pneumatic O = Oleodynamic M = Mechanically D = Direct mechanically (For other operator see past pages)
**	Spool (see CAP. I • 10)
*	Mounting type (tab.1)
Z	No voltage
**	Variants: 00 = no variant V1 = Viton H1 = Marine version (for AD3P only) DI(*) = Internal draining (for AD3O only)
2	Serial No.

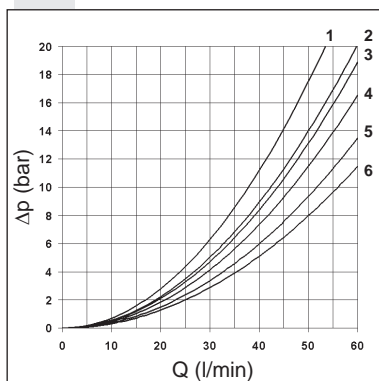
TAB.1 MOUNTING

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

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

(*)The DI variant is recommended in the environments characterised by the presence of dust or any type of contamination.

PRESSURE DROPS



Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
01	5	5	5	5	
02	6	6	6	6	5
03	5	5	6	6	
04	1	1	2	2	4
05	5	5	5	5	
06	5	5	6	5	
66	5	5	5	6	
07		4	6		
08	6	6			
09		5		5	
10	5	5	5	5	

Curve No.

Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
11	4			6	
22		4	6		
12		5	6	6	
13		5	6	6	
14	2	1	1	1	2
28	1	2	1	1	2
15 - 19	4	4	6	6	
16	5	5	4	4	
17 - 21	1	3			
18	5	5			
20	4	4	4	4	

Curve No.

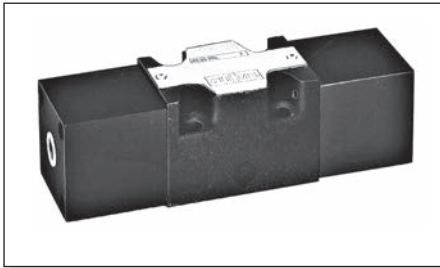
The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C. For higher flow rates than those in the diagram, the losses will be those expressed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

$$\Delta p_1 = \Delta p \times (Q_1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, Δp_1 will be the value of the losses for the flow rate Q_1 that is used.

AD3P... PNEUMATIC OPERATION TYPE VALVES CETOP 3/NG6

1



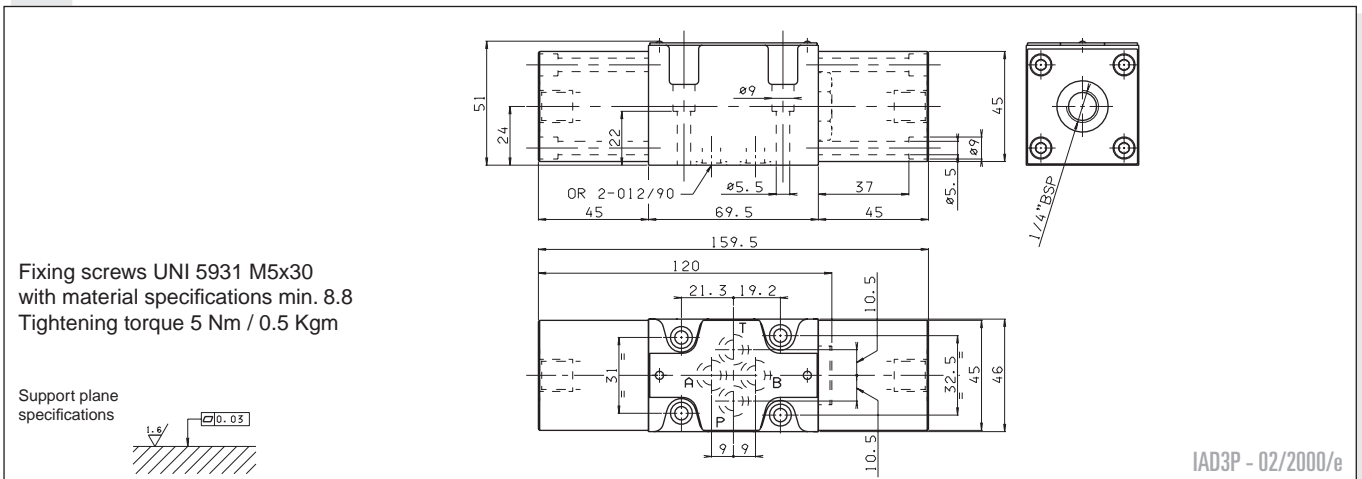
Max. pressure ports P/A/B	320 bar
Max. pressure port T	160 bar
Max. flow	60 l/min
Minimum operating pressure	$2 + [0.027 \times (pt^*)]$ bar - see note
Maximum operating pressure	20 bar
Fluid viscosity	$10 \div 500 \text{ mm}^2/\text{s}$
Fluid temperature	$-25^\circ\text{C} \div 75^\circ\text{C}$
Ambient temperature	$-25^\circ\text{C} \div 60^\circ\text{C}$
Max. contamination level	class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$
Weight single pilot	1,2 Kg
Weight twin pilot	1,8 Kg

• Possible mountings:
C/D/E/F/G/H/I/L/M

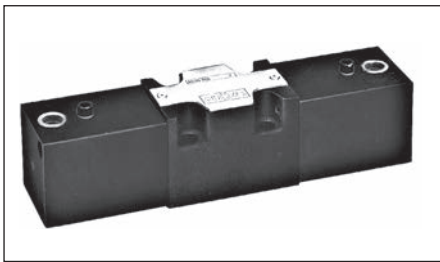
Ordering code see page before

(pt*)= pressure at port T

OVERALL DIMENSIONS



AD30... OLEODYNAMIC OPERATION TYPE VALVES CETOP 3/NG6



Max. pressure ports P/A/B	320 bar
Max. pressure port T	160 bar
Max. flow	60 l/min
Minimum operating pressure	$15 + [0.1 \times (pt^*)]$ bar - see note
Maximum operating pressure	250 bar
Fluid viscosity	$10 \div 500 \text{ mm}^2/\text{s}$
Fluid temperature	$0^\circ\text{C} \div 75^\circ\text{C}$
Ambient temperature	$-25^\circ\text{C} \div 60^\circ\text{C}$
Max. contamination level	class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$
Weight single pilot	1,5 Kg
Weight twin pilot	2,3 Kg

• Possible mountings:
C/D/E/F/G/H/I/L/M

Ordering code see page before

(pt*)= pressure at port "T".

Minimum pilot pressure depends on spool scheme, flow rate and pressure.

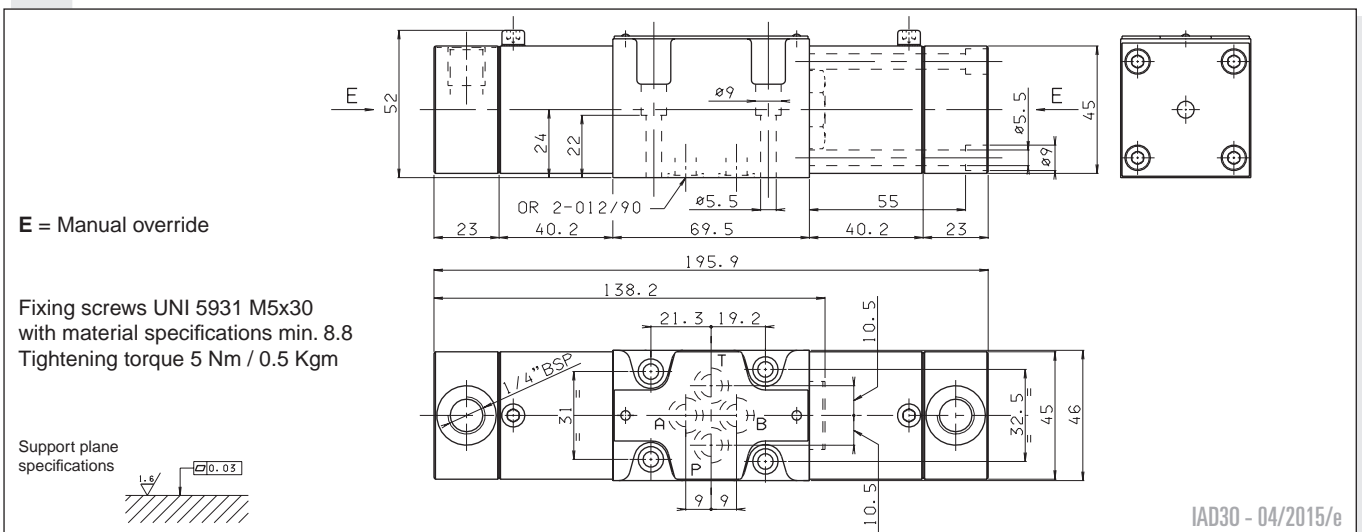
To allow the spool to return to neutral position, the pilot pressure must be below 3 bar.

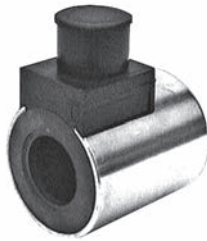
The DI variant is recommended in the environments characterised by the presence of dust or any type of contamination.

Further technical specifications (for DI variant only)

Minimum operating pressure	$[10 + (pt^*)]$ bar - see note
Maximum operating pressure	250 bar
Max. piloting leakage	1 l/min

OVERALL DIMENSIONS





"D15" DC COILS FOR CETOP 3

Type of protection (in relation to the connector used)	IP 66
Number of cycles	18.000/h
Supply tolerance	±10%
Ambient temperature	-25°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	H
Weight	0,354 Kg

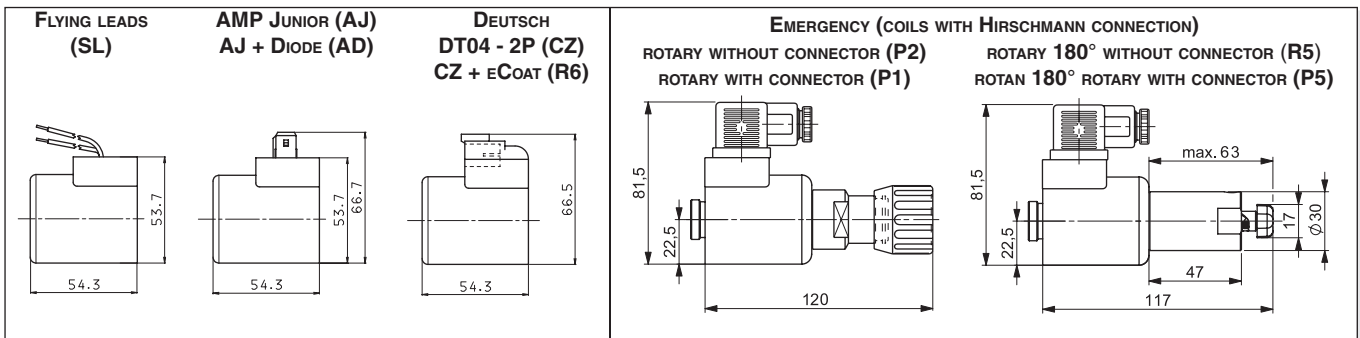
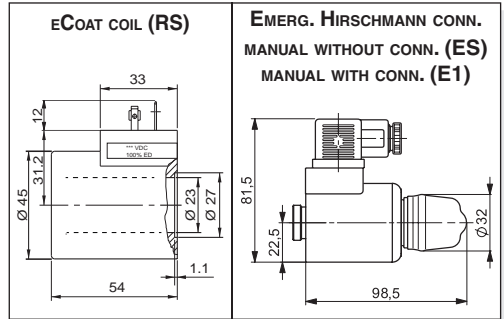
- AMP Junior coils (with or without diode) and coils with flying leads and coils type Deutsch, are available in 12V or 24V DC voltage only.
- The pastic type coil (RS variant) is available in 12V, 24V, 28V or 110V DC voltage only.

1

VOLTAGE (V)	MAX WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°C)	RATED POWER (W)	RESISTANCE AT 20°C (OHM) ±10%
12V	110°C	30	4.8
24V	110°C	30	18.8
28V*	110°C	30	25.6
48V*	110°C	30	75.2
102V(**)	110°C	30	340
110V(**)	110°C	30	387
205V(**)	110°C	30	1375

* Special voltages

** The european low voltage directive is applied to electrical 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 resistance less than 0.1 ohms.

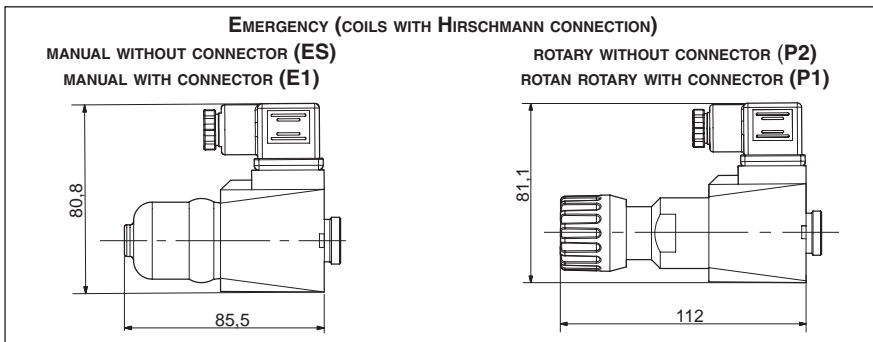


"B14" AC SOLENOIDS FOR CETOP 3

Type of protection (in relation to the connector used)	IP 65
Number of cycles	18.000/h
Supply tolerance	+10% / -10%
Ambient temperature	-30°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	H
Weight	0,436 Kg

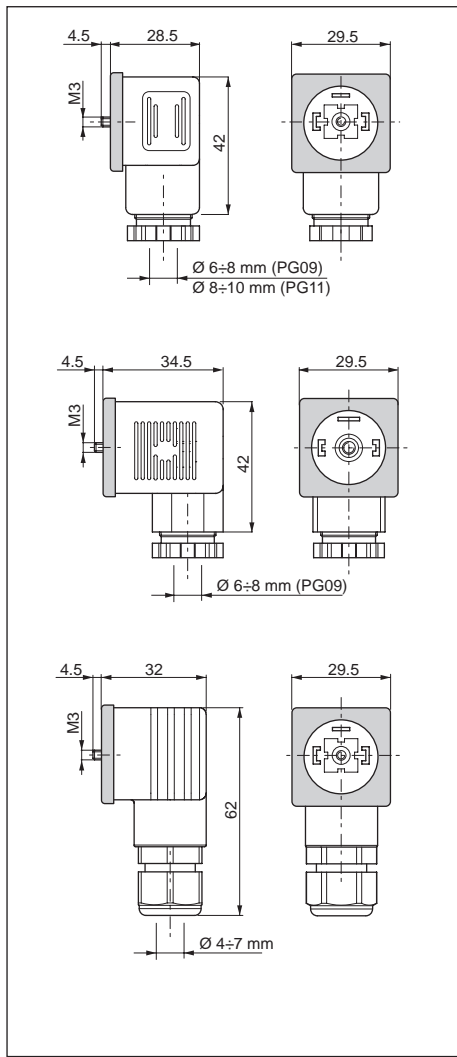
VOLTAGE (V)	MAX. WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°C)	RESISTANCE AT 20°C (OHM) ±10%	RATED POWER. (VA)	PICKUP CURRENT (A)
24V/50Hz - 24V/60Hz	100°C - 96°C	1.7	54 - 40	5.6 - 5
48V/50Hz - 48V/60Hz	112°C - 98°C	6.8	45 - 34	5.3 - 5
115V/50Hz - 120V/60Hz *	133°C - 101°C	32.5	61 - 51	3.2 - 3.2
230V/50Hz - 240V/60Hz *	120°C - 103°C	134	62 - 52	1.6 - 1.6

* The european low voltage directive is applied to electrical 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 resistance less than 0.1 ohms.



CONNECTORS DIRECTIONAL CONTROL VALVES IN ACCORDANCE WITH DIN 43650/ISO4400

1



Connector	Protection level	Type	Cable gland	Code
Standard	IP65	Black color	PG09	V86 05 0002
		Grey color	PG09	V86 05 0004
		Black color	PG11	V86 05 0006
		Grey color	PG11	V86 05 0008
Lens cover with pilot light (bipolar led) (*)	IP65	12 VAC/VDC	PG09	V86 10 0018
		24 VAC/VDC	PG09	V86 10 0012
		115 VAC/VDC	PG09	V86 10 0020
		230 VAC/VDC	PG09	V86 10 0022

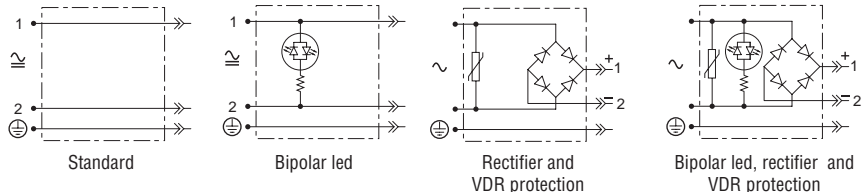
(*) Don't use for proportional versions

Connector	Protection level	Type	Cable gland	Code
With rectifier (*) Inlet voltage 12÷230 VAC Outlet voltage 9÷205 VDC	IP65	Black color	PG09	V86 20 0002
		Grey color	PG09	V86 20 0004
Lens cover with pilot light (bipolar led) and rectifier (*) Inlet voltage 12÷230 VAC Outlet voltage 9÷205 VDC	IP65	12 VAC	PG09	V86 25 0018
		24 VAC	PG09	V86 25 0019
		48 VAC	PG09	V86 25 0020
		115 VAC	PG09	V86 25 0021
		230 VAC	PG09	V86 25 0022

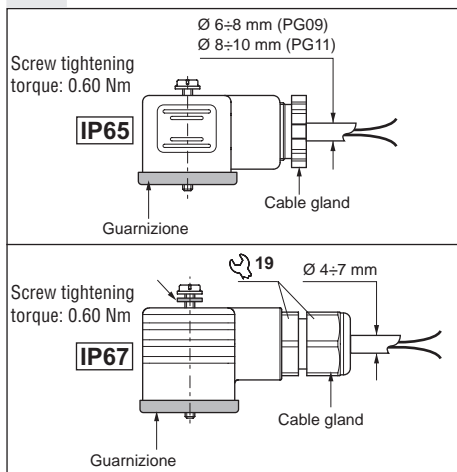
(*) Don't use for proportional versions

Connector	Protection level	Type	Cable gland	Code
With protection level IP67	IP67	Black color	—	V86 28 0001
		Grey color	—	V86 28 0002

Electrical circuits



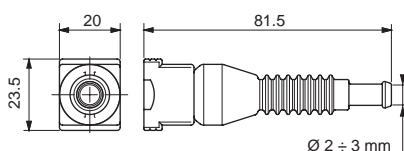
ELECTRICAL FEATURES OF CONNECTORS



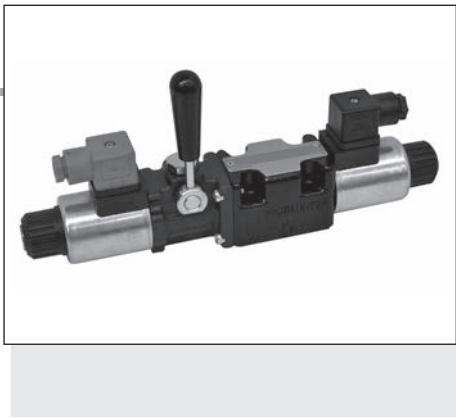
Description	IP65	IP67
AC rated voltage	Max. 250 V	Max. 250 V
DC rated voltage	Max. 300 V	Max. 300 V
Pin contact nominal current	10A	10A
Pin contact max. current	16A	16A
Max. section cable	1.5 mm ²	1.5 mm ²
Cable gland PG09 - M16x1,5	Ø cable 6 ÷ 8 mm	Ø cable 4 ÷ 7 mm
Cable gland PG11 - G 1/2" - M20x1,5	Ø cable 8 ÷ 10 mm	—
Protection level	IP65 EN60529	IP67 EN60529
Insulation class	VDE 0110-1/89	VDE 0110-1/89
Operating temperature	-40°C ÷ 90°C	-20°C ÷ 80°C

The degrees of protection indicate is guaranteed only if the connectors were properly mounted with his original seals.

AMP JUNIOR CONNECTORS



Connector	Type	Cable section	Pin contact max current	Code
AMP Junior connector Timer 2 contact	Black color	0,5 ÷ 1,5 mm ²	10A	RKRC0808000



VARIANTS (*) - EMERGENCY CONTROL LEVER FOR DIRECTIONAL CONTROL VALVES (ADC/AD3E)

The emergency control lever for solenoid valves, represents a develop in terms of safety and flexibility among applied hydraulic components.

Thanks to his flexibility, the component was designed to be inserted between the valve body and the spool, providing total interchangeability between the different types of solenoid body valves. It is compatible with the standard CETOP 3 and stackable valves with threaded connections –G3/8" or 9/16-18UNF (SAE 6). The component is available for both directional control and proportional valves (for the last type of control please contact our Technical Department) As an emergency lever applied to solenoid valves, the control can be used as a safety device in conformity with the industry standards , also playing an useful role in the event of power cuts. The control can be used in agricultural and mobile fields; the manual action can be used to carry out periodic maintenance work on mobile components of the vehicle , in perfectly safe working conditions.

(*) VARIANTS

Variant	Description
LE	Standard coil with Hirschmann connection or without coil (W voltage)
LF	Standard coil without Hirschmann connection(*)
AX	AMP Junior coil(*)
CE	Deutsch coil

Other variants available on request.

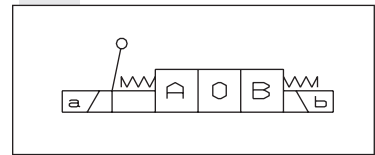
(*) Coils with Hirschmann and AMP Junior connection supplied without connectors. The connectors can be ordered separately, Cap. I • 20.

Max operating pressure port T:	
dynamic	160 bar
static	210 bar
Max operating pressure port P for series connection configuration	160 bar

- MOUNTING TYPE: C / F / H
- SPOOLS TYPE: 01/02/03*/04/16/17/66

* The spool 03 is allowed only on AD3E. Not permitted with ADC3

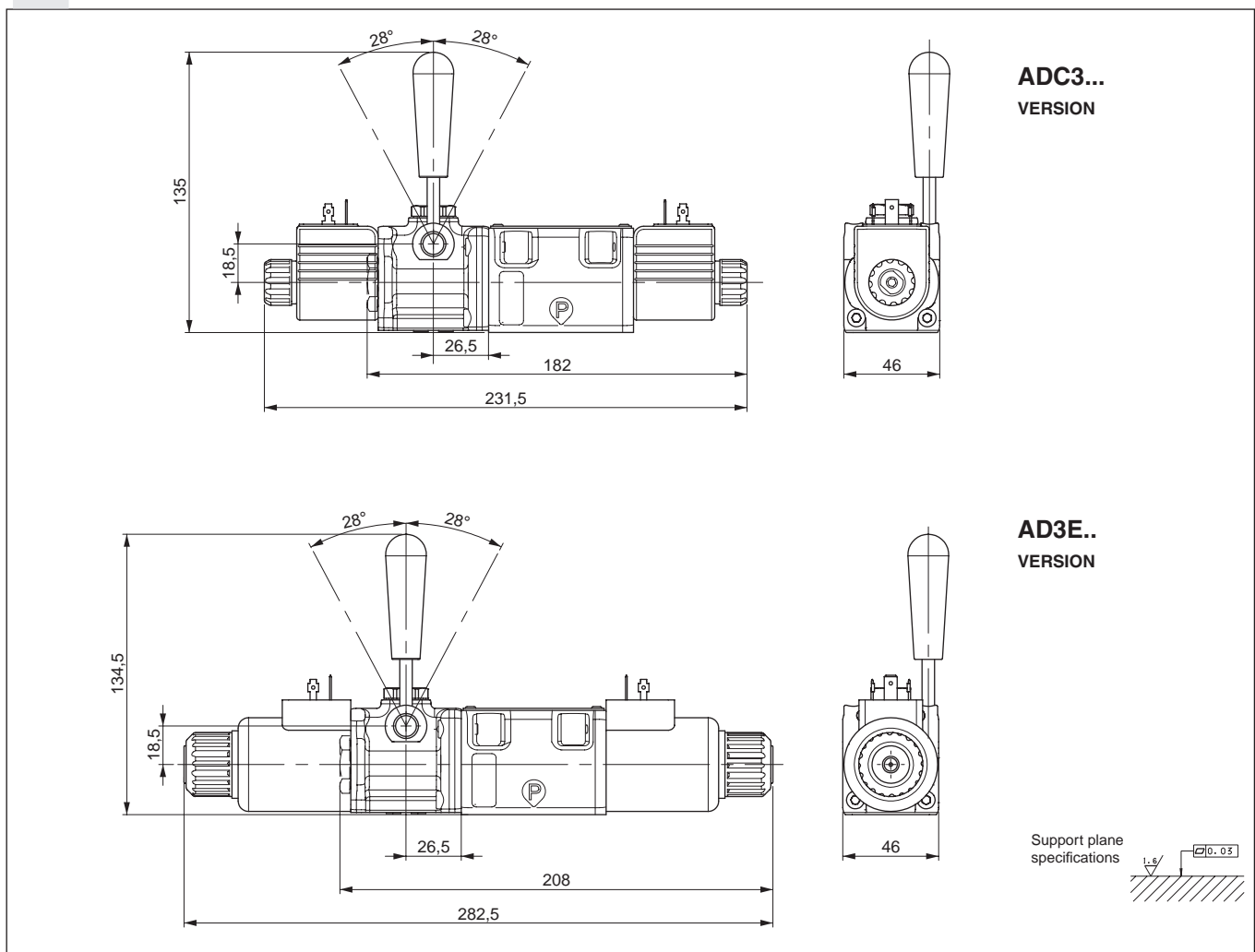
HYDRAULIC SIMBOL



MOUNTING COMPATIBILITY

CODE VALVE	DESCRIPTION	COIL	VOLTAGE
ADC3...	Directional control valve	A09	27 W
AD3E...	Directional control valve	D15	30 W

OVERALL DIMENSION



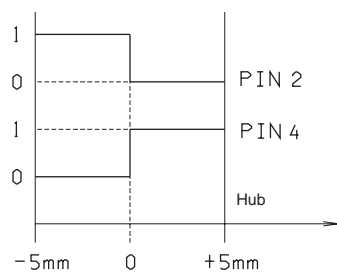
PROXIMITY SENSOR TYPE LVDT

Supply voltage	20..32 VDC
Polarity reversal protection	yes
Switching point hysteresis	≤ 0,05 mm
Reproducibility	± 0,02 mm
Max. output current	≤ 400 mA; duty ratio 100%
Protection against short circuit	yes
Operating temperature	-25°C ÷ 80°C
Connection type	connector
Protection according to DIN	IP65
Max. pressure	400 bar

CE certificate according to 89/336/EEC EMC is provided. A screened cable is needed.

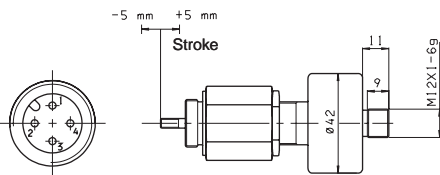
The LVDT position transducers allow to check exactly the very instant when the passage of a minimum flow is allowed.

FUNCTIONAL DIAGRAM ON PIN 2 AND 4

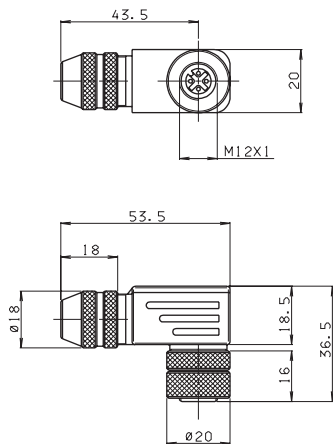


0 = Voltage Pin 2 and Pin 4 < 1,8 V
1 = Voltage Pin 2 and Pin 4 20..32 VDC

OVERALL DIMENSION LVDT



OVERALL DIMENSIONS CONNECTOR



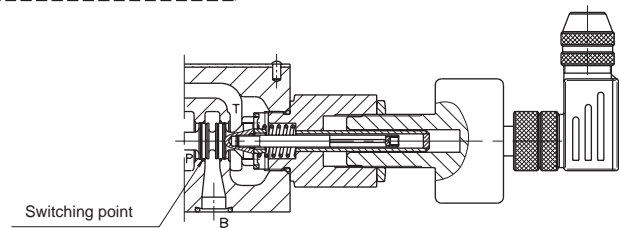
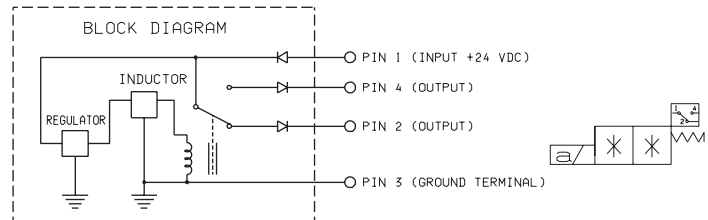
Type of protection IP67
Ambient temperature -40°C ÷ 85°C

Ordering code: V86400003

ELECTRICAL CONNECTIONS LVDT

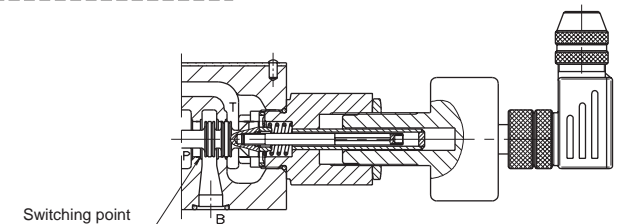
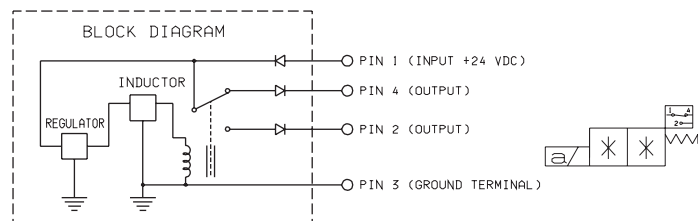
A

With this connection, on the **Pin 2** an **output signal** is active when no oil is crossing the valve (from P → B).



B

With this connection, on the **Pin 2** there is **no output signal** when oil is crossing the valve (from P → B).



NB: connecting the output to Pin 4 or Pin 2 the type of contact, normally closed or open, can be chosen.

DIRECTIONAL CONTROLE CETOP 3 IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

2014/34/UE ATEX EC DIRECTIVE (EXPLOSIVE ATMOSPHERE)

INTRODUCTION

Since 30/06/2003 products introduced into the market (or started-up) inside the EU, destined to be used in potentially explosive environments, must be in compliance with the 2014/34/UE Directive through special marking. The directive regarding ATEX products 2014/34/UE is therefore the regulation instrument that the European Union uses to obtain legislative harmonisation between the States and guarantee free circulation of goods inside the European Community itself.

The directive affirms that to eliminate obstacles from commerce it is necessary to guarantee a high level of protection and, with this aim, define the essential requirements on the subject of safety and health. The dispositions base themselves on the principle of the "new approach" (NA), for which the essential safety requirements of products must be established depending on the risk evaluation concurrent at the time of their use.

The 2014/34/UE Directive is applied to the manufacture specifications of all those products (electrical and not) destined to be used in potentially explosive environments caused, by the dangers deriving from the presence of dust or gas, with the scope of reducing the risk of use that could be derived.

The term **product** refers to appliances, protection systems, devices, components and relative combinations, as defined in 2014/34/UE Directive.

The term **appliances** intends machines, materials, fixed or mobile devices, control elements, instruments detection and prevention systems. Alone or combined these are destined for production, transport, deposit, measurement, adjustment and conversion of energy, and to the transformation of material and which, by way of the powerful triggering sources, risk causing an explosion. As a consequence, even intrinsically safe appliances re-enter within the field of application of the directive.

The combination of two or more appliance parts, as well as any other components, makes up a whole unit that can be considered a product and therefore re-enters within the field of application of the 2014/34/UE Directive. If the whole unit requires adequate **installation** (therefore it is not immediately ready for use) the attached instructions should guarantee maintenance of compliance to the 2014/34/UE Directive on installation, without further evaluations of conformity. The installer must follow the instructions correctly.

When a combination of appliances leads to a **plant** this may not re-enter within the field of application of the directive. Each part must be certified and in compliance with the directive (as well as being subject to the relative evaluation of conformity, EC marking, etc.).

The plant manufacturer must therefore presume the conformity of the various components (each supplied with conformity certificate released by the respective manufacturer) and limit their evaluation only to any additional risks that become important in the final combination. Nevertheless, if the plant manufacturer inserts parts without EC marking or components not supplied with the certificate it will be obligatory to carry out further conformity evaluation of the whole unit.

The 2014/34/UE Directive envisions **obligations of the person** who introduces products into the market and/or starts them up, whether they are manufacturer's, his agent's, importer's or any other responsible person. The dispositions and obligations envisioned by the directive for **introduction into the market** have been applied, since 30 June 2003, to every individual product, independently from the date and place of manufacture. It is the manufacturers responsibility to guarantee conformity of all products, where these re-enter within the field of application of the directive.

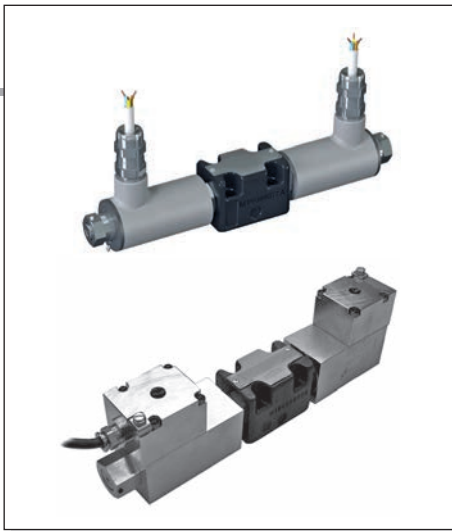
The directive does not govern the use of the appliances; rather it establishes that the products can only be used if in compliance with safety requirements at the time of their introduction into the market or of their start-up. "**Start-up**" means the first use of the products subject of the 2014/34/UE Directive on EU territory by a final user. Nevertheless, a product that is immediately ready for use and does not need assembly or installation, and whose distribution conditions (deposit, transport, etc.) are not important for performance, is considered started-up at the time of introduction into the market.

Among the main potential causes/sources of triggering an explosion, such as sparks, flames, electric arcs etc., **maximum surface temperature** also plays an important role. The dispositions of the directive establish evaluation criteria for the maximum temperature admissible depending on the type of explosive atmosphere in which the appliance must operate.

For environments characterised by the presence of **gas-air**, some temperature values are supplied to which the appliances must refer. They are indicated by the letter T followed by a number. The criterion to apply is that for which the temperature of the appliance must never exceed 80% of the value indicated for its own category.

For environments characterised by the presence of **dust-air**, to prevent setting on fire of the airborne dust, the surface temperature of the appliances must be decidedly lower than the predictable temperature of catching fire of the air+dust mixture. Therefore, during planning the maximum working surface temperature must be declared directly (in degrees centigrade).

Increases in temperature deriving from an accumulation of heat and chemical reactions must also be taken into consideration. The thickness of the deposited layer of dust must also be considered and, if necessary, limit the temperature, to prevent an accumulation of heat.



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ATEX CLASSIFICATION	CAP. I • 24
SERIES AD3XD...	CAP. I • 25
SERIES AD3XG...	CAP. I • 29

1

CLASSIFICATIONS OF AREA - MIX - GROUP AND RELATIVE CATEGORY – ACCORDING TO ATEX DIRECTIVES

1

The 2014/34/UE Directive is a “new approach” directive based on risk analysis. Its objective is to minimise the risks deriving from the use of some products indoors or in relation to a potentially explosive atmosphere. The probability of an explosive atmosphere manifesting must be considered not only as “one-off” or from a static point of view: all operative conditions that can derive from the transformation process must be taken into consideration.

- An **explosive atmosphere** for the 2014/34/UE Directive is made up from a mixture of inflammable substances (as gas, vapours, mists and dust), with air, in determined atmospheric conditions in which, after triggering, the combustion propagates together with the unburned mixture.

- An atmosphere susceptible to transforming into an explosive atmosphere because of local and/or operative conditions is defined **potentially explosive atmosphere**.

Explosive atmospheres are not only formed in the presence of obviously dangerous substances such as fuel, solvents etc., but also in the presence of apparently harmless products such as wood dust, metal dusts, flour, grain, sugar etc. Therefore it can concern not only industries in the chemical or oil industry sectors, but also industries in the foodstuffs, textile, manufacturing etc.. It is important to consider that to re-enter within the 2014/34/UE Directive a product must be applied in presence of one or more of the characteristic elements listed above: *presence of inflammable substances and air, in atmospheric conditions that favour the propagation of combustion*. The directive does not define the atmospheric conditions itself. The relative norms indicate a temperature range, but this does not exclude that the products may be planned and evaluated specifically to occasionally function outside of this range, introducing the opportune construction transformations.

To define a **conformity evaluation procedure** adequate for the directive, the Manufacturer must, on the basis of the declared use, establish the products functioning conditions (this means to say, envision the type of working area, the type of explosive mixture with which it will come into contact and the level of probability that an explosive atmosphere verifies itself); successively he must establish to which Group the product belongs and individualise the category inside the Group.

With the Atex 99/92/EC Directive (For the safety of workers) the working conditions in which products in compliance with Atex 99/92/EC Directive will function are indicated here. These are expressed in “**Areas**” and defined according to the level of probability that a potentially explosive atmosphere is verified, respectively for every type of atmosphere (gas-air mix or dust-air mix).

Area 0 and 20 Places in which an explosive atmosphere is constantly present or present for long periods or frequently.

Area 1 and 21 Places in which an explosive atmosphere is probable. It is verified in normal functioning and exercise conditions.

Area 2 and 22 Places in which an explosive atmosphere has low probability of being verified or, if it occurs only lasts for a brief period of time.

GAS-AIR-TYPE EXPLOSIVE MIXTURE (G)

The products destined to work in environments characterised by this type of explosive atmosphere will be respectively indicated for Area **0, 1 or 2** depending on the Group and category of origin (see below) and are marked with the letter G.

DUST-AIR-TYPE EXPLOSIVE MIXTURE (D)

The products destined to work in environments characterised by this type of explosive atmosphere will be respectively indicated for Area **20, 21 or 22** depending on the Group and category of origin (see below) and are marked with the letter D.

GROUP I

Includes the appliances destined to be used in underground jobs in the mines and their surface plants, exposed to the risk of the release of firedamp and/or combustible dust. The subdivision into categories depends on the fact if the power supply must be interrupted or not if an explosive atmosphere manifests due to a mixture of air and gas, vapours mists (D) or a mixture of air and dust (G).

Category **M1 Very high protection level**. These products must be able to remain operative, for safety reasons, in the presence of an explosive atmosphere and present specific performances or protection configurations for breakdown in case of explosion.

Category **M2 High protection level**. The power supply to these products must be interrupted in the presence of an explosive atmosphere. Protection means must be incorporated to guarantee the level of protection during normal functioning and also in oppressive working conditions or resulting from great stress.

GROUP II

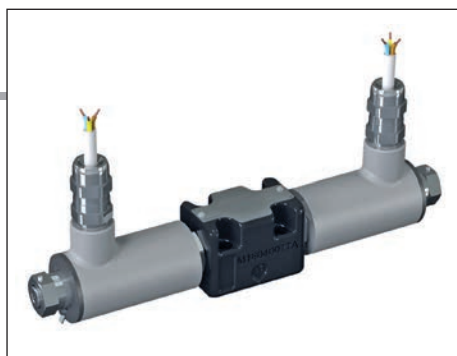
Includes appliances destined to be used in different environments (from the mines) in which there is a probability that an explosive atmosphere manifests itself. Their subdivision into categories depends on two factors: the place, where the product will be used and if the probability that a potentially explosive atmosphere, owing to the mixture of air and gas, vapours, mists (D) and the mixture of air and dust (G), comes about in a constant or occasional manner and if it does occur, does this possibility remain for long or brief period of time.

Category 1 Very high protection level. These products must be planned to function in compliance with operative parameters established by the Manufacturer in environments in which there is a high probability that explosive atmospheres are always detected or manifest often or for long periods of time. They must present specific performances or protection configurations for breakdown in case of explosion.

Category 2 High protection level. These products must be planned to function in compliance with operative parameters established by the Manufacturer in environments in which there is a high probability that explosive atmospheres can manifest. Protection against explosions relative to this category must function in a way to guarantee the required safety level even in the presence of functioning defects of the appliances or in dangerous operative conditions, which frequently must be taken into consideration.

Category 3 Normal protection level. These products must be planned to function in compliance with operative parameters established by the Manufacturer in environments in which there is a slight probability that explosive atmospheres can manifest, and however only rarely or for a brief period of time. This type of product belonging to the category in question must guarantee the safety level required in normal functioning conditions.

AD3XD... DIRECTIONAL CONTROLE CETOP 3 IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE



**SOLENOID VALVES FOR USE IN WORKPLACES WHERE EXPLOSIVE ATMOSPHERES
MAY OCCUR DUE TO THE PRESENCE OF GAS, VAPOUR OR MIST AND DUST.**

1

AD3XD...	
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ATEX CLASSIFICATION	CAP. I • 24
SERIES AD3XD...	CAP. I • 25
TECHNICAL SPECIFICATIONS	CAP. I • 25
ORDERING CODE	CAP. I • 25
TAB.1 ASSEMBLY	CAP. I • 26
TAB.2 VOLTAGES	CAP. I • 26
TAB.3 SPOOL	CAP. I • 26
LIMITS OF USE	CAP. I • 26
IDENTIFICATION NAMEPLATE	CAP. I • 27
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AD3.XD solenoid valves are classified in:

Group II appliances (to be used in workplaces, apart from mines, where there is the probability of explosive atmospheres);

Category 2 (high protection level), for use in workplaces where it is probable that an explosive atmosphere may form in normal working conditions and classified by the presence of explosive mixtures of gas-dust type (letter **GD**) for zones **1, 2** and **21, 22**.

Group I (They are intended to be used in mines with gas firedamp);

Category M2 (high level of protection), they are intended for use in underground environment in mines and their surface installations, exposed to the likely risk of the release of firedamp and / or combustible dust under normal operating conditions.

These valves are therefore designed especially and manufactured in compliance with the ATEX 2014/34/UE Directive and according to European regulations EN 1127-1, EN 1127-2, EN 13463-1 and EN 13463-5.

Belonging to the "NG06 direction control" range, these valves are prepared for plate-mounting with attachment surface in compliance with UNI ISO 4401 - 03 - 02 - 0 - 94 (former CETOP R 35 H 4.2-4-03). They are activated electrically and the centre position is ensured by springs with gauged lengths, which once the pulse or command ceases, re-position the spool in the centre or at the end of travel position.

The coils used for these valves are subject to separate conformity certification, according to the ATEX Directive (EC-type). For further specifications, please consult the documents that are always supplied with the valve.

Before marking and marketing the valves of the AD3XD series, undergo tests and inspections according to the in-house Manufacturing System and to the Certified Company Quality System in compliance with ISO 9001:2008. All of the AD3XD valve series undergo 100% functional testing. These tests and inspections guarantee that the products sold comply with all the information reported in the Technical Specifications File registered and declared by marking with AD3X/ATEX/10.

ORDERING CODE

AD	Directional Control Valve
3	CETOP 3/NG06
XD	Solenoid valves built pursuant to ATEX Directive-2014/34/UE. With coils in explosion-proof version (Ex d) and IECEx conformity marked
**	Spools 01/02/03/04/16 (tab.3). For further hydraulic diagrams, contact our Customer Service
*	Assembly C / E / F / G / H (tab.1). For further assembly instructions, contact our Customer Service
*	Voltage (tab.2)
**	Variants 00 = None V1 = Viton LE = Emergency lever T6 = Suitable for temperature class I M2 Group T6 (<85°C) (mine)
2	Serial number

TECHNICAL SPECIFICATIONS

Description	AD3XD...	T6 version (mine)
Valve marking	CE Ex II 2GD/I M2 cT5	CE Ex II 2GD/I M2 cT6
Max. pressure on lines P/A/B	320 bar	320 bar
Max. pressure on line T (dynamic)	250 bar	250 bar
Max. flow rate	60 l/min	60 l/min
Max. excitation frequency	3 Hz	3 Hz
Duty cycle	100%ED	100%ED
Hydraulic fluids	mineral oils DIN 51524	mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm ² /s	10 ÷ 500 mm ² /s
Fluid temperature (*)	-20°C ÷ +40°C	-20°C ÷ +40°C
Ambient temperature	-20°C ÷ +40°C	-20°C ÷ +40°C
Max. contamination level	NAS 1638: class 10 with filter β ₂₅ ≥ 75	NAS 1638: class 10 with filter β ₂₅ ≥ 75
Weight (one solenoid)	2,37 kg	2,37 kg
Weight (two solenoids)	3,82 kg	3,82 kg
Solenoid rated power:	6,5 ÷ 11W	
Degree of protection:	IP 67	
Power supply tolerance:	±10%	
Power supply cable:	standard length 3 m with cable gland	
Solenoid marking (**):	consult documents supplied with solenoid	
Surface temperature:	function of the power. Consult documents supplied with solenoid.	

(*) For use with different hydraulic fluids, which do not constitute an effective ignition source in potentially explosive atmospheres IIC across the range of temperatures and pressures required by the unit marking, contact our technical department.

(**) Solenoid is provided with marking for protection class according to Explosion Protection Directive ATEX-2014/34/UE and IECEx certificate of conformity mark.

AD3XD... DIRECTIONAL CONTROLE CETOP 3

IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

1

TAB.1 ASSEMBLY

STANDARD	
C	Two solenoids centred
E	One solenoid (side A)
F	One solenoid (side B)
Specials (with increased price)	
G	Special G
H	Special H

TAB.2 VOLTAGES

AC Voltage	
A	24V 50Hz/60Hz
C	110V 50Hz/60Hz
D	220V 50Hz/60Hz
I	230V 50Hz/60Hz
DC Voltage	
L	12V
M	24V
P	110V
N	48V

The tension symbol is always printed on the nameplate.

TAB.3 SPOOL

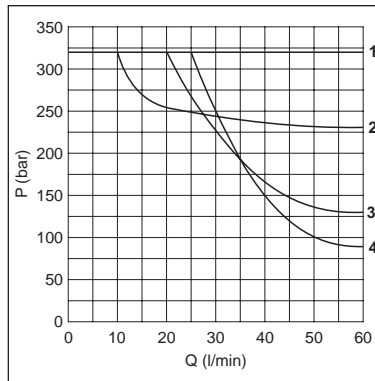
Two solenoids - Assembly C			
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	

One solenoid - Assembly E			
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
16		+	

One solenoid - Assembly F			
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
16		+	

(*) spool with increased price

LIMITS OF USE (MOUNTING C-E-F)



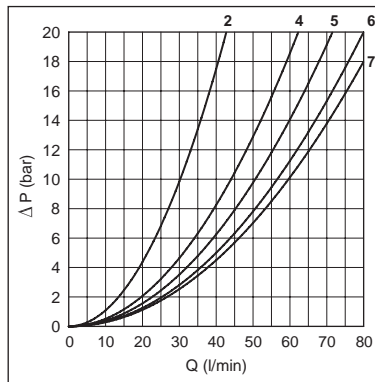
NOTE: the operating limits shown are valid for C fittings, E, F.

Spool type	Curve
01	2
02	1
03	3
04	4
16	1

The tests have been carried out with solenoids at operating temperature with 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 refers to tests carried out with the oil flow in two direction simultaneously (e.g.. from P to A and in the same time B to T).

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

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:

$$\Delta p_1 = \Delta p \times (Q_1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, Δp_1 will be the value of the losses for the flow rate Q_1 that is used.

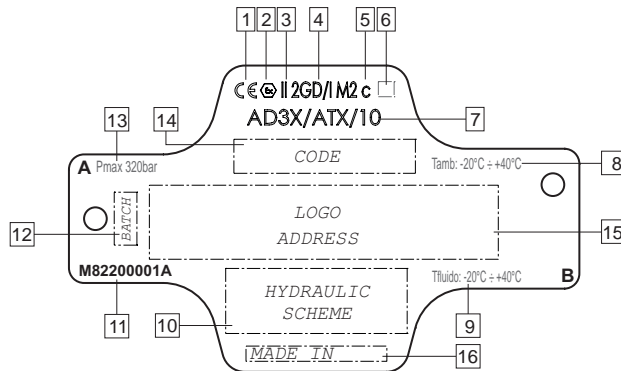
Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
01	5	5	5	5	
02	7	7	7	7	6
03	5	5	6	6	
04	2	2	2	2	4
16	5	5	4	4	

Curve No.

AD3XD... DIRECTIONAL CONTROLE CETOP 3

IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

IDENTIFICATION NAMEPLATE AND MARKING



All the solenoid valves are supplied with **identification nameplate and Declaration of conformity** subject to Directive 2014/34/UE.

The identification nameplate bears the main technical specifications related to the functional and constructional characteristics of the valve and **must therefore be kept intact and visible**.

1	CE	Conformity to European Directive
2	Ex	Conformity to ATEX Directive 2014/34/UE
3	II 2 I	Group II (surface places) Group I (mine) Category 2 (high protection)
4	GD M	Explosive atmosphere: GD: presence of gas, vapour or mist and combustible dust M: presence of firedamp atmospheres
5	c	Constructional safety
6	T*	Temperature class: T5 (T _{sur} < 100 °C) T6 (T _{sur} < 85 °C) T6 version (mine)
7	AD3X/ ATX/10	Reference to Technical File registered c/o Notified Body
8	T amb	Working ambient temperature: - 20°C ÷ + 40°C series AD3XD

9	T fluid	Working fluid temperature: - 20°C ÷ + 40°C series AD3XD
10	HYDRAULIC SCHEME	Type of hydraulic control performed by the valve
11	M82200001A	Nameplate code
12	BATCH	Reference number of technical order (batch)
13	Pmax 320 bar	Max working pressure
14	CODE	Complete reference number of valve ordering code
15	LOGO ADDRESS	Logo and address
16	MADE IN	Preferential origin

SAFETY INSTRUCTIONS

- Read the instruction handbook supplied with the valves carefully before installation. All maintenances must be carried out following the instructions given in the manual.
- The AD3XD series valves must be installed and serviced in compliance with plant engineering and maintenance regulations for workplaces classified against the risk of explosion due to the presence of gas and dust and gas (for example: CEI EN 60079-14, CEI EN 60079-17, CEI EN 61241-14, CEI EN 61241-17 or other national regulations/standards).
- The valves must be connected to earth using the special anti-loosening and anti-rotation connection element.
- For all safety aspects related to the use of the coils, consult the relative use and maintenance instructions. The electrical appliances/components must not be opened when live.
- The user must periodically inspect, based on the conditions of use and the substances used, the presence of scale, dirt, the state of wear and tear and correct efficiency of the valves.

Attention: all installation and maintenance jobs must be carried out by qualified personnel.

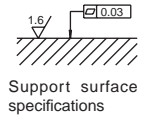
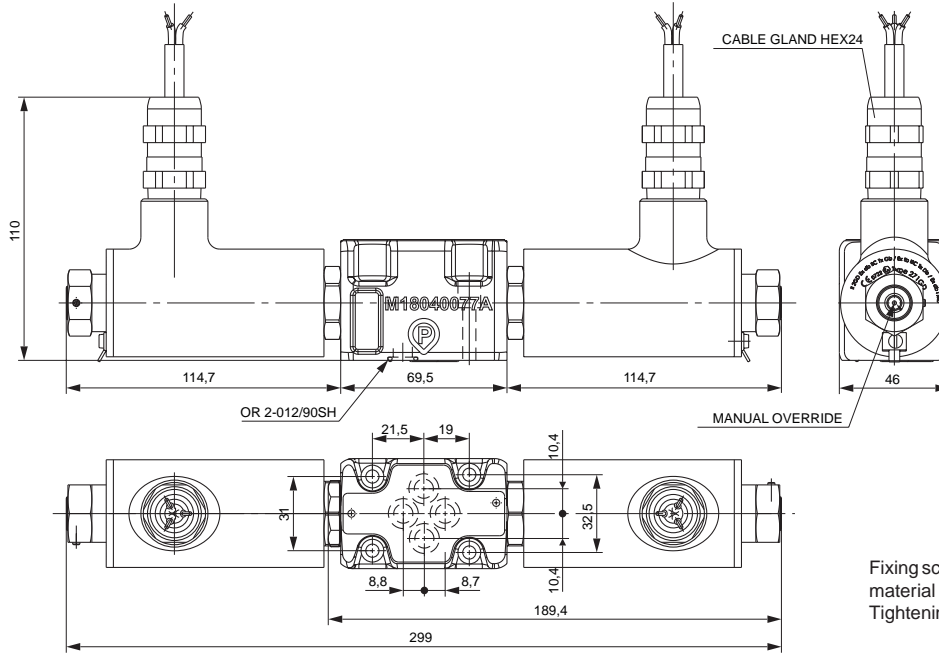
AD3XD... DIRECTIONAL CONTROLE CETOP 3

IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

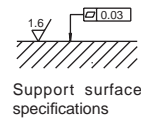
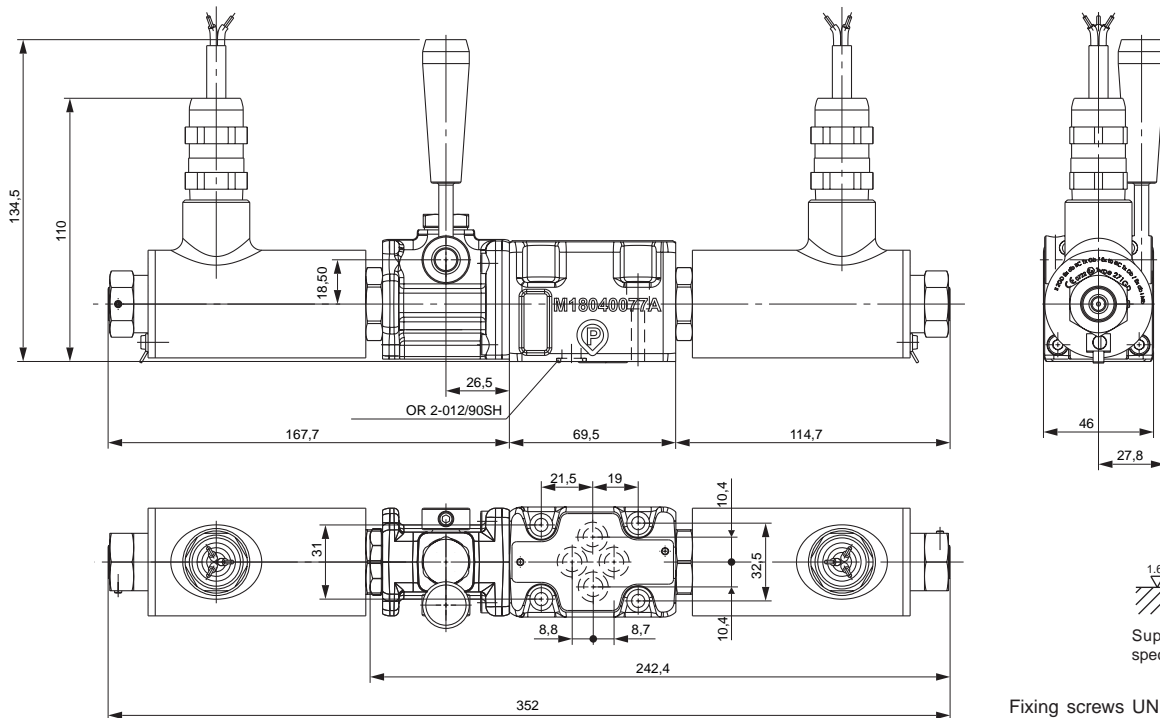
OVERALL DIMENSIONS

1

AD3XD...

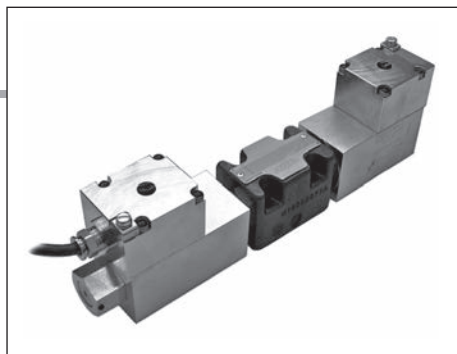


Fixing screws UNI 5931 M5x30 with material specification min. 8.8
Tightening torque 5 Nm / 0.5 kgm



Fixing screws UNI 5931 M5x30 with material specification min. 8.8
Tightening torque 5 Nm / 0.5 kgm

AD3XG... DIRECTIONAL CONTROLE CETOP 3 IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE



**SOLENOID VALVES FOR USE IN WORKPLACES WHERE EXPLOSIVE ATMOSPHERES
MAY OCCUR DUE TO THE PRESENCE OF GAS, VAPOUR OR MIST AND DUST.**

1

AD3XG...

ATEX DIRECTIVE	CAP. I • 23
ATEX CLASSIFICATION	CAP. I • 24
SERIES AD3XG...	CAP. I • 29
TECHNICAL SPECIFICATIONS	CAP. I • 29
ORDERING CODE	CAP. I • 29
TAB.1 ASSEMBLY	CAP. I • 30
TAB.2 VOLTAGES	CAP. I • 30
TAB.3 SPOOL	CAP. I • 30
LIMITS OF USE	CAP. I • 30
IDENTIFICATION NAMEPLATE	CAP. I • 31
SAFETY INSTRUCTIONS	CAP. I • 31
OVERALL DIMENSIONS	CAP. I • 32

AD3XG solenoid valves are classified in:

Group II appliances (to be used in workplaces, apart from mines, where there is the probability of explosive atmospheres);

category 2 (high protection level), for use in workplaces where it is probable that an explosive atmosphere may form in normal working conditions and classified by the presence of explosive mixtures of gas-dust type (letter **GD**) for zones **1, 2** and **21, 22**.

These valves are therefore designed especially and manufactured in compliance with the ATEX 2014/34/UE Directive and according to European regulations EN 1127-1, EN 1127-2, EN 13463-1 and EN 13463-5.

Belonging to the "NG06 direction control" range, these valves are prepared for plate-mounting with attachment surface in compliance with UNI ISO 4401 - 03 - 02 - 0 - 94 (former CETOP R 35 H 4.2-4-03). They are activated electrically and the centre position is ensured by springs with gauged lengths, which once the pulse or command ceases, re-position the spool in the centre or at the end of travel position.

The coils used for these valves are subject to separate conformity certification, according to the ATEX Directive (EC-type). For further specifications, please consult the documents that are always supplied with the valve.

Before marking and marketing the valves of the AD3XG series, undergo tests and inspections according to the in-house Manufacturing System and to the Certified Company Quality System in compliance with ISO 9001:2008. All of the AD3XG valve series undergo 100% functional testing. These tests and inspections guarantee that the products sold comply with all the information reported in the Technical Specifications File registered and declared by marking with AD3X/ATEX/10.

ORDERING CODE

AD	Directional Control Valve
3	CETOP 3/NG06
XG	Solenoid valves built pursuant to ATEX Directive-2014/34/UE. With coils in explosion-proof version (Ex d) and IECEx conformity marked.
**	Temperature Class T4 (T _{sur} < 135 °C) T6 (T _{sur} < 85 °C)
**	Spools 01/02/03/04/16 (tab.3). For further hydraulic diagrams, contact our Customer Service
*	Assembly C / E / F / G / H (tab.1). For further assembly instructions, contact our Customer Service
*	Voltage (tab.2)
**	Variants 00 = None V1 = Viton LE = Emergency lever
1	Serial number

TECHNICAL SPECIFICATIONS

Description	AD3XG T4...	AD3XG T6...
Valve marking	CE Ex II 2 GD cT4	CE Ex II 2 GD cT6
Max. pressure on lines P/A/B (1)	350 bar	350 bar
Max. pressure on line T (dynamic) (2)	250 bar	250 bar
Max. flow rate	80 l/min	80 l/min
Max. excitation frequency	3 Hz	3 Hz
Duty cycle	100%ED	100%ED
Hydraulic fluids	mineral oils DIN 51524	mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm ² /s	10 ÷ 500 mm ² /s
Fluid temperature (3)	-30°C ÷ +70°C	-30°C ÷ +70°C
Ambient temperature	-40°C ÷ +80°C	-40°C ÷ +50°C
Max. contamination level	ISO 4406:1999: class 21/19/16	ISO 4406:1999: class 21/19/16
(filter β ₂₅ ≥ 75)	NAS 1638: class 10	NAS 1638: class 10
Weight (one solenoid)	3 kg	3 kg
Weight (two solenoids)	5 kg	5 kg
Coil rated power	8,5 W	8,5 W
Degree of protection	IP 67	IP 67
Power supply tolerance	±10%	±10%
Power supply cable	standard length 3m with cable gland	standard length 3m with cable gland
Coil marking (4):	consult documents supplied with coil	consult documents supplied with coil
Surface temperature	< 135°C	< 85°C

(1) Dynamic pressure allowed on P for 800.000 cycles.

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

(3) AD3XG valves have been certified for minimum fluid temperatures up to -30°C. Please contact our Technical department for applications at fluid temperatures < -25°C.

(4) Coil is provided with marking for protection class according to Explosion Protection Directive ATEX-2014/34/UE and IECEx certificate of conformity mark.

AD3XG... DIRECTIONAL CONTROLE CETOP 3

IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

1

TAB.1 ASSEMBLY

STANDARD	
C	Two solenoids centred
E	One solenoid (side A)
F	One solenoid (side B)
Specials (with increased price)	
G	
H	

TAB.2 VOLTAGES

AC Voltage for AD3XG	
A	24V 50Hz/60Hz
B	48V 50Hz/60Hz
C	110V 50Hz/60Hz
D	220V 50Hz/60Hz
I	230V 50Hz/60Hz
DC Voltage for AD3XG	
L	12V
M	24V
P	110V
N	48V
U	36V
6	60V
G	125V

The tension symbol is always printed on the nameplate.

TAB.3 SPOOL

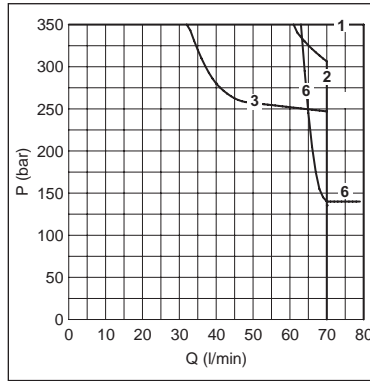
Two solenoids - Assembly C			
Spool type	Covering	Transient position	
01	+		
02	-		
03	+		
04*	-		

One solenoid - Assembly E			
Spool type	Covering	Transient position	
01	+		
02	-		
03	+		
04*	-		
16	+		

One solenoid - Assembly F			
Spool type	Covering	Transient position	
01	+		
02	-		
03	+		
04*	-		
16	+		

(*) spool with increased price

LIMITS OF USE (MOUNTING C-E-F)



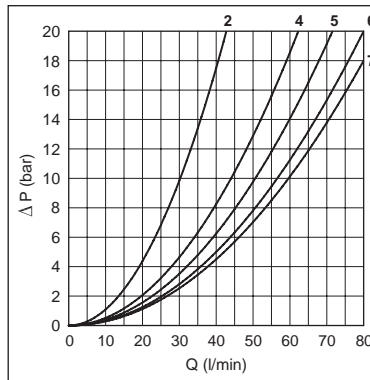
NOTE: The limit of use are valid for C, E, F assembly.

Spool type	Curve
01	1
02	1
03	3
04	2
16	6

The tests have been carried out with solenoids at operating temperature with 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 refers to tests carried out with the oil flow in two direction simultaneously (e.g.. from P to A and in the same time B to T).

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

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:

$$\Delta p_1 = \Delta p \times (Q_1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, Δp_1 will be the value of the losses for the flow rate Q1 that is used.

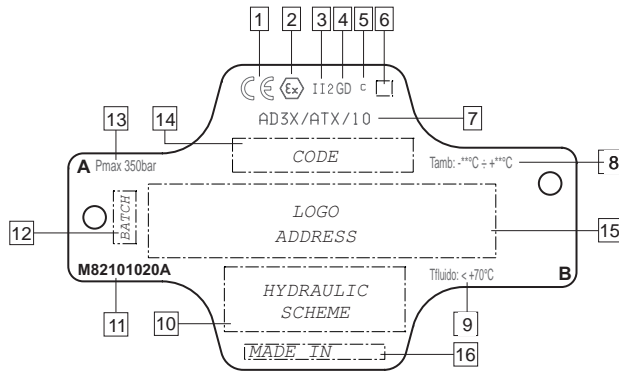
Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
01	5	5	5	5	6
02	7	7	7	7	6
03	5	5	6	6	
04	2	2	2	2	4
16	5	5	4	4	

Curve No.

AD3XG... DIRECTIONAL CONTROLE CETOP 3

IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

IDENTIFICATION NAMEPLATE AND MARKING



All the solenoid valves are supplied with **identification nameplate and Declaration of conformity** subject to Directive 2014/34/UE.

The identification nameplate bears the main technical specifications related to the functional and constructional characteristics of the valve and **must therefore be kept intact and visible**.

1	CE	Conformity to European Directive
2	Ex	Conformity to ATEX Directive 2014/34/UE
3	II 2	Group II (surface places) Category 2 (high protection)
4	GD	Explosive atmosphere: GD: presence of gas, vapour or mist and combustible dust
5	c	Constructional safety
6	T*	Temperature class: T4 (T _{sur} < 135 °C) series AD3XG T4 T6 (T _{sur} < 85 °C) series AD3XG T6
7	AD3X/ATX/10	Reference to Technical File registered c/o Notified Body
8	T amb	Working ambient temperature: - 40°C ÷ + 80°C series AD3XG T4 - 40°C ÷ + 50°C series AD3XG T6

9	T fluid	Working fluid temperature: - 30°C ÷ + 70°C series AD3XG
10	HYDRAULIC SCHEME	Type of hydraulic control performed by the valve
11	M82101020A	Nameplate code
12	BATCH	Reference number of technical order (batch)
13	Pmax 350 bar	Max. working pressure
14	CODE	Complete reference number of valve ordering code
15	LOGO ADDRESS	Logo and address
16	MADE IN	Preferential origin

SAFETY INSTRUCTIONS

- Read the instruction handbook supplied with the valves carefully before installation. All maintenances must be carried out following the instructions given in the manual.
- The AD3XG series valves must be installed and serviced in compliance with plant engineering and maintenance regulations for workplaces classified against the risk of explosion due to the presence of gas and dust and gas (for example: CEI EN 60079-14, CEI EN 60079-17, CEI EN 61241-14, CEI EN 61241-17 or other national regulations/standards).
- The valves must be connected to earth using the special anti-loosening and anti-rotation connection element.
- For all safety aspects related to the use of the coils, consult the relative use and maintenance instructions. The electrical appliances/components must not be opened when live.
- The user must periodically inspect, based on the conditions of use and the substances used, the presence of scale, dirt, the state of wear and tear and correct efficiency of the valves.

Attention: all installation and maintenance jobs must be carried out by qualified personnel.

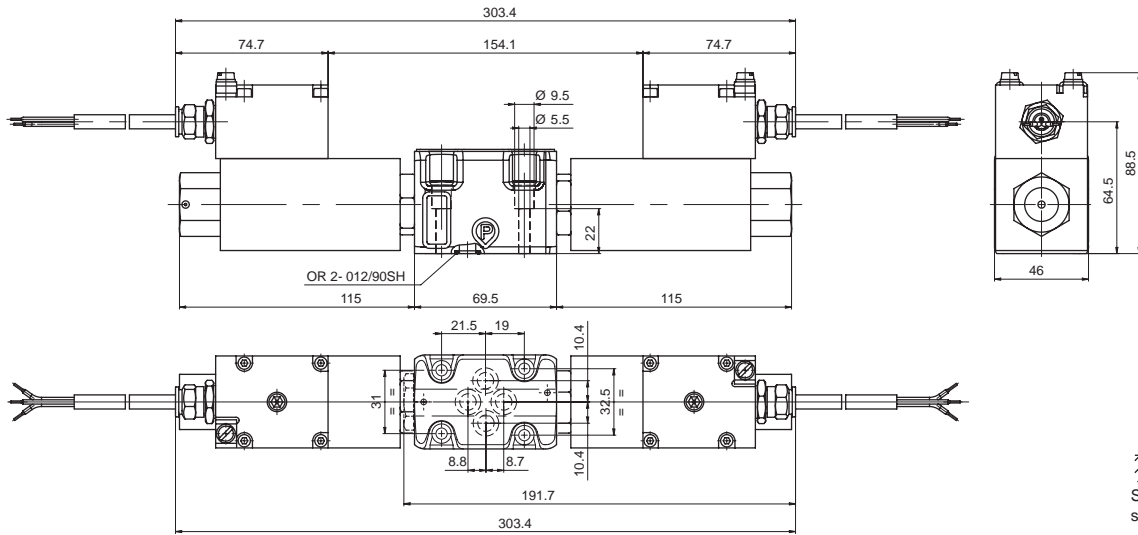
AD3XG... DIRECTIONAL CONTROLE CETOP 3

IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

OVERALL DIMENSIONS

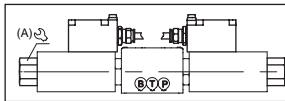
1

AD3XG...



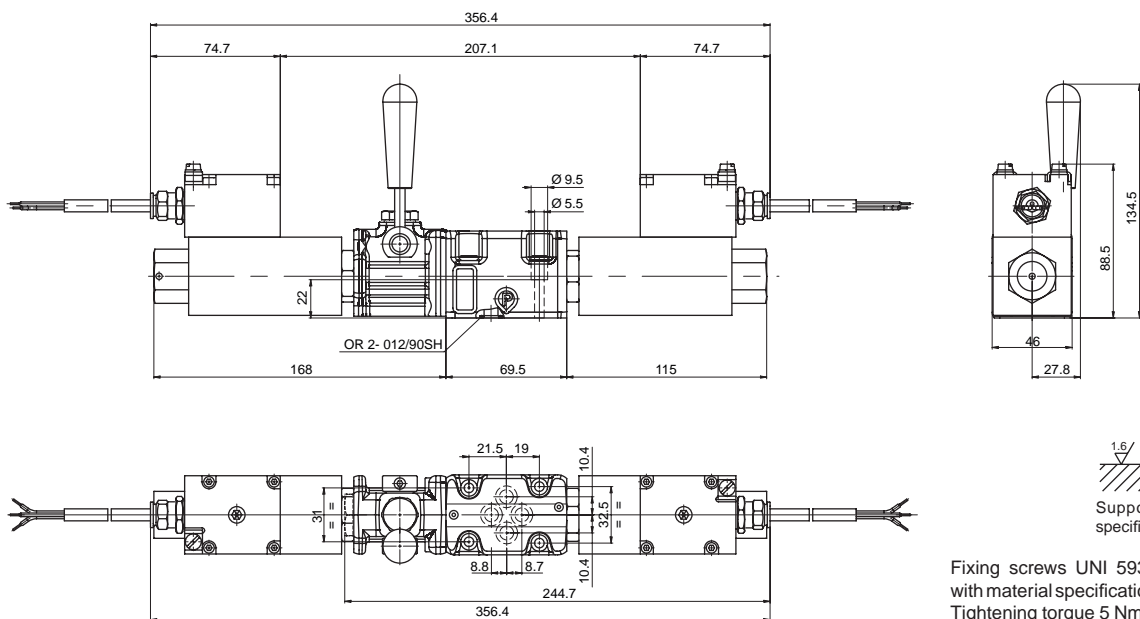
1.6
0.03
Support surface specifications

Fixing screws UNI 5931 M5x30 with material specification min. 8.8
Tightening torque 5 Nm / 0.5 kgm



Should it be necessary to change the coils position, fastener ring nut A as described in the solenoid valve assembly instructions.

AD3XG...LE.

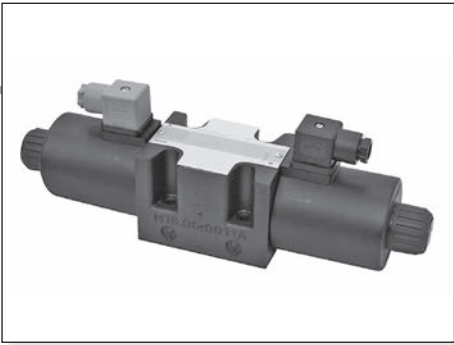


1.6
0.03
Support surface specifications

Fixing screws UNI 5931 M5x30 with material specification min. 8.8
Tightening torque 5 Nm / 0.5 kgm

DIRECTIONAL CONTROL VALVES CETOP 5

1



CETOP 5/NG10

STANDARD SPOOLS	CAP. I • 35
AD5E...	CAP. I • 36
AD5E...J*	CAP. I • 37
AD5E...Q5	CAP. I • 37
AD5O...	CAP. I • 38
AD5D...	CAP. I • 38
AD5L...	CAP. I • 39
"A16" DC SOLENOIDS	CAP. I • 40
"K16" AC SOLENOIDS	CAP. I • 40
STANDARD CONNECTORS	CAP. I • 20

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 .

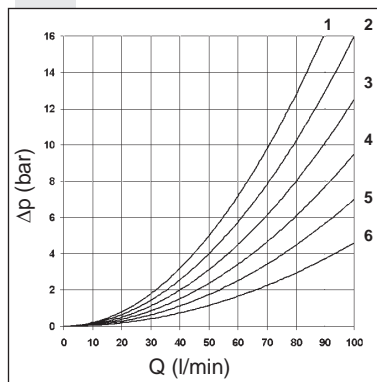
The centring position is achieved by means of calibrated length springs which, once the action of impulse is over, return the spool to the centre or end travel position.

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 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, $\Delta p1$ 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.				

DIRECTIONAL CONTROL VALVES CETOP 5

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.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.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	
	M	24V	
	N	48V*	
	P	110V*	
	Z	102V* 115Vac/50Hz 120Vac/60Hz with rectifier	DC Voltage ** (Technical data see page I • 40)
	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.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.

DIRECTIONAL CONTROL VALVES CETOP 5

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..

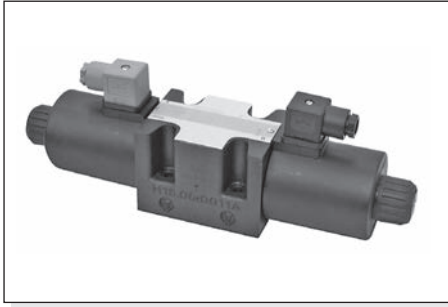
ONE SOLENOID, SIDE B "F" MOUNTING			
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
05		+	
66		+	
06		+	
08*		+	
10*		+	
22*		+	
12*		+	
13*		+	
07*		+	
15		-	
16		+	
17		+	
14*		-	
28*		-	

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

1

AD5E... SOLENOID OPERATED VALVES CETOP 5

1

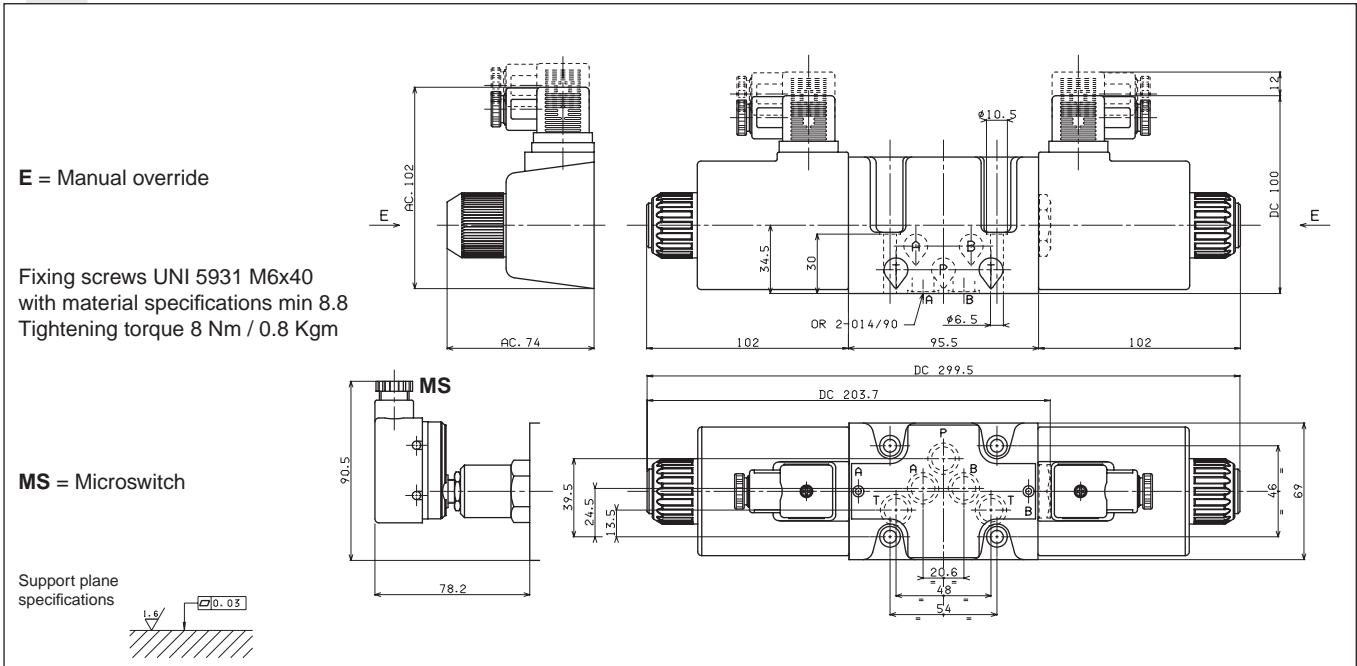


A max. counter-pressure of 4 bar at T is permitted for the variant with a microswitch (MS).

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 mm ² /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 β ₂₅ ≥ 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



LIMITS OF USE (MOUNTING C-E-F)

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.

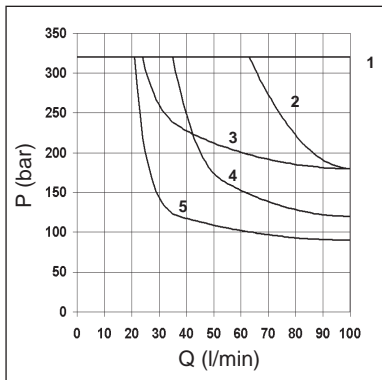
The values in the diagram refer to tests carried out with the oil flow in two directions simultaneously T = 2 bar (e.g. from P to A and the same time B to P).

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.

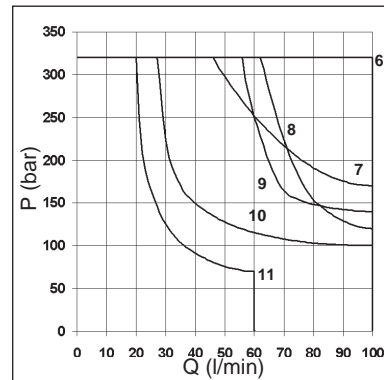
DIRECT CURRENT SOLENOIDS (DC)



Spool type	DC	AC
	01	1
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***

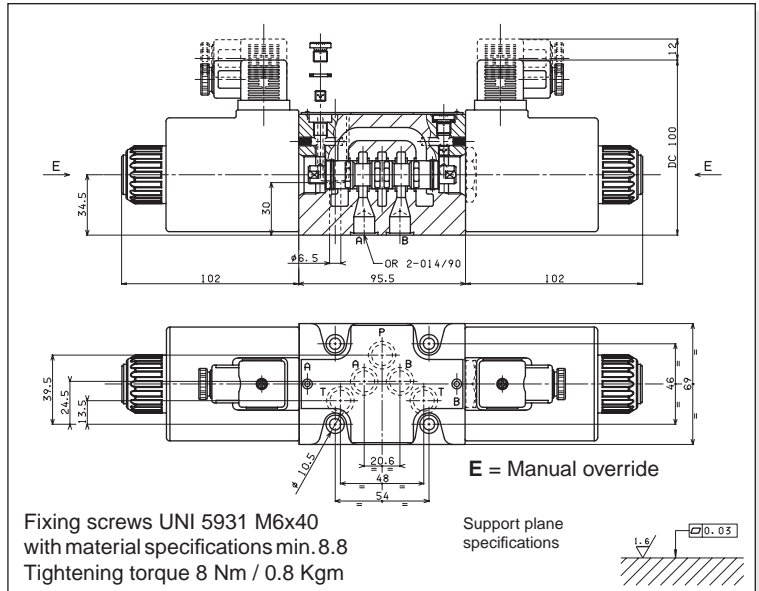
CALIBRATED ORIFICE AVAILABLE		
ø (mm)	M6x6	Code
0.5	M89.10.0031	5S (J5+S1)*
0.6	M89.10.0026	6S (J6+S1)*
0.7	M89.10.0032	7S (J7+S1)*
0.8	M89.10.0033	8S (J8+S1)*

* Old code

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

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 mm ² /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.



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**

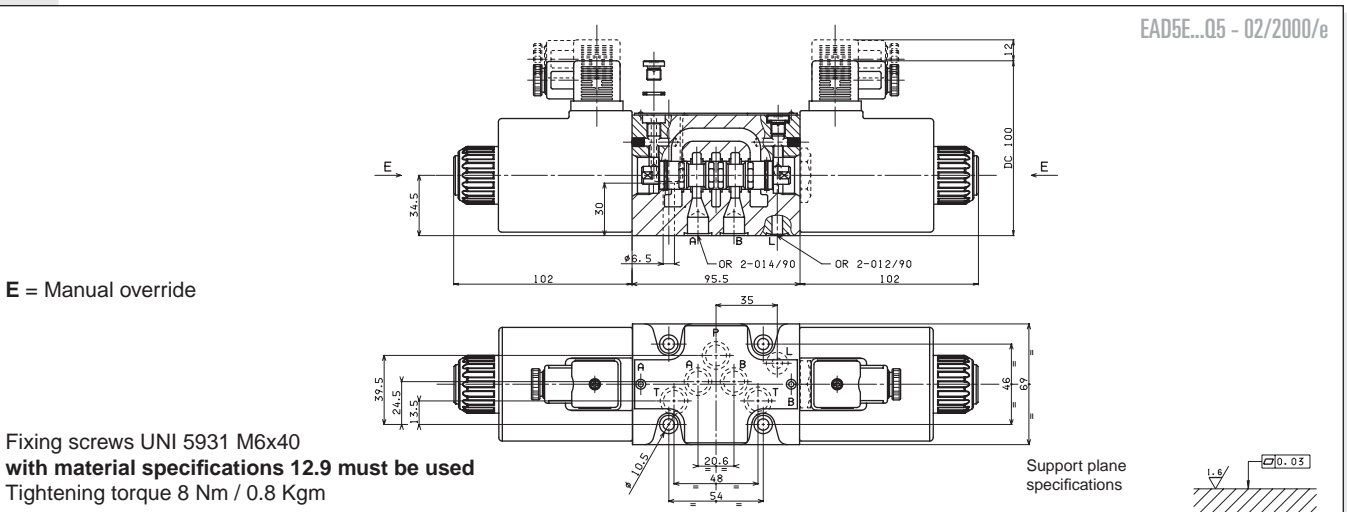
• **For subplate see BSH531..**

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 mm ² /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.

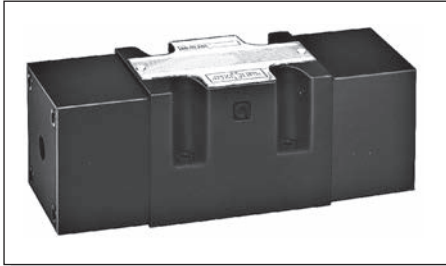
OVERALL DIMENSIONS

EAD5E...Q5 - 02/2000/e



AD50... OLEO-PNEUMATIC OPERATION TYPE VALVES CETOP 5

1



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 mm ² /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

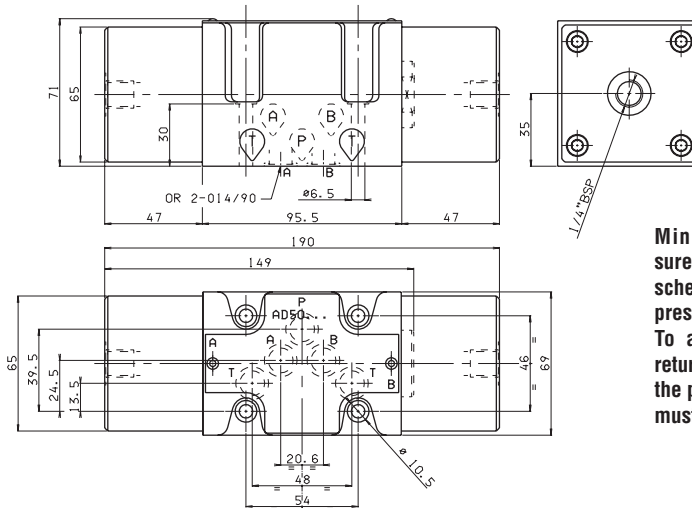
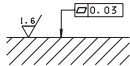
• Ordering code see Cap. I • 34

(pt*) = Pressure at port T

OVERALL DIMENSIONS

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

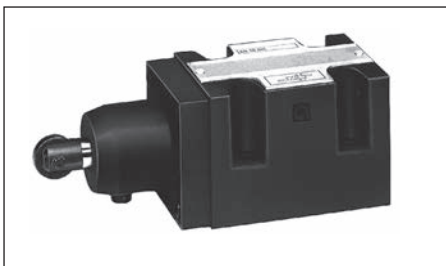
Support plane specifications



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

EAD50 - 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 mm ² /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

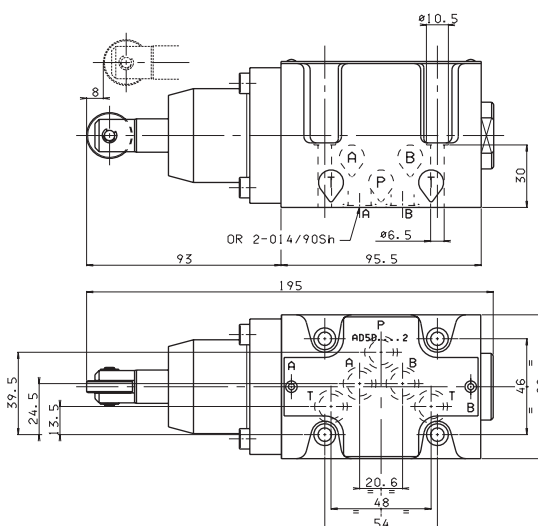
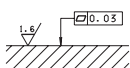
• Notes:
(*) In the absence of counter-pressure at port T

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

OVERALL DIMENSIONS

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

Support plane specifications



Stroke	8 mm
Extra stroke	2 mm
Working stroke	4 mm

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 mm ² /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	4,7 Kg
Weight with M1 variant	5,35 Kg

- 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

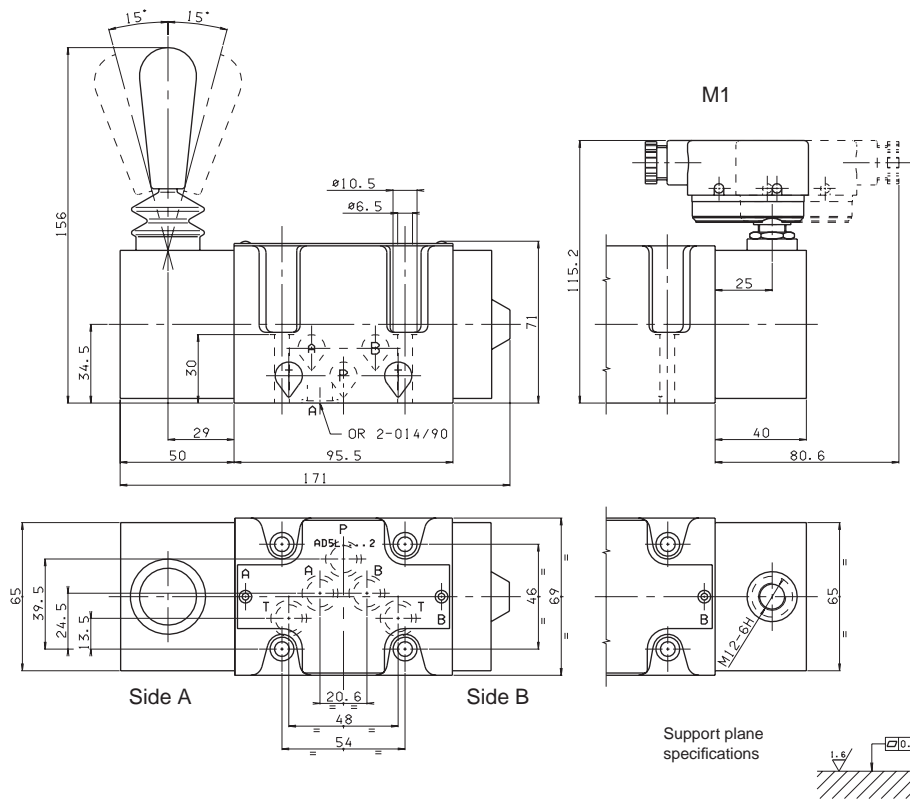
1

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.

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

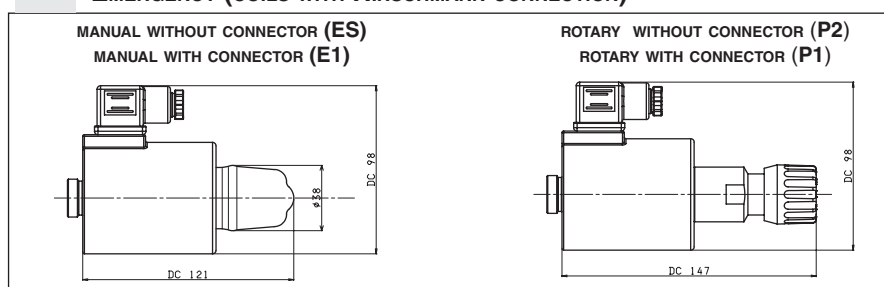
Type of protection (in relation to the connector used)	IP 65
Number of cycles	18.000/h
Supply tolerance	±10%
Ambient temperature	-30°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	H
Weight	0,9 Kg

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 electrical 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 resistance less than 0.1 ohms.

EMERGENCY (COILS WITH HIRSCHMANN CONNECTION)



"K16" AC SOLENOIDS FOR CETOP 5

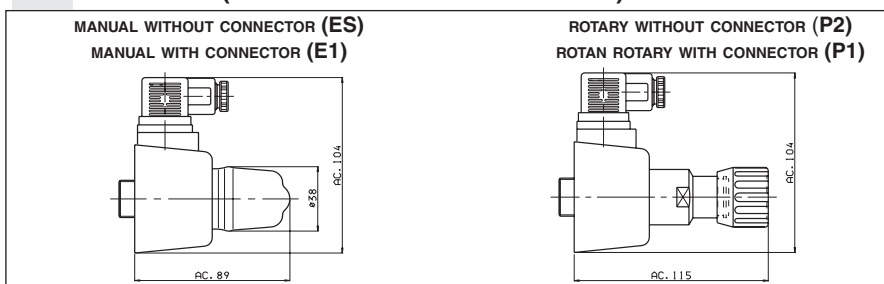
Type of protection (in relation to the connector used)	IP 66
Number of cycles	18.000/h
Supply tolerance	+10% / -10%
Ambient temperature	-54°C ÷ 60°C
Duty cycle	100% ED
Max. pressure static	210 bar
Insulation class wire	H
Weight	0,8 Kg

VOLTAGE (V)	MAX. WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°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

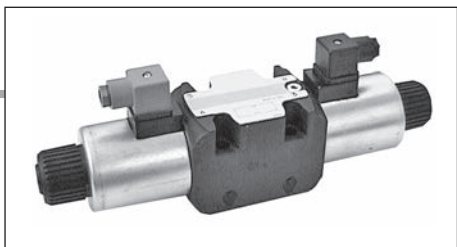
** The european low voltage directive is applied to electrical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with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

EMERGENCY (COILS WITH HIRSCHMANN CONNECTION)



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 ADP5.E.. valve has certain design features which allow it to "manage" a hydraulic power equal to $Q = 120\text{ l/min}$ with a $P = 320\text{ bar}$, 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

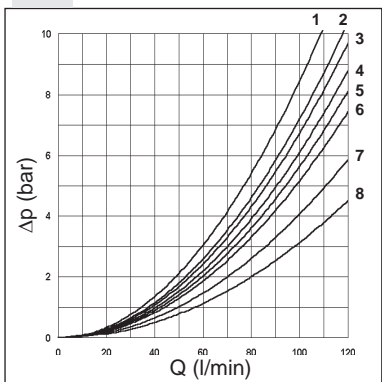
The electrical supply connectors meet DIN 43650 ISO 4400 standards; connectors are also available with built in rectifiers or pilot lights.

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, $\beta_{25} \geq 75$.

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 $46\text{ mm}^2/\text{s}$ 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:

$$\Delta p_1 = \Delta p \times (Q_1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, Δp_1 will be the value of the losses for the flow rate Q_1 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

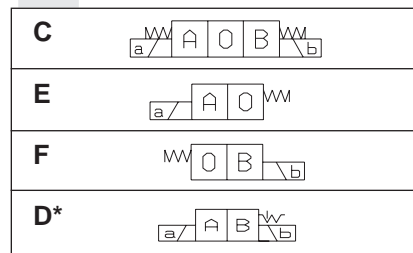
ADP	High performances directional control valve
5	CETOP 5/NG10
E	Electrical operator
**	Spools (Table next page)
*	Mounting (table 1)
*	Voltage (table 2)
**	Variants (table 3)
1	Serial No.

TAB.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 $\varnothing 0.5\text{ mm}$ \varnothing orifice	5S(*)
Spool movement speed control VDC only) with $\varnothing 0.8\text{ mm}$ \varnothing orifice	8S(*)
Other variants available on request	

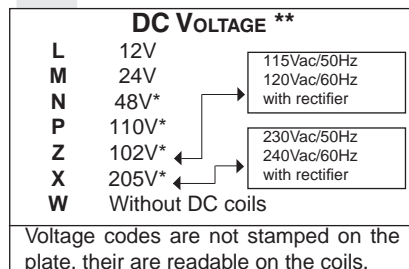
(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, c Cap. I • 20.

TAB.1 - MOUNTING



(*) Valve with detent

TAB.2 - TYPE E CONTROL



* Special voltage

** Technical data see Cap. I • 43

STANDARD SPOOLS

* SPOOLS WITH PRICE INCREASING

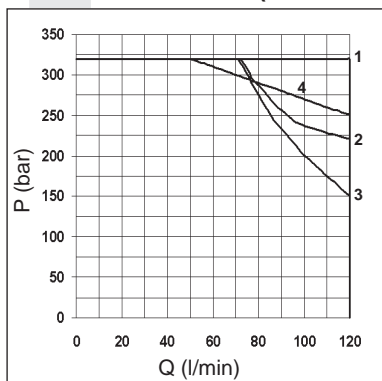
TWO SOLENOIDS, SPRING CENTRED "C MOUNTING"			
Spool type		Covering	Transient position
01		+	
02		-	
03		-	
04*		-	
05		-	
66		-	
06		-	
14*		-	
28*		-	

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

1

ADP5.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:

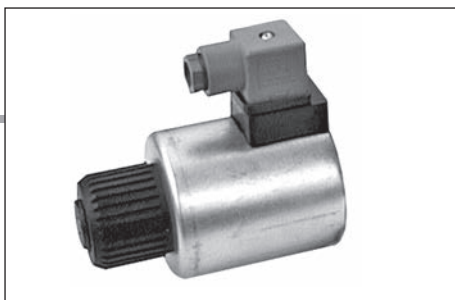
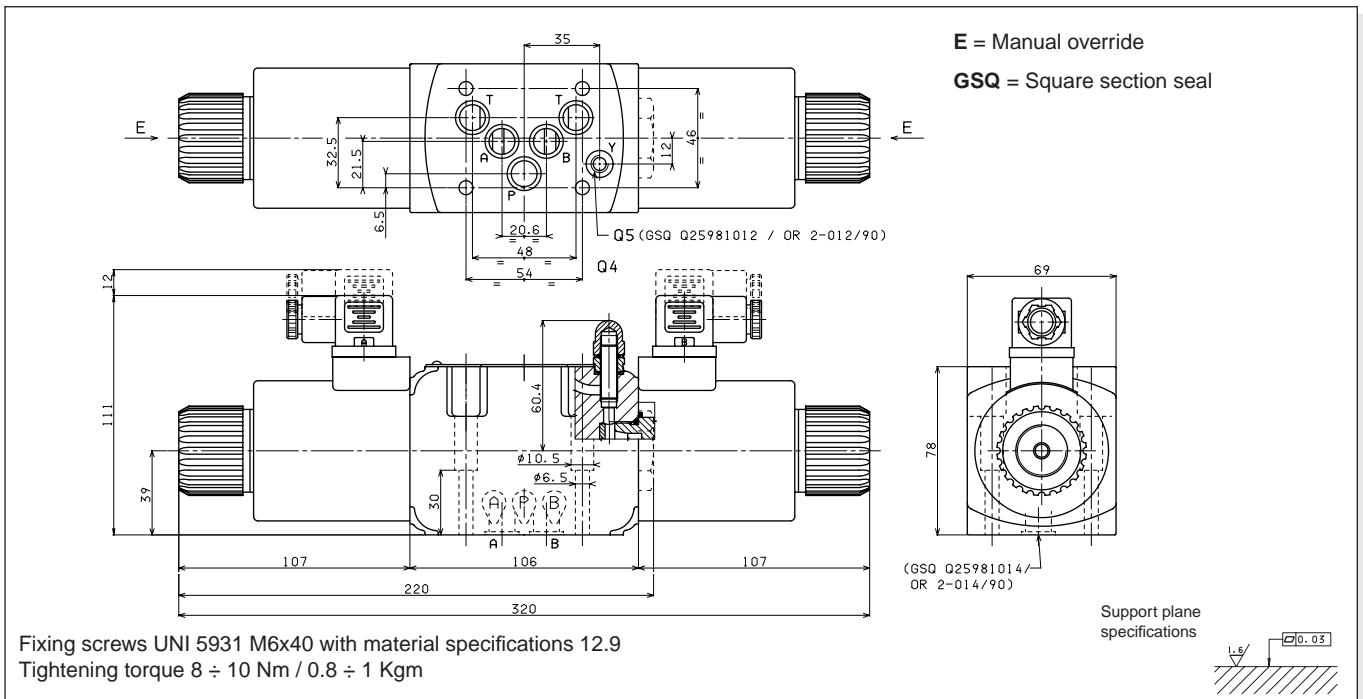
- Applicable hydraulic power, related to the flow rate and pressure drop across the valve;
- Spool type (system configuration);
- Oil viscosity and temperature;
- Back pressure on T.

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 mm ² /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 β ₂₅ ≥ 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 drained is blocked with a plug S.T.E.I M6x6 UNI 5923

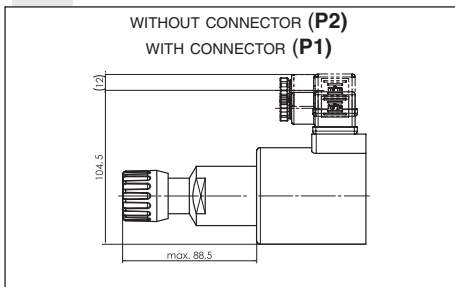
ADP5.E... S5 variant - These are valves with solenoid chambers drainage separated from the T line, obtained on CETOP RO5 interface and characterized by the letter Y. This solution allows operation with up to 320 bar max. back pressure on the T line while using only 12.9 material fixing screws to ensure maximum solenoid valve mounting safety and supplementary drainage.



“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

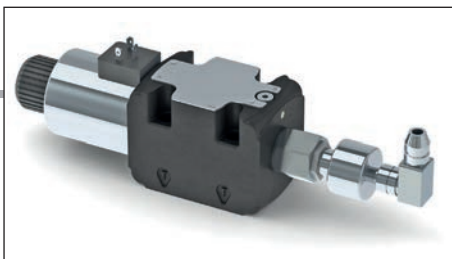
ROTARY EMERGENCY



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 electrical 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 resistance less than 0.1 ohms.



ADP5V...

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

ADP5V... WITH PROXIMITY SENSOR LVDT CETOP 5

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).

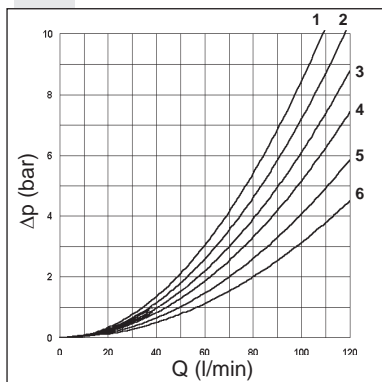
The single solenoid directional valves type ADP5V are used in applications where the monitoring of the position of the spool inside the valve is requested to manage the machine safety cycles in accordance with the accident prevention legislation. These directional valves are equipped with an horizontal 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 mm ² /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 β ₂₅ ≥ 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	115Vac/50Hz 120Vac/60Hz with rectifier
M 24V	
N 48V*	230Vac/50Hz 240Vac/60Hz with rectifier
P 110V*	
Z 102V*	
X 205V*	
W Senza bobina né connettori	

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

Spool type	E / F MOUNTING POSSIBLE	
	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:

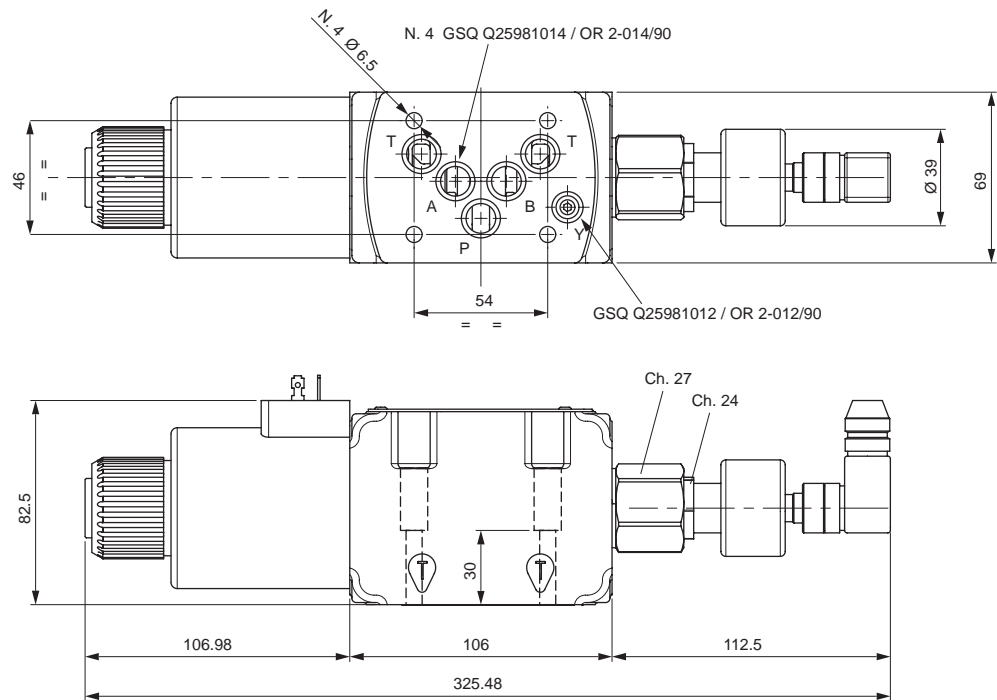
- EN50082-2 general safety norm - industrial environment
- EN 50081-1 emission general norm - residential environment

ADP5V... WITH PROXIMITY SENSOR LVDT CETOP 5

OVERALL DIMENSIONS

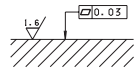
E = Manual override

GSQ = Square section seal



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

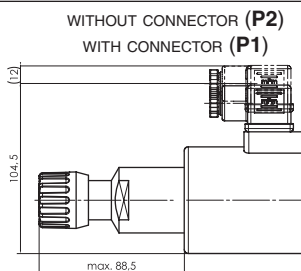
Support plane
specifications



“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	-25°C ÷ 60°C
Duty cycle	100% ED
Max static pressure	210 bar
Insulation class wire	H
Weight	1,63 Kg

ROTARY EMERGENCY

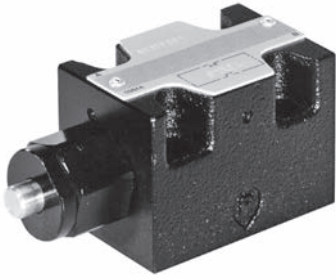


VOLTAGE (V)	MAX WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°C)	RATED POWER (W)	RESISTANCE AT 20°C (OHM) ±10%
12V	105°C	42	3.43
24V	105°C	42	13.71
48V*	105°C	42	55
102V(**)**	105°C	42	248
110V(**)**	105°C	42	288
205V(**)**	105°C	42	1000

* Special voltage

** The european low voltage directive is applied to electrical 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 resistance less than 0.1 ohms.

AD3I... AUTOMATIC RECIPROCATING VALVES CETOP 3



AD3I...

These automatic reciprocating valves, with interface UNI ISO 4401 - 03 - 02 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-03), reverse the movement of an actuator every time the flow through the valve stops. With no max. pressure valves inside the body, the spool is moved by two springs and locked by unbalanced pressure inside valve; when no more flow is crossing the valve, the spool changes the position inverting the direction of the actuator.

Max. operating pressure port P	320 bar
Max. flow	30 l/min
Minimum permitted flow	3 l/min
Fluid viscosity	20 ÷ 200 mm ² /s
Fluid temperature	-20°C ÷ 60°C
Max. contamination level(*)	class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$
Positioner activating force (measured with 1 bar on the T line)	130 N
Weight of version without positioner	0,95 Kg
Weight of version with positioner	1 Kg

(*) Max contamination level must be respect to obtain the right function of the valve

With a preferential starting P → B and A → T position, these valves are mainly used to control the movement compactors or system where is not possible to use electrical device.

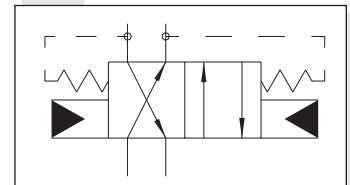
ORDERING CODE

AD	Directional valve
3	CETOP 3/NG6
I	Automatic reciprocating valve at null flow
* (1)	P = Version with positioner to adjust the pressure relief valve of the system
**	00 = No variant V1 = Viton
1	Serial No.

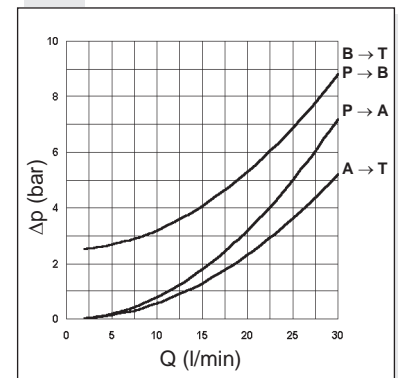
(1) Omit if not required the positioner

Tests carried out with mineral oil at a temperature of 40°C with viscosity of 46 mm²/s.

HYDRAULIC SYMBOL

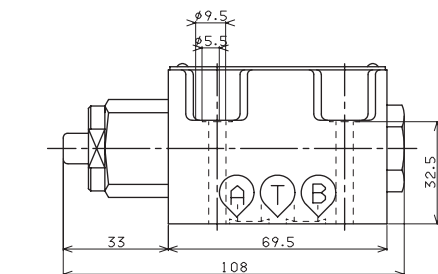


PRESSURE DROPS

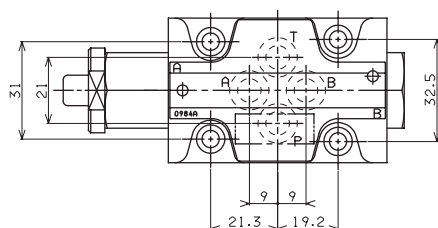
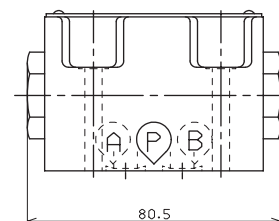
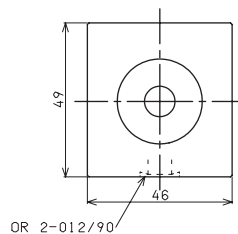


OVERALL DIMENSIONS

With positioner (P)

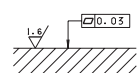


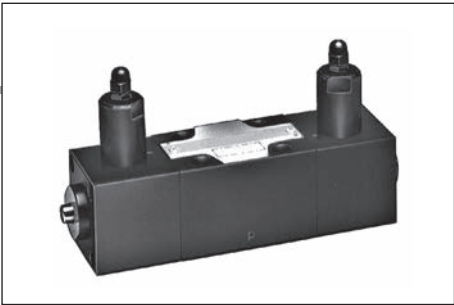
Without positioner



Fixing screws UNI 5931 M5x40
with material specifications min. 8.8
Tightening torque 5 Nm / 0.5 Kgm

Support plane
specifications





AD3RI...

AD3RI... AUTOMATIC RECIPROCATING VALVES CETOP 3

This valve type is characterized by fully hydraulic operation, as it takes advantage of the system pressure rise to cause an automatic and continuous inversion of the utilization. The change-over takes place when the system pressure exceeds the inversion valves calibration pressure, and therefore also in not predetermined positions. At cylinder stroke end, the overall maximum pressure valve should be adjusted on a value 30% higher than the system operating pressure.

Max. operating pressure	320 bar
Max. pressure port T	160 bar
Min. recommended pressure	15 bar
Max. flow	25 l/min
Min. flow	2 l/min
Setting ranges:	Spring 1 15 ÷ 50 bar
	Spring 2 20 ÷ 140 bar
	Spring 3 50 ÷ 320 bar
Fluid viscosity	10 ÷ 60 mm ² /s
Fluid temperature	-20°C ÷ 75°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter β ₂₅ ≥ 75
Weight	2,3 Kg

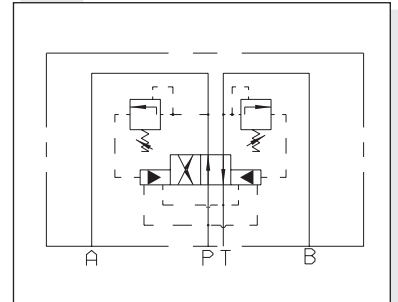
The inverter valves pressure calibration values should be 15% lower than that of the overall maximum pressure valve, and 15% higher than the maximum operating pressure.

Note: to operate the push button emergency, a minimum pressure of 3 bar on the actuator is needed.

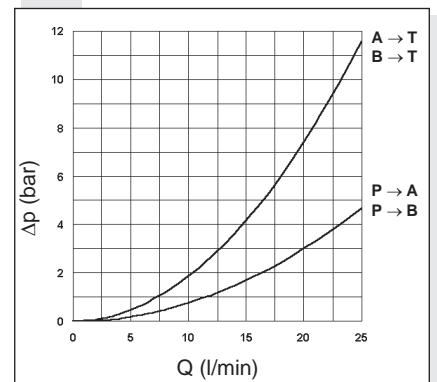
ORDERING CODE

AD	Directional valve
3	CETOP 3/NG6
RI	Automatic reciprocating valve hydraulically operated automatic reciprocation
211	Scheme
Z	No voltage
*	Setting ranges: 1 = 15 ÷ 50 bar 2 = 20 ÷ 140 bar 3 = 50 ÷ 320 bar
**	00 = No variant V1 = Viton
3	Serial No.

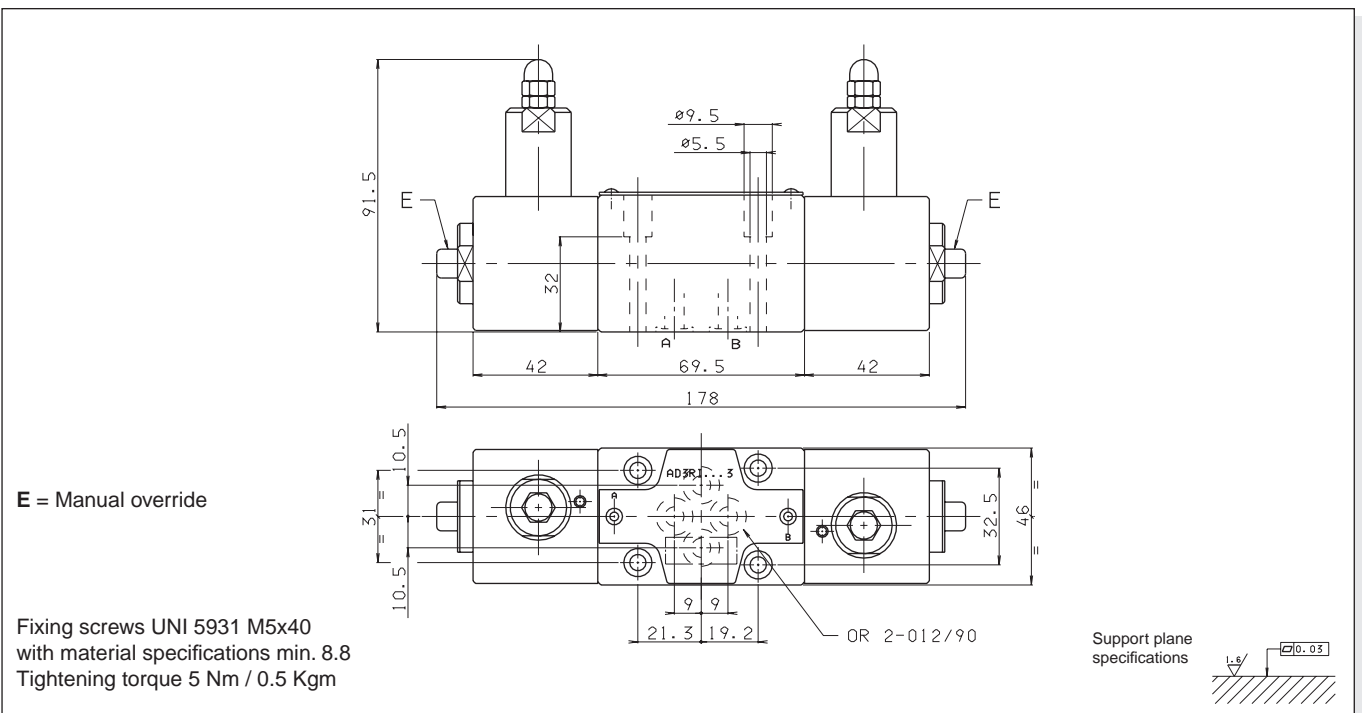
HYDRAULIC SYMBOL



PRESSURE DROPS



Tests carried out with mineral oil at a temperature of 40°C with viscosity of 46 mm²/s.





AD5I...

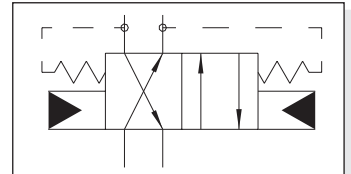
AD5I... AUTOMATIC RECIPROCATING VALVES CETOP 5

The operating principle of this type of inverter valve, with interface UNI ISO 4401 - 05 - 04 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-05), is based on the pressure unbalanced created in its interior as a consequence of the fluid flow rate. On starting the system this valve assumes always a preferential position P → B e A → T.

When a pressure is applied to the cylinder which exceeds the system maximum pressure relief valve setting (e.g. end stroke actuator), a hydraulic unbalanced is generated capable of changing over the valve and inverting the cylinder direction of the movement.

Max. operating pressure port P	320 bar
Max. flow	100 l/min
Minimum permitted flow	10 l/min
Fluid viscosity	32 ÷ 60 mm ² /s
Fluid temperature	-20°C ÷ 60°C
Max. contamination level(*)	class 10 in accordance with NAS 1638 with filter β ₂₅ ≥ 75
Positioner activating force (measured with 1 bar on the T line)	190 N
Weight of version without positioner	3,4 Kg
Weight of version with positioner	3,6 Kg

(*) Max contamination level must be respect to obtain the right function of the valve



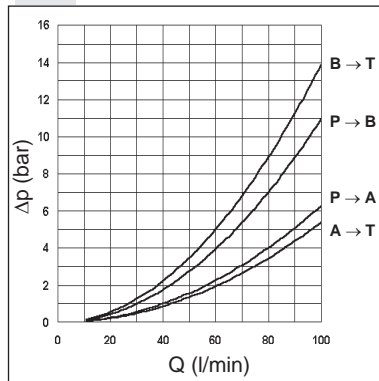
ORDERING CODE

- AD** Directional control
- 5** CETOP 5/NG10
- I** Automatic reciprocating valve at null flow
- * (1)** P = Version with positioner to adjust the pressure relief valve of the system
- **** 00 = No variant
V1 = Viton
2T = Variant for regenerative system
- 1** Serial No.

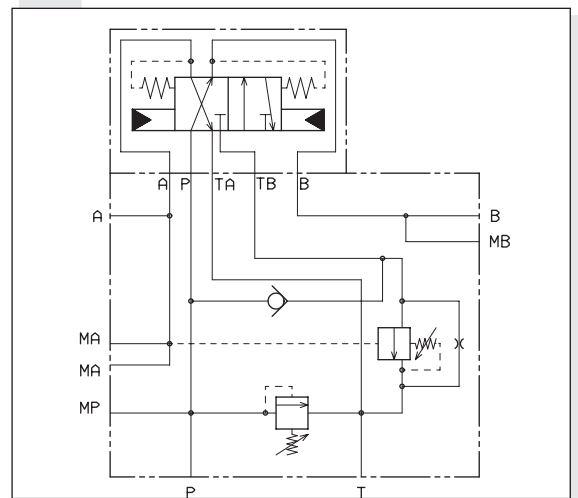
(1) Omit if not required the positioner

Tests carried out with mineral oil at a temperature of 40°C with viscosity of 46 mm²/s.

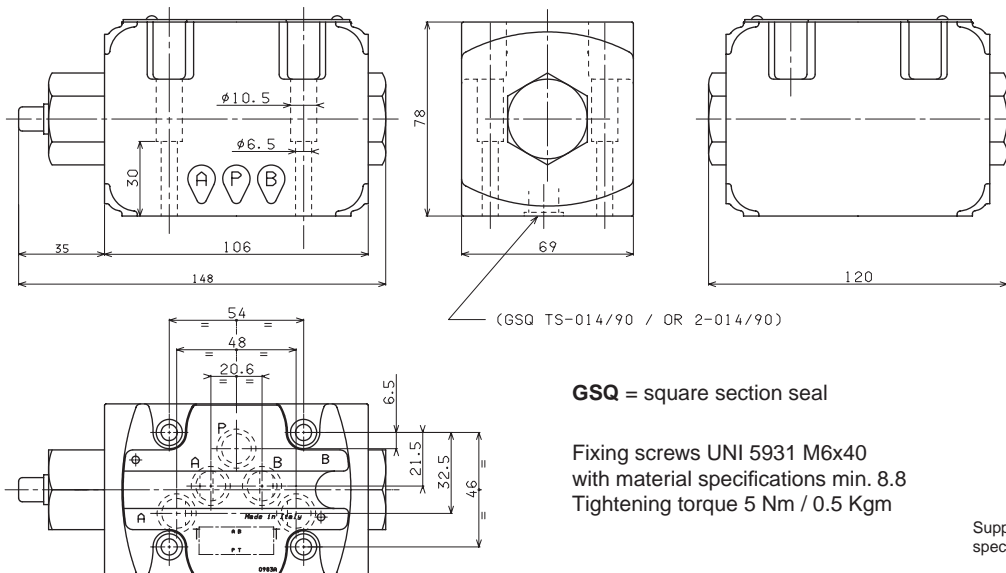
PRESSURE DROPS



AD5IP2T1 FOR REGENERATIVE SYSTEM



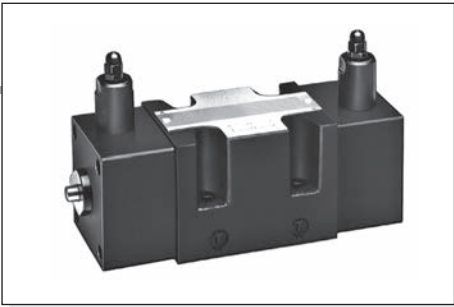
Version AD5IP2T1 integrated in a regenerative circuit for compactors with roll on-off mobile system, solution useful for all applications where to connect microswitch of proximity is not possible. For any information about our regenerative manifold please contact our technical department. For special subplate BS5RIA see Cap. X • 8.



GSQ = square section seal

Fixing screws UNI 5931 M6x40 with material specifications min. 8.8
Tightening torque 5 Nm / 0.5 Kgm

AD5RI... AUTOMATIC RECIPROCATING VALVES CETOP 5



AD5RI...

This valve type is characterized by a fully hydraulic operation, as it takes advantage of the system pressure rise to cause an automatic and continuous inversion of the utilization. The changeover takes place when the system pressure exceeds the inversion valves calibration pressure, and therefore also in not predetermined position. At the cylinder stroke end, the overall maximum pressure valve should be adjusted on a value 30% higher than the system operating pressure.

Max. operating pressure	320 bar
Max. pressure port T	160 bar
Min. recommended pressure	15 bar
Max. flow	70 l/min
Min. flow	6 l/min
Setting ranges:	Spring 1 15 ÷ 50 bar
	Spring 2 20 ÷ 140 bar
	Spring 3 50 ÷ 320 bar
Fluid viscosity	10 ÷ 60 mm ² /s
Fluid temperature	-20°C ÷ 75°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter β ₂₅ ≥ 75
Weight	5,4 Kg

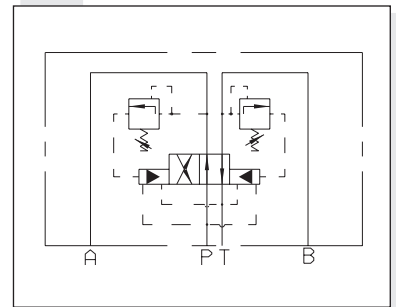
The inverter valves pressure calibration values should be 15% lower than that of the overall maximum pressure valve, and 15% higher than the maximum operating pressure.

Note: to operate the push button emergency, a minimum pressure of 3 bar on the actuator is needed.

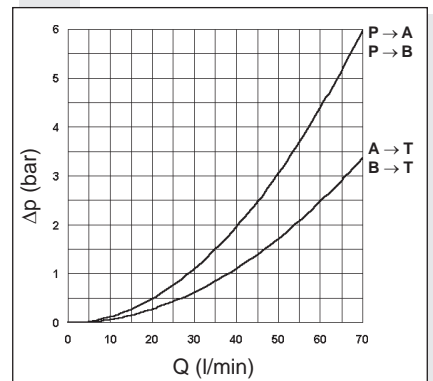
ORDERING CODE

- AD** Directional valve
- 5** CETOP 5/NG10
- RI** Automatic reciprocating valve hydraulically operated automatic reciprocation
- 211** Scheme
- Z** No voltage
- *** Setting ranges:
1 = 15 ÷ 50 bar
2 = 20 ÷ 140 bar
3 = 50 ÷ 320 bar
- **** 00 = No variant
V1 = Viton
- 3** Serial No.

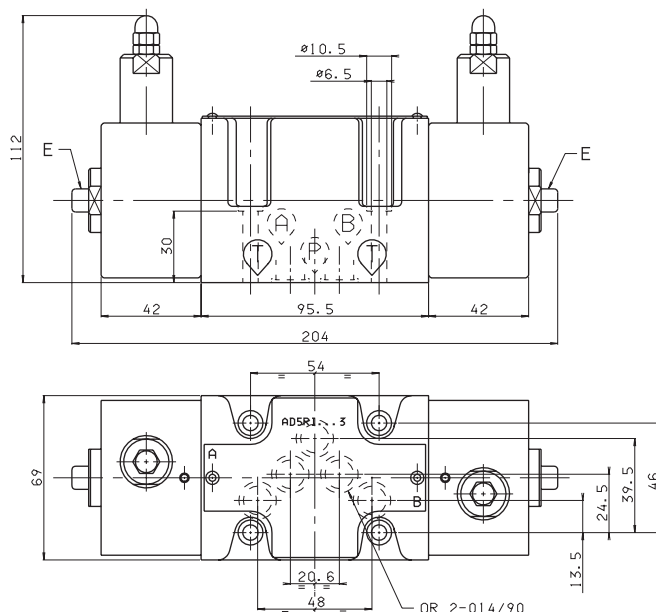
HYDRAULIC SYMBOL



PRESSURE DROPS



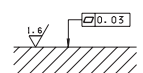
Tests carried out with mineral oil a temperature of 40°C with a viscosity of 46 mm²/s.



E = Manual override

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

Support plane specifications



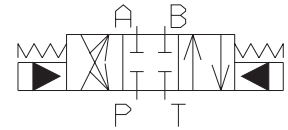
**ADPH5...**

STANDARD SPOOLS FOR ADPH5	CAP. I • 51
TECH. SPECIFICATIONS ADPH5	CAP. I • 52
CETOP 2/NG04	CAP. I • 2
AD2E...	CAP. I • 4
"A09" DC COILS	CAP. I • 4
STANDARD CONNECTORS	CAP. I • 20

ADPH5... PILOTED VALVES CETOP 5/NG10 WITH CETOP 2/NG4 PILOT VALVE

These ADPH 5 valves are used primarily for controlling the starting, stopping and direction of fluid flow. These kind of distributors are composed by a main stage crossed by the big flow from the pump (ADPH5) and by a cetop 2 pilot directional solenoid valve (AD2E) available with different mounting type .

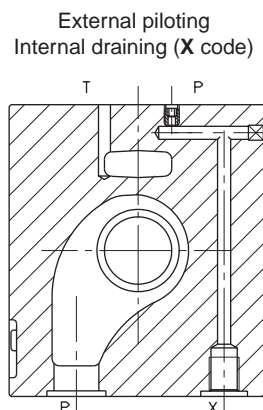
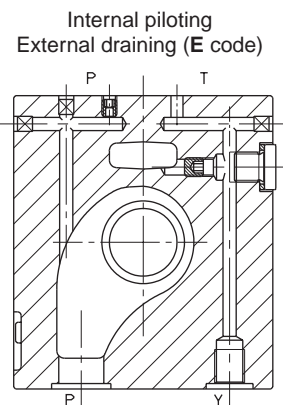
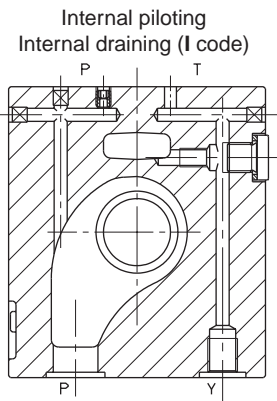
When a short response time is requested, a special version of solenoids with high dynamics is available with the code AD2E****FF2 (please, contact our technical department).

HYDRAULIC SYMBOL**ORDERING CODE**

- ADPH** Piloted valve
The pilot valves AD2E... must be ordered separately
- 5** CETOP 5/NG10
- **** Spool type (Table next page)
- *** Mounting (Table next page)
Standard orifice at port P: \varnothing 1mm
- *** Orifice type on Cetop 2 valves (Table 1)
0 = none
A/B/C/D/E/F/G = orifice on line A
H/I/L/M/N/P/Q = orifice on line B
- *** Piloting and draining type (Tab.2)
I = internal piloting
internal draining
E = internal piloting
external draining
X = external piloting
internal draining
(special body)
- 00** No variant
- 1** Serial No.

TAB.1 - ORIFICE ON LINE A/B

On line A	On line A	\varnothing (mm)
0	0	—
A	H	0,5
B	I	0,6
C	L	0,7
D	M	0,8
E	N	0,9
F	P	1,0
G	Q	1,2

TAB.2 - PLUGS DISPOSAL

ADPH5... PILOTED VALVES 5/NG10 WITH CETOP 2/NG4 PILOT VALVE

HYDRAULIC SYMBOLS, SPOOLS AND MOUNTING

(* Spools with price increasing)

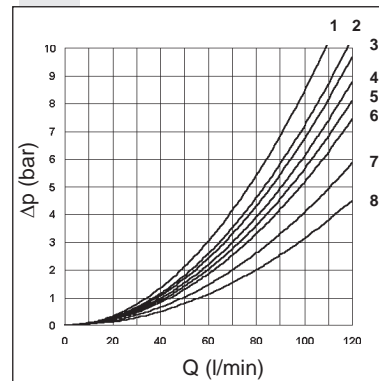
1

"A" MOUNTING			
Pilot Piloted	AD.2.E.03.E... ADPH.5.**.A...		
Scheme			
Spool type		Covering	Transient position
01		+	
02		-	
03		-	
04*		-	
06		+	
15		-	
16		+	

"B" MOUNTING			
Pilot Piloted	AD.2.E.03.F... ADPH.5.**.B...		
Scheme			
Spool type		Covering	Transient position
01		+	
02		-	
03		-	
04*		-	
06		+	
15		-	
16		+	

"C" MOUNTING			
Pilot Piloted	AD.2.E.03.C... ADPH.5.**.C...		
Scheme			
Spool type		Covering	Transient position
01		+	
02		-	
03		-	
04*		-	
06		+	

PRESSURE DROPS



The diagram at the side shows the pressure drop curves for spools during normal usage. The used fluid 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 flow rates higher 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	4	4	7	7	
02	6	6	8	8	7
03	3	3	8	8	
04	4	4	2	2	3
06	4	4	7	8	
15	2	2	5	5	
16	1	1	2	2	
Curve No.					

ADPH5... PILOTED VALVES 5/NG10 WITH CETOP 2/NG4 PILOT VALVE

1

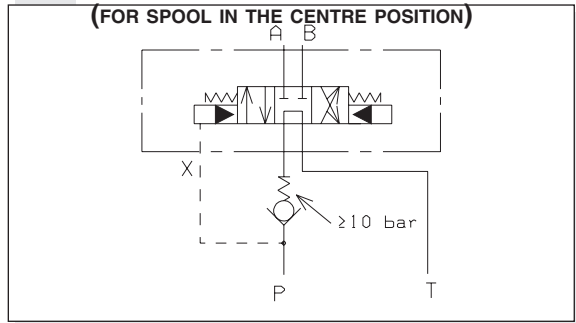
PILOT SOLENOID CONTROL VALVE SPECIFICATIONS

Max. operating pressure: ports P/A/B	250 bar
Max. operating pressure: port T (dynamic)	70 bar
Max. piloting pressure	250 bar
Min. piloting pressure	10 bar
Max. flow	120 l/min
Switching times (*see note below)	Energizing: 20 ms De-energizing: 50 ms
Piloting oil volume for engagement	1 cm ³
Hydraulic fluid	mineral oil DIN 51524
Fluid viscosity	10 ÷ 500 mm ² /s
Fluid temperature	-20°C ÷ 75°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$ plate
Mounting	
Weight ADPH5 without pilot valve	3,4 Kg
Weight ADPH5 with pilot valve with one solenoid	4,3 Kg
Weight ADPH5 with pilot valve with two solenoids	4,5 Kg

(* All the tests have been carried out with AD2E pilot valve with variant FF, mounting type C, spool 03, flow 100 l/min, pressure 160 bar, back pressure on the T line of 2 bar and oil temperature 40°C.

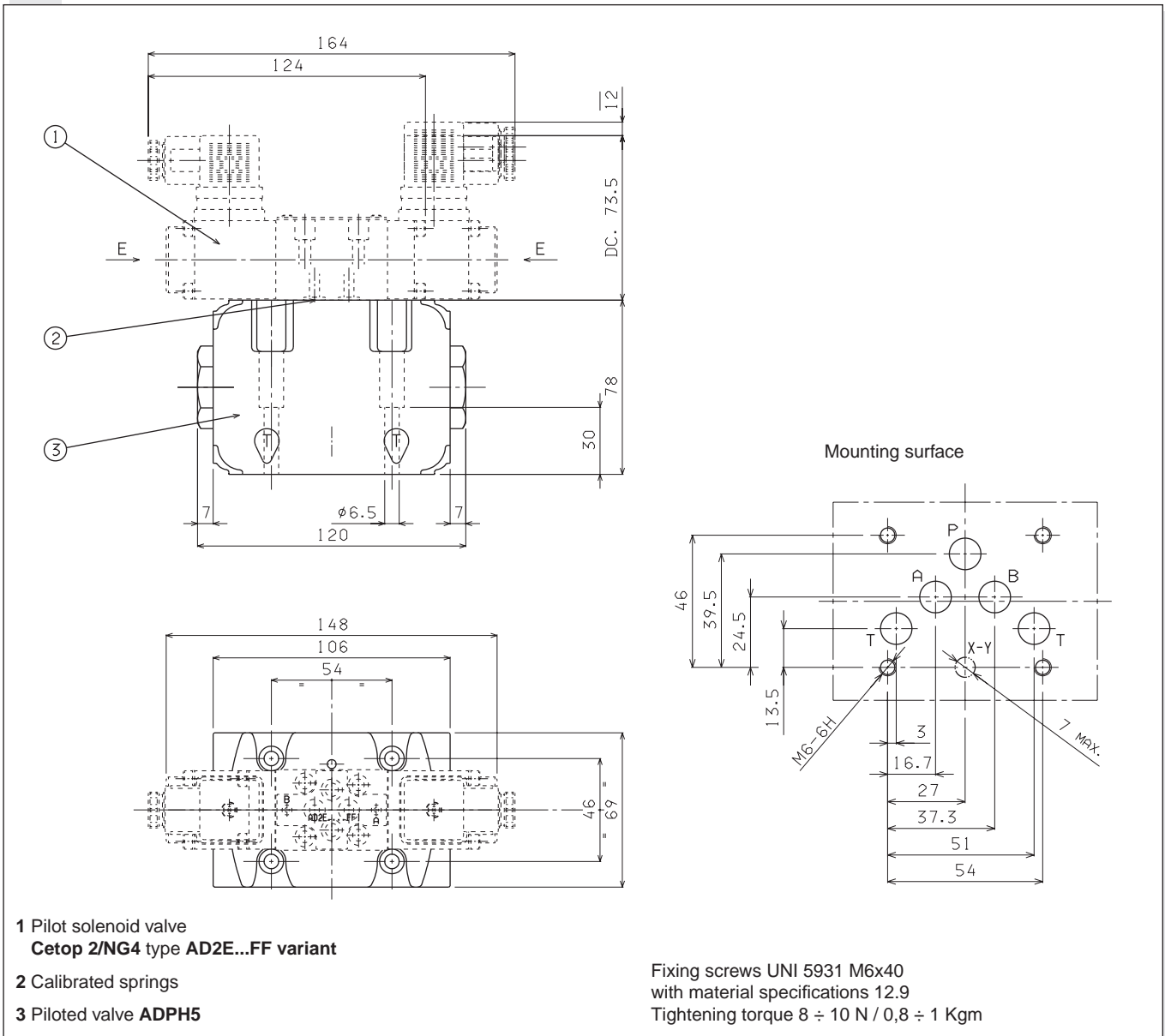
EXTERNAL BACK PRESSURE ON LINE P

(FOR SPOOL IN THE CENTRE POSITION)



When the main spool connect P to T in the centre position, the minimum pressure of 10 bar is needed to move the main spool (see the "Specifications"); for this reason a check valve on the P line (see the drawing above) is necessary.

OVERALL DIMENSIONS AND MOUNTING SURFACE



- 1 Pilot solenoid valve
Cetop 2/NG4 type AD2E...FF variant
- 2 Calibrated springs
- 3 Piloted valve ADPH5

Fixing screws UNI 5931 M6x40
with material specifications 12.9
Tightening torque 8 ÷ 10 N / 0,8 ÷ 1 Kgm

ADH5... 4/3 AND 4/2 PILOTED VALVES CETOP 5/NG10



Type ADH.5 distributors are intended for interrupting, inserting and diverting a hydraulic system flow. Normally these distributors are composed of a main stage, crossed by circuit main flow, and of a pilot stage available in several versions.

Various types of controls are available, used either individually or in combination for, among other functions, stroke limitation and main spool movement speed control, in order to optimize the hydraulic system operation where this type of valve is employed.

In those case where normally to drain spools are used, it is necessary to remember that the minimum changeover pressure due to the opposing springs is equal to approximately 7 bar (see the operating features table on page I•46) and consequently necessary to insert a check valve in the P way (as shown above).

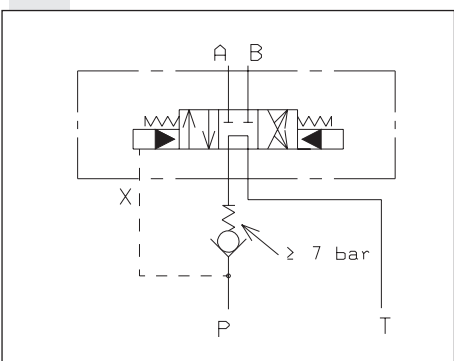
- Mounting surface in accordance with UNI ISO 4401 - 05 - 05 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-05).
- Pilot operated spool, solenoid controller.
- Stroke control of main spool.
- Presetting for pressure reducing valve mounting.
- Presetting for single-acting throttle valve mounting.

ADH5...	
STANDARD SPOOLS FOR ADH5	CAP. I • 54
TECH. SPECIFICATIONS	CAP. I • 55
SUBPLATES BSH5...	CAP. I • 56
CMP30...	CARTRIDGE CATALOGUE
CETOP 3/NG06	CAP. I • 8
STANDARD SPOOLS FOR AD.3.E	CAP. I • 10
AD3E...	CAP. I • 11
"D15" DC COILS	CAP. I • 19
"B14" AC SOLENOIDS	CAP. I • 19
STANDARD CONNECTORS	CAP. I • 20

ORDERING CODE

ADH	Piloted valve (Pilot valve and any mounting valves should be ordered separately)
5	CETOP 5/NG10
*	Mounting type (Table next page)
**	Spool type (Table next page)
*	Piloting and draining I = X internal / Y internal IE = X internal / Y external EI = X external / Y internal E = X external / Y external (see diagram at side)
**	00 = No variant LC = Main spool stroke limiter
1	Serial No.

EXTERNAL CHECK ON P



PLUGS ARRANGEMENT FOR THE PILOT AND DRAIN LINES

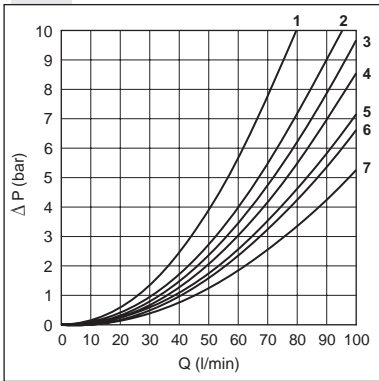
Plugs type used: M5x6 both for pilot and drain

	<p>ADH5...I X internal piloting Y internal draining</p>
	<p>ADH5...IE X internal piloting Y external draining</p>
	<p>ADH5...EI X external piloting Y internal draining</p>
	<p>ADH5...E X external piloting Y external draining</p>

ADH5... 4/3 AND 4/2 PILOTED VALVES CETOP 5/NG10

1

PRESSURE DROPS



The diagram on the side shows the pressure drops in relation to spools adopted for normal usage (see table).

Tests carried out at a constant temperature of 40°C.

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

Spool type	Connections				
	P→A	P→B	A→T	B→T	P→T
01	3	3	5	5	
02	3	3	6	6	3
03	3	3	6	6	
04	2	2	5	5	1
05	3	3	5	5	
06-66	3	3	6	6	
07		1	6		
10	3	3	5	5	
11	4		5		
22		4	5		
14-28	3	3	7	7	2
15	3	3	4	5	
16	3	3	4	5	
17	3	3			
Curve No.					

SPOOLS AND MOUNTING TYPE

(* Spools with price increasing)

Pilot Piloted	C mounting AD.3.E.03.C... ADH.5.C.**..	A mounting AD.3.E.03.E... ADH.5.A.**..	B mounting AD.3.E.03.F... ADH.5.B.**..	P mounting AD3E16E/AD3E16F ADH.5.P.**..
Scheme				
Spool type				
01				
02				
03				
04*				
05				
66				
06				
07*				
10*				
11*				
22*				
14*				
28*				
15				
16				
17				

ADH5... 4/3 AND 4/2 PILOTED VALVES CETOP 5/NG10

PILOT SOLENOID CONTROL VALVE SPECIFICATIONS

FOR DIFFERENT CONTROLS, PLEASE CONTACT OUR TECHNICAL DEPARTMENT

Max. operating pressure ports P/A/B	320 bar
Max. operating pressure port T (int. drainage)	160 bar
Max. pressure on T (ext. drainage)	250 bar
Max. piloting pressure	250 bar
Min. piloting pressure	7 bar
Max. flow	100 l/min
Piloting oil volume engagement 3 position valves	0,8 cm ³
Piloting oil volume engagement 2 position valves	1,6 cm ³
Hydraulic fluid	mineral oil DIN 51524
Fluid viscosity	10 ÷ 500 mm ² /s
Fluid temperature	-20°C ÷ 75°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$
Weight ADH5 without pilot valve	2,7 Kg
Weight ADH5 with pilot valve with 1 AC solenoid	4 Kg
Weight ADH5 with pilot valve with 1 DC solenoid	4,2 Kg
Weight ADH5 with pilot valve with 2 AC solenoids	4,3 Kg
Weight ADH5 with pilot valve with 2 DC solenoids	4,7 Kg

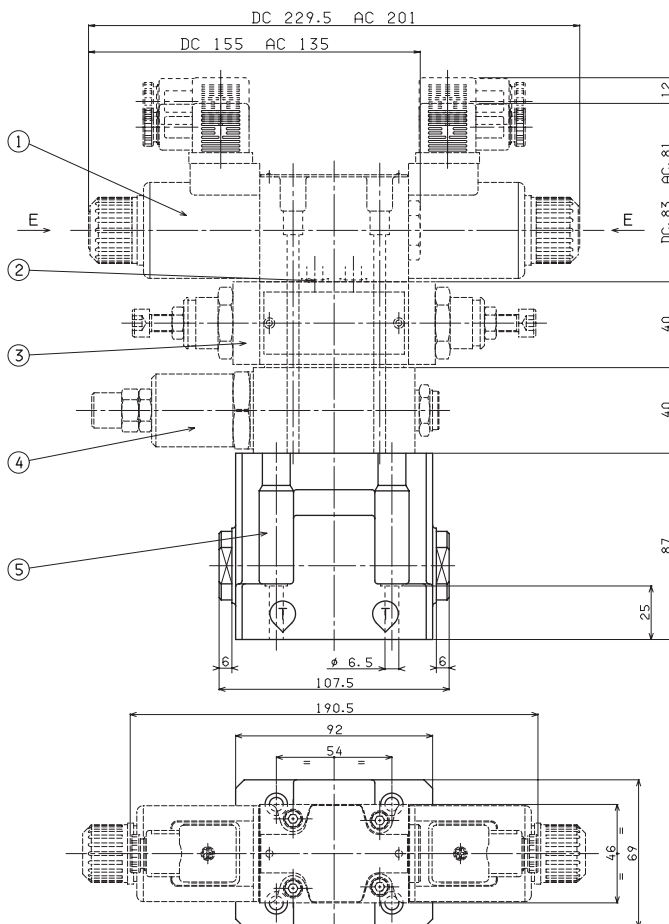
SWITCHING TIMES PILOTED VALVE

OPERATING PRESSURE (bar)	CURRENT	ENERGIZING centre-extern (ms)	DE-ENERGIZING extern-centre (ms)
50	ALTERNATING	30	50
100		25	
200		20	
50	DIRECT	40	60
100		35	
200		30	

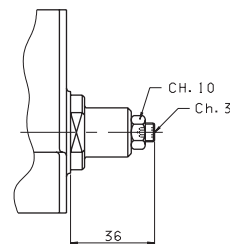
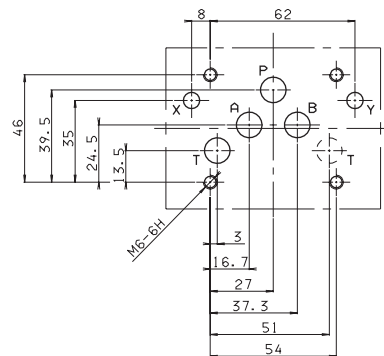
3 position valve. The values are indicative and depend on the hydraulic circuit, the fluid used and the variations in pressure, flow rate and temperature.

OVERALL DIMENSIONS

CETOP 5 MOUNTING SURFACE



- 1 Piloted solenoid valve type AD3E... CETOP 3/NG6
- 2 Calibrated diaphragms for AD3E...
- 3 Flow regulation valve type AM3QF..C
- 4 Pressure reduction valve type AM3RD..C
- 5 Main valve type ADH5..E



SPOOL STROKE ADJUSTMENT

Fixing screws UNI 5931 M6x35 with material specifications 12.9
Tightening torque 8 N / 0,8 Kgm

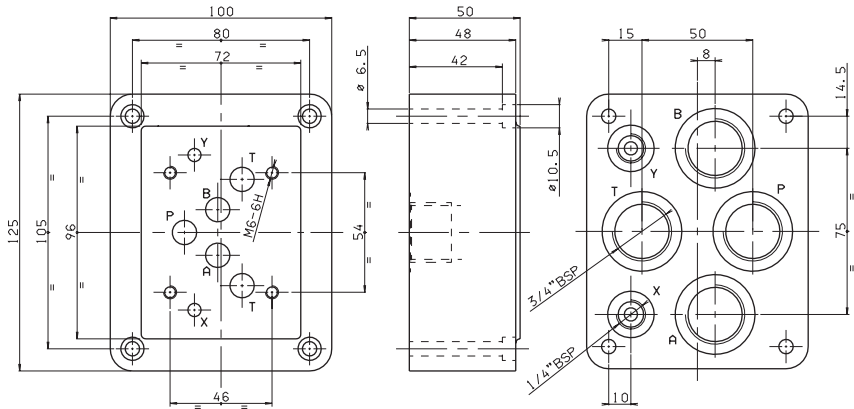
BSH5... SUBPLATES MOUNTING FOR ADH5 TYPE PILOTED VALVES CETOP 5/NG10

1

BSH513 WITH P, T AND A, B REAR 3/4" BSP, X AND Y CLEARANCE HOLES

- BSH** Single plate for piloted valve
- 5** CETOP 5/NG10
- 13** 3/4" BSP rear connectors
- 00** No variant
- 1** Serial No.

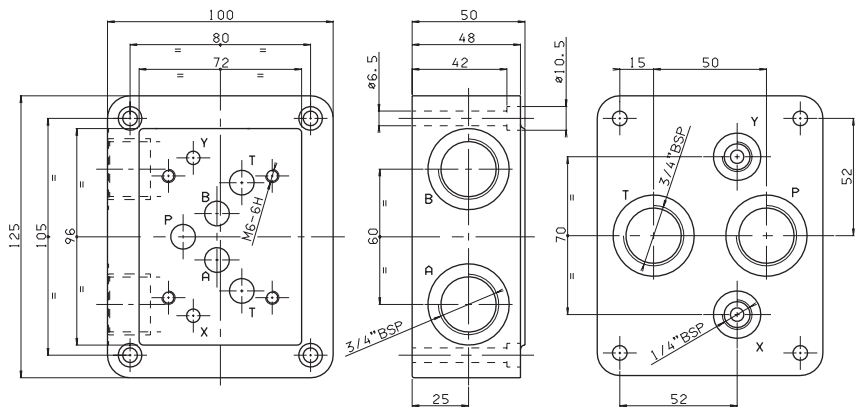
Weight: 3,8 Kg
Fixing screws M6x50 UNI 5931



BSH517 WITH P AND T REAR AND A, B SIDE 3/4" BSP, X AND Y CLEARANCE HOLES

- BSH** Single plate for piloted valve
- 5** CETOP 5/NG10
- 17** 3/4" BSP rear and side connectors
- 00** No variant
- 1** Serial No.

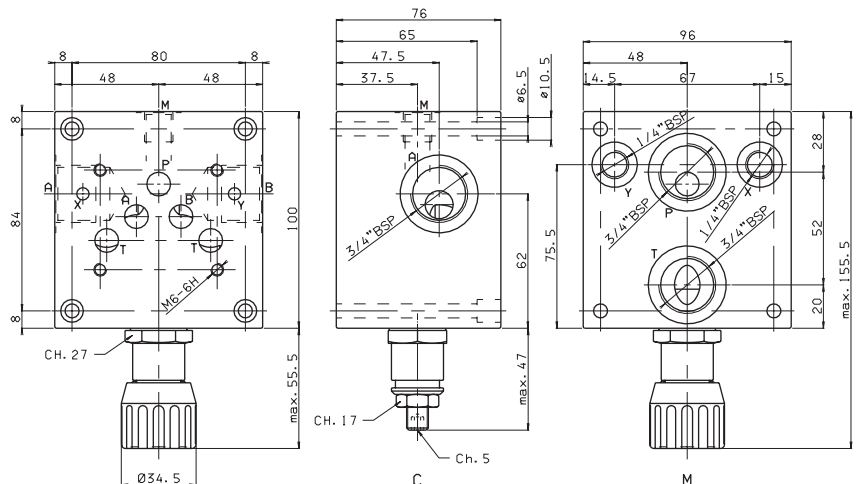
Weight: 3,9 Kg
Fixing screws M6x50 UNI 5931



BSH531 WITH P AND T REAR, A AND B SIDE 3/4" BSP, X AND Y CLEARANCE HOLES WITH MAXIMUM PRESSURE VALVE

- BSH** Single plate for piloted valve
- 5** CETOP 5/NG10
- 31** 3/4" BSP rear and side connectors
- *** **M** = Plastic knob
C = Grub screw
- *** Setting ranges
1 = Max 50 bar
2 = Max 140 bar
3 = Max 320 bar
- **** **00** = No variant
V1 = Viton
- 2** Serial No.

Weight: 5,5 Kg
Fixing screws M6x75 UNI 5931



•For the minimum permissible setting pressure depending on the spring, see minimum setting curve pressure CMP30

ADH7... 4/3 AND 4/2 PILOTED VALVES CETOP 7/NG16



Type ADH.7 distributors are intended for interrupting, inserting and diverting a hydraulic system flow. Normally these distributors are composed of a main stage, crossed by the circuit main flow, and of a pilot stage available in several versions.

Various types of controls are available, used either individually or in combination for, among other functions, stroke limitation and main spool movement speed control, in order to optimize the hydraulic system operation where this type of valve is employed.

In those cases where normally to drain spools are used, it is necessary to remember that the minimum changeover pressure due to the opposing springs is equal to approximately 5 bar (see the operating features table next pages) and it is consequently necessary to specify when ordering the check valve incorporated in the P line, if required (as shown below).

- Mounting surface in accordance with UNI ISO 4401 - 07 - 06 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-07).
- Pilot operated spool, solenoid controller.
- Stroke control of main spool.
- Presetting for pressure reducing valve mounting.
- Presetting for single-acting throttle valve mounting.

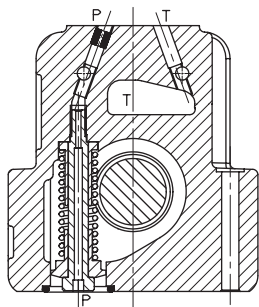
ADH7...	
STANDARD SPOOLS FOR ADH7	CAP. I • 58
TECH. SPECIFICATIONS	CAP. I • 59
SUBPLATES BSH7...	CAP. I • 60
CETOP 3/NG06	CAP. I • 8
STANDARD SPOOLS FOR AD3E	CAP. I • 10
AD3E...	CAP. I • 11
ADC3...	CAP. I • 5
"A09" DC COILS	CAP. I • 7
"D15" DC COILS	CAP. I • 19
"B14" AC SOLENOIDS	CAP. I • 19
STANDARD CONNECTORS	CAP. I • 20

ORDERING CODE

ADH	Piloted valve - Pilot valves and any modulating valves should be ordered separately
7	CETOP 7/NG16
*	Mounting type (see next page)
**	Spool type (see next page)
*	Piloting and draining I = X internal / Y internal IE = X internal / Y external EI = X external / Y internal E = X external / Y external (see Tab.1 at side)
R	Check valve incorporated at port P (Tab. 2) Only for I and IE versions (omit if not required)
**	00 = No variant LC = Main spool stroke limiter
2	Serial No.

Tab. 2 - INTERNAL CHECK ON P

ADH7****R**2 VERSION



• For the spools 02-04-14-28 the piloting is normally external; the internal piloting is possible only with the internal check valve (R).

Tab. 1 - PLUGS ARRANGEMENT FOR THE PILOT AND DRAIN LINES

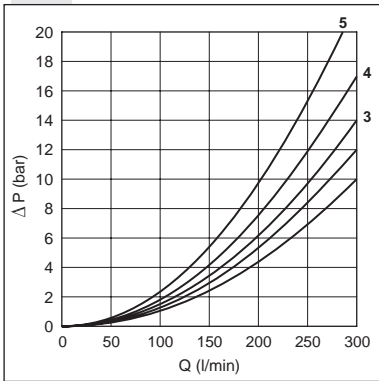
Plugs type used: M5x5 both for pilot and drain.
 Note: standard M6x6 orifice Ø1,5 insert in the P port (Z)

	<p>ADH7...I X internal piloting Y internal draining</p>
	<p>ADH7...IE X internal piloting Y external draining</p>
	<p>ADH7...EI X external piloting Y internal draining</p>
	<p>ADH7...E X external piloting Y external draining</p>

ADH7... 4/3 AND 4/2 PILOTED VALVES CETOP 7/NG16

1

PRESSURE DROPS

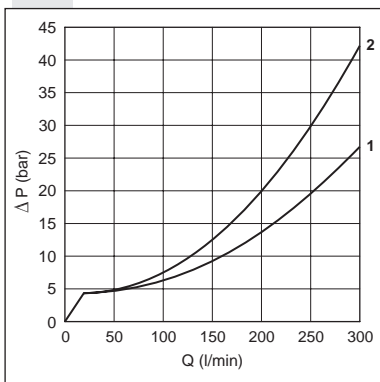


The two diagrams show the "Pressure drops" in relation to spools adopted for normal usage (see table). The fluid used was a mineral based oil with a viscosity of 46 mm²/s at 40° C.

Spool type	Connections					
	P → A	P → B	A → T	B → T	P → T	
01	Energized	2	1	3	3	
02	Energized De-Energized	1	1	3	3	2
03	Energized De-Energized	2	1	3	3	
04	Energized De-Energized	2	2	4	4	5
05	Energized De-Energized	1	1	2	2	
66	Energized De-Energized	1	1	2	4	
10	Energized	2	1	3	3	
14	Energized De-Energized	1	1	3	3	4
28	Energized De-Energized	1	1	3	3	4
23	Energized	2	1	3	3	

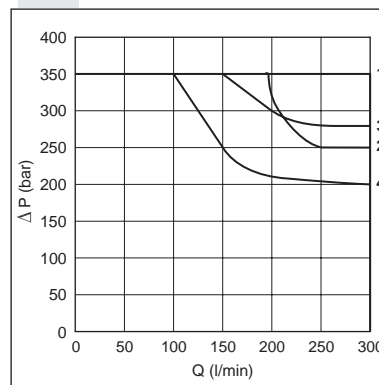
Curve No.

PRESSURE DROPS FOR INTERNAL CHECK ON P VERSION



The limit of use test has been carried out with external draining and orifice Ø1,5 insert in the P port (Z). The fluid used was a mineral based oil with a viscosity of 46 mm²/s at 40° C.

LIMIT OF USE



Spool type	
01	1
02	2
03	1
04	3
05	1
66	1
10	1
14	4
28	4
23	1

(*) For the "E mounting" the locating spring works only with the steady system (* Spools with price increasing)

SPOOLS AND MOUNTING TYPE

	C mounting	A mounting	B mounting	E mounting (*)	P mounting
Pilot Piloted	AD3E03C... ADH7C...	AD3E03E... ADH7A...	AD3E03F... ADH7B...	AD3E16E... ADH7E...	AD3E16E/AD3E16F ADH7P...
Scheme					
Spool type					
01					
02					
03					
04*					
05					
66					
10*					
14*					
28*					
23*					

ADH7... 4/3 AND 4/2 PILOTED VALVES CETOP 7/NG16

PILOT SOLENOID CONTROL VALVE SPECIFICATIONS

FOR DIFFERENT CONTROLS, PLEASE CONTACT OUR TECHNICAL DEPARTMENT

Max. operating pressure ports P/A/B	350 bar
Max. operating pressure port T (int. drainage)	160 bar
Max. operating pressure port T (ext. drainage)	250 bar
Max. piloting pressure	210 bar
Min. piloting pressure*	12 bar
Max flow	300 l/min.
Piloting oil volume for engagement 3 position valves	4 cm ³
Piloting oil volume for engagement 2 position valves	8 cm ³
Hydraulic fluid	mineral oil DIN 51524
Fluid viscosity	2.8 ÷ 380 mm ² /s
Fluid temperature	-20°C ÷ 70°C
Ambient temperature	-20°C ÷ 50°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$
Weight ADH7 without pilot valve	7 Kg
Weight ADH7 with pilot valve with 1 AC solenoid	8,2 Kg
Weight ADH7 with pilot valve with 1 DC solenoid	8,4 Kg
Weight ADH7 with pilot valve with 2 AC solenoids	8,5 Kg
Weight ADH7 with pilot valve with 2 DC solenoids	9 Kg

* For valves with internal drain (Y), tank pressure on T must be added to min. piloting pressure.

For version "R" with check valve on P, the cracking pressure of 5 bar is obtained with flow rate > 25 l/min.

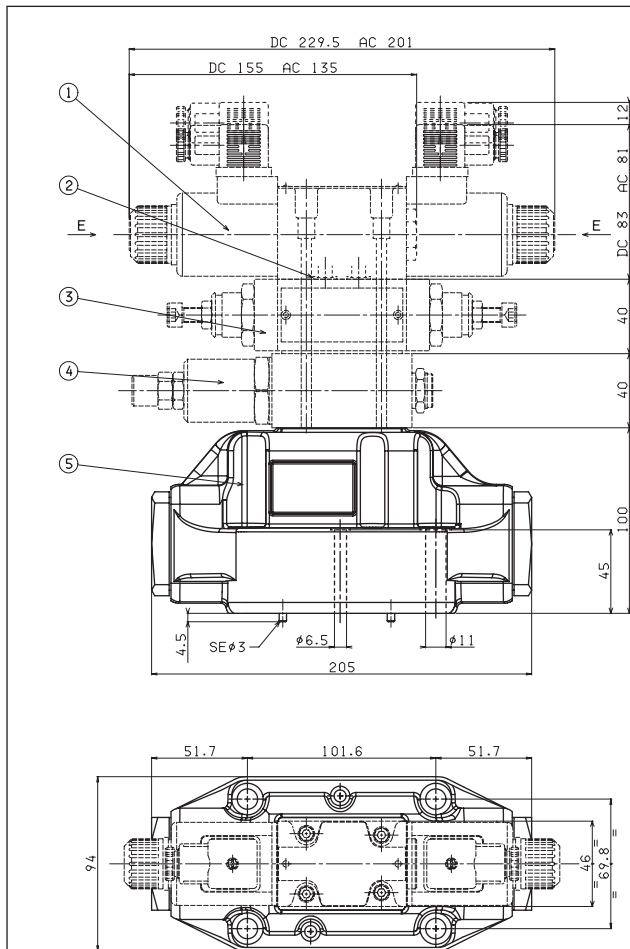
Switching time

Such values refer to a tests carried out with solenoid valve type AD3E03 with P = 100 bar pressure and Q = 100 l/min flow. Orifice ϕ 1.5 mm, insert on piloting port, using a mineral oil at 40°C. with 46 mm²/s viscosity.

TEMPI DI RISPOSTA VALVOLA PILOTATA

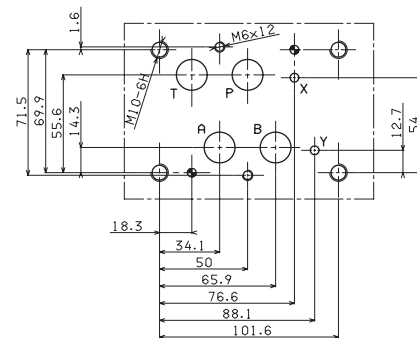
Solenoids	ENERGIZING $\pm 10\%$ (ms)		DE-ENERGIZING $\pm 10\%$ (ms)	
	01 - 03		01 - 03	
No. Spool	01 - 03		01 - 03	
Scheme	2 positions	3 positions	2 positions	3 positions
AC	50	20	25	30
DC	70	35	40	50
Solenoids	02 - 04		02 - 04	
	02 - 04		02 - 04	
No. Spool	02	04	02 - 04	02 - 04
Scheme	2 posit.	2 posit.	3 posit.	2 positions
AC	35	60	30	25
DC	55	80	40	50

Note: the solenoid valve type **ADC3E...** (with A09 coil) and **AD3E...** (with D15 or B14 coils) could be used both as pilote valve, without any changement of technical features.



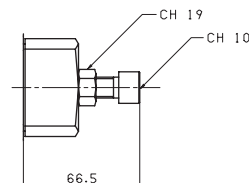
- 1 Piloted solenoid valve type **AD3E...** or **ADC3E...** CETOP 3/NG6
- 2 Calibrated diaphragms **AD3E...**
- 3 Flow regulation valve type **AM3QF.C**
- 4 Pressure reduction valve type **AM3RD..C**
- 5 Main valve type **ADH7..E**

CETOP 7 MOUNTING SURFACE



- Piloted valve fixing:
n° 4 screws T.C.E.I. M10x60 - Tightening torque 40 Nm
n° 2 screws T.C.E.I. M6x55 - Tightening torque 8 Nm
- Seals:
n° 4 OR 2-118 PARKER (type 130)
n° 2 OR 2-013 PARKER (type 2043)

SPOOL STROKE ADJUSTMENT



1

BSH7... SUBPLATES MOUNTING FOR ADH7 TYPE PILOTED VALVES CETOP 7/NG16

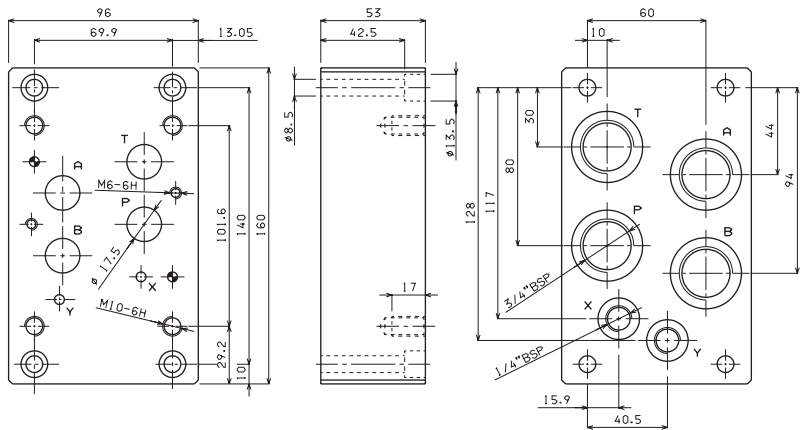
1

BSH712 WITH P, T, AND A, B REAR 3/4" BSP

- BSH** Single plate for piloted valve
- 7** CETOP 7/NG16
- 12** 3/4" BSP rear connectors
- 00** No variant
- 1** Serial No.

Weight: 5,5 Kg

Fixing screws M8x55 UNI 5931

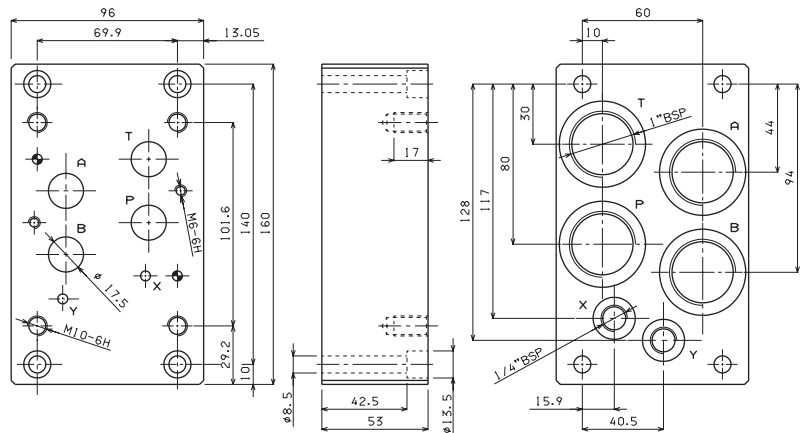


BSH713 WITH P, T AND A, B REAR 1" BSP

- BSH** Single plate for piloted valve
- 7** CETOP 7/NG16
- 13** 1" BSP rear connectors
- 00** No variant
- 1** Serial No.

Weight: 4,7 Kg

Fixing screws M8x55 UNI 5931

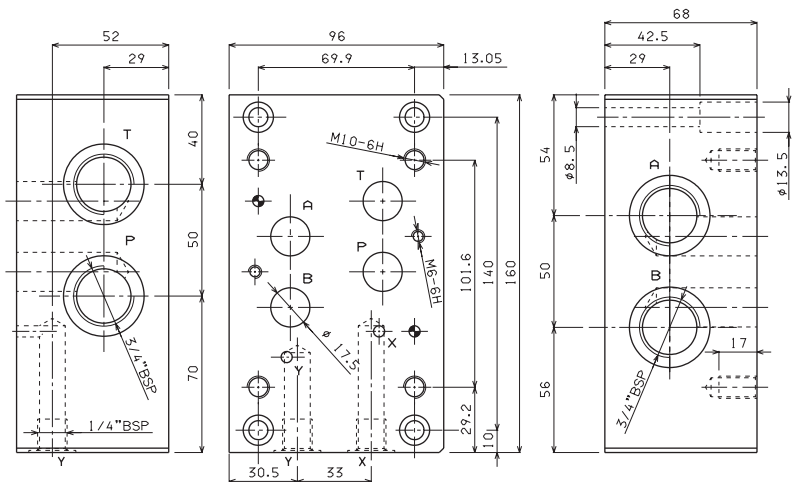


BSH714 WITH P, T AND A, B SIDE 3/4" BSP

- BSH** Single plate for piloted valve
- 7** CETOP 7/NG16
- 14** 3/4" BSP side connectors
- 00** No variant
- 1** Serial No.

Weight: 6,3 Kg

Fixing screws M8x55 UNI 5931



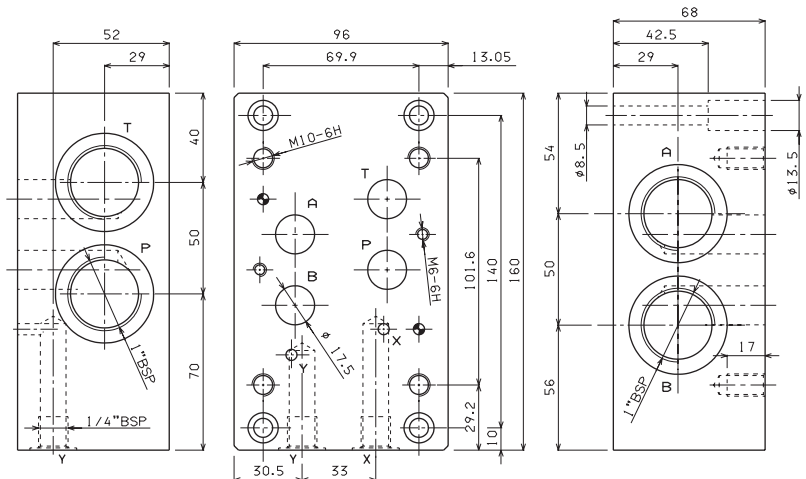
BSH7... SUBPLATES MOUNTING FOR ADH7 TYPE PILOTED VALVES CETOP 7/NG16

1

BSH715 WITH P, T AND A, B SIDE 1" BSP

- BSH** Single plate for piloted valve
- 7** CETOP 7/NG16
- 15** 1" BSP side connectors
- 00** No variant
- 1** Serial No.

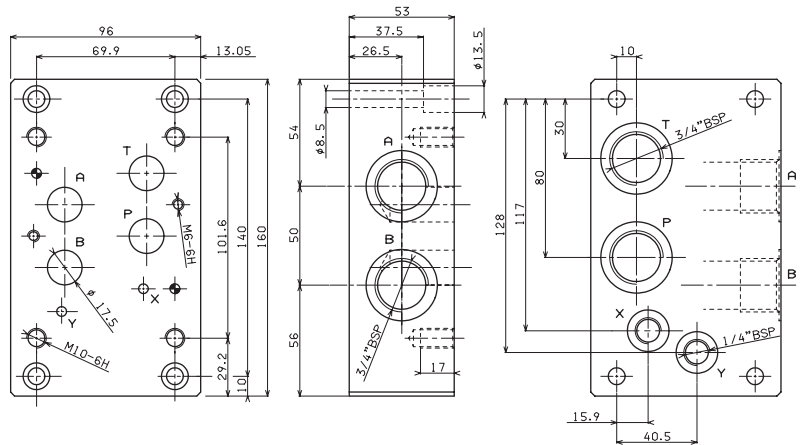
Weight: 6,3 Kg
 Fixing screws M8x55 UNI 5931



BSH716 WITH P AND T REAR, A AND B SIDE 3/4" BSP, X AND Y REAR

- BSH** Single plate for piloted valve
- 7** CETOP 7/NG16
- 16** 3/4" BSP rear and side connectors
- 00** No variant
- 1** Serial No.

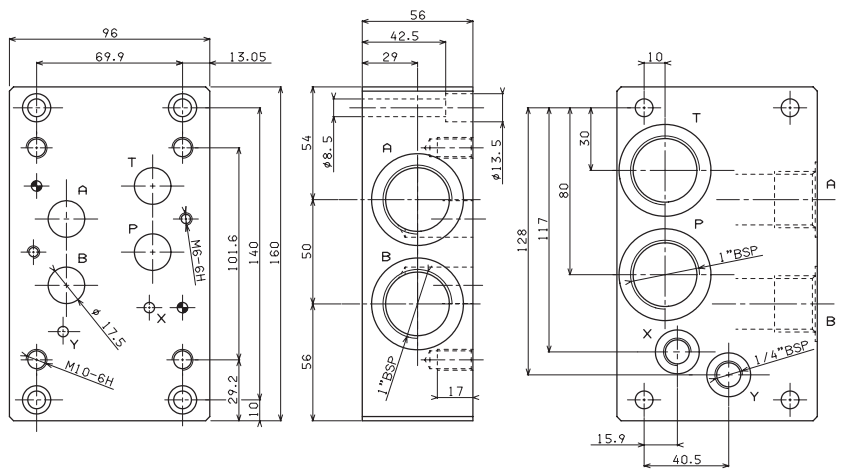
Weight: 5,1 Kg
 Fixing screws M8x50 UNI 5931



BSH717 WITH P AND T REAR, A AND B SIDE 1" BSP, X AND Y REAR

- BSH** Single plate for piloted valve
- 7** CETOP 7/NG16
- 17** 1" BSP rear and side connectors
- 00** No variant
- 1** Serial No.

Weight: 5,3 Kg
 Fixing screws M8x55 UNI 5931





ADH8...

STANDARD SPOOLS FOR ADH8	CAP. I • 63
TECH. SPECIFICATIONS	CAP. I • 64
BSH8...	CAP. I • 65
CETOP 3/NG06	CAP. I • 8
STANDARD SPOOLS FOR AD3E	CAP. I • 10
AD3E...	CAP. I • 11
"D15" DC COILS	CAP. I • 19
"B14" AC SOLENOIDS	CAP. I • 19
STANDARD CONNECTORS	CAP. I • 20

ORDERING CODE

ADH

Piloted valve
(Pilot valves and any modulating valves should be ordered separately)

8

CETOP 8/NG25

Mounting type (see next page)

Spool type (see next page)

Piloting and draining

I = X internal / Y internal
IE = X internal / Y external
EI = X external / Y internal
E = X external / Y external
(see Tab.1 at side)

R

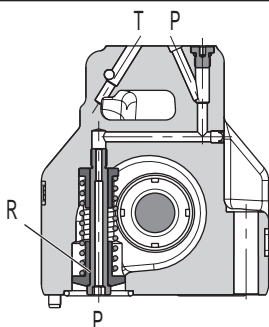
Check valve incorporated at port P
- setting 5 bar (Tab. 2 below)
Only for **I**, **IE** versions
(Omit if not required)

00 = No variant
LC = Main spool stroke limiter

2

Serial No.

TAB. 2 - INTERNAL CHECK ON P



• For the spools 02-04-14-28 the piloting is normally external; the internal piloting is possible with the internal check valve (R).

ADH8...4/3 AND 4/2 PILOTED VALVES CETOP 8/NG25

Type ADH.8 distributors are intended for interrupting, inserting and diverting a hydraulics system flow.

Normally these distributors are composed of a main stage, crossed by circuit main flow, and of a pilot stage available in several versions.

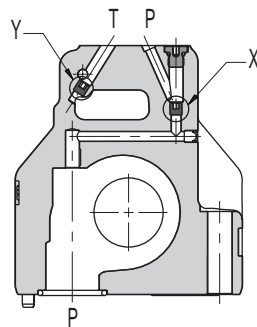
Various types of controls are available, used either individually or in combination for, among other functions, stroke limitation and main spool movement speed control, in order to optimize the hydraulic system operation where this type of valve is employed.

In those cases where normally to drain spools are used, it is necessary to remember that the minimum changeover pressure due to the opposing springs is equal to approximately 5 bar (see the operating features table next pages) and it is consequently necessary to specify when ordering the check valve incorporated in the P line, if required (as shown below).

- Mounting surface in accordance with UNI ISO 4401 - 08 - 07 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-08).
- Pilot operated spool, solenoid controller.
- Stroke control of main spool.
- Presetting for pressure reducing valve mounting.
- Presetting for single-acting throttle valve mounting.

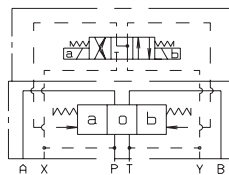
TAB. 1 - PLUGS ARRANGEMENT FOR THE PILOT AND DRAIN LINES

Plugs type used: M6x6 both for pilot X and drain Y

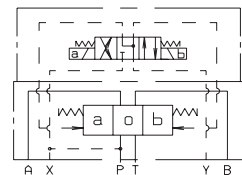


TIPO DI VALVOLA		Montaggio tappi	
		X	Y
ADH8---I	X internal piloting Y internal draining	NO	NO
ADH8---IE	X internal piloting Y external draining	NO	YES
ADH8---EI	X external piloting Y internal draining	YES	NO
ADH8---E	X external piloting Y external draining	YES	YES

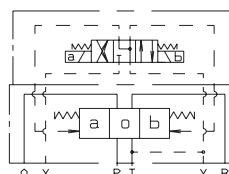
ADH8...I



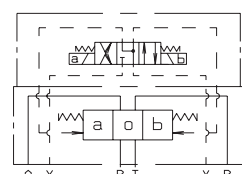
ADH8...IE



ADH8...EI

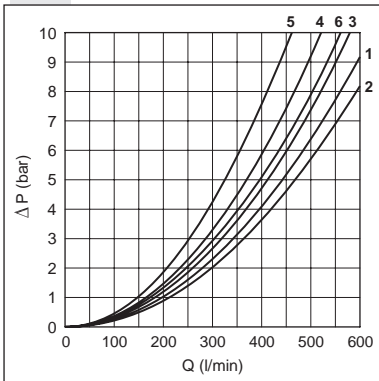


ADH8...E



ADH8... 4/3 AND 4/2 PILOTED VALVES CETOP 8/NG25

PRESSURE DROPS



The diagram shows the pressure drops in relation to spools adopted for normal usage (see table). The fluid used was a mineral based oil with a viscosity of 35 mm²/s at 50° C.

Spool type		Connections				
		P → A	P → B	A → T	B → T	P → T
01	Energized	1	1	2	3	
02	Energized De-Energized	2	2	1	2	6 (1)
03	Energized De-Energized	1	1	1 4 (2)	2 4 (3)	
04	Energized De-Energized	6	6	3	4	5
05	Energized De-Energized	2 4 (2)	2 4 (3)	2	3	
66	Energized De-Energized	1	1	2	2 4	
10	Energized	1	1	2	3	
14	Energized De-Energized	6	6	3	4	5 (3)
28	Energized De-Energized	6	6	4	3	5 (2)
23	Energized De-Energized	1	2 4	2	3	
		Curve No.				

Notes: (1) A/B stopped - (2) B stopped - (3) A stopped

SPOOLS AND MOUNTING TYPE

(*) For the E mounting the locating spring works only with the steady system

	C mounting	A mounting	B mounting	E mounting	P mounting
Pilot Piloted	AD3E03C... ADH8C...	AD3E03E... ADH8A...	AD3E03F... ADH8B...	AD3E16E... ADH8E...	AD3E16E/AD3E16F ADH8P...
Scheme					
Spool type	A X P T Y B	A X P T Y B	A X P T Y B	A X P T Y B	A X P T Y B
01					
02					
03					
04(*) (**)					
05					
66					
10*					
14*					
28*					
23*					

(* SPOOLS WITH PRICE INCREASING)

(** THE SPOOL 04 IS AVAILABLE FOR OPERATING PRESSURES IN THE P/A/B LINES, MAX. 320 BAR)

ADH8... 4/3 AND 4/2 PILOTED VALVES CETOP 8/NG25

PILOT SOLENOID CONTROL VALVE SPECIFICATIONS

FOR DIFFERENT CONTROLS, PLEASE CONTACT OUR TECHNICAL DEPARTMENT

1

Max. operating pressure ports P/A/B	420 bar
The spool 04 is available for operating pressures in the P/A/B lines	max. 320 bar
Max. operating pressure port T (int. drainage)	160 bar
Max. operating pressure port T (ext. drainage)	250 bar
Max. piloting pressure	350 bar
Max. piloting pressure with main spool stroke limiter (LC variant)	250 bar
Min. piloting pressure*	5 bar
Max. flow with 04-14-28 spools	500 l/min a 210 bar 450 l/min a 320 bar
Max. flow with all other spools	600 l/min a 210 bar 500 l/min a 320 bar
Piloting oil volume for engagement 3 position valves	11.1 cm ³
Piloting oil volume for engagement 2 position valves	22.12 cm ³
Hydraulic fluid	mineral oil DIN 51524
Fluid viscosity	2.8 ÷ 380 mm ² /s
Fluid temperature	-20°C ÷ 70°C
Ambient temperature	-20°C ÷ 50°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$
Weight ADH8 without pilot valve	13,1 Kg
Weight ADH8 with pilot valve with 1 AC solenoid	14,3 Kg
Weight ADH8 with pilot valve with 1 DC solenoid	14,5 Kg
Weight ADH8 with pilot valve with 2 AC solenoids	14,6 Kg
Weight ADH8 with pilot valve with 2 DC solenoids	15,1 Kg

* For valves with internal drain (Y), tank pressure on T must be added to min. piloting pressure.
Min. piloting pressure is 5 bar with low flow rate, but it is up to 12 bar with higher flow rate.

For version "R" with check valve on P, the cracking pressure of 5 bar is obtained with flow rate > 25 l/min.

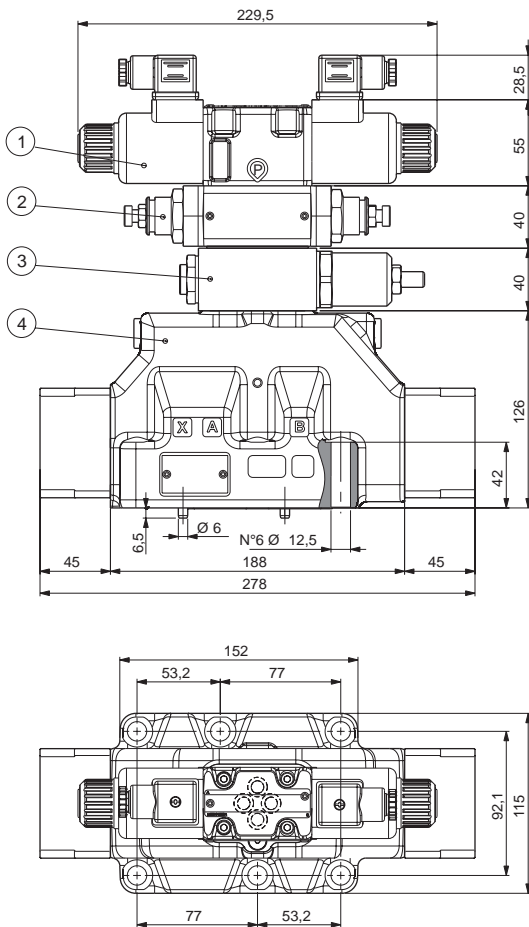
Switching time

Such values refer to a solenoid valve with P = 100 bar pressure using a mineral oil at 50°C with 36 mm²/sec viscosity PA and BT connections.

SWITCHING TIMES PILOTED VALVE

Solenoids	ENERGIZING ±10% (ms)		DE-ENERGIZING ±10% (ms)	
	2 posit.	3 posit.	2 posit.	3 posit.
AC	60	45	90	60
DC	75	55	90	60

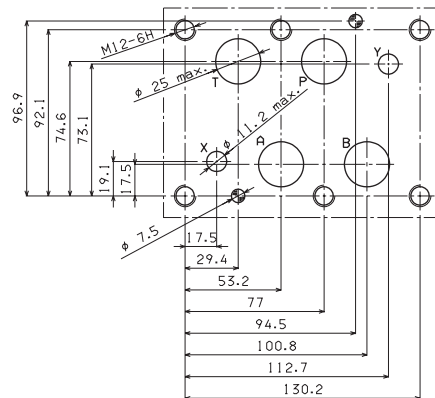
OVERALL DIMENSIONS



- 1 Piloted solenoid valve type **AD3E (CETOP3 NG6)**
- 2 Flow regulation valve type **AM3QF..C**
- 3 Pressure reduction valve type **AM3RD..C**
- 4 Main valve type **ADH8***

* The piloted valve is provided with a calibrated screw M6 with hole $\phi 1.5$, already mounted on the port "P".

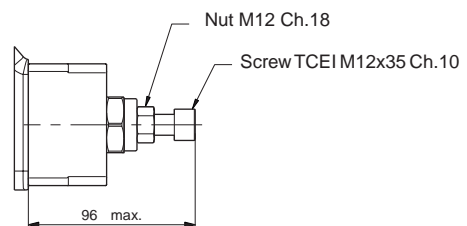
CETOP 8 MOUNTING SURFACE



- Piloted valve fixing: n° 6 screws T.C.E.I. M12x60
- Tightening torque: 115 Nm with screw Cl. 12.9**
69 Nm with screw Cl. 8.8

** Recommended for applications over 350 bar

- Seals: n°4 OR 2-123/3118 type (29.82x2.62) - 90 Shore
n°2 OR 2-117/3081 type (20.24x2.62) - 90 Shore



SPOOL STROKE ADJUSTMENT (LC variant)

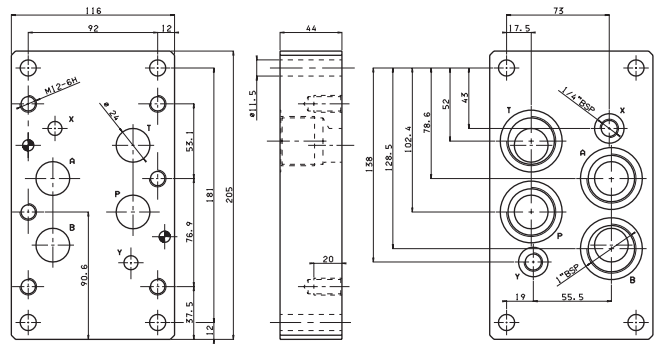
BSH8... SUBPLATES MOUNTING FOR ADH8 TYPE PILOTED VALVES CETOP 8/NG25

1

BSH813 WITH P, T AND A, B REAR 1" BSP

- BSH** Single plate for piloted valve
- 8** CETOP 8/NG25
- 13** 1" BSP rear connectors
- 00** No variant
- 1** Serial No.

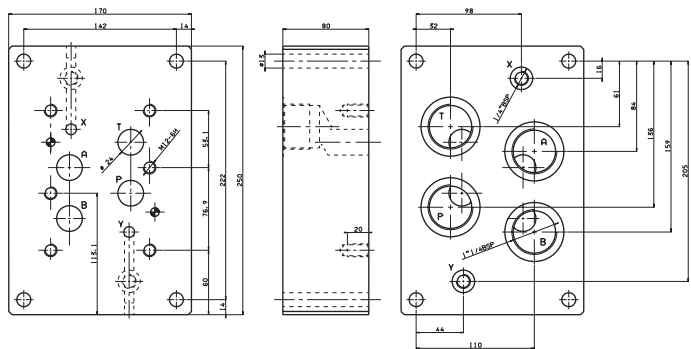
Weight: 6,3 Kg - Fixing screws M10x60 UNI 5931



BSH813* WITH P, T AND A, B REAR 1"1/4 BSP OR 1" 1/2 BSP

- BSH** Single plate for piloted valve
- 8** CETOP 8/NG25
- 13*** A = 1"1/4 BSP rear connectors
B = 1"1/2 BSP rear connectors
- 00** No variant
- 1** Serial No.

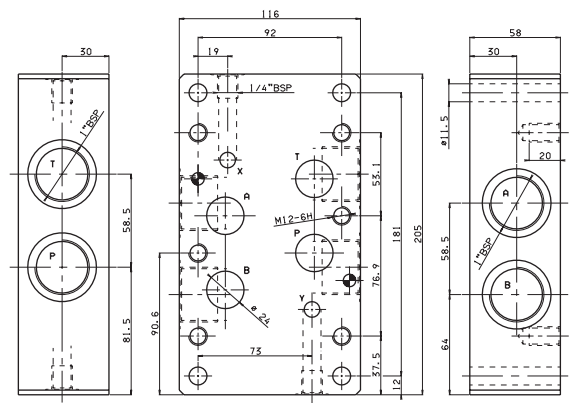
Weight: 21,7 Kg (BSH.8.13A) - Weight: 21,2 Kg (BSH.8.13B)
Fixing screws M12x100 UNI 5931



BSH815 WITH T, P AND A, B SIDE 1" BSP

- BSH** Single plate for piloted valve
- 8** CETOP 8/NG25
- 15** 1" BSP side connectors
- 00** No variant
- 1** Serial No.

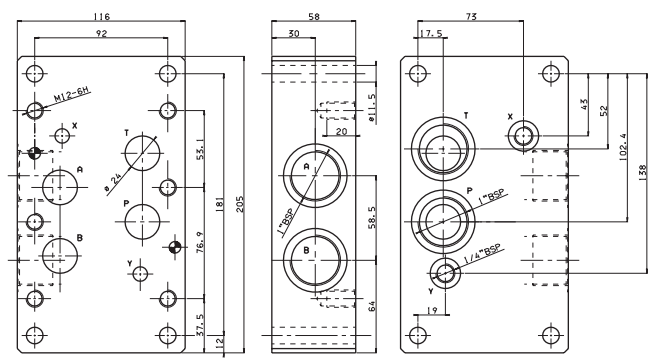
Weight: 8,2 Kg
Fixing screws M10x75 UNI 5931

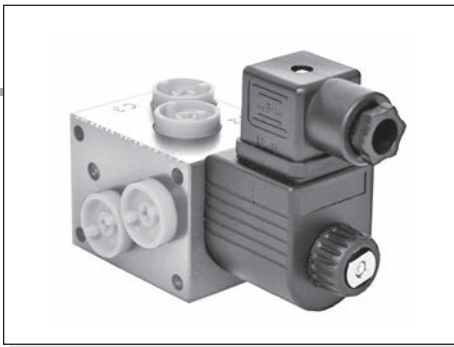


BSH817 WITH P AND T REAR, A AND B SIDE 1" BSP, X AND Y REAR

- BSH** Single plate for piloted valve
- 8** CETOP 8/NG25
- 17** 1" BSP rear and side connectors
- 00** No variant
- 1** Serial No.

Weight: 8,3 Kg - Fixing screws M10x75 UNI 5931





CDL046... STACKABLE CIRCUIT SELECTOR VALVES

The stackable circuit selector valves, type CDL.04.6, allows one single drive of 5 users with 4 elements connected in series.

As they are moved from high performances solenoids they don't need the external drainage.

Additionally, beyond having a reduced and compact dimensions, they can manage high hydraulic powers with a minimal pressure drop. The body valve is white zinc plated.

Max. pressure	250 bar
Max. flow	20 l/min
Overlap	positive
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm ² /s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance NAS with 1638 with filter β ₂₅ ≥ 75
Weight	see "Overall dimension"

CDL046...	
"A09" DC Coils	CAP. I • 73
CONNECTORS STANDARD	CAP. I • 20

ORDERING CODE

CDL	Stackable circuit selector valve
04	Size NG04
6	No. of way (single element)
W	Threaded connectors 1/4" BSP
I	Internal drainage
*	No. of elements: 1 / 2 / 3 / 4
*	Voltage (Tab. 1)
**	Variants (Tab. 2)
1	Serial No.

TAB.1 - A09 (27 W) COIL

DC VOLTAGE **	
L	12V
4	14V
M	24V
N	48V*
P	110V*
Z	102V*
X	205V*
W	Without DC coil

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

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

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

* Special voltage
** Technical data see page CAP. I • 73

- The AMP Junior coil, the Deutsch coil with bidirectional diode and the coil with flying leads (with or without diode) coils are available in 12V or 24V DC voltage only.

TAB. 2 - VARIANTS

VARIANT	CODE
No variant (without connectors)	S1(*)
Viton	SV(*)
Rotary emergency button	P2(*)(**)
Emergency button	ES(*)
AMP Junior connection	AJ(*)
Bobina con fili (250 mm)	FL
with flying leads (130 mm) and integr. diode	LD
Deutsch connection with bidir. diode	CX

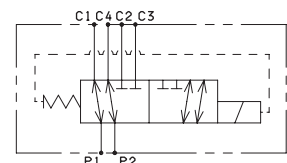
Other variants available on request.

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

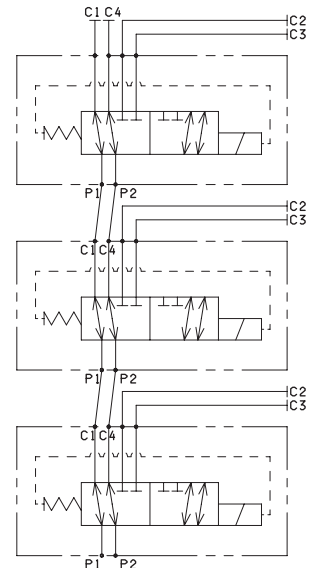
(**) P2 Emergency tightening torque **max. 6÷9 Nm / 0.6 ÷ 0.9 Kgm** with CH n. 22

HYDRAULIC SYMBOLS

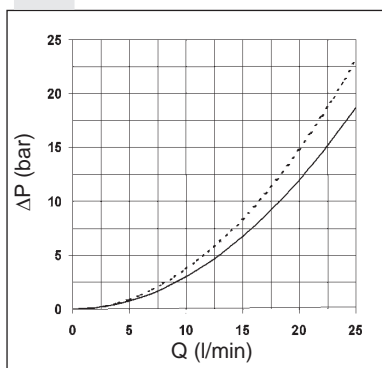
SINGLE ELEMENT



MULTI STATION CONNECTION

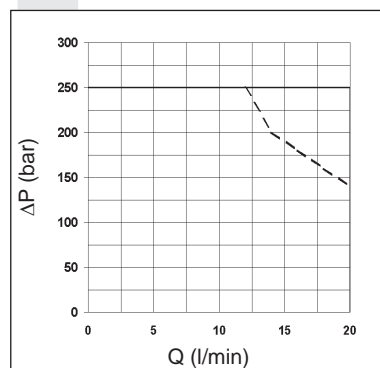


PRESSURE DROPS



— P1 → C1
P1 → C2
- - - P2 → C3
P2 → C4

LIMITS OF USE



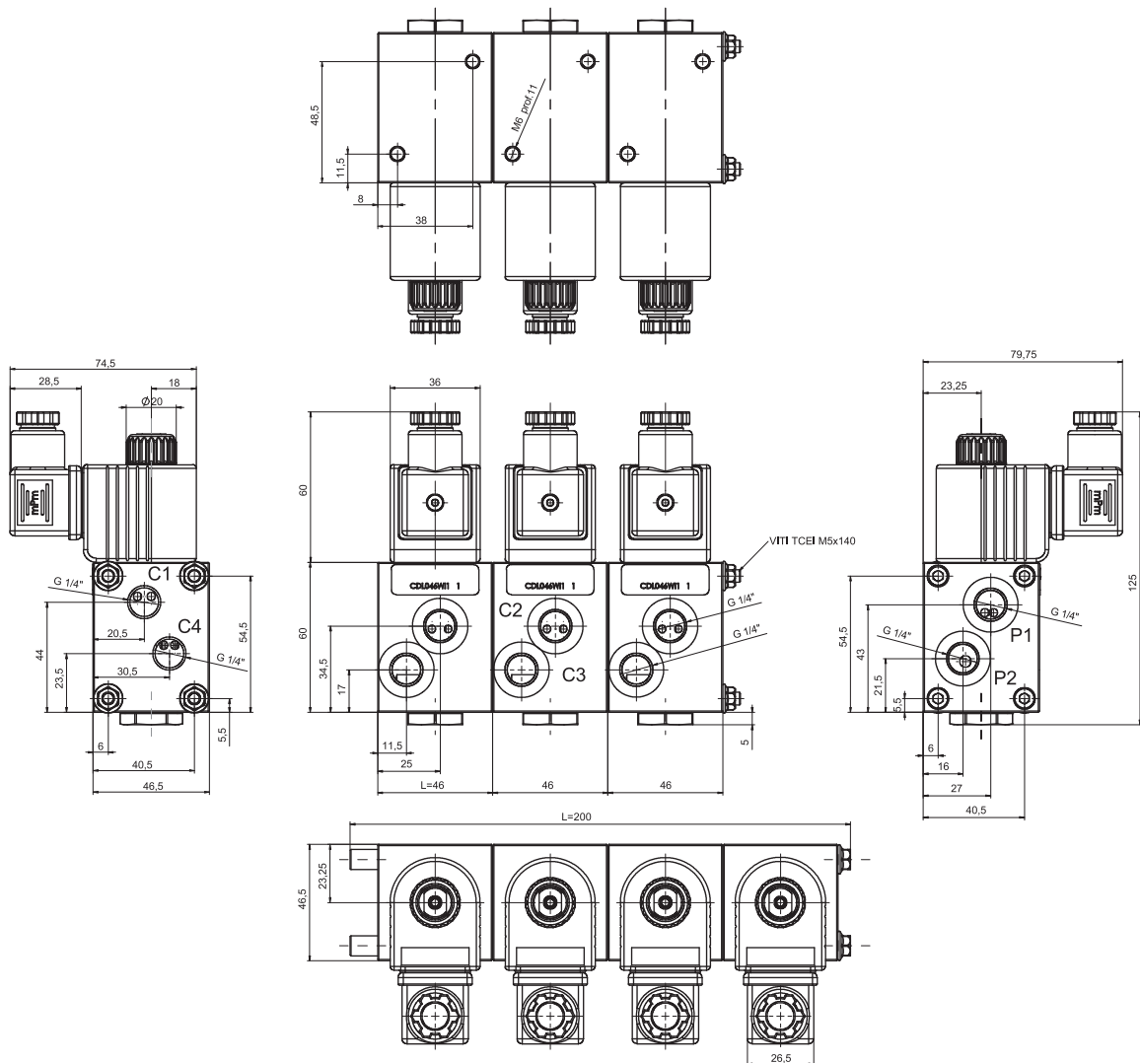
— Energizing
- - - De-energizing

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 degrees C.

CDL046... STACKABLE CIRCUIT SELECTOR VALVES

OVERALL DIMENSIONS

1

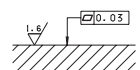


Tighten the screws to a torque of 5 Nm (0.5 Kgm)
Fixing screws with material specifications min. 8.8

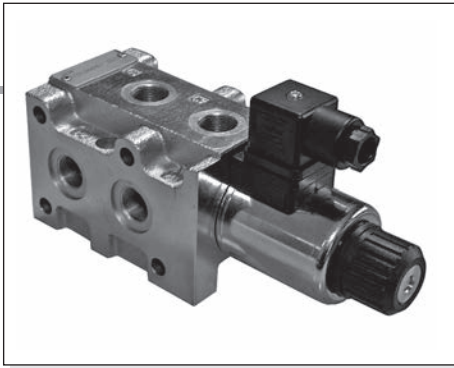
No. of elements	No. of way	L (Length)	Weight (Kg)	Fixing screws	Kit spare part code* (rods and studs)
1	06	46	1.05	—	—
2	08	100	2.20	TCEI M5x95	V89.54.0020
3	10	145	3.30	TCEI M5x140	V89.54.0021
4	12	200	4.45	TCEI M5x194 (special rods)	V89.54.0022

(*) For multiple composition rods and studs are available.

Support plane specifications



CDL066... STACKABLE CIRCUIT SELECTOR VALVES



The stackable circuit selector valves, type CDL.06.6, allows one single drive of 6 users with 5 elements connected in series.

As they are moved from high performances solenoids they don't need the external drainage.

This valves can manage high hydraulic powers with a minimal pressure drop.

Max. pressure	250 bar
Max. flow	50 l/min
Overlap	negative
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm ² /s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance NAS with 1638 with filter β ₂₅ ≥ 75
Weight	see "Overall dimension"

CDL066...	
"40W" DC COILS	CAP. I • 74
CONNECTORS STANDARD	CAP. I • 20

ORDERING CODE

ORDERING CODE

CDL	Stackable circuit selector valve
06	Size NG06
6	No. of way (single element)
W	Threaded connectors 3/8" BSP
I	Internal drainage
*	No. of elements: 1 / 2 / 3 / 4 / 5
*	Voltage (Tab. 1)
**	Variants (Tab. 2)
1	Serial No.

TAB.1 - 40W COIL

DC VOLTAGE

L	12V
M	24V
W	Without DC coil

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

TAB.2 - VARIANTS

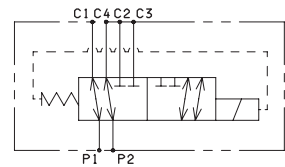
No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2(*)
Raccordements Deutsch DT04-2P	CZ

Other variants available on request.

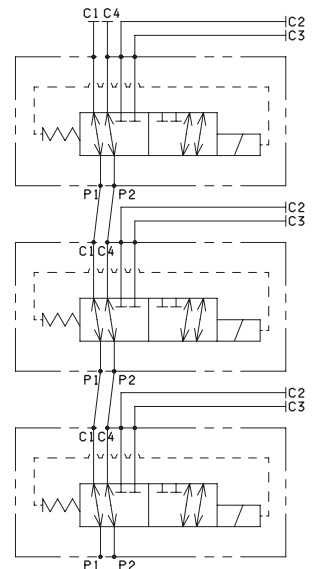
(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, CAP. I • 20.

HYDRAULIC SYMBOLS

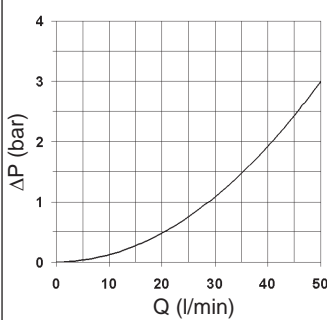
SINGLE ELEMENT



MULTISTATION CONNECTION



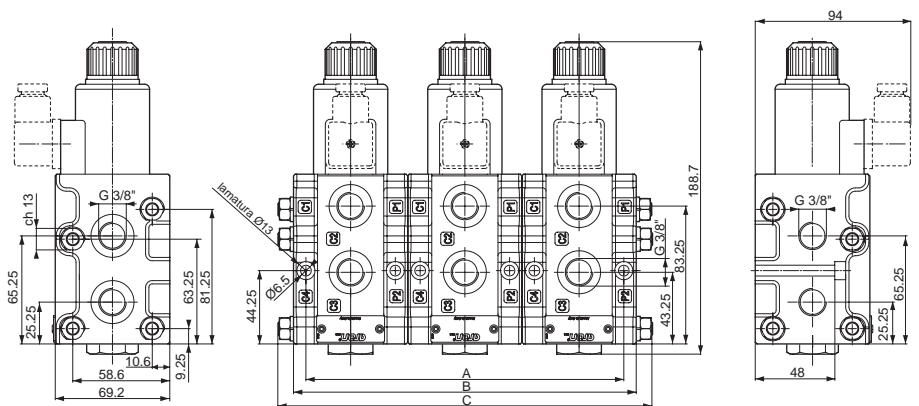
PRESSURE DROPS



— P1 → C1, P1 → C2, P2 → C3 e P2 → C4

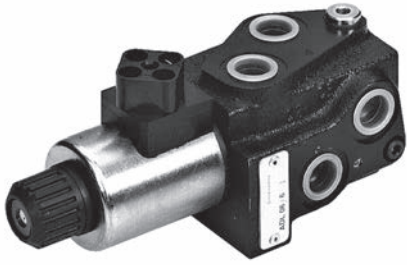
The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C.

OVERALL DIMENSIONS



Fixing screws UNI 5931 M6x60 with material specifications min. 8.8
Tightening torque for studs 8 Nm / 0.8 Kgm
Tightening torque for rods 20 Nm / 2 Kgm

(*) For multiple composition rods and studs are available.



ADL066... FLOW DIVERSION VALVES

The 6 way flow diversion valves are special solenoid valves which allow the simultaneous connection of two systems.

In order to obtain valve's working at pressure of 250 bar up to 320 bar (external drainage) the G 1/8" BSP plug must be removed to Y connector.

Max. pressure (without drainage, Y plugged)	250 bar
Max. pressure (external drainage)	320 bar
Max. flow	40 l/min
Overlap	negative
Fluid viscosity	10 ÷ 500 mm ² /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 β ₂₅ > 75
Weight	2,4 Kg

ADL066...

"D15" DC COILS	CAP. I • 73
STANDARD CONNECTORS	CAP. I • 20

ORDERING CODE

ADL06	Flow diversion valves NG6
6	No. of way
W	Threaded connectors 3/8" BSP
I	Drainage plugged
*	Voltage (see table 1)
**	Variants (see table 2)
3	Serial No.

TAB.2 - VOLTAGE

D15 COIL (30W) **

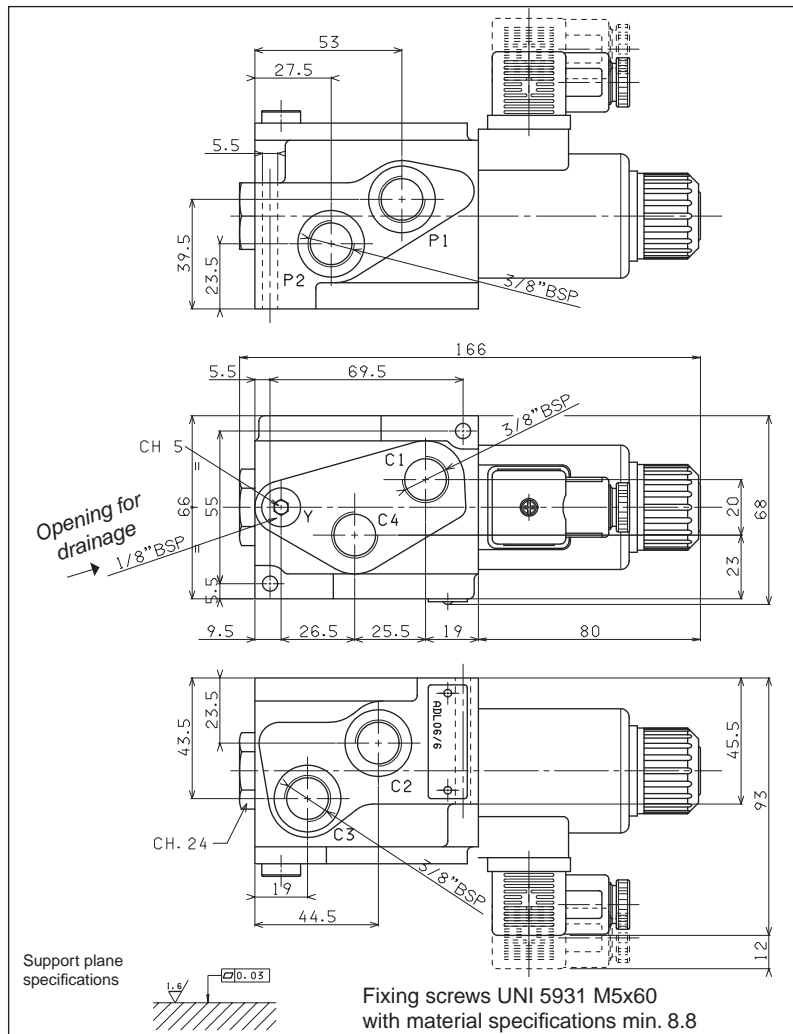
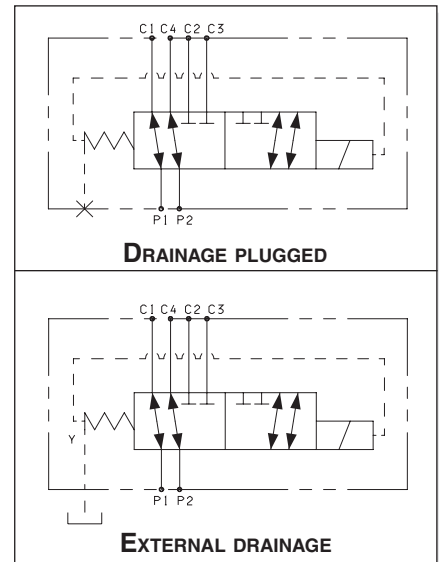
L	12V	
M	24V	
V	28V*	115Vac/50Hz 120Vac/60Hz with rectifier
N	48V*	
Z	102V*	
P	110V*	230Vac/50Hz 240Vac/60Hz with rectifier
X	205V*	
W	Without DC coils and connectors	

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

* Special voltage

** Technical data see CAP. I • 73

- AMP Junior (with or without diode) and Deutsch and with flying leads coils, are available in 12V or 24V DC voltage only.
- Plastic type coils are available in 12V, 24V, 28V or 110V DC voltage only.



TAB.2 - VARIANTS

No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2(*)
AMP Junior coil	AJ(*)
AMP Junior coil and integrated diode	AD(*)
Coil with flying leads (175mm)	SL
Deutsch DT04-2P Coil type	CZ
Plastic type coil D15	RS(*)

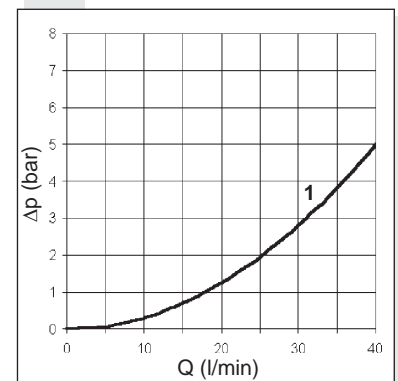
Other variants available on request.

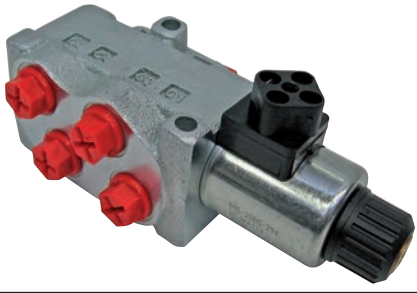
(*) Coils with Hirschmann and AMP Junior connection supplied without connectors. The connectors can be ordered separately, CAP. I • 20.

PRESSURE DROPS

Curve n° 1:

- P1 → C1
- P1 → C2
- P2 → C3
- P2 → C4





BDL066... FLOW DIVERSION VALVES

The 6 way flow diversion valves, type BDL.06.6, are special solenoid valves which allow the simultaneous connection of two systems. With all user ports on the same side, these valves allow to simplify the layout of hydraulic plant. As they are moved from high performances solenoids they don't need the external drainage.

This valves can manage high hydraulic powers with a low pressure drop.

Max. pressure	250 bar
Max. flow	50 l/min
Overlap	negative
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm ² /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 β ₂₅ ≥ 75
Weight	3 Kg

BDL066...

"40W" DC COILS	CAP. I • 74
STANDARD CONNECTORS	CAP. I • 20

ORDERING CODE

BDL	Flow diversion valves
06	Size NG06
6	No. of way
W	Threaded connectors 3/8" BSP
I	Internal drainage
*	Voltage (Tab. 1)
**	Variants (Tab. 2)
1	Serial No.

TAB.1 - 40W COIL

DC VOLTAGE

L	12V
M	24V
N	48V*
W	Without DC coils

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

* Special voltage

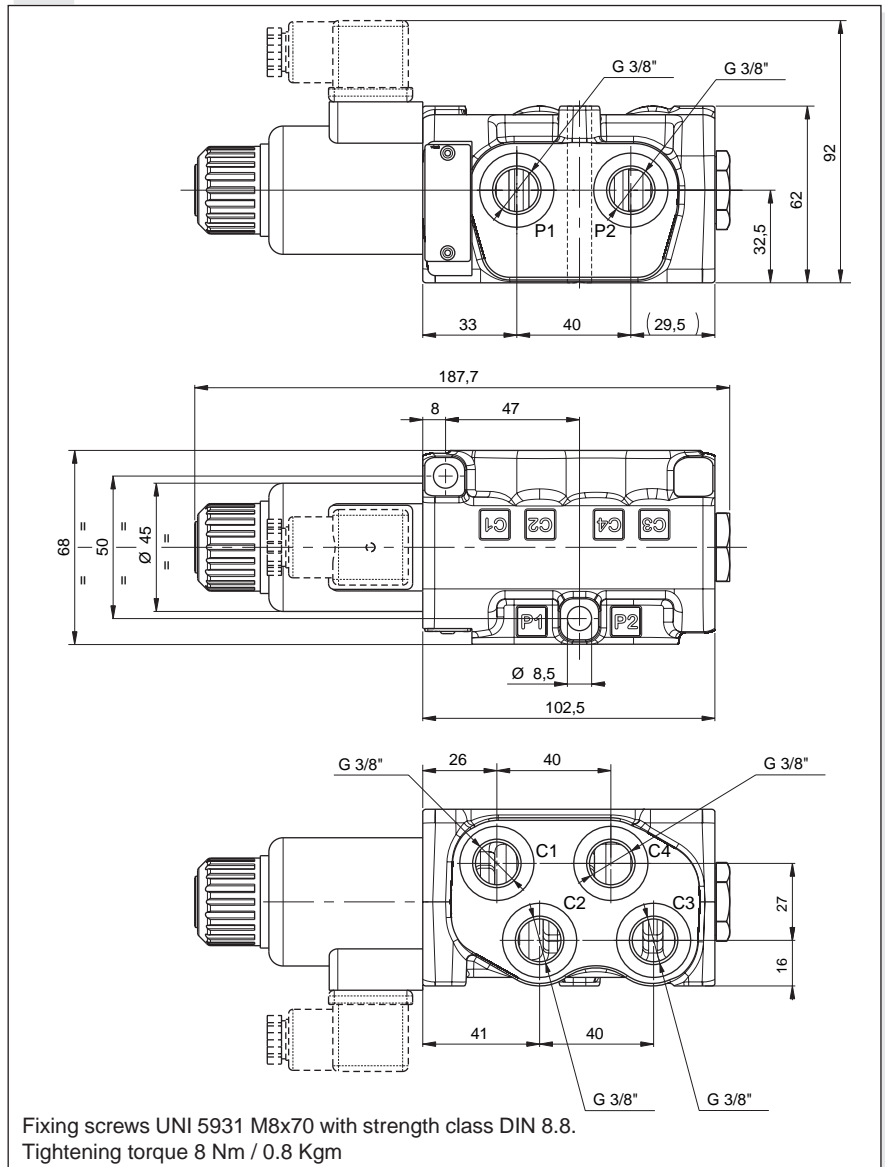
TAB.2 - VARIANTS

No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2(*)
Deutsch DT04-2P Coil type	CZ

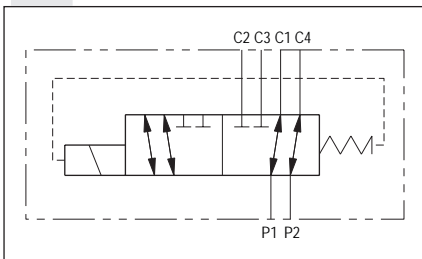
Other variants available on request.

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

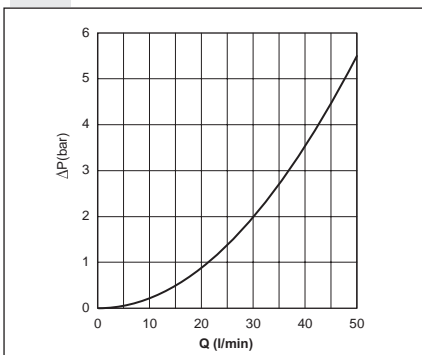
OVERALL DIMENSIONS



HYDRAULIC SYMBOL



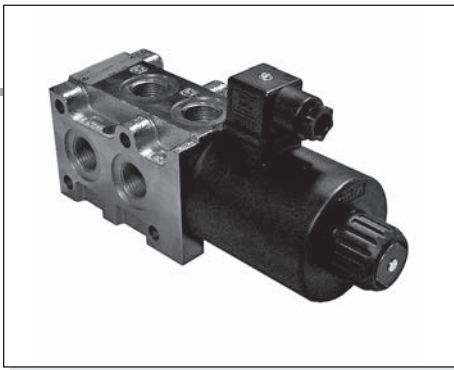
PRESSURE DROPS



P1 → C1 , P1 → C2
P2 → C4 , P2 → C3

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.

CDL106... STACKABLE CIRCUIT SELECTOR VALVES



The stackable circuit selector valves, type CDL.10.6, allows one single drive of 6 users with 5 elements connected in series.

As they are moved from high performances solenoids they don't need the external drainage.

This valves can manage high hydraulic powers with a minimal pressure drop.

Max. pressure	250 bar
Max. flow	80 l/min
Overlap	negative
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm ² /s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance NAS with 1638 with filter β ₂₅ ³⁷⁵ see "Overall dimension"
Weight	

CDL106...	
"A16" DC Coils	CAP. I • 74
CONNECTORS STANDARD	CAP. I • 20

ORDERING CODE

CDL	Stackable circuit selector valve
10	Size NG10
6	No. of way (single element)
*	W = Threaded connectors 1/2" BSP U = Threaded connectors SAE 107/8"-14 UNF
I	Internal drainage
*	No. of elements: 1 / 2 / 3 / 4 / 5
*	Voltage (Tab. 1)
**	Variants (Tab. 2)
1	Serial No.

TAB.1 - A16 COIL

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

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

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

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

* Special voltage
** Technical data see CAP. I • 74

TAB.2 - VARIANTS

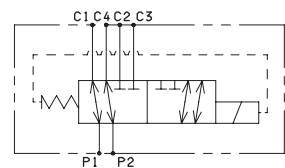
No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2(*)

Other variants available on request.

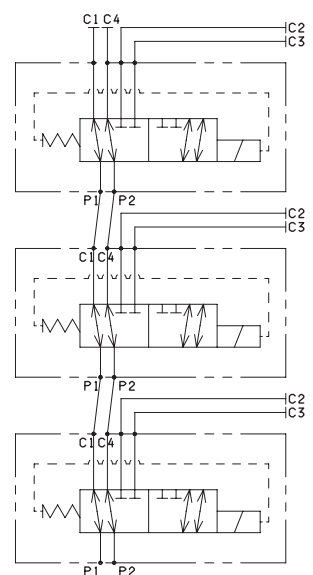
(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, CAP. I • 20.

HYDRAULIC SYMBOLS

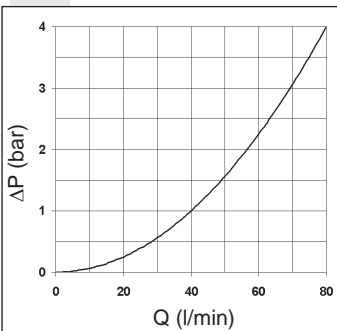
SINGLE ELEMENT



MULTISTATION CONNECTION



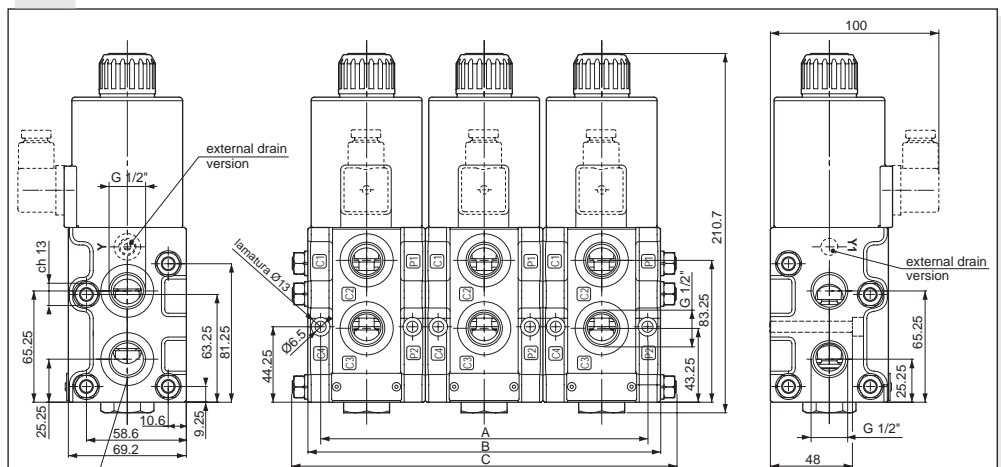
PRESSURE DROPS



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.

Fixing screws UNI 5931 M6x60 with material specifications min. 8.8
Tightening torque for studs 8 Nm / 0.8 Kg
Tightening torque for rods 20 Nm / 2 Kg

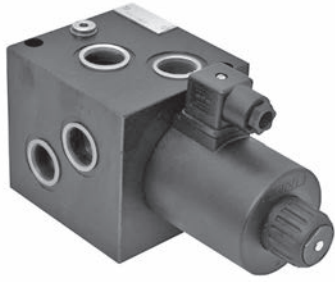
OVERALL DIMENSIONS



N. 2 O-ring
1/2" BSP: 2-024
SAE107/8"-14 UNF: 2-025

No. of elements	No. of way	Length (mm)			Weight (Kg)	Kit spare part code* (rods and studs)
		A	B	C		
1	06	54	69	-	4,5	/
2	08	123	138	160	9,3	V89.56.0001
3	10	192	207	226	14	V89.56.0002
4	12	261	276	296	18,5	V89.56.0003
5	14	330	345	365	23,3	V89.56.0004

(*) For multiple composition rods and studs are available.



ADL106... FLOW DIVERSION VALVES

The 6 way flow diversion valves are special solenoid valves which allow the simultaneous connection of two systems.

In order to obtain valve's working at pressure of 250 bar up to 320 bar (external drainage) the G 1/8" BSP plug must be removed to Y connector.

Max. pressure (without drainage, Y plugged)	250 bar
Max. pressure (external drainage)	320 bar
Max. flow	80 l/min
Fluid viscosity	10 ÷ 500 mm ² /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	3,6 Kg

ADL106...

"A16" DC COILS	CAP. I • 74
STANDARD CONNECTORS	CAP. I • 20

ORDERING CODE

ADL10	Flow diversion valves NG10
6	No. of way
J	Connectors 3/4"BSP
I	Drainage plugged
*	Voltage (see table 1)
**	Variants (see table 2)
1	Serial No.

TAB.1 - A16 COIL

DC VOLTAGE **

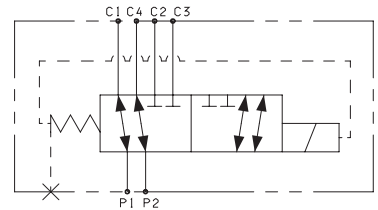
L	12V
M	24V
N	48V*
P	110V*
Z	102V*
X	205V*
W	Without DC coil

115Vac/50Hz 120Vac/60Hz with rectifier
230Vac/50Hz 240Vac/60Hz with rectifier

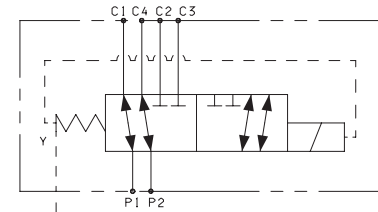
Voltage codes are not stamped on the plate, their are readable on the coils.

* Special voltage
** Technical data see CAP. I • 74

DRAINS AND HYDRAULIC SYMBOLS



DRAINAGE PLUGGED



EXTERNAL DRAINAGE

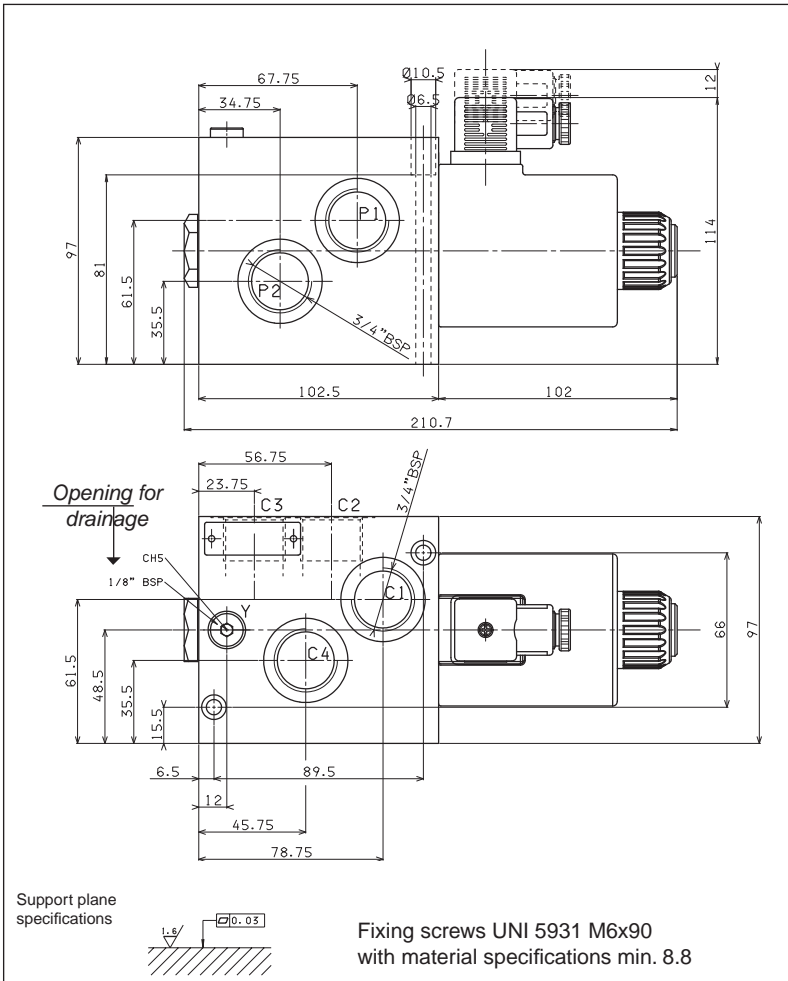
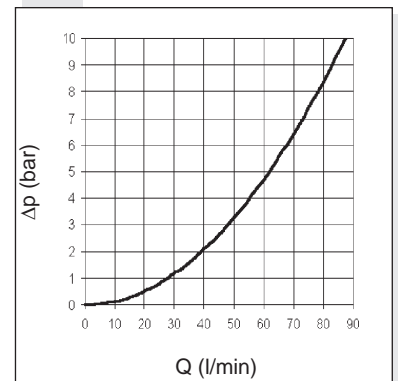
TAB.2 - VARIANTS

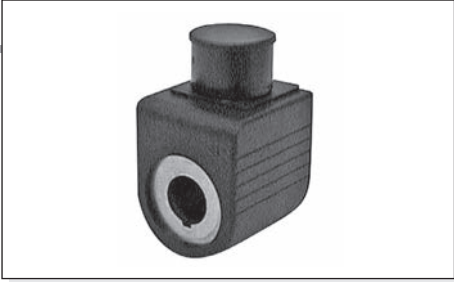
No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2(*)

Other variants available on request.

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

PRESSURE DROPS

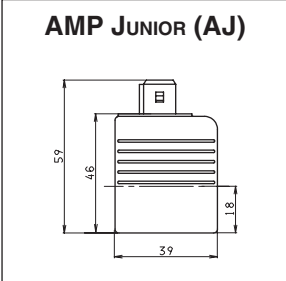




"A09" DC COILS FOR CDL04...

Type of protection (in relation to connector used)	IP 65
Number of cycle	18.000/h
Supply tolerance	±10%
Ambient temperature	-30°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	H
Weight	0,215 Kg

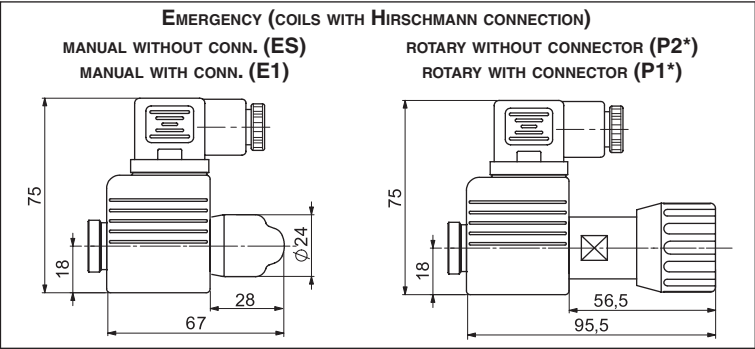
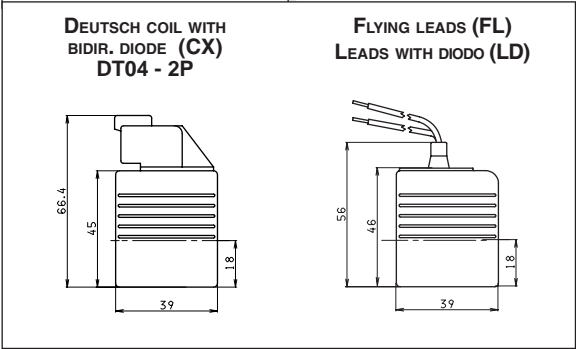
• The AMP Junior coil, the Deutsch coil with bidirectional diode and the coil with flying leads (with or without diode) coils are available in 12V or 24V DC voltage only.



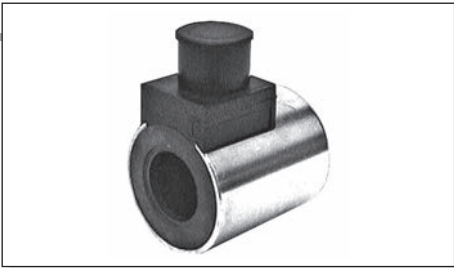
VOLTAGE (V)	MAX WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°C)	RATED POWER (W)	RESISTANCE AT 20°C (OHM) ±7%
12V	123°C	27	5.3
24V	123°C	27	21.3
48V*	123°C	27	85.3
102V*(**)	123°C	27	392
110V*(**)	123°C	27	448
205V*(**)	123°C	27	1577

* Special voltages

** The european low voltage directive is applied to electrical 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 resistance less than 0.1 ohms.



(*) Emergency tightening torque max. 6±9 Nm / 0.6 ÷ 0.9 Kgm with CH n. 22



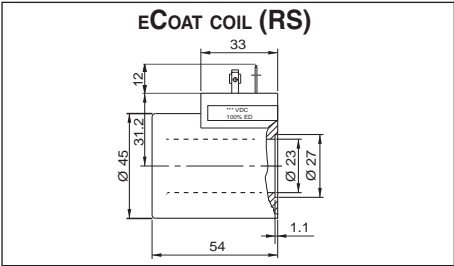
"D15" DC COILS FOR ADL06... AND A66..

Type of protection (in relation to the connector used)	IP 66
Number of cycles	18.000/h
Supply tolerance	±10%
Ambient temperature	-25°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	H
Weight	0,354 Kg

• AMP Junior coils (with or without diode) and coils with flying leads and coils type Deutsch, are available in 12V or 24V DC voltage only.

• The pastic type coil (BR variant) is available in 12V, 24V, 28V or 110V DC voltage only.

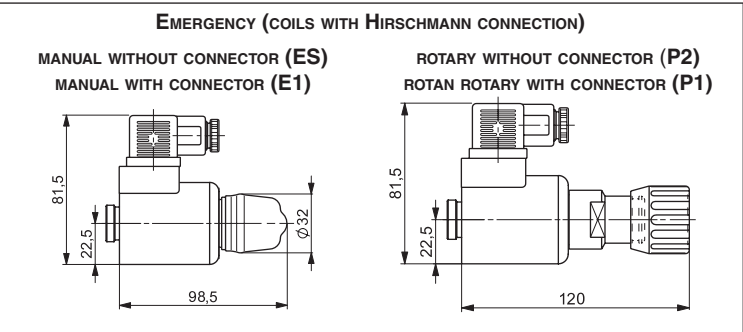
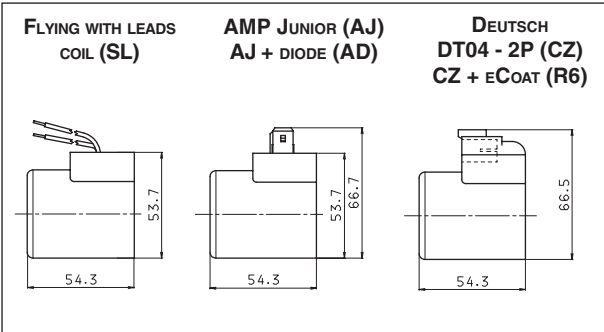
• Emergency, plastic coil, and Amp Junior, leads or deutch coils, are not available for A66 valve.

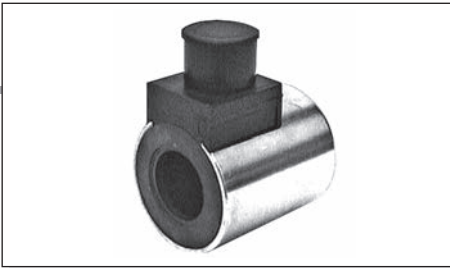


VOLTAGE (V)	MAX WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°C)	RATED POWER (W)	RESISTANCE AT 20°C (OHM) ±10%
12V	110°C	30	4.8
24V	110°C	30	18.8
28V*	110°C	30	25.6
48V*	110°C	30	75.2
102V*(**)	110°C	30	340
110V*(**)	110°C	30	387
205V*(**)	110°C	30	1375

* Special voltages

** The european low voltage directive is applied to electrical 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 resistance less than 0.1 ohms.



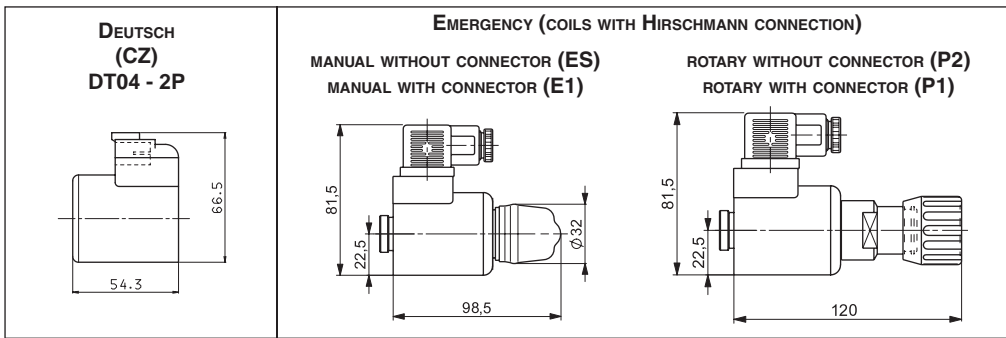


"40W" DC COILS FOR CDL06...

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
Insulation class wire	H
Weight	0,354 Kg

VOLTAGE (V)	MAX. WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°C)	RATED POWER (W)	RESISTANCE AT 20°C (OHM) ±10%
12V	135°C	40	3.6
24V	135°C	40	14.4

IT40W - 01/2004/i



"A16" DC COILS FOR ADL10 AND CDL10

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 electrical 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 resistance less than 0.1 ohms.

