



## DIRECTIONAL CONTROL VALVES CETOP 3/NG6

### INTRODUCTION

The ARON 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 ( $\Delta p$ ).

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.

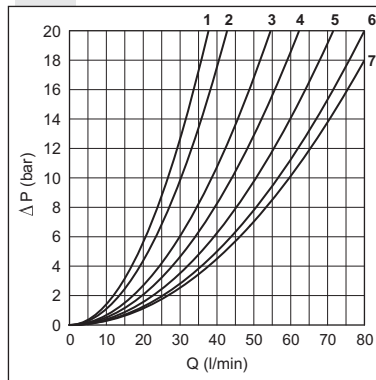
The solenoid coils are normally arranged for DIN 43650 ISO 4400 type connectors; is available on request these variant coils: with AMP Junior connections, with AMP junior and integrated diode, with Deutsch DT04-2P connections or solenoid with flying leads. Connectors with built in rectifiers or pilot 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,  $\beta_{25} \geq 75$ .

### CETOP 3/NG06

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### 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 mm<sup>2</sup>/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  $\Delta p$  will be the value for the losses for a specific flow rate  $Q$  which can be obtained from the diagram,  $\Delta p_1$  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

ORDERING CODE

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

Tab.2 - VOLTAGE

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

\* Special voltage  
\*\* Technical data see page I • 19

• 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.

Tab.1- MOUNTING

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

• 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(*)	◆	I•21
Emergency button	ES(*)		I•19
Rotary emergency button	P2(*)		I•19
Rotary emergency button (180°)	R5(*)		I•19
Preset for microswitch (E/F/G/H mounting only) (see below note ◇)	MS(*)	◆	I•11- I•15
5 micron clearance	SQ(*)	◆	
Spool movement speed control (only VDC) with ø 0.3 mm orifice	3S(*)	◆	I•12
Spool movement speed control (only VDC) with ø 0.4 mm orifice	JS(*)	◆	I•12
Spool movement speed control (only VDC) with ø 0.5 mm orifice	5S(*)	◆	I•12
Spool movement speed control (only VDC) with ø 0.6 mm orifice	6S(*)	◆	I•12
AMP Junior coil - for 12V or 24V DC voltage only	AJ(*)		I•19
AMP Junior coil and integrated diode - for 12V or 24V DC voltage only	AD(*)		I•19
Coil with flying leads (175 mm) - for 12V or 24V DC voltage only	SL		I•19
Hirschmann coil eCoat surface treatment - for 12V, 24V, 28V or 110V DC voltage only	RS(*)		I•19
Deutsch DT04-2P connection eCoat surface treatment - for 12V, 24V DC voltage only	R6		I•19
High corrosion resistance valve - Hirschmann connector	KJ		I•13
High corrosion resistance valve - Deutsch DT04-2P connector - for 12V, 24V DC voltage only	7J		I•13
Deutsch DT04-2P coil - for 12V or 24V DC voltage only	CZ		I•19

Other variants available on request.

◇ = Maximum counter-pressure on T port: 8 bar - Microswitch type AM1107 code V79000001 can 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, ch. I page 20.

**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*		-	

**DIRECTIONAL CONTROL VALVES  
STANDARD SPOOLS CETOP 3/NG6**



**NOTE**

(\*) Spool with price increasing

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

• 16 / 19 / 20 / 21 spool not planned for AD.3.E...J\*

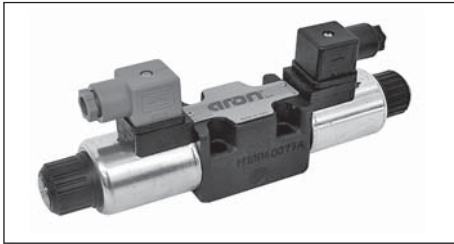
• For lever operated the spools used are different.  
Available spools for this kind of valve see AD3L..

**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*		+	



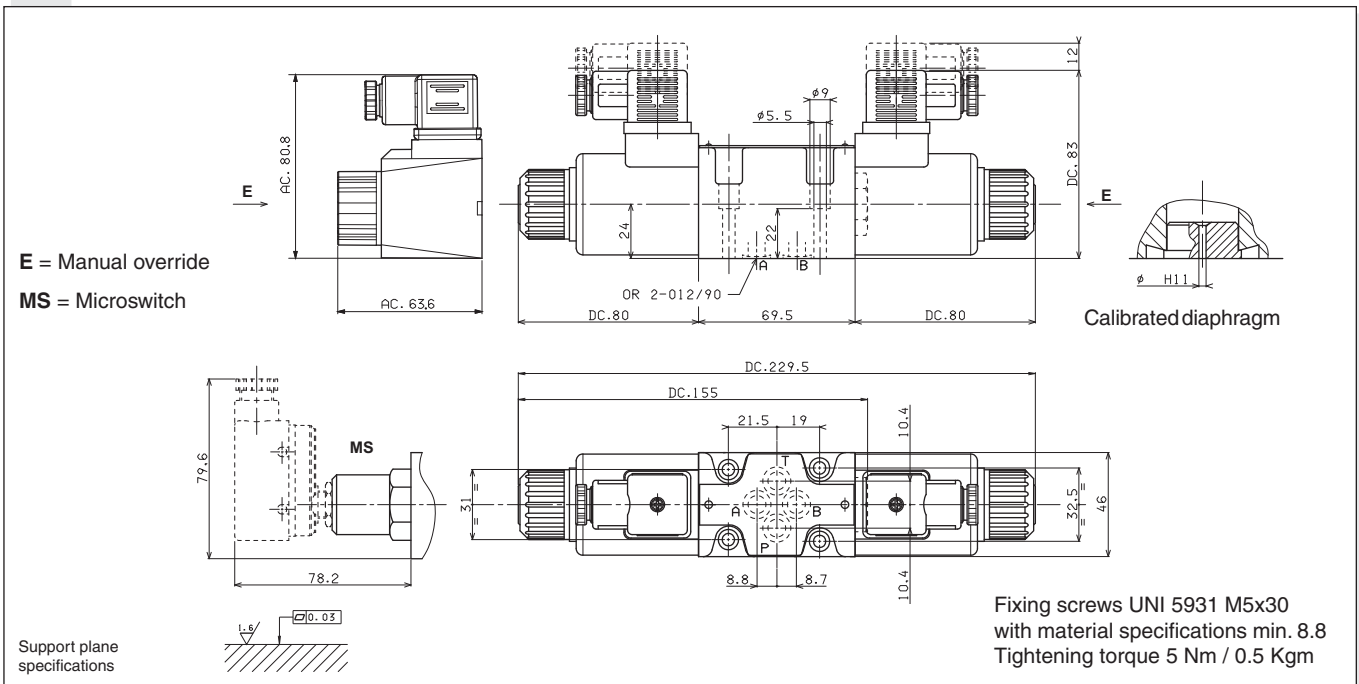
A max. counter-pressure of 8 bar at T is permitted for the variant with a microswitch (MS).  
 (\*) DC: Dynamic pressure allowed for 2 millions of cycles.  
 AC: Dynamic pressure allowed for 350.000 of cycles. For dynamic pressure of 100 bar are allowed 1 million cycles.

Max. pressure port P/A/B	350 bar
Max. pressure port T (for DC) see note (*)	250 bar
Max. pressure port T (for AC) see note (*)	160 bar
Max. flow	80 l/min
Max. excitation frequency	3 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm <sup>2</sup> /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	1,65 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 (**)	
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

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

**OVERALL DIMENSIONS**

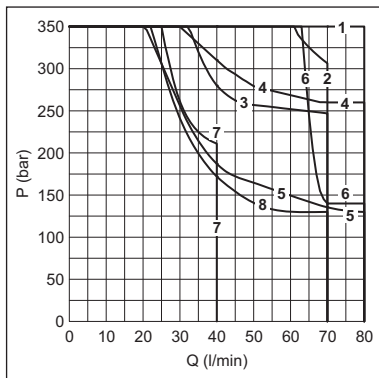


**LIMITS OF USE (MOUNTING C-E-F)**

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 mm<sup>2</sup>/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.

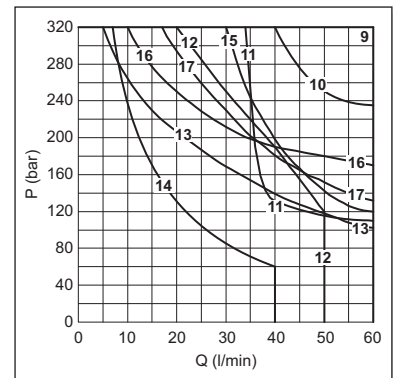
**DIRECT CURRENT SOLENOIDS (DC)**



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)**



1

## Valves type AD3.E...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

- Possible mountings: C / E / F / G / H

- 16 / 19 / 20 / 21 spools not planned for AD3.E...J\*

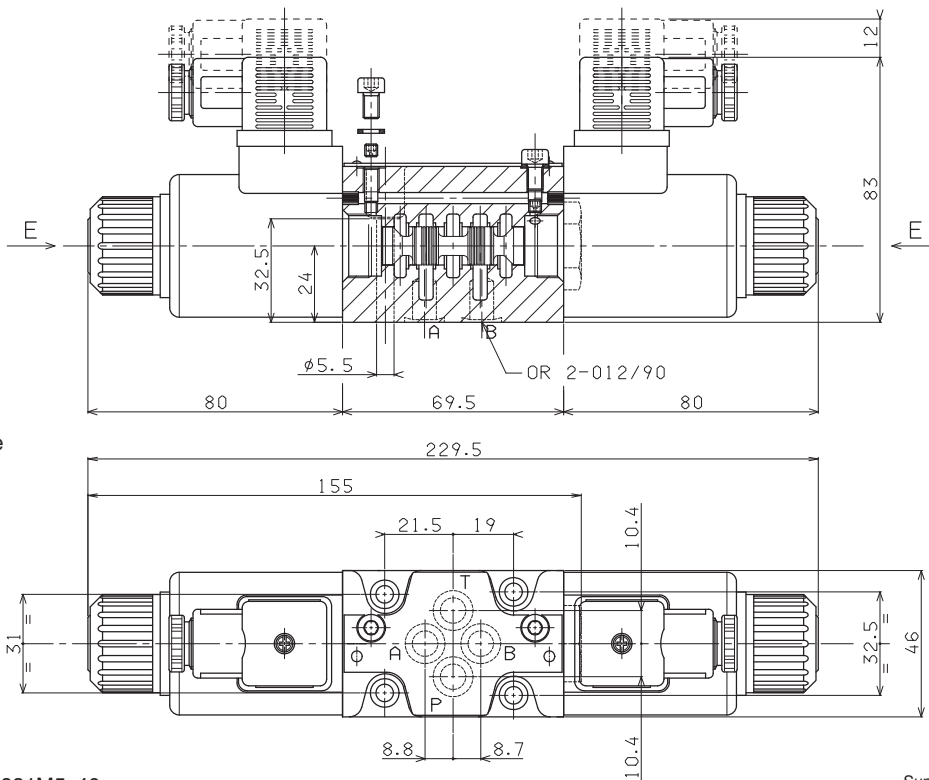
Max. pressure ports P/A/B	320 bar
Max. pressure port T (*)	250 bar
Max. flow	30 l/min
Max. excitation frequency	2 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm <sup>2</sup> /s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Weight with one DC solenoid	1,65 Kg
Weight with two solenoids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

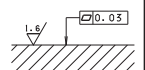
## OVERALL DIMENSIONS



E = Manual override

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

Support plane specifications

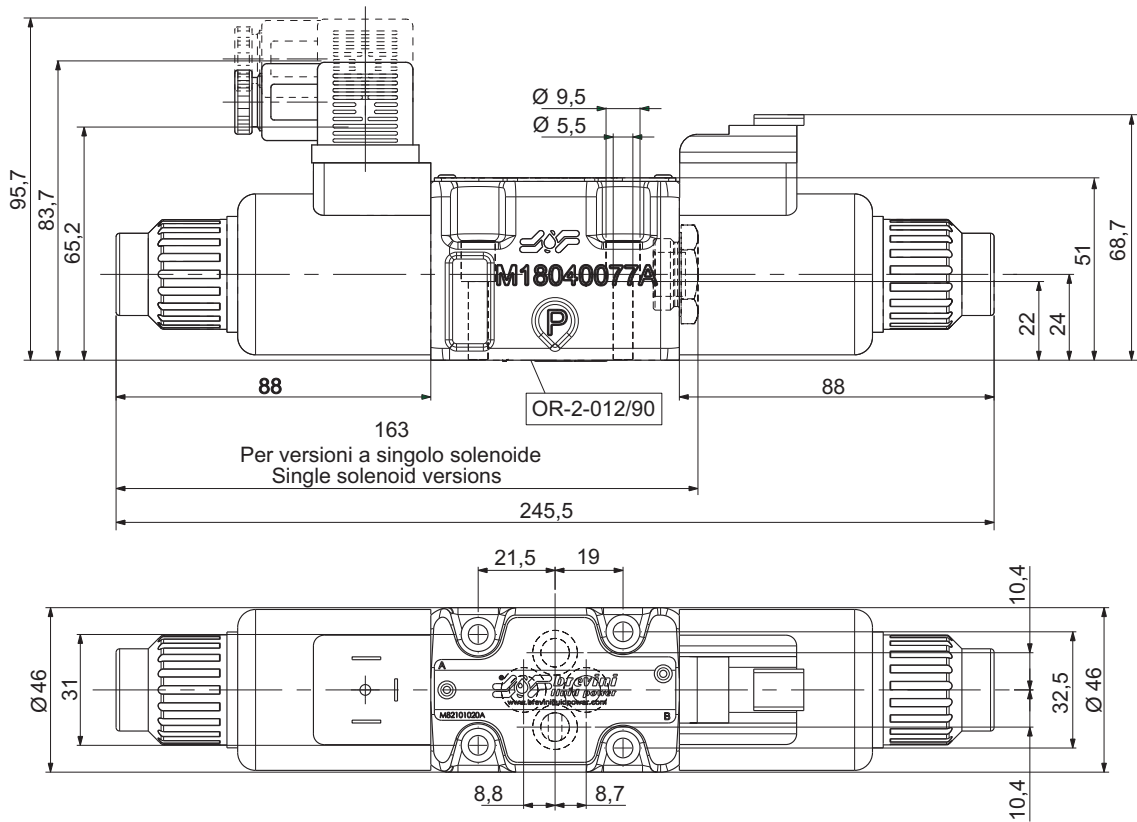




<b>AD.3.V...</b>	
"D15" DC COILS	CAP.I • 19
STANDARD CONNECTORS	CAP.I • 20

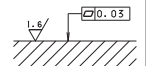
- This variant has a Zinc-Nickel surface treatment on metallic parts for a higher corrosion resistance
- Coil windings are sealed and outer metal housing has eCoat surface treatment
- The complete valve withstand more than 700 hours exposure of Salt Spray Test (test performer according to UNI EN ISO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

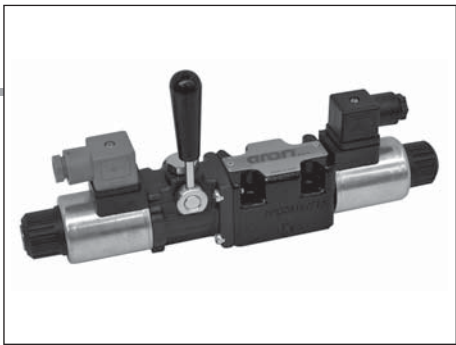
## OVERALL DIMENSIONS



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

Support plane specifications





## VARIANTS (\*) - EMERGENCY CONTROL LEVER FOR DIRECTIONAL CONTROL VALVES (ADC/AD.3.E)

The emergency control lever for solenoid valves by Aron, 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 manufactured by Aron. 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 consult 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.

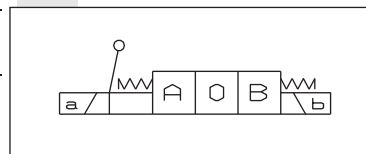
(\*) Coils with Hirschmann and AMP Junior connection supplied without connectors. The connectors can be ordered separately, ch. I page 20.

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
ADC.3...	Directional control valve	A09	27 W
AD.3.E...	Directional control valve	D15	30 W

### OVERALL DIMENSION

