



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 (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.

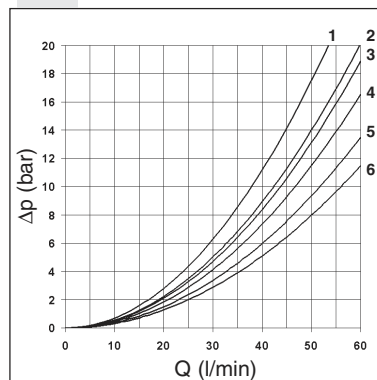
The solenoid coils are normally arranged for DIN 43650 ISO 4400 type connectors; is available on request these variant coils: with AMP Junior connections, with AMP junior and integrated diode, with Deutsch DT04-2P connections or solenoid with flying leads. Connectors with built in rectifiers or pilot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

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 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	6	6	6	6	5
03	5	5	6	6	
04	1	1	1	1	4
44	1	1	1	1	2
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	
13		5	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.				

ORDERING CODE

AD	Directional valve
3	CETOP 3/NG6
E	Type of operator For other operator see next pages
**	Spool see page I•10
*	Mounting type (table 1)
*	Voltage (table 2)
**	Variants (table 3)
*	Serial No.

3 = DC voltage ("D15" coil)
2 = AC voltage ("K12" solenoid)

TAB.2 "E" OPERATOR TYPE

AC VOLTAGE	
A	24V/50Hz
B	48V/50Hz*
J	115V/50Hz - 120V/60Hz
Y	230V/50Hz - 240V/60Hz
E	240V/50Hz*
F	24V/60Hz*
K	AC without coils
DC VOLTAGE	
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.
(*) Special voltage

- 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.

TAB.1- 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).

TAB.3 - VARIANTS

VARIANT	CODE	◆	PAGE
No variant	00		
Viton	V1		
Emergency control lever for directional control valves type ADC3 and AD3E	LE		I•20
Emergency button	E1		I•18
Rotary emergency button	P1		I•18
Rotary emergency button (180°)	P5		I•18
Pilot light	X1		I•19
Rectifier	R1		I•19
Preset for microswitch (E/F/G/H mounting only) (see below note ◊)	M1	◆	I•11- I•14
Solenoid valve without connectors	S1		
Marine version (AD.3.P..)	H1	◆	
Cable gland "PG 11"	C1		I•19
Emergency button+ Viton	EV		
Emergency button+ Pilot light	EX		
Viton + Pilot light	VX		
Emergency button+ Viton + Pilot light	A1		
Emergency button+ Rectifier	ER		
Viton + Rectifier	VR		
Viton + Rectifier + Emergency button	A2		
Pilot light + Rectifier	XR		I•19
Pilot light + Rectifier + Emergency button	A3		
Pilot light + Rectifier + Emergency button+ Viton	A4		
Preset for microswitch + Viton	MV	◆	
5 micron clearance	Q1	◆	
Spool movement speed control (only VDC) with ø 0.3 mm orifice	J3	◆	I•12
Spool movement speed control (only VDC) with ø 0.4 mm orifice	J4	◆	I•12
Spool movement speed control (only VDC) with ø 0.5 mm orifice	J5	◆	I•12
Spool movement speed control (only VDC) with ø 0.6 mm orifice	J6	◆	I•12
AMP Junior coil - for12V or 24V DC voltage only	AJ		I•18
AMP Junior coil and integrated diode - for12V or 24V DC voltage only	AD		I•18
Coil with flying leads (175 mm) - for12V or 24V DC voltage only	SL		I•18
D15 plastic type coil - for12V, 24V, 28V or 110V DC voltage only	BR		
Deutsch DT04-2P coil - for12V or 24V DC voltage only	CZ		I•18
IP67 type of connector	CN		I•19

Other variants relate to a special design

◊ = Maximum counter-pressure on T port: 8 bar
◆ = Variant codes stamped on the plate

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 AD3E variant J*

• For lever operated the spools used are different.

Available spools for this kind of valve are: 01 / 02 / 03 / 04 / 05 / 06 / 66 / 07 / 22 / 13 / 15 / 16 / 17

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 (M1).

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

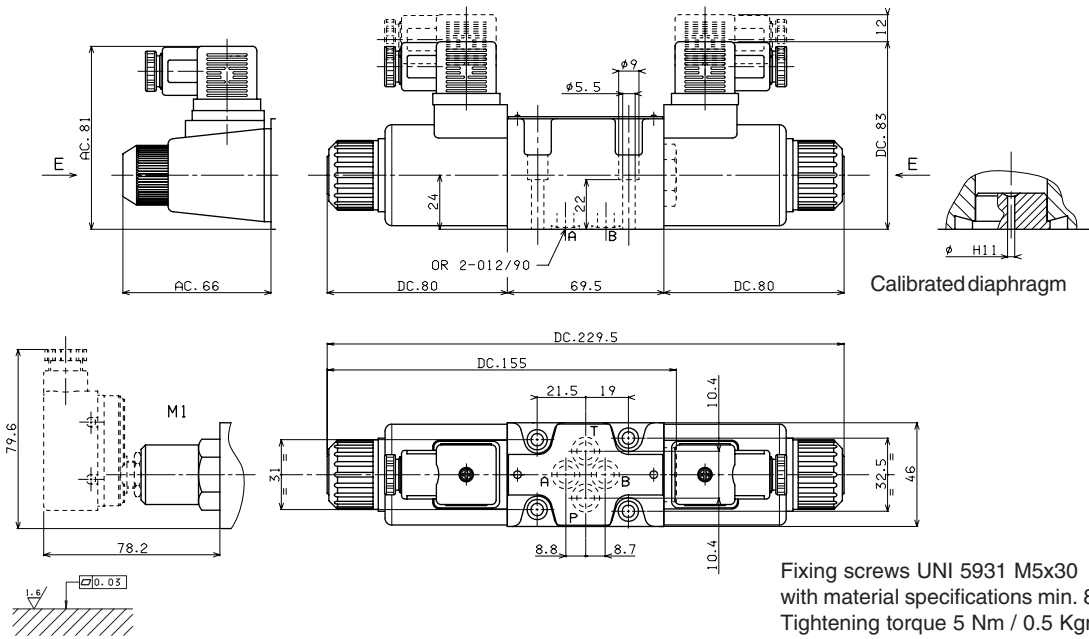
Max. pressure port P/A/B	350 bar
Max. pressure port T (for DC) see note (*)	250 bar
Max. pressure port T (for AC)	160 bar
Max. flow	60 l/min
Max. excitation frequency	3 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm ² /s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination 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	1,25 Kg
Weight with two AC solenoids	1,55 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

E = Manual override
M1 = Microswitch

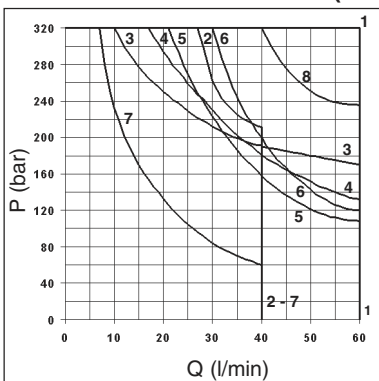


LIMITS OF USE

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).

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

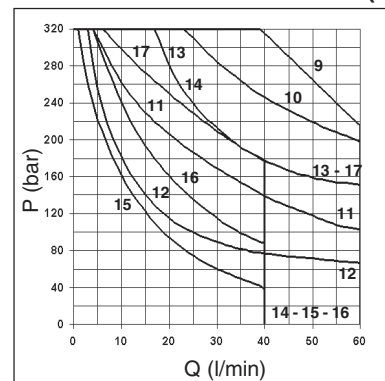
DIRECT CURRENT SOLENOIDS (DC)



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

Curves

ALTERNATING CURRENT SOLENOIDS (AC)



1

Valves type AD3.E... variant 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 AD.3.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

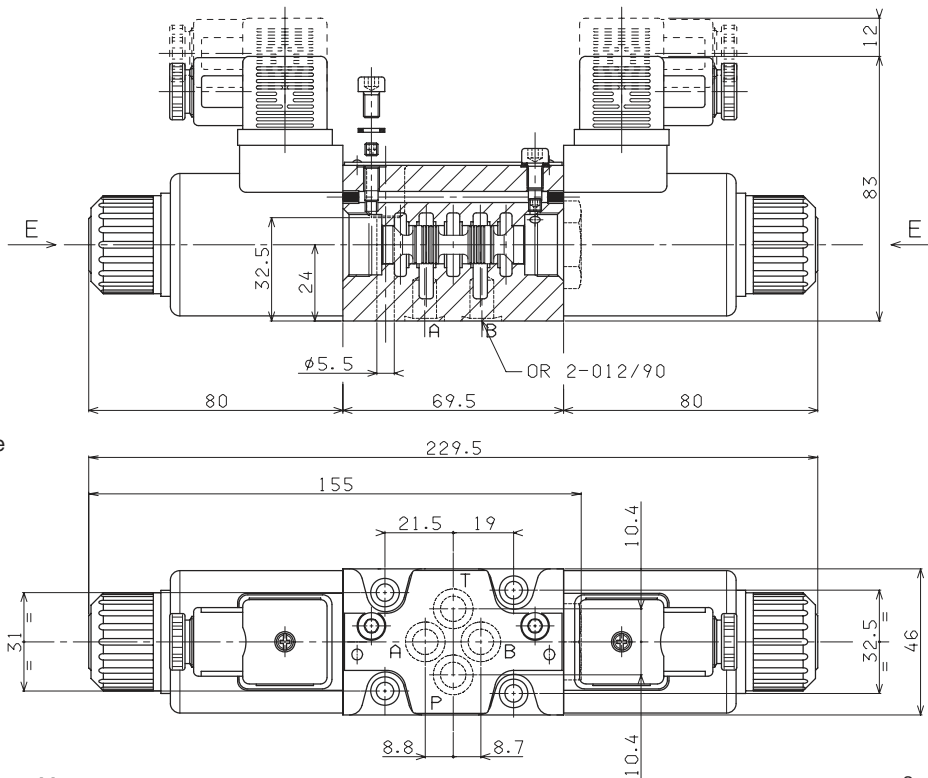
- Possible mountings: C / E / F / G / H
- 16 / 19 / 20 / 21 spools not planned for AD3E variant J*

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 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	J3
0.4	M89.10.0029	J4
0.5	M89.10.0006	J5
0.6	M89.10.0030	J6

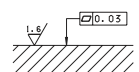
OVERALL DIMENSIONS



E = Manual override

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

Support plane specifications





AD.3.V... CETOP 3/NG6 WITH PROXIMITY SENSOR L.V.D.T.



1

AD.3.V...

"D15" DC COILS	CH. I PAGE 18
STANDARD CONNECTORS	CH. I PAGE 19
L.V.D.T.	CH. I PAGE 21

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 according with the accident prevention legislation. These directional valves are equipped with an horizontal positioned inductive sensor on the opposite side of the solenoid, which is capable of providing the first movement of the valve when the passage of a minimum flow is allowed. Integrated in safety systems, these valves intercept actuator movements that could be dangerous for the operators and for the machine.

Max. operating pressure ports P/A/B	350 bar
Max. operating pressure port T dynamic (see note*)	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

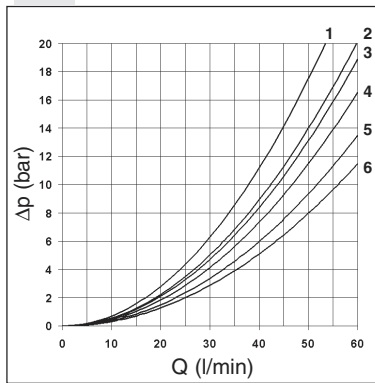
(*) Pressure dynamic allowed for 2 millions of cycles.

- 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 L.V.D.T. proximity sensor
***	Spool and mounting (table 1)
*	Voltage (table 2)
**	Variants (table 3)
2	Serial No.

PRESSURE DROPS



Spool type	Connections				
	P → A	P → B	A → T	B → T	P → T
01	5	5	5	5	5
02	6	6	6	6	
06	5	5	6	5	4
16	5	5	4	4	
17	1	3			6
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	
M	24V	
V	28V*	115Vac/50Hz 120Vac/60Hz with rectifier
N	48V*	
Z	102V*	230Vac/50Hz 240Vac/60Hz with rectifier
P	110V*	
R	205V*	
W	Without DC coils and connectors	

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

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 (connectors as in the drawing)	00
Viton	V1
Emergency button	E1
Pilot light	X1
Rectifier	R1
Flow diversion without connector (coil)	S1
Without proximity connector LVDT	S3
Without coils and proximity connector	S4
Cable gland "PG 11"	C1
Viton + Pilot light	VX
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 relate to a special design	

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

