

DIRECTIONAL CONTROL VALVES CETOP 3/NG6 **aron**[®]

1



CETOP 3/NG6

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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.

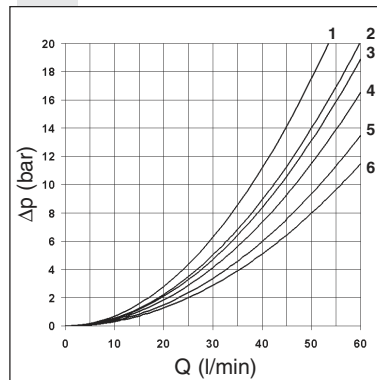
The new type DC coil "D15", of cause their high performance, allows to increasing the limits of use respect to last series.

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

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 | |
| 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

DIRECTIONAL CONTROL VALVES
STANDARD SPOOLS CETOP 3/NG6

1

| 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 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* | | + | |

AD.3.E... DIRECTIONAL CONTROL VALVES SOLENOID OPERATED CETOP 3/NG6 **iron**^{spa}

1



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.

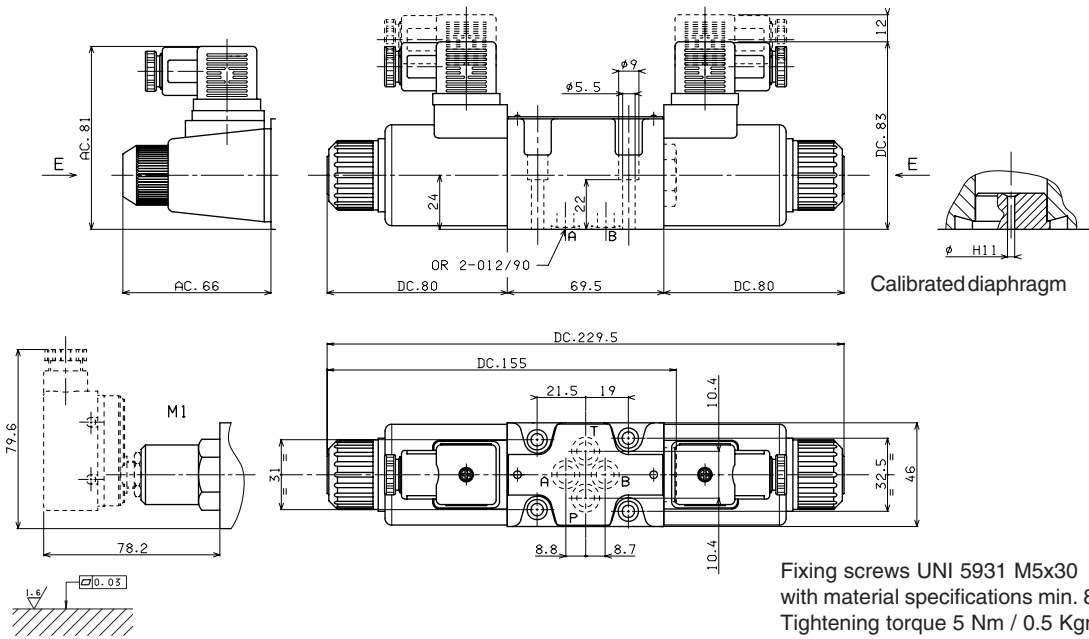
| | |
|--|---|
| Max. pressure port P/A/B | 350 bar |
| Max. pressure port T (for DC) see note (*) | 250 bar |
| Max. pressure port T (for AC) | 160 bar |
| Max. flow | 60 l/min |
| Max. excitation frequency | 3 Hz |
| Duty cycle | 100% ED |
| Fluid viscosity | 10 ÷ 500 mm ² /s |
| Fluid temperature | -25°C ÷ 75°C |
| Ambient temperature | -25°C ÷ 60°C |
| Max. contamination level | class 10 in accordance with NAS 1638 with filter β ₂₅ ≥ 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

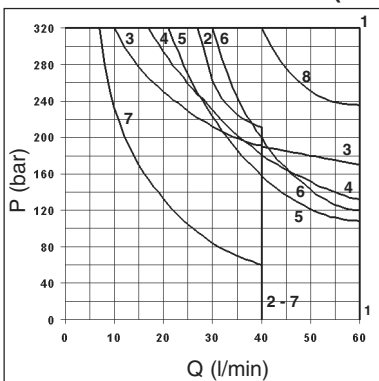


LIMITS OF USE

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. |

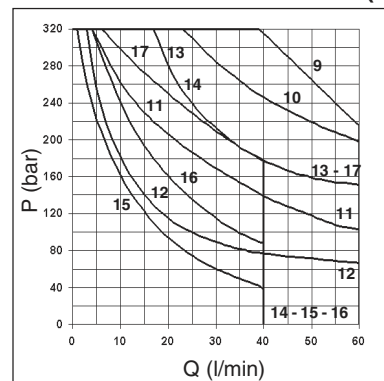
DIRECT CURRENT SOLENOIDS (DC)



| 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)



AD.3.E...J* VALVES WITH SPOOL MOVEMENT SPEED CONTROL VARIANT J*

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

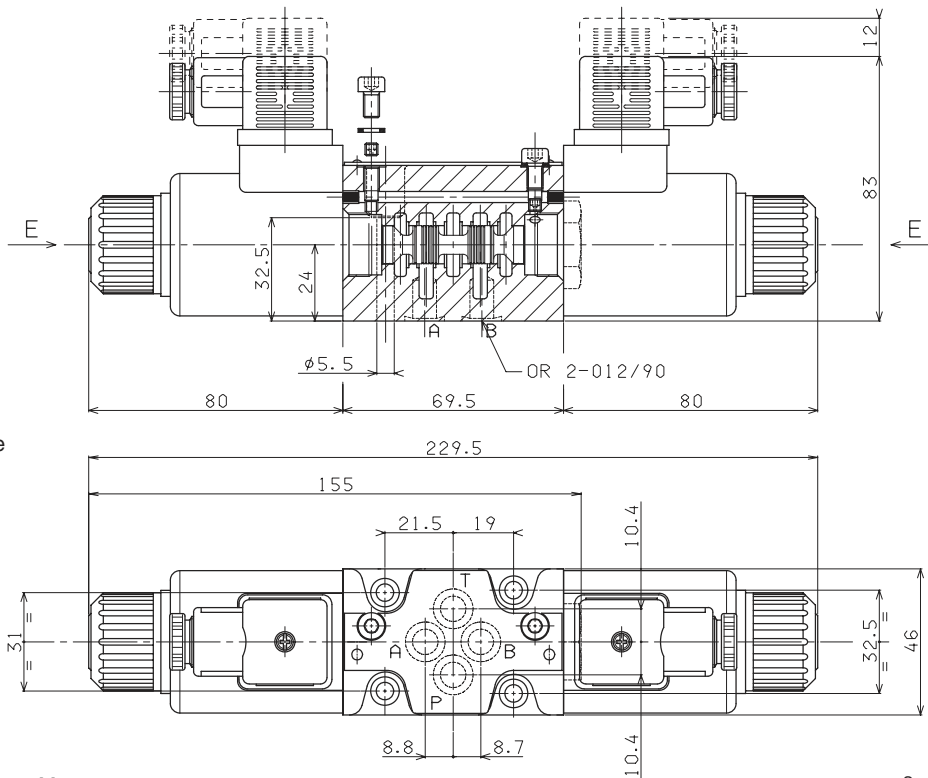
- 16 / 19 / 20 / 21 spools not planned for AD3E variant J*

| | |
|--|-----------------------------|
| 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 |

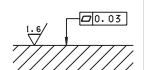
OVERALL DIMENSIONS



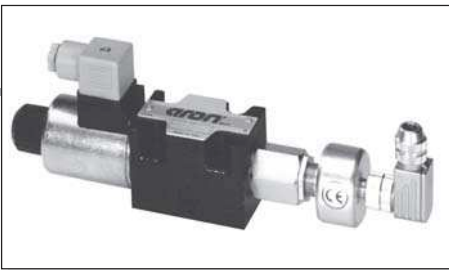
E = Manual override

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.



| 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.

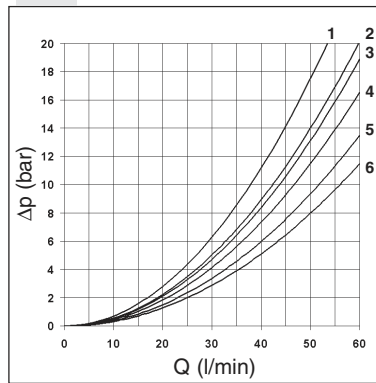
- Possible mountings: E / F / H
- The valve is supplied with DC solenoid only

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. |

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 | 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

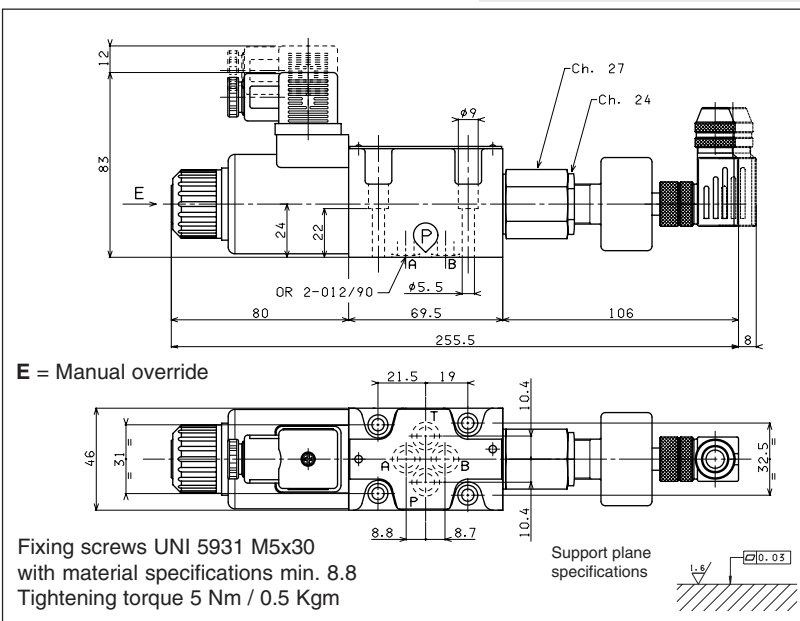
POSSIBLE MOUNTING: E / F / H

| 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 | |



ADC.3... DIRECTIONAL CONTROL VALVES CETOP 3

SOLENOID OPERATED WITH REDUCED OVERALL SIZE



ADC.3.E...

"A09" DC COILS

CH. I PAGE 7

STANDARD CONNECTORS

CH. I PAGE 19

The ARON 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.

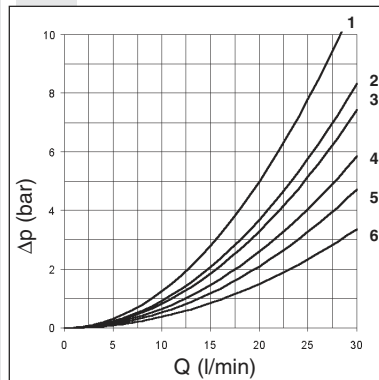
The ADC.3 valve uses shorter solenoids than the standard AD.3.E to reduce the overall dimensions.

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.

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

* SPOOLS WITH PRICE INCREASING

| 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.
* Special voltage

TAB.3 - VARIANTS

| | |
|---|--------|
| No variant | 00 |
| Viton | V1 |
| Pilot light | X1 |
| Rectifier | R1 |
| Solenoid valve without connectors | S1 |
| Cable gland"PG 11" | C1 |
| Viton + Pilot light | VX |
| Viton + Rectifier | VR |
| Pilot light + Rectifier | XR |
| Emergency button | E1 |
| Rotary emergency button | P1 (*) |
| Rotary emergency button (180°) | P5 (*) |
| Variant with lever for emergency button | LE |
| 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 |

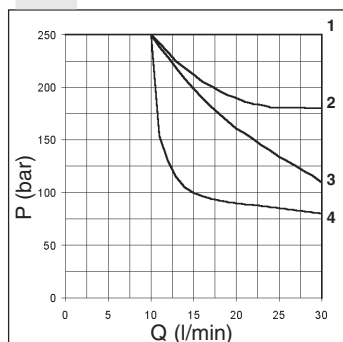
Other variants relate to a special design

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

• The Deutsch coil with bidirectional diode is available in 12V DC voltage only.

(*) **P1 and P5 Emergency** tightening torque **max. 6±9 Nm / 0.6 ÷ 0.9 Kg**m with CH n. 22

LIMIT OF USE



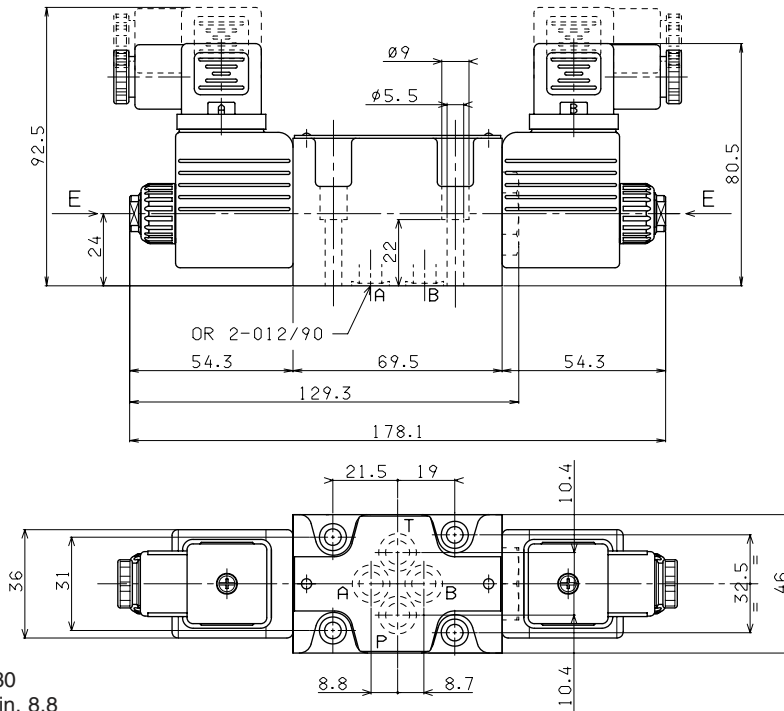
| Spool type | n° curve |
|------------|----------|
| 01 | 2 |
| 02 | 1 |
| 03 | 3 |
| 04 | 3 |
| 15-16 | 1(4*) |

(4*) = 15 and 16 spools used as 2 or 3 way, 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).

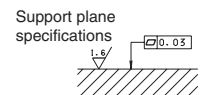
In the cases where valves 4/2 and 4/3 are used with the flow in one direction only, the limits of use could have variations which may even be negative (See curve No 4 and Spool No 15-16). The tests were carried out with a counter-pressure of 2 bar at T port.

OVERALL DIMENSIONS



E = Manual override

Fixing screws UNI 5931 M5x30
with material specifications min. 8.8
Tightening torque 5 ÷ 6 Nm / 0.5 ÷ 0.6 Kgm



A09 DC coils



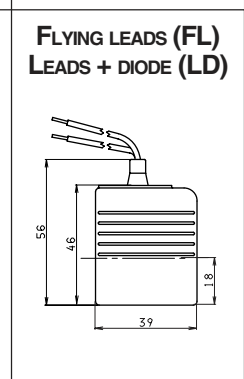
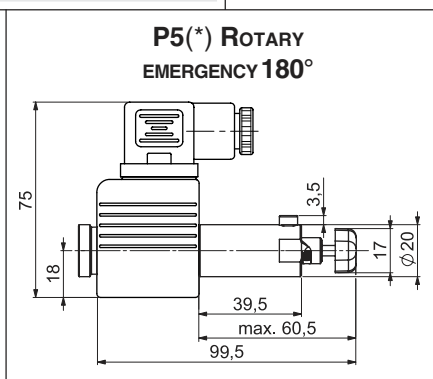
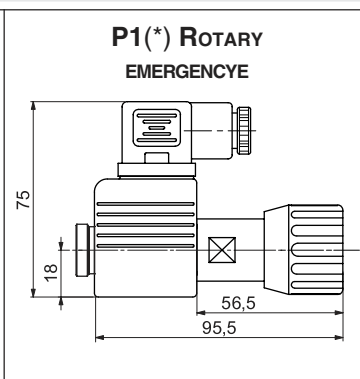
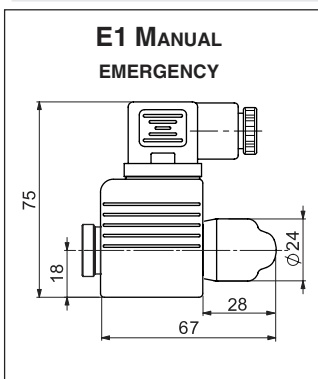
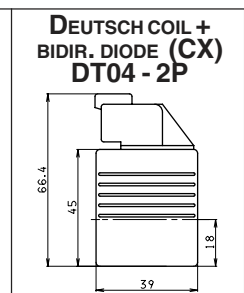
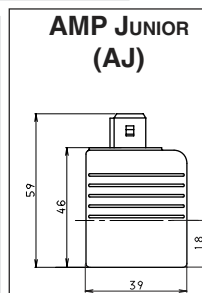
| | |
|--|--------------|
| Type of protection (in relation to connector used) | IP 65 |
| Number of cycle | 18.000/h |
| Supply tolerance | ±10% |
| Ambient temperature | -30°C ÷ 60°C |
| Duty cycle | 100% ED |
| Insulation class | H |
| Weight | 0,215 Kg |

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

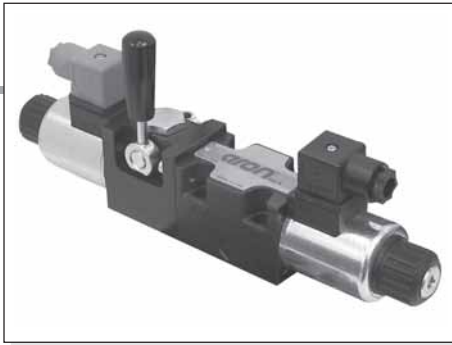
| VOLTAGE (V) | MAX WINDING TEMPERATURE (AMBIENT TEMPERATURE 25°C) | RATED POWER (W) | RESISTANCE AT 20°C (OHM) ±7% |
|-------------|--|-----------------|------------------------------|
| 12V | 123°C | 27 | 5.3 |
| 24V | 123°C | 27 | 21.3 |
| 48V* | 123°C | 27 | 85.3 |
| 102V* | 123°C | 27 | 392 |
|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

* SPECIAL VOLTAGES

ETA09 - 04/2001/e



(*) P1 and P5 Emergency tightening torque max. 6÷9 Nm / 0.6 ÷ 0.9 Kgm with CH n. 22



"LE" VARIANT - 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.

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

HYDRAULIC SIMBOL

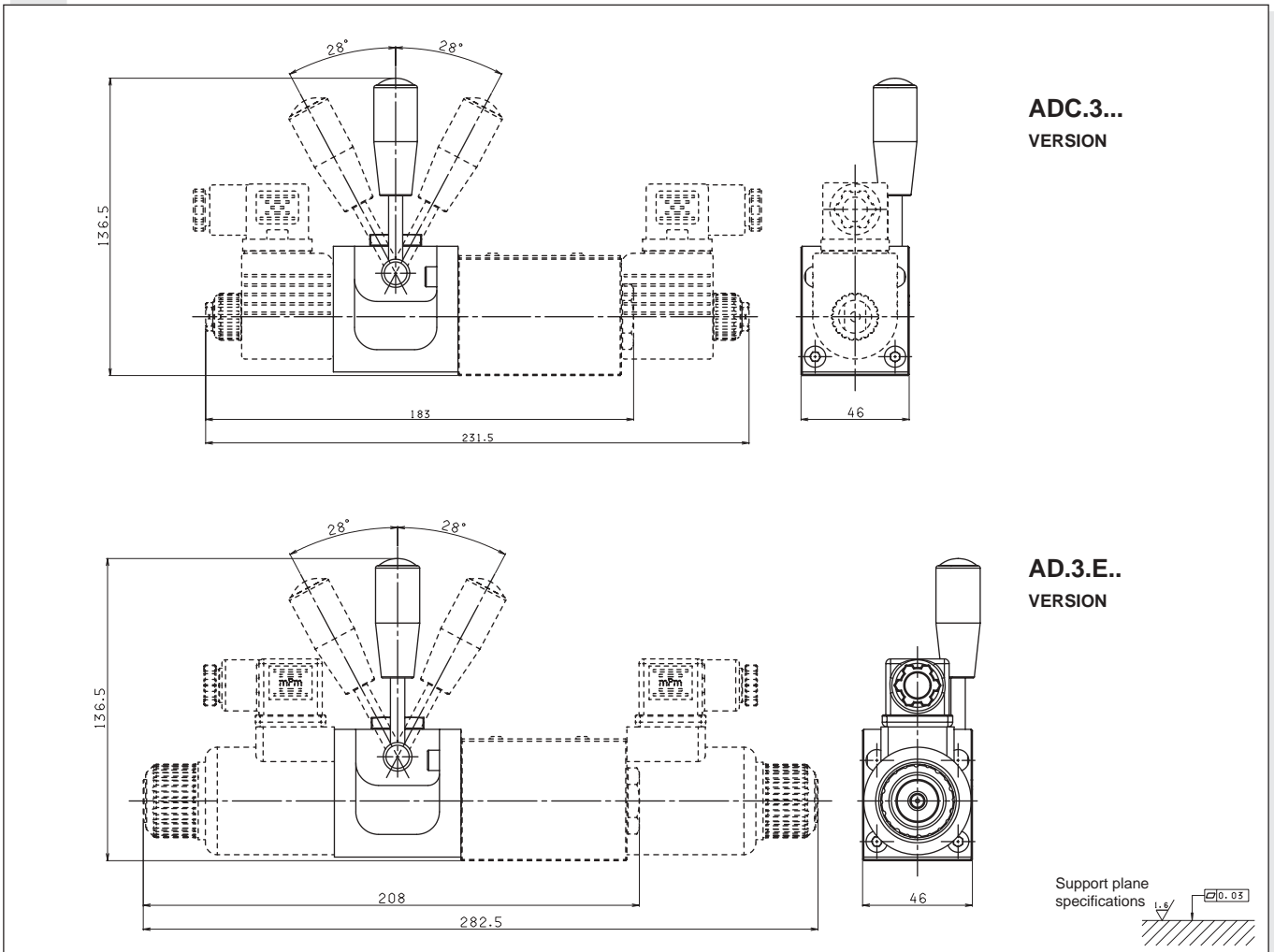


- **MOUNTING TYPE: C / F / H**
- **SPOOLS TYPE: 01/02/03/04/16/17/66/132**

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





AD.3.L...

STANDARD SPOOLS

CH. I PAGE 10

Max. pressure ports P/A/B
 Max. pressure port T
 Max. flow
 Lever angle
 Fluid viscosity
 Fluid temperature
 Ambient temperature
 Max. contamination level

320 bar
 160 bar
 60 l/min
 2 x 17°
 10 ÷ 500 mm²/s
 -25°C ÷ 75°C
 -25°C ÷ 60°C
 class 10 in accordance with
 NAS 1638 with filter $\beta_{25} \geq 75$
 1,2 Kg
 1,8 Kg

Weight
 Weight M1 variant

ORDERING CODE

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

TAB.1

SPOOLS TYPE

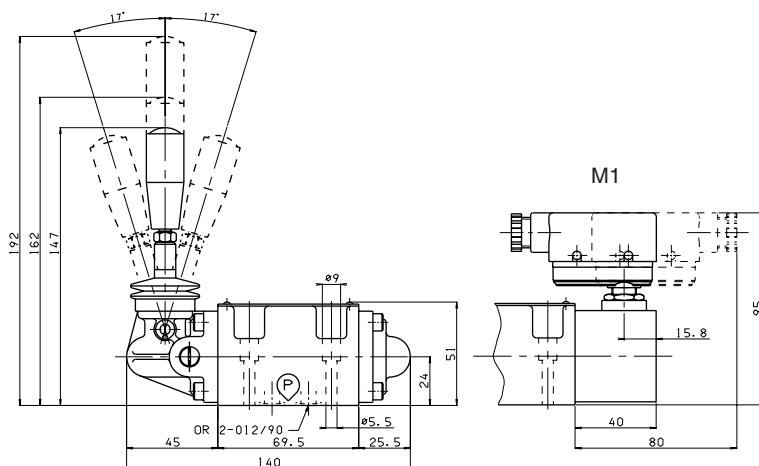
- For these valves spools are different from ones used on the other directional valves
- Available spools:
01 / 02 / 03 / 04 / 05 / 06 / 66
07 / 22 / 13 / 15 / 16 / 17

TAB.2

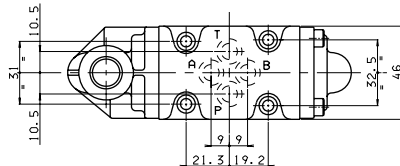
MOUNTING TYPE



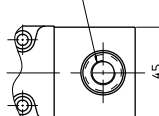
OVERALL DIMENSIONS



M1 = microswitch



M12x1-6H



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

Support plane specifications

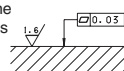


TABLE 3 - VARIANTS TABLE

| VARIANTS | CODE (♦) |
|---|----------|
| No variant | 00 |
| Viton | V1 |
| Preset for microswitch Available on request NATIONAL AM1107 type microswitch | M1 (♦) |
| Preset for microswitch + Viton | MV (♦) |
| 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 | |

DIRECTIONAL CONTROL VALVES OTHER OPERATOR CETOP 3/NG6

1



OTHER OPERATOR

| | |
|-----------------|---------------|
| STANDARD SPOOLS | CH. I PAGE 10 |
| AD.3.P... | CH. I PAGE 16 |
| AD.3.O... | CH. I PAGE 16 |
| AD.3.M... | CH. I PAGE 17 |
| AD.3.D... | CH. I PAGE 17 |

INTRODUCTION

The ARON directional control valves NG6 are designed for subplate mounting with an interface in accordance with 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 page 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.

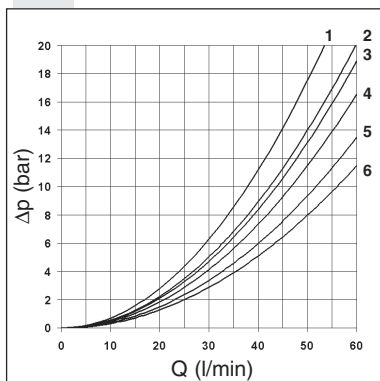
**TAB.1
MOUNTING**

| 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 | |
| 07 | 5 | 5 | 5 | 6 | |
| 08 | 6 | 6 | | | |
| 09 | 5 | 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 | 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.

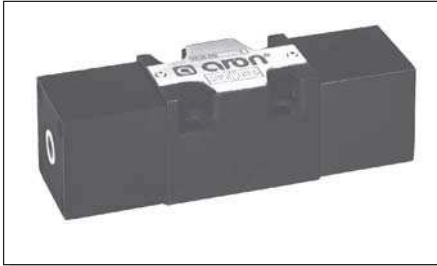
The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C. For higher flow rates than those in the diagram, the losses will be those expressed 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 Q1 that is used.

AD.3.P... PNEUMATIC OPERATION TYPE VALVES CETOP 3/NG6

1



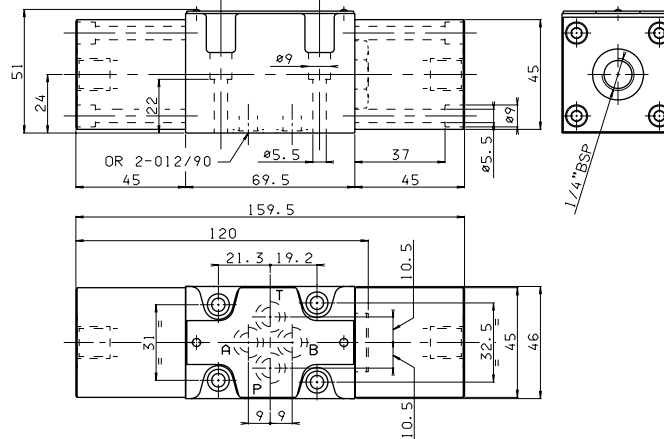
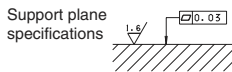
| | |
|----------------------------|--|
| Max. pressure ports P/A/B | 320 bar |
| Max. pressure port T | 160 bar |
| Max. flow | 60 l/min |
| Minimum operating pressure | 2 + [0.027 x (pt*)] bar - see note |
| Maximum operating pressure | 20 bar |
| Fluid viscosity | 10 ÷ 500 mm ² /s |
| Fluid temperature | -25°C ÷ 75°C |
| Ambient temperature | -25°C ÷ 60°C |
| Max. contamination level | class 10 in accordance with NAS 1638 with filter β ₂₅ ≥ 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

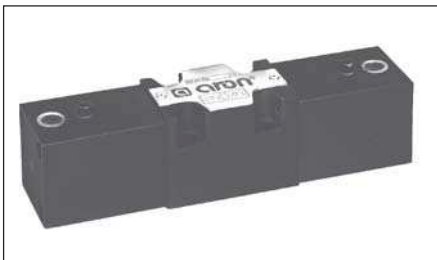
OVERALL DIMENSIONS

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



IAD3P - 02/2000/e

AD.3.O... 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 x (pt*)] bar - see note |
| Maximum operating pressure | 250 bar |
| Fluid viscosity | 10 ÷ 500 mm ² /s |
| Fluid temperature | 0°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 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

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

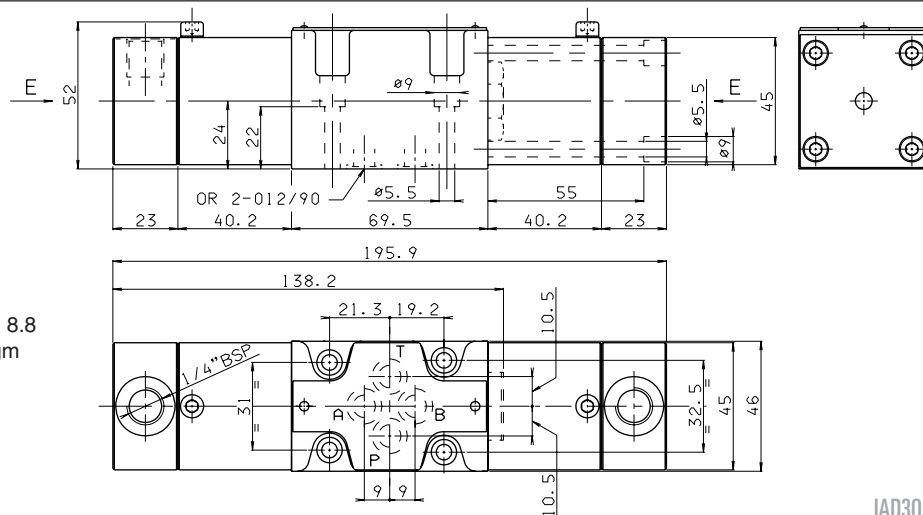
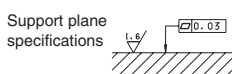
Further technical specifications (for DI variant only)

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

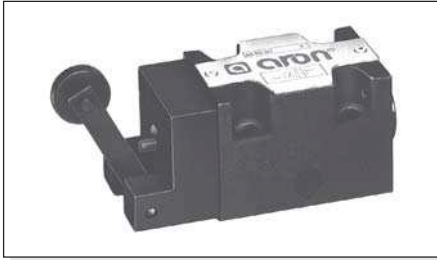
OVERALL DIMENSIONS

E = Manual override

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



IAD3O - 03/2000/e

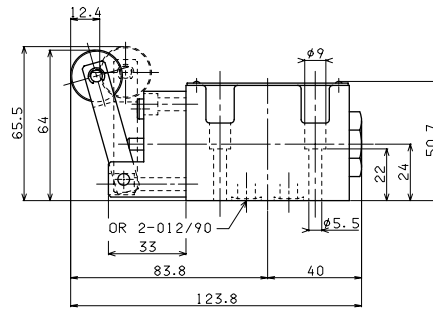


| | |
|---|---|
| Max. pressure ports P/A/B | 320 bar |
| Max. pressure port T | 160 bar |
| Max. flow | 60 l/min |
| Minimum operating force - see note (*) | 2,5 Kg |
| Maximum operating force - see note (**) | 13 Kg |
| Cam angle | 27° |
| Fluid viscosity | 10 ÷ 500 mm ² /s |
| Fluid temperature | -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 | 1 Kg |

- Possible mountings: E / F / G / H
- Ordering code see page before
- Note: (*) In the absence of counter-pressure at port T
- (**) with a pressure of 160 bar at port T

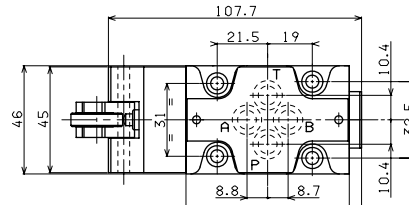
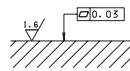
OVERALL DIMENSIONS

| | |
|----------------|---------|
| Stroke | 12,4 mm |
| Working stroke | 3 mm |



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

Support plane specifications



EAD3M - 02/2000/e

AD.3.D... DIRECT MECHANICALLY OPERATED TYPE VALVES CETOP 3/NG6

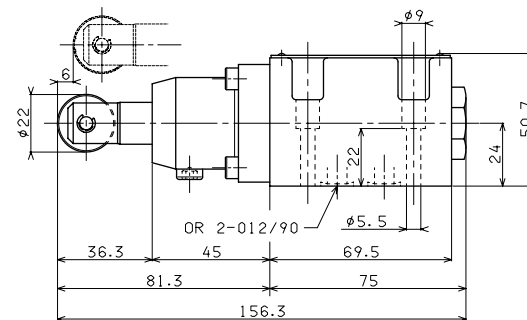


| | |
|--------------------------------|---|
| Max. pressure ports P/A/B | 320 bar |
| Max. pressure port T | 20 bar |
| Max. flow | 60 l/min |
| Operating force - see note (*) | 6 Kg |
| Fluid viscosity | 10 ÷ 500 mm ² /s |
| Fluid temperature | 0°C ÷ 75°C |
| Ambient temperature | -25°C ÷ 60°C |
| Max. contamination level | class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$ |
| Weight | 1,5 Kg |

- Possible mountings: E / F / G / H
- Ordering code see page before
- Note: (*) In the absence of counter-pressure at port T

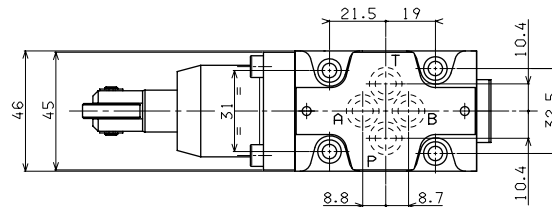
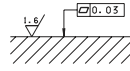
OVERALL DIMENSIONS

| | |
|----------------|------|
| Stroke | 6 mm |
| Extra stroke | 2 mm |
| Working stroke | 3 mm |



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

Support plane specifications



EAD3D - 02/2000/e