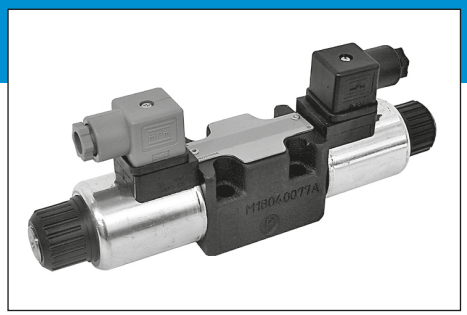
# DIRECTIONAL CONTROL VALVES CETOP 3/NG6





**CETOP 3/NG06**


| | | |
|---|---|---|
| STANDARD SPOOLS | SECT. A | 12 |
| AD3E... | SECT. A | 13 |
| AD3E...*S | SECT. A | 14 |
| AD3E...KJ | SECT. A | 15 |
| AD3V... | SECT. A | 16 |
| AD3L... | SECT. A | 17 |
| OTHER OPERATOR | SECT. A | 18 |
| AD3P... | SECT. A | 19 |
| AD3O... | SECT. A | 19 |
| AD3M... | SECT. A | 20 |
| AD3D... | SECT. A | 20 |
| "D15" DC COILS | SECT. A | 21 |
| "B14" AC SOLENOIDS | SECT. A | 21 |
| STANDARD CONNECTORS | SECT. L | 15 |
| "LE" VARIANTS | SECT. A | 22 |
| L.V.D.T. | SECT. A | 23 |
| MICROSWITCH | SECT. A | 24 |


## 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.

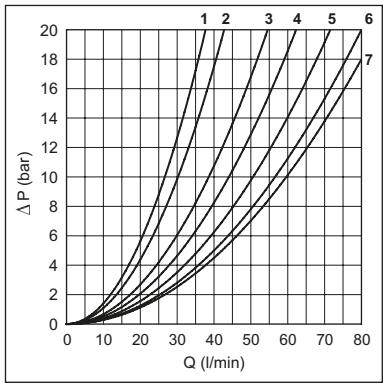
The centre position is obtained by means of calibrated length springs which reposition the spool in the centre or end of travel position once the action of the impulse is over.

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, $ß_{25} \geq 75$.

## 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 $mm^2/s$ at 40°C; the tests have been carried out at a fluid temperature of 40°C. For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

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

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

| | |
|---|---|
| AD | Directional valve |
| 3 | CETOP 3/NG6 |
| E | Type of operator<br>For other operator see<br>next pages |
| ** | Spool see page SECT. A 12 |
| * | 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 | 115Vac/50Hz<br>120Vac/60Hz<br>with rectifier |
| **V** | 28V* | |
| **N** | 48V* | |
| **Z** | 102V* | 230Vac/50Hz<br>240Vac/60Hz<br>with rectifier |
| **P** | 110V* | |
| **X** | 205V* | |
| **W** | DC without coils | |

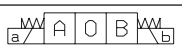
• AMP Junior coils (with or without diode) and coils with flying leads and coils type Deutsch, are available in 12V or 24V DC voltage only.

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

* Voltage available upon request
** Technical data see page Sect. A 21

### TAB.1- MOUNTING

STANDARD

**C** 

**D** 

**E** 

**F** 

SPECIALS

**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).

A

### TAB.3 - VARIANTS

| VARIANT | CODE | ♦ | PAGE |
|---|---|---|---|
| No variant (without connectors) | S1(*) | | |
| FKM | SV (*) | | |
| Emergency control lever for directional control valves type ADC3 and AD3E | LE-LF-AX-CE(*) | ♦ | Sect. A 22 |
| Emergency button | ES(*) | | Sect. A 21 |
| Rotary emergency button | P2(*) | | Sect. A 21 |
| Rotary emergency button (180°) | R5(*) | | Sect. A 21 |
| Preset for microswitch (E/F/G/H mounting only) (see below note ◊) | MS(*) | ♦ | Sect. A 13 - Sect. A 17 |
| 5 micron clearance | SQ(*) (1) | ♦ | |
| Spool movement speed control (only VDC) with ø 0.3 mm orifice | 3S(*) (1) | ♦ | Sect. A 14 |
| Spool movement speed control (only VDC) with ø 0.4 mm orifice | JS(*) (1) | ♦ | Sect. A 14 |
| Spool movement speed control (only VDC) with ø 0.5 mm orifice | 5S(*) (1) | ♦ | Sect. A 14 |
| Spool movement speed control (only VDC) with ø 0.6 mm orifice | 6S(*) (1) | ♦ | Sect. A 14 |
| AMP Junior coil - for12V or 24V DC voltage only | AJ(*) | | Sect. A 21 |
| AMP Junior coil and integrated diode - for12V or 24V DC voltage only | AD(*) (1) | | Sect. A 21 |
| Coil with flying leads (175 mm) - for12V or 24V DC voltage only | SL (1) | | Sect. A 21 |
| Hirschmann coil eCoat surface treatment - for 12V, 24V, 28V or 110V DC voltage only | RS(*) | | Sect. A 21 |
| Deutsch DT04-2P connection eCoat surface treatment - for 12V, 24V DC voltage only | R6 | | Sect. A 21 |
| High corrosion resistance valve - Hirschmann connector | KJ (1) | | Sect. A 15 |
| High corrosion resistance valve - Deutsch DT04-2P connector - for 12V, 24V DC voltage only | 7J (1) | | Sect. A 15 |
| Deutsch DT04-2P coil - for12V or 24V DC voltage only | CZ | | Sect. A 21 |

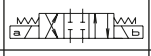
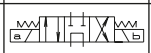
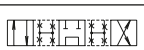
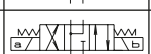
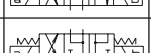
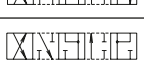
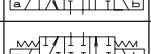
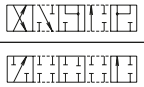
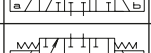
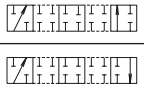
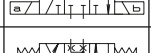
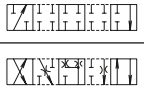
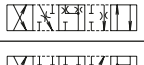
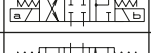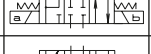
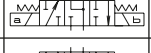
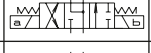
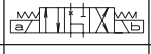
Other variants available on request.

◊ = Maximum counter-pressure on T port: 8 bar - Microswitch type MK code 1319098 must be ordered separately.
♦ = Variant codes stamped on the plate

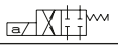
(*) Coils with Hirschmann and AMP Junior connection supplied without connectors. The connectors can be ordered separately, Sect. L 15.
(1) Upon request

# 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 (1) |  | + |  |
| 66 (1) |  | + |  |
| 06 (1) |  | + |  |
| 07 (1) |  | + |  |
| 08 (1) |  | + |  |
| 09 (1) |  | + |  |
| 10 (1) |  | + |  |
| 22 |  | + |  |
| 11 (1) |  | + |  |
| 12 (1) |  | + |  |
| 13 (1) |  | + |  |
| 14 (1) |  | - |  |
| 28 (1) |  | - |  |

## ONE SOLENOID, SIDE A "E" MOUNTING

| Spool type | | Covering | Transient position |
|---|---|---|---|
| 01 |  | + |  |
| 02 |  | - |  |
| 03 |  | + |  |
| 04 |  | - |  |
| 44 |  | - |  |
| 05 (1) |  | + |  |
| 66 (1) |  | + |  |
| 06 (1) |  | + |  |
| 08 (1) |  | + |  |
| 10 (1) |  | + |  |
| 12 (1) |  | + |  |
| 15 |  | - |  |
| 16 |  | + |  |
| 17 (1) |  | + |  |
| 14 (1) |  | - |  |
| 28 (1) |  | - |  |

## NOTE

(1) Upon request

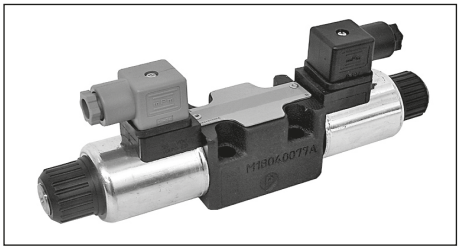
- With spools **15** / **16** / **17** only mounting **E** / **F** are possible
- **16 / 19** / **20** / **21** spool not planned for **AD3E...*S**
- For lever operated the spools used are different.
Available spools for this kind of valve see AD3L..

## ONE SOLENOID, SIDE B "F" MOUNTING

| Spool type | | Covering | Transient position |
|---|---|---|---|
| 01 |  | + |  |
| 02 |  | - |  |
| 03 |  | + |  |
| 04 |  | - |  |
| 44 |  | - |  |
| 05 (1) |  | + |  |
| 66 (1) |  | + |  |
| 06 (1) |  | + |  |
| 08 (1) |  | + |  |
| 09 (1) |  | + |  |
| 10 (1) |  | + |  |
| 22 (1) |  | + |  |
| 12 (1) |  | + |  |
| 13 (1) |  | + |  |
| 07 (1) |  | + |  |
| 15 |  | - |  |
| 16 |  | + |  |
| 17 (1) |  | + |  |
| 14 (1) |  | - |  |
| 28 (1) |  | - |  |

## TWO SOLENOIDS "D" MOUNTING

| Spool type | | Covering | Transient position |
|---|---|---|---|
| 19 |  | - |  |
| 20 |  | + |  |
| 21 (1) |  | + |  |



A max. counter-pressure of 8 bar at T is permitted for the variant with a microswitch (**MS**).
(1) 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 milion 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 mm²/s |
| Fluid temperature | -25°C ÷ 75°C |
| Ambient temperature | - 25°C ÷ 60°C |
| Max. contamination level | class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$ |
| Weight 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)

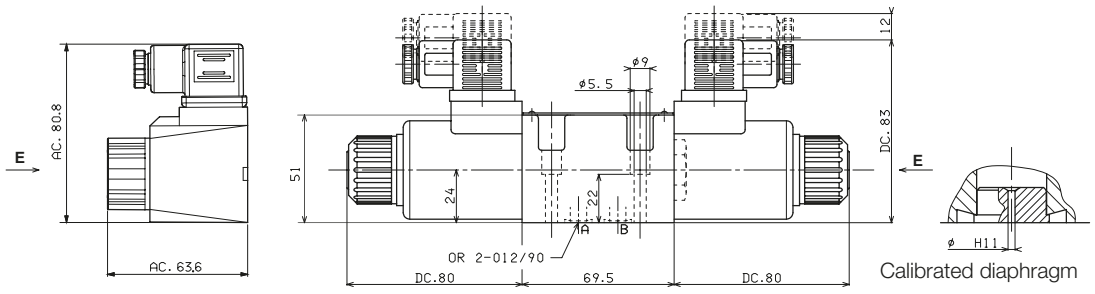
| Ø mm | Code |
|---|---|
| blind | M52.05.0023/4 |
| 0.5 | M52.05.0023/1 |
| 0.6 | M52.05.0023/6 |
| 0.7 | M52.05.0023/8 |
| 0.8 | M52.05.0023 |
| 1.0 | M52.05.0023/2 |
| 1.2 | M52.05.0023/3 |
| 1.5 | M52.05.0023/7 |
| 2.0 | M52.05.0023/10 |
| 2.2 | M52.05.0023/9 |
| 2.5 | M52.05.0023/5 |

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

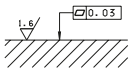
## OVERALL DIMENSIONS

**E** = Manual override

**MS** = Microswitch




Support plane specifications




Fixing screws ISO 4762 M5x30
with material specifications min. 8.8
Tightening torque 5 Nm / 0.5 Kgm

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

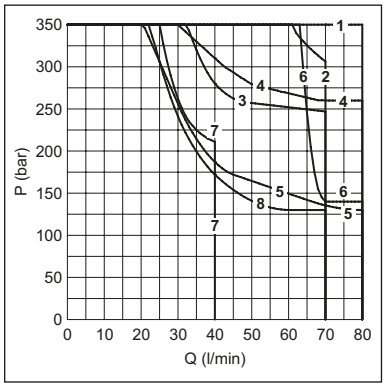
The tests have been carried out with solenoids at operating temperature and a voltage 10% less than rated voltage with a fluid temperature of 40°C. The fluid used was a mineral oil with a viscosity of 46 mm²/s at 40°C. The values in the diagram refers to tests carried out with the oil flow in two directions 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. De-energizing 10 ÷ 30 ms.

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

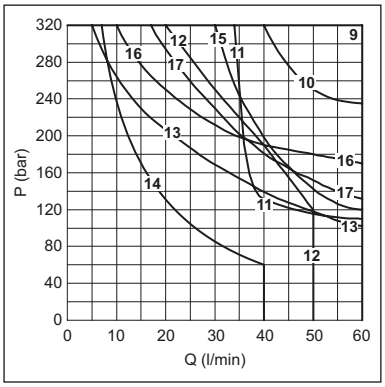
**NOTE: The operating limits shown are valid for mountings C, E, F.**

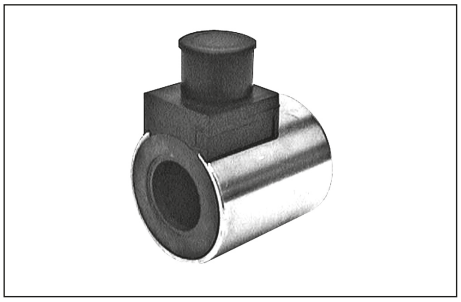
### DIRECT CURRENT SOLENOIDS (DC)




| Spool type | Solenoids DC | Solenoids 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)





## "D15" DC COILS

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

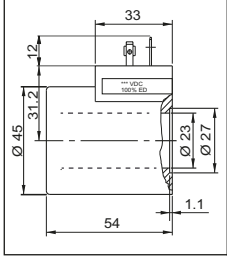
- AMP Junior coils (with or without diode) and coils with flying leads and coils type Deutsch, are available in 12V or 24V DC voltage only.
- The pastic type coil (RS variant) is available in 12V, 24V, 28V or 110V DC voltage only.

| 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 |

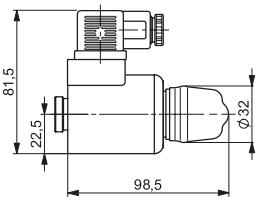
* Special voltages

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

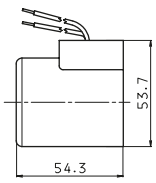
**ECOAT COIL (RS)**



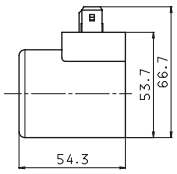

**EMERG. HIRSCHMANN CONN. MANUAL WITHOUT CONN. (ES)**



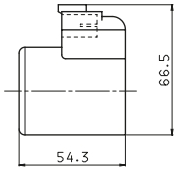

**FLYING LEADS (SL)**




**AMP JUNIOR (AJ) AJ + DIODE (AD)**

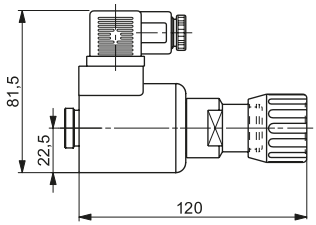



**DEUTSCH DT04 - 2P (CZ) CZ + ECOAT (R6)**

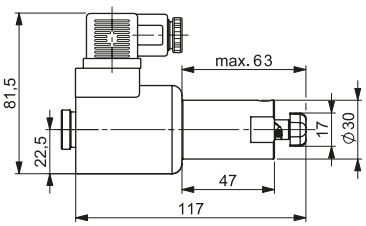


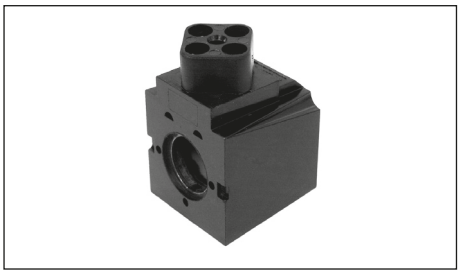

**EMERGENCY (COILS WITH HIRSCHMANN CONNECTION)**

**ROTARY WITHOUT CONNECTOR (P2)**




**ROTARY 180° WITHOUT CONNECTOR (R5)**



## "B14" AC SOLENOIDS

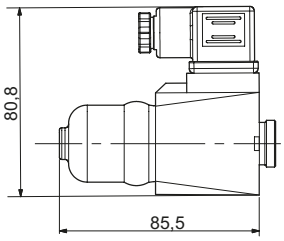
| | |
|---|---|
| Type of protection (in relation to the connector used) | IP 65 |
| Number of cycles | 18.000/h |
| Supply tolerance | +10% / -10% |
| Ambient temperature | -30°C ÷ 60°C |
| Duty cycle | 100% ED |
| Insulation class wire | H |
| Weight | 0,436 Kg |

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

**EMERGENCY (COILS WITH HIRSCHMANN CONNECTION)**

**MANUAL WITHOUT CONNECTOR (ES)**




**ROTARY WITHOUT CONNECTOR (P2)**

