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## SAFETY WARNINGS

- **During the installation and operation of the instrument, follow the instructions set out below:**
- 1) **The instrument should be installed by a skilled operator.**
- 2) **Strictly follow the connection diagrams when installing the instrument.**
- 3) **Do not power or connect the instrument if any part of it is damaged.**
- 4) **Before touching the terminals, make sure the wires to be connected to the instrument are not live.**
- 5) **The connection cables should be able to resist the maximum operating temperature (T<sub>max</sub>), obtained from the sum of the maximum ambient temperature (T<sub>a</sub>) + a temperature of 20 °C (T<sub>max</sub>= T<sub>a</sub> + 20 °C).**
- 6) **The instruments guarantee a main insulation between the low voltage (250 V) and very low voltage parts.**
- 7) **Any outside switches connected to the controls should guarantee a minimum insulation at operating temperature of 250 V AC, or should be protected by equivalent insulation.**
- 8) **Contacts: all type 1C (CEI 107-70 and variants).**
- 9) **The instruments require no maintenance.**

## TECHNICAL SPECIFICATIONS

- Series of digital regulators used for the most simple requirements in the control and regulation of humidity and pressure levels in air conditioning, heating and refrigeration systems
- Two dedicated base models for pressure and humidity control:
  - **DIGITAL HUMIDITY REGULATORS**                      **HR**
  - **DIGITAL PRESSURE REGULATORS**                      **PR**
- Each single model has 1 probe input for the connection of active sensors with standardised 0÷20 mA, 4÷20 mA and 0÷1 V outputs
- The power supply to the active probe (linear sensor) comes directly from the instrument: 9 V DC available
  - For each single model, the probe input can be configured from the keyboard
  - Available in versions with 1 or 2 relay outputs with contact in exchange
  - Regulators with 3 digit, seven segment and decimal point display
  - Relay intervention warning lamp
  - Display range: -99 ÷ +999
  - Display resolution: 0.1 RH or bar (-9.9 ÷ +99.9 RH or bar) and 1 RH or bar (< -9.9 °C and > +99.9 RH or bar)
  - Precision: ±0.5 % of the end of scale value ±1 digit (at an ambient temperature of 23 °C)
  - Sampling time: 0.5s

- Parameter setting in digital mode:
  - Set point
  - Differential
  - Neutral zone
  - Output drive timing
  - Digital input delay function and time
  - Alarm delay / buzzer enable time
  - Probe calibration offset
  - Resolution displayed
  - Measurement display filter (update speed)
  - Type of probe input
  - Password
  - Operating modes (regulation):
    - ON/OFF Direct and/or Reverse action with or without neutral zone
    - PWM Direct and Reverse action with or without neutral zone
    - ALARM
    - Special mode
- 2 independent set points
- Digital input: 1 (not versions HR-..P7A, PR-..P7A) for outside consensus for configurable function: outside alarm, regulator ON/OFF, set-point switching, Direct/Reverse switching, etc.  
Acoustic and visual alarm signalling for: outside alarm (from digital input), probe alarm (malfunction), minimum or maximum alarm
- Infrared receiver with RC-5 protocol for remote control (accessory available separately for remote programming)
- Available in the following fixing versions: 33x75 mm rear panel, 72x72 mm rear panel and modular 4 DIN
- Power supply: see table on the following page
- Rated power: 3 VA for models with 33x75 mm rear panel fixing  
4.5 VA for models with 72x72 mm and modular 4 DIN fixing
- Max absorption: 100 mA at 12 V - 50 mA at 24 V (1 channel)
- Operating temperature: 0 ÷ +50 °C
- Operating humidity: <80%
- Storage temperature: -10 ÷ +70 °C (<80% RH)
- Protection level: front panel IP54 (IP40 for the 4 DIN module version)  
terminals IP20

**Rear panel 33x75 mm**

| Code            | Model   | Power supply (*)                             | Power supply tolerance | n° of relays | Digital input | Infrared receiver |
|-----------------|---------|--|------------------------|--------------|---------------|-------------------|
| <b>VM653300</b> | HR-1P3D | from 12 to 24 V AC/DC                        | ± 10                   | 1            | YES           | YES               |
| <b>VM654100</b> | HR-1P3A | from 100 to 230 V AC<br>from 140 to 300 V DC | ± 15                   | 1            | YES           | YES               |
| <b>VM655800</b> | HR-2P3D | from 12 to 24 V AC/DC                        | ± 10                   | 2            | YES           | YES               |
| <b>VM656600</b> | PR-1P3D | from 12 to 24 V AC/DC                        | ± 10                   | 1            | YES           | YES               |
| <b>VM657400</b> | PR-1P3A | from 100 to 230 V AC<br>from 140 to 300 V DC | ± 15                   | 1            | YES           | YES               |
| <b>VM658200</b> | PR-2P3D | from 12 to 24 V AC/DC                        | ± 10                   | 2            | YES           | YES               |

**Rear panel 72x72 mm**

| Code            | Model   | Power supply (*) | Power supply tolerance | n° of relays | Digital input | Infrared receiver |
|-----------------|---------|------------------|------------------------|--------------|---------------|-------------------|
| <b>VM646700</b> | HR-1P7A | 24/230 V AC      | ± 10                   | 1            | NO            | YES               |
| <b>VM647500</b> | HR-2P7A | 24/230 V AC      | ± 10                   | 2            | NO            | YES               |
| <b>VM648300</b> | PR-1P7A | 24/230 V AC      | ± 10                   | 1            | NO            | YES               |
| <b>VM649100</b> | PR-2P7A | 24/230 V AC      | ± 10                   | 2            | NO            | YES               |

**Modular 4 DIN**

| Code            | Model  | Power supply (*) | Power supply tolerance | n° of relays | Digital input | Infrared receiver |
|-----------------|--------|------------------|------------------------|--------------|---------------|-------------------|
| <b>VM661600</b> | HR-1DA | 24/230 V AC      | ± 10                   | 1            | YES           | YES               |
| <b>VM662400</b> | HR-2DA | 24/230 V AC      | ± 10                   | 2            | YES           | YES               |
| <b>VM663200</b> | PR-1DA | 24/230 V AC      | ± 10                   | 1            | YES           | YES               |
| <b>VM664000</b> | PR-2DA | 24/230 V AC      | ± 10                   | 2            | YES           | YES               |

(\*) AC power supply - frequency 50/60 Hz

## DESCRIPTION OF INSTRUMENT

### **Display**

- A 3 digit led display with decimal point is used.  
For all the models, the display range is:
  - minimum display: -99 or -9.9 RH or bar
  - maximum display: 999 or 99.9 RH or bar

### **Relay intervention signalling lamp:**

- **Out 1:**  
LED off if relay one is OFF, on if relay one is ON, flashing if relay one in OFF is waiting to become ON due to an active timing.
- **Out 2:**  
LED off if relay two is OFF, on if relay two is ON, flashing if relay two in OFF is waiting to become ON due to an active timing.

### **Keys**

- Three parameter setting keys are used:



Confirm and parameter programming/display key.



Key used to increase the parameter or go to the next parameter.



Key used to decrease the parameter or leave the menu.

## ELECTRICAL CONNECTIONS

- Adhere strictly to the instructions in the safety warnings and the “**Connection diagram**” section.

## GLOSSARY

### **Set point (set or operating point)**

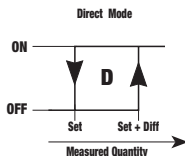
- The set point is the value at which the appliance has to intervene to maintain the measurement controlled at the required level.

### **Differential (or hysteresis)**

- The differential is the maximum permitted variation from the set point for the measurement controlled prior to the intervention of the appliance.
- This is usually set in such a way as to prevent rapid oscillations in the measurement around the set point from causing frequent start-ups and shutdowns of the appliance or the driver connected to it.

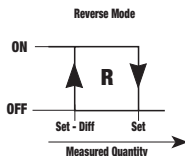
### **Direct action**

- A regulator acts in **direct** mode when it limits the measurement as this increases.



### **Reverse action**

- A regulator acts in **reverse** mode when it limits the reduction of the measurement controlled.

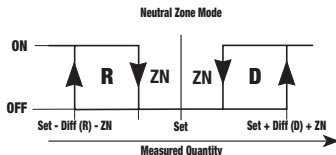


### **Neutral or dead zone ("dead-band")**

- This indicates an interval of values around the set point in which the measurement regulated may oscillate without the activation of any output.

It is normally used in the appliances in which there is a strong inertia of the system, as a result of which the set point may be exceeded even after the driver has been switched off.

Around the neutral zone, no output is activated. Outside the neutral zone, the instrument operates in **direct** mode if the measurement controlled increases, and in **reverse** if it decreases.

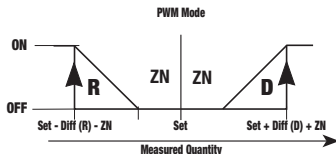


### PWM operation (in proportion to time)

- This is a neutral zone type of operation in which the relays are activated periodically in impulse mode (the interval can be set, see the output menu).

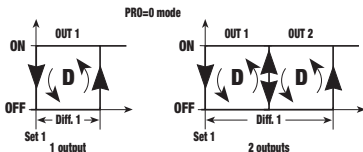
The PWM procedure modulates the power in accordance with the position occupied by the measurement within the differential (the further we move away from the set point, the more the power increases).

**Important: we advise against using this method to drive compressors, due to the very close distance between start-up and shutdown.**



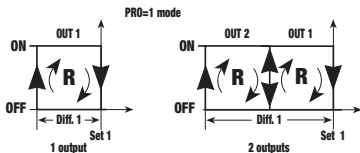
### Direct operating mode [PRO=0]

- In this mode, all the outputs operate in **direct**. The values of set point 1 [ST1] and differential 1 [DF1] have to be set. Hysteresis is to the right of the set point. If both outputs are used, the hysteresis for each output is equivalent to half the differential. In this case, output 1 will be activated when the measurement controlled reaches the value  $[ST1] + [DF1]/2$ , at which point output 2 will be deactivated.



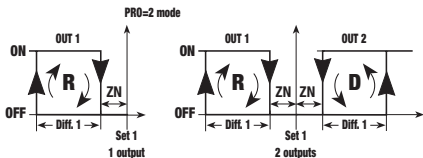
### Reverse operating mode [PRO=1]

- In this mode, all the outputs operate in **reverse**. The set point 1 [ST1] and differential 1 [DF1] values have to be set. Hysteresis is to the left of the set point. If both outputs are used, the hysteresis for each output is equivalent to half the differential. In this case, output 1 will be activated when the measurement controlled reaches the value  $[ST1] - [DF1]/2$ , at which point output 2 will be deactivated.



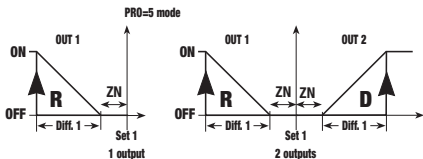
### Neutral zone operating mode [PRO=2]

- In this mode, output 1 operates in **reverse** and output 2 in **direct**. The set point 1 [ST1], differential 1 [DF1] and neutral zone [DBN] values have to be set. These are parameters for both outputs. The regulator will tend to maintain the measurement controlled within the neutral zone. Outside of this, output 2 will be activated if the measurement tends to increase, or output 1 if it tends to decrease. If a single output is present, this will operate in **reverse**, with the hysteresis shifted towards the left of the value [DBN].



### PWM operating mode [PRO=5]

- The regulation logic in this mode is the same as that with the neutral zone. It is therefore necessary to set the set point 1 [ST1], differential 1 [DF1] and **neutral zone** [DBN] values, which are parameters for both outputs. In this operating mode, the relays are activated impulsively, with an interval that can be set on the basis of the [TCL] value (see the output menu). Within this interval, the relay will stay on for a period in proportion to the distance of the measurement regulated from the set point (plus the neutral zone, where applicable). In addition to the differential value, the relay will be active for 100% of the time.

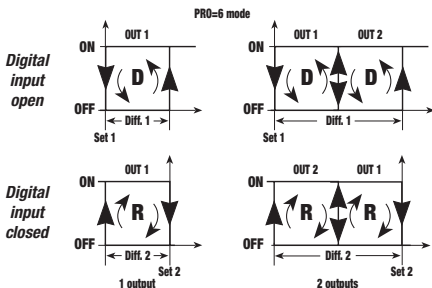


### Operating mode with Direct/Reverse switching from digital input. [PRO=6]

- In this mode, both outputs operate in **direct** (with set point 1 and differential 1) or **reverse** (with set point 2 and differential 2) depending on the status of the digital input. More precisely, in **direct** if the digital input is open and in **reverse** if closed. The operating modes are the same as modes 0 and 1.

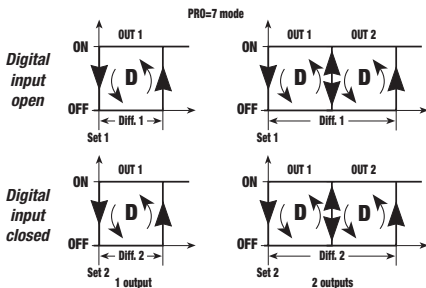


It is therefore necessary to set both set point **[ST1]** and **[ST2]** and differential **[DF1]** and **[DF2]** values.



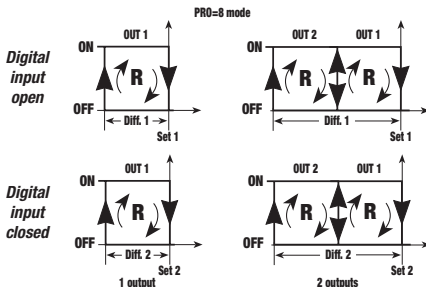
### **Direct operating mode with switching of set point and differential from digital input. [PRO=7]**

- In this mode, both outputs operate in **direct**, with set point 1/differential 1 or set point 2/differential 2 depending on the digital input status. More precisely, with set point 1/differential 1 if the digital input is open and set point 2/differential 2 if closed. The operating modes are the same as mode 0. It is necessary to set both the set point **[ST1]** and **[ST2]** differential **[DF1]** and **[DF2]** values.



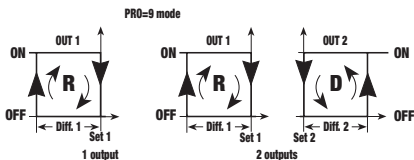
### Reverse operating mode with set point and differential switching from digital input [PRO=8]

- In this mode, both outputs operate in **reverse**, with set point 1/differential 1 or set point 2/differential 2, depending on the status of the digital input. More precisely, with set point 1/differential 1 if the digital input is open and set point 2/differential 2 if closed. The operating modes are the same as mode 1. It is necessary to set both values of the set points **[ST1]** and **[ST2]** and differentials **[DF1]** and **[DF2]**.



### Operating mode with channels 1 and 2 in reverse with set point 1 and differential. 1 and direct with set point 2 and differential 2 [PRO=9] respectively.

- In this mode, output 1 operates in reverse and output 2 in direct. It is necessary to set the values of set point 1 **[ST1]** and differential 1 **[DF1]** for output 1, and set point 2 **[ST2]** and differential 2 **[DF2]** for output 2. The operating modes are the same as modes 0 and 1. If there is a single output, this will operate in reverse.



### Alarm operating mode [PRO=10]

- In this mode, output 1 operates in reverse (with neutral zone), and output 2 is dedicated to the alarm. It is necessary to set the values of set point 1 **[ST1]**,

differential 1 **[DF1]** and the neutral zone **[DB1]** for output 1 and all the alarm menu parameters for output 2.

The maximum alarm will be activated when the value

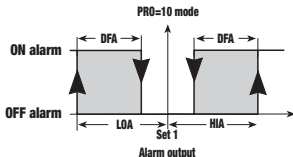
**[ST1]+[HIA]** is reached and will be deactivated at value

**[ST1]+[HIA]-[DFA]**. The minimum

alarm will be activated when the

value **[ST1]-[LOA]** is reached and will be deactivated at value **[ST1]-[LOA]+[DFA]**.

When there is a single output, this will be dedicated to the alarm in the same way.



## OPERATION

### Normal operation

The appliance operates in this way when no parameters are being programmed.

In this status, the instrument carries out the regulation on the basis of the temperature measured and the parameters set. The following information is displayed:

- The quantity measured by the sensor
- The status of outputs OUT1 and OUT2

## SETTING THE REGULATION PARAMETERS

There are two types of programming for the setting of the regulation parameters:

- Simplified programming
- Advanced programming

**Note: to reset the default values set in the factory, switch on the instrument while holding down the OK key.**

### Simplified programming

This is used to modify the **regulation menu [REG]** parameters only.

Access is gained to this type of programming by pressing the “OK” key.

Depending on the operating mode previously selected (see the system menu **[SYS]**), the following parameters can be modified:

- **set, differential** (ON/OFF regulation)
- **set, differential, neutral zone** (ON/OFF regulation with neutral zone)
- **set, differential, neutral zone** (PWM regulation)

Use the “up” (▲) key to scroll through the parameter labels in a circular sequence.

Press the “**down**” (▼) key at any time to leave the menu and return to normal operation (this also happens if no key is pressed for at least 40 seconds). Press “**OK**” to switch between the display of the parameter label and its numerical value. To modify a parameter:

- from the display of its label or value, press “**OK**” and hold down for at least three seconds
- the display will start to flash and will show the parameter value
- use the “**up**” (▲) and “**down**” (▼) keys to increase or reduce the value
- press “**OK**” to confirm the parameter and leave the modification (the display will stop flashing)

**Note: if no key is pressed for at least 40 seconds, the instrument leaves the parameter modification without memorising the changes made. During the display and modification of the parameters, the instrument will continue to operate with the previously set parameters.**

If “password 1” is enabled (access password to protect the settings entered-see system menu), when the “**OK**” key is pressed from normal status the message “- - -” will appear. To set the parameters, enter the previously set password (a number from 0 to 255) with the “**up**” (▲) and “**down**” (▼) keys and press “**OK**” to confirm. If the password is entered correctly, the label of the first menu will appear. Otherwise, the system will return to normal status.

### **Advanced programming**

Access is gained to advanced programming from normal status by pressing and holding down the p and q keys for at least 3 seconds.

**Note: to reset the default values set in the factory, switch on the instrument while holding down the “OK” key.**

These parameters are grouped into eight menus, by type:

- 1) Regulation** (indicated with [REG]): set point, differential, neutral zone
- 2) Output** (indicated with [OUT]): output drive times, PWM cycle time
- 3) Digital input** (indicated with [ING]): function, delay time
- 4) Alarm** (indicated with [ALR]): output status in probe alarm, minimum/maximum shift, differential, delay time, buzzer enable
- 5) Display** (indicated with [DSP]): set point limits, probe offset, resolution, measurement filter
- 6) Sensor** (indicated with [SNS]): type of sensor, sensor parameters
- 7) System** (indicated with [SYS]): password, modification enable, operating mode
- 8) Advanced** (indicated with [ADD]): dependence, type, entry, differential/logic

All the parameters inside the menus and their values are listed in the section that follows.

- Use the “**up**” (▲) to scroll through the eight menus in sequence
- To enter the menu required, press “**OK**”

- Inside each menu, it is possible to scroll through the labels of the parameters that can be modified by pressing “up” (▲). To display the value of the parameter, press “OK” (press “OK” a second time to return to the display of the parameter label).
- To modify the parameter value, hold down “OK” for at least 3 seconds.
- The parameter value will start to flash and it will be possible to increase or decrease it with the “up” (▲) and “down” (▼) keys.
- To confirm the value set, press “OK”.  
The parameter will stop flashing and the new value will be displayed.
- It is possible to return to normal operation at any time by pressing “down” (▼) (or if no key is pressed for at least 40 seconds).

**Note: if no key is pressed for at least 40 seconds, the instrument leaves the parameter modification without memorising the changes made.**

**Note: During the display and modification of the parameters, the instrument will continue to operate with the previously set parameters.**

If “password 2” is enabled (access password for the protection of the settings-see system menu), when the “up” (▲) and “down” (▼) keys are held down for three seconds from normal status, the message “- - -” will appear. To set the parameters, enter the previously set password (a number from 0 to 255) with the “up” (▲) and “down” (▼) keys and press “OK” to confirm. If the password is entered correctly, the label of the first menu will appear. Otherwise, the system will return to normal status.

## PARAMETER MENU

To simplify the programming of the instruments, the parameters are grouped into various menus, in the following order:

- [REG] regulation menu
- [OUT] output menu
- [ING] outside input menu
- [ALR] alarm menu
- [DSP] display menu
- [SNS] sensor menu
- [SYS] system menu
- [ADD] special parameter menu (for special operating mode only)

## Description of parameters

- Inside the tables, the labels are presented in the same order as they appear in the various menus of the instrument.

### [REG] regulation menu

| Labels of parameters that can be modified | Description                  | unit      | Parameter values |     | default | notes |
|---|------------------------------|-----------|------------------|-----|---------|-------|
|   |                              |           | min              | max |         |       |
| ST1                                       | set point 1                  | RH or bar | L01              | HI1 | 20.0    | (1)   |
| DF1                                       | differential for set point 1 | RH or bar | 0.1              | 100 | 2.0     |       |
| ST2                                       | set point 2                  | RH or bar | L02              | HI2 | 30.0    | (2)   |
| DF2                                       | differential for set point 2 | RH or bar | 0.1              | 100 | 2.0     | (2)   |
| DBN                                       | neutral zone (dead band)     | RH or bar | 0                | 100 | 2.0     | (2)   |

Notes:

- (1) for the values L01/L02 and HI1/HI2, see the display menu [DSP]  
 (2) parameter active only if the operating mode permits

### [OUT] output menu

| Labels of parameters that can be modified | Description  | unit | Parameter values |     | default | notes |
|---|--|------|------------------|-----|---------|-------|
|   |  |      | min              | max |         |       |
| ETR                                       | Time handling on relay enable                      | -    | 0                | 3   | 3       | (3)   |
| DON                                       | Minimum time between 2 start-ups of the same relay | min  | 0                | 200 | 0       | (4)   |
| TOF                                       | Minimum relay ON time                              | min  | 0                | 200 | 0       | (5)   |
| TON                                       | Minimum relay OFF time                             | min  | 0                | 200 | 0       | (6)   |
| INI                                       | Initial delay from instrument start-up             | min  | 0                | 200 | 0       | (7)   |
| TCL                                       | PWM cycle time                                     | sec  | 1                | 200 | 200     | (8)   |

Notes:

- (3) This parameter enables the handling of the times defined by DON, TOF and TON for each output channel, in the following ways:  
**0** timing **not enabled** for either relay output  
**1** timing enabled for relay 1 output only  
**2** timing enabled for relay 2 output only  
**3** timing enabled for relay 1 and 2 outputs  
 (4) this parameter limits the number of start-ups per hour for the driver connected to the instrument (this parameter is frequently used for compressors, for example)  
 (5) the minimum time for which the output should remain ON  
 (6) timing enabled for relay 1 output only OFF

- (7) the delay time for the driving of the outputs from the instant of instrument reset  
 (8) the period that can be set for PWM regulation. This item is displayed only if the operating mode selected is PRO=5 (see system menu).

### [ING] outside input menu

| Labels of parameters that can be modified | Description                                    | unit | Parameter values |     | default | notes |
|---|--|------|------------------|-----|---------|-------|
|   |  |      | min              | max |         |       |
| TID                                       | Digital input function                         | -    | 0                | 3   | 0       | (9)   |
| DID                                       | Digital input delay                            | min  | 0                | 200 | 0       | (10)  |
| SUI                                       | Output status with digital input active (open) | -    | 0                | 3   | 0       | (11)  |

#### Notes:

- (9) The values that can be set are:

**0** Not active

**1** Outside alarm (with contact open) with delay time "DID" and automatic reset at the end of the alarm. The output status becomes "SUI"

**2** Outside alarm (with contact open) with manual reset

**3** The input operates as a switch: instrument on with contact closed and off with contact open

**The digital input function is excluded when one of the following operating modes is selected inside the system menu [SYS]: mode=6, mode=7 and mode=8**

- (10) This is the delay after which the instrument responds to a signal from the digital input

- (11) When the digital input is active and a time period "DID" has lapsed, the outputs take on the following states:

**0** Both relays OFF

**1** Relay 1 ON and relay 2 OFF

**2** Relay 1 OFF and relay 2 ON

**3** Both relays ON

**[ALR] alarm menu**

| Labels of parameters that can be modified | Description                            | unit      | Parameter values |     | default | notes |
|---|--|-----------|------------------|-----|---------|-------|
|   |  |           | min              | max |         |       |
| SUA                                       | Output status in probe alarm condition | -         | 0                | 3   | 0       | (12)  |
| LOA                                       | Minimum alarm shift                    | RH or bar | 0.1              | 100 | 50      | (13)  |
| HIA                                       | Maximum alarm shift                    | RH or bar | 0.1              | 100 | 50      | (13)  |
| DFA                                       | Alarm differential                     | RH or bar | 0.1              | 100 | 2       |       |
| TRA                                       | Alarm activation delay time            | min       | 0                | 200 | 0       |       |
| SOU                                       | Buzzer enable                          | -         | no               | yes | no      | (14)  |
| EAC                                       | Alarm messages in timing enable        | -         | no               | yes | no      | (15)  |

**Notes:**

- (12) This is the status taken on by the outputs in probe alarm condition (see note 11)
- (13) This value is added to or subtracted from the set point defined for the maximum or minimum alarm respectively
- (14) If “yes”, the acoustic signal of the key and the buzzer are enabled in alarm condition. If “no”, both of these are disabled.
- (15) If “yes”, the type of alarm is also displayed during its timing.  
If “no”, the type of alarm is displayed only at the end of the timing

**[DSP] display menu**

| Labels of parameters that can be modified | Description                  | unit      | Parameter values |     | default | notes |
|---|------------------------------|-----------|------------------|-----|---------|-------|
|   |                              |           | min              | max |         |       |
| LO1                                       | Lower limit of set point 1   | RH or bar | -99              | HI1 | -99     |       |
| HI1                                       | Upper limit of set point 1   | RH or bar | LO1              | 999 | 999     |       |
| LO2                                       | Lower limit of set point 2   | RH or bar | -99              | HI2 | -99     | (16)  |
| HI2                                       | Upper limit of set point 2   | RH or bar | LO2              | 999 | 999     | (16)  |
| SOF                                       | Probe calibration offset     | RH or bar | -50              | +50 | 0.0     | (17)  |
| RIS                                       | Resolution displayed         | flag      | HI               | LO  | HI      | (18)  |
| UNI                                       | Temperature measurement unit | flag      | C                | F   | C       | (19)  |
| FIL                                       | Measurement filter           | flag      | no               | yes | yes     | (20)  |

**Notes:**

- (16) parameter active only if the operating mode permits
- (17) this value is added to the measurement to compensate for imprecision
- (18) this is the resolution at which the measurement is displayed:  
0.1 if “HI” or 1.0 if “LO”



- (19) **Important:** this parameter should not be modified. If the measurement unit is changed, the parameters set are not converted automatically, but have to be re-calibrated
- (20) if the parameter is set to “yes”, a mobile average is taken of 8 measurement values (4 seconds approx.). If “no”, this average is not calculated

### [SNS] sensor menu

| Labels of parameters that can be modified | Description                                  | unit      | Parameter values |     | default | notes |
|---|--|-----------|------------------|-----|---------|-------|
|   |  |           | min              | max |         |       |
| TY0                                       | Sensor type 0                                | -         | 0                | 16  |         | (21)  |
| ILO                                       | Minimum value of input current/voltage scale | RH or bar | -99              | 999 | 0       | (22)  |
| IHI                                       | Maximum value of input current/voltage scale | RH or bar | -99              | 999 | 100     | (22)  |

Notes:

(21) the values of the default parameter are listed below:

### Linear sensors

| Type of sensor | Display message |
|----------------|-----------------|
| 0-20 mA (*)    | 020 (*)         |
| 4-20 mA        | 420             |
| 0-1V           | 0-1             |

(\*) the instrument is set to this parameter by default

### [SYS] system menu

| Labels of parameters that can be modified | Description                   | unit | Parameter values |     | default | notes |
|---|-------------------------------|------|------------------|-----|---------|-------|
|   |                               |      | min              | max |         |       |
| PS1                                       | password 1                    | -    | 0                | 255 | 0       | (23)  |
| PS2                                       | password 2                    | -    | 0                | 255 | 0       | (23)  |
| NEN                                       | Parameter modification enable | -    | yes              | no  | yes     | (24)  |
| PRO                                       | Operating mode                | -    | 0                | 12  | 0       | (25)  |

Note:

- (22) the password is enabled if the parameter is different from 000
- (23) if set to “no”, it is not possible to modify all the other parameters, only to display them
- (24) the following operating modes are available:  
**0 channels 1 and 2 in direct** mode with set point 1 and 1 (hysteresis to the right of the set point)

- 1 channels 1 and 2 in reverse** with set point 1 and differential 1 (hysteresis to the left of the set point)
- 2 neutral zone** with channel 1 in reverse and channel 2 in direct with set point 1 and differential 1
- 3** as mode 0 but with differential centred on the set point
- 4** as mode 1 but with differential centred on the set point
- 5 PWM regulation** with channel 1 in reverse and channel 2 in direct with set point 1 and differential 1, and neutral zone where applicable
- 6** switching between outputs in direct (with set-point 1 and differential 1) and outputs in reverse (with set-point 2 and differential 2) from digital input
- 7** outputs in direct with switching between set-point 1/differential 1 and set-point 2/differential 2 from digital input
- 8** outputs in reverse with switching between set point 1/differential 1 and set-point 2/differential 2 from digital input
- 9 channel 1 in reverse** with set-point 1 and differential 1 and channel 2 in direct with set-point 2 and differential 2
- 10** if one channel: **alarm operation**;  
if two channels: **channel 1 in reverse** (with set-point 1, differential 1 and neutral zone) and **channel 2 in alarm operation**
- 11 refrigeration mode (CANNOT BE USED)**
- 12 special mode**

### [ADD] special parameter menu

| Labels of parameters that can be modified | Description            | unit | Parameter values |      | default | notes |
|---|------------------------|------|------------------|------|---------|-------|
|   |                        |      | min              | max  |         |       |
| DPO                                       | Output 1 dependence    | -    | 0                | 10   |         | (26)  |
| TIO                                       | On/off or PWM 1 type   | -    | 0                | 1    |         | (27)  |
| DBO                                       | Neutral zone 1         | -    | 0                | 1    |         | (28)  |
| INO                                       | Entry 1                | %    | -100             | +100 |         | (29)  |
| DF0                                       | Logical differential 1 | %    | -100             | +100 |         | (30)  |
| DP1                                       | Output 2 dependence    | -    | 0                | 10   |         | (26)  |
| TI1                                       | On/off or PWM 2 type   | -    | 0                | 1    |         | (27)  |
| DB1                                       | Neutral zone 2         | -    | 0                | 1    |         | (28)  |
| IN1                                       | Entry 2                | %    | -100             | +100 |         | (29)  |
| DF1                                       | Logical differential 2 | %    | -100             | +100 |         | (30)  |

#### Notes:

(25) the parameter defines in what mode an output depends on a set-point or an alarm mode. The values take on the following meanings:

- 0** output not active
- 1** output relates to set-point 1
- 2** output relates to set-point 2

- 3** switching between output in direct (with set-point 1 and differential 1) and output in reverse (with set-point 2 and differential 2) through digital input (open-direct, closed-reverse)
- 4** switching between set-point 1/differential 1 and set-point 2/differential 2 through digital input (open-set 1, closed-set 2)
- 5** output associated with maximum alarm for set-point 2
- 6** output associated with minimum alarm for al set-point 2
- 7** output associated with maximum alarm for set-point 1
- 8** output associated with minimum alarm for al set-point 1
- 9** output associated with maximum/minimum alarm for set-point 1
- 10** output associated with maximum/minimum alarm for set-point 2
- (26) defines whether the type of regulation is ON/OFF (value 0) or PWM (value 1)
- (27) indicates whether the neutral zone is present (value 1) or not (value 0)
- (28) indicates the ON switching point of the relay with respect to the set-point defined by the "dependence" parameter: the switching point is calculated by adding a percentage "INO" (from -100% to +100%) to the set-point of the differential
- (29) indicates the OFF switching point of the relay with respect to the point where the ON switching took place. The OFF switching point is calculated by adding to the ON point a percentage "DFO" (from -100% to +100%) of the differential.

**Note: the default values of these parameters depend on the operating mode and number of channels, as set out in the table below:**

### 1 Channel

| Parameter | Operating mode |      |      |      |     |      |   |      |      |      |     |
|-----------|----------------|------|------|------|-----|------|---|------|------|------|-----|
|           | 0              | 1    | 2    | 3    | 4   | 5    | 6 | 7    | 8    | 9    | 10  |
| INO       | 100            | -100 | -100 | 50   | -50 | -100 | * | 100  | -100 | -100 | 0   |
| DFO       | -100           | 100  | 100  | -100 | 100 | 100  | * | -100 | 100  | 100  | 100 |
| IN1       | 100            | -100 | 100  | 50   | -50 | 100  | * | 100  | -100 | 100  | 0   |
| DF1       | -50            | 50   | -100 | -50  | 50  | -100 | * | -50  | 50   | -100 | 100 |

### 2 Channels

| Parameter | Operating mode |      |      |     |     |      |   |     |      |      |      |
|-----------|----------------|------|------|-----|-----|------|---|-----|------|------|------|
|           | 0              | 1    | 2    | 3   | 4   | 5    | 6 | 7   | 8    | 9    | 10   |
| INO       | 50             | -50  | -100 | 0   | 0   | -100 | * | 50  | -50  | -100 | -100 |
| DFO       | -50            | 50   | 100  | -50 | 50  | 100  | * | -50 | 50   | 100  | 100  |
| IN1       | 100            | -100 | 100  | 50  | -50 | 100  | * | 100 | -100 | 100  | 0    |
| DF1       | -50            | 50   | -100 | -50 | 50  | -100 | * | -50 | 50   | -100 | 100  |

\* The default values for mode 6 are the same as those of modes 0 or 1, depending on whether the outputs are operating in direct or reverse.

## ERROR MESSAGES

- Due to alarms or malfunctions, the display of the measurement may alternate with the display of messages describing the type of alarm. The table below describes the alarm/error messages used.

| Message | Type of error                             | Output status             |
|---------|---|---------------------------|
| ER0     | Sensor 1 disconnected or in short circuit | As parameter [SUA]        |
| ER1     | Sensor 2 disconnected or in short circuit | As parameter [SUA]        |
| ALL     | Minimum alarm                             | Depends on operating mode |
| ALH     | Maximum alarm                             | Depends on operating mode |
| ALE     | Outside input alarm                       | As parameter [SUA]        |
| OFF     | Regulation inhibited by outside input     | As parameter [SUA]        |

*Note:*

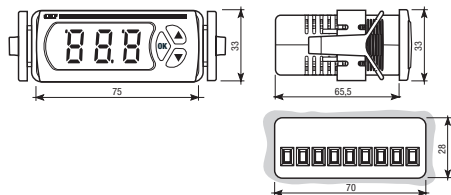
*the "OFF" message is not alternated with the measurement, but remains fixed on the display*

## REFERENCE STANDARDS

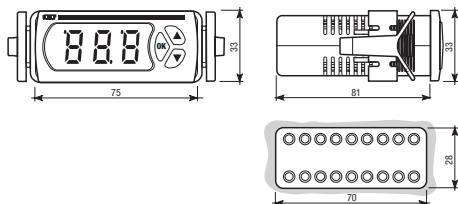
- For safety:  
**CEI-EN 60730-2-9**
  
- For electromagnetic compatibility:  
**CEI-EN 55014-1**  
**CEI-EN 55014-2**  
**CEI-EN 61000-2-2**  
**CEI-EN 61000-2-3**

## 33x75 mm REAR PANEL DIMENSIONS

**HR-1P3D  
PR-1P3D**



**HR-1P3A  
PR-1P3A  
HR-2P3D  
PR-2P3D**

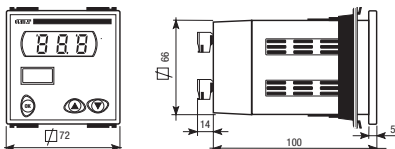


# 33x75 mm REAR PANEL DIAGRAMS

| Model                                    | Connection diagram  |
|--|---|
| <p><b>HR-1P3A</b><br/><b>PR-1P3A</b></p> | <p>Relay output<br/>8(1) A/250 V-</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>Probe input<br/>0-1 V<br/>4-20 mA<br/>0-20 mA</p> <p>Digital input</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>3 wires probe to be powered</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>Probe input<br/>4-20 mA<br/>0-20 mA</p> <p>Digital input</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>2 wires probe to be powered</p> <p>Self-powered probe</p> <p>Probe input<br/>0-1 V<br/>4-20 mA<br/>0-20 mA</p> <p>Digital input</p>   |
| <p><b>HR-1P3D</b><br/><b>PR-1P3D</b></p> | <p>Relay output<br/>8(1) A/250 V-</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>Probe input<br/>0-1 V<br/>4-20 mA<br/>0-20 mA</p> <p>Digital input</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>3 wires probe to be powered</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>Probe input<br/>4-20 mA<br/>0-20 mA</p> <p>Digital input</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>2 wires probe to be powered</p> <p>Self-powered probe</p> <p>Probe input<br/>0-1 V<br/>4-20 mA<br/>0-20 mA</p> <p>Digital input</p>   |
| <p><b>HR-2P3D</b><br/><b>PR-2P3D</b></p> | <p>Relay output 2<br/>8(1) A/250 V-</p> <p>Relay output 1<br/>8(1) A/250 V-</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>Probe input<br/>0-1 V<br/>4-20 mA<br/>0-20 mA</p> <p>Digital input</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>3 wires probe to be powered</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>Probe input<br/>4-20 mA<br/>0-20 mA</p> <p>Digital input</p> <p>Power supply output for probes<br/>9 VDC max 30 mA</p> <p>2 wires probe to be powered</p> <p>Self-powered probe</p> <p>Probe input<br/>0-1 V<br/>4-20 mA<br/>0-20 mA</p> <p>Digital input</p> |

## 72x72 mm REAR PANEL DIMENSIONS

HR-..P7A  
PR-..P7A

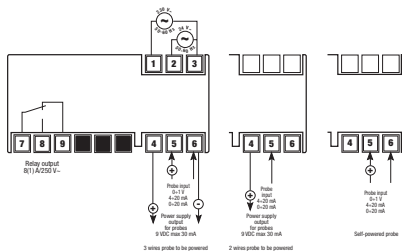


## 72x72 mm REAR PANEL DIAGRAMS

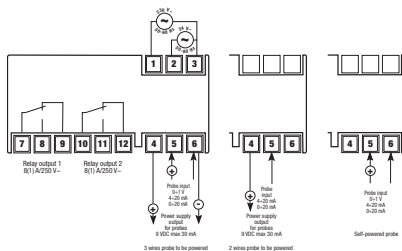
Model

Connection diagram

HR-1P7A  
PR-1P7A



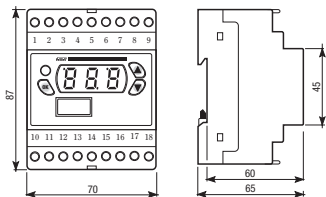
HR-2P7A  
PR-2P7A





## 4 DIN DIMENSIONS MODULARS

HR...DA  
PR...DA

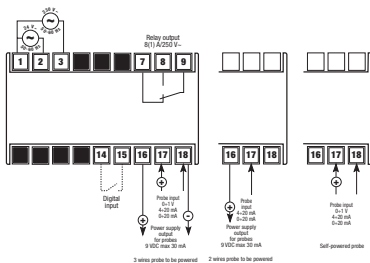


## 4 DIN DIAGRAMS MODULARS

Model

Connection diagram

HR-1DA  
PR-1DA



HR-2DA  
PR-2DA

