

200NDIN3RK

4 relay electronic regulator on din bar
to manage the cooling control unit



User and maintenance manual

ENGLISH

READ AND KEEP

Rel. Software: 6

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CHAPTER 1: INTRODUCTION

GENERAL INFORMATION

1.1

DESCRIPTION

The DIN NANO 3RK is a 4 relay electronic regulator on DIN bar for the management of the cooling control unit which allows up to a maximum of three compressors to be controlled or up to three fans of the condensing unit, based on the measured pressure

APPLICATIONS:

- Controlling the compressors of the cooling control unit.
- Controlling the condensing fans of the cooling control unit.

MAIN FEATURES:

- It can be configured to control the compressors (up to a max. of 3) or condenser fans (up to a max. of 3).
- 0-10V analogue output for the speed adjustment as an alternative to digital outputs to control the condenser fans or the compressors.
- View of the pressure transducer reading in Bar or in °C (depending on the type of selected refrigerant gas).
- Compressor/fan rotation depending on the operation timing.
- Management of the compressors that have different or equal power.
- Management of the number of outputs used.
- Adjustment in sideband.
- 3-digit LED display with sign, decimal point and system status icons.
- RS485 serial connection with Modbus-RTU or Telenet protocol.
- PEGO programming criteria that guarantees immediate start-up.
- Supply voltage 230Vac.

PRODUCT IDENTIFICATION CODES

1.2

200NDIN3RK01

4 relay electronic regulator on DIN bar to manage the cooling control unit which allows up to a maximum of three compressors to be controlled or up to three fans of the condensing unit, based on the measured pressure.

1.3

OVERALL DIMENSIONS

Dimensions in mm.



1.4

IDENTIFICATION DATA

The device described in this manual has a plate on one side bearing the identification data:

- Name of Manufacturer
- Code and model of the electrical board of the device
- Serial number
- Date of manufacture

| | |
|--|--|
|  <p>Made in ITALY</p> |  |
| <p>Description: DIN NANO 3RK</p> <p>Code: 200NDIN3RK01</p> <p>S.N. : 2010021365</p> <p>Date : 24/01/2012</p> | <p>RoHS compliant</p>  |

CHAPTER 2: INSTALLATION

GENERAL RULES FOR THE INSTALLER

2.1

1. Install the device in an area that ensures the correct degree of protection, and take all due care when drilling holes in the box for the cable glands and/or hoses;
2. Avoid using multi-pole cables with conductors connected to inductive and power conductors and signal conductors like probes and digital inputs;
3. Avoid inserting ducts and power cables with signal cables (sensors and digital inputs) in these;
4. Minimize the length of the connecting cables to prevent these from coiling up and adversely affecting the electronics through induction;
5. All the conductors of the cables must be of an appropriate size to withstand the required load;
6. When extensions are needed for the sensors, it is necessary to use conductors of a suitable size measuring no less than 1 mm². Extension or shortening of the probes may alter the factory settings; use an external thermometer, therefore, for testing and calibration.

STANDARD EQUIPMENT FOR ASSEMBLY AND USE

2.2

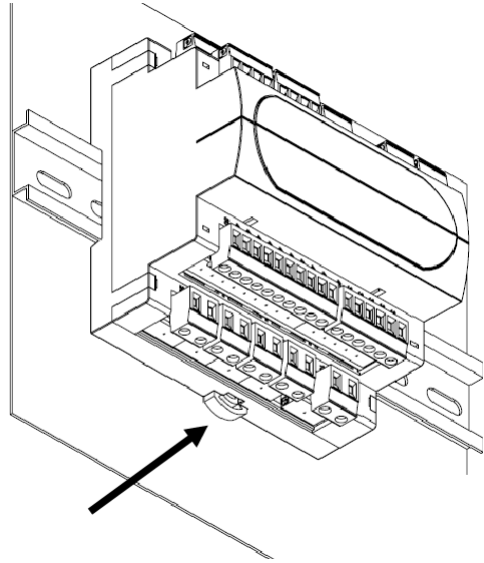
The **DIN NANO 3RK** electronic controller is provided with the following for assembly and use:

- 1 x user manual.

2.3

INSTALLATION OF BOARD

Fig. 1: Install the module on the DIN guide and close the bottom clamp to hold it in place.



Make all the electrical connections with reference to the diagrams of the relative model (see the relative tables in the ANNEXES). During the cabling process, it is advisable to keep the power conductors isolated from the signal conductors.



CHAPTER 3: TECHNICAL FEATURES

TECHNICAL FEATURES

3.1

| | | | |
|---|------------------------|------------------------------------|--------------|
| Power supply | | | |
| Voltage | | 230 V~ ± 10% 50Hz / 60Hz | |
| Max power consumption (electronic controller only) | | ~ 5 VA | |
| Climatic conditions | | | |
| Operating temperature | | -5 ÷ +50°C | |
| Storage temperature | | -10 ÷ +70°C | |
| Relative ambient humidity | | Less than 90% RH | |
| General features | | | |
| Compatible type of pressure sensor: | | pressure sensor: 4/20mA | |
| Output features | | | |
| Description | Relay installed | Features of output board | Notes |
| Compressor/Fan 1 | (Relay 16A AC1) | 16(6)A 250V~ | |
| Compressor/Fan 2 | (Relay 16A AC1) | 16(6)A 250V~ | |
| Compressor/Fan 3 | (8A AC1 relay) | 8(3)A 250V~ | |
| Alarm (voltage-free contact) | (8A AC1 relay) | 8(3)A 250V~ | |
| Dimensional features | | | |
| Dimensions | | 12.15cm x 7.1cm x 10.5cm (HxWxL) | |
| Insulation and mechanical properties | | | |
| Degree of protection of front console (remote-controlled by the power section if assembled on front of board) | | IP65 | |
| Material of boxes | | PC+ABS self-extinguishing UL94 V-0 | |
| Type of insulation | | Class II | |

CHAPTER 4: TERMS OF THE GUARANTEE

4.1

TERMS OF THE GUARANTEE

The NANO DIN electronic controls are guaranteed against all manufacturing defects for 24 months from the date in the production identification code.

In the event of defects, the device must be returned properly packaged to our Site or authorised assistance centre after requesting and receiving the authorisation number for returning the product.

The Customer has the right to repair the defective device inclusive of manual labour and spare parts. The Customer assumes sole responsibility for the expenses and the risks associated with transport. All work carried out under the terms of the guarantee does not renew or extend the duration of the guarantee.

The guarantee does not cover:

- Damage attributable to tampering, negligence, carelessness or inadequate installation of the device.
 - Installation, use or maintenance not in compliance with the rules and instructions provided with the device.
 - Repairs carried out by unauthorised personnel.
 - Damage attributable to natural causes like lightning, natural disasters, etc.
- In all the above cases, the customer pays for the cost of repair.

Request for repairs under the terms of the guarantee may be refused if the device has been modified or converted.

PEGO S.r.l. cannot assume responsibility for any loss of data or information, the cost of replacement goods or services, injury to people or animals, loss of sales or earnings, downtime, and any direct, indirect, accidental, pecuniary, collateral, punitive, special or consequential damage or loss caused in any way, within or outside the scope of the contract or due to negligence or other responsibilities associated with use or installation of the product.

The guarantee is terminated automatically in the event of poor operation attributable to tampering, collisions and inadequate installation. It is obligatory to observe all the rules in this manual and the operating conditions of the device.

PEGO S.r.l. cannot assume any responsibility for inaccuracies in this manual attributable to printing or transcription errors.

PEGO S.r.l. reserves the right to make changes to its products that it considers necessary or useful without affecting their essential characteristics.

Each new release of the manuals for PEGO's products replaces all previous releases.

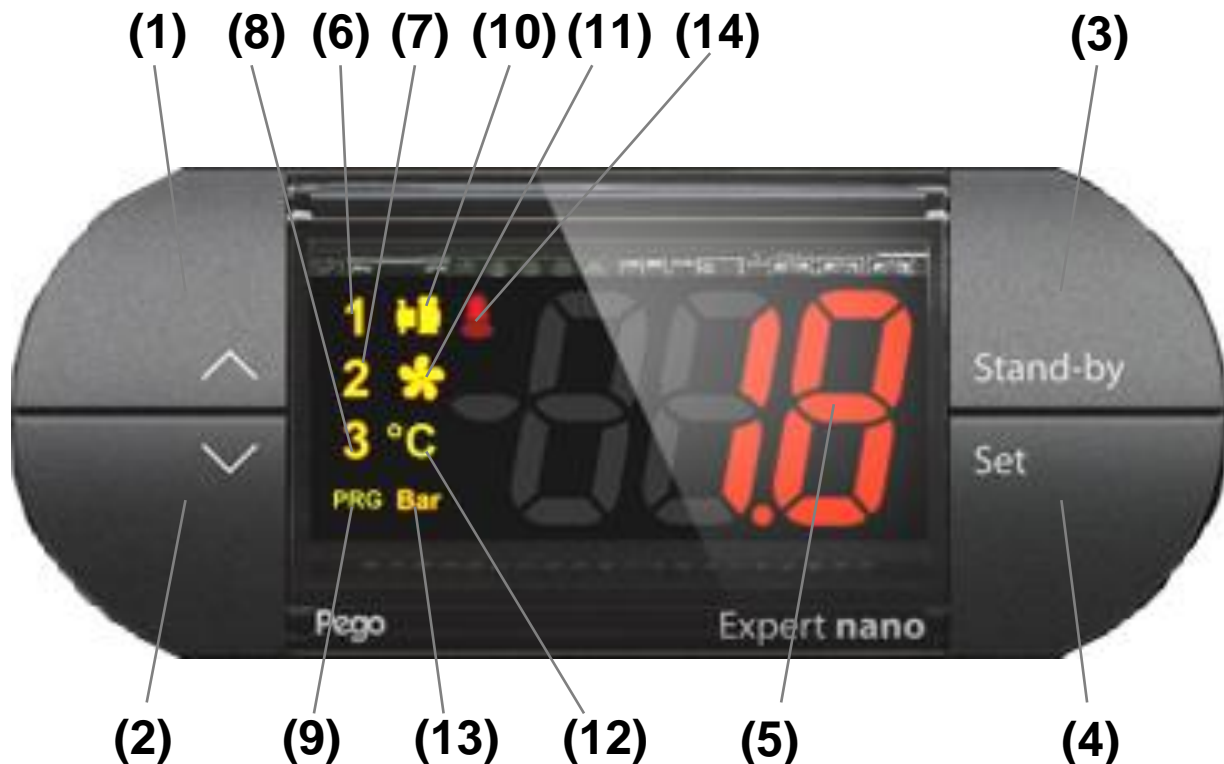
Unless specified otherwise, the guarantee is governed by the rules in force and, in particular, article 1512 of the Italian Civil Code.

All disputes are settled at the Court of Rovigo.

CHAPTER 5: DATA PROGRAMMING

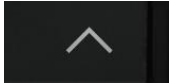

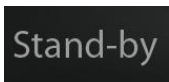

CONTROL PANEL

5.1













FRONT KEYPAD

5.2

| | | |
|-----|---|---|
| (1) |  | UP KEY Increases value / Scrolls up through parameters Acquires an alarm. If pressed for more than 5 sec. while viewing the value contained in the Hr1, Hr2 and Hr3 variables (Hour counter of the digital outputs), the information will be reset. |
| (2) |  | DOWN KEY Decreases value / Scrolls down through parameters. |
| (3) |  | STAND-BY If pressed for more than 1 sec., the Stand-by state will alternate with the normal operating status, and vice versa. In the stand-by state, the system stops and the display will change the writing OFF with the current view. If pressed, it switches the display view from °C to Bar and vice versa. |
| (4) |  | SET Shows the set point Enables configuration of the set point when pressed together with the Down or UP key. |



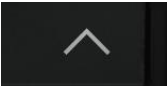

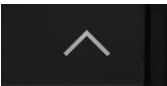




5.3

LED DISPLAY

| | | |
|------|---|--|
| (5) |  | Shows the values / parameters |
| (6) |  | "OUTPUT NO.1" ICON LED ON = Digital output No.1 ON If the control is set with 0-10V analogue output (mOd=2 or mOd=3): ON=analogue output between 0.1 and 3.3V. Flashing LED = (Only for compressor performance) Digital Output no. 1 pending the delays for the passage from on/off or off/on. |
| (7) |  | "OUTPUT NO.2" ICON LED ON = Digital output No.2 ON If the control is set with 0-10V analogue output (mOd=2 or mOd=3): ON=analogue output between 3.4 and 6.6V. Flashing LED = (Only for compressor performance) Digital Output no. 2 pending the delays for the passage from on/off or off/on. |
| (8) |  | "OUTPUT NO.3" ICON LED ON = Digital output No.3 ON If the control is set with 0-10V analogue output (mOd=2 or mOd=3): ON = analogue output > 6.6V. Flashing LED = (Only for compressor performance) Digital Output no. 3 pending the delays for the passage from on/off or off/on. |
| (9) |  | "PRG" ICON Flashing LED = Programming (or SET POINT change) |
| (10) |  | "COMPRESSOR CONTROL" ICON LED ON = Compressor control ENABLED (mOd=0 or mOd=3) |
| (11) |  | "CONDENSER FAN CONTROL" ICON LED ON = Condenser Fan Control ENABLED (mOd=1 or mOd=2) |
| (12) |  | "UNIT OF MEASURE IN DEGREES CELSIUS" ICON LED ON = Unit of measure in degrees Celsius of the viewed value. |
| (13) |  | "UNIT OF MEASUREMENT IN BAR" ICON LED ON = Unit of measure in Bar of the viewed value. |
| (14) |  | ALARM IN PROGRESS ICON LED OFF = No alarm triggered LED ON = Alarm triggered and then cancelled Blinking LED = Alarm in progress |

COMBINATION OF KEYS

5.4

| | |
|--|--|
|  +  | <p>LEVEL 1 PROGRAMMING Pressing both keys together for more than 3 seconds enables access to the Level 1 programming menu.</p> <p>EXIT PROGRAMMING Pressing both keys together for more than 3 seconds in any programming menu exits the menu concerned.</p> |
|  +  + Stand-by | <p>LEVEL 2 PROGRAMMING Pressing all keys together for more than 3 seconds enables access to the Level 2 programming menu. To exit the menu, press the up and down arrow keys together.</p> |
|  + Stand-by | <p>LEVEL 3 PROGRAMMING Pressing both keys together for more than 3 seconds enables access to the Level 3 programming menu. To exit the menu, press the up and down arrow keys together.</p> |
|  pressed +  | <p>SWITCHING FROM Bar to °C WHILE VIEWING THE VALUE OF THE FOLLOWING VARIABLES IN Bar (therefore, with SET pressed). The variables involved with this kind of view are: SET POINT, r0, LSE, HSE. When displaying the value contained in one of the variables listed above, pressing the stand-by key switches the view from Bar to °C according to the table of the gas type selected until the keys are released.</p> |
|  +  | <p>OUTPUT HOUR COUNTER RESET While viewing the working time of an output within the read-only Hr1, Hr2 or Hr3 parameters while pressing the SET key and pressing the "Up arrow" for at least 5 sec., the hour counter will be reset.</p> |

5.5

VIEWING AND CONFIGURATION OF SET POINT

1. Press the SET key to view the current Bar SET POINT value.
 2. Pressing and holding the SET key and pressing one of the keys (▲) or (▼) alters the value of the Bar SETPOINT.
- Release the SET key to return to the value of the adjustment sensor. Any changes made are saved automatically.

While viewing the SET POINT value in Bar (SET button pressed), if you press the standby key at the same time, you will view the value changed to °C depending on the type of Gas set.

While viewing the value in °C, it will not be possible to change the set through the arrows.

5.6

LEVEL 1 PROGRAMMING (User level)

To access Level 2 programming, press and hold the UP key (▲) and DOWN key (▼) for over 3 seconds. When the first programming variable appears:

1. Select the variable you want to change with the key (▲) or with the key (▼). After selecting the required variable, it is possible to:
2. View its configuration by pressing the SET key.
3. Edit configuration by pressing and holding the SET key and pressing either the (▲) or (▼) key.
4. After setting the configuration values, press and hold both the (▲) key and the (▼) key for a few seconds until the cell temperature value appears and exit the menu. The system closes the menu when the keypad is not used for over 30 seconds.
5. Any changes made to the variables are saved automatically when the system closes the configuration menu.

5.7

LIST OF LEVEL 1 VARIABLES (User Level)

| LABEL | MEANING | VALUES | DEFAULT | default mOd |
|-------|---|---|------------------------------|-------------|
| r0 | SET differential (of the pressure) (interlocked with iOV but only if mOd=2) | with mOd=0 (comp. control) 0.2 ÷ 30 bar | (with mOd=0 or 3) 0.6 | * |
| | | with mOd=1 or 2 (fan control) 0.6 ÷ 5 bar | (with mOd=1 or 2) 2 | |
| t1 | The minimum time that must elapse between the insertion of a compressor step and the next one (SECONDS) This time avoids breakaways caused by simultaneous start-ups. | 0 ÷ 500 step 2 sec | (with mOd=0 or 3) 20 | * |
| | | | (with mOd=1 or 2) 2 | |
| t2 | The minimum time that must elapse between two different compressor step deactivations. (SECONDS) | 0 ÷ 500 step 2 sec | (with mOd=0 or 3) 10 | * |
| | | | (with mOd=1 or 2) 2 | |

| | | | | |
|------------|--|---|---|----------|
| t3 | The minimum time that must elapse between two successive insertions of the same compressor step. (SECONDS) | 0 ÷ 500 step 2 sec | (with mOd=0 or 3) 320 (with mOd=1 or 2) 10 | * |
| t4 | The minimum time that must elapse between one shutdown and the next insertion of the same compressor step. (SECONDS) | 0 ÷ 500 step 2 sec | 0 | |
| Fty | Type of refrigerant GAS in use. The setting of this parameter is essential for correct operation. | 0 = 404 4 = 410 1 = 134 5 = 507 2 = R22 6 = CO2 3 = 407 | 1 | |
| UM | View unit of measurement | 0 = bar 1 = °C | 0 | |
| Hr1 | Digital output 1 hour counter (resettable)** | 0 ÷ 999 tens of hours | read-only | |
| Hr2 | Digital output 2 hour counter (resettable)** | 0 ÷ 999 tens of hours | read-only | |
| Hr3 | Digital output 3 hour counter (resettable)** | 0 ÷ 999 tens of hours | read-only | |
| AO1 | Display of the 0-10V analogue output for condenser fans | 0.0 – 10.0V (with mOd = 0 or 1 will be displayed - - -) | read-only | |
| ALL | View of the last alarm triggered | alarm code | read-only | |
| A1 | Minimum pressure alarm The absolute pressure referring to the ambient probe below which, once the Aid delay time is activated, the LOW pressure alarm is triggered showing EL alternating with the pressure on the display and the flashing of the alarm icon. When the alarm turns off, the "alarm presence" icon will remain lit to indicate which operation has occurred until the UP button is pressed. (This parameter has meaning only if mOd=0.) | -0.6 ÷ (A2-02) Bar, step 0.2 Bar | -0.6 Bar | |
| A2 | Maximum pressure alarm The absolute temperature referring to the ambient probe above which, once the Aid delay time is activated, the HIGH pressure alarm is triggered showing EH alternating with the pressure on the display and the flashing of the alarm icon. When the alarm turns off, the "alarm presence" icon will remain lit to indicate which operation has occurred until the UP button is pressed. (This parameter has meaning only if mOd=0.) | (A1+0.2) ÷ +30.0 Bar, step 0.2 Bar | +30.0 Bar | |

Note (**):

Resetting the output working time is carried out by viewing the content of the desired hour meter (Hr1, Hr2, etc.) using the SET key and pressing the "Up arrow" of acquisition for at least 5 sec.

5.8

LEVEL 2 PROGRAMMING (Installer level)

To access Level 2 programming, press and hold the UP key (▲), DOWN key (▼) and STAND-BY key for over 3 seconds.

When the first programming variable appears:

1. Select the variable you want to change with the key (▲) or with the key (▼). After selecting the required variable, it is possible to:
2. View its configuration by pressing the SET key.
3. Edit configuration by pressing and holding the SET key and pressing either the (▲) or (▼) key.
4. After setting the configuration values, press and hold both the (▲) key and the (▼) key for a few seconds until the cell temperature value appears and exit the menu.
5. Any changes made to the variables are saved automatically when the system closes the configuration menu.

5.9

LIST OF LEVEL 2 VARIABLES (Installer Level)

| LABEL | MEANING | VALUES | DEFAULT | default mOd |
|-------|--|--|---------|-------------|
| NO | Digital outputs number selection to control. | 1...3 | 3 | |
| Seq. | Logical selection of the digital outputs activation | 0 = With rotation 1 = Without rotation | 1 | |
| Man | Max. number (hours x 10) of operating hours for a compressor after which, a request for maintenance will be signalled (if = 0, the request for maintenance will not be signalled) | 0...510 step 2 | 0 | |
| In1 | Settings of no.1 Digital input | 8 = General low pressure alarm (with DI=1) 7 = General high pressure alarm (with DI=1) 6 = Freon level alarm (with DI=1) 5 = Central alarm in manual mode (with DI=1) 4 = Read-only Alarm (with DI=1) 3 = Output No.3 Alarm (with DI=1) 2 = Output No.2 Alarm (with DI=1) 1 = Output No.1 Alarm (with DI=1) 0 = Disabled -1 = Output No.1 Alarm (with DI=0) -2 = Output No.2 Alarm (with DI=0) -3 = Output No.3 Alarm (with DI=0) -4 = Read-only Alarm (with DI=0) -5 = Central alarm in manual mode (with DI=0) -6 = Freon level alarm (with DI=0) -7 = General high pressure alarm (with DI=0) -8 = General low pressure alarm (with DI=0) | 1 | |

| | | | | |
|-----|---|--|---|---|
| In2 | Settings of no.2 Digital input | 8 = General low pressure alarm (with DI=1) 7 = General high pressure alarm (with DI=1) 6 = Freon level alarm (with DI=1) 5 = Central alarm in manual mode (with DI=1) 4 = Read-only Alarm (with DI=1) 3 = Output No.3 Alarm (with DI=1) 2 = Output No.2 Alarm (with DI=1) 1 = Output No.1 Alarm (with DI=1) 0 = Disabled -1 = Output No.1 Alarm (with DI=0) -2 = Output No.2 Alarm (with DI=0) -3 = Output No.3 Alarm (with DI=0) -4 = Read-only Alarm (with DI=0) -5 = Central alarm in manual mode (with DI=0) -6 = Freon level alarm (with DI=0) -7 = General high pressure alarm (with DI=0) -8 = General low pressure alarm (with DI=0) | 2 | |
| In3 | Settings of no.3 Digital input | 8 = General low pressure alarm (with DI=1) 7 = General high pressure alarm (with DI=1) 6 = Freon level alarm (with DI=1) 5 = Central alarm in manual mode (with DI=1) 4 = Read-only Alarm (with DI=1) 3 = Output No.3 Alarm (with DI=1) 2 = Output No.2 Alarm (with DI=1) 1 = Output No.1 Alarm (with DI=1) 0 = Disabled -1 = Output No.1 Alarm (with DI=0) -2 = Output No.2 Alarm (with DI=0) -3 = Output No.3 Alarm (with DI=0) -4 = Read-only Alarm (with DI=0) -5 = Central alarm in manual mode (with DI=0) -6 = Freon level alarm (with DI=0) -7 = General high pressure alarm (with DI=0) -8 = General low pressure alarm (with DI=0) | 3 | |
| DO5 | General alarm output settings | 1 = DO5 relay enabled in presence of alarm 0 = DO5 relay disabled -1 = DO5 relay disabled in presence of alarm | 1 | |
| EP4 | Pressure (bar) equal to 4mA. Referring to the adjustment sensor. | -1.0...EP2-0,1 | (with mOd=0) 0.0 (with mOd=1 or 2) 0.0 | * |
| EP2 | Pressure (bar) equal to 20mA. Referring to the adjustment sensor. | EP4+0,1...50.0 | (with mOd=0) 12.0 (with mOd=1 or 2) 30.0 | * |

| | | | | |
|------------|--|-----------------------------------|---------------------------|---|
| NiP | Time (hours) in which the activation of the manual central alarm is triggered 5 times. At the 5th activation, it remains in alarm. | 0 ÷ 240 hours | 6 hours | |
| rLo | Time (min.) with which the freon/oil pre-alarm becomes alarm. Once this time has passed, all outputs are disabled. | 0 ÷ 240 min | 30 min | |
| iOv | Offset Inverter fans (of the pressure) Value always less than the (r0) value | 0.5 ÷ 2.5 bar Always < r0 | 0.5 | |
| iMv | Inverter fans: minimum 0-10V output value setting | 0 ÷ 100 % | 30 % | |
| BOv | Boost fans: Time for which the 0-10V output of the fans is pushed to 100%. This is used to win the breakaway at their start. (SECONDS) | 0 ÷ 240 sec | 2 sec | |
| LSE | Minimum value that can be attributed to set point | with mOd=0 -0.6...HSE-0.2 | (with mOd=0) 0.2 | * |
| | | with mOd=1 or 2 0.0...HSE-0.2 | (with mOd=1 or 2) 10.0 | |
| HSE | Maximum value that can be attributed to set point | with mOd=0 LSE+0.2...10.0 | (with mOd=0) 5.0 | * |
| | | with mOd=1 or 2 LSE+0.2...30.0 | (with mOd=1 or 2) 25.0 | |
| AId | Minimum or maximum pressure alarm signalling and display delay time. (This parameter has meaning only if mOd=0.) | 0...240 min | 120 min | |
| CAL | Adjustment sensor calibration | -10.0...+10.0 step 0.1 bar | 0.0 | |

| | | | | |
|------------|--|--|-----------|--|
| Ad | Network address for connection to the TeleNET or Modbus supervision system | 0 to 31 (with SEr=0) 1 to 247 (with SEr=1) | 1 | |
| SEr | RS-485 communication protocol | 0= TeleNET protocol (NOT PRESENT IN THE rel. 0 and 1) 1 = Modbus-RTU protocol | 0 | |
| Bdr | Modbus baudrate. | 0 = 300 baud 1 = 600 baud 2 = 1200 baud 3 = 2400 baud 4 = 4800 baud 5 = 9600 baud 6 = 14400 baud 7 = 19200 baud 8 = 38400 baud | 5 | |
| Prt | Modbus parity checking. | 0 = no parity bit 1 = even parity bit 2 = odd parity bit | 0 | |
| P1 | Password: type of protection (Active when PA is not 0) | 0 = shows only the set point and permits deactivation of the alarms. 1 = disables access to level 1, 2 and 3 programming (access permitted to all other functions). 2 = disables access to level 2 and 3 programming (access permitted to all other functions). 3 = disables access to level 3 programming (access permitted to all other functions). | 3 | |
| PA | Password (see P1 for the type of protection) | 0...999 0 = function disabled | 0 | |
| dEF | Reserved parameter | | read-only | |
| reL | Software release | | read-only | |

5.10

LEVEL 3 PROGRAMMING (Installer level)

To access Level 3 programming, press and hold the UP key (▲) and STAND-BY key for over 3 seconds. When the first programming variable appears:

1. Select the variable you want to change with the key (▲) or with the key (▼). After selecting the required variable, it is possible to:
2. View its configuration by pressing the SET key.
3. Edit configuration by pressing and holding the SET key and pressing either the (▲) or (▼) key.
4. After setting the configuration values, press and hold both the (▲) key and the (▼) key for a few seconds until the cell temperature value appears and exit the menu.
5. Any changes made to the variables are saved automatically when the system closes the configuration menu.

5.11

LIST OF LEVEL 3 VARIABLES (Installer Level)

| LABEL | MEANING | VALUES | DEFAULT | default mOd |
|-------|---|--------|---------|----------------|
| mOd | <p>Operating mode selection:</p> <p>0=Compressor control with digital outputs (sideband)</p> <p>1= Condenser fan control with digital outputs (sideband)</p> <p>2= Condenser fan control with 0-10V analogue output (sideband)</p> <p>2= Compressor control with 0-10V analogue output (sideband)</p> <p>PLEASE NOTE: the mOd Exchange involves loading default settings dedicated on the variables marked with an asterisk in the "default mOd" column</p> | 0...3 | 0 | |

5.12

ACTIVATION SEQUENCE AND DELAYS

The activation logic of the digital outputs is selected by the **Seq** parameter.

With **Seq=1**, the activation of digital outputs always follows the 1, 2, 3 sequence and the 3, 2, 1 disabling one complying with the t1, t2, t3 and t4 times. If an output is not available because it is alarm, it will be temporarily excluded from the sequence.

With **Seq=0** the activation/deactivation of the digital outputs is operation time-based, and in particular:

- The output that has the least number of operating hours in times t1, t2, t3 and t4, and that is available at that time (therefore not in alarm).
- The output that has the largest number of operating hours in times t1, t2, t3 and t4 is deactivated.

“**t1**” determines the minimum time that must elapse between the insertion of a step and the next one. This parameter avoids breakaways caused by simultaneous start-ups.

“**t2**” determines the minimum time that must elapse between the deactivation of two different steps.

“**t3**” determines the minimum time that must elapse between two subsequent insertions of the same step. This parameter allows you to limit the number of start-ups per hour if the controlled motors require this.

“**t4**” determines the minimum time that must elapse between one shutdown and the next insertion of the same compressor step.

On the LED display, icons 6, 7, and 8 will flash when its output is pending ON or OFF due to these times.

OPERATING MODE

5.13

The mOd variable allows the operating mode of the controller to be selected.

PLEASE NOTE: the change of the mOd involves the loading of the default settings dedicated on variables marked with an asterisk in the "default mOd" column and is therefore the first variable that must be set at the first start-up.

With **mOd=0** you have the Compressor management with digital outputs and sideband type adjustment.

The LED icon (10) turns on to identify the compressors control.

The adjustment pressure sensor (terminals 23 /24) is connected to the inlet pressure sensor.

Based on the value of the "SP" (set point), "r0" and "NO" parameters, the control calculates the various points of insertion and deactivation of the compressor outputs (steps) by placing the various start-ups and switching off within the r0 differential range. Each step has an r0/NO differential (where NO is the total number of compressors).

The combination of the outlets to the steps depends on the setting of the Seq. variable.

For example, considering $seq = 1$ and $mOd = 0$, for Output No. 2, insertion will take place at $SP+(r0/NO)*2$ (the constant 2 indicates step 2) and deactivation will take place at $SP+(r0/NO)*1$ (See graph 1).

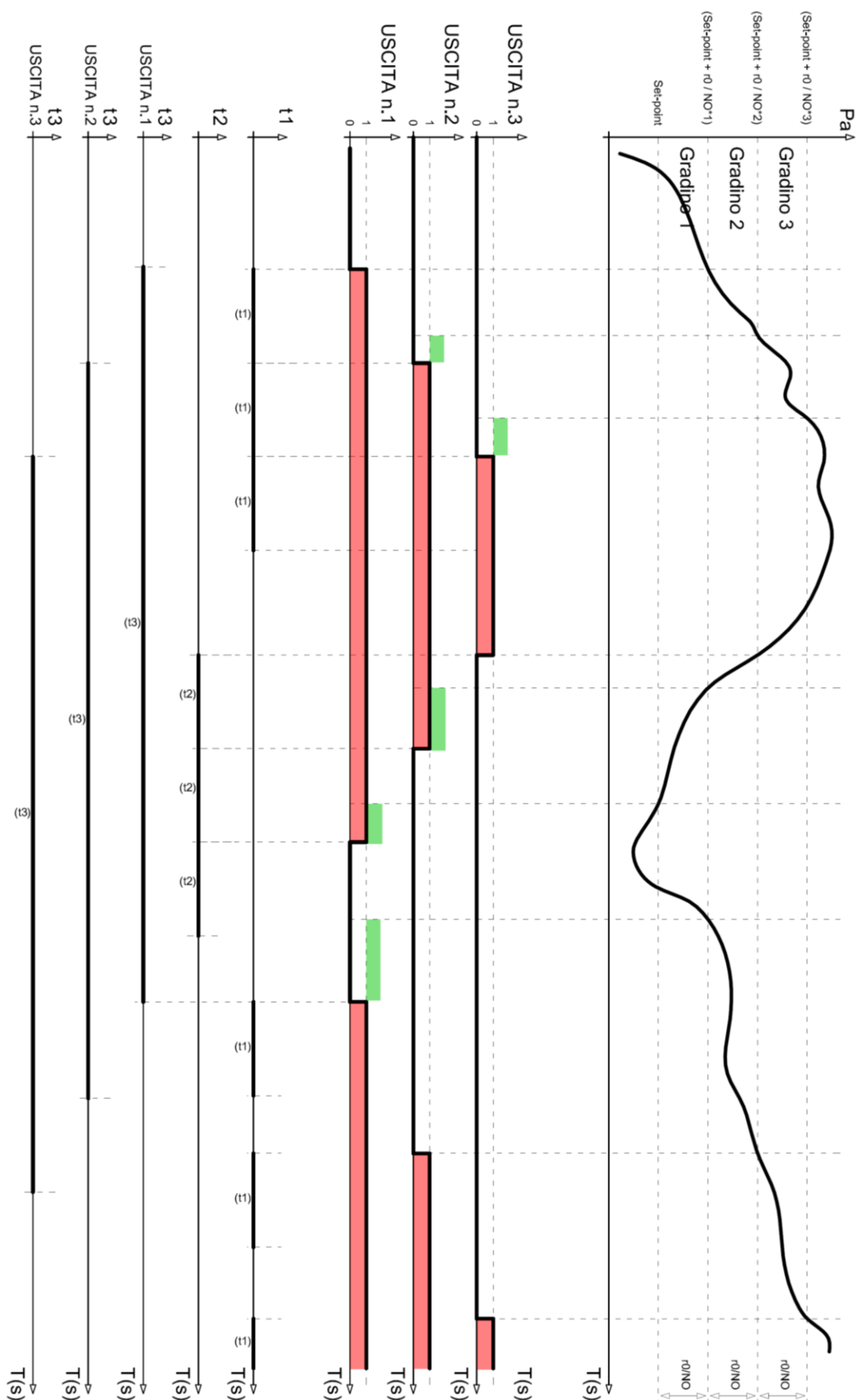
The number of compressors inserted depends on the deviation between the value measured by the adjustment pressure sensor (positioned at vacuum) and the set vacuum Set Point.

CONTROL IN THE EVENT OF ALARMS

With the presence of alarms (alarm outputs 1, 2 and 3 alarm inputs enabled), operation is maintained equal but the output relating to the alarm in the sequence and the relative alarm is shown on the display (EC1, EC2 or EC3).

Graph No.1

Example with $mOd=0$, $sEq=1$, $NO=3$ and the intervention of times $t1$, $t2$ and $t3$.



With **mOd=1** you will have the Condenser fan control with digital outputs and of sideband-type adjustment. The LED icon (11) turns on to identify the fan condenser control. The adjustment pressure sensor (terminals 23 /24) is connected to the output probe sensor.

The adjustment follows the operation of graph no.2 and, in particular, according to the values of the "SP" (Set Point), "r0" and "NO" parameters, the control calculates the various points of insertion and deactivation of the fan outputs by positioning various start-ups and switching off within the differential range. Each step has an r0/NO differential range.

Sequence output insertion with increasing output pressure:

The first step is inserted with: Output pressure > ("Set point"+ r0/NO)

The second step is inserted with: Output pressure > ("Set point"+ r0/NO+ r0/NO)

The third step is inserted with: Output pressure > ("Set point"+r0/NO+r0/NO+r0/NO)

Sequence of output deactivation with decreasing output pressure:

The third step is deactivated with: Output pressure < ("Set point"+ r0/NO+ r0/NO)

The second step is deactivated with: Output pressure < ("Set point"+ r0/NO)

The first step is deactivated with: Output pressure < "Set point"

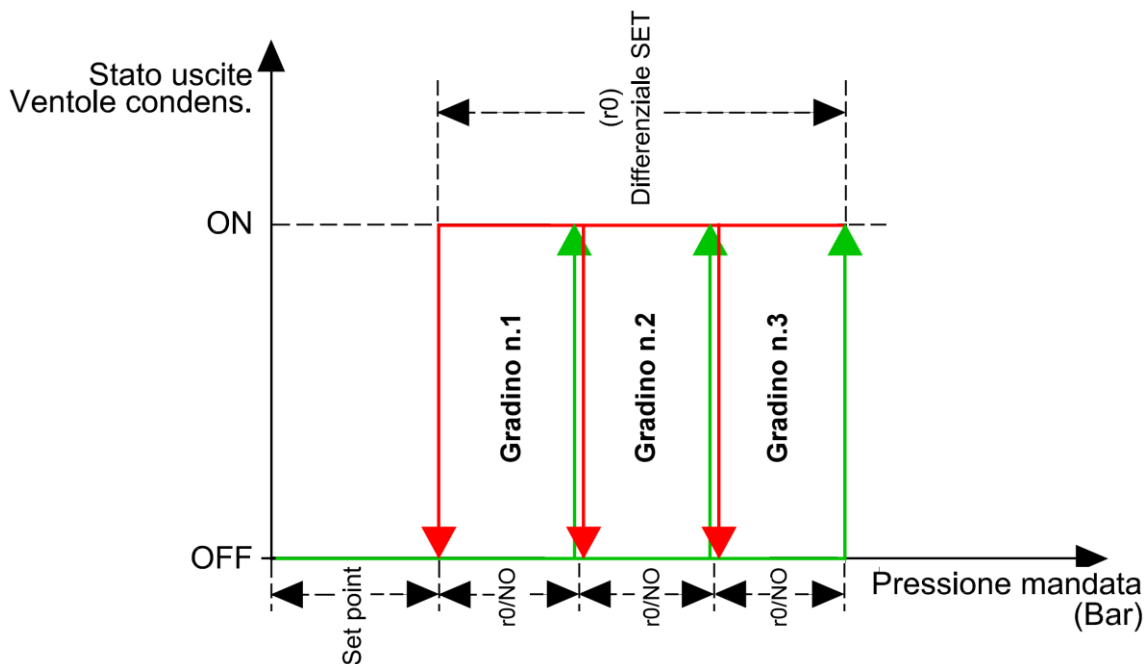
The combination of the outlets to the steps depends on the setting of the Seq. variable.

CONTROL IN THE EVENT OF ALARMS

With the presence of alarms (alarm outputs 1, 2 and 3 alarm inputs enabled), operation is maintained equal but the output relating to the alarm in the sequence and the relative alarm is shown on the display (EV1, EV2 or EV3).

Key

| | |
|-----------------------|--|
| Condenser fans status | Fan output status (on / off) |
| Output pressure | Output pressure (Bar) for the activation of the condenser fans |
| Set point | SET POINT (Bar) value set by the operator to activate the condenser fans. |
| r0 | Fans SET differential. (First level parameter) |
| Step no. 1,2,3 | Insertion steps that are combined with the outputs according to the Seq variable |
| NO | No. of control condenser fan outputs (Second level parameter) |



With **mOd=2** you will have the Condenser fan control with 0-10V analogue output and of sideband-type adjustment.

The LED icon (11) turns on to identify the fan condenser control.

The adjustment pressure sensor (terminals 23 /24) is connected to the output probe sensor.

With **mOd=2**, the NO and Seq variables are not used and digital outputs 2 and 3 are deactivated.

The adjustment follows the operation of graph no.3 with the increase of the output pressure and the decrease of graph no.4.

Output pressure INCREASE (Graph no.3):

The analogue output of the adjuster will be 0V for output pressure probe less or equal to point (B) representing the "SET point + iOv offset" value.

If the output pressure probe value is higher than point (B), you will have the analogue output at 10V for the maximum BOv time. BOv is the Fans Boost times for which the adjuster output is increased by 100% in order to help the start-up of the fans.

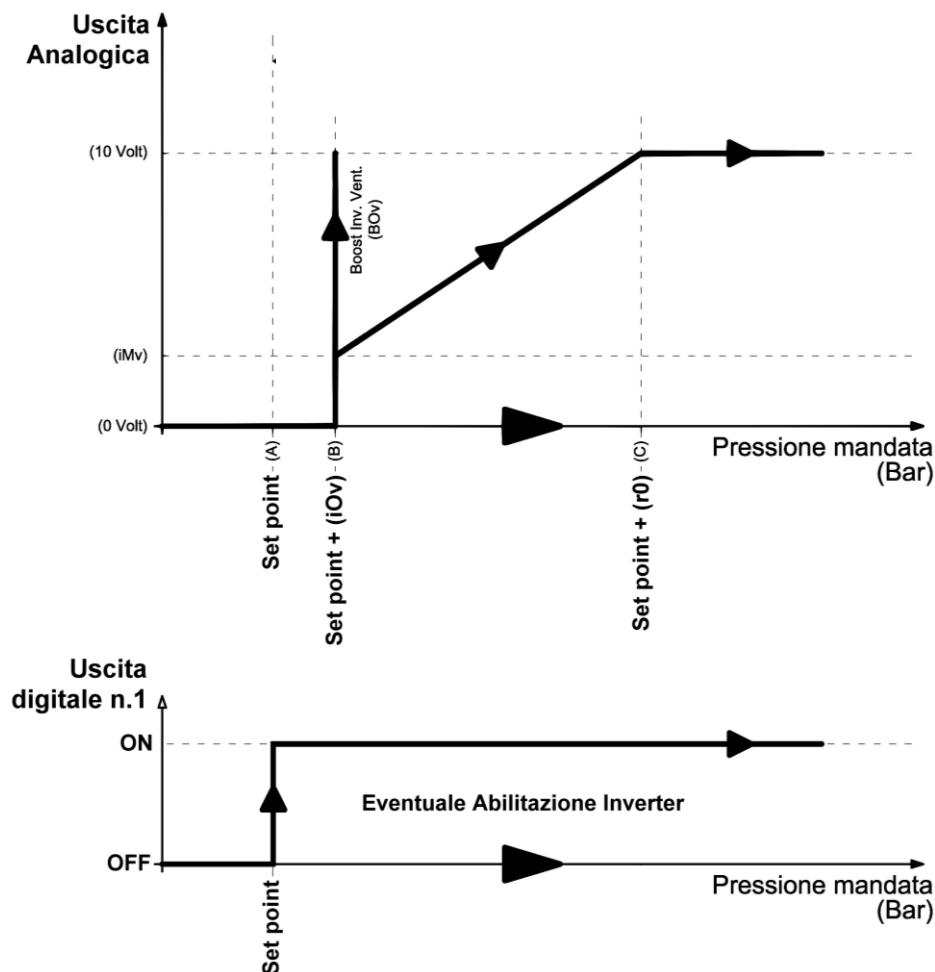
Between points (B) and (C), the analogue output will have a value proportional to the value of the output pressure probe starting from the minimum value of the parameter (iMv) up to the maximum value of 10V.

With output pressure probe values equal or higher than point (C), you will have a 10V analogue output.

Digital output no.1 represents "the condenser fans inverter activation" and is ON for pressure values higher than or equal to the set point and OFF for lower values.

Graph no.3

Pressione mandata in AUMENTO



Output pressure DECREASING (Graph no.4):

With output pressure probe values equal or higher than point (D), you will have a 10V analogue output.

Between points (D) and (E), the analogue output will have a value proportional to the value of the output pressure probe starting from the maximum value of 10V up to the minimum value of the (iMv) parameter.

With values of the output pressure probe lower than point (E) and higher than point (F), you will have an analogue output equal to the minimum value of the (iMv) parameter.

The analogue output of the adjuster will be 0V for output pressure probe less or equal to point (F) representing the "SET point" value.

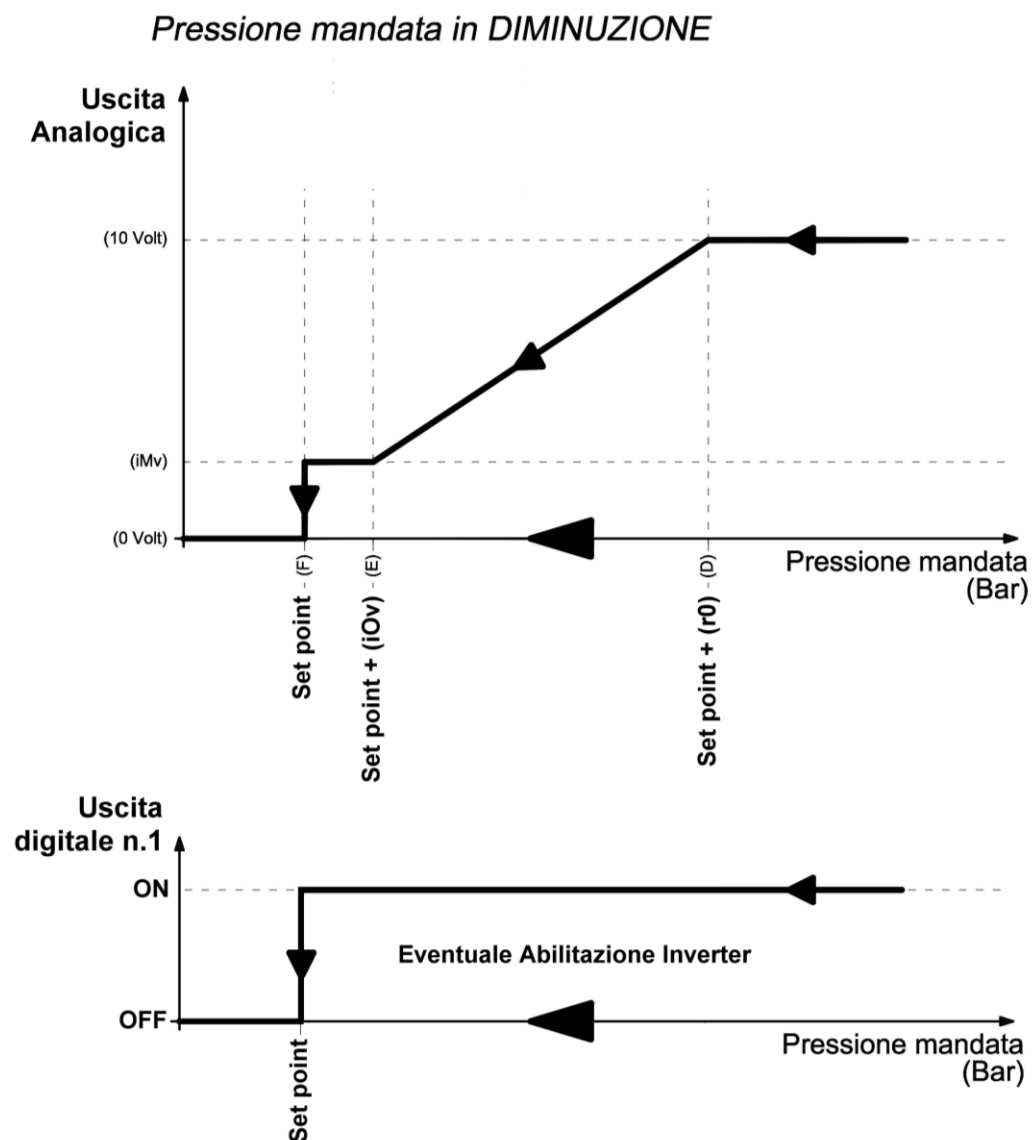
Digital output no.1 represents "the condenser fans inverter activation" and is ON for pressure values higher than or equal to the set point and OFF for lower values.

CONTROL IN THE EVENT OF ALARMS

With the output no.1 alarm input activated, the analogue input will be immediately brought to 0V and the digital output no.1 will be opened after (inverter-enabling is removed).

The relative alarm (EV1) will also be shown on the display.

Graph no.4



With **mOd=3** you will have the Compressor control with 0-10V analogue output and of sideband-type adjustment.

The LED icon (10) turns on to identify the fan condenser control.

For operation details, see the description on the previous mod=2.

5.14**PASSWORD FUNCTION**

The password function is enabled by setting a value other than 0 in the PA parameter. See parameter P1 for the various levels of protection.

Protection is enabled automatically when the keypad is not used for 30 seconds.

The digits 000 appear on the display. Use the up/down arrow keys to edit the number and press the SET key to confirm.

The 000 password window disappears if the keypad is not used for 30 seconds.

If you forget the password, use the universal number 100.

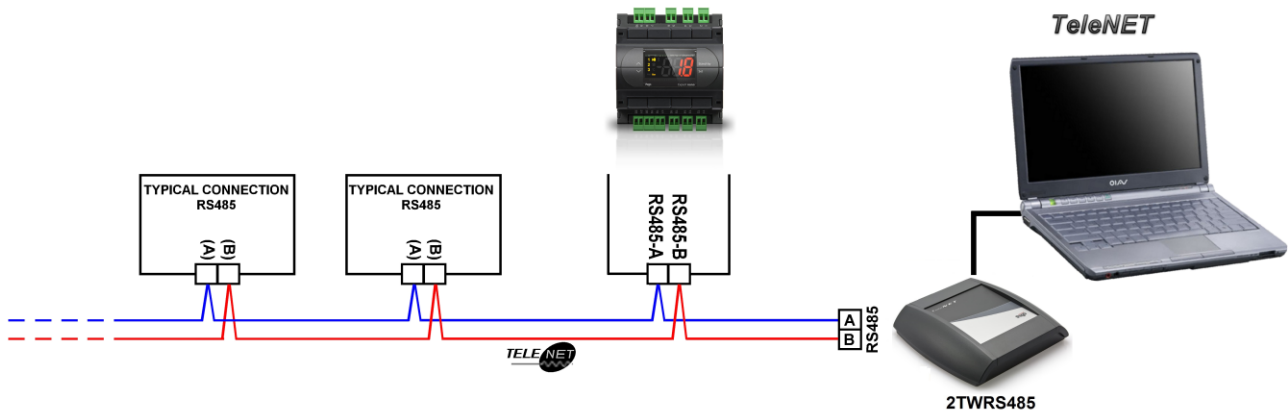
CHAPTER 6: OPTIONS

TELENET MONITORING/SUPERVISION SYSTEM

6.1

In order to connect the board to the **TeleNET** network, follow the diagram below. Configure the instrument with reference to the **TeleNET** manual.

IMPORTANT: During configuration of the "Module", select "DIN NANO 3RK instrument".

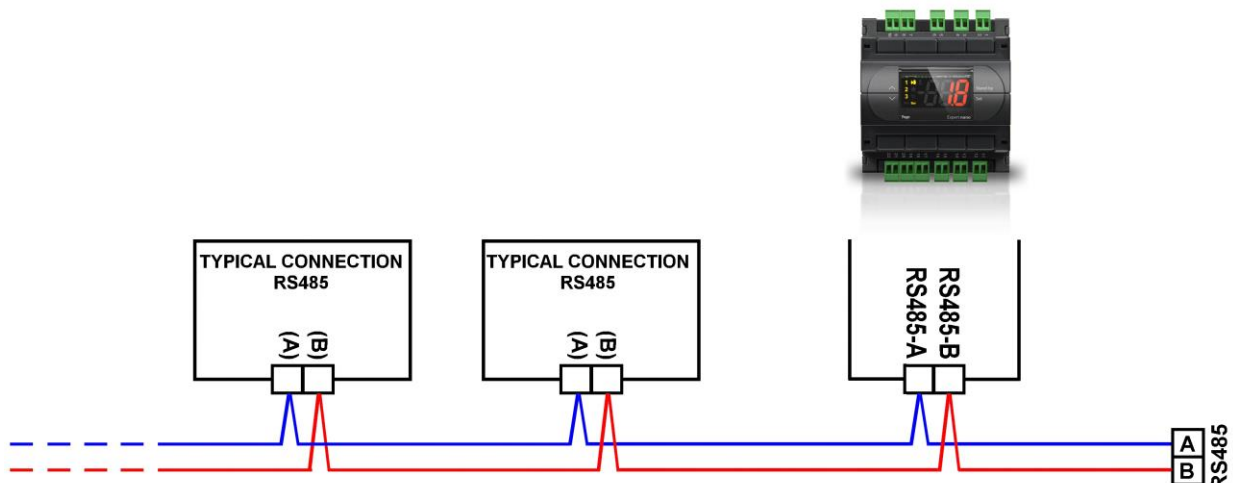


CONFIGURATION OF NETWORK WITH MODBUS-RTU PROTOCOL

6.2

Connect the board to a RS485 network with **Modbus-RTU** protocol with reference to the diagram below.

Refer to the MODBUS-RTU_DIN_NANO_3RK manual (available on our website) for the specifications of the MODBUS-RTU communication protocol.



CHAPTER 7: DIAGNOSTICS

7.1

DIAGNOSTICS

The controller **DIN NANO 3RK**, in the case of any anomalies, will warn the operator through alarm codes shown on the display.

The code of the last alarm triggered will be stored and can be displayed as only-read within the first level ALL variable. The view of this variable at the first commissioning (with empty memory) will display ---.

One of the following messages appears on the screen when an alarm condition occurs:

| CODE | POSSIBLE CAUSE / DESCRIPTION | ACTION TO BE TAKEN | RESET |
|--|--|--|------------------------------|
| E0 | Operation anomalies of the adjustment pressure probe (terminals 23-24) (The outputs are all disabled apart from the alarm outputs) | <ul style="list-style-type: none"> Check the probe status. | automatic |
| E3 | EEPROM ALARM An error was found in the EEPROM memory. (The outputs are all disabled apart from the alarm outputs) | <ul style="list-style-type: none"> Switch the appliance off and back on If the problem persists, replace the Control Circuit Board | manual Requires shut-down |
| E5 | One or more compressors have reached a number of operating hours beyond which maintenance is required. This alarm does not change the status of the outputs. | Perform maintenance and reset the hour meter of its compressors | manual |
| E7 | Central pre-alarm in manual mode. This alarm does not change the status of the outputs. | <ul style="list-style-type: none"> Check the configuration of the parameters. Check the status of the inlet of the "central alarm in manual mode". | automatic |
| E8 | Central alarm in manual mode. It is triggered after 5 interventions in the (Nip) time of its digital input ("central alarm in manual mode"). (The outputs are all disabled apart from the alarm outputs) | <ul style="list-style-type: none"> Check the configuration of the parameters. Check the status of the inlet of the "central alarm in manual mode". | manual |
| EC1 EC2 EC3 | Alarm controlled with mOd=0 or 3 Protection of one or more compressor outputs (e.g. Thermal protection or max. pressure switch.) (The output of the relative COMPRESSOR is deactivated) | <ul style="list-style-type: none"> Check the status of the compressor(s). Check the absorption of the compressor(s). Check the status of the "outlet no.# alarm" inlet. | automatic |
| Ev1 Ev2 Ev3 | Alarm controlled with mOd=1 or 2 Protection of one or more condenser fans (e.g. Thermal protection or max. pressure switch.) (The output of the relative FAN is deactivated) | <ul style="list-style-type: none"> Check the status of the compressor(s). Check the absorption of the compressor(s). Check the status of the "outlet no.# alarm" inlet. | automatic |
| EC | Alarm controlled with mOd=0. Display of the alarm in read-only of one or more compressor outputs (no output is deactivated) | <ul style="list-style-type: none"> Check the status of the compressor(s). Check the absorption of the compressor(s). Check the status of the "only-read alarm". | automatic |
| Ev | Alarm controlled with mOd=1. Display of the alarm in read-only of one or more fan outputs (no output is deactivated) | <ul style="list-style-type: none"> Check the status of the fans Check the absorption of the fans Check the status of the "only-read alarm". | automatic |

| | | | |
|-----------|---|---|-----------|
| EF | <p>Freon/oil level alarm This alarm indicates that the "freon level alarm" remained high for a time longer than "rLo"</p> <p>This alarm deactivates the compressor outputs.</p> | <ul style="list-style-type: none"> Check the device connected to the System that signalled the alarm condition Check the status of the "freon/oil level alarm" inlet. | automatic |
| EP | <p>Freon/oil level pre-alarm This alarm indicates that the "freon level alarm" remained high for a time lower than "rLo"</p> <p>This alarm does not change the status of the outputs.</p> | <ul style="list-style-type: none"> Check the device connected to the System that signalled the alarm condition Check the status of the "freon/oil level alarm" inlet. | automatic |
| EH | <p>Alarm controlled with mOd=0 or 3. General high pressure switch protection (compressor control outputs are deactivated)</p> | <ul style="list-style-type: none"> Check the refrigerant circuit If the problem persists contact the technical assistance service | automatic |
| EL | <p>Alarm controlled with mOd=0 or 3. General low pressure switch protection (all compressor control outputs are deactivated)</p> | <ul style="list-style-type: none"> Check the refrigerant circuit If the problem persists contact the technical assistance service | automatic |

ANNEXES**A.1****EC DECLARATION OF CONFORMITY****COSTRUTTORE / MANUFACTURER:**

PEGO S.r.l. Via Piacentina, 6/b 45030 Occhiobello (RO) – Italy –
Tel. (+39) 0425 762906 Fax. (+39) 0425 762905

DENOMINAZIONE DEL PRODOTTO / NAME OF THE PRODUCT:

MOD.: 200NDIN3RK01

IL PRODOTTO E' CONFORME ALLE SEGUENTI DIRETTIVE CE:**THE PRODUCT IS IN CONFORMITY WITH THE REQUIREMENTS OF THE FOLLOWING EUROPEAN DIRECTIVES:**

Direttiva Bassa Tensione (LVD): **2014/35/UE**
Low voltage directive (LVD): **2014/35/EU**

Direttiva EMC: **2014/30/UE**
Electromagnetic compatibility (EMC): **2014/30/EU**

LA CONFORMITA' PRESCRITTA DALLA DIRETTIVA E' GARANTITA DALL'ADEMPIMENTO A TUTTI GLI EFFETTI DELLE SEGUENTI NORME (comprese tutte le modifiche):

THE CONFORMITY WITH THE REQUIREMENTS OF THIS DIRECTIVE IS TESTIFIED BY COMPLETE ADHERENCE TO THE FOLLOWING STANDARDS (including all amendments):

Norme armonizzate: **EN 60730-1:2011, EN 60730-2-9:2010, EN 61000-6-1:2007, EN 61000-6-3:2007**
European standards: **EN 60730-1:2011, EN 60730-2-9:2010, EN 61000-6-1:2007, EN 61000-6-3:2007**

IL PRODOTTO E' COSTITUITO PER ESSERE INCORPORATO IN UNA MACCHINA O PER ESSERE ASSEMBLATO CON ALTRI MACCHINARI PER COSTITUIRE UNA MACCHINA CONSIDERATE DALLA DIRETTIVA: 2006/42/CE "Direttiva Macchine".

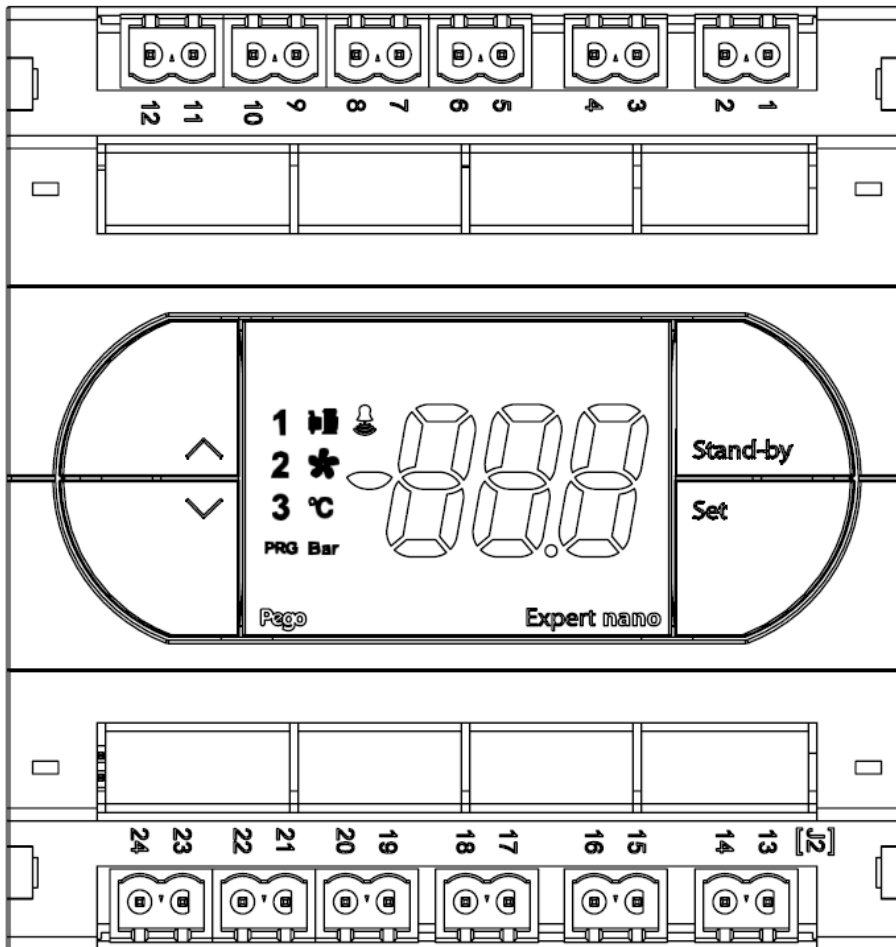
THE PRODUCT HAS BEEN MANUFACTURED TO BE INCLUDED IN A MACHINE OR TO BE ASSEMBLED TOGETHER WITH OTHER MACHINERY TO COMPLETE A MACHINE ACCORDING TO DIRECTIVE: EC/2006/42 "Machinery Directive".

Occhiobello (RO), 01/04/2016

Paolo Pegorari
Rappresentante Legale

CONNECTION DIAGRAM

A.2



NOTE:

Inside the circuit board, there are bridges already configured for the correct reading of the digital and analogue inputs of the board. Their setting must not be changed under any circumstances.

Manufacturer settings of the bridges for the 200NDIN3RK01 control:

J31=1-2
J32=1-2
J21=1-2
J22=1-2
J11=2-3
J12=2-3



Power supply section

1-2: 230 Vac 50/60Hz power supply

Section of digital outputs (voltage-free contacts)

| | | | |
|--------|----------|---------------|------------------------------------|
| 3-4: | (RL5) | General alarm | (Relay 8A AC1 250V contact N.O.) |
| 5-6: | (RL1) | Output No.1 | (Relay 16A AC1 250V contact N.O.) |
| 7-8: | (RL2) | Output No.2 | (Relay 16A AC1 250V contact N.O.) |
| 9-10: | NOT USED | | |
| 11-12: | (RL4) | Output No.3 | (Relay 8A AC1 250V contact N.O.) |

Analogue Output Section

| | | | |
|-----|---------------|------------------------|------------------------|
| 13: | (COM_OUT_AO1) | Common analogue output | (Rif 0) - (gnd) |
| 14: | (OUT_AO1) | Condenser fans | (Analogue output 010V) |

Master interface section - Slave - Console

| | | |
|-----|-----------|----------------------------------|
| 15: | (RS485-B) | RS485-B Lan for Telenet / ModBus |
| 16: | (RS485-A) | RS485-A Lan for Telenet / ModBus |

Section of digital inputs

| | | |
|-----|-----------|--------------------------------|
| 17: | (COM DI1) | Common (GND) digital input n.1 |
| 18: | (DI1) | Digital input no.1 |

Section of analogue inputs

| | | |
|-----|-----------|--|
| 19: | (COM DI2) | Common (GND) digital input no.2 |
| 20: | (DI2) | Digital input no.2 |
| 21: | (COM DI3) | Common (GND) digital input no.3 |
| 22: | (DI3) | Digital input no.3 |
| 23: | (COM AI1) | Common(+12Vdc) Analogue input AI1 |
| 24: | (AI1) | analogue input (4-20mA) for Adjustment pressure probe |

[illegible]



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