



XC15CX XC35CX (v. 1.0)

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1. GENERAL WARNING

1.1 PLEASE READ CAREFULLY BEFORE USING THE DEVICE

- This manual is an integral part of the product and should be kept near the instrument for easy and quick reference.
- The regulator should not be used in applications different from those described below. Moreover, it can not be used as a safety device.
- Before proceeding check carefully the limits of application.
- Dixell Srl reserves the right to change the composition of its products, even without notice, ensuring the same and unchanged functionality.

1.2 SAFETY INSTRUCTIONS

- Check the supply voltage before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical connections before any kind of maintenance.
- The instrument must not be opened.
- In case of failure or faulty operation send the instrument back to the distributor or to "DIXELL s.r.l." (See address) with a detailed description of the fault.
- Consider the maximum current which can be applied to each relay (see Technical Data).
- Ensure that the wires for probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.
- Fit the probe where it is not accessible by the end user.
- In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful

2. GENERAL DESCRIPTION

The XC35CX is a regulator for tandem condensing units. It is able to drive inverter-controlled compressors, digital compressors or standard ON-OFF compressors. It is equipped with:


- 1 or 2 relay outputs to drive ON-OFF compressors of ventilators, or for alarm signalling;
- 1 TRIAC output for ventilator speed modulation in phase-cut mode (MAX current 2.2 A)
- 1 analogue output (0-10Vdc or PWM type) for electronic ventilators control, inverter management or proportional repeater
- Up to 3 digital inputs free of voltage for external alarm management
- 2 analogue outputs to be used with ratiometric pressure transducer (0-5Vdc)
- Up to 4 temperature probe inputs NTC10k, NTC86k or PT1000 type

On the other side, the XC15CX differentiates itself by having only a 16 A relay. All functionalities described in the following manual are common for both XC15CX and XC35CX (with the only exception of function related to second 5 A relay).

3. OPERATIONAL TOOLS

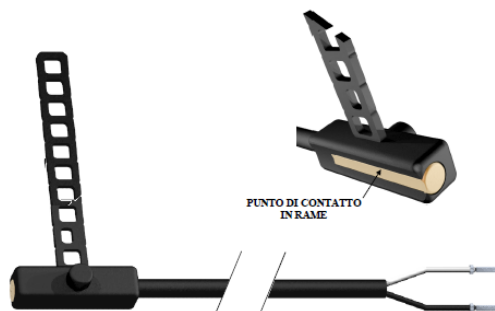
Description	Code
Kit for female plug-in terminals @110 or 230VAC	DA000009 60
Kit for female plug-in terminals @24VAC	DA000009 70
TTL to RS485 adapter	XJ485CX + CABRS02
Suction Pressure Transducer	PPR15 (0T15 bar)
Discharge Pressure Transducer	PPR30 (0T30 bar)
Programming parameter tool	HOT KEY 4K

3.1 RATIOMETRIC PRESSURE TRANSDUCERS (0-5VDC)

	PPR15	2.0m, 0T15 bar Code: BE079302 00
	PPR30	2.0m, 0T30 bar Codice: BE079302 02
	PP101	Code: BE909201 01
	PP102	Code: BE909201 02
	PP103	Code: BE909201 03

NOTE: any PP10x needs a special 2 m cable: **DD520902-00**

3.2 PIPE MOUNTING TEMPERATURE PROBE: NP4-67



The **NP4-67** temperature probe can be used on the discharge line to monitor the discharge temperature of the compressor.

NP4-67:

- 1.5m NTC probe type
- Temperature range: -40+110°C
- Cable length: 1.5mt
- Code: BN609001 52

3.3 MONITORING ADAPTER TOOL: XJ485CX



This is a TTL to RS485 physical layer external adapter. It has to be inserted on the TTL 5-pin port to convert the TTL output into a 2-wire RS485 output.

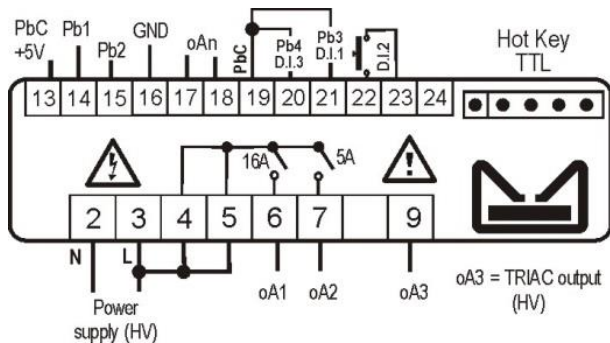
4. WIRING & ELECTRICAL CONNECTIONS

4.1 SAFETY INSTRUCTIONS

Before connecting cables make sure the power supply complies with the instrument. Separate the probe cables from the power supply cables, from the outputs and the power connections. Do not exceed the maximum current allowed on each relay (16_A or 5_A resistive burden). In the case of higher current burden, please use a suitable external power contactor.

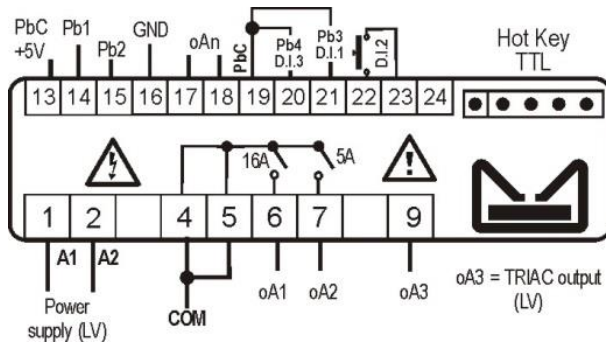
4.2 WIRINGS DIAGRAMS

4.2.1 High Voltage Models (110VAC, 230VAC)



- TRIAC output **oA3** is internally connected to the power supply LINE (L, terminal number 3)
- Follow instructions on par. 4.3 for probe connections
- Analogue output **oAn** can be a PWM (positive on terminal 18) or 0-10Vdc (positive on terminal 17) type.
- All digital inputs are free of voltage type
- Model XC15CX has only a 16_A relay (**oA1**), TRIAC output (**oA3**) and analogue output (**oAn**)

4.2.2 Low Voltage Models (24VAC)



- TRIAC output **oA3** is internally connected to the power supply LINE (**A1**, terminal number 1)
- Follow instructions on par. 4.3 for probe connections
- Analogue output **oAn** can be a PWM (positive on terminal 18) or 0-10Vdc (positive on terminal 17) type.
- All digital inputs are free of voltage type
- Model XC15CX has only a 16_A relay (**oA1**), TRIAC output (**oA3**) and analogue output (**oAn**)

4.3 RATIOMETRIC (0-5VDC) PRESSURE AND TEMPERATURE PROBES

4.3.1 General Warnings

In case of using of terminal ends pay attention there are no bear parts which could cause short circuiting or introduce noise disturbance at high frequencies. To minimize the induced disturbances use shielded cables with the shield connected to earth.

Pressure probes (0-5Vdc):

Pay attention to the polarity

Pb1 = 13(+5Vdc)-14(in)-16(GND);

Pb2 = 13(+5Vdc)-15(in)-16(GND);

Temperature probes: keep all cables far away from the power cables. Use shielded cable to lengthen the cables.

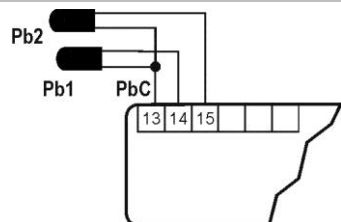
- NTC10k: Pb1 (13-14) e Pb2 (13-15)
- NTC10k or PT1000 or NTC86k: Pb3 (19-21) e Pb4 (19-20)

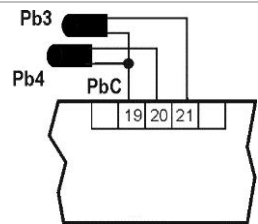
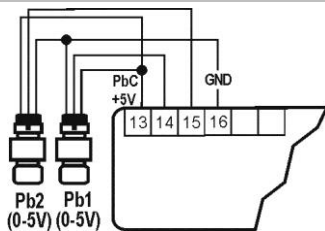
4.3.2 Probes Wirings

Temperature probes (NTC10k)

Pb1 (P1C = NTC): 13-14

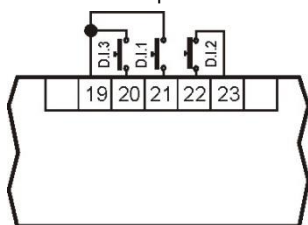
Pb2 (P2C =NTC): 13-15



<p>Temperature probes (NTC10k, PT1000, NTC86k)</p> <p>Pb3 (P3C = NTC, PT1000, NTC86k): 19-21</p> <p>Pb4 (P4C = NTC, PT1000, NTC86k): 19-20</p>	
<p>Ratiometric transducers (0.5÷4.5Vdc)</p> <p>Pb1 (P1C = 0-5) 13 (+); 14(in); 16 (gnd)</p> <p>Pb2 (P2C =0-5) 13 (+); 15(in); 16 (gnd)</p>	

4.4 DIGITAL INPUTS

- D.I.1: available if probe **P3** in not available (**P3P=no**)
- D.I.2: always available
- D.I.3: available if probe **P4** in not available (**P4P=no**)



NOTE: all digital inputs are free of voltage input types

4.5 ANALOGUE OUTPUT: OAN

- Output **PWM**: 17(-); 18(+)
- Output **0-10Vdc**: 17(+); 18(-)

4.6 POWER OUTPUT: OA3 (TRIAC)

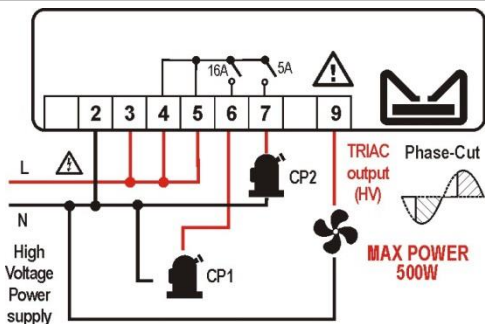
There are 2 different models, characterized by a different TRIAC power supply stage. As general rule, the TRIAC is always internally connected to the device power supply line.

4.6.1 HIGH VOLTAGE POWER SUPPLY MODEL (110 O 230VAC)

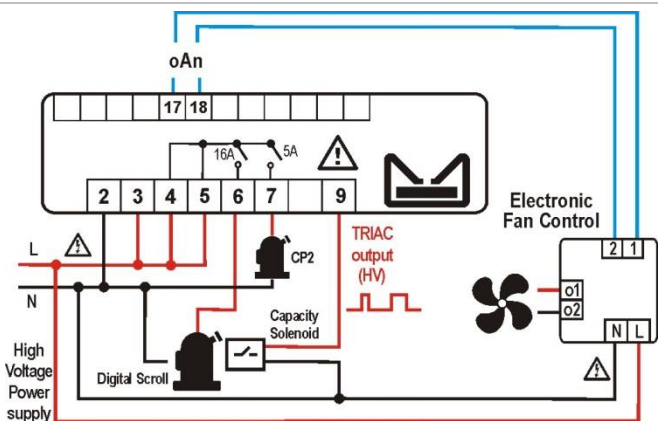
!!! WARNING: oA3 (TRIAC) OUTPUT is internally connected to the power supply line. DO NOT CONNECT LOW VOLTAGE LOADS !!!

Loads:

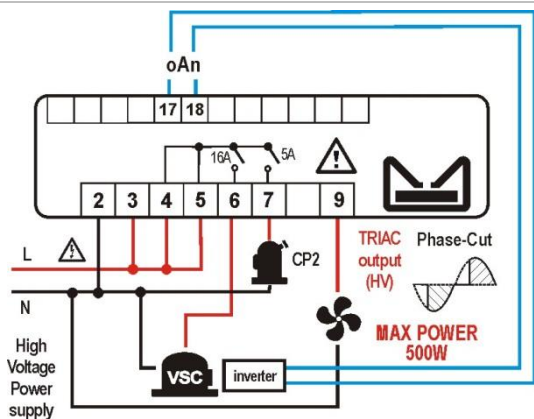
- 2 Compressors ON-OFF type
- 1 Ventilator controlled in phase-cut mode

**Loads:**

- 1 Digital scroll compressor
- 1 Compressor ON-OFF type
- 1 Electronic ventilator

**Load:**

- 1 inverter-controlled compressor
- 1 Compressor ON-OFF type
- 1 Ventilator controlled in phase-cut mode

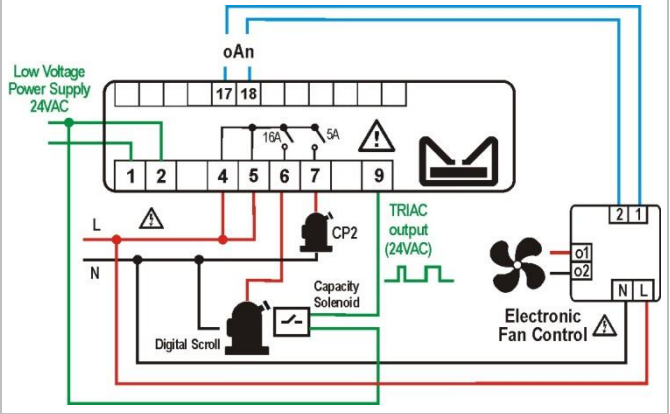


4.6.2 LOW VOLTAGE POWER SUPPLY MODEL (24VAC)

!!! WARNING: oA3 (TRIAC) OUTPUT is internally connected to the power supply line. DO NOT CONNECT HIGH VOLTAGE LOADS !!!

Loads:

- 1 Digital Compressor @ 110 or @230VAC
- 1 Compressor ON-OFF type
- 1 Electronic ventilator

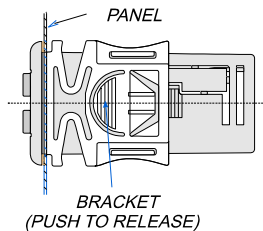
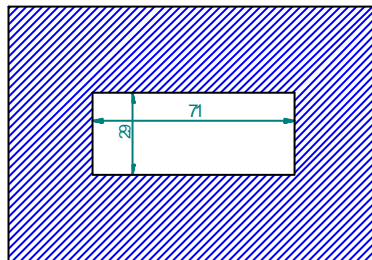
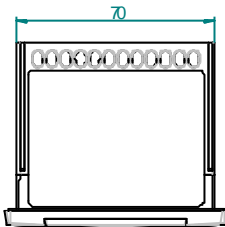
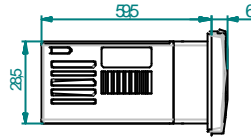
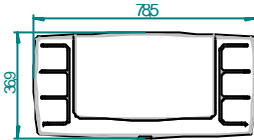


5. Mounting & installation

The instruments are suitable only for internal use. Instruments shall be mounted on panel, in a 29x71 mm hole, and fixed using the special brackets supplied.

The ambient operating temperature range is between -10T60°C.

Avoid locations subject to heavy vibration, corrosive gases or excessive dirt. The same applies to the probes. Ensure ventilation around the instrument.



6. FIRST INSTALLATION

PRELIMINARY CONFIGURATION CHECK:

- Check pressure transducer range: **P1i, P1E, P2i e P2E**
- Check unit of measurement for both compressor and ventilator regulators

6.1 PRESSURE TRANSDUCERS

The default range for pressure transducers will be set to:

- **Pressure probe P1:** -0.5T11.0 bar
- **Pressure probe P2:** 0.0T30.0 bar

If the probes that will be used with the instrument have different operating range, follow this procedure:

Use following parameters to set pressure probe range for both P1 (suction probe) and P2 (discharge probe):

- **P1i, P2i:** set the measurement value corresponding to 0.5V
- **P1E, P2E:** set the measurement value corresponding to 4.5V

These parameters need to be set with the boundaries of the operating range of the particular pressure probe.

Procedure:

1. Enter programming menu by keeping **SET+DOWN** pressed for 3 sec
2. Enter the "**Pr2**" programming level by keeping **SET+DOWN** pressed for 7 sec
3. Select par. **Pxi** (reading value corresponding to 0.5V)
4. Use **SET** button and change the lower value by using **UP** or **DOWN** buttons
5. Press **SET** button con confirm and save the new value. After that the **PxE** (reading value corresponding to 4.5V) will be showed on the display
6. Use **SET** button and change the higher value by using **UP** or **DOWN** buttons
7. Press **SET** button con confirm and save the new value. After that the next parameter will be showed on the display.

Follow the above steps also for pressure probe P2 range modification (par. **P2i** and **P2E**).

CONTROL WITH PRESSURE GAUGE:

Check that the measurements of the probes (both suction and discharge) correspond to the pressure gauge reading. Generally the pressure transducers do not require recalibration.

7. USER INTERFACE

7.1 DISPLAY



7.2 KEYBOARD

SET	<p>Standard visualization: It is used to see and modify the SETPOINT values. In programming mode it is used to modify a parameter or confirm an operation</p> <p>ALARM menu: Keep it pressed for 3 sec in order to reset an alarm</p>
▲	<p>(UP) Programming mode: It is used to browse the parameter list</p> <p>With inserted HOT-KEY: start the parameter UPLOAD function (from HOTKEY to internal memory)</p> <p>INFO menu: It is used to browse the INFO menu</p>
▼	<p>(DOWN) Programming mode: It is used to browse the parameter list</p> <p>With inserted HOT-KEY: start the parameter DOWNLOAD function (from internal memory to the HOTKEY)</p> <p>INFO menu: It is used to browse the INFO menu</p>
Start	<p>Manual load restart: if par. $r1F=rSt$, press this button to restart the loads and previously stopped due to safety alarm</p> <p>ON-OFF: if par. $r2F=onF$, keep this button pressed for 3 sec to switch ON and OFF the instrument</p>
🔧	SERVICE / CLOCK: to enter CLOCK and SERVICE menu
📖	STORED ALARMS: it gives access to the stored alarms

KEY COMBINATION

UP + DOWN	To lock and unlock the keyboard
------------------	---------------------------------

SET + DOWN	To enter the programming parameter menu
SET + UP	To exit from INFO and ALARM menu and from programming parameter menu

7.3 ICONS

LED	STATUS	MEANING
	ON	Unit of measurement for temperature is Celsius degrees
	ON	Unit of measurement for temperature is Fahrenheit degrees
bar	ON	Unit of measurement for pressure is Bar
PSI	ON	Unit of measurement for pressure is PSI
	ON	Relay output oA1 enabled
	BLINKING	Delay in relay output oA1 activation
	ON	Relay output oA2 enabled
	BLINKING	Delay in relay output oA2 activation
	ON	Relay output oA3 enabled
	BLINKING	Delay in relay output oA3 activation
	ON	Analogue output active
	ON	(SER) Service menu
	BLINKING	(SER) Outputs in service mode
	ON	(ALR) Alarm active
	ON	(MEM) At least an alarm present into memory
	BLINKING	(MEM) A new alarm is occurred and need to be checked
ECO	ON	Energy Saving mode active
	ON	Real Time Clock Menu

8. SET-POINT MENU

8.1 SETPOINTS VISUALIZATION

1. Press and release the **SET** button
2. **SUCTION**: the display will show the label **St1** [Compressor setpoint]
3. Press the **SET** button again to show the value of **St1**
4. **DISCHARGE** (if enabled): press the **SET** button once again
5. The display shows the label **St2** [Ventilator setpoint]
6. Press the **SET** button again to show the value of **St2**

EXIT: Press both **SET + UP** or wait for 30 sec

8.2 SETPOINTS MODIFICATION

1. Press the **SET** button for 3 sec
2. The display will show **St1**
3. Press the **SET** button again to show the value of **St1** (Compressor setpoint)
4. Change the value of **SET** by pressing the **UP** or **DOWN**
5. Press the **SET** button to save the set value in memory and move to the ventilator setpoint
6. The display will show **St2** (Ventilator setpoint)

7. Press the **SET** button again to show the value of **St1**
8. Change the value of **SET** by pressing the **UP** or **DOWN**

EXIT: Press both **SET + UP** or wait for 20 sec without pressing any key.

9. INFO MENU

This menu is directly accessible from **UP** or **DOWN** buttons. The INFO menu allows the visualization of some operating information. Use the **UP** and **DOWN** buttons to browse between the variables of the INFO menu. The value of the displayed variable is accessed by pressing the **SET** button.

NOTE: the following information will be displayed if and only if the corresponding function has been enabled.

Variable	Meaning
P1	Probe P1 value (suction line)
P2	Probe P2 value (condensing line)
P3	Probe P3 value
P4	Probe P4 value
tdG	Modulation interval for digital compressors
PEr	TRIAC output activation (in percentage)
Aou	Analogue output value (in percentage)
rEL	Firmware release
FdY	Firmware release date (day)
FMn	Firmware release date (month)
FYr	Firmware release date (year)

EXIT: Press both **SET + UP** or wait for 60 sec without pressing any key.

10. SERVICE MENU

The SERVICE menu is accessible by using the SERVICE button. This menu allows reading the values of any probe or digital input.

Variable	Meaning
n1H	Activation number for output oA1 (thousand of)
n1L	Activation number for output oA1 (unit of)
n2H	Activation number for output oA2 (thousand of)
n2L	Activation number for output oA2 (unit of)
o1H	Number of working hours for output oA1 (thousand of)
o1L	Number of working hours for output oA1 (unit of)
o2H	Number of working hours for output oA2 (thousand of)
o2L	Number of working hours for output oA2 (unit of)
dPx	Real probe Px value
dix	Status of digital input "x"
bAu	Baudrate (for communication serial)
r1F	Function linked with Re-start button (immediate)
r2F	Function linked with Re-start button (timed, 3 sec)
S1F	Function linked with Service/Clock button (immediate)
S2F	Function linked with Service/Clock button (timed, 3 sec)
rSt	Restart regulation enabled in case of lockout alarm
rSC	Couter reset enabled
FdY	Firmware release date (day)

FMn	Firmware release date (month)
FYr	Firmware release date (year)
rEL	Firmware release
Ptb	Parameter map progressive number

11. ALARM MENU

The device is able to memorize:

- The total number of alarm events for any managed alarm (max 999)
- Type and duration of last 10 alarm events (**ALx, x=0...9**)

Moreover, after detecting a new alarm event:

- If a NEW ALARM has been detected, it will be signaled by showing the relative code on the display and by switching on the ALR icon and blinking the MEM icon
- When at least one alarm is present into memory, the icon MEM will be switched on.

NOTE: after entering the ALARM menu the icon MEM will stop blinking and will stay ON. This is used to indicate that all alarms in memory have been checked by an operator.

11.1 TYPE OF ALARM EVENTS RECORDER

The following table shows the available information of the alarm menu:

Alarm	Meaning
HA	High pressure/temperature alarm on the suction line
LA	Low pressure/temperature alarm on the suction line
H2	High pressure/temperature alarm on the discharge line
HLL	High pressure lockout alarm
L2	Low pressure/temperature alarm on the discharge line
dLt	High temperature alarm on compressor head
dLL	Lockout due to DLT alarm
ELP	Electronic pressure switch (warning)
ELL	Electronic pressure switch (lockout)
HP	High pressure alarm from external sensor (warning)
LP	Low pressure alarm from external sensor (warning)
HPL	High pressure alarm from external sensor (lockout)
LPL	Low pressure alarm from external sensor (lockout)

11.2 ALARM MENU VISUALIZATION

1. Press the alarm archive (**MEM**) button
2. Scroll with **UP** or **DOWN** button up to label **AL0** (first alarm event memorized)
3. Press **SET** button to enter the event submenu
4. The encoding label relative to the logged event (par. 11.1) will be displayed
5. Press **SET** button again to display the duration of the alarm event recorded

NOTE: the visualization rules of the duration of any alarm event are the following:

- a. Resolution is 1 min for a duration from 0 to 900 min
 - b. Resolution is 10 min for a duration from 15h00min to 99h.50min (on the display: 15.0 to 99.0)
 - c. Value of fixed to 99h.50min, with blinking decimal point, in the case of exceeding this limit
6. Press the **SET** button to move to the next alarm event

11.3 ALARM RESET

1. Enter the ALARM menu
2. To reset the alarm list, keep the SET button pressed for 5 sec until the message "CLr" blinks on the display
3. To reset the only event displayed, keep the ALR button pressed for 3 sec until the message "rSA" blinks on the display

NOTE: the current alarms will not reset

12. PARAMETER PROGRAMMING

12.1 "PR1" MENU

To access the parameter list Pr1 (user level), proceed as follows:

1. Keep both **SET+DOWN** buttons pressed for 3 sec
2. The display will show the name of the first parameter in the list
3. Press the **SET** key to access to the stored value
4. Change the value of the parameter using the **UP** and **DOWN** buttons
5. Press the **SET** button to store the new value and move to the next parameter

EXIT: press the **SET+UP** or wait for 30 seconds without pressing any key.

NOTE: the new value will be stored even in case the exit from the programming menu is by timeout.

12.2 "PR2" MENU

To access the Pr2 parameter list (protected level), proceed as follows:

1. Enter the menu Pr1
2. Keep both **SET+DOWN** buttons pressed for 7 sec
3. The display will show the label "Pr2" (blinking)

EXIT: press the **SET+UP** or wait for 30 sec without pressing any key.

NOTE: each parameter in Pr2 level can be moved to the Pr1 level (user level) by pressing both **SET+DOWN** buttons. A parameter placed at the level Pr1 will be indicated by switching on the decimal point together with the parameter label.

12.3 PARAMETER VALUE MODIFICATION

The following procedure is valid both for Pr1 and Pr2 levels:

1. Access the required programming menu
2. Select the parameter to modify by using **UP** or **DOWN** buttons
3. Press the **SET** button to display the actual parameter value
4. Change the value by using **UP** or **DOWN** buttons
5. Press the **SET** button to store the new value and move to the next parameter

EXIT: press **SET+UP** or wait for 30 sec without pressing any key.

NOTE: the new value will be stored even in case the exit from the programming menu is by timeout.

13. KEYBOARD LOCK

To prevent any random modification of the operating parameters it is possible to lock the keypad:

- **KEY LOCK:** keep both **UP** and **DOWN** buttons pressed for 3 sec: the message "PoF" indicates that the keyboard is locked.
- **UNLOCK THE KEYBOARD:** keep both **UP** and **DOWN** buttons pressed for 3 sec: the message "Pon" will indicate that the keyboard is unlocked.

14. HOT-KEY

By using the HOT-KEY programming tool (Code DK00000100) it is possible to transfer any configuration to and from the internal memory device.

14.1 UPLOAD: CONFIGURATION TRANSFER FROM DEVICE TO HOT-KEY

1. Insert an HOT-KEY into the 5-pin port paying attention to the polarity
2. Press the **UP** button: the message "uPL" will be displayed during the upload operation. At the end of the operation the label "End" will blink on the display
3. Press the **SET** button and the label "End" will stop flashing
4. Turn off the device and remove the HOT-KEY. After that turn on again the device

NOTE: the "Err" message on the display indicates that the operation is not successful (transfer error or incorrect key). In this case, press the UP button again to restart the upload operation or remove the HOT-KEY to abort this operation.

14.2 DOWNLOAD: CONFIGURATION TRANSFER FROM HOT-KEY TO DEVICE

1. Turn off the device
2. Insert an HOT-KEY on the 5-pin port paying attention to the polarity and then turn on again the device
3. The list of parameters present into the HOT-KEY memory will be automatically downloaded into the device memory. The word "doL" will appear during this operation. At the end of this operation the display will blink the "End" label
4. After 10 sec the device will restart automatically
5. Remove the key HOT-KEY

NOTE: the "Err" message on the display indicates that the operation is not successful (transfer error). In this case, turn off and then on again the device in order to restart the operation or remove the HOT-KEY to abort the operation.

15. PARAMETERS

15.1 DEFAULT CONFIGURATIONS

The XC15-35CX can use one of the 10 pre-loaded factory settings (default configurations). These configurations allow to preload a set of parameters (and visibility) dedicated to a particular application. The end user will be able to load and then modify all the visible parameters in order to optimize the operation of the machine in use.

CODE	CONFIGURATION	OUT PREDEFINED
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C1	1 digital compressor (scroll type) 1 electronic or ON-OFF ventilator Temperature in °C, pressure in bar	oA1 and oA3 : fixed oA2 or oAn : configurable
C2	Same of C1 but temperature in °F and pressure in PSI	oA1 and oA3 : fixed oA2 or oAn : configurable
C3	1 inverter-controlled compressor 1 ON-OFF of phase-cut ventilator Temperature in °C, pressure in bar	oAn : fixed oA1 , oA2 and oA3 : configurable
C4	Same of C3 but temperature in °F and pressure in PSI	oAn : fixed oA1 , oA2 and oA3 : configurable
C5	1 ON-OFF compressor 1 modulated or ON-OFF ventilator Temperature in °C, pressure in bar	oA1 : fixed oA2 , oA3 and oAn : configurable
C6	Same of C5 but temperature in °F and pressure in PSI	oA1 : fixed oA2 , oA3 and oAn : configurable
C7	2 ON-OFF compressor 1 modulated ventilator Temperature in °C, pressure in bar	oA1 and oA2 : fixed oA3 and oAn : configurable
C8	Same of C7 but temperature in °F and pressure in PSI	oA1 and oA2 : fixed oA3 and oAn : configurable
C9	Tandem configuration (1 digital compressor, scroll type, + 1 ONOFF compressor) 1 electronic ventilator Temperature in °C, pressure in bar	All oAx : fixed
C10	Same of C9 but temperature in °F and pressure in PSI	All oAx : fixed

To load one of the above configurations, enter the Pr2 level and change the value of the parameter **CtY** (if enabled) within 120 sec after powering on the instrument.

NOTES:

- Default configurations cannot be modified from final user
- After loading a default configuration the final user will have to adjust the default values.

15.2 REGULATION SET-POINT

St1	SETPOINT 1 for compressor regulation (suction line): LS1 to US1
St2	SETPOINT 2 for ventilator regulation (condensing line): LS2 to US2
HY1	Regulation band for SETPOINT 1: - P1C=ntC → 0.1 to 25.5°C; 1 to 45°F - P1C=0-5 → 0.1 to 9.9 bar; 1 to 999 PSI
LS1	Minimum value for SETPOINT 1: - P1C=NTC: -40.0°C to US; -40°F to US - P1C=0-5: P1i to US [bar, PSI]
US1	Maximum value for SETPOINT 1: - P1C=NTC: LS to 110.0°C; LS to 230°F - P1C=0-5: LS to P1E [bar, PSI]
HY2	Regulation band for SETPOINT 2: - P2C=ntC → 0.1 to 25.5°C; 1 to 45°F - P2C=0-5 → 0.1 to 9.9 bar; 1 to 999 PSI
LS2	Minimum value for SETPOINT 2: - P2C=NTC: -40.0°C to US; -40°F to US - P2C=0-5: P1i to US [bar, PSI]

US2	Maximum value for SETPOINT 2: <ul style="list-style-type: none"> - P2C=NtC: LS to 110.0°C; LS to 230°F - P2C=0-5: LS to P1E [bar, PSI]
ESC	Offset for SETPOINT 1 when in energy savin mode: <ul style="list-style-type: none"> - P1C=ntC → -50.0 to 50.0°C; -90 to 90°F - P1C=0-5 → -20.0 to 20.0 bar; -300 to 300 PSI
ESF	Offset for SETPOINT 2 when in energy saving mode: <ul style="list-style-type: none"> - P2C=ntC → -50.0 to 50.0°C; -90 to 90°F - P2C=0-5 → -20.0 to 20.0 bar; -300 to 300 PSI

15.3 READING FILTER

Fil	Filter for pressure probe reading enabled: n=filter disabled; Y=filter enabled
Fic	Coefficient for pressure probe reading filter: 0 to 100, 100=filter disabled; mEd=avarage value during last period (tdG)

15.4 PROBE CONFIGURATION

15.4.1 Suction Probe Configuration:

P1P	Suction probe P1: n=not available (compressor regulation disabled); Y=available (compressor regulation enabled)
P1C	Suction transducer configuration: <ul style="list-style-type: none"> • 0-5= ratiometric transducer (5.0Vdc) • ntC=temperature probe NTC 10k
P1i	Start of scaling for pressure transducer P1: (-1.5 to P1E bar; -21 to P1E PSI) it is the pressure value measured from sensor corresponding to 0.5Vdc
P1E	End of scaling for pressure transducer P1: (P1i to 99.9 bar; P1i to 999 PSI) it is the pressure value measured from sensor corresponding to 4.5V
P1F	Pressure transducer P1 calibration: depending on the type of sensor as follow <ul style="list-style-type: none"> • P1C=0-5 → -12.0 to 12.0 bar; -200 to 200 PSI • P1C=ntC → -12.0 to 12.0°C; -21 to 21°F
P1d	Pressure probe P1 reading error delayed (valid if P1C=0-5): 0 to 255 min

15.4.2 Condensing Probe Configuration

P2P	Condensing probe P2: n=not available (compressor regulation disabled); Y=available (compressor regulation enabled)
P2C	Condensing transducer configuration: <ul style="list-style-type: none"> • 0-5= ratiometric transducer (5.0Vdc) • ntC=temperature probe NTC 10k
P2i	Start of scaling for pressure transducer P2: (-1.5 to P2E bar; -21 to P2E PSI) it is the pressure value measured from sensor corresponding to 0.5Vdc
P2E	End of scaling for pressure transducer: (P2i to 99.9 bar; P2i to 999 PSI) it is the pressure value measured from sensor corresponding to 4.5V
P2F	Pressure transducer calibration: depending on the type of sensor as follow <ul style="list-style-type: none"> • P2C=0-5 → -12.0 to 12.0 bar; -200 to 200 PSI • P2C=ntC → -12.0 to 12.0°C; -21 to 21°F
P2d	Pressure probe reading error delayed (valid if P2C=0-5): 0 to 255 min

15.4.3 Other Probes Configuration

P3P	Probe P3 presence: n=not available; Y=available
P3C	Probe P3 configuration(*) <ul style="list-style-type: none"> • n86=temperature probe NTC86k • ntC=temperature probe NTC10k • Pt1=temperature probe PT1000

P3F	Calibration: -12.0 to 12.0°C; -21 to 21°F
P4P	Probe P4 presence: n=not available; Y=available
P4C	Probe P4 configuration(*) <ul style="list-style-type: none"> • n86=temperature probe NTC86k • ntC=temperature probe NTC10k • Pt1=temperature probe PT1000
P4F	Calibration: -12.0 to 12.0°C; -21 to 21°F
dEr	Delay before activating probe error: 0 to 255 sec

(*)The support of the various types of probes depends on the model.

15.5 DISPLAY

Unt	Unit of measurement for pressure: bar, PSI
CF	Unit of measurement for temperature: °C=Celsius degree; °F=Fahrenheit degree
dLY	Delayed visualization: 0 to 255 sec
Lod	Variable visualization: P1; P2; P3; St1=SETPOINT1 value; St2=SETPOINT2 value; PEr=TRIAC activation in percentage; Aou=analogue output in percentage

15.6 COMPRESSOR CONFIGURATION

CPb	Compressor regulation probe: nP; P1; P2; P3; P4
rtY	Type of regulation: db=dead band; PrP=proportional band
CPo	Compressor power (valid for tandem units): SPo=same power; dPo= different power
rS1	Offset for differential HY1: used to move the regulation band above and below St1 <ul style="list-style-type: none"> - P1C=NTC, PT1000 → 0.0 to 25.5°C; 0 to 45°F - P1C=0-5 → 0.0 to 9.9 bar; 0 to 999 PSI
inC	Proportional Integral (PI) time: integration time for PI-regulator that acts on the compressor. If inC=0 then regulation will be pure proportional.
rFE	Regulation filter for PI-regulator: n=filter disabled; Y=average filter enabled
SPi	Safety value for PI-regulator used in case of probe error: 0 to 100%
SUt	Start-up time: (0.0 to 10.0 sec) interval of time with digital valve (oA3=dGt) or inverter at 100% (oAn=inV) before starting regulation. NOTE: user from digital or inverter-controlled compressor
tdG	Modulation time interval: (10 to 40 sec) <ul style="list-style-type: none"> - If using of Digital compressors (oA3=dGt, d4d) then it is the cycle modulation time - If using inverter-controlled compressors (oAn=inV) then it is the interval of time used from filter to calculate the pressure/temperature average value
PMi	Minimum compressor power: (0% to PMA) minimum power, in percentage, for controlling the compressor (digital or inverter driven type)
PMA	Maximum compressor power: (PMi to 100%) maximum power, in percentage, for controlling the compressor (digital or inverter driven type)
ton	Delay before activating a second compressor: (0 to 255 sec) interval of time with compressor power at PMA before activating another load (valid if oA2=CP2)
toF	Delay before deactivating a second compressor: (0 to 255 sec) interval of time with compressor power at PMi before deactivating another load (valid if oA2=CP2)
voS	Control signal increasing for inverter-controlled compressors: (0 to 100%, StP) the analogue output value (oAn) will be increased proportionally to voS to the expiration of regular intervals of 1 min and up to the calculated value by the PI-controller. If voS=StP, then the analog output will go immediately to the value calculated by the PI-controller.

vo2	Control signal increasing for inverter-controlled compressors: (0 to 100%, StP) the analogue output value (oAn) will be decreased proportionally to vo2 to the expiration of regular intervals of 1 min and up to the calculated value by the PI-controller. If vo2=StP , then the analog output will go immediately to the value calculated by the PI-controller
t1n	Time interval with compressor PMi during start-up phase: (0 to 255 min) after starting the regulation, the compressor will be forced to minimum power for t1n minutes (valid only for inverter-controlled compressors).
t1F	Time interval with compressor PMi before stopping regulation: (0 to 255 min) before stopping the regulation the compressor will be forced to minimum power for t1F minutes (valid only for inverter-controlled compressors).
MnP	Minimum compressor working power for lubrication control (0 to 100%, 0=function disabled): If compressor works for tMi at a value lower than MnP , it will be forced to work at maximum power (PMA) for tMA . After that, the normal regulation will be restarted.
tMi	Compressor running at a value below MnP: 1 to 255 min
tMA	Time with compressor at PMA for lubrication: 1 to 255 min
FrC	Modulated compressor is always the first to be activated (valid only for tandem units and if oAn=inV or oA3=dGt, d4d): n=after starting the regulation, the compressor with the lower number of working hours will be activated (if roC=Y); Y =after starting the regulation, the variable capacity compressor will always be the first to be activated.

15.7 DISCHARGE LINE TEMPERATURE ALARM (ONLY FOR DIGITAL COMPRESSORS)

dLP	Temperature probe selection: nP; P3; P4
dLt	Temperature value for compressor warning: <ul style="list-style-type: none"> - P3, P4=NTC → -40 to 110°C; -40 to 230°F - P3, P4=NTC86k → -40 to 180°C; -40 to 356°F - P3, P4=PT1000 → -100.0 to 200.0°C; -148 to 392°F
dth	Differential for DLT alarm deactivation: 0.1 to 25.5°C; 1 to 50°F
dLd	Delay in DLT alarm activation: 0 to 255 sec
dCt	Cooling time after detecting a DLT alarm: 0 to 255 min
dLn	Number of DLT alarms detected before activating the compressor lockout: (0 to 15) after detecting dLn alarms DLT type during dLi hours the regulation will be stopped. With dLn=0 this function is disabled.
dLi	Interval of time for DLT alarm management: (0 to 24 hours) with dLi=0 this function is disabled.
CEd	Maximum compressor capacity (in percentage): (10 to PMA) the maximum capacity will be limited to this value in case of: <ul style="list-style-type: none"> - Temperature probe error when dLP=P3, P4; - Regulation probe error (for compressor)
Cdd	Maximum compressor capacity (in percentage) in case of DLT alarm: (10 to PMA) the maximum compressor capacity will be limited to this value, for dLd time, in case of a DLT warning (valid both for Digital or inverter-controlled compressors).

15.8 COMPRESSOR SAFETIES

odS	Output delay activation at start-up: (0 to 255 sec) after start-up, the compressor output will be activated after the delay odS .
Con	Compressor ON time in case of regulation probe error: (0 to 255 min) used only for ON-OFF compressors
CoF	Compressor OFF time in case of regulation probe error: (0 to 255 min) used only for ON-OFF compressors

2on	Delay between two consecutive activation of the same compressor: 0 a 255 min
2oF	Delay between deactivation and next activation of the same compressor: 0 to 255 min
don	Delay before activating another compressor: 0.0 to 99min00sec, res. 10 sec
doF	Delay before deactivating another compressor: 0.0 to 99min00sec, res. 10 sec
dnF	Minimum compressor ON time: 0.0 to 99min00sec, res. 10 sec
MAo	Maximum compressor ON time: 0.0 to 24h00min, res. 10 min
dn1	Delay don is enabled also for the first activation: n; Y
dF1	Delay doF is enabled also for the first deactivation: n; Y
roC	Compressor rotation function enabled (valid if oA2=CP2): n; Y

15.9 VENTILATOR MANAGEMENT

FPb	Regulation probe for ventilators: nP; P1; P2; P3; P4
Fon	Delay between two different ventilators start-up: 0 to 255 sec
FoF	Delay between two different ventilator switch-off: 0 to 255 sec
FSS	Maximum ventilator speed when Silent function is enabled: (0 to 100%; nu=function disabled) Maximum speed for electronic or phase-cut controlled ventilators.
roF	Ventilator rotation function enabled: n; Y

15.10 PHASE-CUT VENTILATOR CONTROL (OUTPUT OA3)

EFS	Ventilator speed (in percentage) in case of regulation probe (FPb) error: 0 to 100%
tP0	Output at maximum (100%) after start-up: 0 to 255 sec
toH	Differential for phase-cut regulator: 0 to 100%
Lto	Lower limit for output oA3: input value (FPb) corresponding to the minimum output power (Po1) <ul style="list-style-type: none"> - NTC10k → -40 to 110°C; -40 to 230°F - NTC86k → -40 to 180°C; -40 to 356°F - PT1000 → -100.0 to 200.0°C; -148 to 392°F - Ratiometric Pressure probe → 0.0 to 51.0 bar; 0 to 750 PSI
Uto	Upper limit for output oA3: input value (FPb) corresponding to the minimum output power (Po2) <ul style="list-style-type: none"> - NTC10k → -40 to 110°C; -40 to 230°F - NTC86k → -40 to 180°C; -40 to 356°F - PT1000 → -100.0 to 200.0°C; -148 to 392°F - 0-5 → 0.0 to 51.0 bar; 0 to 750 PSI
Po1	Minimum output power (valid if oA3=PCF): 0 to 100%
Po2	Maximum output power (valid if oA3=PCF): 0 to 100%

15.11 ALARMS

LAL	Lower limit for temperature/pressure alarm on suction line (depending on probe P1): <ul style="list-style-type: none"> - P1=NTC10k → -40.0°C to HAL; -40°F to HAL - P1=NTC86k → -40.0°C to HAL; -40°F to HAL - P1=PT1000 → -100°C to HAL; -148°F to HAL - P1=0-5 → P1i to HAL [bar, PSI]
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HAL	Upper limit for temperature/pressure alarm on suction line (depending on probe P1): <ul style="list-style-type: none"> - P1=NTC10k → LAL to 110.0°C; LAL to 230°F - P1=NTC86k → LAL to 180°C; LAL to 356°F - P1=PT1000 → LAL to 200°C; LAL to 392°F - P1=0-5 → LAL to P1E [bar, PSI]
AdS	Delay for temperature/pressure alarm activation on suction line: 0 to 255 min
ELP	Electronic pressure control threshold (Low pressure alarm on suction line): <ul style="list-style-type: none"> - P1=NTC10k, NTC86k, PT1000 → -100.0°C to St1; -148°F to St1 - P1=0-5 → P1i to St1 [bar, PSI]
CUP	Compressor up time before maintenance: (10 to 9990 hours, res. 10 hours) after reaching the preset number of hours, the device will show the maintenance warning.
PEn	Max number of pressure control activations (ELP) before stopping regulation: (0 to 15) after detecting PEn alarms of the ELP type in an interval of time PEi, the regulation will be stopped
PEi	Interval of time to count the number of ELP alarm events: 0 to 999 min. With PEi=0 this function is disabled.
SPr	Number of active compressors when probe is in error: 0 to 2
LAF	Lower limit for temperature/pressure alarm on condenser (depending on probe FPb): <ul style="list-style-type: none"> - NTC10k → -40.0°C to HAF; -40°F to HAF - NTC86k → -40.0°C to HAF; -40°F to HAF - PT1000 → -100°C to HAF; -148°F to HAF - 0-5 → Pxi to HAF [bar, PSI]
HAF	Upper limit for temperature/pressure alarm on condenser (depending on probe FPb): <ul style="list-style-type: none"> - NTC10k → LAF to 110.0°C; LAF to 230°F - NTC86k → LAF to 180°C; LAF to 356°F - PT1000 → LAF to 200°C; LAF to 392°F - 0-5 → LAF to PxE [bar, PSI]
Add	Delay for temperature/pressure alarm activation on condenser: 0 to 255 min
HFC	Compressor stopped in case of any HAF alarm: n; Y
HFL	Compressor capacity limitation in case of any HAF alarm: 0 to 80%, if HFL=0 the compressor will be stopped.
dHF	Delay before stopping the compressor in case of any HAF alarm: 1 to 999 sec
PnF	Max number HAF alarms before stopping the regulation: (0 to 15) after detecting PnF alarms of the HAF type in an interval of time PiF, the regulation will be stopped (if HFC=Y).
PiF	Interval of time to count the number of HAF alarms events: 0 to 999 min. With PEi=0 this function is disabled.
FUP	Ventilators up time before maintenance: (10 to 9990 hours, res. 10 hours) after reaching the preset number of hours, the device will show the maintenance warning.
FPr	Number of ventilators active when probe FPb is in error: 0 to 2

15.12 DYNAMIC SETPOINT

dSP	Probe used for dynamic set point function: nP; P1; P2; P3; P4
dSS	Dynamic setpoint value: <ul style="list-style-type: none"> - NTC10k → -40 to 110°C; -40 to 230°F - NTC86k → -40 to 180°C; -40 to 356°F - PT1000 → -100.0 to 200.0°C; -148 to 392°F
dSb	Regulation band for dynamic setpoint: -50 to 50°C; -90 to 90°F
dSd	Differential for dynamic SETPOINT: -50 to 50°C; -90 to 90°F

15.13 ANALOGUE OUTPUT (OAN)

AoP	Analogue output reference probe (valid if oAn=PrP): nP; P1; P2; P3; P4
LAo	Lower limit for analogue output: input value (AoP) corresponding to the minimum analogue output value (Ao1) <ul style="list-style-type: none"> - NTC10k → -40 to 110°C; -40 to 230°F - NTC86k → -40 to 180°C; -40 to 356°F - PT1000 → -100.0 to 200.0°C; -148 to 392°F - 0-5 → 0.0 to 51.0 bar; 0 to 750 PSI
UAo	Upper limit for analogue output: input value (AoP) corresponding to the minimum analogue output value (Ao2) <ul style="list-style-type: none"> - NTC10k → -40 to 110°C; -40 to 230°F - NTC86k → -40 to 180°C; -40 to 356°F - PT1000 → -100.0 to 200.0°C; -148 to 392°F - 0-5 → 0.0 to 51.0 bar; 0 to 750 PSI
Ao1	Minimum value for analogue output: 0 to 10Vdc
Ao2	Maximum value for analogue output: Ao1 to 10Vdc
Aot	Interval of time with analogue output at maximum time: 0 to 255sec <ul style="list-style-type: none"> - If oAn=PrP: after passing toA value - If oAn=EFn: after start-up
SAo	Safety value for analogue output used in case of probe error (valid if oAn=PrP): 0 to 100%
toA	Differential for analogue output: 0 to 100%

15.14 BUMP FUNCTION

bMP	BUMP function enabled: n; Y
bon	Compressor ON time during BUMP function: 1 to 15 sec
boF	Compressor OFF time during BUMP function: 1 to 15 sec
nub	Number of cycles for BUMP function: 1 to 15
bMi	Interval of time with compressor OFF before activating the BUMP function: 0.0 to 23h50min, res. 10 min

15.15 ANTI-RESONANCE

ArF	Anti-resonance function enabled: n; Y
Si1	Lower boundary of the first skipped band: <ul style="list-style-type: none"> - If frequency output: 0 to SE1 Hz - If voltage output: 0.0 to SE1 V
SE1	Upper boundary of the first skipped band: <ul style="list-style-type: none"> - If frequency output: SE1 to 500Hz - If voltage output: SE1 to 10V
Si2	Lower boundary of the first skipped band: <ul style="list-style-type: none"> - If frequency output: 0 to SE2 Hz - If voltage output: 0.0 to SE2 V
SE2	Upper boundary of the first skipped band: <ul style="list-style-type: none"> - If frequency output: SE2 to 500Hz - If voltage output: SE2 to 10V
Si3	Lower boundary of the first skipped band: <ul style="list-style-type: none"> - If frequency output: 0 to SE3 Hz - If voltage output: 0.0 to SE3 V
SE3	Upper boundary of the first skipped band: <ul style="list-style-type: none"> - If frequency output: SE3 to 500Hz - If voltage output: SE3 to 10V

15.16 OUTPUT CONFIGURATION

tbA	Alarm relay deactivation: n; Y
oA1	Relay output (16 A): <ul style="list-style-type: none"> - nu=output not used - onF=output activated when controller in ON - ALr=alarm output - Fn1=ventilator output - dGt=Digital Scroll output - d4d=Digital Stream (4 cylinder) output - inV=Inverter output - CP1=ONOFF compressor output
oA2	Relay output (5 A) (only for XC35CX models): <ul style="list-style-type: none"> - nu=output not used - onF=output activated when controller in ON - ALr= alarm output - Fn2= ventilator output - CP2= ONOFF compressor output
oA3	TRIAC output (MAX 2.2 A): <ul style="list-style-type: none"> - nu=output not used - onF=output activated when controller in ON - ALr=alarm output - PCF=phase-cut controlled output - dGt=Digital Scroll discharge valve control - d4d= Digital Stream discharge valve control
oAn	Analogue output: <ul style="list-style-type: none"> - nu=output not used - onF=output activated when controller in ON - ALr=alarm output - EFn=electronic ventilator control - PrP=analogue repeater - inV=inverter-controlled compressor output
bEn	Buzzer enabled: n; Y

15.17 DIGITAL INPUTS

Digital inputs 1 and 3 depend on the presence of probe P3 and P4 respectively. Digital input 2 is always available.

ixF	Digital input function (x=1, 2, 3): <ul style="list-style-type: none"> • nu=not used • Enb=enabling regulation signal • LP=external low pressure alarm • HP=external high pressure alarm • ES=energy saving mode activation and deactivation • SiL=silent mode activation and deactivation • EAL=external alarm (warning) • bAL=external alarm (lockout) • oAx=output oAx (x=1, 2, 3, n) deactivation • rEV=inversion for analogue output (oAn=PrP)
ixP	Digital input polarity (x=1, 2, 3) <ul style="list-style-type: none"> • oP = active when contact is open • CL = active when contact is closed
dxd	Activation delay for digital input (x=i, 2, 3): 0 to 255 min

nPx	Max number of external alarm events, detected from a digital input, before stopping the regulation (x=1, 2, 3): (0 to 15) if ixF=LP, HP or bAL, after detecting nPx alarms in an interval of time diA, the regulation will be stopped.
diA	Interval of time for LP, HP, bAL lockout alarm management: 0 to 100 hours. When diA=0 this function is disabled.
HPF	Minimum time with compressor locked in case of LP, HP, bAL lockout alarms: 0 to 15 min
Ar	Regulation restart in case of any lockout alarm: MAN=manual, a power-off and power-on is required; Aut=automatic after resetting the alarm condition

15.18 OTHER

Adr	Serial address: 1 to 247
Hur	Real Time Clock: 0 to 23 hours
Min	Real Time Clock: 0 to 59 min
dAY	Real Time Clock: Sun to Sat, day of the week
Hd1	First holiday of the week: Sun to Sat
Hd2	Second holiday of the week: Sun to Sat
iLE	Start time for silent mode on workdays: (0.0 to 24h00min, res. 10 min) when the silent mode is active the maximum speed of ventilators will be set to the value of par. FSS.
dLE	Silent mode duration on workdays: 0.0 to 23h50min, res. 10 min
iSE	Start time for silent mode on holidays: (0.0 to 24h00min, res. 10 min) when the silent mode is active the maximum speed of ventilators will be set to the value of par. FSS.
dSE	Silent mode duration on holidays: 0.0 to 23h50min, res. 10 min

16. REGULATORS

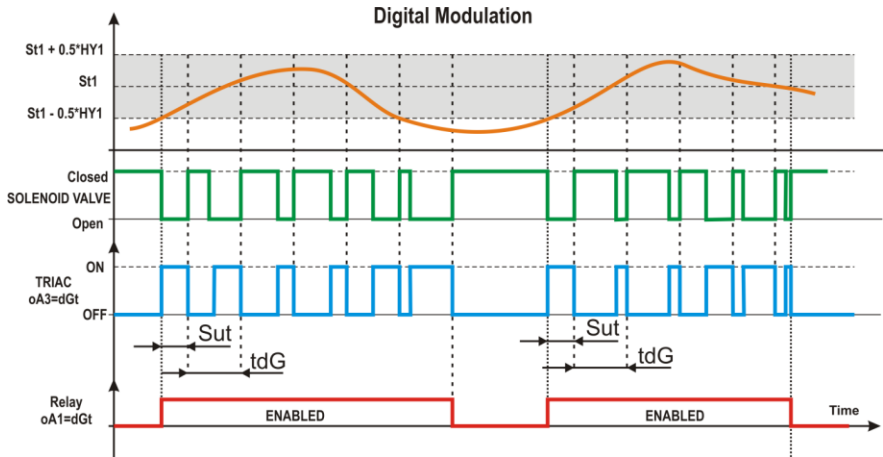
16.1 DIGITAL COMPRESSOR REGULATION

Set par. **oA1** and **oA3** as below indicated to manage Digital (Scroll or Stream D4D) compressors:

- **oA1=dGt** or **d4d**
- **oA3=dGt** or **d4d**

The cooling demand acts on the Digital compressor that, unless of alarms, delays or par. **FrC=n**, is the first to be activated and the last to be deactivated. If Digital compressor is not available and the pressure is over the upper band, then the second compressor will start (if **oA2=CP2**).

The Digital compressor works by modulating the available power in the **HY1** regulation band.



16.1.1 How Digital Regulation works

- The regulation starts when the pressure/temperature on the suction line increases and reaches the value $[SET-0.5 \cdot HY1]$. If available, the compressor will be activated and controlled by Digital modulation (PWM output TRIAC, set as $\bullet A3=DGS, d4d$). **NOTE:** after start-up the digital valve is energized for **Sut** seconds to ensure the discharge of any liquid present in the compressor.
- Within the range $[SET-0.5 \cdot HY1$ to $SET+0.5 \cdot HY1]$ the Digital compressor is controlled by PWM according to the value of the control variable. **NOTE:** when the TRIAC is ON the compressor is unloaded. When the TRIAC is OFF, the compressor is operating.
- When the pressure is greater than $[SET+0.5 \cdot HY1]$ value and the TRIAC output is already at the maximum, another compressor can be activated (if $\bullet A2=CP2$) after expiring the delay **ton**.

NOTE: If the pressure exceeds the $[SET+0.5 \cdot HY1]$ value and the Digital compressor is not available (due to the timer delay **2on**, **2oF** or because of digital input alarm lockout), another compressor will be started (if available).

16.1.2 Capacity decrement and regulation stop

- When the pressure goes below the value $[SET-0.5 \cdot HY1]$ the Digital compressor will be controlled in PWM modulation, at the minimum allowable capacity, for the time **toF**.
- After expiring the delay **toF**, the second compressor (if active when $\bullet A2=CP2$) will be deactivated and the Digital compressor will keep on working for interval of time **doF**.
- After the delay **doF** expires, the Digital compressor will be stopped.

16.1.3 Digital compressor capacity limitation by using parameters PMi and PMA

The Digital compressor capacity can be limited both in maximum and minimum value by using par. **PMi** e **PMA** as showed in the following diagram:

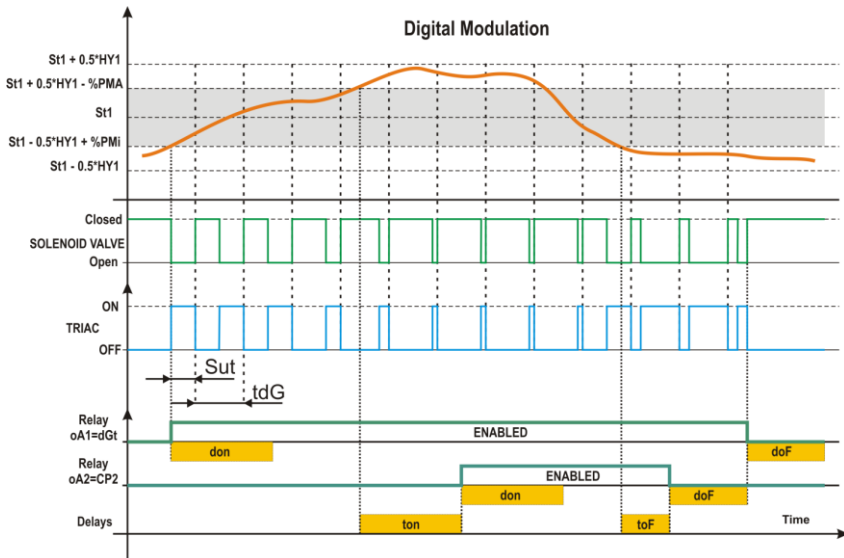
- $\%PMi = HY1 \cdot (PMi / 100)$
- $\%PMA = HY1 \cdot (1 - (PMA / 100))$

PMi: (in percentage) is used to set the minimum activation time of the Digital compressor during the **tdG** cycle period.

ES: with **tdG=20sec** and **PMi=20** the minimum compressor activation will be 4 sec.

NOTE: the minimum activation time for Digital compressor must be set to 2 sec

PMA: (in percentage) is the maximum activation time of the Digital compressor during the **tdG** cycle period.



16.2 INVERTER CONTROLLED COMPRESSOR

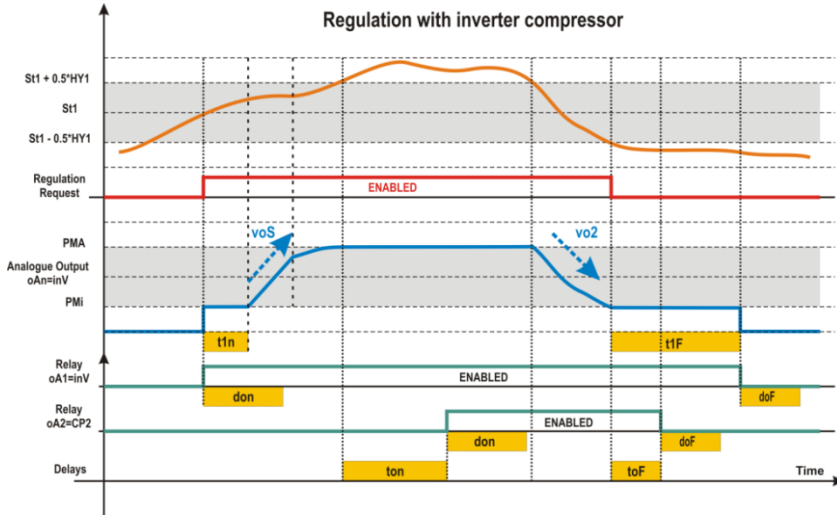
The management of inverter controlled compressor requires setting the output as follows:

- **oAn=inV**
- **oA1=inV**

Other parameters related to the regulation are described in the following table:

Parameter	Description
HY1	Regulation band for St1
rS1	Differential HY1 : it is used to move the regulation band above and below the St1 value.
inC	Integration time for Proportional-Integral regulator (PI) If inC=0 the regulator will work as a pure proportional type.
rFE	Filter for PI-regulator enabled
Sut	Interval with compressor at maximum power after start-up.
tdG	Interval of time used to calculate the pressure/temperature average value for regulation
PMi	Minimum compressor power (in percentage)
PMA	Maximum compressor power (in percentage)
ton	Delay before activating a second compressor
toF	Delay before deactivating a second compressor

Parameter	Description
voS	Increment for compressor power
vo2	Decrement for compressor power
t1n	Interval of time with compressor power at PMi after start-up
t1F	Interval of time with compressor power at PMi before stopping the regulation
MnP	Minimum power level for lubrication
tMi	Interval of time with compressor power below the MnP value
tMA	Interval of time with compressor power at PMA after tMi



It is possible to drive inverter with control signal of frequency or voltage (0-10 V DC) type. **NOTE:** the analog output is not configurable. It may be frequency or voltage type depending on the hardware.

16.2.1 How regulation works

- The regulation starts when the value of the pressure/temperature of the suction line increases and reaches the **St1** value. If available, the inverter-controlled compressor will start and be controlled from the PI-regulator. **NOTE:** at the start-up the inverter-controlled compressor will be driven at maximum power for **SUt** seconds in order to ensure proper lubrication.
- Within the regulation band [**SET-0.5*HY1** to **SET+0.5*HY1**] the capacity (speed) of the inverter-controlled compressor will be modulated in accordance with the value of the pressure/temperature variable and by using par. **voS**, when the pressure/temperature is increasing, or by using par. **vo2**, when the pressure/temperature is decreasing.
- When pressure/temperature is higher than [**SET+0.5*HY1**] and the compressor is already at its maximum possible capacity (speed), then another compressor (if available) will be activated after expiring delay **ton**.

NOTE: if pressure/temperature goes over [**SET+0.5*HY1**] and the inverter-controlled compressor is not available (due to safety delays **2on** and **2oF** or due to external signal), another compressor will be activated (if available).

16.2.2 Capacity decrement and regulation stop

- When the pressure goes below the value [SET-0.5*HY1] the inverter-controlled compressor will be forced at the minimum allowable capacity for the time t1F.
- After expiring the delay toF, the second compressor (if active when oA2=CP2) will be deactivated and the inverter-controlled compressor will keep on working for interval of time doF.
- After the delay t1F expires, the inverter-controlled compressor will be stopped.

16.2.3 Capacity limitation by using parameters PMi and PMA

The compressor capacity can be limited both in maximum and minimum value by using par. **PMi** and **PMA** as showed by the previous diagram:

- **PMi: (in percentage)** set the minimum value for the compressor capacity.
- **PMA: (in percentage)** set the maximum value for the compressor capacity.

16.3 DEAD BAND REGULATION

This kind of regulation is available only for ON-OFF compressors (oA1=CP1 and oA2=CP2) and if par. rtY=db.

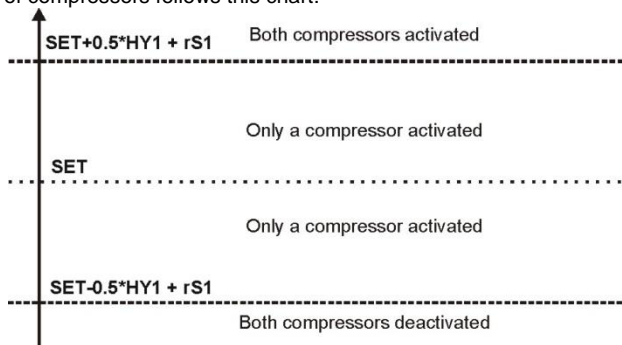
It uses a control variable (pressure/temperature) and a symmetrical band (par. HY1) around the SETPOINT. When the control variable is within the band the outputs stay unchanged. When the control variable is outside the band, the outputs will be enabled or disabled, respecting the delay in activation (par. don, 2on) and deactivation (par. doF, 2oF) according to the following chart:



16.4 PROPORTIONAL BAND REGULATION

This kind of regulation is available only for ON-OFF compressors (oA1=CP1 and oA2=CP2) and if par. rtY=Pbr

The activation of compressors follows this chart:



16.4.1 COMPRESSOR ROTATION

This function is available in case of compressors of equal power and if CPo=SPo.

By using this function (par. roC=YES) is possible to equalize the compressor working hours.

16.5 VENTILATOR REGULATION

This device is able to manage the following type of ventilators:

- ON-OFF (standard by using par. **oA1=Fn1** or par. **oA2=Fn2**)
- ON-OFF in phase-cut mode (by using the internal TRIAC, **oA3=PCF**)
- Electronic type (driven by a voltage command signal, 0-10Vdc type)

The regulation probe is the one set in par. **FPb**.

If a couple of ventilator outputs are set, it is possible to enable the rotation function (par. **roF=YES**) in order to equalize the ventilator working hours.

16.5.1 ON-OFF VENTILATORS

It is possible to drive a max number of 2 ON-OFF ventilators by setting par. **oA1=Fn1** and **oA2=Fn2**.

When only one ventilator is set, then:

- It is activated when **VAL > St2+HY2**
- It is deactivated when **VAL < St2**

If two ON-OFF ventilators are set (**oA1=Fn1** and **oA2=Fn2**) then:

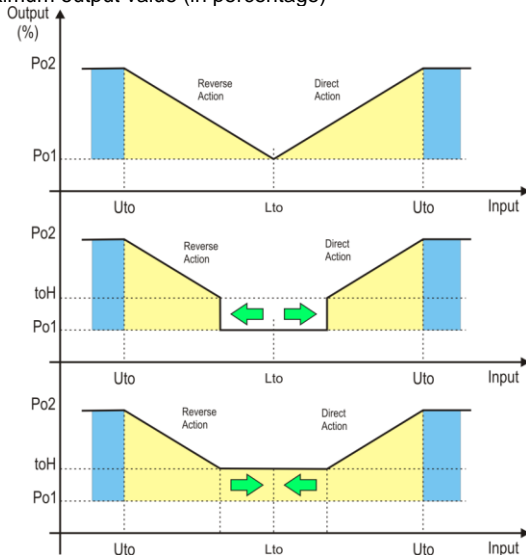
- If **VAL < St2-0.5*HY2** both ventilators are deactivated
- If **St2-0.5*HY2 < VAL < St2+0.5*HY2** then only a ventilator is activated (depending on the par. **roF**)
- If **VAL > St2+0.5*HY2** then both ventilators are activated

16.5.2 PHASE-CUT CONTROL FOR VENTILATORS

It is possible to modulate the ventilator speed by using a phase-cut mode control. This functionality is enabled when par. **oA3=PCF**. The regulation will be proportional to the regulation band and by using the value from probe **FPb**. The max number of managed ventilators depends on the maximum issued current which is 2.2A@230VAC.

The parameters involved are:

- **Lto**: lower limit
- **Hto**: upper limit
- **toH**: differential
- **Po1**: minimum output value (in percentage)
- **Po2**: maximum output value (in percentage)



16.5.3 ELECTRONIC VENTILATORS

If par. **oAn=EFn**, then the analogue output can be used to control electronic ventilators (with input signal command 0-10Vdc). Regulation is proportional in the band defined from par. **HY2**:

- When **VAL=St2** the analogue output will be forced to **Ao1**
- When **St2 < VAL < St2+HY2** the analogue output will be proportional in the range **Ao1...Ao2**
- When **VAL >= St2+HY2** the analogue output will be forced to **Ao2**

16.5.4 SILENT MODE

The activation of the silent mode reduces the maximum allowed speed for ventilators when in predefined intervals.

Parameter	Description
FSS	Fan speed when silent mode active
Hd1	First holyday of the week
Hd2	Second holyday of the week
iLE	Beginning of the silence mode interval during working days
dLE	Duration of the silence mode interval during working days
iSE	Beginning of the silence mode interval during holidays
dSE	Duration of the silence mode interval during holidays

During preset intervals of time the maximum allowed speed will be fixed to par. **FSS** (in percentage).

The silent mode will be deactivated as soon as an alarm is detected.

17. SPECIAL FUNCTIONS

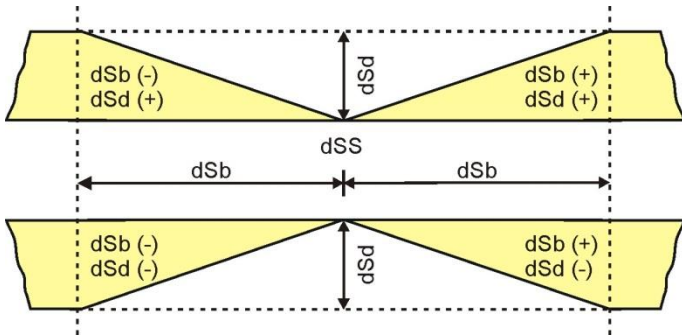
17.1 DYNAMIC SET-POINT

This function is used to move the condensing regulation band (par. **St2** and **HY2**) and use another (external) temperature (par. **dSP**).

Parameter	Description
dSP	External temperature probe
dSS	Dynamic SET-POINT
dSb	Regulation band for dynamic SET-POINT
dSd	Differential for dynamic SET-POINT

17.1.1 HOW IT WORKS

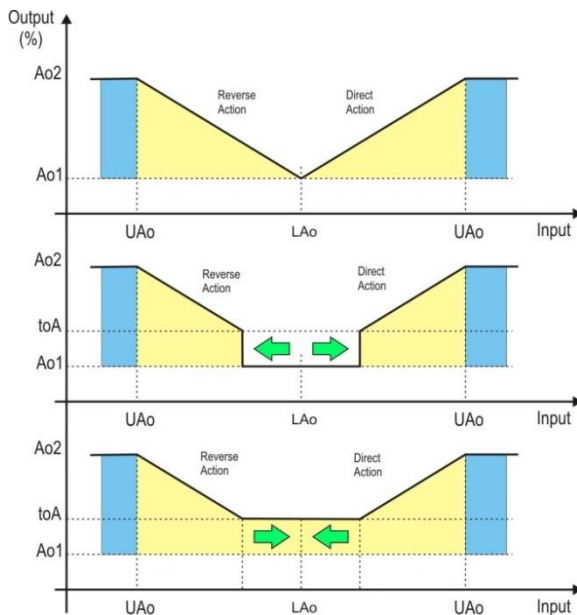
When the temperature measured by the probe **dSP** goes over the **dSS** SET-POINT, this function will be activated. The value of the dynamic SET-POINT increases proportionally from 0 to **dSd** when the temperature measured by the probe **dSP=dSS+dSb**. The value of the dynamic SET-POINT is continuously added to the value of the ventilator set point (**St2**).



17.2 ANALOGUE REPEATER

When enabled (par. **oAn=PrP**) the analogue output will act as a proportional repeater following the value measured from the variable set in the par. **AoP**.

Parameter	Description
L Ao	Lower value for input scale
U Ao	Upper value for input scale
toA	Differential for analogue output
Ao1	Minimum value for analogue output
Ao2	Maximum value for analogue output
Aot	Time with analogue output at maximum after start-up



17.3 “BUMP” FUNCTION

This feature is available only using ON-OFF compressors and if par. **bMp=Y**. When regulation starts, the compressor will be activated and deactivated for a **nu** number of cycles and with a duration respectively set in par. **bon** and **boF**. During the "BUMP" phase pressure/temperature alarms are ignored.

17.4 COMPRESSOR CAPACITY LIMITATION IN CASE OF HIGH CONDENSER PRESSURE/TEMPERATURE

If pressure/temperature measured from probe **FPb>HAF**, then the compressor capacity will be able to be limited in the following way:

- By using par. **HFL** (if Digital or inverter-controlled compressor) for **dHF** interval of time. After that, the compressor will be stopped if the alarm condition persists and if **HFC=YES**
- Immediately stopped after **dHF** interval of time if ON-OFF compressor.

17.5 PRESSURE PROBE ERROR MANAGEMENT AT START-UP

At powering on, a pressure error probe will be signaled after the **P1d** delay expires. If pressure error probe persists, the ON-OFF compressor will be activated following par. **Con** and **CoF**.

If regulation is stopped because of:

- Safety delays
- External alarms (from digital input)
- Pressure alarms

then any measured pressure value out of the probe range will not raise any additional alarm but the display will show the last valid measured value.

17.6 READING FILTER

It is possible to activate a reading filter which acts on the analogue input values (eg. Pressure/temperature values coming from probes). Following the involved parameters:

- **FiC=mEd**, the used value for regulation is the average value calculated on the interval of time **tdG**
- **FiC=1...100**, the used value for regulation is the one calculated by an **exponentially weighted moving average** filter with coefficients **FiC/100**. When **FiC=100** this filter is disabled.

18. DIGITAL INPUTS

There are up to 3 digital inputs available. Two of them are multiplexed with the temperature probe P3 and P4 and they are enabled when **PxP=n, x=3,4**.

The possible functions connected to the digital inputs are explained in the following paragraphs.

The polarity of any digital input can be modified by using the par. **ixP**:

- **ixP=CL**: means that the digital input is active when the external contact is closed
- **ixP=oP**: means that the digital input is active when the external contact is open

18.1 DIGITAL INPUT DISABLED – ixF=nu

The digital input set as **nu** will be not checked from the device.

18.2 REGULATION ENABLED – ixF=Enb

In this case the digital input will act as enabling input. The regulation will start only if the signal is present. If the regulation is locked, the display will show the **Lod** variable alternated with the label "onF" in order to signal the external lock active.

18.3 LOW AND HIGH PRESSURE ALARMS – ixF=LP or HP

This signal is used to signal that a low or high pressure value is present on the cooling circuit. The regulation lock can be temporary or permanent depending on the number of digital input activations (par. **nPx**) in a predefined interval of time (par. **PEi**).

18.3.1 TEMPORARY REGULATION LOCK

A single digital input activation causes the compressor outputs deactivation (delayed of 1 sec each from the other). In addition to this:

- alarm LED and digital output set as alarm (**oAx=ALr**) will be activated;
- all the compressor outputs (**oA1, oA2**) will be deactivated (delayed of 1 sec each from the other);
- solenoid valve control output (**oA3=dGt, d4d**) will be deactivated;
- **oA1=dGt,d4d** and **oA3=dGt,d4d** will be deactivated at the same time;
- analogue output will be deactivated (0V or 0Hz);
- the display will show the relative error label "LP" or "HP";
- the buzzer will be activated (depending on the par. **bEn**);
- the error will be saved into the database.

The regulation will restart as soon as the digital input will be deactivated, respecting all the safety delays.

18.3.2 PERMANENT REGULATION LOCK

If during the interval of time defined from the par. **diA** there is **nPx** digital input activations, then the permanent lock will be enabled. In this situation:

- alarm LED and digital output set as alarm (**oAx=ALr**) will be activated;
- all the compressor outputs (**oA1, oA2**) will be deactivated (delayed of 1 sec each from the other);
- solenoid valve control output (**oA3=dGt,d4d**) will be deactivated;
- **oA1=dGt,d4d** and **oA3=dGt,d4d** will be deactivated at the same time;
- analogue output will be deactivated (0V or 0Hz);
- the display will show the relative error label "LPL" or "HPL";
- the buzzer will be activated (depending on the par. **bEn**);
- the error will be saved into the database.

If **diA=0**, then the lock alarm will be as soon as the **dix** (x=1, 2, 3) digital input will reach the **nPx** value.

The device can be unlocked only manually and in the following ways:

- by keeping the DOWN button pressed for 3 sec (if **rSt=YES**)
- by switching OFF and ON the device (through Stand-by mode)
- by powering OFF and ON the device

18.4 ENERGY SAVING ACTIVATION – ixF=ES

The digital input signal activates and deactivates the energy saving mode.

18.5 SILENCE MODE – ixF=SiL

The digital input is used to activate the silence mode. This function acts on the ventilators driven from an inverter or in phase-cut mode. The ventilator speed is forced to the value of par. **FSS**. In case of an HAF alarm, the silence mode will be exited and the FAN will be driven from the fan algorithm.

18.6 GENERIC EXTERNAL ALARM – ixF=EAL

The digital input reports an external alarm conditions: the device will signal nothing and will continue to work normally.

If the alarm condition persists more than **dx**d min, then an error will be signaled. In this case:

- alarm LED and digital output set as alarm (**oAx=ALr**) will be activated;
- the display will show the relative error label "EA";
- the buzzer will be activated (depending on the par. **bEn**);
- the error will be saved into the database.

Alarm reset is automatic and happens when:

- the malfunctioning cause ends and the digital input is deactivated.

The buzzer can be muted by pressing any button.

18.7 LOCK ALARM – ixF=bAL

The digital input reports an external alarm conditions which causes the lock of the device. In this case:

- alarm LED and digital output set as alarm (**oAx=ALr**) will be activated;
- all the compressor outputs (**oA1**, **oA2**) will be deactivated (delayed of 1 sec each from the other);
- solenoid valve control output (**oA3=dGt,d4d**) will be deactivated;
- **oA1=dGt,d4d** and **oA3=dGt,d4d** will be deactivated at the same time;
- analogue output will be deactivated (0V or 0Hz);
- the display will show the relative error label "CA";
- the buzzer will be activated (depending on the par. **bEn**);
- the error will be saved into the database.

Alarm reset is automatic and happens when:

- the root cause ends and the digital input is deactivated.

The regulation always re-starts after the safety delays are up (es. **2on**, minimum time between two consecutive compressor activations, and **2oF**, minimum time between one compressor stop and next start-up).

The buzzer can be muted by pressing any button.

18.8 SECURITY INPUT – ixF=oAx

The digital input is used to deactivate the **oAx** output. It can be used to deactivate both compressor and ventilators. The following outputs will not be affected from digital input:

- **oA3 = dGt, d4d**
- **oAx = ALR**

Any digital input activation will lead to immediately deactivate the linked output. This condition will be signaled on the display by the label "EAx" (x=1, 2, 3, n) and by the flashing of the relative icon. As soon as the digital input deactivates, the regulation will restart depends on the par. **Ar**.

If **Ar=MA**n, the output will stay locked until a manual restart (done by keeping the **DOWN** button pressed for 3 sec and if **rSt=YES**).

18.9 REVERSE ANALOGUE OUTPUT ACTION – ixF=rEv

The digital input is used to reverse the analogue output set as proportional repeater (**oAn=PrP**) from direct to reverse action.

19. ALARMS

Any alarm is visualized on the display with a specific code as reference. In case of multiple alarms are simultaneously present, these will be visualized in rotation. The buzzer activation, due to a new alarm condition, can always be muted if **tbA=YES**.

In case of a new alarm condition:

- Alarm code signaled on the display.
- Alarm output activation (**oA1...oA3**) if set as **ALr**.
- Buzzer activation (if present and enabled).
- Alarm condition memorization in the internal alarm list.

19.1 BUZZER MUTING AND RELAY DEACTIVATION

If any alarm condition is active, the buzzer can be muted by pressing any button. Moreover, keeping any button pressed for more than 3 sec will deactivate also the alarm relay.

19.2 TABLE: ALARM CONDITIONS

CODE	DESCRIPTION	DUE TO	ACTION	RESET
Px	Probe error (x=1, 2, 3, 4)	Probe damaged or not configured	Change probe or modify configuration	Automatic after error condition ends
HA	High pressure/temperature warning on suction line	Pressure/temperature out of range	Check cooling circuit	Automatic after error condition ends
LA	Low pressure/temperature warning on suction line	Pressure/temperature out of range	Check cooling circuit	Automatic after error condition ends
H2	High pressure/temperature warning on condenser	Pressure/temperature out of range	Check cooling circuit	Automatic after error condition ends
L2	Low pressure/temperature warning on condenser	Pressure/temperature out of range	Check cooling circuit	Automatic after error condition ends
HLL	Low pressure/temperature lockout on condenser	Pressure/temperature out of range	Check cooling circuit	Manual after error condition ends

CODE	DESCRIPTION	DUE TO	ACTION	RESET
dLt	Discharge line temperature warning	Temperature out of range	Check cooling circuit	Automatically after temperature goes below the differential and at the end of the cooling time
dLL	Discharge line temperature lockout	Temperature out of range	Check cooling circuit	Manual after temperature goes below the differential and at the end of the cooling time
ELP	Electronic pressure switch warning	Pressure out of range	Check cooling circuit	Automatic after error condition ends
ELL	Electronic pressure switch lockout	Pressure out of range	Check cooling circuit	Manual by powering off and on the device
HP	External high pressure switch warning	Pressure out of range	Check cooling circuit	Automatic after error condition ends
LP	External low pressure switch warning	Pressure out of range	Check cooling circuit	Automatic after error condition ends
HPL	External high pressure switch lockout	Pressure out of range	Check cooling circuit	Manual by powering off and on the device
LPL	External low pressure switch lockout	Pressure out of range	Check cooling circuit	Manual by powering off and on the device
CUP	Compressor maintenance warning	-	Perform maintenance	Manual by powering off and on the device
FUP	Ventilator maintenance warning	-	Perform maintenance	Manual by powering off and on the device
EE	EEPROM memory error	Hardware problem	Contact Dixell Service	-
rtC	RTC configuration error	-	Set RTC parameters	Automatic after error condition ends
rtF	RTC malfunctioning	Hardware problem	-	-

20. TECHNICAL SPECIFICATIONS

Housing: self-extinguishing ABS

Case: frontal 32x74 mm; depth 60mm

Mounting: panel mounting in a 71x29mm panel cut-out

Protection: IP20; **Frontal protection:** IP65

Connections: plug-in terminal block $\leq 2.5 \text{ mm}^2$ wiring

Power supply: according to the model

24VAC, $\pm 10\%$

110AC $\pm 10\%$, 50/60Hz

230VAC $\pm 10\%$, 50/60Hz

Power absorption: 3.5VA max

Display: 3 digits, red LED, 14.2 mm high

Inputs: up to 4 NTC10k / NTC86k or PT1000 probes

Digital inputs: up to 3 free voltage contacts

Outputs:

oA1: SPST 16(8) A, 250VAC

oA2: SPST 5(2) A, 250VAC (only for XC35CX)

oA3 (Triac): (depending on the model) 0,5A@250Vac or @120Vac; 1,5A@24Vac

oAn (0-10Vdc): max 20mA

Buzzer: optional

Data storing: on the non-volatile memory (EEPROM)

Internal clock back-up: 24 hours

Kind of action: 1B

Pollution degree: 2

Software class: A

Rated impulsive voltage: 2500V

Oversvoltage Category: II

Operating temperature: -10 to 55°C (14 to 131°F)

Storage temperature: -20 to 85°C (-4 to 185°F)

Relative humidity: 20 to 85% (no condensing)

Measuring and regulation range:

NTC10k: -40 to 110°C (-40 to 230°F)

NTC86k: -40 to 180°C (-40 to 356°F)

PT1000: -100 to 200°C (-148 to 392°F)

Resolution: 0.1°C or 1°C or 1°F (selectable), 0.1 bar, 1PSI

Accuracy (ambient temp. 25°C): $\pm 0.7^\circ\text{C} \pm 1$ digit

Dixell



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