XRi77CX - XRi77CH

Digital controller for variable speed drive

FW 23.2

1. GENERAL WARNING

1.1 PLEASE READ BEFORE USING THIS MANUAL

- This manual is part of the product and should be kept near the instrument for easy and quick reference.
- The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- Check the application limits before proceeding.
- Dixell Srl reserves the right to change the composition of its products, even without notice, ensuring the same and unchanged functionality.

1.2 SAFETY PRECAUTIONS

- Check the supply voltage is correct 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 condensation
- **Warning**: disconnect all electrical connections before any kind of maintenance.
- Fit the probe where it is not accessible by the End User. 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.
- In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.

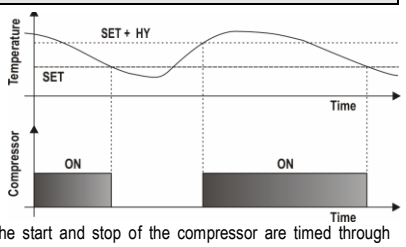
2. GENERAL DESCRIPTION

Model **XRi77CX-CH**, format 32x74mm, is microprocessor-based controller, suitable for applications on medium or low temperature ventilated refrigerating units. It has four relay outputs to control compressor, fan, defrost, which can be either electrical or reverse cycle (hot gas) and light (configurable). It could be provided with a Real Time Clock which allows programming of up to 6 daily defrost cycles, divided into holidays and workdays. A "Day and Night" function with two different set points is fitted for energy saving. It is also provided with up to four NTC probe inputs. The first probe is used for temperature control. The second probe is used to control the defrost termination temperature at the evaporator. One of the two digital inputs can operate as third temperature probe. The fourth probe is used to control the condenser temperature (for condenser alarm management) or to display a temperature.
The RS485 serial output allows connecting the unit to a network line (**ModBUS-RTU** compatible) such as any Dixell monitoring units of X-WEB family. The HOT-KEY receptacle allows programming the controller by using an HOTKEY programming device.
The instrument is fully configurable through special parameters that can be easily programmed through the frontal keyboard.

3. CONTROLLING LOADS

3.1 COMPRESSOR

The regulation is performed according to the temperature measured by the thermostat probe with a positive differential (**HY**) over the set point: if the temperature increases and reaches set point plus differential, the compressor will start. It will turn off as soon as the temperature reaches the set point value again.



In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters **Con** and **CoF**.

3.2 DEFROST

Two defrost modes are available through the **tdF** parameter: defrost through electrical heater (**tdF=EL**) and hot gas defrost (**tdF=in**).
The defrost interval depends on the presence of the RTC (optional). The internal RTC is controlled by means of the **EdF** parameter:
- **EdF=in:** the defrost is made every **idF** time – standard way for controller without RTC.
- **EdF=rtC:** the defrost is real time controlled, depending on the hours set in the parameters **Ld1...Ld6** (for workdays).

Other parameters are used to control defrosting cycles: the maximum length (**MdF**) and defrosting modes: timed or controlled by the evaporator's probe (**P2P**).
At the end of defrost dripping time is started, its length is set in the **Fdt** parameter. With **Fdt=0** the dripping time is disabled.

3.2.1 PRE-DEFROST

The par. **dAF** enable a pre-defrost phase. During this interval the regulation setpoint will be moved to the value SET-1°C (or SET-1°F). The defrost phase starts as soon as the regulation temperature reach the pre-defrost setpoint or when the **dAF** timer ends. This function is disable when **dAF=0**.

3.2.2 HOT GAS DEFROST

If **tdF=in**, the defrost phase will act as follow:
- If **dSd>0**, the compressor output will be deactivated
- At the end of **dSd** interval, the defrost output will be activated and timer **StC** will start
- At the end of **StC** interval, the compressor output will be reactivated.

If **dSd=0** or **StC=0**, the relative functions will be disabled.

3.3 CONTROL OF EVAPORATOR FANS

The fan control mode is selected by means of the **FnC** parameter:
- **FnC=C_n**, fans will switch ON and OFF with the compressor and **not run** during defrost.
- **FnC=o_n**, fans will run even if the compressor is off, and not run during defrost.

After a defrost, there is a timed fan delay allowing for drip time, set by means of the **Fnd** parameter.
- **FnC=C_Y**, fans will switch ON and OFF with the compressor and **run** during defrost.
- **FnC=o_Y**, fans will run continuously also during defrost.

An additional parameter **FSt** provides the setting of temperature, detected by the evaporator probe, above which the fans are always OFF. This is used to make sure circulation of air only if his temperature is lower than set in **FSt**.

3.3.1 FORCED ACTIVATION OF FANS

This function managed by the **FCt** parameter is designed to avoid short cycles of fans, that could happen when the controller is switched on or after a defrost, when the room air warms the evaporator.
How it works: if the temperature difference between evaporator probe and room probe is higher than the **FCt** parameter value, fans will be switched on. With **FCt=0** the function is disabled.

3.3.2 CYCLIC ACTIVATION OF THE FANS WITH COMPRESSOR OFF

When **FnC=C-n** or **C-Y** (fans working in parallel with the compressor), by means of the **Fon** and **FoF** parameters the fans can carry out on and off cycles even if the compressor is switched off. When the compressor is stopped the fans go on working for the **Fon** time. With **Fon=0** the fans remain always off, also when the compressor is off.

3.4 RELAY CONFIGURATION (PAR. OA0, OA1, OA2, OA3)

The functioning of the configurable relays (terminals 1-2 and 1-7-8) can be set by the **oA1** and **oA2** parameters, according to the kind of application. In the following paragraph the possible setting:

3.4.1 LIGHT RELAY

With **oAx=LiG** the related relay operates as light output.

3.4.2 AUXILIARY RELAY

Relay activation by digital input 1 or digital input 2 (**oAx=AUS**, **i1F** or **i2F=AUS**): with **oAx=AUS** and **i1F**, **i2F=AUS** the AUX relay is switched on and off by digital inputs.

3.4.3 ON/OFF RELAY (OAX = ONF)

When **oAx=onF**, the related relay is activated when the controller is turned on and de-activated when the controller is turned off.

3.4.4 NEUTRAL ZONE REGULATION

With **oAx=db** the related relay can control a heater element to perform a neutral zone action.
- **oAx** cut in = **SET-HY**
- **oAx** cut out = **SET**

3.4.5 ALARM RELAY

With **oAx=Alr** the related relay operates as alarm relay. It is activated every time an alarm happens. Its status depends on the **tbA** parameter: if **tbA=Y**, the relay is silenced by pressing any key.
If **tbA=n**, the alarm relay stays on until the alarm condition recovers.

3.4.6 SECOND COMPRESSOR

If **oAx=CP2**, it will work as second compressor output. The anti-short cycle parameter **AC1** gives the possibility to desynchronize the compressor activations.

3.4.7 SECOND DEFROST OUTPUT

If **oAx=dF2**, it will work as second defrost output.
NOTE: It is also possible to manage 2 different and independent defrost by using special parameter map. Please refer to Dixell to activate this function.

3.4.8 NIGHT BLINDS MANAGEMENT DURING ENERGY SAVING CYCLES

With **oAx=HES,** the related relay operates to manage the night blind: the relay is energised when the energy saving cycle is activated by digital input or frontal button.

3.4.9 HEATER FOR WATER DRIPPING

If **oAx=Het**, the related output will work as heater for water dripping during and after any defrost.

3.4.10 REGULATION OUTPUT

If **oAx=inV**, the related output will work as regulation output and will stay active as soon as the regulation request is running.

4. PULL DOWN

An automatic function named PULL-DOWN is implemented. This function forces the controller to work at **PMA** until reaching a specific SETPOINT (par. **CCS**) for a maximum interval of time (par. **CCt**). The PULL-DOWN function is activated:
At start-up if the temperature measured from the regulation probe is higher than the SETPOINT
After any defrost
If the temperature measured from regulation probe go over the **SET+HY+HY1+oHt** value.
If one of the above conditions happens, the controller will maintain the maximum compressor speed (**PMA**) until reaching the **CCS** setpoint. The maximum interval of time for any PULLDOWN is defined from par. **CCt**.

5. EVAPORATOR FAN CONTROL

The evaporator fan control mode is selected by means of the **FnC** parameter:
- **FnC = C_n:** fans will switch ON and OFF with the compressor and **not run** during defrost
- **FnC = o_n:** fans will run even if the compressor is off, and not run during defrost

After defrost, there is a timed fan delay allowing for drip time, set by means of the **Fnd** parameter.
- **FnC = C_Y:** fans will switch ON and OFF with the compressor and **run** during defrost
- **FnC = o_Y:** fans will run continuously also during defrost

The par. **FAP** is used to select which temperature probe will be used from the evaporator fan regulator. A specific setpoint (par. **FSt**) provides the temperature value, detected by the evaporator probe, above which the fans are always OFF. This is used to make sure circulation of air only if his temperature is lower than set in **FSt-HYF**.

5.1 FORCED ACTIVATION FOR FANS

This function, managed by the **FCt** parameter, is designed to avoid short cycles of fans, that could happen when the controller is switched on or after a defrost, when the room air warms the evaporator. If the difference between the evaporator temperature and the room temperature is higher than the **FCt** value, the controller will activate the fans. This function is disabled if **FCt=0**.

5.2 CYCLIC ACTIVATION OF THE FANS WHEN THE COMPRESSOR IS SWITCHED OFF

When **FnC=C-n** or **C-Y** (fans in parallel to the compressor), the fans will be able to carry out on and off cycles even if the compressor is switched off. The on and off interval of time follow the **Fon** and **FoF** parameters. When the compressor is stopped, the fans will go on working for the **Fon** time. On the other side, with **Fon=0** the fans will stay always off when the compressor is off.

6. CONDENSER FAN CONTROL

The condenser fan control mode is selected by means of the **FCC** parameter:
- **FCC = C_n:** fans will switch ON and OFF with the compressor and **not run** during defrost
- **FCC = o_n:** fans will run even if the compressor is off, and not run during defrost
- **FCC = C_Y:** fans will switch ON and OFF with the compressor and **run** during defrost
- **FCC = o_Y:** fans will run continuously also during defrost

The par. **FAC** is used to select which temperature probe will be used from the condenser fan regulator. This regulator uses a specific setpoint (par. **St2**) and differential (par. **HY2**) to activate and deactivate the condenser fans:
- If **T>St2+HY2** the condenser fans are activated
- If **T<St2** the condenser fans are deactivated

The par. **FCo** can be used to keep the ventilators active for a period after compressor OFF.

7. AUXILIARY REGULATOR

The auxiliary regulator can be be linked to a digital output (relay) for ONOFF regulation.
The parameters used to configure the auxiliary regulators are the following:

ACH	Kind of action for auxiliary regulator
SAA	Set point for auxiliary regulator
SHY	Differential for auxiliary regulator
ArP	Probe selection for auxiliary regulator
Sdd	Auxiliary regulator disabled during any defrost

8. DUAL MAP FEATURE

The controller is programmed with 2 different parameter maps. In this way, it is possible to choose the right map to meet both LT and NT applications. There are two different way to do this:
- If **i1F=nt**, it will be possible to change the working map by using the digital input.
- By using the **DOWN** button, if it is linked to the map changing function. If so, keep it pressed 3 sec to activate the relative function.

9. VARIABLE SPEED COMPRESSOR CONTROL

9.1 FREQUENCY MODE

The controller can drive variable speed compressors with frequency control input. The frequency output port can issue a frequency signal from 30 to 200Hz, duty cycle=50%. A special cable must be used in order to connect the frequency output of the controller to the frequency input of the specific inverter.

- CAB/EM1: cable **DD900002 20** for Embraco VNEK/U models
- CAB/SE1: cable **DD900002 22** for SECOP NLV models

NOTE:
- An inverter compressor can be completely controlled from the frequency output only.
- Only one compressor can be connected when frequency mode is used

9.2 PARAMETERS

The following parameters are used to set the regulation:

HY1	**Differential for proportional regulation:** (0.1 to 25.5°C; 1 to 45°F)
Fr0	**Frequency output value with compressor stopped:** (0 to 50Hz) frequency output signal when compressor stopped
PMi	**Minimum compressor speed (in percentage):** (0 to PMA)
PMA	**Maximum compressor speed (in percentage):** (PMi to 100%)
voS	**Signal output variation (increment) when temperature is increasing:** if **vdC=FrE** then 1 to 100 Hz, otherwise 10 to 1000 rpm
vo2	**Signal output variation (decrement) when temperature is decreasing:** if **vdC=FrE** then 1 to 100 Hz, otherwise 10 to 1000 rpm
vo3	**Signal output variation (decrement) after any Pull Down:** if **vdC=FrE** then 1 to 100 Hz, otherwise 10 to 1000 rpm
t1F	**Time with compressor at PMI before stopping regulation:** (0 to 999 min)
SPi	**Compressor speed (in percentage) in case of any error probe:** (PMi to PMA)
CMn	**Continuous mode during Normal Mode:** (n; Y)
CME	**Continuous mode during Energy Saving Mode:** (n; Y)

The value of the par **HY1** can normally be set to the same value of par. **HY**. In this way, the regulation band will be extended from **SET** to **SET+HY+HY1**. The device will activate the regulation when the measured temperature will go over the **SET+HY** value and will stop the regulation when the temperature will reach the **SET** value. When the regulation is running, the frequency output, and then the compressor speed, will be calculated in proportional way by using the **PMi…PMA** band. After reaching the **SET+HY** value, the controller will start increasing the frequency output, and then the equivalent compressor speed, by using the par. **voS**. The speed increasing will be stopped as soon as the proportional calculated value (for the compressor speed) hooks the requested value. In case of temperature decrement and compressor speed higher than the new requested value, the controller will decrease the compressor speed proportionally by using the **vo2** value. After any Pull Down, and in case of continuous mode regulation (**CMn** or **CME=Y**) it is possible to speed up the compressor speed decrement by using par. **vo3**. This helps to avoid subfreezing conditions due to high compressor speed after reaching the regulation setpoint.
After reaching the **SET** value it is possible to force the compressor speed to **Pmi** for **t1F** min.
In case of any regulation probe error, the compressor speed will be set to the value of par. **SPi**.
It is possible to enable a cyclic or a continuous mode operation both during normal mode or energy saving mode:
- **CMn, CME = Y**: after reaching the SETPOINT the VSC will keep on running
- **CMn, CME = n**: after reaching the SETPOINT the VSC will be stopped (after **t1F**)

9.3 TEMPERATURE DEADLOCK CONTROL

The controller can detect temperature deadlocks. If the actual speed is not able to reach the SETPOINT, and if this condition persists for a long interval of time, then the controller will increment the actual speed until reaching the SETPOINT. A differential (par. **th1**) and a speed increment (par. **oFS**) is used to detect and manage any deadlock condition.

9.4 HOT GAS DEFROST

In case of using hot-gas defrost, it will be possible to set the compressor speed by using par. **Aod**.

9.5 PULL DOWN

An automatic function named PULL DOWN is implemented. This function forces the controller to work at **PMA** until reaching a specific SETPOINT (par. **CCS**) for a maximum interval of time (par. **CCt**). The PULL-DOWN function is activated:
- At start-up if the temperature measured from the regulation probe is higher than the **SET+HY+HY1**
- After any defrost
- If the temperature measured from regulation probe go over the **SET+HY+HY1+oHt** value.

If one of the above conditions happens, the controller will maintain the maximum compressor speed (**PMA**) until reaching the **CCS** setpoint. The maximum interval of time for any PULLDOWN is defined from par. **CCt**. At the end of any PULL DOWN it is possible to set an interval of time (par. **t1F**) with predefined compressor speed (**PMi**).

9.6 OIL MIGRATION CONTROL (VALID ONLY FOR VSC)

To avoid oil migration during variable speed compressor operation, a lubrication control is implemented. If the compressor works with a speed lower than the **MnP** threshold for **tMi** time, then the compressor speed will be increased to **PMA** for **tMA** time.
NOTES:
- **MnP= PMi to PMA, nu, OFF**
- If **MnP=nu**, then this function is disabled

If **MnP=oFF**, then the compressor will be stopped for **tMA** if it works continuously for **tMi**

9.7 STEP REGULATION: VSD AND ONOFF COMPRESSOR

The following parameters are used to set up the step regulation function:

Pon	Step regulation: inverter compressor speed during ton (in percentage)
SCd	Step regulation: deactivation of the ONOFF compressor
ton	Step regulation: delay before activation of the second compressor (when T> SET + HY + HY1)
toF	Step regulation: delay before deactivation of the second compressor
don	Step regulation: minimum operating time of the second compressor
doF	Step regulation: minimum stop time of the second compressor

The step regulation is activated when at least one ONOFF compressor is enabled (**oAx=CP1** or **CP2**) and **oAn=FrE**.
The second compressor (the ONOFF one) will be activated when T > SET+HY+HY1.
The ONOFF compressor deactivation follows par. **SCd**.

10. FRONT PANEL AND COMMANDS

SET	To display target set point; in programming mode it selects a parameter or confirm an operation.
	(**DEF**) To start a manual defrost.
	(**UP**) To see the used parameter map. When in programming mode, it browses the parameter codes or increases the displayed value.
	(**DOWN**) To see the used parameter map. When in programming mode, it browses the parameter codes or decreases the displayed value. Keep it pressed 5 sec to change parameter map from "nt" to "Lt" and vice-versa (valid when button properly configured).
	To switch the instrument on and off (when **onF=oFF**).
	To switch on and off the light (when **oAx=LiG**).

KEY COMBINATIONS:

+	To lock & unlock the keyboard
SET +	To enter in programming mode
SET +	To exit the programming mode

10.1 USE OF LEDS

Icon functions are described in the following table:

LED	MODE	FUNCTION
	ON	Compressor enabled
	Flashing	Anti-short cycle delay enabled
	ON	Defrost enabled
	Flashing	Drip time in progress
	ON	Fans enabled
	Flashing	Fans delay after defrost in progress.
	ON	An alarm is occurring
	ON	A PULL DOWN is running
ECO	ON	Energy saving enabled
	ON	Light on
AUX	ON	Auxiliary relay on
°C,°F	ON	Measurement unit
	Flashing	Programming phase

11. MAX & MIN TEMPERATURE MEMORIZATION

11.1 HOW TO SEE THE MIN TEMPERATURE

1. Press and release the **DOWN** button (if properly configurated).
2. The "**Lo**" message will be displayed followed by the minimum temperature recorded.
3. By pressing the **DOWN** button again or waiting for 5 sec the normal display will be restored.

11.2 HOW TO SEE THE MAX TEMPERATURE

1. Press and release the **UP** button (if properly configurated).
2. The "**Hi**" message will be displayed followed by the maximum temperature recorded.
3. By pressing the **UP** button again or waiting for 5 sec the normal display will be restored.

11.3 HOW TO RESET THE MAX AND MIN TEMPERATURE RECORDED

1. Keep **SET** button pressed for more than 3 sec while the max or min temperature is displayed. ("**rSt**" message will be displayed)
2. After confirming the operation, the "**rSt**" message will start blinking and then the normal temperature will be displayed.

12. MAIN FUNCTIONS

12.1 TO SET THE CURRENT TIME AND DAY (ONLY WITH RTC)

When the instrument is switched on, it could be required to set the real-time clock.

1. Enter the Pr1 programming menu by keeping both **SET+DOWN** buttons pressed for 3 sec.
2. Browse to the **rtC** menu and then push the **SET** key to enter the real time clock menu.
3. The **Hur** (hour) parameter is displayed.
4. Push the **SET** and set current hour by the **UP** and **DOWN** keys, then push **SET** to confirm the value.
5. Repeat the same operations with **Min** (minutes) and **dAy** (day) parameters and other parameters.

To exit: Push both **SET+UP** buttons or wait for 15 sec without pushing any button.

12.2 HOW TO SEE THE SET POINT

1. Push and immediately release the **SET** key: the display will show the Set point value
2. Push and immediately release the **SET** key or wait for 5 sec to display the probe value again

12.3 HOW TO CHANGE THE SET POINT

1. Push the **SET** button for 3 sec to change the Set point value.
2. The value of the set point will be displayed and the **°C** or **°F** icon will start blinking
3. Use the **UP** or **DOWN** buttons to modify the current value
4. Use the **SET** button to store the new value into memory

12.4 HOW TO START A MANUAL DEFROST

Keep the **DEF** button pressed for 3 sec to start a manual defrost.

12.5 HOW TO ENTER PARAMETER PROGRAMMING MENU "PR1"

Follow these steps:

1. Enter the Programming mode by pressing the **SET+DOWN** buttons for 3 sec (the **°C** or **°F** LED will start blinking)
2. Browse to the required parameter and then press the **SET** button to display its current value
3. Use **UP** or **DOWN** buttons to change its value
4. Press **SET** button to store the new value and move to the following parameter

To exit: press **SET+UP** buttons or wait for 15 sec without pressing any key.

NOTE: the set value is stored even when the procedure exits by waiting for the time-out

12.6 HOW TO ENTER PARAMETER PROGRAMMING MENU "PR2"

The manufacturer menu (Pr2) includes all the parameters of the instrument.

12.6.1 ENTERING THE PARAMETER PROGRAMMING MENU "PR2"

1. Enter the Programming mode by pressing the **SET+DOWN** buttons for 3 sec (the **°C** or **°F** icon will start blinking).
2. Released the buttons and then push again the **SET+DOWN** buttons for more than 7 sec. The Pr2 label will be displayed immediately followed from the **HY** parameter.

   NOW THE PARAMETER MENU "PR2" IS AVAILABLE FOR ANY MODIFICATION

3. Browse to the required parameter.
4. Press the **SET** button to display its value.
5. Use **UP** or **DOWN** to change its value.
6. Press **SET** to store the new value and move to the following parameter.

To exit: press **SET+DOWN** or wait for 15 sec without pressing any key.

NOTE1: if no parameter is present in Pr1 menu, after 3 sec the "**noP**" message will be displayed. Keep the buttons pushed till the Pr2 message will be displayed.

NOTE2: the set value is stored even when the procedure ends by waiting for the time-out

12.6.2 HOW TO MOVE A PARAMETER FROM "PR2" MENU TO "PR1" MENU AND VICE-VERSA

Each parameter present in the hidden menu (Pr2) can be moved into the user level (Pr1) by pressing both **SET+DOWN** buttons. If a parameter is part of the user level, when showed in the hidden menu the decimal point will be lit.

12.7 HOW TO LOCK THE KEYBOARD

1. Keep both **UP** and **DOWN** buttons pressed more than 3 sec.
2. The "**PoF**" message will be displayed, and the keyboard will be locked. At this point it will be possible only to see the set point or the MAX o Min temperature stored
3. If a button is pressed more than 3 sec the "**PoF**" message will be displayed.

12.8 HOW TO: UNLOCK THE KEYBOARD

Keep both **UP** and **DOWN** pressed more than 3 sec till the **"Pon"** message will be displayed.

12.9 THE ON/OFF FUNCTION

By pushing the **ON/OFF** key, the instrument will go in stand-by.
During the stand-by status, all the relays are switched OFF and the regulations are stopped; if a monitoring system is connected, it does not record the instrument data and alarms.

WARNING: Loads connected to the normally closed contacts of the relays are always supplied and under voltage, even if the instrument is in stand-by mode.

13. PARAMETERS

rtC	**Real time clock menu (only for controller with RTC):** to set the time and date and defrost start time.

REGULATION

LS	**Minimum set point:** (-100°C to SET; -148°F to SET) sets the minimum value for the set point.
US	**Maximum set point:** (SET to 150°C; SET to 302°F) set the maximum value for set point.
HY	**Differential for normal regulation (compressor cut-in):** (0.1 to 25.5°C; 1 to 45°F) differential for set point. Compressor Cut IN is Set Point + differential (HY). Compressor Cut OUT is when the temperature reaches the set point.
odS	**Outputs delay activation after power on:** (0 to 255min) this function is enabled at the initial start-up of the instrument and inhibits any output activation for the period set in the parameter.
AC	**Compressor anti-short-cycle delay:** (0 to 50min) minimum interval between the compressor stop and the following restart.
AC1	**Second compressor anti-short-cycle delay:** (0 to 50min) minimum interval between the second compressor stop and the following restart.

MCo	**Maximum time with compressor active:** (0 to 255 min) if compressor working time is over MCo, it will be stopped. MCo=0 means function disabled.
rtr	**F(P1; P2) percentage for regulation:** (0 to 100; 100=P1, 0=P2) it allows to set the regulation according to the percentage of the first and second probe, as for the following formula (rtr(P1-P2)/100 + P2).
CCt	**Maximum duration for Pull Down:** (0.0 to 24h00min, res. 10min) allows setting the length of the PULL-DOWN cycle. Compressor stays on without interruption during **CCt** time. This is useful, for instance, when the room is filled with new products.
CCS	**Differential for Pull Down:** (-12 to 12°C; -21 to 21°F) relative value to add to the regulation SETPOINT and to use during any PULL-DOWN cycle.
oHt	**Threshold for automatic activation of Pull Down in normal mode:** (0.0 to 25.5°C; 0 to 45°F) upper threshold for auto activation of a PULL DOWN
Con	**Compressor ON time with faulty probe:** (0 to 255min) time during which the compressor is active in case of faulty thermostat probe. With **Con=0** compressor is always OFF.
CoF	**Compressor OFF time with faulty probe:** (0 to 255min) time during which the compressor is OFF in case of faulty thermostat probe. With **CoF=0** compressor is always active.
Pon	**Inverter compressor speed during ton (in percentage):** 0 to 100%
SCd	**Deactivation of the ONOFF compressor:** (th1; th2) define when ONOFF compressor is stopped. **th1**=when T<SET+HY; **th2** when t<SET
ton	**Delay before activation of the second compressor (when T> SET + HY + HY1):** 0 to 255 sec
toF	**Delay before deactivation of the second compressor:** 0 to 255 sec
don	**Minimum operating time of the second compressor:** 0 to 255 sec

VARIABLE SPEED COMPRESSOR CONTROL

HY1	**Differential for normal regulation (compressor cut-in):** (0.1 to 25.5°C; 1 to 45°F)
Fr0	**Frequency output value with compressor stopped:** ([0 Hz ÷ FMi])
PMi	**Minimum drive speed (in percentage):** (0 to PMA)
PMA	**Maximum drive speed (in percentage):** (PMi to 100%)
voS	**Compressor speed variation (increment) when temperature is increasing:** (1 to 100 Hz/min, StP) StP = means that inverter speed is adapted immediately on temperature variation
vo2	**Compressor speed variation (decrement) when temperature is decreasing:** (0 to 100 Hz/min, StP, nu) StP = means that inverter speed is adapted immediately on temperature variation; nu = speed decrement disabled
vo3	**Compressor speed variation (decrement) after any Pull Down:** (0 to 100 Hz/min, StP, nu) StP = means that inverter speed is adapted immediately on temperature variation; nu = speed decrement disabled
PdP	**Variable Speed Drive (in percentage) during any Pull Down:** 0 to 100 %
t1F	**Time with Variable Speed Drive at minimum before stopping it:** 0 to 999 min
Spi	**Variable Speed Drive (in percentage) in case of any error probe:** PMi to PMA
Aod	**Variable Speed Drive (in percentage) during any defrost:** PMi to PMA
AoF	**Variable Speed Drive (in percentage) during a pre-defrost phase**: PMi to PMA
tH1	**Differential for deadlock control:** 0.1 to 1.0°C
oFS	**Compressor speed increment during any deadlock condition:** 1 to 10Hz
CMn	**Continuous mode regulation when normal mode:** (n; Y)
CME	**Continuous mode regulation when energy saving mode:** (n; Y)
MnP	**Minimum compressor speed for activating lubrication control (valid only for Variable Speed Drive):** (nu, 1÷99%, OFF) nu = function disabled; OFF = compressor is stopped for tMA time
tMi	**Compressor running time below the MnP threshold:** (0.0 to 24h00min)
tMA	**Lubrication control interval:** 0 to 255 min

PROBES

PbC	**Temperature probe selection:** ntC; PtC; PT1000
ot	**Probe P1 calibration:** (-12.0 to 12.0°C; -21 to 21°F) allows to adjust possible offset of the thermostat probe.
P2P	**Probe P2 presence:** (n; Y) **n** = not present, the defrost stops by time; **Y** = present, the defrost stops by temperature.
oE	**Probe P2 calibration:** (-12.0 to 12.0°C; -21 to 21°F) allows to adjust possible offset of the evaporator probe.
P3P	**Probe P3 presence:** (n; Y) **n** = not present, the terminals 18-20 operate as digital input; **Y** = present, the terminals 18-20 operate as third probe.
o3	**Probe P3 calibration:** (-12.0 to 12.0°C; -21 to 21°F) allows to adjust possible offset of the third probe.
P4P	**Probe P4 presence:** (n; Y) **n** = not present; **Y** = present
o4	**Probe P4 calibration:** (-12.0 to 12.0°C; -21 to 21°F) allows to adjust possible offset of the fourth probe

DISPLAY

CF	**Temperature measurement unit:** (°C; °F) °C = Celsius; °F = Fahrenheit. WARNING: When the measurement unit is changed the SET point and the values of the parameters HY, LS, US, ot, ALU and ALL have to be checked and modified (if necessary).
rES	**Resolution for °C:** (in=1°C; dE=0.1°C) allows decimal point display.
Lod	**Probe visualized** (P1; P2, P3, P4, SET, dtr) it selects which probe is displayed by the instrument. P1 = Thermostat probe; P2 = Evaporator probe; P3 = Third probe (only for model with this option enabled); P4 = Fourth probe, SET = set point; dtr = percentage of visualization.
dLY	**Temperature visualization delay:** (0 to 20min00s; res. 10 sec) when the temperature increases, the display is updated of 1°C or 1°F after this time.
dtr	**Visualization percentage=F(P1;P2)**: (1 to 99; 99=P1, 1=P2) if Lod=dtr it allows to set the visualization according to the percentage of the first and second probe, as for the following formula (dtr(P1-P2)/100 + P2).

DEFROST

EdF	**Defrost mode (only for controller with RTC): rtC**=Real Time Clock mode. Defrost time follows dd1...dd6 and Ld1…Ld6 parameters on working days. **in**=interval mode. The defrost starts when the time idF is expired.
tdF	**Defrost type:** (EL; in) EL = electrical heater; in = hot gas.
dFP	**Probe selection for defrost control:** (nP; P1; P2; P3; P4) nP = no probe; P1 =thermostat probe; P2 = evaporator probe; P3 =configurable probe; P4 = Probe on Hot Key plug.
dtE	**Defrost end temperature:** (-55 to 50°C; -67 to 122°F) (enabled only when EdF=Pb) sets the temperature measured by the evaporator probe, which causes the end of defrost.
idF	**Interval between two consecutive defrost cycles:** (0 to 120 hours) determines the interval of time between two defrost cycles.
MdF	**Maximum length for any defrost:** (0 to 255min) when P2P=n, (not evaporator probe: timed defrost) it sets the defrost duration. When P2P=Y (defrost end based on temperature) it sets the maximum length for defrost.
dSd	**Start defrost delay:** (0 to 255 sec) when a defrost starts, the compressor will be stopped and the defrost output delayed. If **dSd=0** this function is disabled.
StC	**Compressor stop before activating any defrost**: (0 to 255 sec) is used to delay the compressor restart when the defrost is managed for inversion of cycle (hot-gas).
dFd	**Displaying during any defrost:** (rt; it; Set; dEF) rt = real temperature; it = temperature at defrost start; Set = set point; dEF = "dEF" label.
dAd	**Delay for display temperature update after any defrost:** (0 to 255min) sets the maximum time between the end of a defrost and the beginning of the visualization of the real room temperature.
Fdt	**Draining time:** (0 to 120min) time interval between reaching defrost termination temperature and the restoring of the control's normal operation. This time allows the evaporator to eliminate water drops that might have formed due to defrost.
Hon	**Time with drain heater activated after drainig time Fdt (valid is oAx=HEt):** (0.0 to 24h00min, res. 10 min) the heating elements stay on for this time after finishing the dripping phase.
dPo	**Defrost after power on:** (n; Y) n = after the idF time or following RTC, Y = immediately.
dAF	**Pre-defrost time**: (0 to 255 min) it is used to sub freeze the goods before activating any defrost. The regulation setpoint is modified to SET-1°C or SET-2°F during this interval. If dAF=0 this function is disabled.

FANS

FAP	**Probe selection for evaporator fan:** (nP; P1; P2; P3; P4) nP = no probe; P1 =thermostat probe; P2 = evaporator probe; P3 =configurable probe; P4 = Probe on Hot Key plug.
FSt	**Evaporator fan stop temperature:** (-50 to 50°C; -55 to 122°F) setting of temperature, detected by evaporator probe, above which fans are always OFF.
HY	**Differential for evaporator fan regulator:** (0.1 to 25.5°C; 1 to 45°F)
FnC	**Evaporator fan mode operation:** (C-n; o-n; C-Y; o-Y) C-n = runs with the compressor, OFF during defrost; o-n = continuous mode, OFF during defrost; C-Y = runs with the compressor, ON during defrost; o-Y = continuous mode, ON during defrost.
Fnd	**Evaporator fan delay after defrost:** (0 to 255min) interval between the end of a defrost and the next evaporator fans start.
FCt	**Temperature differential for evaporator fan activation:** (0 to 59°C; 0 to 90°F) (N.B.: FCt=0 means function disabled) if the difference of temperature between the evaporator and the room probes is higher than FCt value, the fans will be switched on.
Ft	**Evaporator fan controlled during any defrost:** (n;Y)
Fon	**Evaporator fan ON in normal mode (with compressor OFF):** (0 to 15min) with Fnc=C_n or C_Y, (fan activated in parallel with compressor) it sets the evaporator fan ON cycling time when the compressor is off. With Fon=0 and FoF≠0 the fan are always off, with Fon=0 and FoF=0 the fan are always off.
FoF	**Evaporator fan OFF in normal mode (with compressor OFF):** (0 to 15min) With FnC=C_n or C_Y, (fan activated in parallel with compressor) it sets the evaporator fan off cycling time when the compressor is off. With Fon=0 and FoF≠0 the fan are always off, with Fon=0 and FoF=0 the fan are always off.
FAC	**Probe selection for condenser fan:** (nP; P1; P2; P3; P4) nP = no probe; P1 =thermostat probe; P2 = evaporator probe; P3 =configurable probe; P4 = Probe on Hot Key plug.
St2	**Set Point for condenser fan regulator:** (-100.0 to 150.0°C; -148 to 302°F)
HY2	**Differential for condenser fan regulator:** (0.1 to 25,5°C; 1 to 45°F)
FCC	**Condenser fan mode operation:** (C-n; o-n; C-Y; o-Y) C-n = runs with the compressor, OFF during defrost; o-n = continuous mode, OFF during defrost; C-Y = runs with the compressor, ON during defrost; o-Y = continuous mode, ON during defrost
FCo	**Condenser fan activated when compressor off (valid if FCC=C-n, C-Y):** (0 to 999 sec

AUXILIARY

ACH	**Type of action for auxiliary regulator:** (CL; Ht) CL=cooling; Ht = heating
SAA	**Set point for auxiliary regulator:** (-100.0 to 150.0°C; -148 to 302°F)
SHY	**Differential for auxiliary regulator:** (0.1 to 25.5°C; 1 to 45°F)
ArP	**Probe selection for auxiliary regulator:** (nP; P1; P2; P3; P4) nP = no probe; P1 =thermostat probe; P2 = evaporator probe; P3 =configurable probe; P4 = Probe on Hot Key plug.
Sdd	**Auxiliary regulator disabled during any defrost:** (n; Y) **n**=the auxiliary relay operates during defrost. **Y**=the auxiliary relay is switched off during defrost.

ALARMS

ALP	**Temperature alarm probe selection:** (nP; P1; P2; P3; P4) nP = no probe, the temperature alarms are disabled; P1 = Probe 1 (Thermostat probe); P2 = Probe 2 (evaporator probe); P3 = Probe 3 (display probe); P4 = Fourth probe.
ALC	**Temperature alarms configuration:** (Ab; rE) Ab = absolute temperature, alarm temperature is given by the ALL or ALU values. rE = temperature alarms are referred to the set point. Temperature alarm is enabled when the temperature exceeds the [SET+ALU] or [SET-ALL] values.
ALU	**Maximum temperature alarm:** If ALC=Ab: [ALL to 150.0°C or ALL to 302°F] If ALC=rE: [0.0 to 50.0°C or 0 to 90°F] when this temperature is reached the alarm is enabled, after the Ald delay time.

ALL	**Minimum temperature alarm:** If ALC=Ab: [-100°C to ALU; -148 to ALU]; If ALC=rE: [0.0 to 50.0°C or 0 to 90°F] when this temperature is reached the alarm is enabled, after the Ald delay time.
AFH	**Differential for temperature alarm recovery:** (0.1 to 25.5°C; 1 to 45°F) intervention differential for recovery of temperature alarm.
ALd	**Temperature alarm delay:** (0 to 255 min) time interval between the detection of an alarm condition and alarm signalling.
dAo	**Temperature alarm delay after power-on:** (0.0 to 24h00min, res. 10min) time interval between the detection of the temperature alarm condition after instrument power on and alarm signalling.

CONDENSER TEMPERATURE ALARM

AP2	**Second temperature alarm probe selection**: (nP; P1; P2; P3; P4) nP = no probe; P1 = thermostat probe; P2 = evaporator probe; P3 = configurable probe; P4 = Probe on Hot Key plug.
AL2	**Second low temperature alarm (absolute value):** (-100 to 150°C; -148 to 302°F) when this temperature is reached the LA2 alarm is signalled, possibly after the Ad2 delay.
Au2	**Second high temperature alarm (absolute value):** (-100 to 150°C; -148 to 302°F) when this temperature is reached the HA2 alarm is signalled, possibly after the Ad2 delay.
AH2	**Differential for second temperature alarm recovery:** 0.1 to 25.5°C; 1 to 45°F
Ad2	**Second temperature alarm delay:** (0 to 255 min) time interval between the detection of the condenser alarm condition and alarm signalling.
dA2	**Second temperature alarm activation delay after power-on**: 0.0 to 24h00min, res. 10min.
bLL	**Compressor off due to second low temperature alarm:** (n; Y) n = compressor keeps on working; Y = compressor is switched off till the alarm is present, in any case regulation restarts after AC time at minimum.
AC2	**Compressor off due to second high temperature alarm:** (n; Y) n = compressor keeps on working; Y = compressor is switched off till the alarm is present, in any case regulation restarts after AC time at minimum.
SAF	**Differential for anti-freezing control:** (0.0 to 25.5°C; 1 to 45°F) low level threshold to stop regulation.

CONFIGURABLE RELAYS

oA1	**Relay oA1 configuration (7-8):** (dEF; Fan; Alr; LiG; AUS; onF; db; CP2; dEF2; HES; Het; inV, CMP, nu) dEF = defrost; Fan = do not select it; Alr = alarm; LiG = light; AUS = Auxiliary relay; onF = always on with instrument on; db = neutral zone; CP2 = second compressor output; dF2 = do not select it; HES = night blind; Het = heater output; inV = inverter compressor; CMP = ONOFF compressor; nu=not used.
oA2	**Relay oA2 configuration (4-5-6):** (dEF; Fan; Alr; LiG; AUS; onF; db; CP2; dEF2; HES; Het; inV, CMP, nu) dEF = defrost; Fan = do not select it; Alr = alarm; LiG = light; AUS = Auxiliary relay; onF = always on with instrument on; db = neutral zone; CP2 = second compressor output; dF2 = do not select it; HES = night blind; Het = heater output; inV = inverter compressor; CMP = ONOFF compressor; nu=not used.
oA3	**Relay oA3 configuration (8-9):** (dEF; Fan; Alr; LiG; AUS; onF; db; CP2; dEF2; HES; Het; inV, CMP, nu) dEF = defrost; Fan = do not select it; Alr = alarm; LiG = light; AUS = Auxiliary relay; onF = always on with instrument on; db = neutral zone; CP2 = second compressor output; dF2 = do not select it; HES = night blind; Het = heater output; inV = inverter compressor; CMP = ONOFF compressor; nu=not used.
oA4	**Relay oA4 configuration (10-11-12):** (dEF; Fan; Alr; LiG; AUS; onF; db; CP2; dEF2; HES; Het; inV, CMP, nu) dEF = defrost; Fan = do not select it; Alr = alarm; LiG = light; AUS = Auxiliary relay; onF = always on with instrument on; db = neutral zone; CP2 = second compressor output; dF2 = do not select it; HES = night blind; Het = heater output; inV = inverter compressor; CMP = ONOFF compressor; nu=not used.
oAn	**Analogue output configuration:** (n;Y) n = 5-pin port is used for HOT-KEY; Y = 5-pin port is used as frequency output.
AoP	**Alarm relay polarity:** (oP; CL) oP = the relay is activated by opening the contact; CL = the relay is activated by closing the contact.

DIGITAL INPUTS

i1P	**Digital input 1 polarity:** (oP; CL) oP = the digital input is activated by opening the contact; CL = the digital input is activated by closing the contact.
i1F	**Digital input 1 configuration:** (EAL; bAL; dor; dEF; ES; AUS; Htr; HdF; onF; nt) EAL = external alarm: "EA" message is displayed; bAL = serious alarm "CA" message is displayed; dor = door switch function; dEF = activation of a defrost cycle; ES = energy saving; AUS = auxiliary relay activation with oAx=AUS; Htr = type of inverting action (cooling or heating); HdF =do not set it; onF = to switch the controller off; nt = to change parameter map
i2P	**Digital input 2 input polarity:** (oP; CL) oP = the digital input is activated by opening the contact; CL = the digital input is activated by closing the contact.
i2F	**Digital input 2 configuration:** (EAL; bAL; dor; dEF; ES; AUS; Htr; HdF; onF; nt) EAL = external alarm: "EA" message is displayed; bAL = serious alarm "CA" message is displayed; dor = door switch function; dEF = activation of a defrost cycle; ES = energy saving; AUS = auxiliary relay activation with oAx=AUS; Htr = type of inverting action (cooling or heating); HdF =do not set it; onF = to switch the controller off; nt = to change parameter map
did	**Digital input 1 alarm delay:** (0 to 255 min) delay between the detection of the external alarm condition and its signalling. When i1F= PAL, it is the interval of time to calculate the number of pressure switch activation.
d2d	**Digital input 2 alarm delay:** (0 to 255 min) delay between the detection of the external alarm condition and its signalling. When i1F= PAL, it is the interval of time to calculate the number of pressure switch activation.
nPS	**Number of pressure alarm events before stopping the regulation (Lock alarm):** (1 to 15) after nPS activations of the ixF=BAL digital input the regulation will be stopped.
odC	**Compressor and fan status after door opening:** (no; Fan; CPr; F_C) no = normal; Fan = normal; CPr = compressor OFF, F_C = compressor OFF.
rrd	**Regulation restart after open door alarm:** (n; Y) n = outputs follow the odC parameter. Y = outputs restart with a door open alarm.
HES	**Differential for energy saving mode:** (-30.0 to 30.0°C; -54 to 54°F) it sets the increasing value of the set point [SET+HES] during the Energy Saving cycle.
LdE	**Energy saving mode controls the lights (lights off when energy saving goes active):** (n, Y) n= lights are independent from energy saving; Y = lights are turned OFF when energy saving mode is activated

CURRENT TIME AND WEEKLY HOLIDAYS (ONLY FOR MODELS WITH RTC)

Hur	**Hours:** 0 to 23h
Min	**Minutes:** 0 to 59min
dAY	**Day of the week:** Sun to Sat
dYM	**Day of the month:** 1 to 31
Mon	**Month:** 1 to 12
YAr	**Year:** 0 to 99
Hd1	**First day of weekend**: (Sun to Sat; nu) set the first day of the week which follows the holiday times.
Hd2	**Second day of weekend**: (Sun to Sat; nu) set the second day of the week which follows the holiday times.

N.B. **Hd1, Hd2** can be set also as **"nu"** value (Not Used).

ENERGY SAVING TIMES (ONLY FOR MODELS WITH RTC)

iLE	**Working days Energy saving starting time:** (0 to 23h50min) during the Energy Saving cycle the set point is increased by the value in HES so that the operation set point is SET+HES.
dLE	**Working days Energy saving duration:** (0 to 24h00min) sets the duration of the Energy Saving cycle on workdays.
iSE	**Holyday Energy saving starting time:** 0 to 23h50min.
dSE	**Holyday Energy saving duration:** 0 to 24h00min.

DEFROST TIMES (ONLY FOR MODELS WITH RTC)

dd1…dd6	**Daily defrost:** (n; Y) to enable the Ld1…Ld6 defrost operations for all the days of the week.
Ld1…Ld6	**Defrost starting time:** (0 to 23h50min) these parameters set the beginning of the 6 programmable defrost cycles during workdays. Ex: when Ld2=12.4 the second defrost starts every Monday at 12.40.

N.B.: To disable a defrost cycle set it to "nu"(not used). ***Ex:*** *if* ***Ld6=nu****; the sixth defrost cycle will be disabled.*

OTHER

Adr	**Serial address:** (1 to 247) identifies the instrument address when connected to a ModBUS compatible monitoring system.
onC	**ONOFF button configuration:** (nu; oFF; ES) nu=not used; oFF=to switch OFF and ON the controller; ES=to enable and disable enersy saving mode
on2	**ONOFF button timed (3sec) configuration:** (nu; oFF; ES) nu=not used; oFF=to switch OFF and ON the controller; ES=to enable and disable enersy saving mode
LG2	**Light button timed (3sec) configuration (left upper side):** (nu; LiG; AUS; Lnt) nu=not used; LiG= to activate and deactivate light output; AUS=to activate and deactivate the auxiliary output; Lnt=to change parameter map
dn2	**Down button timed (3sec) configuration**: (nu; Std; Lnt; Pnd) nu=not used; Std=standard use; Lnt= to change parameter map; Pdn=to activate a Pull Down cycle.
dP1	**Probe P1 value visualization:** read only
dP2	**Probe P2 value visualization:** read only
dP3	**Probe P3 value visualization:** read only
dP4	**Probe P4 value visualization:** read only
SPd	**Instantaneous Variable Speed Drive speed (in percentage):** read only
rSE	**Real set point**: it shows the set point used during the energy saving cycle or during the continuous cycle.
rEL	**Firmware release** for internal use.
Ptb	**Parameter table code**: readable only.

14. DIGITAL INPUTS

The first digital input (terminals 18-20) is enabled with **P3P=n**.
With **P3P=n** and **i1F=i2F** the second digital input is disabled.
The free voltage digital inputs are programmable by the **i1F** and **i2F** parameters.

14.1 GENERIC ALARM (IXF = EAL)

As soon as the digital input is activated the unit will wait for **did** time delay before signalling the "**EAL**" alarm message. The outputs status doesn't change. The alarm stops just after the digital input is de-activated.

14.2 SERIOUS ALARM MODE (IXF = BAL)

When the digital input is activated, the unit will wait for **did** delay before signalling the "**CA**" alarm message. The relay outputs are switched OFF. The alarm will stop as soon as the digital input is de-activated.

14.3 DOOR SWITCH INPUT (IXF = DOR)

It signals the door status and the corresponding relay output status through the **odC** parameter:
no = normal (any change); **FAn** = Fan OFF; **CPr** = Compressor OFF; **F_C** = Compressor and fan OFF.
Since the door is opened, after the delay time set through parameter **doA**, the door alarm is enabled, the display shows the message **dA** and the regulation restarts is **rtr=Y**. The alarm stops as soon as the external digital input is disabled again. With the door open, the high and low temperature alarms are disabled.

14.4 START DEFROST (IXF = DEF)

It starts a defrost if there are the right conditions. After the defrost is finished, the normal regulation will restart only if the digital input is disabled otherwise the instrument will wait until the **MdF** safety time is expired.

14.5 SWITCH THE AUXILIARY RELAY (IXF = AUS)

With **oAx=AUS** the digital input switched the status of the auxiliary relay.

14.6 INVERSION OF THE KIND OF ACTION: HEATING-COOLING (IXF = HTR)

This function allows inverting the regulation of the controller: from cooling to heating and viceversa.

14.7 ENERGY SAVING (IXF = ES)

The Energy Saving function allows to change the set point value as the result of the **[SET+HES]** (parameter) sum. This function is enabled until the digital input is activated.

14.8 ON OFF FUNCTION (IXF = ONF)

To switch the controller on and off.

14.9 CHANGE PARAMETER MAP (IXF = NT)

To move from LT to NT parameter map.

14.10 DIGITAL INPUTS POLARITY

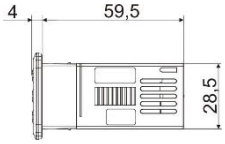
The digital input polarity depends on the **i1P** and **i2P** parameters.

- **i1P or i2P=CL**, the input is activated by closing the contact.
- **i1P or i2P=OP**, the input is activated by opening the contact.

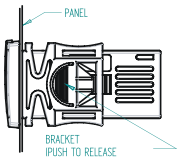
15. RS485 SERIAL LINE – FOR MONITORING SYSTEMS

The RS485 serial line allows connecting the instrument to a monitoring system (**ModBUS-RTU** compatible).

16. INSTALLATION AND MOUNTING



Instrument **XRi77CX-CH** shall be mounted on vertical panel, in a 29x71 mm hole, and fixed using the special bracket supplied.
The temperature range allowed for correct operation is 0 to 60°C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity. The same recommendations apply to probes. Let air circulate by the cooling holes.



17. ELECTRICAL CONNECTIONS

The instrument is provided with screw terminal block to connect cables with a cross section up to 2.5mm2. Before connecting cables make sure the power supply complies with the instrument's requirements. 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, in case of heavier loads use a suitable external relay.

17.1 PROBE CONNECTION

The probes shall be mounted with the bulb upwards to prevent damages due to casual liquid infiltration. It is recommended to place the thermostat probe away from air streams to correctly measure the average room temperature. Place the defrost termination probe among the evaporator fins in the coldest place, where most ice is formed, far from heaters or from the warmest place during defrost, to prevent premature defrost termination.

18. HOW TO USE THE HOT KEY

To enable the HOT-KEY port (5-pin connector), set the par. **oAn=n**.

18.1 PROGRAM A HOT KEY FROM AN INSTRUMENT (UPLOAD)

1. Program one controller with the front keypad.
2. When the controller is ON, insert the "**HOT-KEY**" and push **UP** button; the "**uPL**" message appears followed a by a flashing "**End**" label.
3. Push **SET** button and the "**End**" will stop flashing.
4. Turn OFF the instrument, remove the "**HOT-KEY**" and then turn it ON again.

NOTE: the "**Err**" message appears in case of a failed programming operation. In this case push again button if you want to restart the upload again or remove the "**HOT-KEY**" to abort the operation.

18.2 PROGRAM AN INSTRUMENT BY USING A HOT KEY (DOWNLOAD)

1. Turn OFF the instrument.
2. Insert a **pre-programmed** "**HOT-KEY**" **into the 5-PIN receptacle** and then turn the Controller ON.
3. The parameter list of the "**HOT-KEY**" will be automatically downloaded into the Controller memory. The "**doL**" message will blink followed a by a flashing "**End**" label.
4. After 10 seconds the instrument will restart working with the new parameters.
5. Remove the "**HOT-KEY**".

NOTE: the message "Err" is displayed for failed programming. In this case turn the unit off and then on if you want to restart the download again or remove the "HOT-KEY" to abort the operation.

19. ALARM SIGNALS

Message	Cause	Outputs
P1	Room probe failure	Compressor output works with Con and CoF
P2	Evaporator probe failure	Defrost end is timed
P3	Third probe failure	Outputs unchanged
P4	Fourth probe failure	Outputs unchanged
HA	Maximum temperature alarm	Outputs unchanged
LA	Minimum temperature alarm	Outputs unchanged
HA2	Condenser high temperature	It depends on the AC2 parameter
LA2	Condenser low temperature	It depends on the bLL parameter
dA	Door open	Compressor restarts
EA	External alarm	Output unchanged
CA	Serious external alarm (ixF=bAL)	All outputs OFF
rtC	Real time clock parameter error	Output unchanged, defrost follows idF, need to set RTC parameters
rtF	Real time clock malfunctioning	Output unchanged, defrost follows idF

19.1 BUZZER MUTING OR ALARM RELAY OUTPUT DEACTIVATION

If **tbA=Y**, the buzzer and the relay are silenced by pressing any key.
If **tbA=n**, only the buzzer is silenced while the alarm relay is on until the alarm condition recovers.

19.2 ALARM RECOVERY

Probe alarms "**P1**", "**P2**", "**P3**" and "**P4**" start some seconds after the fault in the related probe; they automatically stop some seconds after the probe restarts normal operation. Check connections before replacing the probe.
Temperature alarms "**HA**" and "**LA**" automatically stop as soon as the temperature returns to normal values.
Alarms "**EA**" and "**CA**" (with **i1F=bAL**) recover as soon as the digital input is disabled.

19.3 OTHER MESSAGES

Pon	Keyboard unlocked.
PoF	Keyboard locked
noP	In programming mode: no parameter in Pr1. On the display or in dP2, dP3, dP4: the selected probe is not enabled.

20. TECHNICAL DATA

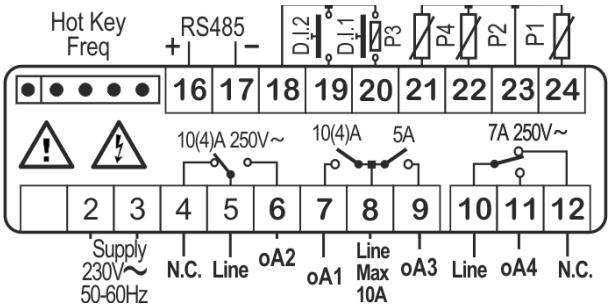
Housing: self-extinguishing ABS
Case: frontal 32x74mm; depth 60mm
Mounting: panel mounting in a 71x29mm panel cut-out
Protection: IP20
Frontal protection: IP65
Connections: Screw terminal block ≤ 2.5 mm^2 wiring
Power supply: (according to the model) 230Vac ±10%, 50/60Hz; 110Vac ±10%, 50/60Hz
Power absorption: 3VA max
Display:
- 3 digits, red LEDs, 14.2 mm high (CX format)
- 3 digits, red LEDs, 19 mm high (CH format)

Inputs: Up to 4 NTC, PTC or PT1000 probes
Digital inputs: free voltage contact
Frequency output: 30 to 200 Hz, 14Vdc MAX, duty cycle=50%
Relay outputs (nominal ratings):
- **oA1:** SPST 16(5)A 250Vac
- **oA2:** SPDT 8(3)A, 250Vac
- **oA3:** SPST 5(2)A, 250Vac
- **oA4:** SPST 8(3)A 250Vac

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; **Overvoltage Category:** II
Operating temperature: 0 to 55°C (32 to 131°F)
Storage temperature: -30 to 85°C (-22 to 185°F)
Relative humidity: 20 to 85% (no condensing)
Measuring and regulation range:
- **NTC probe:** -40 to 110°C (-40 to 230°F)
- **PTC probe:** -50 to 150°C (-55 to 302°F)
- **PT1000 probe:** -100 to 150°C (-148 to 392°F)

Resolution: 0.1°C or 1°C or 1°F (selectable)
Accuracy (ambient temp. 25°C): ±0.7°C ±1 digit

21. WIRINGS



22. DEFAULT SETTING VALUES

LABEL	Description	VALUE	LEVEL
SEt	Regulation Set Point	-20.0	
rtC	RTC menu visualization		Pr1
LS	Minimum Set point	-30.0	Pr2
US	Maximum Set point	10.0	Pr2
Hy	Differential for normal regulation	1.0	Pr1
odS	Outputs delay activation after power on	3	Pr2
AC	Anti-short cycle delay	5	Pr2
AC1	Anti-short cycle delay for second compressor	0	Pr2
MCo	Maximum time with compressor on	0	Pr2
rtr	Percentage for regulation=F(P1; P2) (100=P1; 0=P2)	100	Pr2
CCt	Maximum duration for Pull Down	3.00	Pr1
CCS	Differential for Pull Down (SET+CCS or SET+HES+CCS)	-2.0	Pr1
oHt	Threshold for automatic activation of Pull Down in normal mode (SET+HY+oHt)	10.0	Pr2
Con	Compressor ON time with faulty probe	30	Pr2
CoF	Compressor OFF time with faulty probe	5	Pr2
PbC	Probe selection	ntC	Pr2
ot	Probe P1 calibration	0.0	Pr1
P2P	Probe P2 presence	yes	Pr2
oE	Probe P2 calibration	0.0	Pr2
P3P	Probe P3 presence	no	Pr2
o3	Probe P3 calibration	0.0	Pr2
P4P	Probe P4 presence	no	Pr2
o4	Probe P4 calibration	0.0	Pr2
Hy1	Differential for proportional regulation in normal mode	1.0	Pr2
Fr0	Frequency output value with compressor stopped	0	Pr2
PMi	Minimum compressor speed (in percentage)	20	Pr2
PMA	Maximum compressor speed (in percentage)	100	Pr2
voS	Compressor speed variation (increment) when temperature is increasing	1	Pr2
vo2	Compressor speed variation (decrement) when temperature is decreasing	2	Pr2
vo3	Compressor speed variation (decrement) after any Pull Down	5	Pr2
PdP	Compressor speed during any Pull Down	100	Pr2
t1F	Time with compressor speed at PMI before stopping the compressor	1	Pr2
SPi	Compressor speed (in percentage) in case of any error probe	70	Pr2
Aod	Compressor speed (in percentage) during any defrost (valid if tdf=in)	70	Pr2
AoF	Compressor speed during a pre-defrost phase (valid if tdf=in)	50	Pr2
tHv	Maximum time for compressor speed variation	60	Pr2
tLv	Minimum time for compressor speed variation	20	Pr2
dtC	Temperature sampling time	10	Pr2
tH1	Differential for deadlock control	1.0	Pr2
oFS	Compressor speed increment during any deadlock condition (in Hz)	1	Pr2
CMn	Continuous mode during normal mode	yes	Pr2
CME	Continuous mode during energy saving mode	yes	Pr2
MnP	Minimum compressor speed for activating lubrication control (valid only for variable speed compressors)	30	Pr2
tMi	Compressor running time below the MnP threshold	01:00	Pr2
tMA	Interval of time with compressor a PMA during lubrication control	1	Pr2
CF	Temperature measurement unit: Celsius; Fahrenheit	°C	Pr1
rES	Temperature resolution: decimal, integer	dE	Pr1
Lod	Probe displayed on the display	P1	Pr1
dLy	Display temperature delay	00:00	Pr1
dtr	Visualization percentage=F(P1; P2) (ex: dtr=1 means VALUE=0.01*P1+0.99*P2)	99	Pr1
EdF	Defrost mode	in	Pr2
tdF	Defrost type: electrical heating, hot gas	in	Pr2
dFP	Probe selection for defrost control	P2	Pr2
dtE	Defrost termination temperature	4.0	Pr2
idF	Interval between two consecutives defrost cycles	24	Pr2
MdF	Maximum length for defrost	45	Pr2
dSd	Start defrost delay	0	Pr2
StC	Compressor stop time before starting any defrost	5	Pr2
dFd	Displaying during defrost	it	Pr1
dAd	Delay for display temperature update after any defrost	20	Pr1
Fdt	Draining time	5	Pr2
Hon	Drain heater activated after draining time Fdt (valid if oAx=Het)	00:00	Pr2
dPo	Defrost after power on	no	Pr2
dAF	Defrost delay after Pull Down	3	Pr2
FAP	Probe selection for evaporator fan	P2	Pr2
FSt	Evaporator fan stop temperature	-10.0	Pr2
HyF	Differential for evaporator fan regulator	1.0	Pr2
FnC	Evaporator fan mode operation	O_n	Pr2
Fnd	Evaporator fan delay after defrost	3	Pr2
FCt	Differential of temperature for forced activation of evaporator fan (o=disabled)	0	Pr2
Ft	Evaporator fan controlled during defrost	no	Pr2
Fon	Evaporator fan ON time (with compressor OFF)	0	Pr2
FoF	Evaporator fan OFF time (with compressor OFF)	0	Pr2
FAC	Probe selection for condenser fan	nP	Pr2
St2	Regulation Set Point 2 for condenser fan	35.0	Pr2
Hy2	Differential for Set Point 2 for condenser fan regulator	1.0	Pr2
FCC	Condenser fan mode operation	O_n	Pr2
FCo	Condenser fan on after switching off the compressor	0	Pr2
ACH	Kind of action for auxiliary regulator	CL	Pr2
SAA	Set point for auxiliary regulator	0.0	Pr2
SHy	Differential for auxiliary regulator	1.0	Pr2
ArP	Probe selection for auxiliary regulator	nP	Pr2
Sdd	Auxiliary regulator disabled during any defrost	no	Pr2
ALP	Probe selection for temperature alarms	P1	Pr1
ALC	Temperature alarms configuration: relative, absolute	rE	Pr1
ALU	Maximum temperature alarm	8.0	Pr1
ALL	Minimum temperature alarm	7.0	Pr1
AFH	Temperature alarm recovery differential	1.0	Pr1
ALd	Temperature alarm delay	10	Pr1
dAo	Temperature alarm delay after power-on	24.00	Pr1
AP2	Probe selection for second temperature alarms	nP	Pr2
AL2	Second low temperature alarm	-40.0	Pr2
AU2	Second high temperature alarm	110.0	Pr2
AH2	Differential for second temperature alarm recovery	1.0	Pr2
Ad2	Second temperature alarm delay	5	Pr2
dA2	Delay for second temperature alarm after power-on	01:00	Pr2
bLL	Compressor off due to second low temperature alarm	no	Pr2
AC2	Compressor off due to second high temperature alarm	yes	Pr2
SAF	Differential for anti-freezing control	5.0	Pr2
tbA	Alarm relay switched off by pushing any key	yes	Pr2
oA1	Relay output oA1 configuration	LiG	Pr2
oA2	Relay output oA2 configuration	dEF	Pr2
oA3	Relay output oA3 configuration	Fan	Pr2
oA4	Relay output oA4 configuration	ALr	Pr2
oAn	Analogue output configuration	FrE	Pr2
AOP	Alarm relay polarity	CL	Pr2
i1P	Digital input 1 polarity	CL	Pr1
i1F	Digital input 1 configuration	dor	Pr1
did	Digital inputs 1 alarm delay	1	Pr1
nPS	Number of pressure alarm switch before stopping the regulation (Lock alarm)	5	Pr1
OdC	Compressor and fan status after door opening	F-C	Pr1
rrd	Regulation restart after open door alarm	yes	Pr1
HES	Differential for energy saving mode	0	Pr1

LdE	Energy saving mode controls the lights (lights off when energy saving goes active)	yes	Pr1
Hur	Hours		Pr1
Min	Minutes		Pr1
dAY	Day of the week		Pr1
dyM	Day of the month		Pr1
Mon	Month		Pr1
yAr	Year		Pr1
Hd1	First day of week end	Sat	Pr2
Hd2	Second day of week end	Sun	Pr2
iLE	Working days Energy saving starting time	00:00	Pr2
dLE	Working days Energy saving duration	00:00	Pr2
iSE	Holyday Energy saving starting time	00:00	Pr2
dSE	Holyday Energy saving duration	00:00	Pr2
dd1	Sunday defrost	no	Pr2
dd2	Monday defrost	no	Pr2
dd3	Tuesday defrost	no	Pr2
dd4	Wednesday defrost	no	Pr2
dd5	Thursday defrost	no	Pr2
dd6	Friday defrost	no	Pr2
dd7	Saturday defrost	no	Pr2
Ld1	1st defrost starting time	nu	Pr2
Ld2	2nd defrost starting time	nu	Pr2
Ld3	3rd defrost starting time	nu	Pr2
Ld4	4th defrost starting time	nu	Pr2
Ld5	5th defrost starting time	nu	Pr2
Ld6	6th defrost starting time	nu	Pr2
Adr	Serial address	1	Pr2
bAU	Baud rate selection for serial port	9.6	Pr2
onC	ONOFF button configuration	ES	Pr2
on2	ONOFF button timed (3sec) configuration	oFF	Pr2
LG2	Light button timed (3sec) configuration	nU	Pr2
dn2	Down button timed (3sec) configuration	Lnt	Pr2
dP1	Probe P1 value visualization		Pr1
dP2	Probe P2 value visualization		Pr1
dP3	Probe P3 value visualization		Pr1
dP4	Probe P4 value visualization		Pr1
SPd	Instantaneous compressor speed (in Hz)		Pr1
rSE	Real regulation Set Point		Pr1
rEL	Firmware release		Pr1
Ptb	Parameter map code	1	Pr1
SEt_nt	Regulation Set Point	3.0	
rtC_nt	RTC menu visualization		Pr1
LS_nt	Minimum Set point	-50.0	Pr2
US_nt	Maximum Set point	50.0	Pr2
Hy_nt	Differential for normal regulation	2.0	Pr1
odS_nt	Outputs delay activation after power on	1	Pr2
AC_nt	Anti-short cycle delay	1	Pr2
AC1_nt	Anti-short cycle delay for second compressor	5	Pr2
MCo_nt	Maximum time with compressor on	0	Pr2
rtr_nt	Percentage for regulation=F(P1; P2) (100=P1; 0=P2)	100	Pr2
CCt_nt	Maximum duration for Pull Down	3.00	Pr1
CCS_nt	Differential for Pull Down (SET+CCS or SET+HES+CCS)	2.0	Pr1
oHt_nt	Threshold for automatic activation of Pull Down in normal mode (SET+HY+oHt)	10.0	Pr2
Con_nt	Compressor ON time with faulty probe	15	Pr2
CoF_nt	Compressor OFF time with faulty probe	5	Pr2
PbC_nt	Probe selection	ntC	Pr2
ot_nt	Probe P1 calibration	0.0	Pr1
P2P_nt	Probe P2 presence	no	Pr2

oE_nt	Probe P2 calibration	0.0	Pr2
P3P_nt	Probe P3 presence	no	Pr2
o3_nt	Probe P3 calibration	0.0	Pr2
P4P_nt	Probe P4 presence	no	Pr2
o4_nt	Probe P4 calibration	0.0	Pr2
Hy1_nt	Differential for proportional regulation in normal mode	3.0	Pr2
Fr0_nt	Frequency output value with compressor stopped	20	Pr2
PMi_nt	Minimum compressor speed (in percentage)	20	Pr2
PMA_nt	Maximum compressor speed (in percentage)	100	Pr2
voS_nt	Compressor speed variation (increment) when temperature is increasing	1	Pr2
vo2_nt	Compressor speed variation (decrement) when temperature is decreasing	2	Pr2
vo3_nt	Compressor speed variation (decrement) after any Pull Down	5	Pr2
PdP_nt	Compressor speed during any Pull Down	100	Pr2
t1F_nt	Time with compressor speed at PMI before stopping the compressor	1	Pr2
SPi_nt	Compressor speed (in percentage) in case of any error probe	70	Pr2
Aod_nt	Compressor speed (in percentage) during any defrost (valid if tdf=in)	80	Pr2
AoF_nt	Compressor speed during a pre-defrost phase (valid if tdf=in)	60	Pr2
tHv_nt	Maximum time for compressor speed variation	60	Pr2
tLv_nt	Minimum time for compressor speed variation	20	Pr2
dtC_nt	Temperature sampling time	10	Pr2
tH1_nt	Differential for deadlock control	1.0	Pr2
oFS_nt	Compressor speed increment during any deadlock condition (in Hz)	1	Pr2
CMn_nt	Continuous mode during normal mode	yes	Pr2
CME_nt	Continuous mode during energy saving mode	yes	Pr2
MnP_nt	Minimum compressor speed for activating lubrication control (valid only for variable speed compressors)	30	Pr2
tMi_nt	Compressor running time below the MnP threshold	00:00	Pr2
tMA_nt	Interval of time with compressor a PMA during lubrication control	0	Pr2
CF_nt	Temperature measurement unit: Celsius; Fahrenheit	°C	Pr1
rES_nt	Temperature resolution: decimal, integer	dE	Pr1
Lod_nt	Probe displayed on the display	P1	Pr1
dLy_nt	Display temperature delay	00:00	Pr1
dtr_nt	Visualization percentage=F(P1; P2) (ex: dtr=1 means VALUE=0.01*P1+0.99*P2)	99	Pr1
EdF_nt	Defrost mode	in	Pr2
tdF_nt	Defrost type: electrical heating, hot gas	in	Pr2
dFP_nt	Probe selection for defrost control	P2	Pr2
dtE_nt	Defrost termination temperature	8.0	Pr2
idF_nt	Interval between two consecutives defrost cycles	8	Pr2
MdF_nt	Maximum length for defrost	15	Pr2
dSd_nt	Start defrost delay	0	Pr2
StC_nt	Compressor stop time before starting any defrost	2	Pr2
dFd_nt	Displaying during defrost	it	Pr1
dAd_nt	Delay for display temperature update after any defrost	10	Pr1
Fdt_nt	Draining time	5	Pr2
Hon_nt	Drain heater activated after draining time Fdt (valid if oAx=Het)	00:00	Pr2
dPo_nt	Defrost after power on	no	Pr2
dAF_nt	Defrost delay after Pull Down	1	Pr2
FAP_nt	Probe selection for evaporator fan	P2	Pr2
FSt_nt	Evaporator fan stop temperature	2.0	Pr2
HyF_nt	Differential for evaporator fan regulator	1.0	Pr2
FnC_nt	Evaporator fan mode operation	C_n	Pr2
Fnd_nt	Evaporator fan delay after defrost	5	Pr2
FCt_nt	Differential of temperature for forced activation of evaporator fan (o=disabled)	10	Pr2
Ft_nt	Evaporator fan controlled during defrost	no	Pr2
Fon_nt	Evaporator fan ON time (with compressor OFF)	0	Pr2
FoF_nt	Evaporator fan OFF time (with compressor OFF)	0	Pr2
FAC_nt	Probe selection for condenser fan	nP	Pr2
St2_nt	Regulation Set Point 2 for condenser fan	0.0	Pr2
Hy2_nt	Differential for Set Point 2 for condenser fan regulator	1.0	Pr2

FCC_nt	Condenser fan mode operation	O_n	Pr2
FCo_nt	Condenser fan on after switching off the compressor	0	Pr2
ACH_nt	Kind of action for auxiliary regulator	CL	Pr2
SAA_nt	Set point for auxiliary regulator	0.0	Pr2
SHy_nt	Differential for auxiliary regulator	1.0	Pr2
ArP_nt	Probe selection for auxiliary regulator	nP	Pr2
Sdd_nt	Auxiliary regulator disabled during any defrost	no	Pr2
ALP_nt	Probe selection for temperature alarms	P1	Pr1
ALC_nt	Temperature alarms configuration: relative, absolute	rE	Pr1
ALU_nt	Maximum temperature alarm	5.0	Pr1
ALL_nt	Minimum temperature alarm	5.0	Pr1
AFH_nt	Temperature alarm recovery differential	1.0	Pr1
ALd_nt	Temperature alarm delay	15	Pr1
dAo_nt	Temperature alarm delay after power-on	01:30	Pr1
AP2_nt	Probe selection for second temperature alarms	nP	Pr2
AL2_nt	Second low temperature alarm	-100.0	Pr2
AU2_nt	Second high temperature alarm	150.0	Pr2
AH2_nt	Differential for second temperature alarm recovery	2.0	Pr2
Ad2_nt	Second temperature alarm delay	5	Pr2
dA2_nt	Delay for second temperature alarm after power-on	01:00	Pr2
bLL_nt	Compressor off due to second low temperature alarm	no	Pr2
AC2_nt	Compressor off due to second high temperature alarm	yes	Pr2
SAF_nt	Differential for anti freezing control	3.0	Pr2
tbA_nt	Alarm relay switched off by pushing any key	yes	Pr2
oA1_nt	Relay output oA1 configuration	dEF	Pr2
oA2_nt	Relay output oA2 configuration	Fan	Pr2
oA3_nt	Relay output oA3 configuration	LiG	Pr2
oA4_nt	Relay output oA4 configuration	ALr	Pr2
oAn_nt	Analogue output configuration	FrE	Pr2
AOP_nt	Alarm relay polarity	CL	Pr2
i1P_nt	Digital input 1 polarity	CL	Pr1
i1F_nt	Digital input 1 configuration	dor	Pr1
i2P_nt	Digital input 2 polarity	CL	Pr2
i2F_nt	Digital input 2 configuration	EAL	Pr2
did_nt	Digital inputs 1 alarm delay	1	Pr1
d2d_nt	Digital inputs 2 alarm delay	1	Pr2
nPS_nt	Number of pressure alarm switch before stopping the regulation (Lock alarm)	15	Pr1
OdC_nt	Compressor and fan status after door opening	F-C	Pr1
rrd_nt	Regulation restart after open door alarm	yes	Pr1
HES_nt	Differential for energy saving mode	0	Pr1
LdE_nt	Energy saving mode controls the lights (lights off when energy saving goes active)	yes	Pr1
Hur_nt	Hours		Pr1
Min_nt	Minutes		Pr1
dAY_nt	Day of the week		Pr1
dyM_nt	Day of the month		Pr1
Mon_nt	Month		Pr1
yAr_nt	Year		Pr1
Hd1_nt	First day of week end	Sat	Pr2
Hd2_nt	Second day of week end	Sun	Pr2
iLE_nt	Working days Energy saving starting time	00:00	Pr2
dLE_nt	Working days Energy saving duration	00:00	Pr2
iSE_nt	Holyday Energy saving starting time	00:00	Pr2
dSE_nt	Holyday Energy saving duration	00:00	Pr2
dd1_nt	Sunday defrost	no	Pr2
dd2_nt	Monday defrost	no	Pr2
dd3_nt	Tuesday defrost	no	Pr2
dd4_nt	Wednesday defrost	no	Pr2
dd5_nt	Thursday defrost	no	Pr2
dd6_nt	Friday defrost	no	Pr2
dd7_nt	Saturday defrost	no	Pr2
Ld1_nt	1st defrost starting time	nu	Pr2
Ld2_nt	2nd defrost starting time	nu	Pr2
Ld3_nt	3rd defrost starting time	nu	Pr2
Ld4_nt	4th defrost starting time	nu	Pr2
Ld5_nt	5th defrost starting time	nu	Pr2
Ld6_nt	6th defrost starting time	nu	Pr2
Adr_nt	Serial address	1	Pr2
bAU_nt	Baud rate selection for serial port	9.6	Pr2
onC_nt	ONOFF button configuration	ES	Pr2
on2_nt	ONOFF button timed (3sec) configuration	oFF	Pr2
LG2_nt	Light button timed (3sec) configuration	nU	Pr2
dn2_nt	Down button timed (3sec) configuration	Lnt	Pr2
dP1_nt	Probe P1 value visualization		Pr1
dP2_nt	Probe P2 value visualization		Pr1
dP3_nt	Probe P3 value visualization		Pr1
dP4_nt	Probe P4 value visualization		Pr1
SPd_nt	Instantaneous compressor speed (in Hz)		Pr1
rSE_nt	Real regulation Set Point		Pr1
rEL_nt	Firmware release		Pr1
Ptb_nt	Parameter map code	1	Pr1

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