

XR60CX DIGITAL CONTROLLER WITH DEFROST AND FANS MANAGEMENT
 XR64CX DIGITAL CONTROLLER FOR DUAL EVAPORATOR APPLICATION
 XR70CX DIGITAL CONTROLLER WITH DEFROST AND FANS MANAGEMENT
 XR71CX DIGITAL CONTROLLER WITH DEFROST AND FANS MANAGEMENT
 XR72CX DIGITAL CONTROLLER WITH DEFROST AND FANS MANAGEMENT

1599010320 Rel. 1.2

OPERATING MANUAL



1. GENERAL WARNINGS

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 formation of 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. 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.

1.3 DISPOSAL OF THE PRODUCT

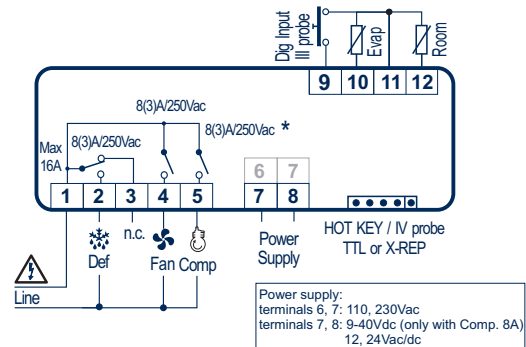
The appliance (or the product) must be disposed of separately in accordance with the local waste disposal legislation in force.

2. FRONT PANEL

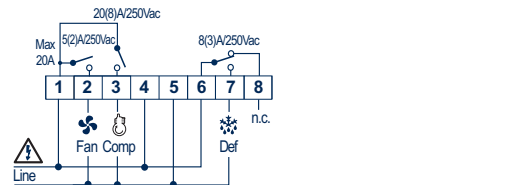


3. CONNECTIONS

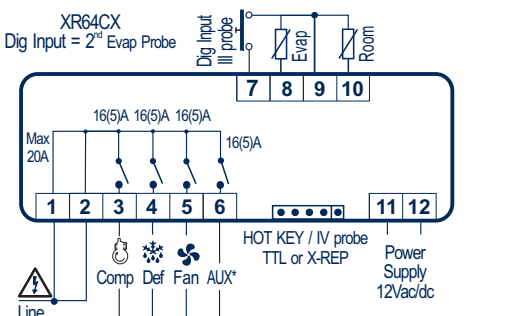
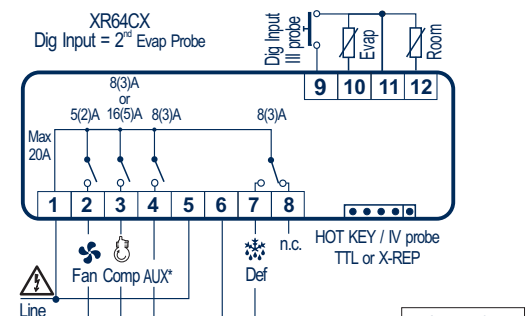
XR60CX



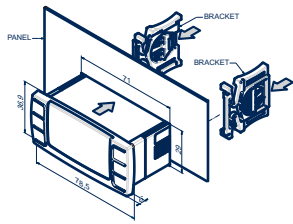
*Note: Comp. 8 - 16 depending on the model.



XR64CX - XR70CX - XR71CX - XR72CX



4. DIMENSIONS AND CUT OUT



5. GENERAL DESCRIPTION

Model XR60CX, 32x74mm format, is microprocessor based controller, suitable for applications on medium or low temperature ventilated refrigerating units. It has three relay outputs to control compressor, fan, and defrost, which can be either electrical or reverse cycle (hot gas). It is also provided with three NTC or PTC probe inputs, the first one for temperature control, the second one, to be located onto the evaporator, to control the defrost termination temperature and to managed the fan, the third one, optional, to connect to the HOT KEY terminals to signal the condenser temperature alarm or to display a temperature. The digital input can operate as fourth temperature probe.

Model XR64CX, 32x74mm format, is microprocessor based controller, suitable for applications on medium or low temperature ventilated refrigerating units with 2 evaporators. It has four relay outputs to control compressor, fan, defrost 1 and 2, which can be either electrical or reverse cycle (hot gas). It is also provided with up to four NTC or PTC probe inputs, the first one for temperature control, the second and third one, to be located onto the evaporator, to control the defrost termination temperature and to managed the fan. The fourth one, to connect to the HOT KEY terminals is used to signal the condenser temperature alarm or to display a temperature.

Model XR70CX, 32x74mm format, is microprocessor based controller, suitable for applications on medium or low temperature ventilated refrigerating units. It has four relay outputs to control compressor, fan, and defrost, which can be either electrical or reverse cycle (hot gas). The last one can be used as light, for alarm signalling or as auxiliary output. It is also provided with up to four NTC or PTC probe inputs, the first one for temperature control, the second one, to be located onto the evaporator, to control the defrost termination temperature and to managed the fan. The digital input can operate as third temperature probe. The fourth one, to connect to the HOT KEY terminals is used to signal the condenser temperature alarm or to display a temperature.

Model XR71CX, 32x74mm format, is microprocessor based controller, suitable for applications on low temperature ventilated refrigerating units. It has four relay outputs to control compressor, fan, and defrost, which can be either electrical or reverse cycle (hot gas). The last one can be used as auxiliary output. It is also provided with up to three NTC or PTC probe inputs, the first one for temperature control, the second one to control the defrost termination temperature, and the third one, to connect to the HOT KEY terminals is used to signal the condenser temperature alarm or to display a temperature.

The digital input can operate as fourth temperature probe. Model XR72CX, 32x74mm format, is microprocessor based controller, suitable for applications on medium or low temperature ventilated refrigerating units. It has four relay outputs to control compressor 1, compressor 2, fan and defrost, which can be either electrical or reverse cycle (hot gas). It is also provided with up to four NTC or PTC probe inputs, the first one for temperature control, the second one, to be located onto the evaporator, to control the defrost termination temperature and to managed the fan. The digital input can operate as third temperature probe. The fourth one, to connect to the HOT KEY terminals is used to signal the condenser temperature alarm or to display a temperature.

The HOT KEY output allows to connect the units, by means of the external module XJ485-CX, to a network line ModBUS-RTU compatible such as the DIXELL monitoring units of X-WEB family. It allows to program the controllers by means the HOT KEY programming keyboard.

The instruments are fully configurable through special parameters that can be easily programmed through the keyboard.

6. CONTROLLING LOADS

6.1 COMPRESSOR

The regulation is performed according to the temperature measured by the thermostat probe with a positive differential from the set point: if the temperature increases and reaches set point plus differential the compressor is started and then turned off when 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 CO_n and CO_F.

6.2 2nd COMPRESSOR MANAGEMENT (Only for XR72CX)

The relay of the second compressor is activated in parallel with the relay of the first compressor, with a possible delay set in the AC1 parameter. Both the compressors are switched off at the same time.

6.3 DEFROST

Two defrost modes are available through the tdf parameter: defrost through electrical heater (tdF = EL) and hot gas defrost (tdF = in). Other parameters are used to control the interval between defrost cycles (ldF), its maximum length (Mdf) and two defrost 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 Fst parameter. With Fst=0 the dripping time is disabled.

6.4 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 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.

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. Functioning: if the difference of temperature between the evaporator and the room probes is more than the value of the Fct parameter, the fans are switched on. With Fct=0 the function is disabled.

Cyclical activation of the fans with compressor off

When Fnc = c-n or c-Y (fans in parallel to 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, when the compressor is off.

7. FRONT PANEL COMMANDS

- SET To display target set point, in programming mode it selects a parameter or confirm an operation
- ☼ To start a manual defrost
- ⬆ To see the max. stored temperature. In programming mode it browses the parameter codes or increases the displayed value
- ⬇ To see the min stored temperature. In programming mode it browses the parameter codes or decreases the displayed value
- ⏻ To switch the instrument off, if onF = OFF
- ☀ To switch the light, if oA3 = Lig (only for XR70CX)

KEYS COMBINATION

- ⬆ + ⬆ To lock or unlock the keyboard
- SET + ⬆ To enter in programming mode
- SET + ⬆ To return to room temperature display

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	Continuous cycle is running
🌞	ON	Energy saving enabled
💡	ON	Light on
AUX	ON	Auxiliary relay on
°C/°F	ON	Measurement unit
°C/°F	Flashing	Programming phase

8. MIN & MAX TEMPERATURE MEMORIZATION

8.1 HOW TO SEE THE MIN TEMPERATURE

Press and release the ⬆ key. The Lo message will be displayed followed by the minimum temperature recorded. By pressing the ⬆ key again or by waiting 5s the normal display will be restored.

8.2 HOW TO SEE THE MAX TEMPERATURE

Press and release the ⬆ key. The Hi message will be displayed followed by the maximum temperature recorded. By pressing the ⬆ key again or by waiting 5s the normal display will be restored.

8.3 HOW TO RESET THE MAX AND MIN TEMPERATURE RECORDED

Hold press the SET key for more than 3s, while the max or min temperature is displayed. (rSt message will be displayed) To confirm the operation the rSt message starts blinking and the normal temperature will be displayed.

9. MAIN FUNCTIONS

9.1 HOW TO SEE THE SET POINT

- Push and immediately release the SET key, the set point will be showed;
- Push and immediately release the SET key or wait about 5s to return to normal visualisation.

9.2 HOW TO CHANGE THE SETPOINT

- Push the SET key for more than 3 seconds to change the Set point value;
- The value of the set point will be displayed and the °C or °F LED starts blinking;
- To change the SET value push the ⬆ or ⬆ arrows within 10s;
- To memorise the new set point value push the SET key again or wait 10s.

9.3 HOW TO START A MANUAL DEFROST

Push the DEF ☼ key for more than 2 seconds and a manual defrost will start.

9.4 HOW TO CHANGE A PARAMETER VALUE

- To change the parameter's value operate as follows:
- Enter the Programming mode by pressing the SET+ ⬆ keys for 3s (°C or °F LED starts blinking);
 - Select the required parameter. Press the SET key to display its value;
 - Use ⬆ or ⬆ to change its value;
 - Press SET to store the new value and move to the following parameter.

To exit: Press SET+ ⬆ or wait 15s without pressing a key. NOTE: the set value is stored even when the procedure is exited by waiting the time-out to expire.

9.5 HIDDEN MENU

The hidden menu includes all the parameters of the instrument.

HOW TO ENTER THE HIDDEN MENU

- Enter the Programming mode by pressing the SET+ ⬆ keys for 3s (°C or °F LED starts blinking);
- Released the keys, then push again the SET+ ⬆ keys for more than 7s. The Pr2 label will be displayed immediately followed from the Hy parameter.

NOW YOU ARE IN THE HIDDEN MENU.

- Select the required parameter;
 - Press the SET key to display its value;
 - Use ⬆ or ⬆ to change its value;
 - Press SET to store the new value and move to the following parameter.
- To exit: Press SET+ ⬆ or wait 15s without pressing a key. NOTE: if one parameter is present in Pr1, after 3s the noP message is displayed. Keep the keys pushed till the Pr2 message is displayed. NOTE2: the set value is stored even when the procedure is exited by waiting the time-out to expire.

HOW TO MOVE A PARAMETER FROM THE HIDDEN MENU TO THE FIRST LEVEL AND VICEVERSA.

Each parameter present in the HIDDEN MENU can be removed or put into "THE FIRST LEVEL" (user level) by pressing SET+ ⬆. In HIDDEN MENU when a parameter is present in First Level the decimal point is on.

9.6 TO LOCK THE KEYBOARD

Keep pressed for more than 3s the ⬆ and ⬆ keys. The PoF message will be displayed and the keyboard will be locked. If a key is pressed more than 3s the PoF message will be displayed.

9.7 TO UNLOCK THE KEYBOARD

Keep pressed together for more than 3s the ⬆ and ⬆ keys till the Pon message will be displayed.

9.8 THE CONTINUOUS CYCLE

When defrost is not in progress, it can be activated by holding the ⬆ key pressed for about 3 seconds. The compressor operates to maintain the ccS set point for the time set through the CCT parameter. The cycle can be terminated before the end of the set time using the same activation key ⬆ for 3 seconds.

9.9 THE ON/OFF FUNCTION (STAND-BY)

With onF = OFF, pushing the ON/OFF key, the instrument is switched off. The OFF message is displayed. In this configuration, the regulation is disabled. To switch the instrument on, push again the ON/OFF key. 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

10. PARAMETERS

REGULATION

- Hy Differential: (0,1 + 25,5°C / 1+45 °F) Intervention differential for set point. Compressor Cut In is Set Point + differential (Hy). Compressor Cut OUT is when the temperature reaches the set point.
- LS Minimum set point: (-50°C+SET/-58°F+SET): Sets the minimum value for the set point.
- US Maximum set point: (SET+110°C/SET+230°F). Set the maximum value for set point.
- Ot Thermostat probe calibration: (-12,0+12,0°C; -21+21°F) allows to adjust possible offset of the thermostat probe.

P2P Evaporator probe presence: n= not present; the defrost stops by time; y= present; the defrost stops by temperature.

OE Evaporator probe calibration: (-12,0+12,0°C; -21+21°F). allows to adjust possible offset of the evaporator probe.

P3P Third probe presence (P3): n= not present; the terminal operates as digital input; y= present; the terminal operates as third probe.

O3 Third probe calibration (P3): (-12,0+12,0°C; -21+21°F). allows to adjust possible offset of the third probe.

P4P Fourth probe presence: (n = Not present; y = present).

o4 Fourth probe calibration: (-12,0+12,0°C; -21+21°F) allows to adjust possible offset of the fourth probe.

ODS Outputs activation delay at start up: (0+255min) This function is enabled at the initial start up of the instrument and inhibits any output activation for the period of time set in the parameter.

AC Anti-short cycle delay: (0+50 min) minimum interval between the compressor stop and the following restart.

AC1 2nd compressor delay at start up (Only for XR72CX): (0+255s) Time interval between the switching on of the first compressor and the second one.

rt Percentage of the second and first probe for regulation (0+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 (rt/(P1-P2)/100 + P2).

CCt Compressor ON time during continuous cycle: (0,0+24,0h; res. 10min) Allows to set the length of the continuous cycle: compressor stays on without interruption for the CCT time. Can be used, for instance, when the room is filled with new products.

CCS Set point for continuous cycle: (-50+150°C) it sets the set point used during the continuous cycle.

CO_n Compressor ON time with faulty probe: (0+255 min) time during which the compressor is active in case of faulty thermostat probe. With CO_n=0 compressor is always OFF.

CO_F Compressor OFF time with faulty probe: (0+255 min) time during which the compressor is OFF in case of faulty thermostat probe. With CO_F=0 compressor is always active.

DISPLAY

CF Temperature measurement unit: °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 Instrument display: (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.

rEd X-REP display (optional): (P1; P2; P3; P4, SET, dtr): it selects which probe is displayed by X-REP: 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 Display delay: (0+20,0m; risul. 10s) when the temperature increases, the display is updated of 1 °C/1°F after this time.

dtr Percentage of the second and first probe for visualization when Lod = dtr (0+100; 100 = P1, 0 = 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

tdF Defrost type: EL = electrical heater; in = hot gas.

dFP Probe selection for defrost termination (Only for XR64CX): nP = no probe; P1 = thermostat probe; P2 = evaporator probe; P3 = configurable probe; P4 = Probe on Hot Key plug.

dTE Defrost termination temperature: (-50+50 °C/-58+122°F) (Enabled only when EdF=Pb) sets the temperature measured by the evaporator probe, which causes the end of defrost.

dTS Second termination temperature (Only for XR64CX): (-50+50°C/-58+122°F) Enabled only when P3P=y. It sets the temperature measured by the second evaporator probe, which causes the end of defrost.

ldF Interval between defrost cycles: (0+120h) Determines the time interval between the beginning of two defrost cycles.

MdF (Maximum) length for defrost: (0+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.

MdS (Maximum) length for second defrost (Only for XR64CX): (0+255min) When P3P = n, (not evaporator probe: timed defrost) it sets the defrost duration, when P3P = y (defrost end based on temperature) it sets the maximum length for defrost.

dSd Start defrost delay: (0+99min) This is useful when different defrost start times are necessary to avoid overloading the plant.

dFd Temperature displayed during defrost: (rt = real temperature; it = temperature at defrost start; SE = set point; dEF = "dEF" label)

dAd Max display delay after defrost: (0+255min). Sets the maximum time between the end of defrost and the restarting of the real room temperature display.

Fdt Drip time: (0+120 min) 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.

dPo First defrost after start-up: (y = immediately; n = after the ldF time)

dAF Defrost delay after continuous cycle: (0+23,5h) time interval between the end of the fast freezing cycle and the following defrost related to it.

FANS

FnC Fans operating mode: 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 Fans delay after defrost: (0+255min) Interval between end of defrost and evaporator fans start.

Fct Temperature differential avoiding short cycles of fans (0+59°C; Fct=0 function disabled). If the difference of temperature between the evaporator and the room probes is more than the value of the Fct parameter, the fans are switched on.

FSt Fans stop temperature: (-50+50°C/122°F) setting of temperature, detected by evaporator probe, above which fans are always OFF.

Fon Fan ON time: (0+15 min) 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 Fan OFF time: (0+15 min) 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.

FAP Probe selection for fan management: nP= no probe; P1= thermostat probe; P2= evaporator probe; P3= configurable probe; P4= Probe on Hot Key plug.

AUXILIARY THERMOSTAT CONFIGURATION (Only for XR71CX)

ACH Kind of regulation for auxiliary relay: Ht = heating; CL = cooling

SAA Set Point for auxiliary relay: (-50,0+110,0°C; -58+230°F) it defines the room temperature setpoint to switch auxiliary relay.

Shy Differential for auxiliary relay: (0,1°C+25,5°C) with ACH= cL the auxiliary relay is activated when the probe temperature ArP is higher than the SAA+Shy value, and is switched off when the temperature reaches the SAA value. With ACH = Ht the auxiliary relay is activated when the probe temperature ArP is lower than SAA - Shy, and switched off when the temperature returns to the SAA value.

ArP Probe selection for auxiliary: nP= no probe, the auxiliary relay is switched only by button; P1= Probe 1 (Thermostat probe); P2= Probe 2 (evaporator probe); P3= Probe 3 (display probe); P4= Probe 4 (Hot Key).

Sdd Auxiliary regulator off during defrost: n= the regulator goes on working, Y= the regulator is off during defrost.

ALARMS

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: (SET+110°C; SET+230°F) when this temperature is reached the alarm is enabled, after the "ALD" delay time.

ALL Minimum temperature alarm: (-50,0+SET°C; -58+230°F) when this temperature is reached the alarm is enabled, after the "ALD" delay time.

AFH Differential for temperature alarm/fan recovery: (0,1+25,5°C; 1+45°F)

Intervention differential for recovery of temperature alarm. It's also used for the restart of the fan when the FST temperature is reached.

ALd Temperature alarm delay: (0+255 min) time interval between the detection of an alarm condition and alarm signalling.

daO Exclusion of temperature alarm at startup: (from 0.0 min to 23.5h) time interval between the detection of the temperature alarm condition after instrument power on and alarm signalling.

CONDENSER TEMPERATURE ALARM

AP2 Probe selection for temperature alarm of condenser: nP = no probe; P1 = thermostat probe; P2 = evaporator probe; P3 = configurable probe; P4 = Probe on Hot Key plug.

AL2 Low temperature alarm of condenser: (-55+150°C) when this temperature is reached the LA2 alarm is signalled, possibly after the Ad2 delay.

Au2 High temperature alarm of condenser: (-55+150°C) when this temperature is reached the HA2 alarm is signalled, possibly after the Ad2 delay.

AH2 Differential for temperature condenser alarm recovery: (0,1+25,5°C; 1+45°F).

Ad2 Condenser temperature alarm delay: (0+255min) time interval between the detection of the condenser alarm condition and alarm signalling.

da2 Condenser temperature alarm exclusion at start up: (from 0.0 min to 23.5h, res. 10min).

bLL Compressor off with low temperature alarm of condenser: n = no; compressor keeps on working; Y = yes, compressor is switched off till the alarm is present, in any case regulation restarts after AC time at minimum.

AC2 Compressor off with high temperature alarm of condenser: n = no; compressor keeps on working; Y = yes, compressor is switched off till the alarm is present, in any case regulation restarts after AC time at minimum.

FOURTH RELAY (Only for XR70CX - XR71CX)

tbA Alarm relay silencing (with oA3=ALr): n = silencing disabled: alarm relay stays on till alarm condition lasts; y = silencing enabled: alarm relay is switched OFF by pressing a key during an alarm

oA3 Fourth relay configuration: ALr: alarm; Lig: light; AuS: Auxiliary relay; onF: always on with instrument on; db: do not select it; dEF: do not select it; FAn: do not select it; dF2: do not select it.

AoP Alarm relay polarity: it set if the alarm relay is open or closed when an alarm happens. CL = terminals 1-2 closed during an alarm; oP = terminals 1-2 open during an alarm

DIGITAL INPUT

iP Digital input polarity: oP: the digital input is activated by opening the contact; CL: the digital input is activated by closing the contact.

iF Digital input configuration: EAL = external alarm: "EA" message is displayed; bAL = serious alarm "CA" message is displayed. PAL = pressure switch alarm, "CA" message is displayed; dor = door switch function; dEF = activation of a defrost cycle; AUS = not enabled; Htr = kind of action inversion (cooling heating); FAn = not set it; ES = Energy saving.

did: (0+255 min) with iF=EAL or iF=bAL digital input alarm delay: delay between the detection of the external alarm condition and its signalling.

with iF=dor: door open signalling delay with iF=PAL: time for pressure switch function: time interval to calculate the number of the pressure switch activation.

nPS Pressure switch number: (0+15) Number of activation of the pressure switch, during the did interval, before signalling the alarm event (iF=PAL).

If the nPS activation in the did time is reached, switch off and on the instrument to restart normal regulation.

odc Compressor and fan status when open door: no = normal; Fan = Fan OFF; CP = Compressor OFF; F_C = Compressor and fan OFF.

rrd Outputs restart after doA alarm: no = outputs not affected by the doA alarm; yES = outputs restart with the doA alarm;

HES Temperature increase during the Energy Saving cycle: (-30,0°C+30,0°C/-22+86°F) it sets the increasing value of the set point during the Energy Saving cycle.

OTHER

Adr Serial address (1+244): Identifies the instrument address when connected to a ModBUS compatible monitoring system.

PbC Type of probe: it allows to set the kind of probe used by the instrument: PbC = PBC probe, ntc = NTC probe.

onF on/off key enabling: nu = disabled; oFF = enabled; ES = not set it.

dp1 Thermostat probe display

dp2 Evaporator probe display

dp3 Third probe display - optional.

dp4 Fourth probe display.

rSE Real set point: it shows the set point used during the energy saving cycle or during the continuous cycle.

rEL Software release for internal use.

Ptb Parameter table code: readable only.

11. DIGITAL INPUT

The free voltage digital input is programmable in different configurations by the iF parameter.

11.1 DOOR SWITCH (iF=dor)

It signals the door status and the corresponding relay output status through the "odc" parameter: no = normal (any change); Fan = Fan OFF; CP = Compressor OFF; F_C = Compressor and fan OFF.

Since the door is opened, after the delay time set through parameter did, the door alarm is enabled, the display shows the message da and the regulation restarts is rtr= yES. 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.

11.2 GENERIC ALARM (iF=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 don't change. The alarm stops just after the digital input is de-activated.

11.3 SERIOUS ALARM MODE (iF=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.

11.4 PRESSURE SWITCH (iF=PAL)

If during the interval time set by did parameter, the pressure switch has reached the number of activation of the nPS parameter, the CA pressure alarm message will be displayed. The compressor and the regulation are stopped. When the digital input is ON the compressor is always OFF. If the nPS activation in the did time is reached, switch off and on the instrument to restart normal regulation.

11.5 START DEFROST (iF=dF)

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.

11.6 INVERSION OF THE KIND OF ACTION: HEATING-COOLING (iF=Htr)

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

11.7 ENERGY SAVING (iF=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.

11.8 DIGITAL INPUT POLARITY

The digital input polarity depends on the iP parameter.

iP=CL: the input is activated by closing the contact.

iP=OP: the input is activated by opening the contact.

12. TTL SERIAL LINE FOR MONITORING SYSTEMS

The TTL serial line, available through the HOT KEY connector, allows by means of the external TTL/RS485 converter, XJ485-CX, to connect the instrument to a monitoring system ModBUS-RTU compatible such as the X-WEB500/3000/300.

13. X-REP OUTPUT OPTIONAL

As optional, an X-REP can be connected to the instrument, through the HOY KEY connector. The X-REP output EXCLUDES the serial connection. To connect the X-REP to the instrument the following connectors must be used CAB-51F(1m), CAB-52F(2m), CAB-55F(5m)

14. INSTALLATION AND MOUNTING

Instruments 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+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.

15. ELECTRICAL CONNECTIONS

The instruments are provided with screw terminal block to connect cables with a cross section up to 2,5 mm². 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.

15.1 PROBES 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.

16. HOW TO USE THE HOT KEY

16.1 HOW TO PROGRAM THE HOT KEY FROM THE INSTRUMENT (UPLOAD)

- Program one controller with the front keypad;
 - When the controller is ON, insert the Hot key and push ^ key; the uP message appears followed a by flashing Ed;
 - Push SET key and the Ed will stop flashing;
 - Turn OFF the instrument remove the Hot Key, then turn it ON again.
- NOTE:** the Er message is displayed for failed programming. In this case push again ^ key if you want to restart the upload again or remove the Hot key to abort the operation.

16.2 HOW TO PROGRAM AN INSTRUMENT USING HOT KEY (DOWNLOAD)

- Turn OFF the instrument;
 - Insert a programmed "Hot Key" into the 5 PIN receptacle and then turn the Controller ON;
 - Automatically the parameter list of the Hot Key is downloaded into the Controller memory, the do message is blinking followed a by flashing Ed;
 - After 10 seconds the instrument will restart working with the new parameters;
 - Remove the Hot Key.
- NOTE:** the Er message is displayed for failed programming. In this case push again ^ key if you want to restart the upload again or remove the "Hot key" to abort the operation.

17. ALARM SIGNALLING

MESS.	CAUSE	OUTPUTS
P1*	Room probe failure	Compressor output acc. to par. "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 according to rrd
EA*	External alarm	Output unchanged
CA*	Serious external alarm (iF=bAL)	All outputs OFF
CA*	Pressure switch alarm (iF=PAL)	All outputs OFF

17.1 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, LA, HA2 and LA2 automatically stop as soon as the temperature returns to normal values. Alarms EA and CA (with iF=bAL) recover as soon as the digital input is disabled.

17.2 OTHER MESSAGES

Pon	Keyboard unlocked
Pof	Keyboard locked
noP	In programming mode: none parameter is present in Pr1
	On the display or in dP2, dP3, dP4: the selected probe is not enabled

18. TECHNICAL DATA

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: Screw terminal block 2,5 mm² wiring.

Power supply: according to the model: 9-40Vdc, 12Vac/dc, ±10%; 24Vac/dc, ±10%; 230Vac 10%, 50/60Hz, 110Vac 10%, 50/60Hz.

Power absorption: 3,5VAmax.

Display: 3 digits, red LED, 14,2 mm high.

Inputs: Up to 4 NTC or PTC probes.

Digital input: free voltage contact.

Relay outputs: compressor: SPST 8(3) A, 250Vac, SPST 16(6) A 250Vac, or 20(8) A 250Vac (XR60CX); SPST 8(3) A, 250Vac, SPST 16(6) A 250Vac (XR64CX, XR70CX, XR72CX). **compressor2:** SPDT 8(3) A, 250Vac or SPST 16(6) A 250Vac (XR71CX, XR72CX).

defrost: SPDT 8(3) A, 250Vac (XR60CX);

SPDT 8(3) A, 250Vac or SPST 16(6) A 250Vac (XR64CX, XR70CX, XR71CX, XR72CX).

defrost2: SPDT 8(3) A, 250Vac or SPST 16(6) A 250Vac (XR64CX).

fan: SPST 8(3) A, 250Vac or SPST 16(6) A 250Vac (XR60CX).

SPST 5A, 250Vac or SPST 16(6) A 250Vac (XR64CX, XR70CX, XR71CX, XR72CX).

aux: SPDT 8(3) A, 250Vac or SPST 16(6) A 250Vac (XR70CX).

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

Kind of action: 1B.

Pollution grade: 2.

Software class: A.

Rated impulsive voltage: 2500V.

Overvoltage Category: II.

Operating temperature: 0+60 °C.

Storage temperature: -30+85 °C.

Relative humidity: 20+85% (no condensing).

Measuring and regulation range: NTC probe: -40+110°C (-40+230°F).

PTC probe: -55+150°C (-67+302°F).

Resolution: 0,1 °C or 1 °C or 1 °F (selectable).

Accuracy (ambient temp. 25°C): ±0,7 °C ±1 digit.

DEFAULT SETTING VALUES

LABEL	DESCRIPTION	RANGE	XR60CX	XR64CX	XR70CX	XR71CX	XR72CX
Set	Set Point	LS - US	-5.0°C / 0°F	-5.0°C / 0°F	-5.0°C / 0°F	-5.0°C / 0°F	-5.0°C / 0°F
Hy	Differential	0,1+25°C/ 1+45°F	2.0°C / 4°F	2.0°C / 4°F	2.0°C / 4°F	2.0°C / 4°F	2.0°C / 4°F
LS	Minimum Set Point	-55°C+SET/ -67°F+SET	-50°C/ -58°F	-50°C/ -58°F	-50°C/ -58°F	-50°C/ -58°F	-50°C/ -58°F
US	Maximum Set Point	SET+150°C / SET+302°F	110 °C / 230°F	110 °C / 230°F	110 °C / 230°F	110 °C / 230°F	110 °C / 230°F
ot	First probe calibration	-12+12°C/ -21+21°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F
P2P	Second probe presence	n-y	y	y	y	y	y
oE	Second probe calibration	-12+12°C/ -21+21°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F
P3P	Third probe presence	n-y	n	y	n	n	n
o3	Third probe calibration	-12+12°C/ -21+21°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F
P4P	Fourth probe presence	n-y	n	n	n	n	n
o4	Fourth probe calibration	-12+12°C/ -21+21°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F	0.0°C / 0°F
odS	Outputs activation delay at start up	0 + 255 min	0	0	0	0	0
AC	Anti-short cycle delay	0 + 50 min	1	1	1	1	1
AC1	2 nd compressor delay	0 + 255 sec	-	-	-	-	1
rtr	P1-P2 percentage for regulation	0 + 100 (100=P1, 0=P2)	100	100	100	100	100
CCt	Continuous cycle duration	0 + 24 h	0.0	0.0	0.0	0.0	0.0
CCS	Set Point for continuous cycle	(-55,0+150,0°C) (-67+302°F)	-5.0°C / 0°F	-5.0°C / 0°F	-5.0°C / 0°F	-5.0°C / 0°F	-5.0°C / 0°F
Con	Compressor ON with faulty probe	0 + 255 min	15	15	15	15	15
CoF	Compressor OFF with faulty probe	0 + 255 min	30	30	30	30	30
CF	Measurement units	°C / °F	°C/°F	°C/°F	°C/°F	°C/°F	°C/°F
rES	Resolution (only for °C)	dE - in	dE/in	dE/in	dE/in	dE/in	dE/in
Lod	Probe displayed	P1;P2	P1	P1	P1	P1	P1
rEd	X-REP display	P1; P2; P3; P4; Set; dtr	P1	P1	P1	P1	P1
dLy	Display delay	0+20.0 min(10sec.)	0	0	0	0	0
dtr	P1-P2 percentage for display	1 + 99	50	50	50	50	50
tdF	Defrost type	EL; in	EL	EL	EL	EL	EL
dFP	Probe selection for def. termination	nP; P1; P2; P3; P4	P2	-	P2	P2	P2
dTE	Defrost termination temperature	-50 50 °C	8°C / 46°F	8°C / 46°F	8°C / 46°F	8°C / 46°F	8°C / 46°F
dtS	2nd def. termination temperature	-50 50 °C	-	8°C / 46°F	-	-	-
IdF	Interval between def. cycles	0 + 120 h	6	6	6	6	6
MdF	Max length for def.	0 + 255 min	30	30	30	30	30
MdS	Max length for def. 2	0 + 255 min	-	30	-	-	-
dSd	Start defrost delay	0 + 255 min	0	0	0	0	0
dFd	Display during def.	rt-It-SEI-dEF	it	it	it	it	it
dAd	MAX display delay after defrost	0 + 255 min	30	30	30	30	30
Fdt	Draining time	0+120 min	0	0	0	0	0
dPo	First defrost after startup	n; y	n	n	n	n	n
dAF	Defrost delay after fast freezing	0 + 23h and 50'	0.0	0.0	0.0	0.0	0.0
Fnc	Fan operating mode	C-n, o-n, C-y, o-Y	o-n	o-n	o-n	o-n	o-n
Fnd	Fan delay after defrost	0+255min	10	10	10	10	10
Fct	Differential of temp. for forced activation of fans	0+50°C	10°C / 20°F	10°C / 20°F	10°C / 20°F	10°C / 20°F	10°C / 20°F
FSt	Fan stop temperature	-50+50°C/-58+122°F	2°C / 36°F	2°C / 36°F	2°C / 36°F	2°C / 36°F	2°C / 36°F
Fon	Fan on time with compressor off	0+15 (min.)	0	0	0	0	0
Fof	Fan off time with compressor off	0+15 (min.)	0	0	0	0	0
FAP	Probe selection for fan management	nP; P1; P2; P3; P4	P2	P2	P2	P2	P2
ACH	Kind of action for auxiliary relay	CL; Ht	-	-	-	CL	-
SAA	Set Point for auxiliary relay	(-55,0+150,0°C) (-67+302°F)	-	-	-	0°C / 36°F	-
SHy	Differential for auxiliary relay	0,1+25°C/ 1+45°F	-	-	-	2°C / 4°F	-
ArP	Probe selection for auxiliary relay	nP; P1; P2; P3; P4	-	-	-	nP	-
Sdd	Auxiliary relay off during defrost	n; y	-	-	-	n	-
ALC	Temperature alarms configuration	rE-Ab	Ab	Ab	Ab	Ab	Ab
ALU	Max temperature alarm	Set 110,0°C; Set+230°F	110°C/ 230°F	110°C/ 230°F	110°C/ 230°F	110°C/ 230°F	110°C/ 230°F
ALL	Min temperature alarm	-50+50°C/-58+122°F	-50°C/ -58°F	-50°C/ -58°F	-50°C/ -58°F	-50°C/ -58°F	-50°C/ -58°F
AFH	Differential for temp. alarm recovery	(0,1°C+25,5°C) (1°F+45°F)	1°C / 2°F	1°C / 2°F	1°C / 2°F	1°C / 2°F	1°C / 2°F
ALd	Temperature alarm delay	0 + 255 min	15	15	15	15	15
daO	Exclusion of temp. alarm at startup	0 + 24 h	1.3	1.3	1.3	1.3	1.3
AP2	Probe for temp. alarm of condenser	nP; P1; P2; P3; P4	P4	P4	P4	P4	P4
AL2	Condenser for low temp. alarm	(-55,0+150,0°C) (-67+302°F)	-40°C/ -40°F	-40°C/ -40°F	-40°C/ -40°F	-40°C/ -40°F	-40°C/ -40°F
AU2	Condenser for high temp. alarm	(-55,0+150,0°C) (-67+302°F)	110°C/ 230°F	110°C/ 230°F	110°C/ 230°F	110°C/ 230°F	110°C/ 230°F
AH2	Differential for condenser temp. alarm recovery	(0,1°C+25,5°C) (1°F+					