DIGITAL CONTROLLERS WITH

ENERGY SAVING MANAGEMENT

XRB06CH AND XRB07CH

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.

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." (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.
- Dixell Srl reserves the right to change the composition of its products, even without notice, ensuring the same and unchanged functionality.

2   GENERAL DESCRIPTION

The **XRB06CX**, **format 32 x 74 x 60 mm**, is microprocessor based controller, suitable for applications on medium or low temperature ventilated refrigerating units. It has three relay outputs to control compressor, fan, lights or defrost which can be either electrical or reverse cycle (hot gas). The device is also provided with 2 NTC probe inputs, the first one for temperature control and the second one to be located onto the evaporator, to control the defrost termination temperature and to control the ventilators. It is also equipped with a couple of configurable digital inputs.
The **XRB07CX** has an additional configurable relay.
With the HOTKEY it's possible to program the instrument in a quick and easy way.

3   REGULATION

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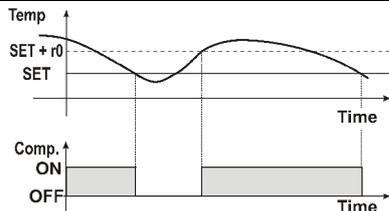
In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters **CY** and **Cn**.

4   AUTOMATIC SUPER COOLING FUNCTION

This function is used to cool quickly the goods when the cabinet is filled.
Different parameters are used for this function depending on the working mode:
Normal mode will use: **1H**, **1S** and **1t**
Energy Saving mode will use: **2H**, **2S**, **1t**
Here below the parameter description:
- **1H**, **2H** overheating before activating the super cooling function: (0.0 to 12.0°C; 0 to 21°F) value added to Set-Point to determine the start temperature of sub-cooling cycle.
- **1S**, **2S** Subcooling: (0.0 to 12.0°C; 0 to 21°F) value subtracted to Set-Point to determine the end temperature of sub-cooling cycle.
- **1t** maximum duration for super cooling function: 0 to 99 min

If the temperature is higher than **SET+HY+1H** or **SET_ES+HYE+2H**, the super cooling function starts and the compressor is not stopped till the temperature is **1S** or **2S** degrees below the set point **SET** or **SET_ES**. To disable this function set **1S**, **2S=0**.

5   DEFROST

Two defrost modes are available through the **td** parameter:
- **td=EL** → defrost through electrical heater (compressor OFF)
- **td=in** → hot gas defrost (compressor ON).

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

6   FANS

With **FC** parameter it can be selected the fans functioning:
- **FC=Cn** → will switch ON and OFF with the compressor and **not run** during defrost
- **FC=on** → 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 **Fd** parameter.

- **FC=Cy** → fans will switch ON and OFF with the compressor and **run** during defrost
- **FC=oY** → fans will run continuously also during defrost.

An additional parameter **FS** 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 **FS**.

6.1   FANS CYCLICAL ACTIVATION WITH COMPRESSOR OFF

When **FC=Cn** or **CY** (fans in parallel to the compressor), by means of the **Fn** and **FF** 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 **Fn** time. With **Fn=0** the fans remain always off, when the compressor is off.
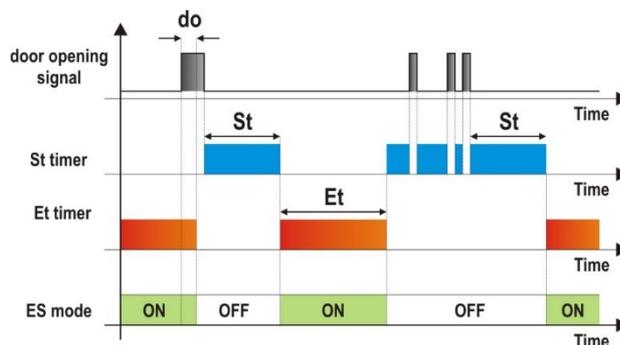
6.2   FANS AND DIGITAL INPUT

When the digital input is configured as door switch (**iF=do**) fan and compressor status depends on the **dC** parameter value:
- **dC=no** → normal regulation
- **dC=Fn** → fans OFF
- **dC=CP** → compressor OFF
- **dC=FC** → compressor and fans OFF

When **rd=Y**, the regulation restart with door open alarm.

7   AUTOMATIC ENERGY SAVING FUNCTION

FROM	TO	CHANGED BY
Standard	E.S.	- Push the **ECO** button - Door continuously closed for the **Et** time
E.S.	Standard	- Push the **ECO** button - Controller in ES mode for the **St** time - If the controller is in ES and the door is open more than **do** time, the controller restart standard set point.

NOTE: the cycles (ES → Standard mode → ES ….) are always operating with **iF** or **2F=do** and **Et** and **St** different from zero.
With **Et** or **St=0** the controller doesn't change the operating mode, and it's possible to pass from the standard mode to E.S. by using the **ECO** button or with **iF** or **2F=ES**.

Note: the energy saving status is saved in EEPROM to resume previous operation if a power failure occurs.

8   FRONT PANEL COMMANDS

SET	To display target set point, in programming mode it selects a parameter or confirm an operation.

LED	MODE	SIGNIFICATO
❄	On	Compressor running
	Flashing	Anti-short cycle delay enabled (AC parameter).
ECO	On	Energy Saving mode active
✿	On	Fans output enabled
	Flashing	Fans delay after defrost
°C	On	Measurement unit
	Flashing	Programming mode
°F	On	Measurement unit
	Flashing	Programming mode

ECO		(**ECO**) for light or energy saving mode activation/deactivation
⋀		(**UP**) In programming mode it browses the parameter codes or increases the displayed value.
⋁ ONOFF		(**DOWN/OFF**) In programming mode it browses the parameter codes or decreases the displayed value. Keep it pressed for 3 sec for ON/OFF mode.

KEYS COMBINATION

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

8.1 HOW TO SEE THE SET POINT

1. Push and immediately release the **SET** key, the set point will be showed;
2. Push and immediately release the **SET** key or wait for 3 sec to return to normal visualisation.

8.2 HOW TO CHANGE THE SETPOINT

1. Push the **SET** key for more than 3 sec to change the Set point value;
2. The value of the set point will be displayed and the "°C" or "°F" LED starts blinking;
3. To change the Set value push the **UP** or **DOWN** arrows.
4. To memorise the new set point value push the **SET** key again or wait for 10 sec.

8.3 HOW TO START A MANUAL DEFROST

A configurable button needs to be set as **dE** to activate the manual defrost control function. After that, keep the DEF button pressed for the required time (immediate or 3 sec if timed) in order to activate a defrost.

8.4 HOW TO CHANGE A PARAMETER VALUE

To change any parameter value, operate as follows:
1. Enter the Programming mode by pressing the **SET+DOWN** keys for 3 sec ("°C" or "°F" LED starts blinking).
2. Select the required parameter. Press the **SET** key to display its value
3. Use **UP** or **DOWN** to change its value.
4. Press **SET** to store the new value and move to the following parameter.
To exit: Press **SET+ UP** or wait for 15 sec without pressing any key.
NOTE: the set value is stored even when the procedure is terminated by waiting for the time-out to expire.

8.5 HIDDEN MENU

The hidden menu includes all the parameters of the instrument.
HOW TO ENTER THE HIDDEN MENU
1. Enter the Programming mode by pressing the **SET+DOWN** keys for 3 sec ("°C" or "°F" LED starts blinking).
2. Released the keys and then push again the **SET+DOWN** keys for more than 7 sec. The "L2" label will be displayed immediately followed from the **Hy** parameter.
NOW YOU ARE IN THE HIDDEN MENU.
3. Select the required parameter.
4. Press the **SET** key 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+ UP** or wait for 15 sec without pressing any key.
NOTE1: if there are no parameters in L1, after 3 sec the "nP" message will be displayed. Keep both keys pushed till the "L2" message will be displayed.
NOTE2: the set value is stored even when the procedure is terminated by waiting for 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+DOWN**. In HIDDEN MENU when a parameter is present in First Level the decimal point is on.

8.6 TO LOCK THE KEYBOARD

1. Keep pressed for more than 3 sec the **UP** and **DOWN** keys.
2. The "OF" message will be displayed and the keyboard will be locked. If a key is pressed more than 3 sec the "OF" message will be displayed.

8.7 TO UNLOCK THE KEYBOARD

Keep both UP and **DOWN** key pressed more than 3 sec until the "on" message will be displayed.

9 PARAMETERS

REGULATION

HY	**Differential in standard mode:** (0.1 to 25°C; 1 to 45°F) differential for set point used in normal mode. Compressor Cut IN is **SET+HY**. Compressor Cut OUT is when the temperature reaches the set point **SET**.
HE	**Differential in energy saving mode:** (0.1 to 25°C; 1 to 45°F) differential for set point used in energy saving mode. Compressor Cut IN is **SET_ES+HE**. Compressor Cut OUT is when the temperature reaches the set point **SET_ES**.
LS	**Minimum SET POINT:** (-55°C to SET; -67°F to SET) sets the minimum value for the set point.
US	**Maximum SET POINT:** (SET to 99°C; SET to 99°F) set the maximum value for set point.
ot	**First probe calibration:** (-9.9 to 9.9°C; -17 to 17°F) allows to adjust possible offset of the first probe.
P2	**Evaporator probe presence:** (n; Y) **n**=not present; **Y**=probe configured as present.
oE	**Second probe calibration:** (-9.9 to 9.9°C; -17 to 17°F) allows to adjust possible offset of the second probe.
P3	**Third probe presence:** (n; Y) **n**=not present; **Y**=probe configured as present.
F3	**Third probe calibration:** (-9.9 to 9.9°C; -17 to 17°F) allows to adjust possible offset of the second probe.
od	**Outputs activation delay at start up:** (0 to 99 min) 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	**Anti-short cycle delay:** (0 to 99 min) minimum interval between the compressor stop and the following restart.
CY	**Compressor ON time with faulty probe:** (0 to 99min) time during which the compressor is active in case of faulty thermostat probe. With **CY=0** compressor is always OFF.
Cn	**Compressor OFF time with faulty probe:** (0 to 99min) time during which the compressor is OFF in case of faulty thermostat probe. With **Cn=0** compressor is always active.

DISPLAY

CF	**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, oE, o1, AU, AL have to be checked and modified if necessary.
rE	**Resolution (only for °C):** (dE; in) **dE**=decimal between -9.9 and 9.9°C; **in**=integer.
Ld	**Default display:** (P1; P2; P3; P4; SP; dr) **P1**=thermostat probe; **P2**=evaporator probe; **P3**=third probe; **P4**=not used; **SP**=Set point; **dr**=not used.
dy	**Display delay:** (0 to 99 min) when the temperature increases, the display is updated of 1°C or 1°F after this time.

DEFROST

td	**Defrost type:** (EL; in) **EL**= electrical heater, compressor OFF; **in**=hot gas, compressor ON.
EA	**Automatic defrost:** (n; Y) **n**=function disabled; **Y**=a defrost is automatically activated at the beginning of any energy saving period.
PE	**Probe selection for first defrost:** (nP; P1; P2; P3; P4) **nP**=not used, defrost ends by time; **P1**=thermostat probe; **P2**=evaporator probe; **P3**=third probe; **P4**=not used.
dE	**Defrost termination temperature:** (-55 to 50°C; -67 to 99°F) if **P2=Y**, this is the temperature measured by the evaporator probe which causes the end of defrost.
id	**Interval between defrost cycles:** (0 to 99 min) determines the time interval between two consecutives defrosts cycles.
Md	**Maximum duration for first defrost:** (0 to 99min, 0 means no defrost) when **P2=n**, (no evaporator probe present, the defrost is) it sets the defrost duration, when **P2=y** (defrost end based on temperature) it sets the maximum length for defrost.
dd	**Start defrosts delay:** (0 to 99min) this is useful when different defrost start times are necessary to avoid overloading the plant.
dF	**Display during defrost:** (rt; it; SP; dF) **rt**=real temperature; **it**=start defrost temperature; **SP**=SET-POINT; **dF**=label **dF**.
tA	**Delay for temperature visualization after defrost:** 0 to 99 min.
dt	**Drip time:** (0 to 99min) 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.

FANS

FC	**Fans operating mode:** (cn, on, cY, oY) **cn**=in runs with the compressor, OFF during defrost; **on**=continuous mode, OFF during defrost; **cY**=runs with the compressor, ON during defrost; **oY**=continuous mode, ON during defrost.
Fd	**Fans delay after defrost:** (0 to 99 min) Interval between the end of a defrost operation and the next evaporator fans start.
Ft	**Temperature differential for forced activation of fans:** 0 to 50°C; 0 to 90°F.
FS	**Fans stop temperature:** (-55 to 50°C; -67 to 99°F) setting of temperature, detected by evaporator probe, above which fans are always OFF.
Fn	**Fan ON time:** (0 to 15 min) with **FC=Cn** or **CY**, (fan activated in parallel with compressor). It sets the evaporator fan ON cycling time when the compressor is off. With **Fn=0** and **FF≠0** the fan are always off, with **Fn=0** and **FF=0** the fan are always off.
FF	**Fan OFF time:** (0 to 15 min) with **FC=Cn** or **CY**, (fan activated in parallel with compressor). It sets the evaporator fan off cycling time when the compressor is off. With **Fn=0** and **FF≠0** the fan are always off, with **Fn=0** and **FF=0** the fan are always off.
FP	**Probe selection for fan management:** **nP** = fan regulator is disabled; **P1** = thermostat probe; **P2** = evaporator probe; **P3** =configurable probe; **P4** = Probe on Hot Key plug.

ALARMS

CA	**Temperature alarms configuration:** (Ab; rE) **Ab** = absolute temperature: alarm temperature is given by the **AL** or **AU** values. **rE** = temperature alarms are referred to the set point. Temperature alarm is enabled when the temperature exceeds the **SET+AU** or **SET-AL** values.
AU	**Maximum temperature alarm:** (AL to 99°C; AL to 99°F) when this temperature is reached the alarm is enabled, after the **Ad** delay time.
AL	**Minimum temperature alarm:** (-55°C to AU; -67°F to AU) when this temperature is reached the alarm is enabled, after the **Ad** delay time.
FH	**Differential for temperature alarm recovery:** (0.1 to 25.5°C; 1 to 45°F) differential for temperature alarm recovery. It's also used for the restart of the fan when the **FS** temperature is reached.

Ad	**Temperature alarm delay:** (0 to 99 min) time interval between the detection of an alarm condition and alarm signalling.
dA	**Exclusion of temperature alarm at start-up:** (0 to 99 min) time interval between the detection of the temperature alarm condition after instrument power on and alarm signalling.

CONDENSER TEMPERATURE ALARMS

t2	**Condenser alarm temperature probe:** (nP; P1; P2; P3; P4) **nP**=not used, condenser alarm is disabled; **P1**=thermostat probe; **P2**=evaporator probe; **P3**=third probe; **P4**=not used.
L2	**Condenser low temperature alarm:** (-55 to 99°C; -67 to 99°F) when this temperature is reached the "L2" alarm is signalled after the **r1+r2** delay.
U2	**Condenser high temperature alarm:** (-55 to 99°C; -67 to 99°F) when this temperature is reached the "H2" alarm is signalled after the **r1+r2** delay.
H2	**Differential for temperature condenser alarm recovery:** 0.1 to 25°C; 1 to 45°F
r1	**Condenser temperature alarm delay:** (0 to 99 min) time interval between the detection of the condenser alarm condition and alarm signalling.
r2	**Condenser temperature alarm exclusion at start up:** 0 to 99 min.
bL	**Compressor off due low temperature alarm:** n; Y
C2	**Compressor off due high temperature alarm:** n; Y

RELAYS

tb	**Alarm relay switched off by pushing a button:** n; Y.
o1	**First relay configuration:** **dF**=defrost; **Fn**=evaporator fan; **AL**=alarm; **Li**=light; **Au**=DO NOT USE; **nF**=always on with instrument on; **db**=DO NOT USE; **C2**=DO NOT USE; **d2**=DO NOT USE
o2	**Second relay configuration:** **dF**=defrost.; **Fn**=evaporator fan; **AL**=alarm; **Li**=light; **Au**=DO NOT USE; **nF**=always on with instrument on; **db**=DO NOT USE; **C2**=DO NOT USE; **d2**=DO NOT USE
o3	**Third relay configuration:** **dF**=defrost.; **Fn**=evaporator fan; **AL**=alarm; **Li**=light; **Au**=DO NOT USE; **nF**=always on with instrument on; **db**=DO NOT USE; **C2**=DO NOT USE; **d2**=DO NOT USE
AP	**Alarm output polarity: (**CL; oP) **CL**=alarm relay will close in case of any alarm; **oP**=alarm relay will open ain case of any alarm

ENERGY SAVING

Et	**Period to switch from Energy Saving to Standard mode with door closed:** (0 to 99 hours) if the door remains closed for the **Et** time, the controller automatically switch to the ES mode. With **Et=0** the cycle are disabled. For curtain application set **iF** or **2F=ES**.
St	**Period to switch from Standard to Energy Saving mode with door closed:** (0 to 99 hours) if the door remains closed for the Et time the controller automatically switch from ES to standard mode. With **St=0** the cycle are disabled. For curtain application set **iF** or **2F=ES**.
ES	**Temperature variation during the Energy Saving cycle:** (-30.0°C to 30.0°C; -54 to 54°F) sets the increasing value of the set point during the Energy Saving cycle.
do	**Door open time before restoring the Standard mode:** (0 to 99 min) if the door remains open more than **dS** time, the controller switches from the ES to standard mode.
1H	**Overheating before activating the super cooling function in Standard mode:** (0.0 to12.0°C; 0 to 21°F) value added to Set-Point **SET** to determine the activation temperature for the sub-cooling cycle.
1S	**Subcooling for super cooling function in Standard mode:** (0.0 to 12.0°C; 0 to 21°F) value subtracted to Set-Point **SET** to determine the end temperature of sub-cooling cycle.
1t	**Maximum duration for super cooling function both for Standard and energy Saving mode:** (0 to 99 min) working period for super cooling function
2H	**Overheating before activating the super cooling function in Energy Saving mode:** (0.0 to12.0°C; 0 to 21°F) value added to Set-Point SET to determine the activation temperature for the sub-cooling cycle.
2S	**Subcooling for super cooling function in Energy Saving mode:** (0.0 to 12.0°C; 0 to 21°F) value subtracted to Set-Point SET to determine the end temperature of sub-cooling cycle.
LG	**Light off in ES mode:** (n, Y) it sets if the light is switched off when the controller is in ES mode.

DIGITAL INPUT

iP	**Digital input 1 polarity:** (oP; cL) **oP**=activated by closing the contact; **cL**=activated by opening the contact.
2P	**Digital input 2 polarity:** (oP; cL) **oP**=activated by closing the contact; **cL**=activated by opening the contact.
iF	**Digital input 1 configuration:** (do; ES; CP; EL; bA; dF;AU; HC; Fn; PA; nu) **do**=door switch function; **ES**=energy saving mode control; **CP**=compressor lock; **EA**=external warning alarm, "EA" label is displayed; **bA**=external lock alarm, "CA" label is displayed; **dF**=defrost activation; **Au**=not used; **HC**=inversion of the kind of action; **Fn**=remote fan activation; **PA**=external pressure switch alarm, label "PA" is displayed; **nu**=not used.
2F	**Digital input 2 configuration:** (do; ES; CP; EL; bA; dF;AU; HC; Fn; PA; nu) **do**=door switch function; **ES**=energy saving mode control; **CP**=compressor lock; **EA**=external warning alarm, "EA" label is displayed; **bA**=external lock alarm, "CA" label is displayed; **dF**=defrost activation; **Au**=not used; **HC**=inversion of the kind of action; **Fn**=remote fan activation; **PA**=external pressure switch alarm, label "PA" is displayed; **nu**=not used.
di	**Digital input 1 delay:** (0 to 99min) with **iF=EA**, **bA** or **PA**: is the delay between the detection of the external alarm condition and its signalling. With **iF=do** it represents the delay to activate the door open alarm.
2d	**Digital input 2 delay:** (0 to 99min) with **2F=EA**, **bA** or **PA**: is the delay between the detection of the external alarm condition and its signalling. With **iF=do** it represents the delay to activate the door open alarm.
dC	**Compressor and fan status when open door:** (no; Fn; cP; Fc) **no**=normal functioning; **Fn**=Fan OFF; **cP**=Compressor OFF; **Fc**=Compressor and Fan OFF.
rd	**Regulation restart with door open alarm:** (n; Y) **n**=no regulation if door is opened; **Y**=when di is elapsed regulation restarts even if door open alarm is present.
Cd	**Stop Compressor delay:** (0 to 99 min) set the time between the activation of the digital input and the stop of the compressor when **iF** or **2F=CPr**.

OTHER

bd	**ECO key configuration (immediate pressure):** (dE; Li; Au; P2; ES) **dE**=defrost; **Li**=light; **Au**=do not use; **P2**=probe P2 value visualisation; **ES**=energy saving mode
bn	**DOWN key configuration (immediate pressure):** (nu; OF; ES; dE) **nu**=not used; **OF**=ONOFF function; **ES**=energy saving mode; **dE**=defrost

b3	**ECO key configuration (long pressure):** (dE; Li; Au; P2; ES) **dE**=defrost; **Li**=light; **Au**=do not use; **P2**=probe P2 value visualisation; **ES**=energy saving mode
b4	**DOWN key configuration (long pressure):** (nu; OF; ES; dE) **nu**=not used; **OF**=ONOFF function; **ES**=energy saving mode; **dE**=defrost
d1	**Thermostat probe display (read only)**
d2	**Evaporator probe display (read only)**
d3	**Third probe display (read only)**
rS	**Real Set Point value (read only)**
rL	**Software release**
Pt	**Parameter code table**

10 DIGITAL INPUTS

The available digital inputs are configurable by using **iF** and **2F** parameters. They are placed as follows:
- Digital input 1 is in parallel to temperature probe P3. P3 present means that Digital Input 1 is disabled.
- Digital input 2 is in parallel to temperature probe P2. P2 present means that Digital Input 2 is disabled.

10.1 DOOR SWITCH (IF, 2F = DO)

It signals the door status and the corresponding relay output status through the **dC** parameter:
- **no** = normal (any change);
- **Fn** = Fan OFF;
- **CP** = Compressor OFF;
- **FC** = Compressor and fan OFF.

Since the door is opened, after the delay time set through parameter **di**, the door alarm is enabled, the display shows the message **dA** and **the regulation restarts if rd=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.

10.2 ENERGY SAVING (IF, 2F = 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.

10.3 ENERGY SAVING (IF, 2F = CP)

Compressor will be locked if the input is active.

10.4 EXTERNAL ALARM (IF, 2F = EA)

After delay (**di** or **2d**) the display will show the label EA and the outputs status will not change. The alarm ends when the digital input is deactivated.

10.5 SERIOUS ALARM (IF, 2F = BA)

After delay (**di** or **2d**) the display will show the label CA and the outputs status will be deactivated. The alarm ends when the digital input is deactivated.

10.6 START DEFROST (IF, 2F = DF)

It starts a defrost if there are the requested 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 **Md** safety time is expired.

10.7 KIND OF ACTION: HEATING OR COOLING (IF, 2F = HC)

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

10.8 REMOTE FAN MANAGEMENT (IF, 2F = FN)

Remote fan management by using digital input.

10.9 PRESSURE SWITCH (IF, 2F = PA)

After delay (**di** or **2d**) the display will show the label PA and the outputs status will be deactivated. The alarm end:
- Automatically if the number of detected external events during the **di** or **2F** period is lower than **nS**
- Manual if the number of detected external events during the **di** or **2F** period is higher than **nS**

11 INSTALLATION AND MOUNTING

XRB06CH and XRB07CH 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.

12 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.

12.1 PROBES

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.

13 USE THE HOT KEY

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

Program a controller by using the keypad.
1. When the controller is ON, insert the "**Hot Key**" and push **UP** key.
2. The "**uP**" message will appear, followed a by a flashing "**Ed**" label.
3. Push **SET** key and the "**Ed**" will stop flashing.
4. Turn OFF the instrument, remove the "**Hot Key**" and then turn it ON again.

NOTE: the "**Er**" message will be displayed in case of a failed programming operation. In this case push the **UP** key if you want to restart the upload again or remove the "**Hot Key**" to abort the operation.

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

1. Turn OFF the controller.
2. Insert a **programmed "Hot Key" into the 5-PIN plug** and then turn the controller ON.
3. The parameter list present into the HOTKEY is automatically downloaded into the controller memory. The "**do**" label will blink followed a by flashing "**Ed**".
4. After 10 sec the controller restarts, loading the newer parameters.
5. Remove the "**Hot Key**".

NOTE: the "**Er**" message is displayed in case of a failed copying operation. In this case turn the controller off and then on again (if you want to retry the operation) or remove the "**Hot Key**" to end the operation.

14 ALARM SIGNALLING

Mess.	Cause	Outputs
P1	Room probe failure	Compressor output according to **CY** e **Cn**
P2	Evaporator probe failure	Defrost end is timed
P3	Third probe failure	Outputs unchanged
HA	Maximum temperature alarm	Outputs unchanged
LA	Minimum temperature alarm	Outputs unchanged
H2	Maximum temperature alarm for condenser	Outputs unchanged
L2	Minimum temperature alarm for condenser	Outputs unchanged
EA	External alarm	Outputs unchanged
CA	Serious external alarm	All outputs OFF
PA	Pressure switch alarm	All outputs OFF
dA	Door Open	Depends on par. rd

14.1 ALARM RECOVERY

Probe alarms **P1**, **P2** and **P3** starts 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**", "**U2**" and "**L2**" automatically stop as soon as the temperature returns to normal values.
Alarms "**EA**" and "**CA**" (with **iF=bL**) recover as soon as the digital input is disabled.

15 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) 230Vac ±10%, 50/60Hz; 110Vac ±10%, 50/60Hz
Power absorption: 3.5VA max
Display: 2 digits, red LED, 14.2 mm high
Inputs: up to 3 NTC or PTC probes
Digital input: up to 2 free voltage contacts
Relay outputs:
    Compressor: SPST 16(6) A 250Vac or 20(8) A 250Vac
    Defrost: SPDT 8(3) A, 250Vac
    AUX: SPST 8(3) A, 250Vac
    Fan: SPST 5(2) A, 250Vac
Data storing: on the non-volatile memory (EEPROM)
Kind of action: 1B
Pollution degree: 2
Software class: A
Rated impulsive voltage: 2500V
Overvoltage Category: II
Operating temperature: 0T60°C (32T140°F)
Storage temperature: -25T60°C (-13T140°F)
Relative humidity: 20 to 85% (no condensing)
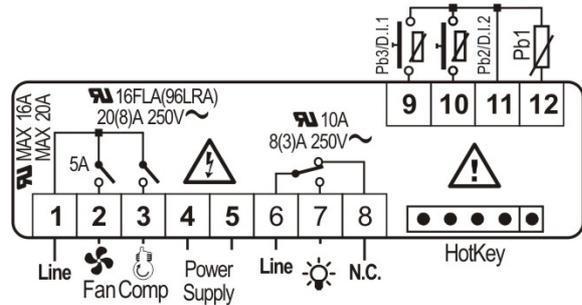**Measuring and regulation range:**
    NTC -40T110°C (-40T230°F)
    PTC -40T150°C (-40T302°F)
Resolution: 0.1°C or 1°C or 1°F (selectable)
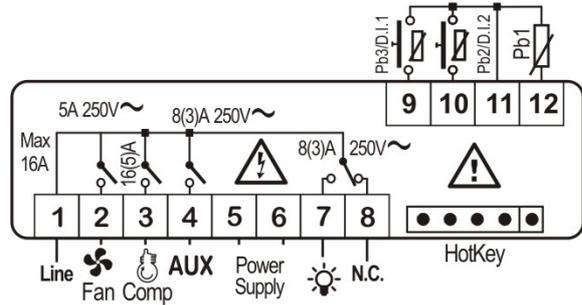**Accuracy (ambient temp. 25°C):** ±0.1°C ±1 digit

16 CONNECTIONS

16.1 XRB06CH – 20+8+5A

16.2 XRB07CH – 16+8+8+5A

17 DEFAULT SETTING VALUES

LABEL	DESCRIPTION	RANGE	DEFAULT
REGULATION			
HY	Differential in standard mode	0.1 to 25°C; 1 to 45°F	2.0°C
HE	Differential in energy Saving mode	0.1 to 25°C; 1 to 45°F	2.0°C
LS	Minimum Set Point value	-55°C to SET; -67°F to SET	-50.0°C
US	Maximum Set Point value	SET to 99°C; SET to 99°F	50.0°C
ot	Thermostat probe calibration	-9.9 to 9.9°C; -17 to 17°F	0.0
P2	Evaporator probe presence	n; Y	n
oE	Evaporator probe calibration	-9.9 to 9.9°C; -17 to 17°F	0.0
P3	Third probe presence	n; Y	n
F3	Third probe calibration	-9.9 to 9.9°C; -17 to 17°F	0.0
od	Outputs activation delay at start up	0 to 99 min	0
AC	Anti-short cycle delay	0 to 99 min	2
CY	Compressor ON time faulty probe	0 to 99 min	5
Cn	Compressor OFF time faulty probe	0 to 99 min	10
DISPLAY			
CF	Measurement units	°C; °F	°C
rE	Resolution (only for °C)	dE; in	dE
Ld	Default Display	P1; P2; P3; P4; SP; rt	P1
dy	Display delay	0 to 15 min	0
DEFROST			
td	Defrost type	EL; in	EL
EA	Automatic defrost	n; Y	n
PE	Defrost probe selection	nP; P1; P2; P3; P4	P2
dE	Defrost termination temperature	-55 to 50°C; -67 to 99°F	8.0°C
id	Interval between defrost cycles	0 to 99 hours	12
Md	Maximum length for defrost	0 to 99 min	15
dd	Start defrost delay	0 to 99 min	0
dF	Display during defrost	rt; in; SP; dF	dE
tA	Delay for temperature visualization after defrost	0 to 99 min	0
dt	Draining time	0 to 99 min	2
1d	Defrost enabled during super cooling	n; Y	n
FANS			
FC	Fans operating mode	cn; on; cY; oY	Cn
Fd	Fans delay after defrost	0 to 99 min	2

Ft	Temperature differential for forced activation of fans	0 to 50°C; 0 to 90°F	0
FS	Fans stop temperature	-55 to 50°C; -67 to 99°F	50.0°C
Fn	Fan ON time	0 to 15 min	5
FF	Fan OFF time	0 to 15 min	10
FP	Probe selection for fan management	nP; P1; P2; P3; P4	P2
ALARMS			
CA	Temperature alarm configuration	Ab; rE	Ab
AU	Maximum temperature alarm	ALL to 99°C; ALL to 99°F	99°C
AL	Minimum temperature alarm	-55°C to ALU; -67°F to ALU	-40°C
FH	Differential for temperature alarm recovery	0.1 to 25,5°C; 1 to 255°F	2.0
Ad	Temperature alarm delay	0 to 99 min	2
dA	Exclusion of temperature alarm at startup	0 to 99 min	99
CONDENSER TEMPERATURE ALARMS			
t2	Condenser alarm probe selection	nP; P1; P2; P3; P4	nP
L2	Condenser low temperature alarm	-55 to 99°C; -67°F to 99°F	-1.0°C
U2	Condenser high temperature alarm	-55°C to 99°C; -67°F to 99°F	45°C
H2	Differential for condenser temperature alarm recovery	0.1 to 25°C; 1 to 45°F	5°C
r1	Temperature alarm delay	0 to 99 min	5
r2	Exclusion of temperature alarm after power-on	0 to 99 min	99
bL	Compressor off due to condenser low temperature alarm	n; Y	n
C2	Condenser off due to condenser high temperature alarm	n; Y	n
DEFROST-LIGHT RELAY			
tb	Alarm relay muting	n; Y	Y
o1	First relay configuration	dF; Fn; AL; Li; AU; nF; dB; C2; d2	Li
o2	Second relay configuration	dF; Fn; AL; Li; AU; nF; dB; C2; d2	Fn
o3 (*)	Third relay configuration	dF; Fn; AL; Li; AU; nF; dB; C2; d2	AL
AP	Alarm relay polarity	CL; oP	CL
ENERGY SAVING			
Et	Standard to ES mode time with door closed	0 to 99 hours	4
St	ES to Standard mode time with door closed	0 to 99 hours	8
ES	Differential for energy saving	-30 to 30°C; -54 to 54°F	3
do	Door open time before restoring Standard mode.	0 to 255 sec	3
1H	Overheating before activating super cooling function	0.1 to 25.0°C; 1 to 45°F	10
1S	Sub Cooling	0.1 to 25.0°C; 1 to 45°F	1.0
1t	Maximum duration for super cooling	0 to 99 min	60
2H	Overheating before activating super cooling function	0.1 to 25.0°C; 1 to 45°F	10
2S	Sub Cooling	0.1 to 25.0°C; 1 to 45°F	1.0
LG	Light off in ES mode	n; Y	n
DIGITAL INPUTS			
iP	Digital input 1 polarity	CL; oP	CL
2P	Digital input 2 polarity	CL; oP	CL
iF	Digital input 1configuration	do; ES; CP; EL; bA; dF; AU; HC; Fn; PA; nu	do
2F	Digital input 2 configuration	do; ES; CP; EL; bA; dF; AU; HC; Fn; PA; nu	EL
di	Digital input 1 alarm delay	0 to 99 min	2
2d	Digital input 2 alarm delay	0 to 99 min	2
nS	Number of activation of the pressure switch	0 to 15	15
dC	Compressor and fan status when open door	no; Fn; cP; Fc	Fn
rd	Regulation with door open	n; Y	Y
Cd	Stop compressor delay	0 to 15 min	0
OTHER			
bd	ECO key configuration (immediate)	dE; Li; AU; P2; ES	ES
bn	DOWN key configuration (immediate)	nu; OF; ES; dE	nu
b3	ECO key configuration (timed)	dE; Li; AU; P2; ES	Li
b4	DOWN key configuration (timed)	nu; OF; ES; dE	oF
d1	Thermostat probe display	Read Only	- - -
d2	Evaporator probe display	Read Only	- - -
d3	Third probe display	Read Only	- - -
rS	Real SETPOINT value	Read Only	- - -
rL	Firmware release	Read Only	- - -

Pt	Parameter code table	Read Only	- - -

(*) available only for XRB07CH