

DIGITAL CONTROLLER WITH ADVANCED ENERGY SAVING MANAGEMENT  
XRB07CH

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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

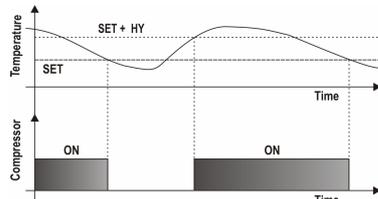
- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical 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." (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

The XRB07CH, 32x74x60mm format, is a microprocessor based controller suitable for applications on medium or low temperature ventilated refrigeration units. It has 4 relay outputs to control compressor, fans, light and defrost or auxiliary output. The device is also provided with up to 4 NTC 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 manage the fan and the third, optional and located on the HOT-KEY port, used to control the condenser temperature. There is also a configurable digital input. By using the HOT-KEY it is 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 will start. The compressor will stop when the temperature reaches the set point value again.



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

4 ENERGY REDUCTION ALGORITHM

4.1 DESCRIPTION

The device permits to set different temperature to be used during normal and reduced power use. The standard SET-POINT (SET) is used to maintain the temperature at a certain value when the energy saving status (ES) is not active. On the other side, when the ES status is active a different SET-POINT (SET\_ES), higher than the standard one, will be used. The parameter HES will have to be set to change the regulation temperature according to the following formula:

$$SET\_ES = SET + HES$$

There are also two different differential values for SET and SET\_ES, which are used for compressor cut-in and cut-out: when ES status is active the HYE parameter will be used instead of the HY parameter.

The device uses special Energy reduction Algorithm (ErA algorithm from Dixell) to optimize loads activation during the day. It is possible to set two different algorithms (ErA=bas or Aut). They differ for the used sensor and for the total length of the interval of time involved.

4.2 BASIC ENERGY SAVING ALGORITHM – ErA=bas

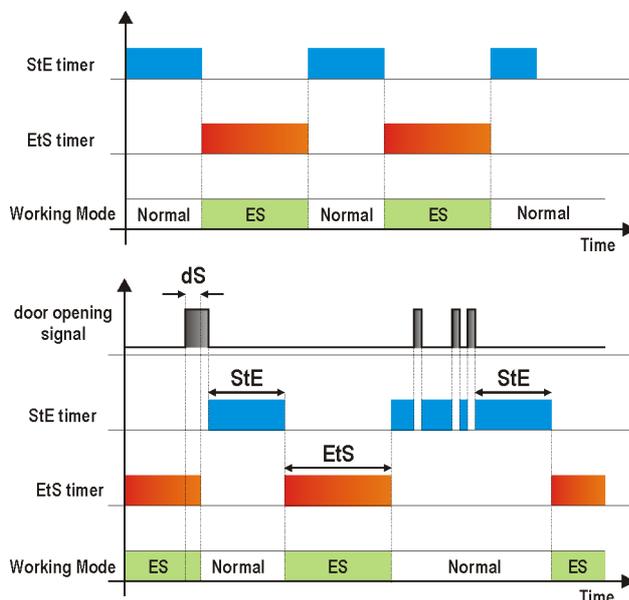
This will be used when ErA=bas. The energy saving status will be always saved in the internal memory to resume previous operation if a power failure occurs. It needs the presence of a door switch to work (i1F=dor).

4.2.1 Parameter involved and suggested values:

- ErA=bas
- i1F=dor
- StE=4.0 hours
- EtS=6.0 hours
- HES=4.0 to 5.0 °C
- HYE=3 to 4°C
- dS=5 to 10 sec
- LdE=Y

FROM	TO	CHANGED BY
Normal mode	Energy Saving	- Push the <b>DOWN</b> button for 3 sec (if enabled). - Door continuously closed for the <b>StE</b> time.
Energy Saving	Normal mode	- Push the <b>DOWN</b> button for 3 sec (if enabled). - Controller in ES mode for the <b>EtS</b> time. - If the controller is in ES mode, it returns in Standard mode (normal set-point) after opening the door more than <b>dS</b> time.

NOTE: the cycling mode (ES - Normal mode - ES - etc.) works if i1F=dor and EtS and StE are different from zero. If EtS=0 or StE=0, the controller will not change the operating mode, and it will be possible to change from the normal mode to the energy saving mode by using ES button or by setting i1F=ES. See the below diagrams where the status changing is depicted:



4.3 AUTOMATIC ENERGY SAVING ALGORITHM

This will be used when ErA=Aut. The operations are controlled by using the Aid parameter. After powering on the device, it automatically starts to analyze the temperature behavior by using the only room temperature probe. In this way it can build the best energy saving model according to the application. The device uses temperature behavior information of the previous Aid interval to manage the loads during the current period. When Aid is set to use long periods (Aid>1), a day-by-day model will be used during the first interval of time.

4.3.1 Parameter involved and suggested values:

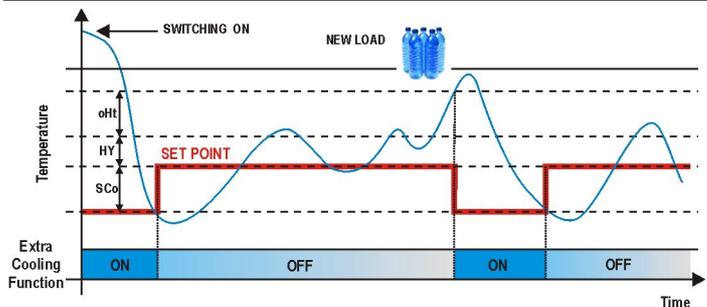
- ErA=Aut
- HES= 3.0 to 5.0°C
- LdE=Y
- Aid=1 or 7
- nCE=4
- nCC=8
- Pdt=2
- HYE=3 to 4°C
- PPU=P1
- tun=depends on the regulation probe placement

NOTES:

- In case of any blackout, the calculated energy saving model will be reset.
- ErA can exclusively drive the light output by using the LdE parameter. When LdE=YES, the light output status will change according to the energy saving (ES) status:
  - OFF if ES is active
  - ON if ES is not active
- It is always possible to override the light output status by using the frontal button. Anyway, this modification will have a temporary impact on the lights if LdE=YES. In fact, ErA will take the control after the next ES status change.
- ErA does not need any door switch input to work.
- Be sure to place the room temperature probe in near the upper zone of the cabinet: this gives the best results in terms of temperature variation analysis.
- The Aid parameter indicates the interval of analysis as "number of days". The suggested values for it are 1 or 7, depending on the particular application.

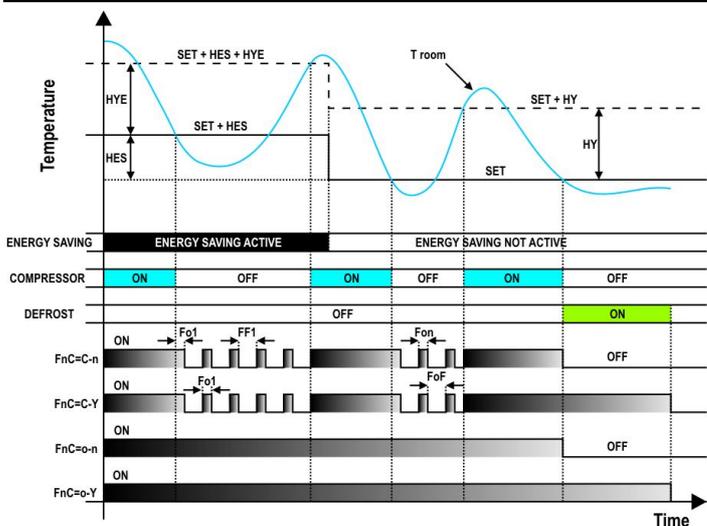
7. When **Aid=1**, the first day will be used to analyze the temperature behavior and to build the model to apply to the second day. The model will be updated every day in order to better match the working conditions.
8. When **Aid=7**, the first 7 days will be used to analyze the temperature behavior and to build the model to apply to the next 7 days. The model will be updated every 7 days in order to better match the working conditions.
9. When **Aid=7**, the first 7 days after power on will use a sub analysis base on 1-day model.
10. **nCE** is used to define the minimum duration of an energy saving interval of time
11. **nCC** is used to move the SET-POINT value from normal mode value to the energy saving mode value by steps (1 step = 1°C or 1°F, starting from the SET value and increasing it every 30 min till reaching the SET\_ES value)
12. **Pdt** is used to anticipate the end of the energy saving mode in order to decrease the temperature of the bottles before starting the normal mode interval
13. **PPU** select the probe used for automatic energy saving algorithm
14. **tun** is used to change the sensibility of the automatic energy saving algorithm. **tun=H** (high) is used for cabinet with regulation probe installed near the evaporator air outlet flow. **tun=L** (low) is used for cabinet with regulation probe installed far away from the evaporator air outlet flow.

**5 EXTRA COOLING FUNCTION**



The SUPER-COOLING function is active when the room temperature measured from the probe 1 goes over the **SET+oHt+HY** value. In this case, a special set-point value, lower than the normal SET value, will be enabled. As soon as the room temperature reaches the **SET-SCo** value, the compressor will be stopped and the normal regulation will restart. **N.B.**: super-cooling function is disabled when **SCo=0**. The **TSC** parameter sets the maximum activation time for super cooling operations. When **TSC** expires, the super cooling will be stopped and the standard SET-POINT will be restored. **NOTE**: in case of energy saving mode active, the used values will be: **SET\_ES=SET+HES**, **oHE** and **SCE**.

**6 EVAPORATOR FANS**



- With **FnC** parameter it can be selected the fans functioning:
- **FnC=C-n** → fans will switch ON and OFF with the compressor and **not run** during defrost; when compressor is OFF, fans will enter a duty-cycle working mode (see **FoF**, **Fon**, **FF1** and **Fo1** parameters).
  - **FnC=o-n** → fans will run even if the compressor is off, and not run during defrost;
  - **FnC=C-Y** → fans will switch ON and OFF with the compressor and **run** during defrost; when compressor is OFF all fans will enter a duty-cycle working mode (see **FoF**, **Fon**, **FF1** and **Fo1** parameters).
  - **FnC=o-Y** → fans will run continuously also during defrost.

After defrost, there is a timed fan delay allowing for drip time, set by means of the **Fnd** parameter. An additional parameter **FSt** provides the setting of temperature, detected by the evaporator probe, above which the fans are always OFF. By using this parameter it is possible to assure air circulation only if air temperature is lower than **FSt** value.

**6.1 EVAPORATOR FAN AND DIGITAL INPUT**

- When the digital input is configured as door switch (**i1F=dor**), fans and compressor status will depend on the **odC** parameter value:
- **odC=no** → normal regulation
  - **odC=FAn** → evaporator fan OFF
  - **odC=CPr** → compressor OFF
  - **odC=F-C** → compressor and evaporator fan OFF

When **rrd=Y** the regulation will restart after a door open alarm.

**7 DEFROST**

**7.1 DEFROST MODE**

Any defrost operation can be controlled in the following way:

- **EdF=rTC**: by using an internal real time clock (only for models equipped with RTC).
- **EdF=in**: timed defrost, in this case a new defrost will start as soon as the idF timer elapses.
- **EdF=Aut**: automatic management, in this case the controller will start a new defrost any time a change from normal to energy saving mode will occur (valid if **ErA=Aut**).

**7.2 TIMED OR PROBE CONTROLLED MODE**

Two defrost modes are available: timed or controlled by the evaporator's probe. A couple of parameters is used to control the interval between defrost cycles (**idF**) and its maximum length (**MdF**). During the defrost cycle is possible to select some different display indications by using the **dfD** parameter. These modes are available with any kind of defrost type:

- **tdF=EL**: electric heater defrost
- **tdF=in**: hot gas defrost.

**7.3 AUTOMATIC DURATION DETECTION**

When a defrost operation is performed by compressor stop (means by stopping the compressor and by activating the internal ventilators), it will be possible to use an automatic defrost mode by setting **tdF=ALt**. In this case the device will use the evaporator probe (which MUST to be present and properly mounted on the evaporator surface) to detect the end of the actual defrost phase. In any case, a maximum period of time (**MdF**) and an upper evaporator temperature value will be used to stop the current defrost phase. If **ErA=Aut**, the automatic defrost mode will activate a defrost at the beginning of any energy saving mode period. In this case the **idF** delay is used as safety function. It forces the controller to activate a defrost operation when **idF** runs. **NOTE**: during the defrost phase the loads (compressor and evaporator fans) will be controlled from the defrost algorithm.

**8 INTERNAL COUNTERS**

The next table shows the implemented load and function counters.

<b>n1H</b>	Number of compressor activation (thousands of)
<b>n1L</b>	Number of compressor activation (hundreds of)
<b>n2H</b>	Number of fan activation (thousands of)
<b>n2L</b>	Number of fan activation (hundreds of)
<b>n3H</b>	Number of defrost activation (thousands of) – available only if defrost relay enabled
<b>n3L</b>	Number of defrost activation (hundreds of) – available only if defrost relay enabled
<b>n4H</b>	Number of light activation (thousands of)
<b>n4L</b>	Number of light activation (hundreds of)
<b>oCH</b>	Compressor working hours (thousands of)
<b>oCL</b>	Compressor working hours (hundreds of)

In this way it is possible to monitor the application and discovering bad functioning that could lead to damages. They are updated in EEPROM every hour. It is not possible to reset them. **NOTE**: the compressor activation counters take into account also defrost in case of inversion (hot gas) mode.

**8.1 AUX RELAY CONFIGURATION (PAR. oA1)**

The functioning of the auxiliary relay (terminals 7-8) can be set by the **oA1** parameter, according to the kind of application. In the following paragraph the possible setting:

**8.1.1 Light relay**

With **oA1=LiG** the AUX relay operates as light output.

**8.1.2 Auxiliary relay**

- a. **Relay activation by digital input 1 or digital input 2 (oA1=AUS, i1F or i2F=AUS)**: with **oA1=AUS** and **i1F, i2F=AUS** the AUX relay is switched on and off by digital inputs.
- b. **Auxiliary thermostat**: anti condensing heater with the possibility of switching it on and off also by using the frontal keyboard.
 

Parameters involved:

  - **ACH**: kind of regulation for the auxiliary relay: **Ht** = heating; **CL** = cooling.
  - **SAA**: set point for auxiliary relay.
  - **SHy**: differential for auxiliary relay.
  - **ArP**: probe for auxiliary relay.
  - **Sdd**: auxiliary output off during defrost.
  - **Ao1**: output active when in energy saving mode
  - **AF1**: output not active when in energy saving mode

The differential threshold value is set by the **SHY** parameter.

**NOTE:**

- if **oA1=AUS** and **ArP=nP** (no probe for auxiliary output) the AUX relay can be activated
- by digital input if **i1F=AUS** or **i2F=AUS**
  - by auxiliary button (if **LPC=AUS** or **dPC=AUS**)
  - by serial command (Modbus protocol)
  - by fixed interval of time if **Ao1>0** and **AF1>0** (if **Ao1=0** or **AF1=0** the auxiliary output is disabled)

**8.1.3 On/off relay (oA1 = onF)**

When **oA1=onF**, the AUX relay is activated when the controller is turned on and de-activated when the controller is turned off.

**8.1.4 Neutral zone regulation**

With **oA1=db** the AUX relay can control a heater element to perform a neutral zone action.

- **oA1 cut in = SET-HY**
- **oA1 cut out = SET**

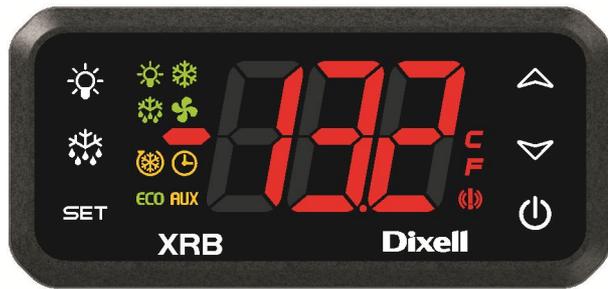
**8.1.5 Alarm relay**

With **oA1=ALr** the AUX 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 stay on until the alarm condition recovers.

8.1.6 Activation during energy saving cycles

With oA1=HES, the AUX relay is energised when the energy saving cycle is activated.

9 FRONT PANEL COMMANDS



<b>SET</b>	Press to display target set point and the real set point. When in programming mode it selects a parameter or confirms an operation
	(LIG) To switch on and off the light. Keep it pressed for 3 sec in order to reset (the memorized pattern) of the Energy Reduction Algorithm
	(DEF) To start a defrost (when function available)
	(UP) In programming mode it browses the parameter codes or increases the displayed value.
	(DOWN) In programming mode it browses the parameter codes or decreases the displayed value. Keep it pressed for 3 sec in order to change the default parameter map (P01, P02 or P03)
	(ONOFF) To switch on and off the device. Keep it pressed for 3 sec to activate or deactivate the energy saving mode function

KEYS COMBINATION	
+	To lock or unlock the keyboard
<b>SET</b> +	To enter in programming mode
<b>SET</b> +	To return to room temperature display

ICON	MODE	MEANING
	On	Compressor enabled
	Flashing	Anti-short cycle delay enabled (AC parameter)
	On	Light output enabled
	Flashing	Fans delay after defrost
	On	Fans output enabled
	Flashing	Fans delay after defrost
	On	Measurement unit
	Flashing	Programming mode
<b>ECO</b>	On	Energy saving mode active
	Flashing	Programming mode
	On	An alarm condition is present
	Flashing	Start-up operations are pending
<b>AUX</b>	On	Auxiliary output is activated
	On	Real Time Clock enabled

NOTE: start-up operations lasts about 30 sec after powering on the device. At the end of this phase, the alarm icon will switch off if no alarm is active.

9.1 SET POINT MENU

The SET key gives access to a quick menu where it is possible to see:  
 - the set point value  
 - the real set point value (rSE)  
 Push and release the SET key five times or wait for 60 sec to return to normal visualisation.

9.2 CHANGE THE SETPOINT

1. Push the SET key for more than 2 sec to change the Set point value;
2. The value of the set point will be displayed and the °C° LED starts blinking;
3. To change the Set value push the UP or DOWN button.
4. To memorise the new set point value push the SET key again or wait for 60 sec.

9.3 START A MANUAL DEFROST

Push the DEFROST button for more than 2 sec to start a manual defrost.

9.4 CHANGE A PARAMETER VALUE

- To change the parameter values operate as follows:
1. Enter the Programming mode by pressing the SET+DOWN buttons for 3 sec (°C° LED starts blinking).
  2. Select the required parameter. Press the SET button to display its value
  3. Use UP or DOWN buttons to change its value.
  4. Press SET to store the new value and move to the following parameter.

To exit: Press SET+UP buttons or waits for 15 sec without pressing any key.

NOTE: the set value is stored even when the procedure is exited by waiting the time-out to expire.

9.5 ENTERING THE HIDDEN MENU

The hidden menu includes all the parameters of the instrument.

ENTER THE HIDDEN MENU

1. Enter the Programming mode by pressing SET+DOWN buttons for 3 sec (°C° or °F° LED starts blinking).
2. Released the keys and then push again SET+DOWN buttons 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" label will be displayed. Keep the keys pushed till the "L2" message will be displayed.

NOTE2: the previous set value will be stored even if the programming mode is exited by waiting for the time-out to expire.

MOVE PARAMETERS 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. If a parameter is visible also in the First Level, in the HIDDEN MENU the decimal point will be lit.

9.6 LOCK THE KEYBOARD

1. Keep both UP and DOWN buttons pressed for more than 3 sec.
2. The "oOFF" label will be displayed and the keyboard will be locked. If any button is pressed more than 3 sec, the "oOFF" message will be displayed.

9.7 UNLOCK THE KEYBOARD

Keep both UP and DOWN buttons pressed together for more than 3 sec till the "on" message will be displayed.

9.8 REAL TIME CLOCK SETTINGS (IF AVAILABLE)

When the instrument is switched on, it could be required to set its internal clock (ex. if the "rtC" label is blinking):

1. Enter the Pr1 programming menu by keeping both SET+DOWN buttons pressed for 3 sec
2. The rtC parameter is displayed. 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 for both Min (minutes) and dAy (day) parameter.

To exit: Push SET+UP keys or wait for 15 sec without pushing any keys.

9.9 THE ON/OFF FUNCTION

If onF = oFF, the instrument will be switched off by pushing the ON/OFF button. The "oOFF" message will appear on the display. In this configuration the regulation is disabled.  
 To switch the instrument on, push again the ON/OFF button.

WARNING: any load connected to the normally closed contacts of the relays is always supplied from the main voltage, even if the instrument is in standby mode.

10 PARAMETERS

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

REGULATION

HY	Differential in normal mode (energy saving mode not active): (0.1 to 25.0°C; 1 to 45°F) differential for set point. Compressor Cut-IN is [SET-POINT + HY]. Compressor Cut-OUT is when the temperature reaches the set point.
HYE	Differential when energy saving mode is active: (0.1 to 25.0°C; 1 to 45°F) differential for set point. Compressor Cut-IN is [SET-POINT + HES + HYE]. Compressor Cut-OUT is when the temperature reaches the [SET-POINT + HES].
LS	Minimum SET POINT: (-55.0°C to SET; -67°F to SET) sets the minimum value for the set point.
US	Maximum SET POINT: (SET to 150.0°C; SET to 302°F) set the maximum value for set point.
ot	Thermostat probe calibration: (-12.0 to 12.0°C; -21 to 21°F) allows to adjust any possible offset of the first probe.
P2P	Evaporator probe presence: n = not present; Y = the defrost stops by temperature.
oE	Evaporator probe calibration: -12.0 to 12.0°C; -21 to 21°F) allows to adjust any possible offset of the third probe.
P3P	Third probe presence: n = not present; Y = the defrost stops by temperature.
o3	Third probe calibration: -12.0 to 12.0°C; -21 to 21°F) allows to adjust any possible offset of the third probe.
P4P	Fourth probe presence: n = not present; Y = the condenser temperature alarm is managed.
o4	Fourth probe calibration: (-12.0 to 12.0°C; -21 to 21°F) allows to adjust any possible offset of the condenser probe.
odS	Outputs delay activation after power on: (0 to 255 min) this function is enabled after the power-on of the instrument and inhibits any output activation for the period of time set in the parameter.
AC	Anti-short cycle delay: (0 to 50 min) minimum interval between a compressor stop and the following restart.
Con	Compressor ON time with faulty probe: (0 to 255 min) time during which the compressor is active in case of faulty thermostat probe. With CY=0 compressor is always OFF.
CoF	Compressor OFF time with faulty probe: (0 to 255 min) time during which the compressor is OFF in case of faulty thermostat probe. With Cn=0 compressor is always active.

DISPLAY	
CF	Temperature measurement unit: (°C; °F) °C = Celsius; °F = Fahrenheit.
rES	Resolution (only for °C): (dE; in) dE = decimal; in = integer.
Lod	Probe displayed: (P1; P2; P3; P4; SEI; dtr; USr) Px=probe "x"; SET=set point; dtr=do not use it; USr=do not use it.
dLY	Temperature visualization delay: (0.0 to 20min00sec, res. 10 sec) when the temperature increases, the display is updated of 1°C or 1°F after this time.

DEFROST	
EdF	Defrost Mode: rC=controlled from real time clock (if available); in=timed mode; Aut=automatic mode.
tdF	Defrost type: EL=electrical heaters; in=hot gas; ALT=uses only for compressor stop defrost.
dFP	Probe selection for defrost control: nP=no probe; P1=thermostat probe; P2=evaporator probe; P3=third probe (do not use it); P4=Probe on Hot Key plug.
dtE	Defrost termination temperature for defrost control: (-55 to 50°C; -67 to 122°F) it sets the temperature measured by the evaporator probe (dFP), which causes the end of defrost.
idF	Interval between two consecutive defrost cycles: (0 to 255 hours) determines the time interval between the beginnings of two defrosting cycles.
MdF	Maximum length for defrost: (0 to 255 min; 0 means no defrost) when P2P=n (no evaporator probe presence) it sets the defrost duration, when P2P=Y (defrost end based on evaporator temperature) it sets the maximum length for defrost.
dSd	Start defrost delay: (0 to 255 min) delay in defrost activation.
dFd	Display during defrost: (rt; it; SP; dF) rt = real temperature; it = start defrost temperature; SP = SET-POINT; dF = label "dF".
dAd	Max delay for updating display after any defrost: (0 to 255 min) delay before updating the temperature on the display after finishing any defrost.
Fdt	Draining time: (0 to 255 min)
dPo	First defrost after start-up: (n; Y) to enable defrost at power on.
dAF	Defrost delay after freezing: (0.0 to 24h00min, res. 10 min) delay before activating a defrost.

FANS	
FnC	Fan mode operation: (Cn; on; CY; oY) <ul style="list-style-type: none"> <li>Cn = runs with the compressor, duty-cycle when compressor is OFF (see FoF, Fon, FF1 and Fo1 parameters) and OFF during defrost</li> <li>on = continuous mode, OFF during defrost</li> <li>CY = runs with the compressor, duty-cycle when compressor is OFF (see FoF, Fon, FF1 and Fo1 parameters) and ON during defrost</li> <li>oY = continuous mode, ON during defrost</li> </ul>
Fnd	Fan delay after defrost: (0 to 255 min) delay before fan activation after any defrosts.
Fct	Differential of temperature for forced activation of fans
FSt	Fans stop temperature: (-55 to 50°C; -67 to 122°F) setting of temperature, detected by evaporator probe. Over this value of temperature fans are always OFF. <b>NOTE: it works only for the evaporator fan, NOT for the condenser fan.</b>
Fon	Fan on time when the compressor is off: (0 to 255 min) used when energy saving status is not active.
FoF	Fan off time when the compressor is off: (0 to 255 min) used when energy saving status is not active.
FAP	Probe selection for fan management: nP=no probe; P1=thermostat probe; P2=evaporator probe; P3=do not use it; P4=Probe on Hot Key plug.
Fo1	Fan on time with compressor off in Energy Saving mode: (0 to 255 min) used when energy saving status is active.
FF1	Fan off time with compressor off in Energy Saving mode: (0 to 255 min) used when energy saving status is active.

AUXILIARY OUTPUT MANAGEMENT	
ACH	Kind of regulation for auxiliary relay: (Ht; CL) Ht = heating; CL = cooling.
SAA	Set Point for auxiliary relay: (-55.0 to 150.0°C; -67 to 302°F) it defines the room temperature set point to switch auxiliary relay.
SHY	Differential for auxiliary relay: (0.1 to 25.5°C; 1 to 45°F) intervention differential for auxiliary output set point. <ul style="list-style-type: none"> <li>ACH=CL, AUX Cut in is [SAA+SHY]; AUX Cut out is SAA.</li> <li>ACH=Ht, AUX Cut in is [SAA-SHY]; AUX Cut out is SAA.</li> </ul>
ArP	Probe selection for auxiliary relay: (nP; P1; P2; P3; P4) nP = no probe, the auxiliary relay is switched only by the digital input; P1 = Probe 1 (Thermostat probe); P2 = Probe 2 (evaporator probe); P3 = do not use it; P4 = Probe 4.
Sdd	Auxiliary relay switched off during defrost: (n; Y) n = the auxiliary relay operates during defrost. Y = the auxiliary relay is switched off during defrost.
Ao1	AUX output active when in energy saving mode: 0 to 255 min
AF1	AUX output not active when in energy saving mode: 0 to 255 min

ALARMS	
ALC	Temperature alarms configuration: (Ab, rE) Ab = absolute; rE = relative.
ALU	Maximum temperature alarm: when this temperature is reached, the alarm is enabled after the Ad delay time. <ul style="list-style-type: none"> <li>If ALC=Ab → ALL to 150.0°C or ALL to 302°F.</li> <li>If ALC=rE → 0.0 to 50.0°C or 0 to 90°F.</li> </ul>
ALL	Minimum temperature alarm: when this temperature is reached, the alarm is enabled after the Ad delay time. <ul style="list-style-type: none"> <li>If ALC=Ab → -55.0°C to ALU or -67°F to ALU.</li> <li>If ALC=rE → 0.0 to 50.0°C or 0 to 90°F.</li> </ul>
AFH	Differential for temperature alarm recovery: (0.1 to 25.0°C; 1 to 45°F) differential for alarms.
ALd	Temperature alarm delay: (0 to 255 min) delay time between the detection of an alarm condition and the relative alarm signalling.
dAo	Delay of temperature alarm at start up: (0.0 to 24h00min, res. 10 min) delay time between the detection of a temperature alarm condition and the relative alarm signalling, after powering on the instrument.

CONDENSER TEMPERATURE ALARM	
AP2	Probe selection for second temperature alarms: (nP; P1; P2; P3; P4) nP=no probe; P1=thermostat probe; P2=evaporator probe; P3=do not use it; P4=Probe on Hot Key plug
AL2	Second low temperature alarm: (-55.0 to 150.0°C; -67 to 302°F)
AU2	Second high temperature alarm: (-55.0 to 150.0°C; -67 to 302°F)
AH2	Differential for second temperature alarm recovery: (0.1 to 25.0°C; 1 to 45°F)
Ad2	Second temperature alarm delay: (0 to 255 min; 255 = not used) delay time between the detection of a condenser alarm condition and the relative alarm signalling.
dA2	Delay for second temperature alarm at start up: (0.0 to 24h00min, res. 10 min)

bLL	Compressor off because of second low temperature alarm: (n; Y) 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 because of second high temperature alarm: (n; Y) 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.
tbA	Alarm muting: (n; Y) to disable the (optional) buzzer and the output configured as alarm.

DIGITAL OUTPUT MANAGEMENT	
oA1	First relay configuration: (dEF; FAn; ALr; LiG; AUS; onF; db; dEF2; HES) dEF = defrost; FAn = fan; ALr = alarm; LiG = light; AUS = Auxiliary relay; onF = always on with instrument on; db = neutral zone; dEF2 = do not select it; HES = night blind.
AoP	Alarm relay polarity: (oP; CL) oP = alarm activated by closing the contact; CL = alarm activated by opening the contact

DIGITAL INPUT	
i1P	Digital input 1 polarity: (oP; CL) oP = activated by closing the contact; CL = activated by opening the contact. Digital input 1 configuration: (dor; dEF; LiG; AUS; Lis; ES) <ul style="list-style-type: none"> <li>dor = door switch function</li> <li>dEF = defrost activation</li> </ul>
i1F	<ul style="list-style-type: none"> <li>LiG = light activation / deactivation</li> <li>AUS = auxiliary output</li> <li>Lis = not used</li> <li>ES = energy saving activation / deactivation</li> </ul>
i2P	Digital input 2 polarity (if d.i.2 present): (oP; CL) oP = activated by closing the contact; CL = activated by opening the contact. Digital input 2 configuration (if d.i.2 present): (dor; dEF; LiG; AUS; Lis; ES) <ul style="list-style-type: none"> <li>dEF = defrost activation</li> <li>LiG = light activation / deactivation</li> <li>AUS = auxiliary output activation / deactivation</li> <li>Lis = not used</li> </ul>
i2F	<ul style="list-style-type: none"> <li>ES = energy saving activation / deactivation</li> <li>EAL = external alarm</li> <li>bAL = block alarm</li> <li>FAn = not used</li> <li>HdF = holiday mode activation / deactivation</li> <li>onF = to switch ON and OFF the device</li> </ul>
did	Digital inputs alarm delay: (0 to 255 min) when i1F=EAL or bAL, it is the delay between the detection of an external alarm condition and the relative signalling.
doA	Door alarm delay: (0 to 255 min) it is the delay before the activation of the door open alarm.
odC	Compressor and fan status after door opening: (no; FAn; CP; F-C); no = normal; FAn = Fans OFF; CP = Compressor OFF; F-C = Compressor and fans OFF.
rrd	Regulation restart after door open alarm: (n; Y) n = no regulation if door is opened; Y = when did is elapsed, regulation restarts even if a door open alarm is present.

ENERGY SAVING	
ErA	Energy reduction algorithm used: (nu; bAS; Aut) nu=no energy saving algorithm used; bAS=basic energy saving algorithm; Aut=automatic energy saving algorithm.
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 during the Energy Saving cycle.
LdE	Energy saving mode controls the lights (lights off when energy saving goes active): (n; Y) the light status depends on the energy saving mode and is managed from ErA.
Aid	Period of analysis for ErA (valid if ErA=Aut): (1 to 20 days) set the interval of time for temperature variation analysis.
nCE	Number of contiguous cells to activate Energy Saving (valid if ErA=Aut): (1 to 20) minimum pattern (1 cell = 30 min) without activity for energy saving activation
nCC	Number of contiguous cells with energy saving for Set-Point variation (valid if ErA=Aut): (1 to 12) minimum interval of time for SET-POINT variation by steps (1°C or 1°F every 30 minutes)
Pdt	Pull Down time after energy saving: (1 to 8) energy saving mode is deactivated in advance
tun	System tuning: L=low sensibility; H=high sensibility
PPU	Temperature probe used for temperature variation analysis: (P1, P2, P3, P4) which probe is used from Energy Reduction Algorithm
FEn	Force status change from energy saving mode to normal mode (valid if ErA=Aut): number of intervals with activity for mode changing
FnE	Force status change from normal mode to energy saving mode (valid if ErA=Aut): number of intervals without activity for mode changing
StE	Period of time to switch from normal mode to energy saving mode (valid if ErA=bAS): (0.0 to 24h00min, res. 10 min) if door stay closed for StE time, the energy saving mode will be activated. NOTE: this will require a door switch to work.
EIS	Period of time to switch from energy saving mode to normal mode (valid if ErA=bAS): (0.0 to 24h00min, res. 10 min) maximum time for energy saving mode. NOTE: this will require a door switch to work.
dS	Door open time to switch from ETS to StE (valid if ErA=bAS): (0 to 999 sec) the energy saving mode will be immediately deactivated as soon as the door stay open more than the dS time. NOTE: this will require a door switch to work.
oHt	Overheating before activating the super cooling function (when in normal mode): (1.0 to 12.0°C; 1 to 21°F) this is the upper threshold limit used to activate the super cooling function.
SCo	Subcooling for Super Cooling function (when in normal mode): (0.0 to 12°C; 0 to 21°F) this is the special set-point differential value used during a super cooling function (cut-off value for compressor). If SCo=0, the super cooling function during normal mode is disabled.
tSC	Maximum duration for Super Cooling function (both for normal and energy saving mode): (0.0 to 24h00min, res. 10 min) maximum length for super cooling mode.
oHE	Overheating before activating the super cooling function (when in energy saving mode): (1.0 to 12.0°C; 1 to 21°F) this is the upper threshold limit used to activate the super cooling function.
SCE	Sub cooling for Super Cooling function (when in energy saving mode): (0.0 to 12°C; 0 to 21°F) this is the special set-point value used during a super cooling function (cut-off value for compressor). If SCE=0, the super cooling function during energy saving mode is disabled.

COUNTERS	
n1H	Number of compressor activations (thousands of) (read only)
n1L	Number of compressor activations (hundreds of) (read only)
n2H	Number of fan activations (thousands of) (read only)
n2L	Number of fan activations (hundreds of) (read only)
n3H	Number of defrost activations (hundreds of) (read only)
n3L	Number of defrost activations (hundreds of) (read only)

n4H	Number of light activations (thousands of) (read only)
n4L	Number of light activations (hundreds of) (read only)
oCH	Compressor working hours (thousands of) (read only)
oCL	Compressor working hours (hundreds of) (read only)

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

Hur	Hours: 0 to 23 hours
Min	Minutes: 0 to 59 min
dAY	Day of the week: Sun to SAT
Hd1	First day of week end: (Sun to nu) set the first day of the week which follows the holiday times.
Hd2	Second day of week end: (Sun to 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	Holiday Energy saving starting time: 0 to 23h50min
dSE	Holiday Energy saving duration: 0 to 24h00min

**DEFROST TIMES (ONLY FOR MODELS WITH RTC)**

Ldx (x=1 to 6)	N-th working day 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 at 12.40 during workdays.
Sdx (x=1 to 6)	N-th holiday defrost starting time: (0 to 23h50min) these parameters set the beginning of the 6 programmable defrost cycles on holidays. Ex: when Sd2=3.4 the second defrost starts at 3.40 on holidays.

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 for Modbus communication: 0 to 247
onF	ON/OFF button configuration: nu=not used; onF=ON/OFF function; ES=change working mode from normal to energy saving mode and vice-versa.
d1	Probe P1 value visualization (read only)
d2	Probe P2 value visualization (read only)
d3	Probe P3 value visualization (read only)
d4	Probe P4 value visualization (read only)
rSE	Real Set point (SET + ES + oHx)
rEL	Firmware Release (read only)
Ptb	Parameter code table (read only)
FdY	Firmware release: day (read only).
Fm	Firmware release: month (read only).
FYr	Firmware release: year (read only).

**11 DIGITAL INPUT**

The free voltage digital input is programmable in different configurations by the i1F and i2F parameters.

**DOOR SWITCH (i1F=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 did, the door alarm is enabled, the display shows the message "dA" and the regulation restarts if rrd = 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.

**START DEFROST (ixF=dEF)**

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

**LIGHT CONTROL (ixF=LiG)**

The light output status will change with the digital input.

**ENERGY SAVING (ixF=ES)**

The energy saving mode will be enabled / disabled with the digital input.

**AUXILIARY OUTPUT (ixF=AUS)**

The AUX output (if present and configured) will be enabled / disabled with the digital input.

**EXTENRNAL ALARM (i2F=EAL)**

It is used to detect an external alarm. This signal does not block the regulation.

**BLOCK ALARM (i2F=bAL)**

It is used to detect a critical external alarm. This signal blocks the regulation.

**REMOTE HOLYDAY MODE (i2F=HdF)**

It is used to force the holiday mode.

**REMOTE ONOFF (i2F=onF)**

It is used to switch ON and OFF the device remotely.

**12 DEFAULT PARAMETER MAPS**

There are 3 preloaded parameter maps. It is possible to load them by keeping the DOWN button pressed for 3 sec. The map sequence is P01, P02 and P03. The following table gives a description of the possible application for any default map:

Map label	Typical application
P01	Standard ventilated cabinet with AUX output
P02	Ventilated cabinet with advanced energy saving and AUX output
P03	Ventilated cabinet with low temperature variation or regulation temperature probe placement far away from evaporator inlet, outlet air flow (tun=L) and AUX output

**P01**

Use this configuration in case of a standard ventilated cabinet. Compressor, light and fan plus an auxiliary output are under control. The defrost operations are by compressor stop with temperature control (by using P2 probe). An auxiliary output can be used for outdoor application (street coolers).

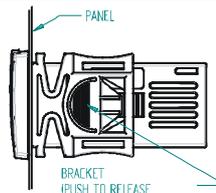
**P02**

Use this configuration in case of a standard ventilated cabinet and to obtain the maximum energy consumption reduction. Both SET-POINT level and defrost operations are optimized. An auxiliary output can be used for outdoor application (street coolers).

**P03**

Use this configuration in case of a standard ventilated cabinet where the regulation probe is placed out from the evaporator air inlet / outlet. An auxiliary output can be used for outdoor application (street coolers).

**13 INSTALLATION AND MOUNTING**



Instrument 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.

**14 OPTIONAL FEATURES**



The MDP/CX rear cover can be used to increase the protection from water and dust.



The HOT-KEY is used for a quick and easy upload (from device to HOT-KEY) or download (from HOT-KEY to device) of the parameter map.



The PROG-KEY is used for firmware upgrade operations.



**WIZMATE PROG-TOOL KIT**  
With this self-powered tool kit it is possible to easily modify the internal parameter map of any XRB device. The WIZMATE® software (part of this KIT) permits to build any personal configuration in a short time and to load it into the controller memory.

**15 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.

**15.1 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.

**16 USE THE HOT KEY**

**16.1 SAVE PARAMETERS IN A HOT KEY (UPLOAD FROM INSTRUMENT)**

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

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

**16.2 COPY PARAMETERS FROM A HOT KEY (DOWNLOAD PARAMETER VALUES)**

1. Turn OFF the instrument.
2. Insert a programmed "HOT-KEY" into the 5-PIN receptacle and then turn the Controller ON.
3. Automatically the parameter list of the "HOT-KEY" is downloaded into the Controller memory, the "do" message is blinking followed a by flashing "End".

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.

### 17 USE THE PROG-KEY

During 30 sec which following a switch on it will be possible to upgrade the internal firmware by using a special tool named **PROG-KEY**. This operation does not change the internal parameter configuration.

**PAY ATTENTION:** this operation **MUST** be carried out only from expert personnel in order not to damage the controller. Please contact your regional reseller to have more information.

### 18 ALARM SIGNALLING

Label	Cause	Outputs
"oFF"	Keyboard locked	Outputs unchanged
"on"	Keyboard unlocked	Outputs unchanged
"P1"	Room probe failure	Compressor output according to <b>Con e CoF</b>
"P2"	Evaporator probe failure	Defrost end is timed
"P4"	Fourth probe failure	Linked temperature alarm is not managed
"HA"	Maximum temperature alarm	Outputs unchanged
"LA"	Minimum temperature alarm	Outputs unchanged
"H2"	Maximum temperature for second temperature alarm	Outputs unchanged
"L2"	Minimum temperature for second temperature alarm	Outputs unchanged
"dA"	Door open more than doA time	Compressor and fans restarts
"EA"	External alarm	Outputs unchanged
"CA"	Serious external alarm	Outputs disabled
"EE"	EEPROM alarm	Outputs unchanged

#### 18.1 ALARM RECOVERY

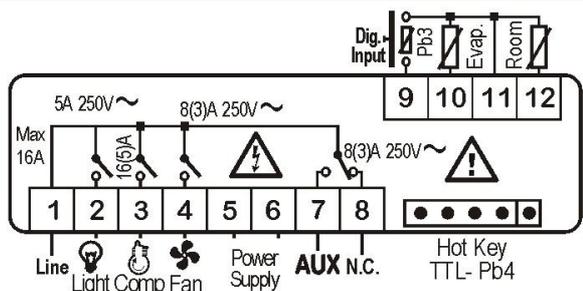
Probe alarms "P1", "P2", "P3" and "P4" start some seconds after the fault in the related probe; they automatically stop some seconds after the probe restarts normal operation. Check connections before replacing the probe. Temperature alarms "HA", "LA", "H2" and "L2" automatically stop as soon as the temperature returns to normal values. It is possible to reset the "EE" alarm by pressing any button. The alarms "EA", "CA" and "dA" will automatically stop as soon as the digital input is disabled. The optional buzzer can be muted by pressing any key if parameter **tbA=Y**.

### 19 TECHNICAL DATA

**Housing:** self-extinguishing ABS  
**Case:** frontal 32x74 mm; depth 60mm  
**Mounting:** panel mounting in a 71x29mm panel cut-out  
**Body Protection:** IP20  
**Frontal protection:** IP65  
**Connections:** Screw terminal block ≤ 2.5 mm<sup>2</sup> wiring  
**Power supply:** (according to the model) 230Vac ±10%, 50/60Hz; 110Vac ±10%, 50/60Hz  
**Power absorption:** 3.5VA max  
**Display:** 3 digits red LED, 14.2 mm high  
**Inputs:** up to 3 NTC probes  
**Digital input:** free voltage contact  
**Relay outputs:** Compressor SPST 16(5)A or 20(8)A, 250VAC  
                   Light: SPDT 5(2)A, 250VAC  
                   Fans: SPST 8(3)A, 250VAC  
                   AUX: SPDT 8(3)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:** 0 to 60°C (32 to 140°F)  
**Storage temperature:** -25 to 60°C (-13 to 140°F)  
**Relative humidity:** 20 to 85% (no condensing)  
**Measuring and regulation range:**  
           NTC -40 to 110°C (-40 to 230°F)  
**Resolution:** 0.1°C or 1°C (selectable)  
**Accuracy (ambient temp. 25°C):** ±0.1°C ±1 digit.

### 20 WIRINGS

#### 20.1 XRB07CH, 16+8+8+5A



**Power Supply:**  
 12 or 24 Vac/dc (NOTE: all relay outputs @24Vac/dc MAX)  
 110 or 230 Vac @50 or 60Hz

### 21 APPLICATION NOTES

Pay attention to the positioning of the regulation probe. In fact, the XRB can obtain the best performances of the system under control when the regulation probe is placed by following these guidelines.

**NOTE:** it is possible to change the sensibility of the energy reduction algorithm (**ErA=Aut**) by using the parameter **tun** (tuning). In case of different temperature probe placement (respect to the ones depicted in the following table), try to change **tun** value from **H** to **L**.

	<p><b>Ventilated applications – Evaporator placed on the back of the refrigerated zone, ventilator placed above the evaporator</b></p> <ul style="list-style-type: none"> <li>- The regulation probe is normally placed in the outlet air flow from the evaporator</li> <li>- The regulation probe can be placed both inside or outside the ventilator pack, paying attention to avoid positions too near to the motor of the ventilator</li> <li>- Sensibility for <b>ErA=Aut</b> algorithm to be set to <b>tun=H</b></li> </ul>
	<p><b>Ventilated applications – Evaporator placed on the top side of the refrigerated zone, ventilator placed on the outlet air flow from the evaporator</b></p> <ul style="list-style-type: none"> <li>- The regulation probe is normally placed in the inlet air flow to the evaporator</li> <li>- The regulation probe has to be installed outside the evaporator, avoiding any contact with the metallic parts of the evaporator itself</li> <li>- Sensibility for <b>ErA=Aut</b> algorithm to be set to <b>tun=H</b></li> </ul>
	<p><b>Static applications – Coolers without ventilators:</b></p> <ul style="list-style-type: none"> <li>- The regulation probe is normally placed at the side-wall of the refrigerated zone, approximately from 30% to 50% (of the internal height) from the bottom and 20% to 30% (of the internal width) from the back</li> <li>- Sensibility for <b>ErA=Aut</b> algorithm to be set to <b>tun=H</b></li> </ul>

### 22 DEFAULT SETTING VALUES

LABEL	DESCRIPTION	RANGE	VALUE	LEV
SET	Set Point	LS; US	3.0°C	---
rtC	Access to Real Time Clock menu (*)	(Read Only)	---	---
HY	Differential in normal mode (energy saving mode not active)	[0.1 to 25°C] [1 to 45°F]	2.0°C	Pr1
HYE	Differential when energy saving mode active	[0.1 to 25°C] [1 to 45°F]	3.0°C	Pr1
LS	Minimum set point	[-55°C to SET] [-67°F to SET]	-50.0°C	Pr1
US	Maximum set point	[SET to 150°C] [SET to 302°F]	50.0°C	Pr1
ot	Thermostat probe calibration	[-12.0 to 12.0°C] [-21 to 21°F]	0.0	Pr1
P2P	Evaporator probe presence	n; Y	Y	Pr1
oE	Evaporator probe calibration	[-12.0 to 12.0°C] [-21 to 21°F]	0.0	Pr1
P3P	Third probe presence	n; Y	n	Pr2
o3	Third probe calibration	[-12.0 to 12.0°C] [-21 to 21°F]	0.0	Pr2
P4P	Fourth probe presence	n; Y	n	Pr2
o4	Fourth probe calibration	[-12.0 to 12.0°C] [-21 to 21°F]	0.0	Pr2
odS	Outputs delay activation after power on	0 to 255 min	1	Pr1
AC	Anti-short cycle delay	0 to 50 min	1	Pr1
Con	Compressor ON time with faulty probe	0 to 255 min	15	Pr2
CoF	Compressor OFF time with faulty probe	0 to 255 min	30	Pr2
CF	Temperature measurement unit	°C; °F	°C	Pr1
rES	Resolution (only for °C): decimal, integer	dE; in	dE	Pr1
Lod	Probe displayed	P1; P2; P3; P4; SEt; dtr; USr	P1	Pr1
dLY	Temperature visualization delay	0.0 to 20min00sec, res. 10 sec	0	Pr2
EdF	Defrost Mode	rC; in; Aut	in	Pr2
tdF	Defrost type: electrical heating, hot gas, compressor stop	EL; in; ALt	EL	Pr2
dFP	Probe selection for defrost control	nP; P1; P2; P3; P4	P2	Pr1
dtE	Defrost termination temperature for defrost control	[-55 to 50°C] [-67 to 122°F]	10.0°C	Pr1
idf	Interval between two consecutive defrost cycles	0 to 255 hours	12	Pr1
MdF	Maximum length for defrost	0 to 255 min	20	Pr1
dSd	Start defrost delay	0 to 255 min	0	Pr2
dFd	Displaying during defrost	rt; it; SEt; dEF; dEG	dEF	Pr1

<b>dAd</b>	Max delay for updating display after a defrost	0 to 255 min	1	Pr1
<b>Fd</b>	Draining time	0 to 255 min	1	Pr1
<b>dPo</b>	First defrost after start-up	n; Y	n	Pr1
<b>dAF</b>	Defrost delay after fast freezing	0.0 to 24h00min; nu	nu	Pr2
<b>FnC</b>	Fan mode operation	C-n; o-n; C-Y; o-Y	C-Y	Pr1
<b>Fnd</b>	Fan delay after defrost	0 to 255 min	0	Pr1
<b>FCt</b>	Differential of temperature for forced activation of fans	[0 to 50°C] [32 to 122°F]	0	Pr1
<b>FSt</b>	Fan stop temperature	[-55 to 50°C] [-67 to 122°F]	20.0°C	Pr1
<b>Fon</b>	Fan on time with compressor off	0 to 15 min	5	Pr1
<b>FoF</b>	Fan off time with compressor off	0 to 15 min	10	Pr1
<b>FAP</b>	Probe selection for fan management	np; P1; P2; P3; P4	P2	Pr1
<b>Fo1</b>	Fan on time with compressor off in Energy Saving mode	0 to 15 min	5	Pr1
<b>FF1</b>	Fan off time with compressor off in Energy Saving mode	0 to 15 min	12	Pr1
<b>ACH</b>	Kind of regulation for auxiliary relay	Ht; CL	Ht	Pr2
<b>SAA</b>	Set Point for auxiliary relay	-55.0 to 150.0°C; -67 to 302°F	00.0	Pr2
<b>SHY</b>	Differential for auxiliary relay	0.1 to 25.5°C; 1 to 45°F	1.0	Pr2
<b>ArP</b>	Probe selection for auxiliary regulator	nP; P1; P2; P3; P4	nP	Pr2
<b>Sdd</b>	Auxiliary relay switched off during defrost	n; Y	no	Pr2
<b>Ao1</b>	AUX output active when in energy saving mode	0 to 255 min	0	Pr2
<b>AF1</b>	AUX output not active when in energy saving mode	0 to 255 min	0	Pr2
<b>ALP</b>	Probe selection for temperature alarms	nP; P1; P2; P3; P4	P1	Pr1
<b>ALC</b>	Temperature alarms configuration	rE, Ab	Ab	Pr2
<b>ALU</b>	Maximum temperature alarm	[ALL to 150.0°C] [ALL to 302°F]	110.0°C	Pr1
<b>ALL</b>	Minimum temperature alarm	[-55°C to ALU] [-67°F to ALU]	-50.0°C	Pr1
<b>AFH</b>	Differential for temperature alarm recovery	[0.1 to 25.5°C] [1 to 45°F]	1.0°C	Pr2
<b>ALd</b>	Temperature alarm delay	0 to 255 min	0	Pr2
<b>dAo</b>	Delay of temperature alarm at start up	0.0 to 24h00min, res. 10 min	4.0	Pr2
<b>AP2</b>	Probe selection for second temperature alarms	nP; P1; P2; P3; P4	nP	Pr2
<b>AL2</b>	Second low temperature alarm	[-55.0 to 150.0°C] [-67 to 302°F]	-50.0	Pr2
<b>AU2</b>	Second high temperature alarm	[-55.0 to 150.0°C] [-67 to 302°F]	110.0	Pr2
<b>AH2</b>	Differential for second temperature alarm recovery	[0.1 to 25.5°C] [1 to 45°F]	2.0	Pr2
<b>Ad2</b>	Second temperature alarm delay	0 to 254 min; 255=not used	0	Pr2
<b>dA2</b>	Delay for second temperature alarm at start up	0.0 to 24h00min, res. 10 min	1.3	Pr2
<b>bLL</b>	Compressor off because of second low temperature alarm	n; Y	n	Pr2
<b>AC2</b>	Compressor off because of second high temperature alarm	n; Y	Y	Pr2
<b>tbA</b>	Alarm relay switched off by pressing any key	n; Y	Y	Pr2
<b>oA1</b>	First relay configuration	dEF; FAn; ALr; LiG; AUS; onF; dB; dEF2; HES	AUS	Pr2
<b>i1P</b>	Digital input 1 polarity	CL; oP	CL	Pr1
<b>i1F</b>	Digital input 1 configuration	dor; dEF; LiG; AUS; ES	dor	Pr1
<b>i2P</b>	Digital input 2 polarity	CL; oP	CL	Pr2
<b>i2F</b>	Digital input 2 configuration	dor; dEF; LiG; AUS; EAL; bAL; HdF; ES; onF	EAL	Pr2
<b>did</b>	Digital inputs alarm delay	0 to 255 min	1	Pr1
<b>doA</b>	Door alarm delay	0 to 255 min	5	Pr1
<b>odC</b>	Compressor and fan status after door opening	no; FAn; CPr; F-C	FAn	Pr1
<b>rrd</b>	Regulation restart after open door alarm	n; Y	Y	Pr1
<b>ErA</b>	Energy reduction algorithm used	nu; bAS; Aut	Aut	Pr2
<b>HES</b>	Differential for energy saving mode	-30 to 30°C	3.0°C	Pr2
<b>LdE</b>	Energy saving mode controls the lights (lights off when energy saving goes active)	n; Y	Y	Pr2
<b>Aid</b>	Period of analysis for ErA (valid if ErA=Aut)	1 to 20	7	Pr2
<b>nCE</b>	Number of contiguous cells to activate Energy Saving (valid if ErA=Aut)	1 to 20	4	Pr2
<b>nCC</b>	Number of contiguous cells with energy saving for Set-Point variation (valid if ErA=Aut)	1 to 12	8	Pr2
<b>Pdt</b>	Pull Down time after energy saving	1 to 8	2	Pr2
<b>tun</b>	System tuning: L=low sensibility; H=high sensibility	L; H	H	Pr2
<b>PPU</b>	Temperature probe used for temperature variation analysis	P1; P2; P3; P4	P1	Pr2
<b>FEn</b>	Force status change from energy saving mode to normal mode (valid if ErA=Aut)	1 to 15	1	Pr2

<b>FNE</b>	Force status change from normal mode to energy saving mode (valid if ErA=Aut)	1 to 15	8	Pr2
<b>StE</b>	Period of time to switch from normal mode to energy saving mode (valid if ErA=bAS)	0.0 to 24h00min, res. 10 min	4.0	Pr2
<b>EtS</b>	Period of time to switch from energy saving to normal mode (valid if ErA=bAS)	0.0 to 24h00min, res. 10 min	6.0	Pr2
<b>dS</b>	Door open time to switch from EtS to StE (valid if ErA=bAS)	0 to 999 sec	5	Pr2
<b>oHt</b>	Overheating before activating the super cooling function (when in normal mode)	[1.0 to 12.0°C] [1 to 21°F]	0.0°C	Pr2
<b>SCo</b>	Sub cooling for Super Cooling function (when in normal mode)	[0.0 to 12.0°C] [0 to 21°F]	0.0°C	Pr2
<b>tSC</b>	Maximum duration for Super Cooling function (both for normal and energy saving mode)	0.0 to 24h00min, res. 10 min	0.0	Pr2
<b>oHE</b>	Overheating before activating the super cooling function (when in energy saving mode)	[1.0 to 12.0°C] [1 to 21°F]	0.0°C	Pr2
<b>SCE</b>	Subcooling for Super Cooling function (when in energy saving mode)	[0.0 to 12.0°C] [0 to 21°F]	0.0°C	Pr2
<b>n1H</b>	Number of compressor activation (thousands of)	Read Only	---	Pr1
<b>n1L</b>	Number of compressor activation (hundreds of)	Read Only	---	Pr1
<b>n2H</b>	Number of fan activation (thousands of)	Read Only	---	Pr1
<b>n2L</b>	Number of fan activation (hundreds of)	Read Only	---	Pr1
<b>n3H</b>	Number of defrost activation (thousands of)	Read Only	---	Pr1
<b>n3L</b>	Number of defrost activation (hundreds of)	Read Only	---	Pr1
<b>n4H</b>	Number of light activation (thousands of)	Read Only	---	Pr1
<b>n4L</b>	Number of light activation (hundreds of)	Read Only	---	Pr1
<b>oCH</b>	Compressor working hours (thousands of)	Read Only	---	Pr1
<b>oCL</b>	Compressor working hours (hundreds of)	Read Only	---	Pr1
<b>Hur</b>	Hours (*)			
<b>Min</b>	Minutes (*)			
<b>dAY</b>	Day of the week (*)			
<b>Hd1</b>	First day of week end (*)			
<b>Hd2</b>	Second day of week end (*)			
<b>iLE</b>	Working days Energy saving starting time (*)			
<b>dLE</b>	Working days Energy saving duration (*)			
<b>iSE</b>	Holiday Energy saving starting time (*)			
<b>dSE</b>	Holiday Energy saving duration (*)			
<b>Ldx</b>	N-th working day defrost starting time (*)			
<b>Sdx</b>	N-th holiday defrost starting time (*)			
<b>Adr</b>	Serial address	1 to 247	1	Pr2
<b>onF</b>	On/off button configuration	nu; onF; ES	onF	Pr1
<b>LPC</b>	Light button configuration	nu; LiG; AUS; dEF	LiG	Pr1
<b>dPC</b>	Defrost probe value	nu; AUS; dEF	dEF	Pr1
<b>dP1</b>	Probe P1 value visualization	Read Only	---	Pr1
<b>dP2</b>	Probe P2 value visualization	Read Only	---	Pr1
<b>dP3</b>	Probe P3 value visualization	Read Only	---	Pr1
<b>dP4</b>	Probe P4 value visualization	Read Only	---	Pr1
<b>rSE</b>	Real Set point (SET + ES + oHx)	Read Only	---	Pr1
<b>rEL</b>	Firmware release	Read Only	---	Pr1
<b>Ptb</b>	Parameter code table	Read Only	---	Pr1
<b>FdY</b>	Firmware release: day	Read Only	---	Pr1
<b>FmT</b>	Firmware release: month	Read Only	---	Pr1
<b>FyR</b>	Firmware release: year	Read Only	---	Pr1

(\*) Parameter present only for models with real time clock



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