DIGITAL CONTROLLER WITH ADVANCED ENERGY SAVING MANAGEMENT

XRB70CH

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

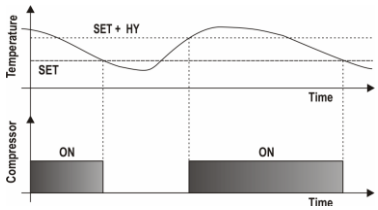
- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical 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 **XRB70CH**, **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 and lights and auxiliary. 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 and fourth are optional. There are up to 2 configurable digital inputs. 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 **E**nergy **r**eduction **A**lgorithm (**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

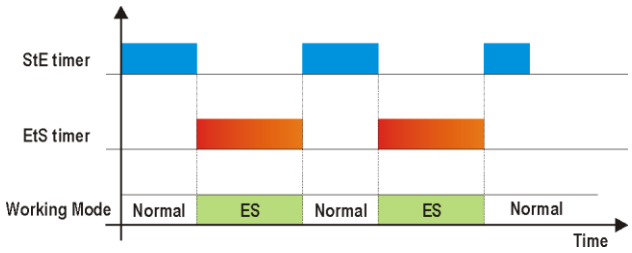
This will be used when **ErA=bAS**. The energy saving status will be always saved in the internal memory to resume previous operation if a power failure occurs. It needs the presence of a door switch to work (**i1F=dor**).

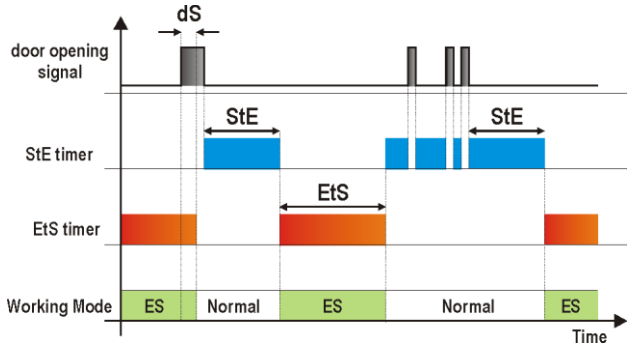
4.2.1 Parameter involved and suggested values:

- **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 **DOWN** button for 3 sec (if enabled). - Door continuously closed for the **StE** time.
Energy Saving	Normal mode	- Push the **DOWN** button for 3 sec (if enabled). - Controller in ES mode for the **EtS** time. - If the controller is in ES mode, it returns in Standard mode (normal set-point) after opening the door more than **dS** 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. So, it builds 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:

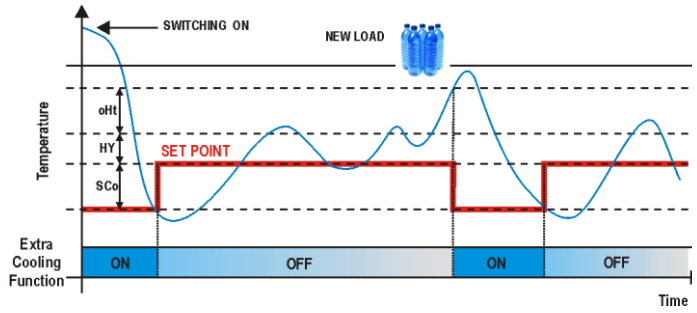
- **ErA=Aut**
- **Aid=1 or 7**
- **LdE=Y**
- **HES= 4.0 to 5.0°C**
- **HYE=3 to 4°C**

NOTES:

1. In case of any blackout, the calculated energy saving model will be reset.
2. **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:
   a. OFF if ES is active
   b. ON if ES is not active
3. 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.
4. **ErA** **does not** **need any door switch input to work**.
5. 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.
6. The **Aid** parameter indicates the interval of analysis as "number of days". The suggested values for it are 1 or 7, depending on the 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 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 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

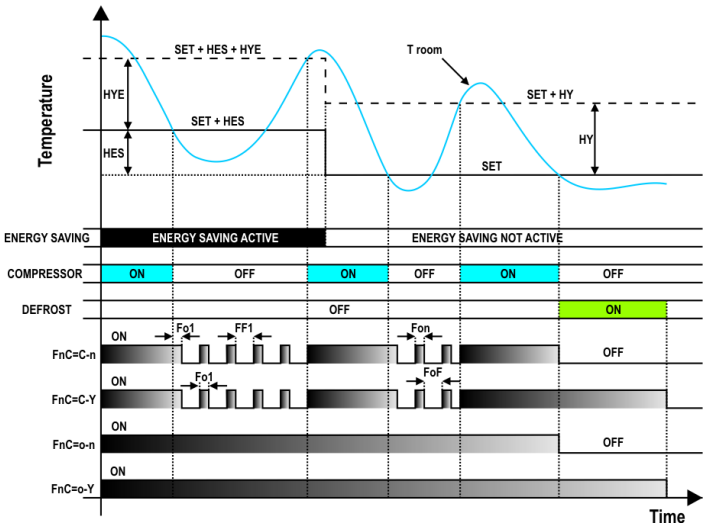
11. **nCC** is used to move the SET-POINT value from normal mode value to the energy saving mode value by steps (1 step = 1°C or 1°F, starting from the **SET** value and increasing it every 30 min till reaching the **SET_ES** value)
12. **Pdt** is used to anticipate the end of the energy saving mode 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.

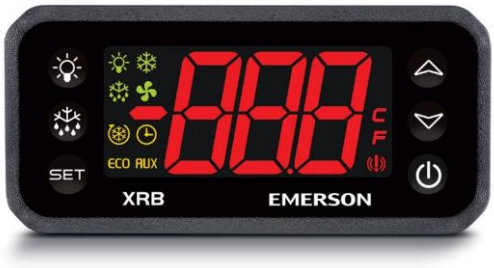
8 INTERNAL COUNTERS

The next table shows the implemented load and function counters.

n1H	Number of compressor activation (thousands of)
n1L	Number of compressor activation (hundreds of)
n2H	Number of fan activation (thousands of)
n2L	Number of fan activation (hundreds of)
n3H	Number of defrost activation (thousands of)
n3L	Number of defrost activation (hundreds of)
n4H	Number of light activation (thousands of)
n4L	Number of light activation (hundreds of)
oCH	Compressor working hours (thousands of)
oCL	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 consider also any defrost phase in case of inversion (hot gas) mode.

9 FRONT PANEL COMMANDS



SET	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
SET +	To enter in programming mode
SET +	To return to room temperature display

ICON	MODE	MEANING
	On	Compressor enabled
	Flashing	Anti-short cycle delay enabled (**AC** parameter)
	On	Light output enabled
	On	Fans output enabled
	Flashing	Fans delay after defrost
°C, °F	**On**	Measurement unit
	Flashing	Programming mode
ECO	**On**	Energy saving mode active
	On	An alarm condition is present
	Flashing	Start-up operations are pending

AUX	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 HOW TO: START A MANUAL DEFROST

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

9.4 HOW TO: 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 exits by waiting the time-out to expire.

9.5 HOW TO: SHOW 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 exits 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 HOW TO: LOCK THE KEYBOARD

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

9.7 HOW TO: 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 "**OFF**" 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 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 110.0°C; SET to 230°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	**Pb2 probe presence: n** = not present; **Y** = the defrost stops by temperature.
oE	**Pb2 probe calibration:** -12.0 to 12.0°C; -21 to 21°F) allows to adjust any possible offset of the second probe.
P3P	**Pb3 probe presence: n** = not present; **Y** = the condenser temperature alarm is managed.
o3	**Pb3 probe calibration:** (-12.0 to 12.0°C; -21 to 21°F) allows to adjust any possible offset of the Pb3 probe.
P4P	**Pb4 probe presence: n** = not present; **Y** = the condenser temperature alarm is managed.
o4	**Pb4 probe calibration:** (-12.0 to 12.0°C; -21 to 21°F) allows to adjust any possible offset of the Pb4 probe.
odS	**Outputs activation delay at start up:** (0 to 255 min) this function is enabled after the start-up of the instrument and inhibits any output activation for the period of time set in the parameter.
AC	**Anti-short cycle delay:** (0 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; Set; dtr; USr) **P1**=Pb1 temperature probe; **P2**=Pb2 temperature probe; **P3**=Pb3 temperature probe; **P4**=Pb4 temperature probe; **SEt**=set point value; **dtr**=do not use it; **USr**=label "USr" fixed on the display
dLY	**Display temperature 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: rtC**=controlled from real time clock (if available); **in**=timed mode; **Aut**=automatic mode.
tdF	**Defrost type: EL**=electrical heaters; **in**=hot gas; **ALt**=automatic, only for for compressor stop.
dFP	**Probe selection for defrost control (termination): nP**=no probe; **P1**=thermostat probe; **P2**=evaporator probe; **P3**=do not use it; **P4**=Probe on Hot Key plug.
dtE	**Defrost termination temperature:** (-55 to 50°C; -67 to 122°F) if **P2=Y** it sets the temperature measured by the evaporator probe, which causes the end of defrost.
idF	**Interval between two consecutives 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 a defrost:** (0 to 255 min) delay before updating the temperature on the display after finishing a 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) • **C-n** = runs with the compressor, duty-cycle when compressor is OFF (see **FoF**, **Fon**, **FF1** and **Fo1** parameters) and OFF during defrost; • **O-n** = continuous mode, OFF during defrost; • **C-Y** = runs with the compressor, duty-cycle when compressor is OFF (see **FoF**, **Fon**, **FF1** and **Fo1** parameters) and ON during defrost; • **O-Y** = continuous mode, ON during defrost.
Fnd	**Fan delay after defrost:** (0 to 255 min) delay in fan activation after a defrost.
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.
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:** (0 to 255 min) used when energy saving status is active.
FF1	**Fan off time with compressor off in Energy Saving:** (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. • **ACH=CL**, AUX Cut in is [**SAA+SHY**]; AUX Cut out is **SAA**. • **ACH=Ht**, AUX Cut in is [**SAA–SHY**]; AUX Cut out is **SAA**.

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

ALP	**Probe selection for temperature alarm:** (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.
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. • If **ALC=Ab** → ALL to 110.0°C or ALL to 230°F. • If **ALC=rE** → 0.0 to 50.0°C or 0 to 90°F.
ALL	**Minimum temperature alarm:** when this temperature is reached, the alarm is enabled after the **Ad** delay time. • If **ALC=Ab** → -55.0°C to ALU or -67°F to ALU. • If **ALC=rE** → 0.0 to 50.0°C or 0 to 90°F.
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 110.0°C; -67 to 230°F)
AU2	**Second high temperature alarm:** (-55.0 to 110.0°C; -67 to 230°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 signaling.
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

oA1	**Digital output 1 configuration:** (dEF; FAn; ALr; LiG; AUS; onF; db; CP2; dF2; HES) dEF=defrost; FAn=evaporator fans; ALr=alarm output; onf=onoff output; db=dead-band output; CP2=second compressor; dF2=second defrost; HES=energy saving output

DIGITAL INPUTS

i1P	**Digital input 1 polarity:** (oP; CL) **oP** = activated by closing the contact; **CL** = activated by opening the contact.
i1F	**Digital input 1 configuration:** (dor; dEF; LiG; AUS; Lis; ES) • **dor** = door switch function; • **dEF** = defrost activation; • **LiG** = light activation / deactivation; • **AUS** = not used; • **LiS** = not used; • **ES** = energy saving activation / deactivation.
I2P	**Digital input 2 polarity:** (oP; CL) **oP** = activated by closing the contact; **CL** = activated by opening the contact.
I2F	**Digital input 2 configuration:** (dEF; LiG; AUS; LiS; ES; EAL; bAL; FAn; HdF; onF) • **dEF** = defrost activation; • **LiG** = light activation / deactivation; • **AUS** = not used; • **LiS** = not used; • **ES** = energy saving activation / deactivation; • **EAL** = external warning alarm • **bAL** = external lock alarm • **FAn** = fan activation • **HdF** = holiday mode activation / deactivation • **onF** = to switch on and off the device
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. When **i1F=dor,** this represents the delay before the activation of the door open alarm.
doA	**Door alarm delay:** (0 to 255 min)
odC	**Compressor and fan status after opening of the door:** (no; FAn; CPr; F-C): **no** = normal; **FAn** = Fans OFF; **CPr** = 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 aaving 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 E.S. 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.
EtS	**Period of time to switch from energy saving 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 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	**Subcooling 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

nH1	**Number of compressor activation (thousands of) (read only)**
nL1	**Number of compressor activation (hundreds of) (read only)**
nH2	**Number of fan activation (thousands of) (read only)**
nL2	**Number of fan activation (hundreds of) (read only)**
nH3	**Number of defrost activation (thousands of) (read only)**
nL3	**Number of defrost activation (hundreds of) (read only)**
nH4	**Number of light activation (thousands of) (read only)**
nL4	**Number of light activation (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	**Holyday Energy saving starting time:** 0 to 23h50min
dSE	**Holyday 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.: <u>**To disable a defrost cycle set it to "nu"(not used).**</u> ***Ex:*** *if* ***Ld6=nu****; the sixth defrost cycle will be disabled*

OTHER

Adr	**Serial address for Modbus communication:** 1 to 247
onF	**Button function: nu**=not used; **onF**=ON/OFF function; **ES**=change working mode from normal to energy saving mode and vice-versa.
LPC	**Light button configuration:** (nu; LiG; AUS; dEF) **nu**=not used; **LiG**=light output control; **AUS**=auxiliary output control; **dEF**=defrost start
dPC	**Defrost button configuration:** (nu; dEF; AUS) **nu**=not used; **dEF**=defrost start; **AUS**=auxiliary output control
d1	**Thermostat probe display (read only)**
d2	**Evaporator probe display (read only)**
d3	**Pb3 probe display (read only)**
d4	**Pb4 probe display (read only)**
rSE	**Real Set point (read only)**
rEL	**Firmware Release (read only)**
Ptb	**Parameter code table (read only)**
FdY	**Firmware release information (read only)**
FMt	**Firmware release information (read only)**
FYr	**Firmware release information (read only)**

11 DIGITAL INPUT

The free voltage digital inputs are 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 (i1F, i2F=dEF)

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

LIGHT CONTROL (i1F, i2F=LiG)

The light output status will change with the digital input.

ENERGY SAVING (i1F, i2F=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 an critical external alarm. This signal blocks the regulation.

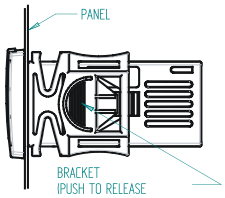
REMOTE HOLYDAY MODE (i2F=HdF)

It is used to force the holyday mode.

REMOTE ONOFF (i2F=onF)

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

12 INSTALLATION AND MOUNTING



The **XRB70CH** 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.

13 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.

14 ELECTRICAL CONNECTIONS

The instrument is provided with screw terminal block to connect cables with a cross section up to 2.5mm^2. 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.

14.1 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.

15 USE THE HOT KEY

15.1 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.

15.2 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.

16 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 you regional reseller to have more information.

17 ALARM SIGNALLING

Label	Cause	Outputs
"oFF"	Keyboard locked	Outputs unchanged
"on"	Keyboard unlocked	Outputs unchanged
"P1"	Pb1 (Room) probe failure	Compressor output according to **Con** e **CoF**
"P2"	Pb2 (Evaporator) probe failure	Defrost end is timed
"P3"	Pb3 probe failure	Depends on the linked function
"P4"	Pb4 probe failure	Depends on the linked function
"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

17.1 ALARM RECOVERY

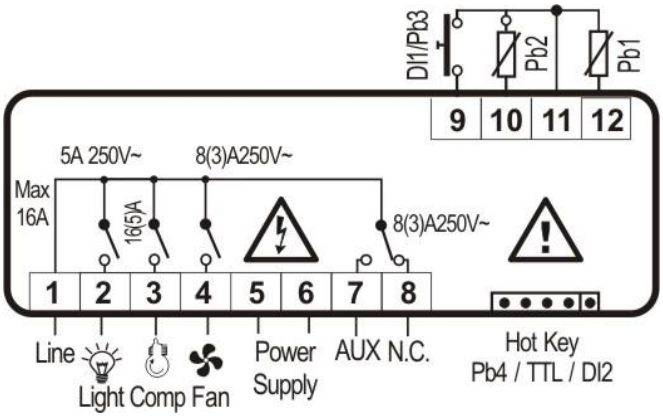
Probe alarms "**P1**", "**P2**", "**P3**" and "**P4**" start some seconds after the fault in the related probe; they automatically stop some seconds after the probe restarts normal operation. Check connections before replacing the probe. Temperature alarms "**HA**", "**LA**", "**H2**" and "**L2**" automatically 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**.

18 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^2 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 4 NTC probes
Digital input: up to 2 free voltage contacts
Relay outputs: **Compressor** SPST 16(5)A, 250VAC
Light: SPDT 8(3)A, 250VAC
Fans: SPST 8(3)A, 250VAC
AUX: 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: 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

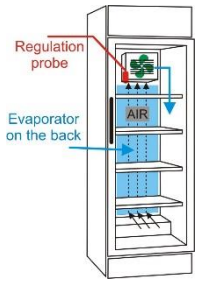
19 CONNECTIONS

19.1 XRB70CH – 16+8+8+5AMP – 230VAC

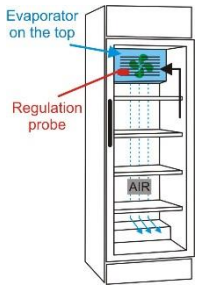


20 APPLICATION NOTES

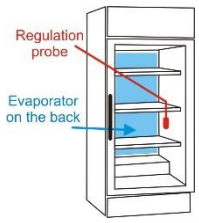
Pay attention to the positioning of the regulation probe. In fact, the XRB can obtain the best performances of the system under control when the regulation probe is placed by following these guidelines:



Ventilated applications – Evaporator placed on the back of the refrigerated zone, ventilator placed above the evaporator
- The regulation probe is normally placed in the outlet air flow from the evaporator
- 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



Ventilated applications – Evaporator placed on the top side of the refrigerated zone, ventilator placed on the outlet air flow from the evaporator
- The regulation probe is normally placed in the inlet air flow to the evaporator
- The regulation probe has to be installed outside the evaporator, avoiding any contact with the metallic parts of the evaporator itself



Static applications – Coolers without ventilators:
- 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

21 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	rtC; 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 to122°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
dAd	Max delay for updating display after a defrost	0 to 255 min	1	Pr1
Fdt	Draining time	0 to 255 min	1	Pr1
dPo	First defrost after start-up	n; Y	n	Pr1
dAF	Defrost delay after fast freezing	0.0 to 24h00min; nu	nu	Pr2
FnC	Fan mode operation	C-n; o-n; C-Y; o-Y	C-Y	Pr1
Fnd	Fan delay after defrost	0 to 255 min	0	Pr1
FCt	Differential of temperature for forced activation of fans	[0 to 50°C] [32 to 122°F]	0	Pr1
FSt	Fan stop temperature	[-55 to 50°C] [-67 to 122°F]	20.0°C	Pr1
Fon	Fan on time with compressor off	0 to 15 min	5	Pr1
FoF	Fan off time with compressor off	0 to 15 min	10	Pr1
FAP	Probe selection for fan management	np; P1; P2; P3; P4	P2	Pr1
Fo1	Fan on time with compressor off in Energy Saving mode	0 to 15 min	5	Pr1
FF1	Fan off time with compressor off in Energy Saving mode	0 to 15 min	12	Pr1
ACH	Kind of regulation for auxiliary relay	Ht; CL	Ht	Pr2
SAA	Set Point for auxiliary relay	-55.0 to 150.0°C; -67 to 302°F	00.0	Pr2
SHY	Differential for auxiliary relay	0.1 to 25.5°C; 1 to 45°F	1.0	Pr2
ArP	Probe selection for auxiliary regulator	nP; P1; P2; P3; P4	nP	Pr2
Sdd	Auxiliary relay switched off during defrost	n; Y	no	Pr2
Ao1	AUX output active when in energy saving mode	0 to 255 min	0	Pr2
AF1	AUX output not active when in energy saving mode	0 to 255 min	0	Pr2
ALP	Probe selection for temperature alarms	nP; P1; P2; P3; P4	P1	Pr1
ALC	Temperature alarms configuration	rE, Ab	Ab	Pr2
ALU	Maximum temperature alarm	[ALL to 150.0°C] [ALL to 302°F]	110.0° C	Pr1
ALL	Minimum temperature alarm	[-55°C to ALU] [-67°F to ALU]	-50.0°C	Pr1
AFH	Differential for temperature alarm recovery	[0.1 to 25.5°C] [1 to 45°F]	1.0°C	Pr2
ALd	Temperature alarm delay	0 to 255 min	0	Pr2
dAo	Delay of temperature alarm at start up	0.0 to 24h00min, res. 10 min	4.0	Pr2
AP2	Probe selection for second temperature alarms	nP; P1; P2; P3; P4	nP	Pr2
AL2	Second low temperature alarm	[-55.0 to 150.0°C] [-67 to 302°F]	-50.0	Pr2
AU2	Second high temperature alarm	[-55.0 to 150.0°C] [-67 to 302°F]	110.0	Pr2
AH2	Differential for second temperature alarm recovery	[0.1 to 25.5°C] [1 to 45°F]	2.0	Pr2
Ad2	Second temperature alarm delay	0 to 254 min; 255=not used	0	Pr2
dA2	Delay for second temperature alarm at start up	0.0 to 24h00min, res. 10 min	1.3	Pr2
bLL	Compressor off because of second low temperature alarm	n; Y	n	Pr2
AC2	Compressor off because of second high temperature alarm	n; Y	Y	Pr2
tbA	Alarm relay switched off by pressing any key	n; Y	Y	Pr2
oA1	First relay configuration	dEF; FAn; ALr; LiG; AUS; onF; db; dEF2; HES	AUS	Pr2
i1P	Digital input 1 polarity	CL; oP	CL	Pr1
i1F	Digital input 1 configuration	dor; dEF; LiG; AUS; ES	dor	Pr1
i2P	Digital input 2 polarity	CL; oP	CL	Pr2

i2F	Digital input 2 configuration	dor; dEF; LiG; AUS; EAL; bAL; HdF; ES; onF	EAL	Pr2
did	Digital inputs alarm delay	0 to 255 min	1	Pr1
doA	Door alarm delay	0 to 255 min	5	Pr1
odC	Compressor and fan status after door opening	no; FAn; CPr; F-C	FAn	Pr1
rrd	Regulation restart after open door alarm	n; Y	Y	Pr1
ErA	Energy reduction algorithm used	nu; bAS; Aut	Aut	Pr2
HES	Differential for energy saving mode	-30 to 30°C	3.0°C	Pr2
LdE	Energy saving mode controls the lights (lights off when energy saving goes active)	n; Y	Y	Pr2
Aid	Period of analysis for ErA (valid if ErA=Aut)	1 to 20	7	Pr2
nCE	Number of contiguous cells to activate Energy Saving (valid if ErA=Aut)	1 to 20	4	Pr2
nCC	Number of contiguous cells with energy saving for Set-Point variation (valid if ErA=Aut)	1 to 12	8	Pr2
Pdt	Pull Down time after energy saving	1 to 8	2	Pr2
tun	System tuning: L=low sensibility; H=high sensibility	L; H	H	Pr2
PPU	Temperature probe used for temperature variation analysis	P1; P2; P3; P4	P1	Pr2
FEn	Force status change from energy saving mode to normal mode (valid if ErA=Aut)	1 to 15	1	Pr2
FnE	Force status change from normal mode to energy saving mode (valid if ErA=Aut)	1 to 15	8	Pr2
StE	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
EtS	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
dS	Door open time to switch from EtS to StE (valid if ErA=bAS)	0 to 999 sec	5	Pr2
oHt	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
SCo	Sub cooling for Super Cooling function (when in normal mode)	[0.0 to 12.0°C] [0 to 21°F]	0.0°C	Pr2
tSC	Maximum duration for Super Cooling function (both for normal and energy saving mode)	0.0 to 24h00min, res. 10 min	0.0	Pr2
oHE	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
SCE	Subcooling for Super Cooling function (when in energy saving mode)	[0.0 to 12.0°C] [0 to 21°F]	0.0°C	Pr2
n1H	Number of compressor activation (thousands of)	Read Only	- - -	Pr1
n1L	Number of compressor activation (hundreds of)	Read Only	- - -	Pr1
n2H	Number of fan activation (thousands of)	Read Only	- - -	Pr1
n2L	Number of fan activation (hundreds of)	Read Only	- - -	Pr1
n3H	Number of defrost activation (thousands of)	Read Only	- - -	Pr1
n3L	Number of defrost activation (hundreds of)	Read Only	- - -	Pr1
n4H	Number of light activation (thousands of)	Read Only	- - -	Pr1
n4L	Number of light activation (hundreds of)	Read Only	- - -	Pr1
oCH	Compressor working hours (thousands of)	Read Only	- - -	Pr1
oCL	Compressor working hours (hundreds of)	Read Only	- - -	Pr1
Hur	Hours (*)	0 to 23	- - -	Pr1
Min	Minutes (*)	0 to 59	- - -	Pr1
dAY	Day of the week (*)	Sun to SAt	- - -	Pr1
Hd1	First day of week end (*)	Sun to Sat; nU	nU	Pr1
Hd2	Second day of week end (*)	Sun to Sat; nU	nU	Pr1
iLE	Working days Energy saving starting time (*)	0 to 23h50min, res. 10min	0.00	Pr1
dLE	Working days Energy saving duration (*)	0 to 24h 00min, res. 10min	0.00	Pr1
iSE	Holyday Energy saving starting time (*)	0 to 23h 50min, res. 10min	0.00	Pr1
dSE	Holyday Energy saving duration (*)	0 to 24h 00min, res. 10min	0.00	Pr1
Ldx	N-th working day defrost starting time (*)	0 to 23h 50min, res. 10min; nU	nU	Pr1
Sdx	N-th holyday defrost starting time (*)	0 to 23h 50min, res. 10min; nU	nU	Pr1
Adr	Serial address	1 to 247	1	Pr2
onF	On/off button configuration	nu; onF; ES	onF	Pr1
LPC	Light button configuration	nu; LiG; AUS; dEF	LiG	Pr1
dPC	Defrost probe value	nu; AUS; dEF	dEF	Pr1
dP1	Probe P1 value visualization	Read Only	- - -	Pr1
dP2	Probe P2 value visualization	Read Only	- - -	Pr1
dP3	Probe P3 value visualization	Read Only	- - -	Pr1
dP4	Probe P4 value visualization	Read Only	- - -	Pr1

rSE	Real Set point (SET + ES + oHx)	Read Only	- - -	Pr1
rEL	Firmware release	Read Only	- - -	Pr1
Ptb	Parameter code table	Read Only	- - -	Pr1
FdY	Firmware release: day	Read Only	- - -	Pr1
FMt	Firmware release: month	Read Only	- - -	Pr1
FYr	Firmware release: year	Read Only	- - -	Pr1

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