XWi70K

STANDARD CONTROLLER

FW REL. 21.4

1 GENERAL WARNING

1.1 PLEASE READ BEFORE USING THIS MANUAL

- This manual is part of the product and should be kept near the instrument for easy and quick reference.
- The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- Check the application limits before proceeding.
- Dixell S.r.l. 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

Model **XWi70K** is a microprocessor-based controller suitable for applications on medium or low temperature refrigerating units. It must be connected by means of a two-wire shielded twisted cable (∅ 1mm) at a distance of up to 30 meters to the keyboard **CH620**, **T620T/H** or **T820T/H**. It is provided with five relay outputs to control compressor, defrost (which can be either electrical or hot gas), evaporator and condenser fans and light or alarm. It is also provided with 4 NTC, PTC or PT1000 probe inputs.
The HOTKEY I/O port allows connecting the unit, by means of the external module XJ485-CX, to a network line **ModBUS-RTU** compatible such as an X-WEB monitoring system. With the HOTKEY port it is possible to modify the configuration of the controller (by using the Wizmate Progtool Kit).
The instrument is fully configurable and it can be easily programmed through an external keyboard.

3 FIXED SPEED COMPRESSOR CONTROL

The regulation uses the temperature measured by the regulation probe with a positive differential from the set point: if the temperature increases and reaches set point plus differential the compressor is started and then turned off when the temperature reaches the set point value again. In case of any regulation probe fault, the compressor management will switch to fixed ON/OFF time mode, as set in the parameters **Con** and **CoF**.

3.1 DOUBLE FIXED SPEED COMPRESSOR CONTROL

The controller can drive double compressor circuits. To do this, a couple of relays need to be properly configured: **oAx=CP1** and **oAy=CP2**. (do not use **oA5** for compressor management). The parameters used for this kind of regulation are the following:

AC	Compressor anti-short-cycle delay
AC1	Second compressor anti-short-cycle delay
2CC	Activation mode for second compressor (valid if oAx=CP1 and oAy=CP2)
rCC	Compressors rotation enabled
Cdd	Maximum time with compressor active

The second compressor output is activated by following the **2CC** parameter:
- If **2CC=FUL** then in parallel with the relay of the first compressor (**CP1**), with a possible delay as set in the **AC1** parameter. Both compressors are switched off at the same time.
- If **2CC=HAF** then only if the temperature **T>SET+HY+HY1**. The delay **AC1** is always respected. The second compressor is deactivated when **T<SET+HY**.

With parameter **rCC** it is possible to enable the compressor rotation function: the activation of the first and the second compressor will be alternated to equalize the number of working hours of both of them. In case of hot gas defrost operation, it is possible to select if one or both compressors will be used.

3.2 PULL DOWN

When defrost is not in progress, it can be activated by keeping the **UP** button pressed for 3 sec. The compressor will operate to reach the **CCS** set point by the time set through the **CCt** parameter. The cycle can be terminated before the end of the **CCt** time by using the same activation button (keeping the **UP** pressed for 3 sec when PULL DOWN is running)

4 DEFROST

Two defrost modes are available through the **tdF** parameter: defrost through electrical heater (**tdF=EL**) and hot gas defrost (**tdF=in**).
The defrost interval depends on the presence of the RTC (optional). The internal RTC is controlled by means of the **EdF** parameter:
- **EdF=in:** the defrost is made every **idF** time – standard way for controller without RTC.
- **EdF=rtC:** the defrost is real time controlled, depending on the day enabled in the parameters **dd1**…**dd7** and the hours set in the parameters **Ld1...Ld6**.

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

4.1 SYNCHRONIZED DEFROST

This defrost function requires:
- To set a digital input of any controller as **ixF=dEF**
- To connect (by wire) all digital inputs set as **ixF=dEF**

A maximum number of 20 controllers can be used in this configuration.

The Synchronized defrost mode is enabled by par. **SYd=SYn**. After any defrost request (received by RTC, timed by par. **idF,** manually by defrost button or by digital input set as dEF), all controllers will activate their own defrost phase. The first controller which ends its defrost phase will release the defrost line and load its dripping time. At the end of the dripping time the normal regulation will restart.
The other controllers follow the same logic.

4.2 DE-SYNCRONIZED DEFROST

This defrost function requires:
- To set a digital input of any controller as **ixF=dEF**
- To connect (by wire) all digital inputs set as **ixF=dEF**

A maximum number of 20 controllers can be used in this configuration.

The De-Synchronized defrost mode is enabled by par. **SYd=nSY**. After any defrost request (received by RTC, timed by par. **idF,** manually by defrost button or by digital input set as dEF), all controllers will load a random delay. The first controller which ends the random delay will retain the **ixF=dEF** line to signal to the other controllers that they have to wait before starting their own defrost phases. When the first controller ends its defrost phase, it will release the **ixF=dEF** line. The other ones will repeat the same procedure. The total defrost phase will end when all controllers complete their own defrost phases.
NOTES:
- take care about the time available to complete the defrost phase. It must be used for selecting the proper **MdF** value
- all controllers in waiting mode will keep on the normal regulation

4.3 RANDOM DEFROST

A random defrost mode can be enabled by par. **Syd=rnd**. After any defrost request (received by RTC or timed by par. **idF**) a random delay will be added. At the end of the added delay the defrost will start. The random function lead to desynchronize the start of the defrost phases in those cases where more than a cabinet is installed in the same "island". The maximum defrost delay is linked to the following parameters:
- **Mdf**=maximum time for any defrost
- **ndE**=delay multiplier

by the following formula:

MAX_DEFROST_DELAY = Mdf*ndE (min)

For example: if **ndE=10** and **Mdf=20 min**, this means that the total interval of time used by any device for complete its defrost phase is 200 min (worst case).

NOTE:
- take care about the interval of time available for defrost. It must be used for selecting both **MdF** and **ndE** values
- the higher is the **ndE** value and the better is the result in terms of desynchronization. On the other side, the longer will be the total interval of time required to complete defrosts

5 FAN MANAGEMENT

The controller can manage the following type of fans:
- Fixed speed fans (**oAx=FAn**, **Cnd**)

6 EVAPORATOR FAN CONTROL

The evaporator fan control mode is selected by means of the **FnC** parameter:
FnC = C_n: fans will switch ON and OFF with the compressor and **not run** during defrost;
FnC = o_n: fans will run even if the compressor is off, and not run during defrost;
After defrost, there is a timed fan delay allowing for drip time, set by means of the **Fnd** parameter.
FnC = C_Y: fans will switch ON and OFF with the compressor and **run** during defrost;
FnC = o_Y: fans will run continuously also during defrost.

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

6.1 FORCED ACTIVATION FOR FANS

This function, managed by the **FCt** parameter, is designed to avoid short cycles of fans, that could happen when the controller is switched on or after a defrost, when the room air warms the evaporator.

If the difference between the evaporator temperature and the room temperature is higher than the **FCt** value, the controller will activate the fans. This function is disabled if **FCt=0**.

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

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

7 CONDENSER FAN CONTROL

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

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

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

8 AUXILIARY REGULATORS

Up to 2 auxiliary regulators can be used. Both can be linked:
- To a digital output (relay) for ONOFF regulation
- To an analogue output for proportional regulation

The parameters used to configure the auxiliary regulators are the following:

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

9 SPECIAL FUNCTIONS

By using the parameters **oAx** it is possible to configure the functions of the relay outputs as described in the following paragraphs:

9.1 LIGHT RELAY (OAX = LIG)

By setting **oAx=Lig** the relay will work as light relay, it is switched on and off by the light button on the keyboard and is affected by status of the digital input when **i1F=dor**.
The parameter **LHt (Light timer)** sets the time the light will stay on after pressing the light switch on the keyboard. Every time the key is pushed the timer is re-loaded.

9.2 SECOND COMPRESSOR MANAGEMENT (OAX = CP2)

By setting one of the parameters **oAx=CP2**, the correspondent relay will operate as "second compressor". It will be activated in parallel with the relay of the first compressor, with a possible delay set in the **AC1** parameter (seconds).

9.3 ON/OFF RELAY (OAX = ONF)

By setting one of the parameters **oAx=onF**, correspondent the relay will operate as "on-off" relay: it will be activated when the controller is switched on and it will be switched off when the controller is in stand-by status.

9.4 ALARM RELAY (OAX=ALR)

By setting **oAx=ALr** the correspondent relay will work as alarm relay, it is switched on when an alarm happens.
Parameters involved:
- **tbA (n, Y)** Alarm relay silencing
- **AoP (cL; oP)** Alarm relay polarity

9.5 ANTI-SWEAT HEATER (OAX=TIM)

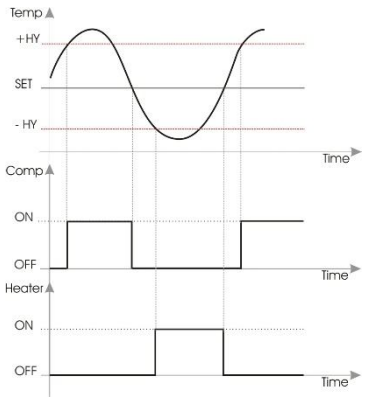
If **oAx=tiM,** the correspondent relay will be able to work as Anti-Sweat Heater output.
The relay will work based on the parameters **btA** (base time setting: seconds or minutes), **AtF** (output OFF time) and **Ato** (output ON time) with the following logic: the relay output will cycle (starting with the OFF time) between OFF and ON status.

9.6 ENERGY SAVING TIMEOUT

If the Energy Saving function has been activated by buttons or digital input, the Energy Saving will be automatically deactivated once the time defined in the parameter **ESt** is expired. If the value of **ESt=0** the timeout is not considered and the Energy Saving, once activated by button or digital input, can be deactivated only manually by the user.

9.7 DEAD BAND (OAX=DB)

By setting **oAx=db** the controller will perform a "dead band" regulation.
The heating element has to be connected to the correspondent relay.
If the temperature increases and reaches set point plus differential (**HY**) the **compresso**r is started and then turned off when the temperature reaches the set point value again.
If the temperature decreases and reaches the set point minus differential (**HY**) the output (**heater**) is switched on and then turned OFF when the temperature reaches again the set point.



10 KEYBOARDS

Depending on the type of keyboard, some special function could be linked to predefined buttons. Follow here below the complete list of functions:

SET	**Normal pressure:** to visualize the temperature set point; in programming mode it selects a parameter or confirm an operation.
	Timed: to modify the temperature set point; when max or min temperature value is displayed, keep it pressed for 3 sec to reset the stored value.
	Normal pressure: nu=not special functions; **Std**=maximum temperature; **Lnt**=configuration change; **ALr**=alarm list
	Timed: nu=not special functions; **Std**=maximum temperature; **CC**=reload default configuration; **ALr**=not used; **Pdn**=Pull Down activation
	Normal pressure: nu=not special functions; **Std**=minimum temperature; **Lnt**=configuration change; **ALr**=alarm list
	Timed: nu=not special functions; **Std**=maximum temperature; **Lnt**=configuration change; **ALr**= not used; **Pdn**=Pull Down activation
	Normal pressure: nu=not special functions; **Pb2**=Second probe value; **AU1**=auxiliary output 1 activation; **AU2**=auxiliary output 2 activation
	Timed: nu=not special functions; **Std**=maximum temperature; **Lnt**=configuration change; **ALr**= not used; **Pdn**=Pull Down activation
	Normal pressure: nu=not special functions; **LiG**=light output activation; **AU1**=auxiliary output 1 activation; **AU2**=auxiliary output 2 activation; **Lnt**=configuration change
	Timed: nu=not special functions; **LiG**=light output activation; **AU1**=auxiliary output 1 activation; **AU2**=auxiliary output 2 activation; **Lnt**=configuration change; **rSt**=reset
	Normal pressure: nu=not special functions; **oFF**=ON OFF function; **ES**=energy saving
	Timed: nu=not special functions; **oFF**=ON OFF function; **ES**=energy saving
AUX	**Normal pressure: nu**=not special functions; **AU1**=auxiliary output 1 activation; **AU2**=auxiliary output 2 activation; **LiG**=light output activation
	Timed: nu=not special functions; **AU1**=auxiliary output 1 activation; **AU2**=auxiliary output 2 activation; **LiG**=light output activation
ECO	**Normal pressure: nu**=not special functions; **ES**=energy saving
	Timed: nu=not special functions; **ES**=energy saving

10.1 KEYBOARD LOCK

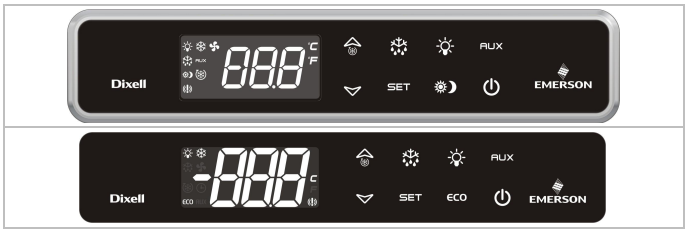
It is possible to select partial or complete keyboard lock:
- **brd**: type of lock, **UnL**=unlock; **SEL**=only buttons SET and ONOFF are available during lock condition (factory predefined configuration, not changeable); **ALL**=all buttons locked.
- **tLC**: power-on interval before locking keyboard

NOTE: a power-off is required to deactivate the keyboard lock function

10.2 CH620 OR VH620 KEYBOARD

10.3 T620T OR T620H KEYBOARD

10.4 T820T OR T820H KEYBOARD



10.5 KEY COMBINATIONS

UP + DOWN	To lock and unlock the keyboard.
SET + DOWN	To enter the programming mode.
SET + UP	To exit the programming mode.

10.6 USE OF LEDS

Each LED function is described in the following table.

LED	MODE	Function
	ON	The compressor is running
	FLASHING	- Programming Phase (flashing with LED) - Anti-short cycle delay enabled
	ON	The fan is running
	FLASHING	Programming Phase (flashing with LED)
	ON	The defrost is enabled
	FLASHING	Drip time in progress
	ON	- ALARM signal - In "Pr2" indicates that the parameter is also present in "Pr1"
	ON	Pull down is running
ECO	ON	Energy saving enabled
	ON	Light on
AUX	ON	Auxiliary output on
°C/°F	ON	Measurement unit

11 CONTROLLER INTERFACE

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

When the instrument is switched on, it could be necessary to program the real-time clock. This operation requires to enter the rtC menu (depending on the visibility level) and set the following parameters: **HUr** (hours), **Min** (minutes), **dAy** (day of the week), **dYM** (day of the month) **Mon (month**) and **YAr** (year).

11.1 HOW TO SEE THE MIN TEMPERATURE

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

11.2 HOW TO SEE THE MAX TEMPERATURE

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

11.3 HOW TO RESET THE MAX AND MIN TEMPERATURE RECORDED

To reset the stored temperature, when max or min temperature is displayed:
1. Press **SET** key until "rSt" label starts blinking.

Note: after the installation remember to RESET the temperature stored.

11.4 HOW TO SEE AND MODIFY THE SET POINT

1. Push and immediately release the **SET** key: the display will show the Set point value;
2. To change the **SEt** value, push the **UP** or **DOWN** arrows within 10 sec.
3. To save the new set point value push the **SET** key again or wait for 10 sec.

11.5 TO START A MANUAL DEFROST

1. Push the **DEF** key for more than 2 sec and a manual defrost will start.

11.6 ON/OFF FUNCTION (STAND BY)

By pushing the **ON/OFF** key, the instrument shows "OFF" for 5 sec. and the ON/OFF LED is switched ON.
During the OFF status, all the relays are switched OFF and the regulations are stopped; if a monitoring system is connected, it does not record the instrument data and alarms.
When the instrument is in stand by the keyboard displays "oFF".

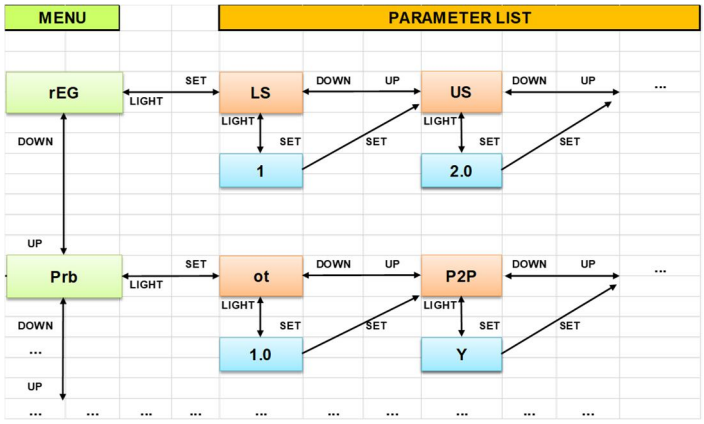
N.B. During the OFF status the Light and AUX buttons are active.

11.7 HOW TO SEE THE PROBE VALUES

1. Enter "**Pr1**" programming menu.
2. Parameters "dP1", "dP2", "dP3" and "dP4" display the value of probes P1, P2, P3 and P4.

12 PROGRAMMING MODE

The configuration parameters are divided in groups (named menu). After entering the programming mode, the first label corresponding to the first available group (menu) will appear on the display depending on the visibility level. Every parameter belonging to a specific menu has its own visibility rules for placement in PR1 (user accessible parameters) or PR2 (hidden parameters). Any menu can have parameters placed both in PR1 and/or PR2.



12.1 HOW TO ENTER PARAMETER PROGRAMMING MENU "PR1"

To enter a parameter list under "Pr1" level (user accessible parameters), under a specific menu, operate as follows:

SET + DOWN

1. Enter the Programming mode by pressing the **SET+DOWN** key for 3 seconds.
2. The display will show the first menu available under "Pr1" level

12.2 HOW TO ENTER PARAMETER PROGRAMMING MENU "PR2"

In the PR2 level there are all the parameters of the instrument.

12.2.1 ENTERING THE PARAMETER PROGRAMMING MENU "PR2"

1. Enter the Programming mode by pressing both **SET+DOWN** buttons for 3 sec: the label of the first menu available in Pr1 will be displayed (for example: rEG)
2. Release the **SET+DOWN** buttons and then push them again for 7 sec: during this time both compressor and fan icon will blink. After 7 sec the "**Pr2**" label will be displayed immediately, and, after releasing the **SET+DOWN** buttons, the first parameter menu available will be displayed (for example: rEG)
   NOW THE PARAMETER MENU "PR2" IS AVAILABLE FOR ANY MODIFICATION

NOTE:
- if no parameter is present in the "**Pr1**" level, after the first 3 sec the "**noP**" message will be displayed. Keep **SET+DOWN** buttons pushed till the "**Pr2**" message will be displayed.

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

Each parameter present in the PR2 level can be moved or put into PR1 level (user level) by pressing **SET+DOWN** buttons. When in PR2 menu, if a parameter is present also in the First Level (Pr1), the decimal point will be lit.

12.2.3 HOW TO CHANGE A PARAMETER VALUE

1. Enter the programming mode (both in PR1 or PR2 level)
2. Select the required menu with **UP** or **DOWN**
3. Press the SET button to enter the parameter list belonging to the selected menu
4. The first available parameter label (depending on the visibility level) will be displayed. The compressor icon will blink to indicate the position in the selected menu
5. Select the required parameter by using **UP** or **DOWN** buttons.
6. Press the **SET** key to display the current value (compressor and fan icon starts blinking to indicate this condition)
7. Use **UP** or **DOWN** to change its value.
8. Press **SET** to store the new value and move to the following parameter (belonging to the same menu)

To exit: Press **SET+UP** or wait for 30 sec without pressing any button.
NOTE:
- the new programming is stored even when the procedure ends by waiting the time-out
- the LIGHT button is used as BACK function when into PROGRAMMING MODE: press it to exit from a parameter list and return to the upper menu or to discard a parameter value modification and return to the same parameter label (without changing the previous parameter value)

12.3 KEYBOARD CONTROL

+	1. Keep both **UP** and **DOWN** buttons pressed for 3 sec. 2. The "PoF" message will be displayed and the keyboard is locked. At this point it is only possible the viewing of the set point or the MAX o Min temperature stored and to switch ON and OFF the light, the auxiliary output and the instrument. **TO UNLOCK THE KEYBOARD** Keep both **UP** and **DOWN** buttons pressed for 3 sec.

NOTE: if keyboard lock is enabled (see par. **brd**), then keyboard control function is disabled.

13 PARAMETER LIST

The configuration parameters are divided in groups (named menu) to speed up the browsing operations. Here below the list of all Menu with their meaning:

rEG	**Regulation menu:** to set regulation band
Prb	**Temperature probe menu**
vSC	**Variable Speed Drive menu:** to set the VS functional parameters
vSF	**Modbus Variable Speed Fan menu:** to set Modbus VSF functional parameters
diS	**Display menu:** to set the visualization rules
dEF	**Defrost menu:** to set the defrost operational mode
FAn	**Fan menu:** to set the evaporator and condenser fan control mode
AUS	**Auxiliary menu:** to set the auxiliary output mode
ALr	**Alarm menu:** to set the alarm thresholds
oUt	**Output menu:** to set the function linked to any configurable output
inP	**Input menu:** to set the function linked to any configurable input
ES	**Energy saving menu:** to set the energy saving mode
rtC	**Real Time Clock menu:** to set the internal clock
oth	**Others menu:** to set other functions like serial address, keyboard functions, real probe value visualization

REGULATION MENU - rEG

LS	**Minimum set point:** (-100°C to SET; -148°F to SET) sets the minimum value for the set point.
US	**Maximum set point:** (SET to 150°C; SET to 302°F) set the maximum value for set point.
HY	**Differential for normal regulation (compressor cut-in):** (0.1 to 25.5°C; 1 to 45°F) differential for set point. Compressor Cut IN is Set Point + differential (**HY**). Compressor Cut OUT is when the temperature reaches the set point.
odS	**Outputs delay activation after power on:** (0 to 255min) this function is enabled at the initial startup of the instrument and inhibits any output activation for the period set in the parameter.
AC	**Compressor anti-short-cycle delay:** (0 to 50min) minimum interval between the compressor stop and the following restart. It is also used to retry communication if serial compressor control is used.
AC1	**Second compressor anti-short-cycle delay:** (0 to 255 sec) delay before activating second compressor, depending on regulation mode selected by par. **2CC**
2CC	**Activation mode for second compressor (valid if oAx=CP1 and oAy=CP2):** (FUL; HAF) **FUL**=second compressor activated in parallel with first one. **HAF**=second compressor activated with step logic.
rCC	**Compressors rotation enabled:** (n;Y) **n** = CP1 is always the first compressor activated. **Y** = CP1 and CP2 activation is alternated
MCo	**Maximum time with compressor active:** (0 to 255min) maximum time with ONOFF compressor active. With **MCo=0** this function is disabled.
rtr	**F(P1; P2) percentage for regulation:** (0 to 100; 100=P1, 0=P2) it allows to set the regulation according to the percentage of the first and second probe, as for the following formula (**rtr***(P1-P2)/100 + P2).
CCt	**Maximum duration for Pull Down:** (0.0 to 24h00min, res. 10min) allows setting the length of the PULL DOWN cycle. Compressor stays on without interruption during **CCt** time. This is useful, for instance, when the room is filled with new products.
CCS	**Differential for Pull Down (SET+CCS or SET+CCS+HES):** (-12 to 12°C; -21 to 21°F) relative value to add to the regulation SETPOINT and to use during any PULL DOWN cycle.
oHt	**Threshold for automatic activation of PULL DOWN in mormal mode:** (0.0 to 25.5°C; 0 to 45°F) upper threshold for auto activation of a PULL DOWN
Con	**Compressor ON time with faulty probe:** (0 to 255min) time during which the compressor is active in case of faulty thermostat probe. With **Con=0** compressor is always OFF (not valid for VSC compressors).
CoF	**Compressor OFF time with faulty probe:** (0 to 255min) time during which the compressor is OFF in case of faulty thermostat probe. With **CoF=0** compressor is always active (not valid for VSC compressors).

PROBE MENU – Prb

PbC	**Temperature probe selection:** ntC; PtC; Pt1000
ot	**Probe P1 calibration:** (-12.0 to 12.0°C; -21 to 21°F) allows to adjust possible offset of the thermostat probe. Terminals 1-2.
P2P	**Probe P2 presence:** (n; Y) **n** = not present, the defrost stops by time; **Y** = present, the defrost stops by temperature. Terminals 2-3
oE	**Probe P2 calibration:** (-12.0 to 12.0°C; -21 to 21°F) allows to adjust possible offset of the second probe. Terminals 2-3.
P3P	**Probe P3 presence (P3):** (n; Y) **n** = not present, **Y** = present. Terminals 4-5
o3	**Probe P3 calibration (P3):** (-12.0 to 12.0°C; -21 to 21°F) allows to adjust possible offset of the third probe. Terminals 4-5
P4P	**Probe P4 presence:** (n; Y) n = Not present; Y = present. Terminals 5-6
o4	**Probe P4 calibration:** (-12.0 to 12.0°C; -21 to 21°F) allows to adjust possible offset of the fourth probe. Terminals 5-6

DISPLAY MENU - diS

CF	**Temperature measurement unit:** (°C; °F) **°C** = Celsius; **°F** = Fahrenheit. **WARNING:** When the measurement unit is changed the SET point and the values of the parameters related to the temperature have to be checked and modified (if necessary).
rES	**Resolution for °C:** (in=1°C; dE=0.1°C) allows decimal point visualization.
rEd	**Remote display** (P1; P2, P3, P4, SET, dtr) it selects which probe is displayed by the controller. **P1** = Thermostat probe; **P2** = Second probe; **P3** = Third probe; **P4** = Fourth probe, **SET** = set point; **dtr** = percentage of visualization.
dLY	**Temperature visualization delay:** (0 to 20min00s; res. 10s) when the temperature increases, the display is updated of 1°C or 1°F after this time.
dtr	**Visualization percentage=F(P1; P2):** (0 to 99; 100=P1, 0=P2) if **rEd=dtr** it allows to set the visualization according to the percentage of the first and second probe, as for the following formula (**dtr***(P1-P2)/100 + P2).

DEFROST MENU - dEF

EdF	**Defrost mode:** (rtC; in) **rtC** = real time clock control; **in** = interval of time control
tdF	**Defrost type:** (EL; in) **EL** = electrical heating; **in** = hot gas.
dFP	**Probe selection for defrost control:** (nP; P1; P2; P3; P4) **nP** = no probe; **P1** =thermostat probe; **P2** = Second probe; **P3** =Third probe; **P4** = Fourth Probe
dSP	**Probe selection for second defrost control:** (nP; P1; P2; P3; P4) **nP** = no probe; **P1** =thermostat probe; **P2** = Second probe; **P3** =Third probe; **P4** = Fourth Probe
dtE	**Defrost end temperature:** (-55 to 50°C; -67 to 122°F) sets the temperature measured by the evaporator probe, which causes the end of defrost.
dtS	**Second defrost end temperature:** (-55 to 50°C; -67 to 122°F) sets the temperature measured by the second evaporator probe, which causes the end of defrost.
idF	**Interval between two consecutive defrost cycles:** (0 to 120 hours) determines the interval of time between two defrost cycles.
MdF	**Maximum duration for any defrost:** (0 to 255min) when **dtE=nP**, (not evaporator probe: timed defrost) it sets the defrost duration. When **dtE** different from **nP** (defrost end based on temperature) it sets the maximum length for defrost.
MdS	**Maximum duration for second defrost:** (0 to 255min) when **dtE=nP**, (not evaporator probe: timed defrost) it sets the defrost duration. When **dtE** different from **nP** (defrost end based on temperature) it sets the maximum length for defrost.
dSd	**Start defrost delay:** (0 to 99min) this is useful when different defrost start times are necessary to avoid overloading the plant.
StC	**Compressor stop before activating any defrost:** (0 to 30 min) is used stop the compressor when a defrost is managed for inversion (hot-gas).
dFd	**Displaying during any defrost:** (rt; it; SEt; dEF; Coo) **rt** = real temperature; **it** = temperature at defrost start; **SEt** = set point; **dEF** = "**dEF**" label; **Coo** = used after any defrost, it shows the label "Coo" if the regulation temperature is above SET+HY+HY1
dAd	**Delay for display temperature update after any defrost:** (0 to 255min) sets the maximum time between the end of defrost and the restarting of the real room temperature display.
Fdt	**Draining time:** (0 to 120min) time interval between reaching defrost termination temperature and the restoring of the control's normal operation. This time allows the evaporator to eliminate water drops that might have formed due to defrost.
Hon	**Time with drain heater activated after drainig time Fdt:** (0 to 255 min) valid only if oAx=HEt.
dPo	**Defrost after power-on:** (n; Y) **n** = after the **idF** time, **Y** = immediately.
dAF	**Defrost delay after Pull Down (used only if tdF=in):** (0 to StC) used to delay the activation of the defrost output.
od1	**Automatic defrost: n**=function disabled; **Y**=function enabled. At the beginning of any energy saving mode a defrost will be activated.
od2	**Optimized defrost: no**=function disabled; **Y**=function enabled
Syd	**Type of synchronized defrost:** (nu; SYn; rnd, nSY) **nu**=not used; **SYn**=synchronized defrost; **rnd**=random defrost function; **nSY**=desynchronized defrost
dt1	**Optimized defrost termitation control:** (0.1 to 1.0 °C) differential used from optimized defrost algorithm for ending a defrost
ndE	**Number of devices for random defrost (SYd=rnd):** (1 to 20) used to determinate the number of appliances with random or desynchronized defrost function active

FAN MENU - FAn

FAP	**Probe selection for evaporator fan:** (nP; P1; P2; P3; P4) **nP** = no probe; **P1** =thermostat probe; **P2** = Second probe; **P3** =Third probe; **P4** =Fourth probe.
FSt	**Evaporator fan stop temperature:** (-55 to 50°C; -67 to 122°F) setting of temperature, detected by evaporator probe, above which fans are always OFF.
HYF	**Differential for evaporator fan regulator:** (0.1 to 25.5 °C; 1 to 45°F) differential used for evaporator fan regulator
FnC	**Evaporator fan mode operation:** (C-n; o-n; C-Y; o-Y) **C-n** = runs with the compressor, OFF during defrost; **o-n** = continuous mode, OFF during defrost; **C-Y** = runs with the compressor, ON during defrost; **o-Y** = continuous mode, ON during defrost.
Fnd	**Evaporator fan delay after any defrost:** (0 to 255min) interval between end of defrost and evaporator fans start.
FCt	**Temperature differential for evaporator fan activation:** (0 to 59°C; 0 to 90°F) (N.B.: **FCt=0** means function disabled) if the difference of temperature between the evaporator and the room probes is higher than **FCt** value, the fans will be switched on.
Fon	**Evaporator fan ON in normal mode (with compressor OFF):** (0 to 15min) with **Fnc=C_n** or **C_Y**, (fan activated in parallel with compressor) it sets the evaporator fan ON cycling time when the compressor is off. With **Fon=0** and **FoF≠0** the fan are always off, with **Fon=0** and **FoF=0** the fan are always off.
FoF	**Evaporator fan OFF in normal mode (with compressor OFF):** (0 to 15min) With **FnC=C_n** or **C_Y**, (fan activated in parallel with compressor) it sets the evaporator fan off cycling time when the compressor is off. With **Fon=0** and **FoF≠0** the fan are always off, with **Fon=0** and **FoF=0** the fan are always off.
LA1	**Evaporator fan operating hours:** (0 to 999) set the warning interval for maintenance. Internal value is multiplied by 100.
rS1	**Reset maintenance alarm for evaporator fan:** change to Y and confirm with SET button to reset condenser fan maintenance warning. LA2 interval will be reloaded.

FAC	**Probe selection for condenser fan:** (nP; P1; P2; P3; P4) **nP** = no probe, regulator disabled; **P1** =thermostat probe; **P2** = Second probe; **P3** =Third probe; **P4** =Fourth probe.
St2	**Set Point for condenser fan regulator:** (-100 to 150 °C; -148 to 302°F) set point used for condenser fan regulator
HY2	**Differential for condenser fan regulator:** (0.1 to 25.5°C; 1 to 45°F) differential used for condenser fan regulator
FCC	**Condenser fan mode of operation:** (C-n; o-n; C-Y; o-Y) **C-n** = runs with the compressor, OFF during defrost; **o-n** = continuous mode, OFF during defrost; **C-Y** = runs with the compressor, ON during defrost; **o-Y** = continuous mode, ON during defrost
FCo	**Condenser fan activated when compressor off:** (0 to 999 sec) interval with condenser fan on after stopping compressor and when **FCC=C-n** or **C-Y**
LA2	**Condenser fan operating hours:** (0 to 999) set the warning interval for maintenance. Internal value is multiplied by 100.
rS2	**Reset maintenance alarm for condenser fan:** change to Y and confirm with SET button to reset condenser fan maintenance warning. LA2 interval will be reloaded.

AUXILIARY MENU – AUS

ACH	**Type of action for auxiliary regulator:** (CL; Ht) **CL** = cooling; **Ht**= heating
SAA	**Set point for auxiliary regulator:** (-100 to 150 °C; -148 to 302°F) set point used for auxiliary regulator
SHY	**Differential for auxiliary regulator:** (0.1 to 25.5°C; 1 to 45°F) differential used for auxiliary regulator
ArP	**Probe selection for auxiliary regulator:** (nP; P1; P2; P3; P4) **nP** = no probe, regulator disabled; **P1** =thermostat probe; **P2** = Second probe; **P3** =Third probe; **P4** =Fourth probe
Sdd	**Auxiliary regulator disabled during any defrost:** (n; Y) n = enabled; Y = disabled
btA	**Time base for parameter Ato and AtF:** (Min; SEC) **Min**=base time is in minutes; **SEC**=base time is in seconds
Ato	**Interval with auxiliary output active:** (0 to 255) valid if oAx=tiM, x=0,1,2,3,4 or if xAo=tiM, x=1, 2
AtF	**Interval with auxiliary output not active: (0** to 255) valid if oAx=tiM, x=0,1,2,3,4 or if xAo=tiM, x=1, 2

ALARM MENU - ALr

ALP	**Temperature alarm probe selection:** (nP; P1; P2; P3; P4) **nP** = no probe, the temperature alarms are disabled; **P1** = Probe 1 (Thermostat probe); **P2** = Probe 2; **P3** = Probe 3; **P4** = Fourth probe.
ALC	**Temperature alarms configuration:** (Ab; rE) **Ab** = absolute temperature, alarm temperature is given by the **ALL** or **ALU** values. **rE** = temperature alarms are referred to the set point. Temperature alarm is enabled when the temperature exceeds the [**SET+ALU**] or [**SET-ALL**] values.
ALU	**Maximum temperature alarm:** • If **ALC=Ab**: [ALL to 150.0°C or ALL to 302°F] • If **ALC=rE**: [0.0 to 50.0°C or 0 to 90°F] when this temperature is reached, the alarm is enabled after the **ALd** delay time.
ALL	**Minimum temperature alarm:** • If **ALC=Ab**: [-100°C to ALU; -148°F to ALU] • If **ALC=rE**: [0.0 to 50.0°C or 0 to 90°F] when this temperature is reached, the alarm is enabled after the **ALd** delay time.
AFH	**Differential for temperature alarm recovery:** (0.1 to 25.5°C; 1 to 45°F) intervention differential for recovery of temperature alarm.
ALd	**Temperature alarm delay:** (0 to 255 min) time interval between the detection of an alarm condition and alarm signaling.
dot	**Temperature alarm delay when door open:** (0 to 255 min) delay before activating the door open alarm
dAo	**Temperature alarm delay after power-on:** (0.0 to 24h00min, res. 10min) time interval between the detection of the temperature alarm condition after instrument power on and temperature alarm signaling. It also delays the display indication of compressor warning alarms (if serial compressor control is used). NOTE: Modbus status are always updated with running alarm or warnings, also during **dAo** delay.
AP2	**Second temperature alarm probe selection:** (nP; P1; P2; P3; P4) **nP** = no probe; **P1** = thermostat probe; **P2** = second probe; **P3** = Third probe; **P4** = Fourth probe.
AL2	**Second low temperature alarm:** (-100 to 150°C; -148 to 302°F) when this temperature is reached the **LA2** alarm is signaled, possibly after the Ad2 delay.
Au2	**Second high temperature alarm:** (-100 to 150°C; -148 to 302°F) when this temperature is reached the **HA2** alarm is signaled, possibly after the **Ad2** delay.
AH2	**Differential for second temperature alarm recovery:** 0.1 to 25.5°C; 1 to 45°F.
Ad2	**Second temperature alarm delay:** (0 to 255 min) time interval between the detection of the condenser alarm condition and alarm signaling.
dA2	**Second temperature alarm activation delay after power-on:** 0.0 to 24h00min, res. 10min.
bLL	**Compressor off due to second low temperature alarm:** (n; Y) **n** = compressor keeps on working; **Y** = compressor is switched off till the alarm is present, in any case regulation restarts after **AC** time at minimum.
AC2	**Compressor off due to second high temperature alarm:** (n; Y) **n** = compressor keeps on working; **Y** = compressor is switched off till the alarm is present, in any case regulation restarts after **AC** time at minimum.
SAF	**Differential for anti-freezing control:** (0.0 to 25.5°C; 0 to 45°F) lower threshold used to avoid freezing conditions. If **T<SET-SAF**, then the compressor will be stopped. If **SAF=0** this function is disabled.
tbA	**Alarm relay deactivation (with oAx =ALr):** (n; Y) **n** = silencing disabled: alarm relay stays on till alarm condition lasts. **Y** = silencing enabled: alarm relay is switched OFF by pressing a key during an alarm.
bUM	**Buzzer muting:** (n; Y) **n** = buzzer cannot be stopped; **Y** = buzzer activation due to any alarm can be stopped

OUTPUT CONFIGURATIONS – oUt

oA1 (20-21)	**Relay output oA1 configuration, terminals 16-17:** (nu; onF; dEF; Fan; Alr; LiG; Au1; Au2; db; CP1; CP2; dF2; HES; HEt; inV; tiM; Cnd) **nu**=not used; **onF** = always on with instrument on; **dEF**=defrost; **Fan**=Fan; **Alr**=alarm; **LiG**=light; **Au1**=auxiliary output; **Au2**=auxiliary output 2; **db**=neutral zone; **CP1**=ONOFF compressor; **CP2**=second ONOFF compressor; **dF2**=second defrost; **HES**=energy saving; **HEt**=heater output control; **inV**=inverter output; **tiM**=timed mode activation; **Cnd**=condenser fan
oA2 (16-17)	**Relay output oA2 configuration, terminals 20-21:** (nu; onF; dEF; Fan; Alr; LiG; Au1; Au2; db; CP1; CP2; dF2; HES; HEt; inV; tiM; Cnd) **nu**=not used; **onF** = always on with instrument on; **dEF**=defrost; **Fan**=Fan; **Alr**=alarm; **LiG**=light; **Au1**=auxiliary output; **Au2**=auxiliary output 2; **db**=neutral zone; **CP1**=ONOFF compressor; **CP2**=second ONOFF compressor; **dF2**=second defrost; **HES**=energy saving; **HEt**=heater output control; **inV**=inverter output; **tiM**=timed mode activation; **Cnd**=condenser fan
oA3 (18-19)	**Relay output oA3 configuration, terminals 22-23:** (nu; onF; dEF; Fan; Alr; LiG; Au1; Au2; db; CP1; CP2; dF2; HES; HEt; inV; tiM; Cnd) **nu**=not used; **onF** = always on with instrument on; **dEF**=defrost; **Fan**=Fan; **Alr**=alarm; **LiG**=light; **Au1**=auxiliary output; **Au2**=auxiliary output 2; **db**=neutral zone; **CP1**=ONOFF compressor; **CP2**=second ONOFF compressor; **dF2**=second defrost; **HES**=energy saving; **HEt**=heater output control; **inV**=inverter output; **tiM**=timed mode activation; **Cnd**=condenser fan
oA4 (22-23)	**Relay output oA4 configuration, terminals 22-23:** (nu; onF; dEF; Fan; Alr; LiG; Au1; Au2; db; CP1; CP2; dF2; HES; HEt; inV; tiM; Cnd) **nu**=not used; **onF** = always on with instrument on; **dEF**=defrost; **Fan**=Fan; **Alr**=alarm; **LiG**=light; **Au1**=auxiliary output; **Au2**=auxiliary output 2; **db**=neutral zone; **CP1**=ONOFF compressor; **CP2**=second ONOFF compressor; **dF2**=second defrost; **HES**=energy saving; **HEt**=heater output control; **inV**=inverter output; **tiM**=timed mode activation; **Cnd**=condenser fan
oA5 (29-30-31)	**Relay output oA5 configuration, terminals 29-30-31:** (nu; onF; dEF; Fan; Alr; LiG; Au1; Au2; db; CP1; CP2; dF2; HES; HEt; inV; tiM; Cnd) **nu**=not used; **onF** = always on with instrument on; **dEF**=defrost; **Fan**=Fan; **Alr**=alarm; **LiG**=light; **Au1**=auxiliary output; **Au2**=auxiliary output 2; **db**=neutral zone; **CP1**=ONOFF compressor; **CP2**=second ONOFF compressor; **dF2**=second defrost; **HES**=energy saving; **HEt**=heater output control; **inV**=inverter output; **tiM**=timed mode activation; **Cnd**=condenser fan
AoP	**Alarm relay polarity:** (CL; oP) it set if the alarm relay is open or closed when an alarm occurs. **CL** = terminals closed during an alarm; **oP** = terminals open during an alarm.

DIGITAL INPUT MENU - inP

i1P	**Digital input 1 polarity:** (oP; CL) **oP** = the digital input is activated by opening the contact; **CL** = the digital input is activated by closing the contact.
i1F	**Digital input 1 configuration:** (EAL; bAL; PAL; dor; dEF; AUS; Htr; FAn; ES; HdF; LHt; onF; Lnt) **EAL** = external alarm: "**EA**" message is displayed; **bAL** = serious alarm "**CA**" message is displayed; **PAL** = pressure switch alarm, "**CA**" message is displayed; **dor** = door switch function; **dEF** = activation of a defrost cycle; **AUS** = auxiliary relay activation with **oAx=AUS**; **Htr** = type of inverting action (cooling or heating); **FAn** = evaporator fan activation; **ES** = energy saving; **HdF** = Holiday defrost (enable only with RTC); **onF** = to switch the controller off; **LHt** = to activate the light; **Lnt** = parameter map change.
did	**Digital input 1 alarm delay:** (0 to 255 min) delay between the detection of the external alarm condition and its signalling. When **i1F= PAL**, it is the interval of time to calculate the number of pressure switch activation.
i2P	**Digital input 2 polarity:** (oP; CL) **oP** = the digital input is activated by opening the contact; **CL** = the digital input is activated by closing the contact.
i2F	**Digital input 2 configuration:** (EAL; bAL; PAL; dor; dEF; AUS; Htr; FAn; ES; HdF; LHt; onF; Lnt) **EAL** = external alarm: "**EA**" message is displayed; **bAL** = serious alarm "**CA**" message is displayed; **PAL** = pressure switch alarm, "**CA**" message is displayed; **dor** = door switch function; **dEF** = activation of a defrost cycle; **AUS** = auxiliary relay activation with **oAx=AUS**; **Htr** = type of inverting action (cooling or heating); **FAn** = evaporator fan activation; **ES** = energy saving; **HdF** = Holiday defrost (enable only with RTC); **onF** = to switch the controller off; **LHt** = to activate the light; **Lnt** = parameter map change.
d2d	**Digital input 2 alarm delay:** (0 to 255 min) delay between the detection of the external alarm condition and its signaling. When **i2F= PAL**, it is the interval of time to calculate the number of pressure switch activation.
nPS	**Number of pressure alarm events before stopping the regulation (Lock alarm):** (0 to 15) Number of activation, during the **did** or **d2d** interval, before signalling an alarm event (**i1F, i2F=PAL**). If the **nPS** activation during **did** or **d2d** time is reached, switch off and on the instrument to restart normal regulation.
odC	**Compressor and fan status after door opening:** (no; FAn; CPr;F_C;) **no** = normal; **FAn** = normal; **CPr** = compressor OFF, **F_C** = compressor OFF.
rrd	**Regulation restart after open door alarm:** (n; Y) **n** = outputs follow the **odC** parameter. **Y** = outputs restart with a door open alarm.

ENERGY SAVING MENU – ES

HES	**Differential for energy saving mode:** (-30 to 30°C; -54 to 54°F) it sets the increasing value of the set point **[SET+HES]** during the Energy Saving cycle.
ESt	**Time-out for energy saving mode:** (0 to 255 hours) maximum duration for energy saving mode. If **ESt=0** then this function is disabled.
LdE	**Energy saving mode controls the lights:** (n; Y) lights off when energy saving mode is active
LHt	**Time-out for light output:** (0 to 255 min) the light output will be forced OFF after this period. **LHt=0** means function disabled.

OTHER

Adr	**Serial address:** (1 to 247) identifies the instrument address when connected to a Modbus compatible monitoring system.
bAU	**Baudrate for serial communication: 9.6** = 9600baud; **19.2** = 19200baud
onC	**ONOFF button configuration:** (nU; oFF; ES; SEr) **nU** = disabled; **oFF** = enabled; **ES** = energy saving mode; **SEr** = do not use it
dP1	**Probe P1 value visualization** (read only)

dP2	**Probe P2 value visualization** (read only)
dP3	**Probe P3 value visualization** (read only)
dP4	**Probe P4 value visualization** (read only)
SPd	**Instantaneous compressor speed (in percentage):** read only
rSE	**Real regulation set point:** it shows the set point used during the energy saving cycle or during the continuous cycle.
rEL	**Firmware release**
Ptb	**Parameter map code**

14 DIGITAL INPUT

The free voltage digital inputs are programmable in different configurations by the **i1F or i2F** parameters.

14.1 DOOR SWITCH INPUT (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 is rtr = yES.** The alarm stops as soon as the external digital input is disabled again. With the door open, the high and low temperature alarms are disabled.

14.2 GENERIC ALARM (EAL)

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

14.3 SERIOUS ALARM MODE (BAL)

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

14.4 PRESSURE SWITCH (PAL)

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

14.5 DEFROST CONTROL (DEF)

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

14.6 KIND OF ACTION: HEATING OR COOLING (HTR)

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

14.7 ENERGY SAVING (ES)

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

14.8 EVAPORATOR FAN CONTROL (FAN)

Outputs set as evaporator fan (FAn) will be activated or deactivated following the digital input polarity.

14.9 HOLIDAY MODE (HDF)

Holiday mode activation.

14.10 REMOTE LIGHT CONTROL (LHT)

To manage the light activation from remote.

14.11 REMOTE ON OFF (ONF)

To issue a remote ON/OFF command.

14.12 PARAMETER MAP CHANGE (LNT)

To change the used parameter map from **nt** (normal temperature) to **Lt** (low temperature) and vice-versa.

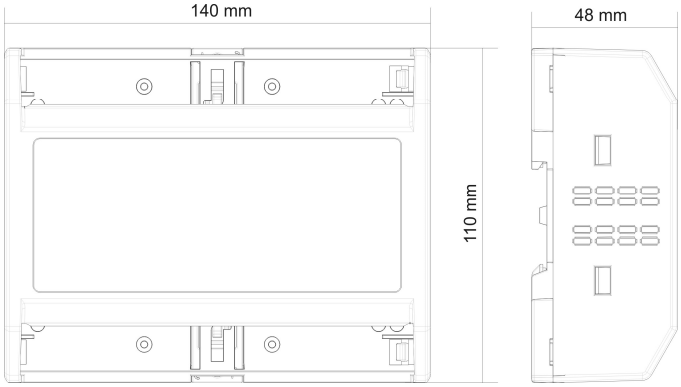
14.13 DIGITAL INPUTS POLARITY

The digital input polarity depends on the **i1P** or **i2P** parameters:
i1P or i2P=CL: the input is activated by closing the contact.
i1P or i2P=OP: the input is activated by opening the contact

15 HOW TO INSTALL AND MOUNT

T620T/H or T820T/H keyboards shall be mounted on vertical panel, in a 150x31 mm hole, and fixed using the special bracket supplied.
VH620H keyboard shall be mounted on vertical panel, in a 72x56 mm hole, and fixed using two screws 3x2 mm. To obtain an IP65 protection grade use the front panel rubber gasket (mod. RGW-V).
CH620 keyboard shall be mounted on vertical panel, in a 29x71 mm hole, and fixed using the special bracket supplied.
The controller **XWi70K** shall be mounted in a din rail and in a horizontal position or with the relay output on the bottom side (IEC/60730).
It must be connected to the keyboard by using a 2-wire cable (∅ 1mm). 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 the air free to circulate by the aeration holes.

15.1 XWi70K – 8 DIN CASE - DIMENSIONS



16 ELECTRICAL CONNECTIONS

XWi70K is provided with screw terminal blocks to connect cables with a cross section up to 2.5 mm² for the RS485 (optional) and the keyboard. To connect the other inputs, power supply and relays, **XWi70K** is provided with Plug-in connections (6.3mm). Heat-resistant cables must be used. 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, in case of heavier loads use a suitable external relay.
NOTE:

- **the maximum current allowed for the common line of the relays is 14A (IEC/60730)**
- **the maximum current allowed for insulated relay (oA5) is 3A (IEC/60730)**

16.1 PROBE CONNECTIONS

The probes shall be mounted with the bulb upwards to prevent damages due to 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.

17 TTL/RS485 SERIAL LINE

The TTL connector allows, by means of the external module TTL/RS485 **(XJ485CX)**, to connect the unit to a network line **ModBUS-RTU** compatible as the **Dixell** monitoring system. The same TTL connector is used to upload and download the parameter list of the "**HOT-KEY**".

18 HOW TO USE OF THE "HOT KEY"

NOTE: the XWi controllers need a 64KB HOT KEY. Standard Hot Key is not supported.

18.1 PROGRAM A HOT-KEY FROM AN INSTRUMENT (UPLOAD)

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

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

18.2 HOT TO CHANGE PARAMETER MAP BY USING AN HOT-KEY (DOWNLOAD)

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

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

19 ALARM SIGNALS

Message	Cause	Outputs
P1	Thermostat probe failure	Alarm output ON; Compressor output according to parameters **Con** and **CoF**
P2	Second probe failure	Alarm output ON; Other outputs unchanged
P3	Third probe failure	Alarm output ON; Other outputs unchanged
P4	Fourth probe failure	Alarm output ON; Other outputs unchanged
HA	Maximum temperature alarm	Alarm output ON; Other outputs unchanged
LA	Minimum temperature alarm	Alarm output ON; Other outputs unchanged
HA2	Condenser high temperature	It depends on the **AC2** parameter
LA2	Condenser low temperature	It depends on the **bLL** parameter
dA	Door open	Compressor and fans restarts
EA	External alarm	Output unchanged
CA	Serious external alarm (i1F=bAL)	All outputs OFF
CA	Pressure switch alarm (i1F=PAL)	All outputs OFF
EE	Data or memory failure	Alarm output ON; Other outputs unchanged
noL	No communication between base and keyboard	Unchanged

The alarm message is displayed until the alarm condition is recovery.
All the alarm messages are showed alternating with the room temperature except for the "P1" which is flashing.
To reset the "EE" alarm and restart the normal functioning press any key, the "**rSt**" message is displayed for about 3 sec.

19.1 BUZZER MUTING

Once the alarm signal is detected the buzzer can be silenced by pressing any key. Buzzer is mounted in the keyboard and it is an option.

19.2 "EE" ALARM

The **Dixell** instruments are provided with an internal check for the data integrity. The "EE" alarm flashes when a failure in the memory data occurs. In such cases the alarm output is enabled.

19.3 ALARM RECOVERY

Probe alarms: "**P1**" (probe1 faulty), "**P2**", "**P3**" and "**P4**"; they automatically stop 10 sec after the probe restarts normal operation. Check connections before replacing the probe.
Temperature alarms "**HA**", "**LA**" "**HA2**" and "**LA2**" automatically stop as soon as the temperature returns to normal values.
Alarms **"EA"** and **"CA"** (with **i1F=bAL**) recovers as soon as the digital input is disabled.
Alarm "**CA"** (with **i1F=PAL**) recovers only by **switching off and on** the instrument.

20 TECHNICAL DATA

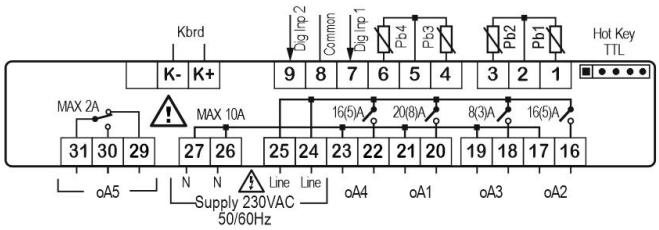
20.1 KEYBOARDS

Housing: self-extinguishing ABS
Supported models: CH620, V620H, T620x, T820x
Protection: IP20; **Frontal protection:** IP65 with frontal gasket
Connections: Screw terminal block ≤ 2.5 mm²
Power supply: from **XWi70K** power module
Display: 3-digit red, white or blue LED
Optional: buzzer

20.2 POWER MODULE XWI70K

Case: 8-DIN, 140x176x148
Connections: Screw terminal block ≤ 2.5 mm² heat-resistant wiring, 6.3mm Spade or Plug-in type
Power supply: 230Vac or 110Vac ± 10%
Power absorption: 10VA max
Temperature probe inputs: 4 NTC, PTC or PT1000 probes
Digital inputs: 2 free voltage contacts
Relay outputs (absolute ratings):
oA1: relay SPST 20(8) A, 250Vac
oA2: relay SPST 16(5) A, 250Vac
oA3: relay SPST 8(3) A, 250Vac
oA4: relay SPST 20(8) A, 250Vac
oA5: relay SPDT 7(2) A, 250Vac
Maximum current ratings on loads 14A (IEC/60730)
Maximum current ratings on insulated relay (oA5) 3A (IEC/60730)
Serial output:
TTL standard available on 5-pin port (JST connector)
Communication protocol: Modbus - RTU
Data storing: on the non-volatile memory (EEPROM)
Kind of action: 1B; **Pollution degree:** normal
Software class: A
Operating temperature: 0 to 50°C (32 to 140°F) (IEC/60730)
Storage temperature: -25 to 60°C (-13 to 140°F)
Relative humidity: 20 to 85% (no condensing)
Measuring and regulation range:
NTC probe: -40 to 110°C (-58 to 230°F)
PTC probe: -50 to 150°C (-58 to 302°F)
PT1000 probe: -100 to 150°C (-148 to 302°F)
Resolution: 0.1°C or 1°C or 1°F (selectable)
Accuracy (ambient temp. 25°C): ±0.5°C ±1 digit

21 WIRING DIAGRAMS



22 DEFAULT PARAMETER MAPS

Label	Description	Value	Level
Set	Set Point (compressor cut-out)	2.0	
LS	Minimum Set Point	-50.0	Pr1
US	Maximum Set Point	50.0	Pr1
Hy	Differential for normal regulation (compressor cut-in)	2.0	Pr2
odS	Outputs delay activation after power on	1	Pr2
AC	Compressor anti-short-cycle delay	1	Pr1
AC1	Second compressor anti-short-cycle delay	10	Pr1
2CC	Activation mode for second compressor (valid if oAx=CP1 and oAy=CP2)	FUL	Pr1
rCC	Compressors rotation enabled	No	Pr1
Rtr	F(P1; P2) percentage for regulation (100=P1; 0=P2)	100	Pr2
CCt	Maximum duration for Pull Down	00:00	Pr2
CCS	Differential for Pull Down (SET+CCS or SET+HES+CCS)	0.0	Pr2
oHt	Threshold for automatic activation of Pull Down in normal mode (SET+HY+oHt)	0.0	Pr2
Con	Compressor ON time with faulty probe	5	Pr2
CoF	Compressor OFF time with faulty probe	10	Pr2
PbC	Temperature probe selection	ntC	Pr2
Ot	Probe P1 calibration	0.0	Pr2
P2P	Probe P2 presence	Yes	Pr2
oE	Probe P2 calibration	0.0	Pr2
P3P	Probe P3 presence	No	Pr2
o3	Probe P3 calibration	0.0	Pr2
P4P	Probe P4 presence	No	Pr2
o4	Probe P4 calibration	0.0	Pr2
Hy1	Differential for proportional regulation	1.0	Pr1
CF	Temperature measurement unit: Celsius, Fahrenheit	°C	Pr2
rES	Resolution for °C: decimal, integer	dE	Pr2
rEd	Remote display: probe visualized	P1	Pr2
dLy	Temperature visualization delay	00:00	Pr2
Dtr	Visualization percentage=F(P1; P2) (ex: dtr=1 means VALUE=0.01*P1+0.99*P2)	50	Pr2
tdF	Defrost type: electrical heating, hot gas	In	Pr1
dFP	Probe selection for defrost control	P2	Pr2
dtE	Defrost end temperature	6.0	Pr1
idF	Interval between two consecutives defrost cycles	12	Pr1
MdF	Maximum length for any defrost	30	Pr1
dSd	Start defrost delay	0	Pr2
StC	Compressor stop before activating hot-gas defrost	0	Pr2
dFd	Displaying during any defrost	dEF	Pr2
dAd	Delay for display temperature update after any defrost	20	Pr2
Fdt	Draining time	0	Pr2
dAF	Defrost delay after Pull Down	0	Pr2
od1	Automatic defrost (at the beginning of any energy saving mode)	no	Pr2
FAP	Probe selection for evaporator fan	P1	Pr1
FSt	Evaporator fan stop temperature	30.0	Pr1
HyF	Differential for evaporator fan regulator	10.0	Pr1
FnC	Evaporator fan mode operation	O_Y	Pr1
Fnd	Evaporator fan delay after defrost	2	Pr1
FCt	Temperature differential for evaporator fan activation (0=function disabled)	0	Pr1
Fon	Evaporator fan ON in normal mode (with compressor OFF)	0	Pr2
FoF	Evaporator fan OFF in normal mode (with compressor OFF)	0	Pr2
LA1	Operating hours (x100) for condenser fans	0	Pr2
rS1	Reset maintenance alarm	No	Pr2
FAC	Probe selection for condenser fan	nP	Pr2
St2	Regulation Set Point for condenser fan	15	Pr2
Hy2	Differential for condenser fan regulator	20	Pr2
FCC	Condenser fan mode operation	C_n	Pr2
FCo	Condenser fan on after switching off compressor	0	Pr2
LA2	Operating hours (x100) for condenser fans	0	Pr1
rS2	Reset maintenance alarm	no	Pr2
ACH	Type of action for auxiliary regulator	CL	Pr2
SAA	Set point for auxiliary regulator	0.0	Pr2
SHy	Differential for auxiliary regulator	2.0	Pr2
ArP	Probe selection for auxiliary regulator	nP	Pr2
Sdd	Auxiliary regulator disabled during any defrost	No	Pr2
btA	Base time for parameter Ato and AtF	Min	Pr2
Ato	Interval of time with auxiliary output active (valid if oAx=tiM, x=0,1,2,3,4 or if xAo=tiM, x=1, 2)	5	Pr2
AtF	Interval of time with auxiliary output not active (valid if oAx=tiM, x=0,1,2,3,4 or if xAo=tiM, x=1, 2)	5	Pr2
ALP	Temperature alarm probe selection	P1	Pr2
ALC	Temperature alarms configuration: relative, absolute	rE	Pr2

ALU	Maximum temperature alarm	5.0	Pr2
ALL	Minimum temperature alarm	5.0	Pr2
AFH	Differential for temperature alarm recovery	1.0	Pr2
ALd	Temperature alarm delay	15	Pr2
dot	Temperature alarm delay when door open	15	Pr2
dAo	Temperature alarm delay after power-on	02:00	Pr2
AP2	Second temperature alarm probe selection	P3	Pr1
AL2	Second low temperature alarm (absolute value)	0.0	Pr2
AU2	Second high temperature alarm (absolute value)	55.0	Pr2
AH2	Differential for second temperature alarm recovery	20.0	Pr2
Ad2	Second temperature alarm delay	5	Pr2
dA2	Second temperature alarm activation delay after power-on	00:00	Pr2
bLL	Compressor off due to second low temperature alarm	no	Pr2
AC2	Compressor off due to second high temperature alarm	yes	Pr2
tbA	Alarm relay deactivation	Yes	Pr2
bUM	Buzzer muting	Yes	Pr2
oA1	Relay output oA1 (terminals 20-21)	CP1	Pr2
oA2	Relay output oA2 (terminals 16-17)	dEF	Pr2
oA5	Relay output oA3 (terminals 18-19)	Fan	Pr2
oA4	Relay output oA4 (terminals 22-23)	Cnd	Pr2
oA5	Relay output oA5 (terminals 29-30-31)	onF	Pr2
AoP	Alarm relay polarity	CL	Pr2
i1P	Digital input 1 polarity	CL	Pr1
i1F	Digital input 1 configuration	Dor	Pr1
did	Digital inputs 1 alarm delay	5	Pr1
i2P	Digital input 2 polarity	CL	Pr2
i2F	Digital input 2 configuration	EAL	Pr2
d2d	Digital inputs 2 alarm delay	0	Pr2
nPS	Number of pressure alarm events before stopping the regulation (Lock alarm)	15	Pr2
odC	Compressor and fan status after door opening	Fan	Pr2
rrd	Regulation restart after open door alarm	Yes	Pr2
HES	Differential for energy saving mode	0	Pr2
LdE	Energy saving mode controls the lights (lights off when energy saving goes active)	No	Pr2
Adr	Serial address	1	Pr2
bAU	Baudrate selection for serial port (TTL on Hotkey)	9.6	Pr2
onC	ONOFF button configuration	oFF	Pr2
dP1	Probe P1 value visualization	-	Pr1
dP2	Probe P2 value visualization	-	Pr1
dP3	Probe P3 value visualization	-	Pr1
dP4	Probe P4 value visualization	-	Pr1
rSE	Real regulation Set Point	-	Pr1
rEL	Firmware release	-	Pr1
Ptb	Parameter map code	-	Pr1

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