XWi70K

VARIABLE SPEED COMPRESSOR MANAGEMENT

FW RELEASE 17.2

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.

1.2 SAFETY PRECAUTIONS

- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical connections before any kind of maintenance.
- Fit the probe where it is not accessible by the End User. The instrument must not be opened.
- In case of failure or faulty operation send the instrument back to the distributor or to "Dixell S.r.l." (see address) with a detailed description of the fault.
- Consider the maximum current which can be applied to each relay (see Technical Data).
- Ensure that the wires for probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.
- In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.
- Dixell Srl reserves the right to change the composition of its products, even without notice, ensuring the same and unchanged functionality.

2 GENERAL DESCRIPTION

Model **XWi70K** is a microprocessor based controller suitable for applications on medium or low temperature refrigerating units. It has to be connected by means of a two-wire shielded twisted cable (∅ 1mm) at a distance of up to 30 meters to the keyboard **CX/CH620**, **T620T/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 or PTC fully configurable probe inputs. It has a both a frequency output and a serial port which can be used to control variable speed compressors. A couple of analogue outputs (4-20mA or 0-10V) and a master 2-wire RS485 output complete the HW resources.
The HOT KEY output 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. It allows programming the controller by means the HOT KEY programming tool.
The instrument is fully configurable and it can be easily programmed through the connected keyboard.

3 CONTROLLING LOADS

3.1 FIXED SPEED COMPRESSOR CONTROL

The regulation is performed according to the temperature measured by the thermostat probe with a positive differential from the set point: if the temperature increases and reaches set point plus differential the compressor is started and then turned off when the temperature reaches the set point value again. In case of thermostat probe fault, the compressor works in timed mode as set in the parameters **Con** and **CoF**.

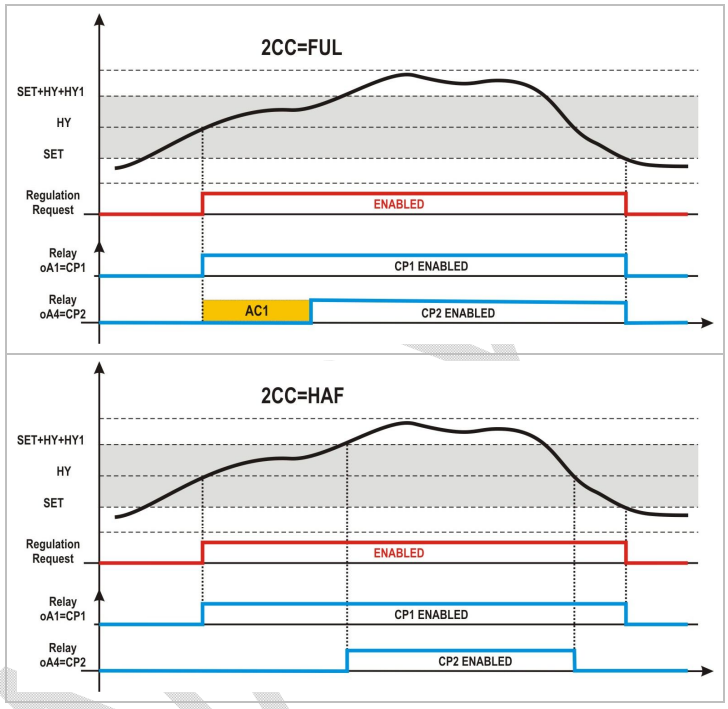
3.2 DOUBLE FIXED SPEED COMPRESSOR CONTROL

The controller is able to drive double compressor circuits. To do this, a couple of relays need to be properly configured: **oAx=CP1** and **oAy=CP2**. The parameters used for this kind of regulation are the following:

AC	**Compressor anti short cycle delay:** 0 to 50 min
AC1	**Second compressor anti short cycle delay:** 0 to 255 sec
2CC	**Activation mode for second compressor:** FUL; HAF
rCC	**Compressors rotation enabled:** no; YES
Cdd	**Compressor used during a defrost phase:** CP1; CP2; bC

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 in order 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.

3.3 FAST FREEZING

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

3.4 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 hours set in the parameters **Ld1...Ld6** (for workdays).

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.

3.4.1 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.
NOTE:

- take care about the interval of time available for defrost. It must be used for decide 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 for performing a defrost.

3.5 EVAPORATOR FANS CONTROL

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

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**.

3.5.1 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**.

3.5.2 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.

3.6 CONDENSER FANS CONTROL

The 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**) in order to activate and deactivate the condenser fans:
- If **T>St2+HY2** the condenser fans are activated
- If **T<St2** the condenser fans are deactivated.

4 AUXILIARY REGULATORS

Up to 2 auxiliary regulators can be used. Both of them 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	**Kind 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**
A2C	**Kind of action for auxiliary regulator 2**
SA2	**Set point for auxiliary regulator 2**
SH2	**Differential for auxiliary regulator 2**
Ar2	**Probe selection for auxiliary regulator 2**
Sd2	**Auxiliary regulator disabled during any defrost 2**

5 ANALOGUE OUTPUTS

The controller is equipped with 2 configurable analogue outputs, type 4-20mA or 0-10Vdc (selectable). It is possible to use them for proportional regulation of:
- Evaporator fan speed
- Condenser fan speed

Or as proportional output linked to the:
- Auxiliary regulator 1
- Auxiliary regulator 2

The parameters used to configure the analogue outputs are the following:

1An	**Kind of analogue output (4,20mA or 0-10Vdc)**
1oL	**Minimum value for analogue output (in percentage)**
1oH	**Maximum value for analogue output (in percentage)**
1At	**Start-up time with analogue output at 100%**
2An	**Kind of analogue output 2 (4,20mA or 0-10Vdc)**
2oL	**Minimum value for analogue output 2 (in percentage)**
2oH	**Maximum value for analogue output 2 (in percentage)**
2At	**Start-up time with analogue output 2 at 100%**

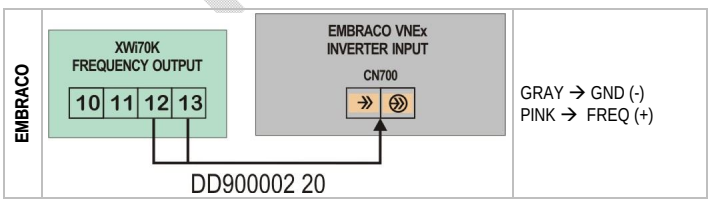
6 VARIABLE SPEED COMPRESSOR CONTROL

6.1 FREQUENCY MODE

The controller is able to drive Embraco variable speed compressor with frequency control input. The frequency output port is able to issue a frequency signal from 30 to 200Hz, duty cycle=50%. A special cable has to be used in order to connect the frequency output of the controller to the frequency input of the specific inverter.
- CAB/EMB2: cable **DD900002 20** for Embraco VNEK/U models

One of the available relays can be set as **oAx=inV** in order to control the compressor power supply.
NOTE: an inverter compressor can be completely controlled from the frequency output only.

6.1.1 CABLE FOR FREQUENCY MODE CONTROL

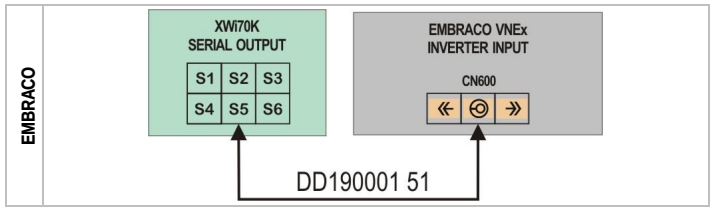


6.2 SERIAL MODE CONTROL

The controller is able to drive Embraco variable speed compressor with serial control input. A special cable has to be used in order to connect the serial port of the controller to the serial port of the specific inverter.
- CAB/EMB 1.5MT: cable **DD190001 51** for Embraco VNEK/U models

One of the available relays can be set as **oAx=inV** in order to control the compressor power supply.

6.2.1 CABLE FOR SERIAL MODE CONTROL



6.3 PARAMETERS

The following parameters are used to set the regulation:

HY1	**Differential for proportional regulation:** (0.1 to 25.5°C; 1 to 45°F)
PMi	**Minimum compressor speed (in percentage):** (0 to PMA)
PMA	**Maximum compressor speed (in percentage):** (PMi to 100%)
voS	**Signal output variation (increment) when temperature is increasing:** (1 to 100 Hz/min)
vo2	**Signal output variation (decrement) when temperature is decreasing:** (0 to 100 Hz/min)
vo3	**Signal output variation (decrement) after any Pull Down:** (0 to 100 Hz/min)
t1F	**Time with compressor at PMI before stopping regulation:** (0 to 999 min)
SPi	**Compressor speed (in percentage) in case of any error probe:** (Pmi to PMA)
CMn	**Continuous mode during Normal Mode:** (n; Y)
CME	**Continuous mode during Energy Saving Mode:** (n; Y)

The value of the par **HY1** can normally be set to the same value of par. **HY**. In this way, the regulation band will be extended from **SET** to **SET+HY+HY1**. The device will activate the regulation when the measured temperature will go over the **SET+HY** value and will stop the regulation when the temperature will reach the **SET** value. When the regulation is running, the frequency output, and then the compressor speed, will be calculated in proportional way by using the **PMi…PMA** band. After reaching the **SET+HY** value, the controller will start increasing the frequency output, and then the equivalent compressor speed, by using the par. **voS**. The speed increasing will be stopped as soon as the proportional calculated value (for the compressor speed) hooks the requested value. In case of temperature decrement and compressor speed higher than the new requested value, the controller will decrease the compressor speed proportionally by using the **vo2** value. After any Pull Down, and in case of continuous mode regulation (**CMn** or **CME=Y**) it is possible to speed up the compressor speed decrement by using par. **vo3**. This helps to avoid subfreezing conditions due to high compressor speed after reaching the regulation setpoint.
After reaching the **SET** value it is possible to force the compressor speed to **Pmi** for **t1F** min.
I case of regulation probe error, the compressor speed will be set to the value of par. **SPi**.
It is possible to enable a cyclic or a continuous mode operation both during normal mode or energy saving mode:
- **CMn, CME = Y**: after reaching the SETPOINT the VSC will keep on running
- **CMn, CME = n**: after reaching the SETPOINT the VSC will be stopped (after **t1F**)

6.4 TEMPERATURE DEADLOCK CONTROL

The controller is able to detect temperature deadlocks. If the actual speed is not able to reach the SETPOINT, and if this condition persists for a long interval of time, then the controller will increment the actual speed until reaching the SETPOINT. A differential (par. **th1**) and a speed increment (par. **oFS**) is used to detect and manage any deadlock condition.

6.5 HOT GAS DEFROST

In case of using hot-gas defrost, it will be possible to set the compressor speed by using par. **Aod**.

6.6 PULL DOWN

An automatic function named PULL DOWN is implemented. This function forces the controller to work at **PMA** until reaching a specific SETPOINT (par. **CCS**) for a maximum interval of time (par. **CCt**). The PULL DOWN function is activated:
- At start-up if the temperature measured from the regulation probe is higher than the **SET+HY+HY1**
- After any defrost
- If the temperature measured from regulation probe go over the **SET+HY+HY1+oHt** value.

If one of the above conditions happens, the controller will maintain the maximum compressor speed (**PMA**) until reaching the **CCS** setpoint. The maximum interval of time for any PULLDOWN is defined from par. **CCt**. At the end of any PULL DOWN it is possible to set an interval of time (par. **t1F**) with predefined compressor speed (**PMi**).

6.7 OIL MIGRATION CONTROL (VALID ONLY FOR VSC)

In order to avoid oil migration during variable speed compressor operation, a lubrication control is implemented. If the compressor works with a speed lower than the **MnP** threshold for **tMi** time, then the compressor speed will be increased to **PMA** for **tMA** time.

7 SPECIAL FUNCTIONS

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

7.1 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.

7.2 SECOND COMPRESSOR MANAGEMENT (OA4 = CP2)

By setting one of the parameters **oA4=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).

7.3 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.

7.4 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

7.5 ANTI-SWEAT HEATER (OAX=TIM)

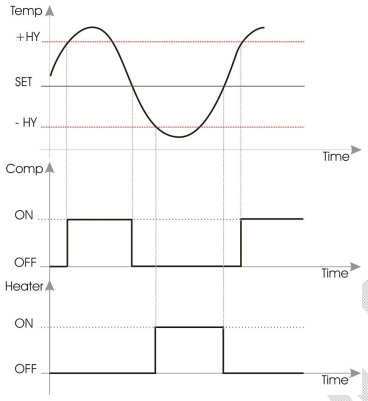
If **oAx=tiM,** the correspondent relay will be able to work as Anti-Sweat Heater output.
The relay will work based on the parameters **btA** (base time setting: seconds or minutes), **AtF** (output OFF time) and **Ato** (output ON time) with the following logic: the relay output will cycle (starting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

7.6 ENERGY SAVING TIMEOUT

If the Energy Saving function has been activate 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.

7.7 NEUTRAL ZONE (OAX=DB)

By setting **oAx=db** the controller will perform a "neutral zone" 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.



8 KEYBOARDS

Depending on the type of keyboard, some special function could be linked to predetermined buttons. Follow here below some examples.

8.1 CH620 OR CX620 KEYBOARD

8.2 T620T OR T620H KEYBOARD

SET — To display and modify target set point; in programming mode it selects a parameter or confirm an operation. By holding it pressed for 3 sec when max or min temperature is displayed it will be erased.

(**UP**) To see the max stored temperature; in programming mode it browses the parameter codes or increases the displayed value.

(**DOWN**) To see the min stored temperature; in programming mode it browses the parameter codes or decreases the displayed value.

(**DEF**) By holding it pressed for 3 sec the defrost is started.

(**LIG**) Switch ON and OFF the cold room light.

(**ONOFF**) Switch ON and OFF the instrument.

KEY COMBINATIONS

+ To lock and unlock the keyboard.

SET + To enter the programming mode.

SET + To exit the programming mode.

8.3 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 relay on (CX/CH620 only)
°C/°F	ON	Measurement unit (CX/CH620 only)

9 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).

9.1 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.

9.2 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.

9.3 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.

9.4 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 memorise the new set point value push the **SET** key again or wait for 10 sec.

9.5 TO START A MANUAL DEFROST

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

9.6 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".

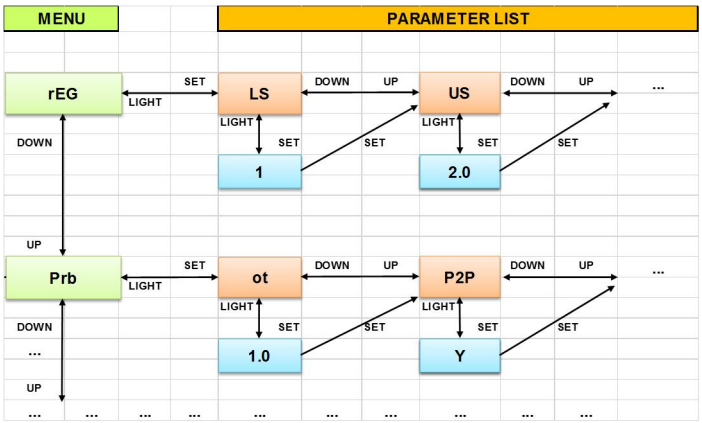
N.B. During the OFF status the Light and AUX buttons are active.

9.7 TO SEE THE PROBE VALUES

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

10 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.



10.1 HOW TO ENTER PARAMETER MENUS UNDER "PR1" LEVEL

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

10.2 HOW TO ENTER PARAMETERS MENUS UNDER "PR2" LEVEL

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

10.2.1 ENTERING THE PARAMETER MENU UNDER PR2 LEVEL

1. Enter the Programming mode by pressing the **SET+DOWN** keys for 3 sec: the label of the first menu available in Pr1 will be displayed (for example: rEG)
2. Release the keys and then push again the **SET+DOWN** keys more than 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** keys, the first parameter menu available will be displayed (for example: rEG)
   NOW THE PARAMETER MENU PR2 IS AVAILABLE FOR 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** keys pushed till the "**Pr2**" message will be displayed.

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

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

10.2.3 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 in order 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 key.
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)

10.3 KEYBOARD CONTROL

DOWN + UP

1. Keep the **UP** and **DOWN** keys pressed together for more than 3 sec the **UP** and **DOWN** keys.
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 the **UP** and **DOWN** keys pressed together for more than 3 sec.

11 PARAMETER LIST

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

rEG	**Regulation menu:** to set regulation band
Prb	**Real time clock menu (only for controller with RTC):** to set the time and date and defrost start time.
vSC	**Variable Speed Compressors menu:** to set the VSC functional parameters
diS	**Display menu:** to set the visualization rules
dEF	**Defrost menu:** to set the defrost operational mode
FAn	**Ventilator menu:** to set the ventilator control mode
AUS	**Auxiliary menu:** to set the auxiliary output mode
dYn	**Dynamic Set Point:** used to modify the condenser fan regulator output
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 value:** (-55°C to SET; -67°F to SET) sets the minimum value for the set point.
US	**Maximum set point value:** (SET to 150°C; SET to 302°F) set the maximum value for set point.
HY	**Differential for normal regulation:** (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 of time set in the parameter.
AC	**Compressor anti-short cycle delay:** (0 to 50min) minimum interval between the compressor stop and the following restart.
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:** (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.
Cdd	**Compressor used during a defrost phase:** (CP1; CP2; 2C) which compressor will be used during a defrost operation. CP1=only compressor 1; CP2=only compressor 2; 2C=both compressors.
rtr	**P1 and P2 percentage value 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:** (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	**Probe type selection:** ntC; PtC
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

VARIABLE SPEED COMPRESSOR MENU - vSC

HY1	**Differential for proportional regulation:** (0.1 to 25.5°C; 1 to 45°F) differential for proportional regulation band
Fr0	**Frequency output value with compressor stopped:** (0 to 50Hz) frequency output signal when compressor stopped
PMi	**Minimum compressor speed (in percentage):** (0 to PMA) minimum compressor speed for proportional regulation
PMA	**Maximum compressor speed (in percentage):** (PMi to 100%) maximum compressor speed for proportional regulation
vdC	**Type of variable speed compressor:** (nu; FrE; VC1; VC2) **nu** = no variable speed compressor connected; **FrE** = frequency command; **VC1** = Embraco VNEK/U type; **VC2** = do not use it
voS	**Signal output variation (increment) when temperature is increasing:** (1 to 100Hz)
vo2	**Signal output variation (decrement) when temperature is decreasing:** (0 to 100Hz)
vo3	**Signal output variation (decrement) after any Pull Down:** (0 to 100Hz)
PdP	**Compressor speed (in percentage) during a Pull Down:** (0 to 100%)
t1F	**Time with compressor at PMi before stop:** (0 to 255 min) interval of time with compressor speed at PMi before stopping the regulation
SPi	**Compressor speed (in percentage) in case of any probe error:** (PMi to PMA) fixed value for compressor velocity when error probe is active
Aod	**Compressor speed (in percentage) during any defrost:** (0 to 100%) fixed value for compressor velocity during any defrost
AoF	**Compressor speed during a pre-defrost phase:** (0 to 100%) fixed value for compressor velocity during any pre-defrost phase (par. **StC**)
tH1	**Differential for deadlock control:** (0.1 to 1.0°C) differential for deadlock control

oFS	**Speed increment during deadlock condition:** (1 to 10Hz) increment for compressor velocity during any deadlock condition
CMn	**Continuous mode during normal mode:** (n; Y) n=the compressor will be stopped after reaching the SETPOINT. Y=the compressor will keep on running after reaching the SETPOINT.
CME	**Continuous mode during energy saving mode:** (n; Y) n=the compressor will be stopped after reaching the SETPOINT. Y=the compressor will keep on running after reaching the SETPOINT.
MnP	**Minimum compressor speed for lubrication control activation (valid only for VSC):** (0 to 100%) threshold value used to activate the lubrication function
tMi	**Compressor running time below the MnP threshold:** (0 to 24h00min) interval of time with compressor velocity below MnP before activating the lubrication function
tMA	**Interval of time with compressor a PMA during lubrication control:** (0 to 255 sec) interval of time with compressor velocity a PMA
A00	**Number of serial controlled compressors:** (0 to 2) how many variable speed compressors controlled via serial mode. 0 = none; 1=1 VSC; 2=do not use it.

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 display.
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; ond) **rtC** = real time clock control; **in** = interval of time control
tdF	**Defrost type:** (EL; in) **EL** = electrical heater; **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
dtE	**Defrost end temperature:** (-55 to 50°C; -67 to 122°F) (enabled only when **EdF=Pb**) sets the temperature measured by the evaporator probe, which causes the end of defrost.
idF	**Interval between two consecutive defrost cycles:** (0 to 120hours) determines the interval of time between two defrost cycles.
MdF	**Maximum length for any defrost:** (0 to 255min) when **P2P = nP**, (not evaporator probe: timed defrost) it sets the defrost duration. When **P2P** 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 hot-gas defrost operation:** (0 to 30 min) is used stop the compressor when a defrost is managed for inversion (hot-gas).
dFd	**Displaying during defrost:** (rt; it; SEt; dEF) **rt** = real temperature; **it** = temperature at defrost start; **SEt** = set point; **dEF** = "**dEF**" label.
dAd	**Delay for display temperature updating 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	**Driping 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.
dPo	**Defrost after power-on:** (n; Y) **n** = after the **idF** time, **Y** = immediately.
dAF	**Delay before activating the defrost output (used only if tdF=in):** (0 to StC) used to delay the activation of the defrost output.
Syd	**Type of synchronized defrost:** (nu; Syn; rnd) nu=not used; Syn=do not use it; rnd=random defrost function
ndE	**Number of devices for random defrost (Syd=rnd):** (1 to 20) used to determinate the number of appliances with random defrost function active

VENTILATORI FAN MENU - FAn

FAP	**Probe selection for evaporator fan management:** (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:** (0.1 to 25.5 °C; 1 to 45°F) differential used for evaporator fan regulator
FnC	**Evaporator fan operating mode:** (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.
Ft	**Evaporator fan controlled during defrost:** (no; Yes) **no** = fan stopped during defrost; **Yes** = fan controlled during any defrost
Fon	**Evaporator fan ON time (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 time (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.
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	**Regulation Set Point for condenser fan:** (-100 to 200 °C; -148 to 302°F) set point used for condenser fan regulator
HY2	**Differential for condenser fan:** (0.1 to 25.5°C; 1 to 45°F) differential used for condenser fan regulator
FCC	**Condenser 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

AUXILIARY MENU – AUS

ACH	**Kind of action for Auxiliary regulator:** (CL; Ht) **CL** = cooling; **Ht**= heating
SAA	**Set point for auxiliary regulator:** (-100 to 200 °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
A2C	**Kind of action for Auxiliary regulator 2:** (CL; Ht) **CL** = cooling; **Ht**= heating
SA2	**Set point for auxiliary regulator 2:** (-100 to 200 °C; -148 to 302°F) set point used for auxiliary regulator 2
SH2	**Differential for auxiliary regulator 2:** (0.1 to 25.5°C; 1 to 45°F) differential used for auxiliary regulator 2
Ar2	**Probe selection for auxiliary regulator 2:** (nP; P1; P2; P3; P4) **nP** = no probe, regulator disabled; **P1** = thermostat probe; **P2** = Second probe; **P3** =Third probe; **P4** = Fourth probe
Sd2	**Auxiliary regulator 2 disabled during any defrost:** (n; Y) n = enabled; Y = disabled
btA	**Base time for parameter Ato and AtF:** (Min; SEC) **Min**=base time is in minutes; **SEC**=base time is in seconds
Ato	**Interval of time with auxiliary output active:** 0 to 255
AtF	**Interval of time with auxiliary output not active:** 0 to 255
1An	**Kind of analogue output 1:** (VLt; Cur) VLt = 0-10Vdc; Cur=4-20mA
1oL	**Minimum value for analogue output 1 (in percentage):** (0 to 100%) output value at the beginning of the scale
1oH	**Maximum value for analogue output 1 (in percentage):** (0 to 100%) output value at the end of the scale
1At	**Start-up time with analogue output 1 at 100%:** (0 to 255 sec) analogue output will be forced at 100% for this interval of time after any power-on
2An	**Kind of analogue output 2:** (VLt; Cur) VLt = 0-10Vdc; Cur=4-20mA
2oL	**Minimum value for analogue output 2 (in percentage):** (0 to 100%) output value at the beginning of the scale
2oH	**Maximum value for analogue output 2 (in percentage):** (0 to 100%) output value at the end of the scale
2At	**Start-up time with analogue output 2 at 100%:** (0 to 255 sec) analogue output will be forced at 100% for this interval of time after any power-on

DYNAMIC SET POINT – dYn

dSi	**Reference probe for dynamic set point function:** (nP; P1; P2; P3; P4) **nP** = no probe, regulator disabled; **P1** = thermostat probe; **P2** = Second probe; **P3** =Third probe; **P4** = Fourth probe
dSS	**Regulation set point for dynamic set point function:** (-100 to 200 °C; -148 to 302°F) regulation set point used
dSb	**Regulation band for dynamic set point:** (-50 to +50°C; -58 to 122°F) band of action for dynamic set point
dSH	**Differential for dynamic set point:** (-50 to 50°C; -100 to 100°F) differential used

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**: [-55°C to ALU; -67 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	**Temperature alarm recovery differential:** (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 is open:** (0 to 255 min) delay before activating the door open alarm
dAo	**Temperature alarm delay at power-on:** (0.0 to 24h00min, res. 10min) time interval between the detection of the temperature alarm condition after instrument power on and alarm signaling.
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:** (-55 to 150°C; -67 to 302°F) when this temperature is reached the **LA2** alarm is signaled, possibly after the Ad2 delay.
Au2	**Second high temperature alarm:** (-55 to 150°C; -67 to 302°F) when this temperature is reached the **HA2** alarm is signaled, possibly after the **Ad2** delay.
AH2	**Second temperature alarm recovery differential:** 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 1 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**=not used; **db**=neutral zone; **CP1, CP2**=do not select it; **dF2**=do not select it; **HES**=night blinds; **Het**=do not select it; **inV**=inverter output; **tiM**=timed mode activation; **Cnd**=condenser fan
oA2 (16-17)	**Relay 2 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**=not used; **db**=neutral zone; **CP1, CP2**=do not select it; **dF2**=do not select it; **HES**=night blinds; **Het**=do not select it; **inV**=inverter output; **tiM**=timed mode activation; **Cnd**=condenser fan
oA3 (18-19)	**Relay 3 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**=not used; **db**=neutral zone; **CP1, CP2**=do not select it; **dF2**=do not select it; **HES**=night blinds; **Het**=do not select it; **inV**=inverter output; **tiM**=timed mode activation; **Cnd**=condenser fan
oA4 (22-23)	**Relay 4 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**=not used; **db**=neutral zone; **CP1, CP2**=do not select it; **dF2**=do not select it; **HES**=night blinds; **Het**=do not select it; **inV**=inverter output; **tiM**=timed mode activation; **Cnd**=condenser fan
oA5 (29-30-31)	**Relay 4 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**=not used; **db**=neutral zone; **CP1, CP2**=do not select it; **dF2**=do not select it; **HES**=night blinds; **Het**=do not select it; **inV**=inverter output; **tiM**=timed mode activation; **Cnd**=condenser fan
1Ao	**Analogue output 1 (4-20mA; 0-10Vdc):** (nu, tiM, FAn, AUS, ALr, Cnd) **nu** = not used, regulator disabled; **tiM** = timed mode; **FAn** = linked to the evaporator fan regulator; **ALr** = linked to any alarm condition; **Cnd** = linked to the condenser fan regulator
2Ao	**Analogue output 2 (4-20mA; 0-10Vdc):** (nu, tiM, FAn, AUS, ALr, Cnd) **nu** = not used, regulator disabled; **tiM** = timed mode; **FAn** = linked to the evaporator fan regulator; **ALr** = linked to any alarm condition; **Cnd** = linked to the condenser fan regulator
3Ao	**Analogue output 3 (PWM):** (nu; FrE; ALr) **nu** = not used, regulator disabled; **FrE** = frequency output for variable speed compressors; **ALr** = linked to any alarm condition
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) **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.
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) **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.
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:** (-30.0 to 30.0°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

REAL TIME CLOCK MENU - rtC

Hur	**Hour:** 0 to 23h
Min	**Minute:** 0 to 59min
dAY	**Day of the week:** Sun to Sat
dYM	**Day of the month:** 0 to 31
Mon	**Month:** 1 to 12
YAr	**Year:** 00 to 99
Hd1	**First day of the weekend:** (Sun to Sat; nu) set the first day of the week which follows the holiday times.
Hd2	**Second day of the weekend:** (Sun to Sat; nu) set the second day of the week which follows the holiday times.
iLE	**Working day 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 day 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.
dd1...dd6	**Daily defrost enabled:** (n; Y) to enable the **Ld1...Ld6** defrost operations for any day of the week.
Ld1...Ld6	**Daily defrost start:** (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.

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:** (1 to 247) identifies the instrument address when connected to a Modbus compatible monitoring system.
onC	**On/Off key enabling:** (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**

12 DIGITAL INPUT

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

12.1 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.

12.2 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.

12.3 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.

12.4 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.**

12.5 START DEFROST (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.

12.6 KIND OF ACTION: HEATING OR COOLING (HTR)

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

12.7 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.

12.8 EVAPORATOR FAN CONTROL (FAN)

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

12.9 HOLIDAY MODE (HDF)

Holiday mode activation.

12.10 REMOTE LIGHT CONTROL (LHT)

To manage the light activation from remote.

12.11 REMOTE ON OFF (ONF)

To issue a remote ON/OFF command.

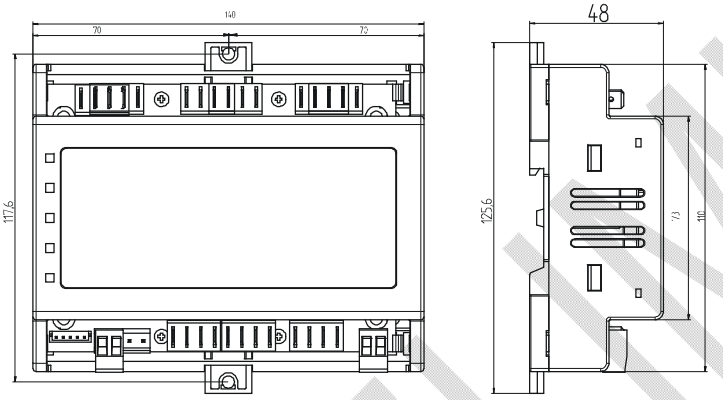
12.12 DIGITAL INPUTS POLARITY

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

13 INSTALLATION AND MOUNTING

T620 keyboard shall be mounted on vertical panel, in a 150x31 mm hole, and fixed using two screws ∅ 3 x 2mm. To obtain an IP65 protection grade use the front panel rubber gasket (mod. RG-L).
VX620 keyboard shall be mounted on vertical panel, in a 72x56 mm hole, and fixed using two screws ∅ 3 x 2mm. To obtain an IP65 protection grade use the front panel rubber gasket (mod. RGW-V).
CX/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.
It must be connected to the keyboard by means of a two-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 circulate by the cooling holes.

13.1 XWi70K – 8 DIN CASE - DIMENSIONS



14 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 have to 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 on each relay, in case of heavier loads use a suitable external relay.
NOTE: the maximum current allowed for all the loads is 16A.

14.1 PROBE CONNECTIONS

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 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**".

16 HOW TO: USE OF THE PROGRAMMING "HOT KEY"

16.1 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.

16.2 PROGRAM AN INSTRUMENT BY USING A HOT-KEY (DOWNLOAD)

1. Turn OFF the instrument.
2. Insert a **pre-programmed** "**HOT-KEY**" **into the 5-PIN receptacle** 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.

17 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.

17.1 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.

17.2 "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.

17.3 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.

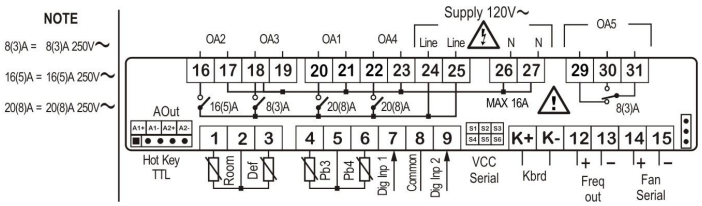
18 Technical data

Keyboards
Housing: self-extinguishing ABS
Case: CX/CH620 dimension 32x74 mm; depth 23mm
Mounting: CX/CH620: panel mounting in a 29x71 mm hole, and fixed using the special bracket
Protection: IP20; **Frontal protection:** IP65 with frontal gasket
Connections: Screw terminal block ≤ 2.5 mm²
Power supply: from **XWi70K** power module
Display: 3 digits, red LED, 14.2 mm high
Optional output: buzzer

Power module XWi70K
Case: 8 DIN: 140x176x148
Connections: Screw terminal block ≤ 2.5 mm² heat-resistant wiring and 6.3mm Plug-in type
Power supply: 230Vac or. 110Vac ± 10% or 24Vac
Power absorption: 10VA max
Temperature probe inputs: 4 NTC or PTC probes
Digital inputs: 2 free voltage contacts
Relay outputs: ***Total current on loads MAX. 16A***
Compressor/Valve: relay SPST 20(8) A, 250Vac
Fan: relay SPST 8(3) A, 250Vac
Defrost: relay SPST 20(8) A, 250Vac
Light: relay SPST 16(5) A, 250Vac
Alarm: relay SPDT 7(2) A, 250Vac
Serial output: TTL standard
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 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 probe: -40 to 110°C (-58 to 230°F); **PTC probe:** -50 to 150°C (-58 to 302°F)
Resolution: 0.1°C or 1°C or 1°F (selectable); **Accuracy (ambient temp. 25°C):** ±0.5°C ±1 digit

19 CONNECTIONS

19.1 XWi70K



20 Default setting values

TBD

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