



BRILLIANT SERIES

TN VENTILATED

User manual



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1. INTRODUCTION

1.1. PRESENTATION

Dear customer,

Ciam spa, glad to have among its customers, confident that you purchased the equipment fully meets your expectations. For this to happen it is advisable to follow the advice and instructions contained in this user's manual that you should always keep it safe for future reference.

1.2. USE OF EQUIPMENT

PERMITTED USED

This refrigeration unit is used exclusively for the exhibition and sale of confectionery products.

NOT PERMITTED USED

It's absolutely forbidden to use the equipment for storage of pharmaceutical products.

1.3. NORME RISPETTATE

The device is designed in meeting the safety standards laid down by the applicable directives:

Direttiva Macchine N° 2006/42/CE	: Regulations for the CE
Direttiva N° 2006/95/CE	: lowt tension
Direttiva N° 2004/108/CE	: electromagnetic compatibility
Norma CEI EN 60335-1 (CEI 61-150)	: Safety of household and similar electrical
Norma CEI EN 60335-2-24 (CEI 61-56)	: Particular requirements for refrigerators, freezers and ice makers

1.4. RESPONSABILITY

The manufacturer declines all responsibility for damage caused to persons, animals or the product itself due to:

- non-compliance with the rules in force;
- installation not in accordance with the provisions contained in the manual;
- failure to comply with maintenance recommended in the manual;
- extraordinary changes do not agree with the 'manufacturer;
- Operation of this equipment other than that provided.

1.5. WARNING

The manufacturer reserves the right, at any time and without obligation to promptly update the contents of the manual and / or modify the product in case it contributes to the improvement of the quality of the same.

2. DISPLAY CASE DATA PLATE

2.1. DATA PLATE CONTENT

Design & Tecnologia su misura 			
Model 1		Production Date	
Serial No. 2		3	
 4 V/ 5 ph / 6 Hz		14 W/A	
 Type 7		 15 W	
No. 8		 16 W	
Gas 9	10 Kg	Cl. 11	 17 W
Pmax 12 psig		Pmin 13 psig	

1. Commercial name of the unit

2. Identification number

3. Production date

4. Voltage

5. Phases

6. Frequency

7. Compressor type

8. Number of compressor

9. Refrigerant type

10. Refrigerant weight

11. Climatic rate (Cl.3 = +25°C/60% U.R.; Cl. 4 = +30°C/55% U.R.)

12. Test pressure – system high pressure side

13. Test pressure – system low pressure side

14. Nominal power/current absorbed during defrost

15. Max. power absorbed during defrost

16. Nominal power absorbed by heating elements (only if higher than 100W)

17. Lighting nominal power

2. TECHNICAL DATA

External dimension (LxWxH) (mm)		1390x686x2415
Type of display shelves		Glass tempered 477x1250mm thickness 10 mm
Number of shelves		8
Capacità netta di ogni ripiano (Kg)		15 kg regulary distributed
Prestazioni	Climatic class (°C/%U.R.)	3 - (+25° / 60%)
	Class Temperature	H2 (-1 ÷ +10)
	Temperatura di esercizio (°C)	+4÷ +15
Electric supplied (V/ph/Hz)		230 / 1 / 50 or 60
Type of refrigeration		ventilated
Type of defrost		Stop compressor
Refrigerant		R 404A
Illumination	Type	Led 4100°K 12V 9Watt/meter
	N°	4
Condensing unit	Type	Hermetic single-phase
	N°	1
Power/current absorbed (W/A)		350 / 1.5 (without U.C.)
Closing refrigerated compartment		Doors with double glass

3. INSTALLATION

3.1. MACHINE HANDLING

- The movement, the means of transport to the final site, must be carried out **following the instructions provided in the Appendix.**
- The cabinet can be shipped with or without wood packaging, in case wood crate will be used, will have a pallet base for an easy fork-lift handling. The pallet, however should be handle in the central position
- During the shipment, it is necessary to avoid any crash or/and shake of the display cabinet in order to not damage its frame, especially its glasses.
- Do not drag the display cabinet on the floor and do not push it on the upper glasses.

3.2 STOCK OF THE DISPLAY CABINET

- Whenever the cabinet has to be stoked, follow carefully what suggested before.
- Environmental temperature during the cabinet stock can have following range -15°C and + 55°C and humidity between 30% and 90%.
- The display cabinet has always to be protected by sunrays and raining.
- In case the display cabinet has to remain in stock quite long time before its use, keep it with its packaging in order to maintain its protection.

3.3. PACKAGING REMOVE

Before getting the display cabinet from the forwarding agent, check its conditions. In case it will be some damages, inform the driver and sign it on shipping documents. **Eventual damages relevant to the shipment and/or to the wrong stock, have not to be ascribed to the manufacturer.**

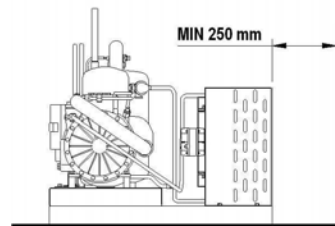
3.4. DISPLAY CABINET POSITION

The refrigerated display cabinet needs particular environmental conditions in order to offer the right performance, so that the area where it will be used has to respect following indications

- Floor has to be levelled perfectly, on the contrary keep the display cabinet on the horizontal position in order to guarantee a perfect defrosting water drain and avoid boring compressor noises.
- The display cabinet has to not be under the sun-rays in order to have its better refrigeration performance, has to remain inside the local or to be sheltered by window curtain. If what described above is not observed, it can determinate an increase of temperature of displayed product and an increasing power consume.
- The display cabinet has not to be under air currents due to open doors or windows, or under roof ventilators or under air condition outlets. In case will be not respected the above suggestions it can arise an increasing of temperature of the displayed product and/or an increasing ice phenomena on the evaporator and internal fans, which compromise the correct cold air circulation and product consistence
- The display cabinet has not to be placed close any heat source as heaters, ovens, etc
- The display cabinet has to have a sufficient place in order to ensure a correct custom service, to make an easy maintenance operation, to guarantee the right air flow necessary to make cold the condenser. Besides the warm air which flows out has to no have any obstacle or to invest other equipments in order to not reduce the correct functions.

3.5. REMOTE CONDENSING UNIT PLACING

- According to the model of ice cream display cabinet you have No.1 or No.2 internal, or remote, condensing units.
- The remote condensing unit has to be checked by specialised technicians and according to the required refrigerating power and their position respect the cabinet. The condensing unit has to be placed following these points:
 - The condensing unit has to be located at least 250 mm from any eventual wall. (pic.3.1)
 - Air flow direction has to be from the eventual wall towards compressor.
 - The local, in case will be closed, has to be with enough air circulation.
 - By the condenser has to be guaranteed in any case as much as possible cold air.
 - In case will be necessary it has to be foreseen a forced air exchange by any fan according to the air flow of condenser.
 - The condensing units of display cabinets have to be fixed properly.
 - The generated noise has not exceed the admitted noise levels relevant to the public places, especially in case of domestic buildings.
 - It is always necessary a sufficient place along the four sides of the display cabinet in order to make easy any type of check and maintenance operations.
 - When the condensing units are external will be necessary a frame holder that has to be fixed in a proper way and eventually added with amortising elements. Besides this frame has to be closet with no-water protection grid and sufficient opening holes for ventilation.



pic.3.1

36 ELECTRICAL CONNECTION

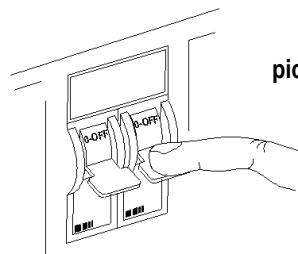
- Before proceeding with electrical connection, be sure that the available electric power and tension are what is required on technical label of the cabinet.
- The electric connection has to be made by qualified personnel and following manufacturer's instructions taking into consideration the relevant norms in force.
- The display cabinet has already a general switch, however it is necessary an omni polar switch, with a minimum distance among the contacts of 3mm.
- It is obligatory that the display cabinet will be connected properly with an efficient ground socket.

WARNING! A wrong connection may occur always to persons, animals and things, where the manufacturer cannot be considered as responsible.

WARNING!

The display cabinet has no main switch breaking both the phases.

Before any maintenance operation disconnect the electrical supply of the display cabinet (see label on the rear of the display cabinet). (pic.3.3).



pic.3.3

CORRETTA MOVIMENTAZIONE DEL BRILLIANT.
BRILLIANT PROPER HANDLING AND TRANSPORT.

1

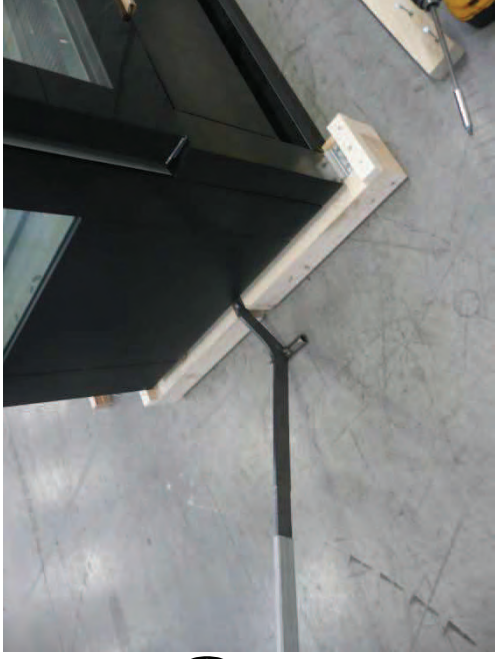


4



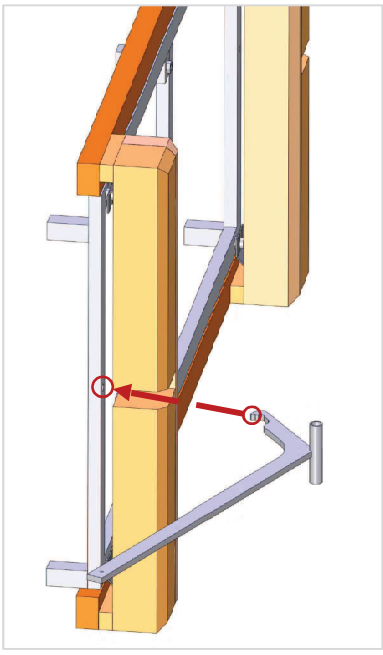
SVITARE IL LISTELLO DI LEGNO FRONTALE E POSTERIORE.

5



RIMUOVERE LE SQUADRETTE DI ANCORAGGIO DEI PIEDINI.

2



6



REMOVE THE LEGS ANCHORING BRACKETS.

AGENDO SULLA LEVA SOLLEVARE LENTAMENTE IL BRILLIANT MENTRE UN SECONDO OPERATORE RIMUOVE LA ZOCCA DI LEGNO. RIABBASSARE INFINE ADAGIO FINCHÈ I PIEDINI NON POGGIANO A TERRA.

USING THE LEVER RAISE SLOWLY THE BRILLIANT WHILE A SECOND OPERATOR REMOVES THE WOODEN SUPPORT. FINALLY, PUT DOWN SLOWLY UNTIL THE FEET DO NOT TOUCH THE GROUND.

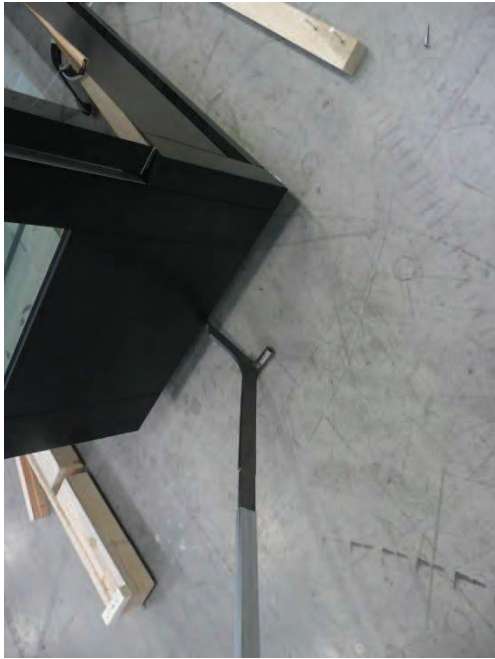
3



INSERIRE LA LEVA NELLO SPAZIO TRA LE ZOCHE INCASTRANDO BENE IL PERNO ALL'ESTREMITÀ DELLA LEVA DENTRO AL FORO PRESENTE SOTTO IL BASAMENTO DEL BRILLIANT . SI CONSIGLIA DI SISTEMARE AL DI SOTTO DELLA LEVA LA LAMINA D'ACCIAIO IN DOTAZIONE PER PROTEGGERE LA PAVIMENTAZIONE.

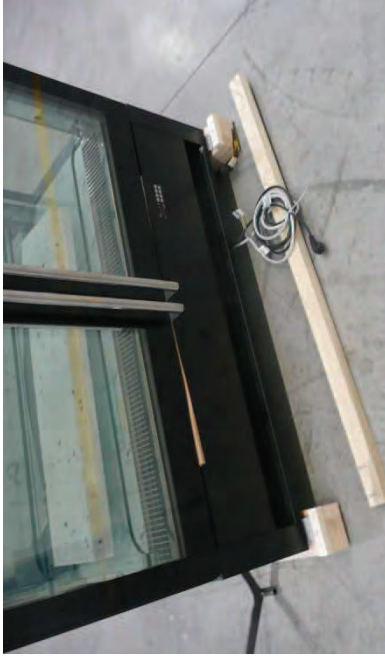
INSERT THE IRON LEVER IN THE SPACE BETWEEN THE WOODEN FITTING THE PIVOT AT THE END OF THE LEVER INTO THE HOLE IN THE BASE OF THE BRILLIANT. WE RECOMMEND THAT YOU PLACE UNDER THE LEVER THE SUPPLIED STEEL PLATE TO PROTECT THE FLOORING.

7



8

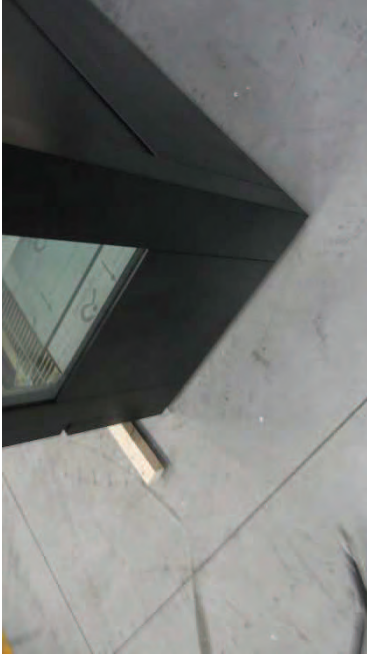
REMOVE THE LISTEL FROM THE FRONT AND BEHIND.



9



10



IL BRILLIANT È COSÌ DISIMBALLATO.
THE BRILLIANT IS READY.

11

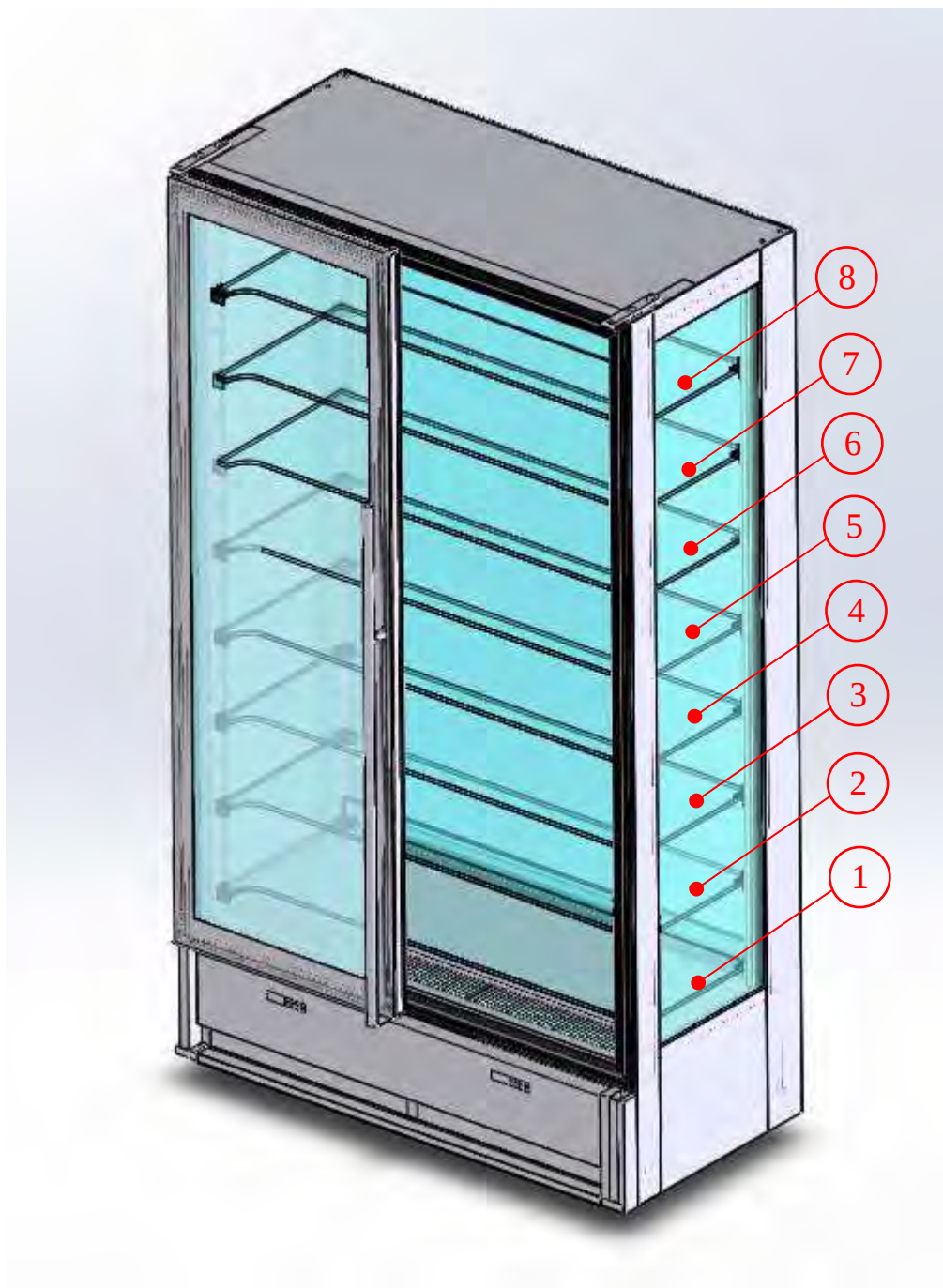


PROCEDERE ALLO STESSO MODO SULL'ALTRO FIANCO.
PROCEED IN THE SAME WAY ON THE OTHER SIDE.

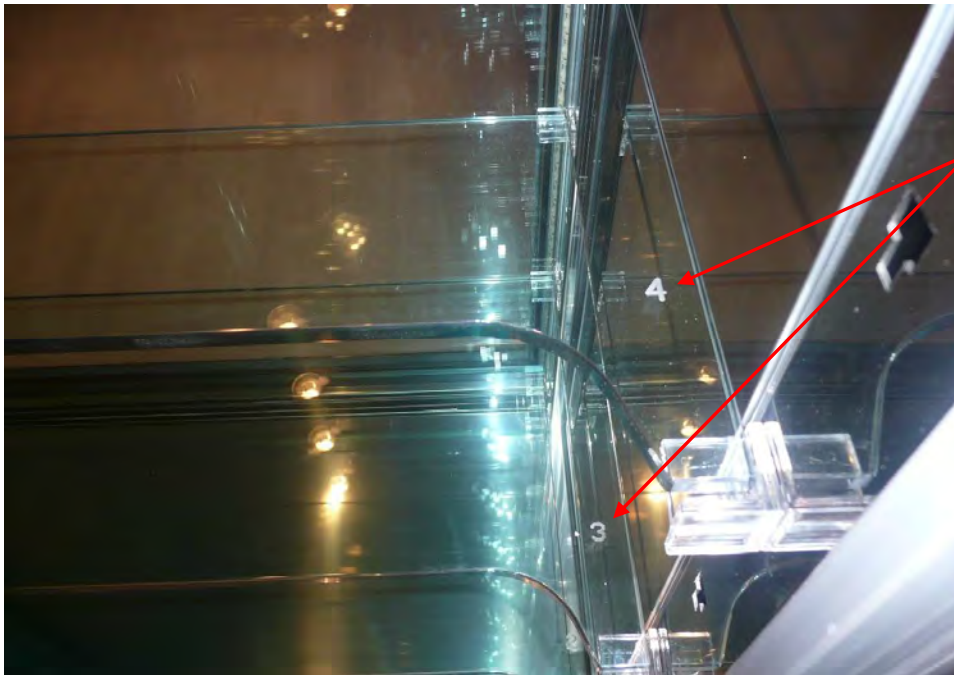
4. LOAD LIMITS AND NOTES TO THE CORRECT FUNCTIONING

4.1 SHELVES POSITION

WARNING! The glass shelves are numbered and must be placed inside the refrigerated criterion, only in this way you can ensure proper cooling inside the refrigerated compartment.



POSITION OF THE SHELVES



NUMBERS ENGRAVED ON
GLASS SHELF

NUMBERS ON THE SHELVES

4.2 LOAD LIMIT

Each glass shelf can be loaded with a maximum weight of 15kg, the weight should be distributed evenly over the surface of the floor.

Leave between a product and the other sufficient space for air circulation and also to facilitate the grip by the customer.

Also leave a space of at least 3cm between the upper limit of the displayed product and the shelf immediately above to allow a more facilitates air circulation above the product itself.

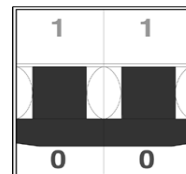
WARNING! The refrigerated cabinet is a fair distribution of the temperature when it is fully loaded (within the limits set by the load limits just mentioned).

In this case it will also be guaranteed a lower air exchange opening of the doors, with the consequent decrease in the percentage of compressor operation, and then with all the benefits associated.

5. ROUTINE MAINTENANCE AND PERIODIC CHECKS

- These kinds of operations are at client's expenses.
- In case some malfunctioning of the unit are observed, please make sure this is not due to non-maintenance reasons, before you apply to qualified assistance.
- The accurate and periodic cleaning of the unit will reduce the risk of damages to the unit itself and to the products stored within.
- See following tab for reference.

ATTENTION ! Before starting any maintenance and cleaning operation make sure you operate on the main switch in order to deactivate tension (**pic. 5**)



(pic 5)

MAINTENANCE OPERATIONS AND THEIR FREQUENCY. A SUMMARY TAB.

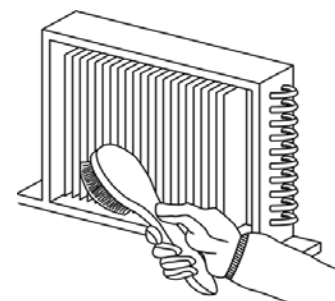
OPERATION	DESCRIPTION	FREQUENCY
Surfaces' cleaning	- Wash exclusively with warm water and neutral soap; rinse abundantly and wipe off with a soft cloth. - Do not use abrasive products	weekly
Plastic surfaces' cleaning	- Wash exclusively with warm water and neutral soap; rinse abundantly and wipe off with a soft cloth. - Do not use alcohol, acetone and any solvent that might spoil the look and structure of the material.	weekly
Glass surfaces' cleaning	- Use only specific products for glass cleaning - Using water alone might lead to calcareous deposits on the glass surfaces	daily
Wooden surfaces' cleaning	Use exclusively a wet cloth.	weekly
Additional defrost	- Under particular conditions of temperature and humidity, the frost that normally forms on the evaporator and fans might increase in volume, so leading to a faulty functioning the unit. - If these conditions should last, the assistance of a qualified technician shall be needed. Waiting for this service, it is suggested to operate one or more defrost cycles (despite the damages this might cause to the stored product)	Waiting for qualified assistance
Periodic defrost	- In order to obtain the best performance from the cooling system, we suggest to operate an extended defrost cycle. - Before you do that, please remove displayed products from inside the cabinet; always operate an additional defrost cycle in order to remove from the evaporator the largest possible amount of frost or ice. Turn the main switch off for 5 hours (min.) - Before re-starting the unit, make sure that frost has totally melted and wipe carefully.	max. 15 DAYS
ATTENTION! DO NOT CLEAN THE UNIT WITH WATER JETS		

6. EXTRAORDINARY MAINTENANCE

This type of operation has to be made by qualified technician only.

ATTENTION! Before operating any maintenance, make sure the tension is deactivated. (pic.11).

- Lamps' replacement: qualified technician needed.
- Air condenser cleaning: qualified technician needed. When the fan is switched off you can clean the condenser with a compressed air jet. Never use metallic brushes. Use protection gloves (**pic.6**).



(Pic.6.)

WING

XW270K - XW271K

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 "Dixel 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

Models **XW270K** and **XW271K** are microprocessor based controllers suitable for applications on medium or low temperature refrigerating units. They must be connected by means of a two-wire cable (Ø 1mm) at a distance of up to 30 meters to the keyboards **T820** or **T821**. They are provided with six relay outputs to control compressor, defrost - which can be either electrical or not gas - the evaporator fans, the lights, the alarm and an auxiliary output. In **XW271L**, the auxiliary output is configured as anti-condensing heater.

They are also provided with three NTC probe inputs, one for temperature control, one to control the defrost and temperature of the evaporator and the third, optional, for the display. There are two digital inputs (free contact) for the door switch and configurable by parameter.

The standard TTL output allows the user to connect, by means of a TTLRS485 external module, a ModBUS-RTU compatible monitoring system and to programme the parameter list with the "Hot Key". An optional output for **RS485** direct is available.

3. CONTROLLING LOADS

3.1 THE COMPRESSOR

The regulation is performed according to the temperature measured by the thermostat probe with a positive differential from the set point: if the temperature increases and reaches set point plus differential the compressor is started and then turned off when the temperature reaches the set point value again.

In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters 'CON' and 'COF'.

3.2 FAST FREEZING

When defrost is not in progress, it can be activated the keypad by holding the $\ominus$ key pressed for about 3 seconds. The compressor operates in continuous mode for the time set through the "CCF" parameter. The cycle can be terminated before the end of the set time using the same activation key, $\ominus$ for about 3 seconds.

3.3 DEFROST

Three defrost modes are available through the "IdF" parameter: defrost with electrical heater, hot gas or thermostatic defrost. The defrost interval is control by means of parameter **EdF** : (EdF=in) the defrost is made every "IdF" time, (EdF=Sd) the interval "IdF" is calculate through Smart Defrost algorithm (only when the compressor is ON and the evaporator temperature is bigger than "SdF" parameter). At the end of defrost the drip time is controlled through the "FdF" parameter.

3.4 CONTROL OF EVAPORATOR FANS

The fan control mode is selected by means of the "FnC" parameter:

- C_F = running with the compressor, OFF during the defrost;
- C_Y = running with the compressor, ON during the defrost;
- O_Y = continuous mode, OFF during the defrost;
- O_Y = continuous mode, ON during the defrost;

An additional parameter "FS" provides the setting of temperature, detected by the evaporator probe, above which the fans are always OFF. This can be used to make sure circulation of air only if its temperature is lower than set in "FS".

3.5 AUXILIARY OUTPUT

The auxiliary output is switch ON and OFF by means of the corresponding button on the keyboard.

The auxiliary output of the **XW271K** model controls the anti-condensing heater and it is automatically activated if the room temperature is lower than the "SAA" parameter.

4. KEYBOARD



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

To see the max. stored temperature; in programming mode it browses the parameter codes or increases the displayed value. By holding it pressed for 3s the fast freezing cycle is started.
To see the min stored temperature; in programming mode it browses the parameter codes or decreases the displayed value.

By holding it pressed for 3s the defrost is started.

Switch ON and OFF the cold room light.

By holding it pressed for 3s Energy Saving function is started or stopped.

Present in **T820** Keyboard (for connection to **XW270K**).
Switch ON and OFF the auxiliary output.

Present in **T821** Keyboard (for connection to **XW271K**).
Switch ON and OFF the anti-condensing heater output.

Switch ON and OFF the instrument.

KEY COMBINATIONS



To lock and unlock the keyboard.

To enter the programming mode.

To exit the programming mode.

4.1 USE OF LEADS

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	The Fast Freezing cycle is enabled
	ON	- ALARM signal - In "Pr2" indicates that the parameter is also present in "Pr1"
	ON	(Present only in T821 keyboard) The Anti-condensing heater relay (Aux) is ON.

Function of the LEDs placed on the left top side of buttons:

BUTTON	MODE	FUNCTION
SET	FLASHING	The Set point is displayed and it can be modified
DEFROST	ON	The Manual Defrost is activated
ENERGY SAVING	ON	The Energy Saving is enabled
LIGHT	ON	The Light is ON
AUX	ON	The Auxiliary output is ON (T820)
HEATER	ON	The Anti-condensing heater is ON (T821)
ON/OFF	ON	The instrument is OFF

Installing and Operating Instructions

4.12 TO SEE THE PROBE VALUES

- Enter in "Pr2" level.
- Select "Prd" parameter with $\ominus$ or Δ .
- Press the "SET" key to display "Pb1" label alternate with Pb1 value.
- Use $\ominus$ and Δ keys to display the other probe values.
- Press "SET" to move to the following parameter.

5. PARAMETER LIST

REGULATION
Hy Differential: (0.1÷25.5°C; 1÷45°F). Intervention differential for set point, always positive. Compressor Cut IN is Set Point Plus Differential (Hy). Compressor Cut OUT is when the temperature reaches the set point.
LS Minimum set point limit: (-50.0°C-SET; -58°F-SET) Sets the minimum acceptable value for the set point.
US Maximum set point limit: (SET+110°C; SET÷230°F) Set the maximum acceptable value for set point.
OdS Outputs activation delay at start up: (0÷255 min) This function is enabled at the initial start up of the instrument and inhibits any output activation for the period of time set in the parameter. (AUX and Light can work)
AC Anti-short cycle delay: (0÷30 min) Interval between the compressor stop and the following restart
CCt Thermostat override: (0min ÷23h 50min) allows to set the length of the continuous cycle. Can be used, for instance, when the room is filled with new products.
Con Compressor ON time with faulty probe: (0÷255 min) time during which the compressor is active in case of faulty thermostat probe. With CON=0 compressor is always OFF.
COF Compressor OFF time with faulty probe: (0÷255 min) time during which the compressor is off in case of faulty thermostat probe. With COF=0 compressor is always active.

DISPLAY
CF Temperature measurement unit: °C = Celsius; °F = Fahrenheit. When the measurement unit is changed the SET point and the values of the regulation parameters have to be modified
RES Resolution (for °C): (in = 1°C; de = 0.1°C) allows decimal point display. de = 0.1°C

Red Remote display : select which probe is displayed by the remote display (**T820** or **T821**)
P1 = Thermostat probe
P2 = Evaporator probe
P3 = auxiliary probe
1/2 = difference between P1 and P2 (P1-P2)

DEFROST
IdF Defrost type: F = electrical heater (Compressor OFF) RT = thermostatic defrost. During the defrost time "IdF", the heater switches On and OFF depending on the evaporator temperature and "dIE" value. In = hot gas (Compressor and defrost relays ON)
EdF Defrost mode: n = interval mode. The defrost starts when the time "IdF" is expired. Sd = Smartfrost mode. The time IdF (interval between defrosts) is increased only when the compressor is running (even non consecutively) and only if the evaporator temperature is less than the value in "SdF" (set point for SMARTFROST).

SdF Set point for SMARTFROST: (-30÷-30 °C/-22÷-86 °F) evaporator temperature which allows the IdF counting (interval between defrosts) in SMARTFROST mode.| |
| --- |
| dIE Defrost termination temperature: (-50.0÷-110.0°C; -58÷-230°F) (Enabled only when the evaporator probe is present) sets the temperature measured by the evaporator probe which causes the end of defrost. |
| IdF Interval between defrosts: (1÷120h) Determines the time interval between the beginning of two defrost cycles. |
| IddF (Maximum) duration of defrost: (0÷255 min) When P2P = n, no evaporator probe, it sets the defrost duration, when P2P = Y, defrost end based on temperature, it sets the maximum length for defrost. |

dFd Display during defrost:
rt = real temperature;
It = temperature reading at the defrost start;| SdF = set point; dEG = "dEG" label; |

dAd Defrost display time out: (0÷255 min) Sets the maximum time between the end of defrost and the restarting of the real room temperature display.| |
| --- |
| Fdt Drain down time: (0÷60 min.) time interval between reaching defrost termination temperature and the restoring of the control's normal operation. |

dPo First defrost after start-up:
Y = immediately;
n = after the IdF time| dAF Defrost delay after fast freezing: (0min÷23h 50min) after a Fast Freezing cycle, the first defrost will be delayed for this time. |

FANS
FnC Fan operating mode:
C=n = running with the compressor, OFF during the defrost;
C=y = running with the compressor, ON during the defrost;
O=n = continuous mode, OFF during the defrost;
O=y = continuous mode, ON during the defrost;
FnD Fan delay after defrost: (0÷255 min) The time interval between the defrost end and evaporator fans start.

FSt Fan stop temperature: (-50÷-110°C; -58÷-230°F) setting of temperature, detected by evaporator probe, above which the fan is always OFF.

ALARMS

ALC Temperature alarm configuration
rE = High and Low alarms related to Set Point
Ab = High and low alarms related to the absolute temperature.
High temperature alarm setting:
ALC= IE, 0 ÷ 50°C or 90°F
ALC= AE, ALL ÷ 110°C or 230°F
when this temperature is reached and after the ALd delay time the HA alarm is enabled.

ALL Low temperature alarm setting:

ALC = IE, 0 ÷ 50 °C or 90°F
ALC = Ae, - 50°C or -58°F ÷ ALU
when this temperature is reached and after the ALd delay time, the LA alarm is enabled.

AFH Temperature alarm and fan differential: (0.1÷25.5°C; 1÷45°F) Intervention differential for temperature alarm set point and fan regulation set point, always positive.

ALd Temperature alarm delay: (0÷255 min) time interval between the detection of an alarm condition and the corresponding alarm signalling.

dAO Delay of temperature alarm at start-up: (0min÷23h 50min) time interval between the detection of the temperature alarm condition after the instrument power on and the alarm signalling.

EAd Alarm delay at the end of defrost: (0÷255 min) Time interval between the detection of the temperature alarm condition at the end of defrost and the alarm signalling.

dot Delay of temperature alarm after closing the door : (0÷255 min) Time delay to signal the temperature alarm condition after closing the door.

dOA Open door alarm delay:(0÷255 min) delay between the detection of the open door condition and its alarm signalling. the flashing message "dA" is displayed.

tba Buzzer and alarm relay silencing: by pushing one of the keypad buttons.

n= Only the Buzzer is silenced;

Y= Buzzer and relay are silenced.

nPS Pressure switch number: (0 ÷15) Number of activation of the pressure switch, during the "did" interval, before signalling the alarm event (I2F= PAL).

PROBE INPUTS

Ot Thermostat probe calibration: (-12.0÷-120.0°C/-21÷-21°F) allows to adjust possible offset of the thermostat probe.

OE Evaporator probe calibration: (-12.0÷-12.0°C/-21÷-21°F) allows to adjust possible offsets of the evaporator probe.

O3 Auxiliary probe calibration: (-12.0÷-12.0°C/-21÷-21°F) allows to adjust possible offsets of the evaporator probe.

P2P Evaporator probe presence:

n= not present: the defrost stops only by time; y= present: the defrost stops by temperature and time.

P3P Auxiliary probe presence: n= not present; y= present.

HES Temperature increase during the Energy Saving cycle : (-30.0°C / -22÷-86°F) sets the increasing value of the set point during the Energy Saving cycle.

DIGITAL INPUTS

odc Compressor and fan status when open door:

no = normal;

Fan = Fan OFF;

 CPr = Compressor OFF; | F_C = Compressor and fan OFF; |

11P Door switch input polarity:

CL : the digital input is activated by closing the contact;

OP : the digital input is activated by opening the contact.

I2P Configurable digital input polarity:

CL : the digital input is activated by closing the contact;

OP : the digital input is activated by opening the contact

I2F Digital input operating mode: configure the digital input function:

bAL = generic alarm;

PAL = serious alarm mode;

dFr = Pressure switch;

AUS = Relay AUX actuation;

Es = Energy Saving;

onF = remote On/OFF.

did Time interval/delay for digital input alarm:(0÷255 min.) Time interval to calculate the number of the pressure switch activation when I2F=PAL. If I2F=EAL or bAL (external alarms), "did" parameter defines the time delay between the detection and the successive signaling of the alarm.

SAA Set Point for anti-condensing heater: (-50.0÷-110.0°C; -58÷-230°F) defines the room temperature setpoint to switch on the anti-condensing heater.

OTHER

Adr RS485 serial address (1÷247): Identifies the instrument address when connected to a ModBUS compatible monitoring system.

Rel Release software: (read only) Software version of the microprocessor

Ptb Parameter table: (read only) it shows the original code of the dixel parameter map.

Prd Probes display: (read only) display the temperature values of the evaporator probe Pb2 and the auxiliary probe Pb3.

Pr2 Access to the protected parameter list (read only).

6. DIGITAL INPUTS

The Wing series can support up to 2 free contact digital inputs. One is always configured as door switch, the second is programmable in seven different configurations by the "I2F" parameter.

6.1 DOOR SWITCH INPUT
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 "dOA", the alarm output is enabled and the display shows the message "dA". The alarm stops as soon as the external digital input is disabled again. During this time and then for the delay "dot" after closing the door, the high and low temperature alarms are disabled.

6.2 CONFIGURABLE INPUT - 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 relay outputs are switched OFF. The alarm stops just after the digital input is de-activated.

6.3 CONFIGURABLE INPUT - SERIOUS ALARM MODE (BAL)
When the digital input is activated, the unit will wait for "did" delay before signalling the "BAL" alarm message. The relay outputs are switched OFF. The alarm will stop as soon as the digital input is de-activated.

6.4 CONFIGURABLE INPUT - 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 "PAL" pressure alarm message will be displayed. The compressor and the regulation are stopped. When the digital input is ON the compressor is always OFF.

6.5 CONFIGURABLE INPUT - START DEFROST (DFR)
It executes 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.

6.6 CONFIGURABLE INPUT - RELAY AUX ACTUATION (AUS)
This function allows to turn ON and OFF the auxiliary relay by using the digital input as external switch.

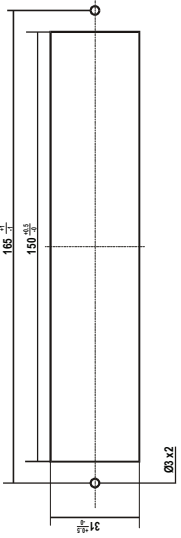
6.7 CONFIGURABLE INPUT - ENERGY SAVING (ES)
The Energy Saving function allows to change the set point value as the result of the SET+ HES (parameter) sum. This function is enabled until the digital input is activated.

6.8 CONFIGURABLE INPUT - REMOTE ON/OFF (ONF)
This function allows to switch ON and OFF the instrument.

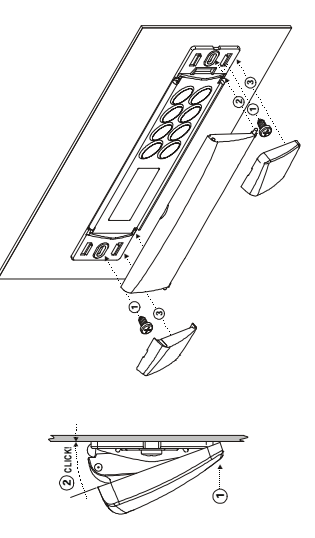
6.9 DIGITAL INPUTS POLARITY
The digital inputs polarity depends on "1P" and "2P" parameters.
CL : the digital input is activated by closing the contact.
OP : the digital input is activated by opening the contact

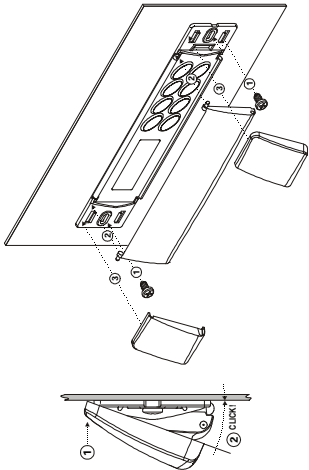
7. INSTALLATION AND MOUNTING
T820 and T821 keyboards shall be mounted on vertical panel, in a 150x31 mm hole, and fixed using two screws Ø 3 x 2mm. To obtain an IP65 protection grade use the front panel rubber gasket (mod. RG-L). Power modules **XW270K** and **XW271K** shall be mounted in a panel with two or more screws and they must be connected to the keyboards by means of a two-wire cable (Ø 1mm). The temperature range allowed for correct operation is 0 - 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.

7.1 T820 AND T821 CUT OUT



7.2 MOUNTING WITH KEYBOARD COVER OPENING DOWNWARD





8. ELECTRICAL CONNECTIONS
XW270K and **XW271K** are provided with screw terminal block to connect cables with a cross section up to 2,5 mm² for the RS485(optional) and the keyboard. Connecting other inputs, power supply and relays, **XW270K** and **XW271K** are provided with Fasion connection (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.
N.B. Maximum current allowed for all the loads is 20A.

8.1 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.

9. TTL/RS485 SERIAL LINE
The TTL connector allows, by means of the external module TTL/RS485 (X485), to connect the unit to a network line ModBUS-RTU compatible as the **dixell** monitoring system X1500 (Version 3.0).
The same TTL connector is used to upload and download the parameter list of the "HOT KEY". The instruments can be ordered wit the serial output RS485(Optional).

10. USE OF THE PROGRAMMING "HOT KEY"
The Wing units can UPLOAD or DOWNLOAD the parameter list from its own E2 internal memory to the "Hot Key" and vice-versa.

10.1 DOWNLOAD (FROM THE "HOT KEY" TO THE INSTRUMENT)
1. Turn OFF the instrument by means of the ON/OFF key, remove the TTL serial cable if present, insert the "Hot Key" and then turn the Wing ON.
2. Automatically the parameter list of the "Hot Key" is downloaded into the Wing memory, the "Ddl" message is blinking. After 10 seconds the instrument will restart working with the new parameters.
3. Turn OFF the instrument remove the "Hot Key", plug in the TTL serial cable, then turn it ON again.
At the end of the data transfer, phase the instrument displays the following messages:
"end" for right programming.
The instrument starts regularly with the new programming.
"err" 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.

10.2 UPLOAD (FROM THE INSTRUMENT TO THE "HOT KEY")
1. Turn OFF the instrument by means of the ON/OFF key and remove the TTL serial cable if present; then turn it ON again.
2. When the Wing unit is ON, insert the "Hot key" and push  key; the "uPL" message appears.
3. Push "SET" key to start the UPLOAD; the "uPL" message is blinking.
4. Turn OFF the instrument remove the "Hot Key", plug in the TTL serial cable, then turn it ON again.
At the end of the data transfer phase the instrument displays the following messages:
"end" for right programming.
"err" for failed programming. In this case push "SET" key if you want to restart the programming again or remove the not programmed "Hot key".

Message	Cause	Outputs
"P1"	Thermostat probe failure	Alarm output ON; Compressor output according to parameters "CON" and "COF"
"P2"	Evaporator probe failure	Alarm output ON; Other outputs unchanged
"P3"	Auxiliary 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
"EE"	Data or memory failure	Alarm output ON; Other outputs unchanged
"dA"	Door switch alarm	Alarm output ON; Other outputs unchanged
"EAL"	External alarm	Alarm output ON; Other outputs unchanged
"BAL"	Serious external alarm	Alarm output ON; Other outputs OFF
"PAL"	Pressure switch alarm	Alarm output ON; Other outputs OFF

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 3s.

11.1 SILENCING BUZZER / ALARM RELAY OUTPUT
If "bA = Y", once the alarm signal is detected the buzzer and the relay are is silenced by pressing any key.
If "bA = n", only the buzzer is silenced while the alarm relay is on until the alarm condition recovers.
Buzzer is mounted in the **T820** and **T821** keyboards and it is an option.

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

11.3 ALARM RECOVERY
Probe alarms : "P1" (probe1 faulty), "P2" and "P3": they automatically stop 10s after the probe restarts normal operation. Check connections before replacing the probe. Temperature alarms "HA" and "LA" automatically stop as soon as the thermostat temperature returns to normal values or when the defrost starts.
Door switch alarm "dA" stop as soon as the door is closed.
External alarms "EAL", "BAL" stop as soon as the external digital input is disabled.
"PAL" alarm is recovered by switching OFF the instrument.

12. TECHNICAL DATA
T820 and T821 keyboards
Housing: self extinguishing ABS.
Case: iacca 38x185 mm; depth 23mm
Mounting :
panel mounting in a 150x31 mm panel cut-out with two screws. Ø 3 x 2mm.
Distance between the holes 165mm
Protection: IP20.
Frontal protection: IP65 with frontal gasket mod RG-L (optional)
Connections: Screw terminal block ≤ 2,5 mm² heat-resistant wiring and 6,3mm
Power supply: from **XW270K** or **XW271K** power module
Display: 3 digits, red LED, 14,2 mm high.
Optional output: buzzer

Power modules XW270K and XW271K
Case:
"OS": open board 132x 94 mm; height: 40mm.
"OA": open board with aluminium protection 176x 123mm; height: 52mm.
"GS": case 155x114; height 70mm. Self extinguishing ABS. IP55
"PS": case 147x110; height 47mm. Self-extinguishing ABS. IP55. UL approved
Connections: Screw terminal block ≤ 2,5 mm² heat-resistant wiring and 6,3mm
Fasion
Power supply: 230Vac or . 110Vac ± 10%
Inputs: 3 NTC probes
Digital inputs: 2 free vdlage
Relay outputs: Total current on loads MAX. 20A
compressor: relay SPST 20(8) A, 250Vac
light: relay SPST 16(3) A, 250Vac
fans: relay SPST 8(3) A, 250Vac
defrost: relay SPST 8(3) A, 250Vac
alarm: SPST relay 8(3)A, 250Vac
auxiliary (XW270K): SPST relay 16(3) A, 250Vac
heater (XW271K): SPST relay 16(3) A, 250Vac
Serial output : TTL standard. RS485 optional
Communication protocol: Modbus - RTU
Data storing: on the non-volatile memory (EEPROM).
Kind of action: IB.
Pollution grade: normal
Software class: A
Operating temperature: 0÷60 °C.
Storage temperature: -25÷60 °C.
Relative humidity: 20÷85% (no condensing)
Measuring and regulation range: NTC probe: -40÷+110°C (-58÷+230°F)
Resolution: 0.1 °C or 1 °C or 1 °F (selectable).
Accuracy (ambient temp. 25°C) ±0.5 °C ±1 digit

13. CONNECTIONS
13.1 XW270K / XW271K

T821 Keyboard

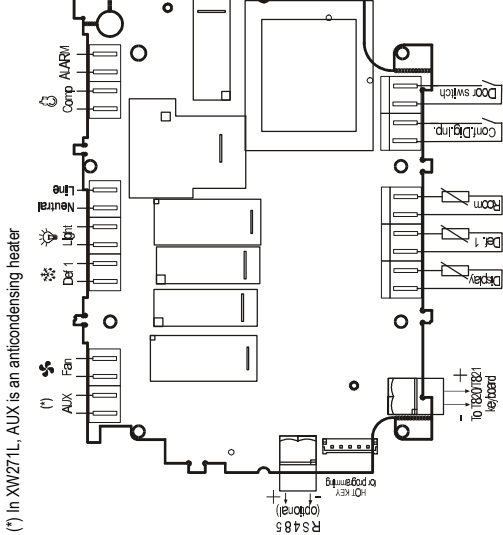


To XW271K

T820 Keyboard



To XW270K



(*) In XW271L, AUX is an anticondensing heater

Connector number	Description	Connector number	Description
HOT KEY	Hot key for programming	11 - 12	Alarm relay
RS485 (Optional)	RS485 direct output	13 - 14	Compressor relay
KEY (+)	+ connection for keyboard	15	Phase
KEY (-)	- : connection for keyboard	16	Neutral
1 - 2	Display probe	17 - 18	Light relay
3 - 4	Defrost probe	19 - 20	Defrost relay
5 - 6	Room probe	21 - 22	Fan relay
7 - 8	Configurable digital input	18 - 19	Auxiliary relay
9 - 10	Door switch		

14. DEFAULT SETTING VALUES

Label	Name	Range	Default	°C/°F	XW270K	XW271K
Set	Set point	LS÷US	-5/23	P1	P1	P1
Hy	Differential	0,1÷25,5 °C 1÷45°F	2/4	P1	P1	P1
LS	Minimum set point	-50,0°C÷SET -58°F÷SET	30/22	P2	P2	P2
US	Maximum set point	SET ÷ 110°C SET ÷ 230°F	20/68	P2	P2	P2
OdS	Outputs activation delay at start up	0÷255 min.	1	P2	P2	P2
AC	Anti-short cycle delay	0÷30 min.	1	P1	P1	P1
COt	Compressor ON time during fast freezing	0 ÷ 23h 50 min.	0	P2	P2	P2
COh	Compressor ON time during fast freezing	0÷255 min.	15	P2	P2	P2
COF	Compressor OFF time with faulty probe	0÷255 min.	30	P2	P2	P2
	DISPLAY					
CF	Temperature measurement unit	°C ÷ °F	°C/°F	P2	P2	P2
RES	Resolution (integer/decimal point)	in ÷ de	de	P1	P1	P1
LoD	Local display	P1 ÷ 1/2	P1	P2	P2	P2
ReD	Remote display	P1 ÷ 1/2	P2	P2	P2	P2
	DEFROST					
dEf	Defrost type	rE, rT, in	rE	P1	P1	P1
EdF	Defrost mode	In, Sd	In	P2	P2	P2
SdF	Set. point for SMART	-30 ÷ +30 °C -22÷+86°F	0	P2	P2	P2
dIE	Defrost termination temperature (1°Evaporator)	-50,0÷+110°C -58÷+230°F	8/46	P1	P1	P1
dEf	Interval between defrost cycles	1÷120h	6	P1	P1	P1
MdF	(Maximum) length for 1° defrost	0÷255 min.	30	P1	P1	P1
dFd	Displaying during defrost	rT, it, SET, dEF, dEG	it	P2	P2	P2
dAd	MAX display delay after defrost	0÷255 min.	30	P2	P2	P2
FdD	Draining time	0÷60 min.	0	P2	P2	P2
dPO	First defrost after start up	n ÷ y	n	P2	P2	P2
dAF	Defrost delay after fast freezing	0 ÷ 23h 50 min.	2	P2	P2	P2
	FANS					
FriC	Fans operating mode	C-n, C-y, O-n, O-y	O-n	P2	P2	P2
Frd	Fans delay after defrost	0÷255 min.	10	P2	P2	P2

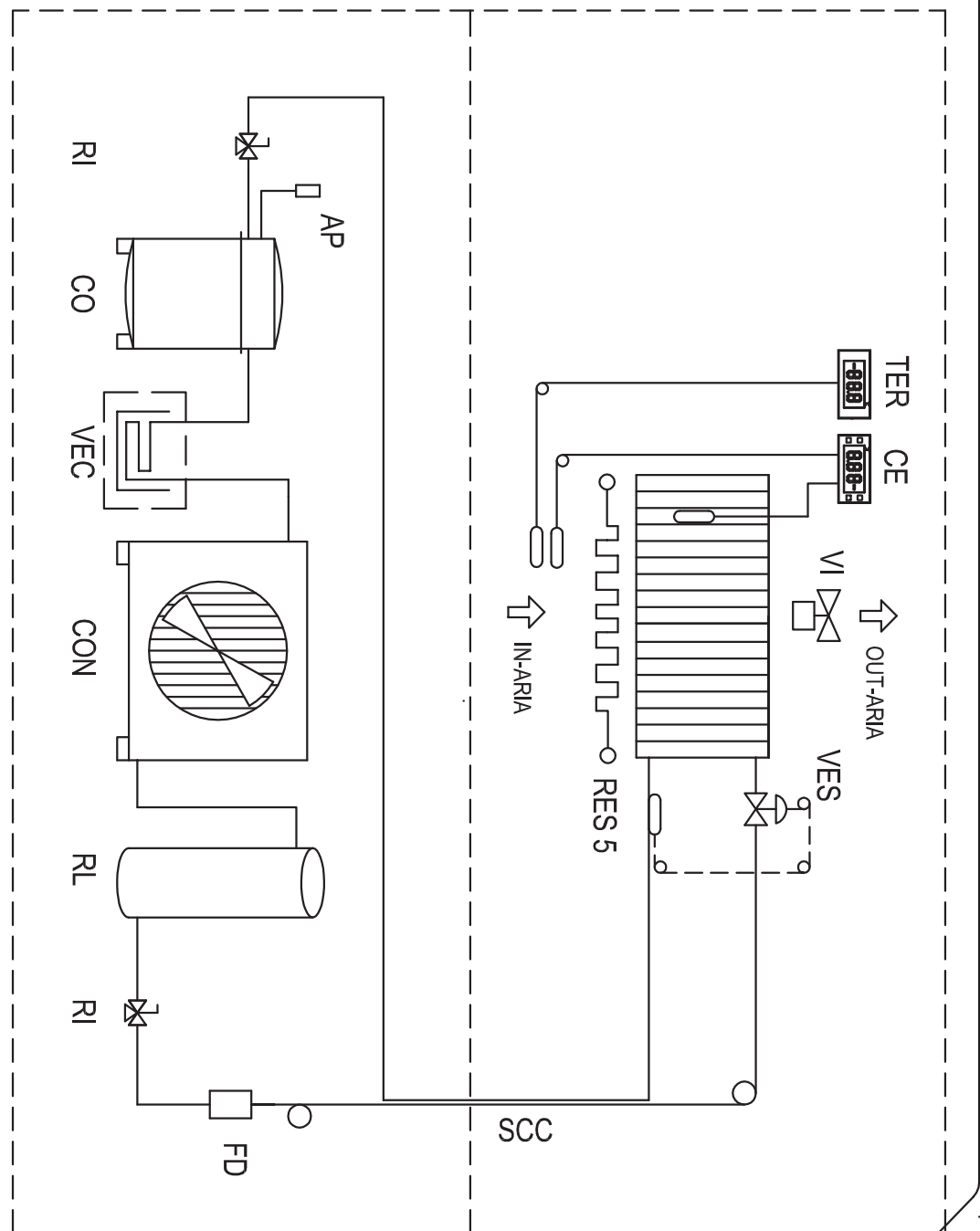
Label	Name	Range	Default	Level
FSt	Fans stop temperature	-50,0÷+110°C -58÷+230°F	2/35	P2
	ALARMS			
ALC	Temperature alarms configuration	rE÷Ab	rE	P2
ALU	MAXIMUM temperature alarm	-50,0÷+110°C -58÷+230°F	10/20	P1
ALL	minimum temperature alarm	-50,0÷+110°C -58÷+230°F	10/20	P1
AFH	Temperature alarm and fan differential	0,1÷25,5 °C 1÷45°F	2/4	
ALd	Temperature alarm delay	0÷255 min.	15	P2
dAO	Delay of temperature alarm at start up	0 ÷ 23h 50 min.	1,3	P2
EdA	Alarm delay at the end of defrost	0÷255 min.	30	P2
dot	Delay of temperature alarm after closing the door	0÷255 min.	15	P2
dOA	Open door alarm delay	0÷255 min.	15	P2
tBA	Alarm relay silencing	Y ÷ n	Y	P2
nPS	Pressure switch activation number	0÷15	0	P2
	ANALOGUE INPUTS			
Ot	Thermostat probe calibration	-12,0÷+12,0°C -21÷+21°F	0	P1
OE	Evaporator probe calibration	-12,0÷+12,0°C -21÷+21°F	0	P2
O3	Auxiliary probe calibration	-12,0÷+12,0°C -21÷+21°F	0	P2
P2P	Evaporator probe presence	n ÷ y	Y	P2
P3P	Auxiliary probe presence	n ÷ y	n	P2
HES	Temperature increase during the Energy Saving cycle	-30÷+30°C -22÷+86°F	0	P2
	DIGITAL INPUTS			
Odc	Open door control	no, Fan, CP+, F, C	Fan	P2
11P	Door switch polarity	CL÷OP	CL	P2
12P	Configurable digital input polarity	CL÷OP	CL	P2
i2F	Digital input configuration	EAL, bAL, PAL, dFt, AUS, ES, OnF	EAL	P2
dId	Digital input alarm delay	0÷255 min.	5	P2
SAA	Set point for anti-condensing heater	-50,0÷+110°C -58÷+230°F	-20/04	---
	OTHER			
Adr	Serial address	0÷247	1	P1
rEL	Software release	---	1.0	P2
PtB	Map code	---	---	P2
Prd	Probes display	Pb1÷Pb3	---	P2
P2	Access parameter list	---	---	P2

Dixell s.r.l. Via dell'Industria, 27 - 32010 Z.I. Pieve d'Alpago (BL) ITALY
tel. +39 - 0437 - 98 33 - fax +39 - 0437 - 98 93 13
E-mail: dixell@dixell.com - <http://www.dixell.com>



nati per il freddo

UNITA' CONDENSATRICE VANO REFRIGERATO



Design & Tecnologia su misura

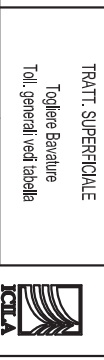
Viale dei Pini, 9
06051 Perugia d'Assisi
Perugia - Italy
Phone: 075 80161 Fax: 075 8016215
www.ctangroup.it - mail: info@ctangroup.it

Rugosità - Ra
3.2 / (V)

0-6 ±0.06 6-30 ±0.1 30-120 ±0.15 120-315 ±0.2 315-1000 ±0.3 1000-2000 ±0.5 3-6 ±1° 6-30 e 30' 30-120 e 20' oltre 120 e 10' Smussi e Raggi 0.3-0.8

QUOTE SENZA INDICAZIONE DI TOLLERANZA - Grado di precisione medio UNI 5307

TRATT. SUPERFICIALE
Togliere Barature
Toll. generali vedi tabella



REV.	DATA	DESCRIZIONE	VERIFICA	APPROVAZIONE
0	31/05/13	EMMISSIONE		

DEMINIMAZIONE
SERIE BRILLIANT TN
(U.C. monofase/trifase remote)

Schema impianto frigorifero
SIF 195-13

MATERIALE	Q.tà	0	31/05/13	EMMISSIONE	VERIFICA	APPROVAZIONE	DEMINIMAZIONE	DESIGNER	Mattecci Franco	P / N	SIF 195-13	FOGLIO	Certified Quality System ISO 9001:2000
FINITURA	Peso (kg)												

A termini di legge ci riserviamo la proprietà di questo disegno con divieto di riproduzione o renderlo noto a terzi senza nostra approvazione

REFRIGERATION AND ELECTRICAL SYSTEM CABLE CONNECTION GUIDE

AGD	DIGITAL FLAVOURS DISPLAY FEEDER	RES28	FRONT GLASS LOWER FRAME HEATING ELEMENT
AEL	ELECTRONIC BALLAST	RES29	FRONT GLASSES COUPLING PROFILE HEATING ELEMENT
AP	SERVICE VALVE	RES30	DOORS FRAME MIDDLE POST HEATING ELEMENT
CA	SUPPLY CABLE	RES31	GLASSES PERIMETRAL FRAME HEATING ELEMENT
CAR	AIR CONDENSER	RES32	HEATED DOORS HEATING ELEMENTS
CE	ELECTRONIC CONTROL	RES33	WATER DRAIN HEATING ELEMENT
CN	MULTIPOLAR CONNECTOR	RES34	DOORS FRAME HEATING ELEMENT
CO	COMPRESSOR	RES35	COMPRESSOR CRANKCASE HEATING ELEMENT
D	DIOD	RES36	FRONT GLASS FRAME HEATING ELEMENT
DEV	SHUNT	RES37	CABINET FRAME HEATING ELEMENT
DR	REMOTE DISPLAY	RES38	HOT COMPARTMENT HEATING ELEMENT
EM	PHOTOCELL EMITTER	REV	CONDENSER FAN SPEED CONTROL
EV	EVAPORATOR	REVC	CONDENSER FAN RELAY
F	FUSE	RI	REFRIGERANT TAP
FD	FILTER DRIER	RIC	COMPRESSOR DELAYER
FLU	WATER FLOW SWITCH	RICV	PHOTOCELL RECEIVER
FR	COMPRESSOR THERMAL PROTECTION	RIS	RESERVE , ANTI-FOG HEATER ELEMENT
HL	COMPRESSOR ALARM LIGHT	RL	LIQUID RECEIVER
I	GENERIC SWITCH	RLA	WATER LEVEL ELECTRONIC CONTROL
IEC	WATER EVAPORATION BIN SWITCH	RO	OIL HEATER ELEMENT
IGD	DIGITAL FLAVOURS DISPLAY	SAA	ABSENCE OF WATER LIGHT
II	LIGHTING SWITCH	SC	CONDENSER PROBE
IL	SIGHT GLASS	SD	TERMINAL BOX
IMC	WARM SHELF SWITCH	SDC	COMPRESSOR TERMINAL BOX
INV	INVERTER	SE	PROXIMITY SENSOR
IR	REFRIGERATION SWITCH	SEC	MAIN SWITCH
IRP	LIGHT REFRIGERATION SWITCH	SFV	TANK BOTTOM HEATING COIL
IV	INTERNAL FAN SWITCH	SIDG	FLAVOURS DISPLAY DIGITAL SYSTEM
KM	CONTACTOR	SL	LIQUID SEPARATOR
LF	FRONT LIGHTING	SLA	WATER LEVER PROBE
LI	INTERNAL UPPER LIGHTING	SPC	COMPRESSOR LIGHT
LIA	FRONT LIGHTING	SPMC	WARM SHELF LIGHT
LIG	FLAVOURS DISPLAY LIGHTING	SPR	ELECTRIC SUPPLY LIGHT
LIP	REAR LIGHTING	SPS	DEFROSTING LIGHT
MDIG	DIGITAL MODULE FOR FLAVOURS DISPLAY	SS	DEFROSTING PROBE
MM	SPINNING SHELVES ELECTRIC MOTOR	ST	TEMPERATURE PROBE
MUC	CONDENSING UNIT ELECTRIC CONNECTIONS	STR	LIGHTING STARTER
PA	HIGH PRESSURE CONTROL	SU	HUMIDITY PROBE
PD	HIGH-LOW PRESSURE CONTROL	T	TEMPERATURE CONTROL
PO	WATER PUMP	TI	WINTER THERMOSTAT
QE	EXTERNAL ELECTRIC PANEL	TC	CAPILLARY TUBE
QF	MAGNETIC-THERMIC SWITCH	TE	TIMER
R	LIGHTING BALLAST	TER	THERMOMETER
RADD	RECTIFIER	TF	FUSIBLE PLUG
RE	GENERIC RELAY	TMC	WARM SHELF THERMOSTAT
REL	ELECTRONIC BALLAST	TP	LIGHTING FIXTURES REGRIGERATOR THERMOSTAT
REP	ELECTRONIC CONTROL TEMPERATURE REPEATER	TRA	TRANSFORMER
RES1	COLD AIR DISCHARGE HEATING ELEMENT	TRC	ELECTRONIC CONTROL TRANSFORMER
RES2	FRONT PROFILE HEATING ELEMENT	TREV	WATER EVAPORATION HEATER ELEMENT THERMOSTAT
RES3	RIGHT/LEFT GLASS HEATING ELEMENT	TS	SECURITY THERMOSTAT
RES4	FRONT GLASS HEATING ELEMENT	TVC	CONDENSER FAN THERMOSTAT
RES5	DEFROST HEATING ELEMENT	V	COMPRESSOR FAN / GENERAL USE
RES6	WATER EVAPORATION HATING ELEMENT	VC	CONDENSER FAN
RES7	TOP LIGHTING FIXTURE HEATING ELEMENT	VEC	WATER EVAPORATION BIN
RES8	LATERAL GLASS SUPPORT HEATING ELEMENT	VES	EXPANSION VALVE
RES9	FRONT BAND HEATING ELEMENT	VI	INTERNAL FAN
RES10	COUPLING BAND HEATING ELEMENT	VPA	CONDENSING PRESSURE CONTROL WATER VALVE
RES11	SERVICE TOP HEATING ELEMENT	VR	CHECK VALVE
RES12	UPPER BAND/DOOR FRAME HEATING ELEMENT	VRA	SUCTION PRESSURE REGULATION VALVE
RES13	HOT DRY/BAIN MARIE DISPLAY HEATING ELEMENT	VRE	EVAPOTATING PRESSURE REGUTATION VALVE
RES14	ANTI-FOG SUCTION AIR BAND HEATING ELEMENT	VS	GENERAL USE SOLENOID VALVE
RES15	WARM SHELF HEATING ELEMENT	VSA	SOLENOID WATER VALVE
RES16	SIDE BANDS/ FRONT GLASS HINGE HEATING ELEMENT	VSAB	BY-PASS SOLENOID WATER VALVE
RES17	DEHUMIDIFICATION HEATING ELEMENT	VSIC	REVERSING CYCLE SOLENOID VALVE
RES18	DEFROSTING WATER DRAIN HEATING ELEMENT	VSL	LIQUID SOLENOID VALVE
RES19	RING FRAME HEATING ELEMENT	VSS	DEFROSTING SOLENOID VALVE
RES20	SIDE BAND HEATING ELEMENT	VT	POWER REGULATOR
RES21	SUCTION AIR GLASS HEATING ELEMENT	VV	GLASS FAN
RES22	OUTLET AIR HEATING ELEMENT	X1	CABINET CONNECTIONS
RES23	REAR GLASS HEATING ELEMENT	X2	EXTERNAL ELECTRIC PANEL CONNECTIONS
RES24	INTERNAL GLASS HEATING ELEMENT	X3	CONDENSING UNIT CONNECTIONS
RES25	FRONT GLASS UPPER FRAME HEATING ELEMENT		
RES26	FRONT GLASS LATERAL/LOWER FRAME HEATING ELEMENT		
RES27	FRONT GLASS LATERAL FRAME HEATING ELEMENT		