PLUS 200 2 PLT

MANUALE D'USO E MANUTENZIONE
USE AND MAINTENANCE MANUAL

rev 02-06

CONTENTS

CHAPTER 1: INTRODUZIONE

1.1 GENERAL

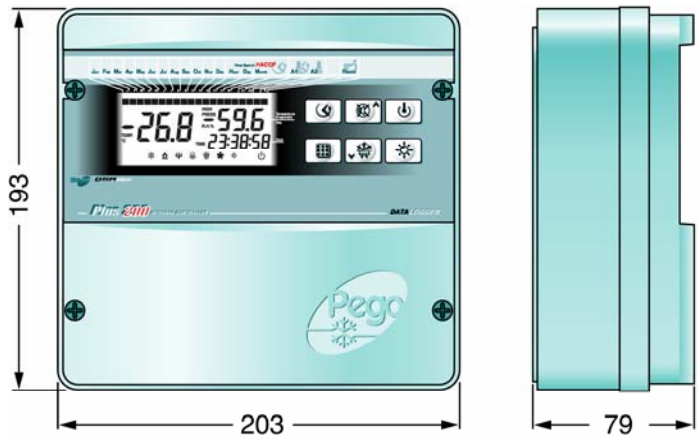
The electronic controllers of the ***PLUS 200*** series have been designed to control static or ventilated cold rooms.

The ***PLUS200 2 PLT*** electronic panel allows the user to control all the components on a refrigeration unit equipped with a double system. The panel allows the user to control the essential components of a refrigeration system with up to two compressors, a double evaporator (fans and defrosting elements) and a cold room light.
The double evaporator is controlled separately with a double defrosting sensor.

1.2 PRODUCT IDENTIFICATION CODES

PLUS200 2 PLT	Controller for cold rooms with double storage system.

OVERALL DIMENSIONS 1.3



IDENTIFICATION DATA 1.4

The unit described in this manual has, on its side, an ID plate showing all the relevant identification data:

- Name of Manufacturer
- Code and model of electrical board
- Serial number
- IP protection rating
- Power supply voltage

CHAPTER 2: INSTALLATION

2.1 IMPORTANT INFORMATION FOR THE INSTALLER

1. Install the device in places where the protection rating is observed and try not to damage the box when drilling holes for wire/pipe seats.

2. Do not use multi-polar cables in which there are wires connected to inductive/power loads or signalling wires (e.g. probes/sensors and digital inputs).

3. Do not fit power supply wiring and signal wiring (probes/sensors and digital inputs) in the same raceways or ducts.

4. Minimise the length of connector wires so that wiring does not twist into a spiral shape as this could have negative effects on the electronics.

5. Fit a general protection fuse upstream from the electronic controller.

6. All wiring must be of a cross-section suitable for relevant power levels.

7. When it is necessary to make a probe/sensor extension, the wires must be of the correct cross-section, which in any case must be at least 1 mm^2.

2.2 STANDARD ASSEMBLY AND USE KIT

The ***PLUS 200 2 PLT*** electronic controller is supplied with the following assembly and utilisation items:

- N°3 sealing gaskets to be placed between fixing screws and box backing
- N°3 NTC temperature sensors (room, evaporator 1, evaporator 2)
- N°1 user's manual.

CHAPTER 3: FUNCTIONS

3.1 FUNCTIONS CONTROLLED BY THE PLUS200 2 PLT

- Display and adjustment of room temperature
- Display of evaporator 1 and evaporator 2 temperature
- System control activation/deactivation
- Operation with single set-point and control of two motor condensing units with delays between the two parameter-set starts.
- Compressor rotation (to make wear uniform)
- Operation with double set point for gradual application of refrigerating power
- System warnings (temperature sensor error, min-max temperature alarms, compressor 1 and compressor 2 safety devices)
- Evaporator 1 and evaporator 2 fan control
- Automatic/manual defrost control (static, with elements, cycle inversion)
- Clock for real time clock defrosting of the two evaporators simultaneously or separately (even where defrosting cycle is set simultaneously the end-of-defrost temperature and control of fan start delay on the two evaporators are independent)
- Room light can be switched on with on-panel key or door switch
- Alarm relay

CHAPTER 4: TECHNICAL CHARACTERISTICS

TECHNICAL CHARACTERISTICS 4.1

Power supply	
Voltage	230 V~ ± 10% 50 Hz
Max. power absorption	~ 7 VA
Climatic conditions	
Working temperature	-10 - 60°C
Storage temperature	-30 - 70°C
Relative humidity	Below 90% RH
General characteristics	
Type of sensors that can be connected	NTC 10K 1%
Resolution	1°C
Sensor read precision	± 0.5°C
Read range	-45…+45 °C
PLUS200 2 PLT - Output characteristics - max applicable load (230 V AC)	
Compressor (non-powered contact)	750W (AC3)
Elements (non-powered contact)	1500W (AC1)
Fans (non-powered contact)	500W (AC3)
Room light (non-powered contact)	800W (AC1)
Alarm contact	800W (AC1)
Dimensional characteristics	
Dimensions	19.3 cm x 7.9 cm x 20.3 cm (HxPxL)
Insulation / mechanical characteristics	
Box protection rating	IP65
Box material	ABS self-extinguishing
Type of insulation	Class II

4.2 WARRANTY TERMS

PLUS200 electronic controllers are covered by a 24-month warranty against all manufacturing defects, valid from date of delivery. If the system malfunctions as a result of tampering, impact or improper installation the warranty will automatically be rendered null and void. It is strongly recommended that you observe all instructions/information regarding the technical characteristics of the device.

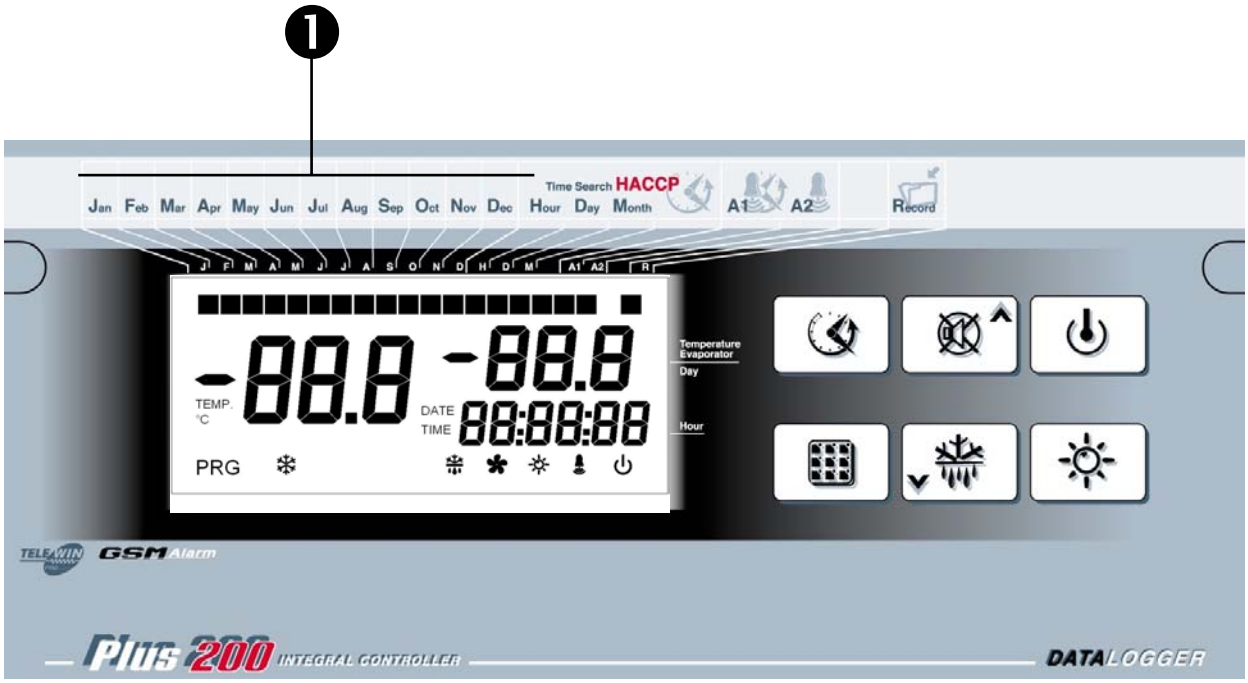
WARNING !

Any modifications made to wiring and/or internal components or any tasks carried out in a way that fails to comply with the information/instructions in this manual shall not only render the warranty null and void immediately but may also lead to malfunctions, irreparable damage, serious injury or put persons/objects in danger.

PEGO S.r.l. declines any responsibility for possible errors or inaccuracies written in this manual as a result of printing or transcription errors.
PEGO S.r.l. reserves the right to modify its products as it deems necessary without altering its main characteristics. Each new release of a ***PEGO*** user manual replaces previous ones.

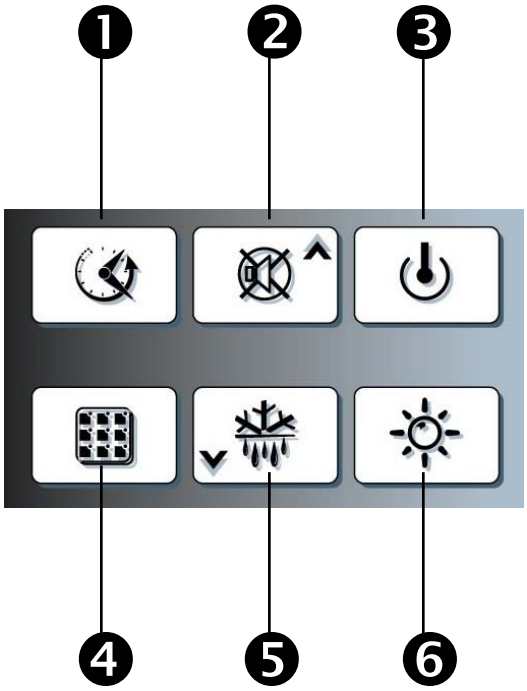
CHAPTER 5: PARAMETER PROGRAMMING

PANEL LAYOUT 5.1



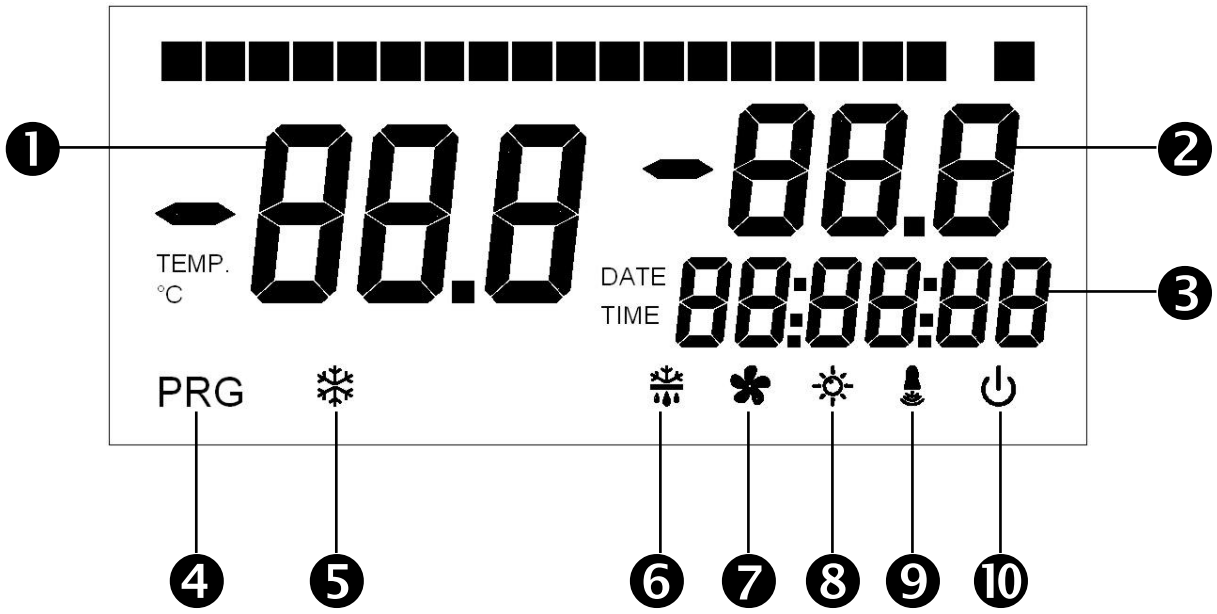
1. Display of current month (previous months also remain lit)

5.2 KEYPAD FUNCTIONS



1. **CLOCK DISPLAY key** (press key to display current time for a few seconds)
2. **UP / MUTE BUZZER ALARM key**
3. **STAND BY key** (system shuts down, room temperature flashes)
4. **SET key,** room temperature (with double set point both are shown alternately)
5. **DOWN / MANUAL DEFROST key**
6. **ROOM LIGHT key**

DISPLAY LCD 5.3



1. Ambient temperature / parameters
2. Evaporator 1 temperature / Evaporator 2 temperature / day of current month (see setting on parameter tEu on 1st level programming) / parameters (during programming)
3. System status / time / parameter values:
    a. C1 = compressor 1 active
    b. C2 = compressor 2 active
    c. d1 = evaporator 1 defrosting
    d. d2 = evaporator 2 defrosting
    e. Current time
    f. Time parameters
4. Programming (control is in programming mode)
5. Cold (compressor call indicator)
6. Defrost
7. Fans (flashing during fan stop – parameter F5)
8. Light
9. Alarm
10. Stand-by (flashing in stand-by. Outputs deactivated.)

5.4 GENERAL

To enhance safety and simplify the operator's work, the ***PLUS 200 system*** has two programming levels; the first level (Level 1) is used to configure the frequently-modified **SET-POINT** parameters. The second programming level (Level 2) is for general parameter programming of the various controller work modes.

It is not possible to access Level 2 programming directly from Level 1: you must exit the programming mode first.

5.5 KEY TO SYMBOLS

For purposes of practicality the following symbols are used::

- **(▲)** the UP key is used to increase values and mute the buzzer;
- **(▼)** the DOWN key is used to decrease values and force defrosting.

5.6 SETTING AND DISPLAYING THE SET-POINTS

1. Press the **SET key** to display the current **SET-POINT** (temperature).
2. Hold down the **SET key** and press the **(▲)** or **(▼)** keys to modify the **SET-POINT**.
3. Release the **SET key** to return to room temperature display: the new setting will be saved automatically.

Note: with the double set point configuration the display of the two set points is alternated each time SET is pressed.

LEVEL 1 PROGRAMMING (User level)

To gain access to the Level 1 configuration menu proceed as follows:

1. Press the **(▲)** and **(▼)** keys simultaneously and keep them pressed for a few seconds until the first programming variable appears on the display.

2. Release the **(▲)** and **(▼)** keys.

3. Select the variable to be modified using the **(▲)** or **(▼)** key.

4. When the variable has been selected it is possible:

• to display the setting by pressing SET

• to modify the setting by pressing the SET key and the **(▲)** or **(▼)** keys.

When configuration values have been set you can exit the menu by pressing the **(▲)** and **(▼)** keys simultaneously for a few seconds until the cold room temperature reappears.

5. The new settings are saved automatically when you exit the configuration menu.

5.8 LIST OF LEVEL 1 VARIABLES (User level)

VARIABLE	MEANING	VALUES	DEFAULT
r0	**Temperature differential** referred to main SETPOINT (both set points where double)	1 - 10 °C	2°C
d0	**Defrost interval** (hours). In the case of the double evaporator defrost start is simultaneous and time d0 is reloaded at the end of the last defrost	0 - 24 hrs	4 hrs
d21	**End-of-defrost set point, evaporator 1**. Defrost is not executed if the temperature read by the defrost sensor is greater than value *d21* (If the sensor is faulty defrosting is time-based)	-35 - 45 °C	15°C
d22	**End-of-defrost set point, evaporator 2**. Defrost is not executed if the temperature read by the defrost sensor is greater than value *d22* (If the sensor is faulty defrosting is time-based)	-35 - 45 °C	15°C
d31	**Maximum defrost duration, evaporator 1** (minutes)	1 - 120 min	25 min
d32	**Maximum defrost duration, evaporator 2** (minutes)	1 - 120 min	25 min
d7	**Drip duration** (minutes) At the end of defrosting the compressor and the fans remain at standstill for time setting *d7*: the defrost LED on the front of the panel flashes.	0 - 120 min	0 min
F5	**Fan pause** after defrost (minutes) Allows fans to be kept at standstill for a time *F5* after dripping. This time is counted from the end of dripping. If dripping is not set the fan pause is executed directly after the end of defrosting. During the pause the fan icon flashes.	0 - 10 min	0 min
dEL	**Second system start delay** (valid if nrC=2)	0-60 min	30 min
A1	**Minimum temperature alarm** (active only during storage) Allows user to define a minimum cold room storage temperature. Below the value *A1* a warning is given: the alarm LED and the displayed temperature flash and the fault is also highlighted by an internal buzzer.	-	-45°C
A2	**Maximum temperature alarm** (active only during storage). Allows user to define a maximum cold room storage temperature. Above the value *A2* a warning is given: the alarm LED and the displayed temperature flash and the fault is also highlighted by an internal buzzer.	-	+45°C

VARIABLE	MEANING	VALUES	DEFAULT
tEu	**Displays evaporator sensor temperature / current day-date**	0 = current day 1 = displays evaporator 1 temperature; displays nothing if dE =1 2 = displays evaporator 2 temperature; displays nothing if dE2 =1	0
dF1	**Real-time defrost enable, evaporator 1** With *dF1*=1 it is possible to set up to 6 defrosts in real time in a day by using the parameters d41…d46	0 disabled 1 enabled	0
dF2	**Real-time defrost enable, evaporator 2** With *dF2*=1 it is possible to set up to 6 defrosts in real time in a day by using the parameters d51…d56	0 disabled 1 enabled	0
d41…d46	**Programming defrost times, evaporator 1** It is possible to set up to 6 defrosting times	00:00:00 - 23:50:00	--
d51…d56	**Programming defrost times, evaporator 2** It is possible to set up to 6 defrosting times	00:00:00 - 23:50:00	--

LEVEL 2 PROGRAMMING (Installer level) 5.9

To access the second programming level press the UP **(▲)** and DOWN **(▼)** keys and the LIGHT key simultaneously for a few seconds.

When the first programming variable appears the system automatically goes to stand-by.

1. Select the variable to be modified by pressing the UP **(▲)** and DOWN **(▼)** keys.

When the parameter has been selected it is possible to:

2. View the setting by pressing the SET key.

3. Modify the setting by holding the SET key down and pressing the **(▲)** or **(▼)** key.

4. When configuration settings have been completed you can exit the menu by pressing the **(▲)** and **(▼)** keys simultaneously and keeping them pressed until the room temperature value reappears.

5. Changes are saved automatically when you exit the configuration menu.

6. Press the STAND-BY key to enable electronic control.

LIST OF LEVEL 2 VARIABLES (Installer level) 5.10

VARIABLE	*MEANING*	*VALUES*	*DEFAULT*
nrC	**Number of compressors (or solenoids or systems)**	1= 1 system 2= 2 systems	2
nrE	**Number of evaporators**	1= 1 evaporator 2= 2 evaporators	2
SEt	**Single or double set-point setting** Only displayed if nrC=2	0= one setting only 1= double setting	0
rot	**Compressor rotation**	0= compressor rotation 1= fixed call	0
AC	**Microswitch input status**	0= normally open 1= normally closed	0
F3	**Fan status with compressor off**	0 = Fans running continuously 1 = Fans running only if compressor is working	1
F4	**Fan pause during defrost**	0 = Fans running during defrost 1 = Fans not working during defrost	1
dE1	**Evaporator 1 sensor presence** Disabling the evaporator sensor causes defrosts to occur cyclically with period *d0* or by real time clock and terminate according to time *d31*	0 = evaporator 1 sensor present 1 = evaporator 1 sensor absent	0
dE2	**Evaporator 2 sensor presence** Disabling the evaporator sensor causes defrosts to occur cyclically with period *d0* or by real time clock and terminate according to time *d32*	0 = evaporator 2 sensor present 1 = evaporator 2 sensor absent	0
dC	**Man in cold room alarm input status**	0 = NO 1 = NC	0 = NA
d1	**Defrost type**, cycle inversion (hot gas) or elements With 2 compressors and only 1 evaporator both compressors are activated	1= hot gas 0= element	0
d8	**Post-defrost compressor start mode**. Determines whether system compressor start is possible or not if second is defrosting	0= if an evaporator is still defrosting the second system can continue working 1= compressors do not start until all defrosts have been completed	0

Ad	**Network address** for connection to the TeleWIN supervision system	0 – 31	0
Ald	**Minimum and maximum temperature** signalling and alarm display delay	1…240 min	2:00:00
C1	Minimum time between shutdown and **subsequent switching on of the compressor**.	0…15 min	0 min
Hr1	**Compressor 1 hour counter** (can be reset by pressing the set and clock keys for 10 sec)	0-999 tens of hours	0
Hr2	**Compressor 2 hour counter** (can be reset by pressing the set and clock keys for 10 sec)	0-999 tens of hours	0
CAL	**Room sensor value correction**	-10…+10	0
Pc1	**Compressor 1 protection contact status**	0 = NO 1 = NC	0 = NA
Pc2	**Compressor 2 protection contact status**	0 = NO 1 = NC	0 = NA
doC	**Compressor safety time for door switch**: when the door is opened the evaporator fans shut down and the compressor will continue working for time **doC**, after which it will shut down.	0…5 minutes	0
Fst	**FAN shutdown TEMPERATURE** The fans will stop if the temperature value read by the **evaporator** sensor is higher than this value.	-45…+45°C	+45°C
tA	**NO – NC** alarm relay switching	=activates when alarm is on 1=deactivates when alarm is on	1
rA	**Control relay** door anti-fogging element	0=alarm relay 1=anti-fogging element on	0
int	**Spare**	------	--
dMY	**Day-month-year setting**	dd-mm-yy	-
hMS	**Clock setting**	Hour-min-sec	-

5.11 SWITCHING ON THE PLUS 200 PLT ELECTRONIC CONTROLLER

After wiring the controller correctly, power up at 230 V AC; the panel will immediately emit a beep and all segments and LEDs come on simultaneously for a few seconds.

5.12 COMPRESSOR ACTIVATION/DEACTIVATION CONDITIONS

The ***PLUS 200*** controller activates the compressor when cold room temperature exceeds setting+differential (r0); it deactivates the compressor when cold room temperature is lower than the setting.

5.13 CONFIGURATIONS

- Control of 2 motor condenser units with 2 evaporators
- Control of 1 motor condenser unit with 2 evaporators
- Control of unit panel with 2 evaporators
- Control of 2 motor condenser units with 1 evaporator

Functional combinations are managed by nrC (number of compressors) and nrE (number of evaporators) parameters.

5.14 SINGLE SET POINT WITH DOUBLE SYSTEM

With a single set point (parameter SEt=0) and double system (parameter nrC=2).
The controller initially 'calls' the compressor which has worked less if rot=0 or calls compressor 1 and then 2 after the delay if rot=1. If the set point is not reached within time DeL (1st level parameter) the second presser is switched on to help.

5.15 DOUBLE SET POINT

With SEt=1 (double set), there are 2 distinct set points for the 2 compressors. Setting of the 2 set points is done by pressing the set key: press once and the set value will appear with St1 alongside; the second time it is pressed the second set value and appears with St2 alongside.
If rot=0 there will be compressor rotation (with reference to the lowest set point the compressor that has worked the least will be started)

MANUAL DEFROSTING 5.16

To defrost just press the dedicated key (see section 5.2) to activate the elements relay. Defrosting will not take place if the end-of-defrost temperature setting (d21 or d22) is lower than the temperature detected by the evaporator sensor. Defrosting ends when the end-of-defrost temperature (d21 or d22) or maximum defrost time (d31 or d32) is reached.
Manual defrosting is possible even if real time clock defrosting is set.

HOT GAS DEFROSTING 5.17

Set parameter d1 =1 to manage defrost in cycle inversion mode.
The compressor relay and defrost relay are activated throughout the defrost phase. During dripping (d7) the compressor shuts down but the defrost relay remains activated.
To ensure proper control of the system the installer must use the defrost output: this must allow opening of the cycle inversion solenoid valve and closure of the liquid solenoid valve.
For capillary systems (without thermostat valve) it is only necessary to control the cycle inversion solenoid valve via the defrost relay control.

MODIFYING DATE AND TIME 5.18

To change date and time settings just modify the values as per the parameter setting procedure described in section 5.9 of this manual.

CHAPTER 6: TROUBLESHOOTING

6.1 TROUBLESHOOTING GUIDE

In the event of any anomalies the PLUS200 system warns the operator by displaying alarm codes and sounding the warning buzzer inside the control panel. If an alarm is tripped the display will show one of the following messages.

ALARM CODE	POSSIBLE CAUSE	PROCEDURE TO BE FOLLOWED
E0	*Room temperature sensor faulty*	• Check that the room sensor is working properly • If the problem persists replace the sensor
E1	*Defrost sensor 1 faulty* (In this event any defrosts will have duration time *d31*)	• Check that defrost sensor is working properly • If the problem persists replace the sensor
E2	*Defrost sensor 2 faulty* (In this event any defrosts will have duration time *d32*)	• Check that defrost sensor is working properly • If the problem persists replace the sensor
E3	*EEPROM ALARM* EEPROM memory error detected. (All outputs deactivated except alarms)	• Switch off unit and switch back on
E6	*Flat battery alarm*; the controller will function for at least another 20 days; subsequently any power loss to the board will involve loss of time settings (but not previously recorded data)	• Change the battery
E7	*Day/month/date anticipation attempt alarm* Happens when you try to bring forward the date by a day, month or year or if data is already present.	• Switch off unit and switch back on; date/day/month/year will be restored as per the settings prior to the variation attempt.
E8	*Man in room alarm* The man in room alarm switch in the room has been pressed to indicate a dangerous situation	• Reset the alarm switch inside the cold room
Ec1	*Compressor 1 safety device tripped* (e.g. Overheat or max. pressure switch.) (All outputs deactivated except the alarm one, if present)	• Check the compressor status • Check compressor absorption • If problem persists contact technical assistance service
Ec2	*Compressor 2 safety device tripped* (e.g. Overheat or max. pressure switch.) (All outputs deactivated except the alarm one, if present)	• Check the compressor status • Check compressor absorption • If problem persists contact technical assistance service
Temperature shown on display is flashing	*Minimum or maximum temperature alarm.* The temperature inside the cold room has exceeded the min. or max. temperature alarm setting (see variables *A1 and A2, user programming level*)	• Check that the compressor is working properly. • Sensor not reading temperature properly or compressor start/stop control not working.

Should the alarm cease without any intervention on the part of the operator a record shall in any case be made of it. Pressing the “mute alarm” key will display the error code of the already-ceased alarm.

ALLEGATI / APPENDICES

A.1 *EC DECLARATION OF CONFORMITY*

COSTRUTTORE / MANUFACTURER
PEGO SRL Via Piacentina,6b 45030 Occhiobello (RO) - ITALY -

DENOMINAZIONE DEL PRODOTTO / NAME OF THE PRODUCT
MOD.: PLUS 200 2 PLT

IL PRODOTTO E' CONFORME ALLE SEGUENTI DIRETTIVE CE / THE COMPLIES WITH THE REQUIREMENTS OF THE FOLLOWING EUROPEAN DIRECTIVES:

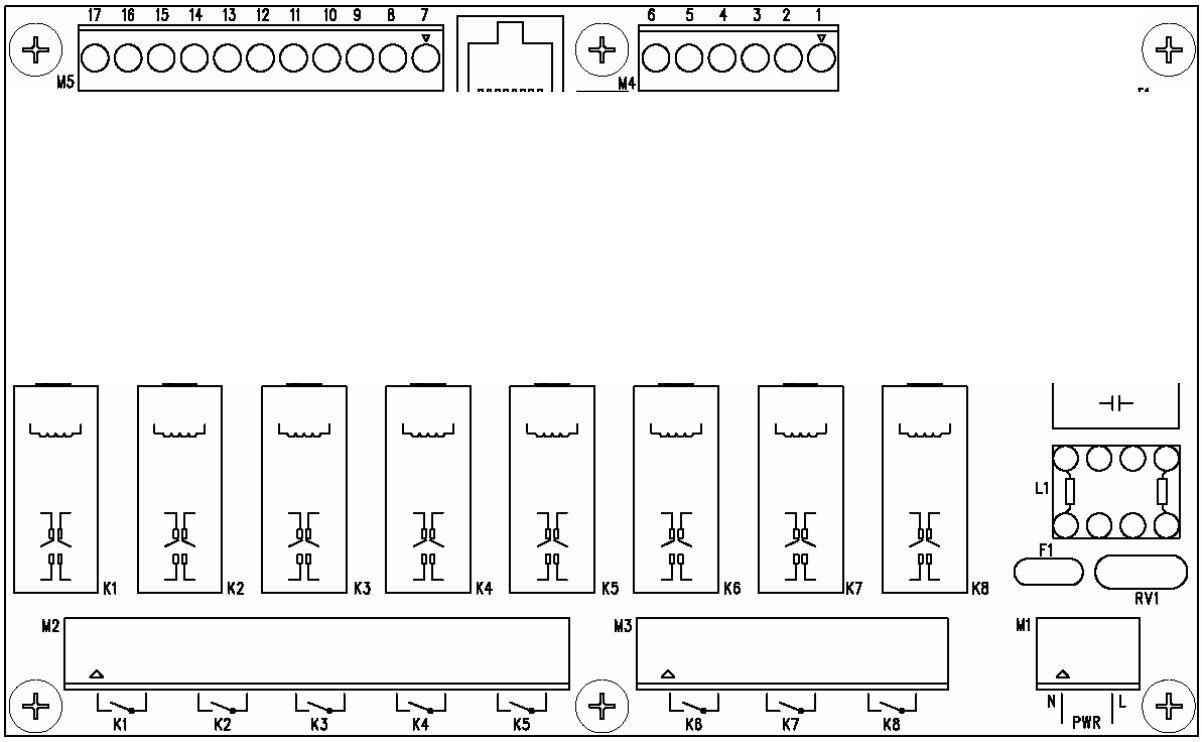
2006/95/CE	**Direttiva del Consiglio per l'unificazione delle normative dei Paesi CEE relativa al materiale elettrico destinato ad essere utilizzato entro certi limiti di tensione e successive modificazioni**
2006/95/EC	EC Directive on unification of laws of the Member States relating to electrical equipment employed within certain voltage limits and subsequent amendments
89/336 CEE	**Direttiva del Consiglio per l'unificazione delle normative dei Paesi CEE relativa alla compatibilità elettromagnetica e successive modificazioni**
89/336 EEC	EC Directive on unification of the laws of the Member States relating to electro-magnetic compatibility and subsequent amendments
93/68 CEE	**Direttiva del consiglio per la marcatura CE del materiale elettrico destinato ad essere utilizzato entro talunni limiti di tensione.**

LA CONFORMITA' PRESCRITTA DALLE DIRETTIVE E' GARANTITA DALL' ADEMPIMENTO A TUTTI GLI EFFETTI DELLE SEGUENTI NORME:
CONFORMITY WITH THE REQUIREMENTS OF THIS DIRECTIVE IS TESTIFIED BY COMPLETE ADHERENCE TO THE FOLLOWING STANDARDS:

NORME ARMONIZZATE / HARMONIZED EUROPEAN STANDARDS

EN 61000-6-1 EN 61000-6-3 EN 60335 – 1

A.2 PLUS 200 2 PLT connection diagram



Power supply section
N-L Power supply 230 Vac 50 Hz

Inputs section

7-8 NTC sensor 10K, evaporator 2
9-10 NTC sensor 10K, evaporator 1
11-12 NTC sensor 10K, cold room

N.B. terminal 13 is the common of all digital inputs

13-14 Door switch
13-15 Man in cold room alarm input
13-16 Compressor protection 2
13-17 Compressor protection 1

Outputs section (no-voltage contacts)

K8 Room light
K7 General alarm
K6 System 2 defrost
K5 System 1 defrost
K4 System 2 fans
K3 System 1 fans
K2 Compressor/system 2
K1 Compressor/system 1

TeleWIN section
1-2 RS485 for TeleWIN

Notes:

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