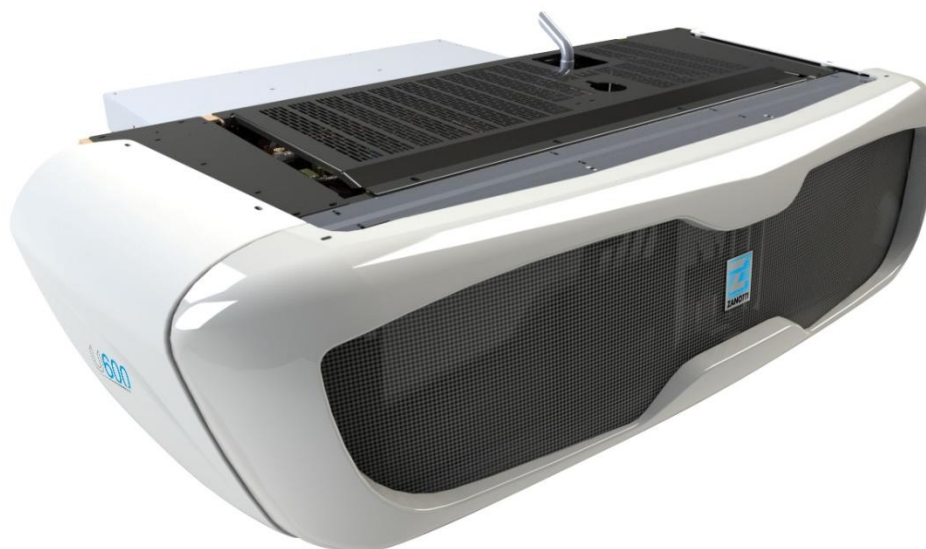




Refrigeration **excellence** since 1962



REFRIGERATION UNIT **Series Uno**

USER MANUAL

TRANSLATION OF THE ORIGINAL
INSTRUCTIONS



REVISION

DATE	REVISION	DESCRIPTION
11/2021	01	First version
12/2021	02	General adjustment of all sections
11/2022	03	Update alarm code
05/2024	04	Update alarms description, added appendix A - Fuse list
06/2024	05	Multi-temperature setup description page added, appendix B with program parameters added
06/2025	06	Maintenance alerts logic and table modified, removed appendix B

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ZANOTTI S.p.A. reserves the right to change, without prior notice, the characteristics of the product described in this manual.

In case of doubt or difficulty in understanding or interpreting the manual, the original/official version indicated as "ORIGINAL INSTRUCTIONS" on the cover, must be considered as the valid version.

The contents of this manual have been carefully checked to ensure they correspond to the system in question.

However, as possible differences cannot be excluded, the contents of this document are periodically checked and any corrections or modifications will be included in the next edition.

Some of the images included in this manual should only be considered as an example, as they may not refer to the refrigeration unit described here.

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1 GENERAL INFORMATION

1.1 Introduction



NOTE

ZANOTTI S.p.A., the manufacturer of this refrigeration unit in question is referred to in the manual as **Manufacturer**.



NOTE

The company that purchased the refrigeration unit is referred to in the manual as **Customer**.

This manual contains all the information necessary for correct use and maintenance of the refrigeration unit.

This document represents the user manual of Refrigeration unit Uno and is completed in accordance with EEC Directive 2006/42.




This manual is to be regarded as an integral part of the refrigeration unit and must be kept until final disposal.

1.2 Service

For technical service, contact the manufacturer's service centre directly.

1.3 Symbols

The manual uses some symbols which are used to draw the reader's attention and highlight some particularly important aspects.

SYMBOL	MEANING	NOTES
	DANGER	It indicates a risk of injury to the user. Pay close attention to the text blocks indicated by this symbol.
	CAUTION	It is a warning of possible deterioration or damage to the refrigeration unit. Pay attention to the text blocks indicated by this symbol.
	WARNING NOTE	It indicates a warning or a note on key functions or useful information. Pay attention to the text blocks indicated by this symbol.

1.4 Manufacturer's contact details

For any type of information or clarification regarding use, etc., the Manufacturer's Technical Office is always at the disposal of the Customer's requests.

The latter should ask questions in clear terms, with references to this manual, always indicating the data on the identification plate of the refrigeration unit in question.

Any request for intervention, from the Customer's service department, or for clarification regarding the technical aspects of this document, must be addressed to:

Zanotti S.p.A.
Via M. L. King, 30
46020 Pegognaga (MN) Italy
Phone +39 0376 5551
E-mail: info@zanotti.com

1.5 Safety standards

This manual provides instructions, indications, standards, and safety notes which are intended to define a series of behaviours and obligations that must be followed in carrying out the various activities intended for use of the refrigeration unit in order to ensure personnel, equipment, and the surrounding environment are protected.

The safety standards are aimed at all personnel authorised, trained and delegated to perform the various tasks and activities of:

- Operation
- Use
- Management

1.6 Manufacturer's responsibility

The manufacturer cannot be held responsible for improper or incorrect use of the refrigeration unit, for damage resulting from the use of non-authorised spare parts or tampering with circuits, components and software.

The responsibility for the implementation of the safety precautions, listed below, is borne by the technical personnel responsible for the activities envisaged on the refrigeration unit.

It is the installer's responsibility to ensure that the operators (authorised to perform the required activity) are qualified, adhere to, and are aware of all the requirements of this document as well as the general safety standards applicable to the refrigeration unit.

Failure to observe the safety standards can cause injury to personnel and damage to the equipment.

1.7 Management of the refrigeration unit

The management of the refrigeration unit is only permitted to authorised and properly trained operators.

The operators in charge of the use of the refrigeration unit must be aware that knowledge and application of the safety standards is an integral part of their work.

Before starting the refrigeration unit it is necessary to:

- read this manual carefully.
- know which guards and emergency stop devices are on the refrigeration unit, where they are located and how they work.

It is prohibited to remove, even partially, the safety guards and devices located on the refrigeration unit.

The same standard applies to the warning plates.

The safety guards and devices must be kept in perfect order to ensure proper operation. In the event of a malfunction or breakdown of these devices, contact the Manufacturer's Technical service immediately.

1.8 Warranty

The Manufacturer warrants his products from defects in materials and manufacture for a period of 24 months from the date of delivery.

The purchaser is only entitled to the replacement of the defective parts; the costs of packing, transport and any installation shall be borne by the manufacturer. In this case, the following shall be specified:

- Date and number of the purchase document.
- Refrigeration unit model.
- Serial number.

Claims for damages due to non-use or long periods of inactivity of the refrigeration unit will not be accepted.

Damage for use not in accordance with this manual is excluded from the warranty.

The warranty will not be recognised for machines where unauthorised modifications have been made. In any case, modifications or tampering with safety devices are strictly prohibited.

In the case of repairs during the warranty period, it is necessary to use original spare parts in order not to affect their validity.

Repair work must only be carried out by specialised operators, who are familiar with the refrigeration unit.

2 SAFETY

2.1 General information

The Customer must provide personnel with training on the risks of injury, on the safety devices installed on the refrigeration unit and on the general accident prevention rules in the European Union and local regulations.

The operators must know the position and operation of all the controls of the refrigeration unit and their characteristics.

In addition, they must have read and fully understood the contents of this manual.

By tampering with, or unauthorised replacement of, one or more components of the refrigeration unit, adopting accessories that modify its use, and using spare parts other than those recommended, there is a risk of injury.



DANGER

It is absolutely forbidden to by-pass/tamper with the safety devices on the refrigeration unit. The Manufacturer accepts no responsibility for the safety of the refrigeration unit in case of non-compliance with this prohibition.



DANGER

In the event of an intervention on the plant, only use bypass hoses in good condition and avoid letting them come into contact with belts, pulleys, or fans.



DANGER

Avoid putting your hands near the fans and the belts when the unit is operating.



DANGER

The coolant liquid is under pressure. Any intervention into the refrigeration circuit must only be carried out by authorised personnel. To prevent accidental spillages of liquid, do not open the caps of the tanks.



DANGER

Disconnect the plug and ensure that the refrigeration unit is turned off before performing maintenance. In case of prolonged maintenance, disconnect the battery.

**DANGER**

Battery acid causes burns. The batteries contain sulphuric acid.

Avoid contact with skin, eyes or clothing.

In case of accidental contact with the skin, rinse with water.

In case of accidental contact with the eyes, rinse with water for 15 minutes and consult a doctor immediately.

In the event of an accidental ingestion, you should consume large quantities of water or milk. Do not induce vomiting. Consult a doctor immediately.

Failure to comply may result in death or serious injury.

**DANGER**

The battery could explode!

To prevent an explosion:

- Always unplug the negative battery cable (-) first.
- Always connect the negative battery cable (-) last.
- Do not short-circuit the battery ends with metal objects.
- Do not weld, mould or smoke near a battery.

Failure to comply may result in death or serious injury.

2.1.1 Refrigeration unit certification

The refrigeration unit is provided with the EC Declaration of Conformity with the essential safety requirements in accordance with Machine Directive 2006/42/EC (Annexe II A) and the Electromagnetic Compatibility Directive 2014/30/EU.

**NOTE**

Any changes made to the refrigeration unit will immediately invalidate the EC certification issued by the manufacturer.

2.1.2 Refrigeration unit identification

The model and serial number (or serial number) are shown on the metal plate attached to the side of the unit (Figure 1) and to the electrical panel (Figure 2).



Figure 1 - Metal plate

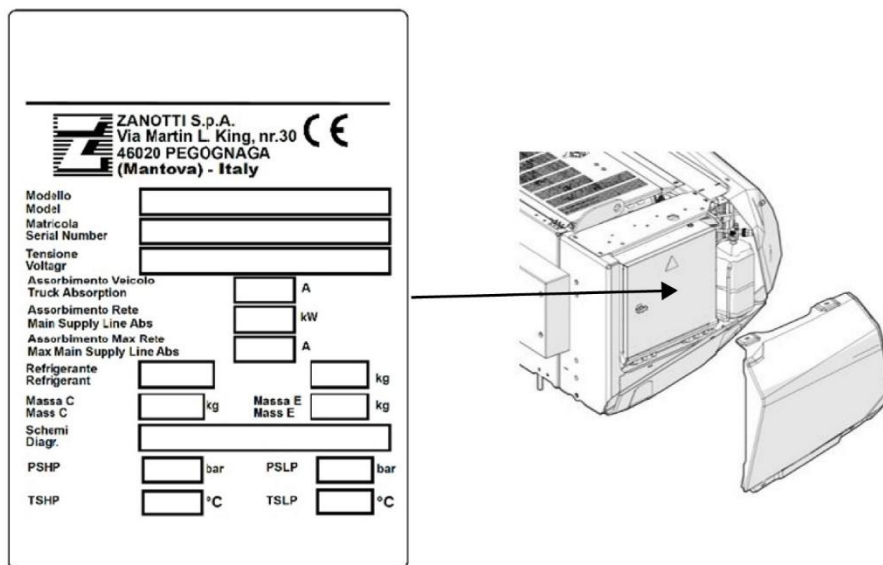


Figure 2 - Plate on the electrical panel

2.2 Intended and unintended uses

The unit in question was designed and built to be installed in motor vehicles intended for the transportation of refrigerated products, or, more generally, for the transportation of goods for which temperature control is required.



DANGER

The use of the refrigeration unit for purposes and processes not described in this manual constitutes **IMPROPER USE**. The Manufacturer declines any and all responsibility for any damage caused to property and/or persons and considers that any form and type of guarantee of the refrigeration unit has lapsed. The Manufacturer accepts no responsibility for tampering with the refrigeration unit, for unauthorised modifications or for maintenance operations carried out by untrained personnel.



DANGER

In case of abnormal operation or lack of supply, it is forbidden to carry out any procedure. These interventions are reserved only for operators assigned to maintenance.

2.3 Environmental operating conditions

2.3.1 Fire extinguishing system

The refrigeration unit is not equipped with its own fire extinguishing system.

In accordance with local regulations, the customer must make sure the fire extinguishing devices on the vehicle where the refrigeration unit is installed are present and functioning properly.

Flammable liquids do not circulate freely in the refrigeration unit.

2.3.2 Explosive Atmosphere

The refrigeration unit is not designed and manufactured to work in environments with an explosive or partially explosive atmosphere.

2.3.3 Vibrations

The refrigeration unit does not produce vibrations which are dangerous to the health of the staff in charge.



CAUTION

Excessive vibration can only be caused by a mechanical fault, which must be immediately reported and eliminated, in order not to jeopardise the safety of the refrigeration unit and of the staff in charge.

2.3.4 Noise

The noise level testing has been carried out in accordance with the requirements of UNI EN ISO 9614-2 acoustics.

Typical phonometric data are stored by the Manufacturer.

The sound power generated is indicated on a label located on the door of the electrical panel.



NOTE

The measurements of the noise exposure levels of the persons in charge shall be carried out by the users, in accordance with the local regulations.

2.3.5 Electromagnetic emissions

The refrigeration unit contains electronic components subject to Electromagnetic Compatibility legislation, conditioned by conducted and irradiated emissions.

Emission values conform to the standard through the use of components complying with the Electromagnetic Compatibility Directive, suitable connections and installation of filters where necessary.

The refrigeration unit therefore complies with the Electromagnetic Compatibility (EMC) Directive.

2.4 Disposal of used materials

The refrigeration unit, in its normal operation and in the absence of defects, does not produce any used material.

It is necessary to periodically check for leaks in the coolant circuit, in accordance with the correct procedure to avoid any dispersion. It is also necessary to check for leaks of fuel, oil and engine cooling liquids.

The engine oil, cooling liquid, dehydrating filter, oil filter, fuel filter and air filter are materials that must be replaced regularly according to the scheduled maintenance plans in this manual. They should not be disposed of in the environment, but in accordance with local regulations. The customer must be aware of this fact and operate in such a way as to comply with it.

The refrigeration unit and its packaging must be disposed of in accordance with local laws and regulations. As this unit is composed of an engine and electronic components, the refrigeration unit and its accessories must be disposed of separately from general solid urban waste at the end of its life cycle. Contact your local authority for information on disposal and recycling.



3 DESCRIPTION

3.1 General information

The refrigeration unit has been designed and built to be installed on motor vehicles for the refrigerated transport of fresh and frozen products.

The refrigeration unit consists of the following parts (Figure 3):

Condenser unit, installed outside the isothermic crate.

Evaporative unit installed inside the isothermic crate.

Electronic control and command power unit (HMI) , located inside the vehicle cab (in-cab controller).



Figure 3 - Refrigeration unit Uno

There are two different versions of HMI software. A button or a switch controls the power on the unit, depending on the version. These differences are indicated by the last letter of the serial number of the unit, as follows:

- last letter of the serial number: **A** → **button** power-on
- last letter of the serial number: **B** and subsequent → power-on by switch

3.2 Loading of goods



NOTE

The refrigeration system is designed to keep the temperature of the goods being loaded constant. It is not designed to refrigerate hot products.

It is therefore extremely important to check the temperature of the goods during loading to ensure that they are at the ideal transport temperature.

Maintaining the quality of the goods during transport depends on the correct air circulation (and thus on the uniform temperature distribution) in the insulated cold room.

The lack of free movement of air leads to pockets of heat or to ice formation.

For this reason, it is advisable to use pallets that will promote the free movement of air, protecting goods from heat coming from the floor of the trailer.

It is also important to position the goods away from the walls of the insulated cold room in order to ensure correct air circulation.

Products such as fruit and vegetables, which generate heat, must be stacked to ensure sufficient space for the removal of the heat generated.

Products such as meat and frozen food, which do not generate heat, must be stacked in the centre of the cold room close to each other.

3.2.1 Before loading goods

- Cool the cold room in advance before loading the goods. Power on the unit before loading.
- If the temperature reaches 4°C, it is recommended that the evaporating battery is defrosted from the presence of ice in order to increase its efficiency.

3.2.2 When loading goods



NOTE

The loading of goods must be carried out with the system off.

- Reduce the opening times of the cold room doors, to avoid the entrance of hot air and humidity.
- Depending on the products to be transported, select the temperature via the HMI in-cab controller (see 4.4.3).

- Promote air circulation without obstructing the air suction and air supply openings (Figure 4).

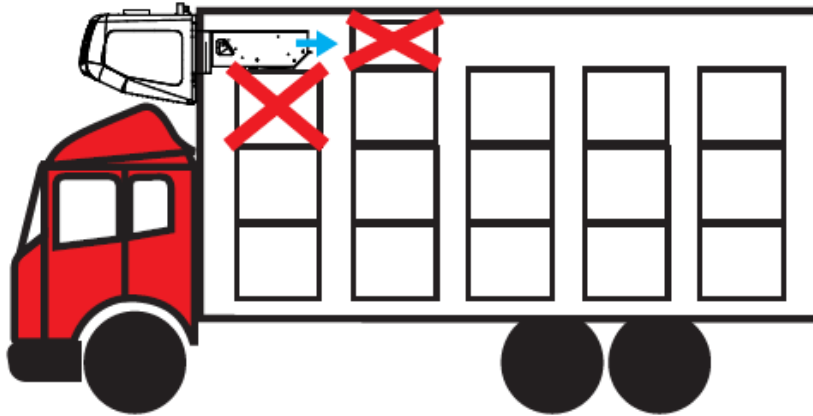


Figure 4 - Covered suction and ventilation ducts

- Leave a free space of about 6 - 8cm between the load and the front wall and about 20cm between the top of the load and the roof (Figure 5).
- Leave a free space even between the floor and the load.

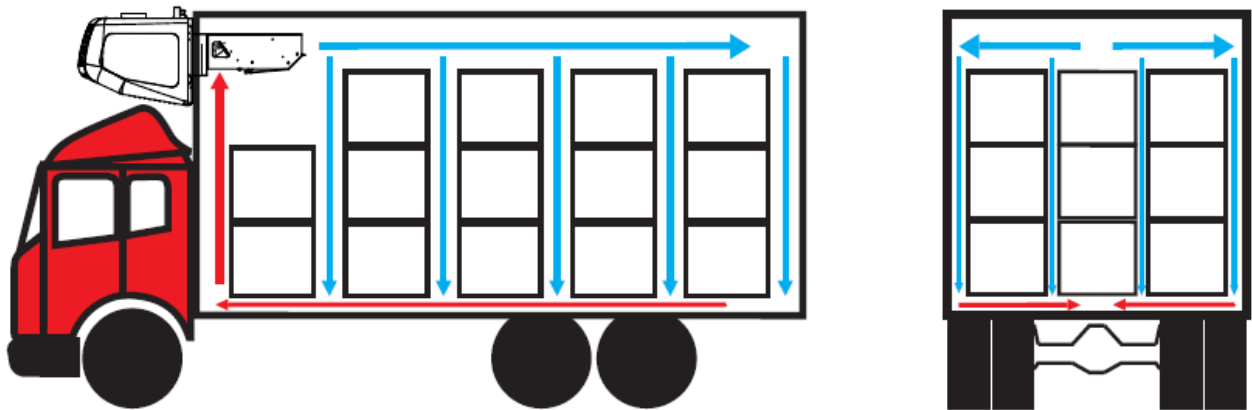


Figure 5 - Air circulation inside the cold room



DANGER

The transport cold rooms do not need to be opened from the inside. Before closing the doors of the cold room, make sure that no one is inside it.



CAUTION

During rest periods, it is recommended to place the cold room in the shadows.



CAUTION

Never leave a system unused for more than a month.

3.3 Operation

3.3.1 Operating in "road" mode

The in-cab controller recognises that the unit is in "road mode" operation mode when it does not detect the presence of a mains voltage (plug connection to the mains).

The unit is completely autonomous with respect to the vehicle on which it is installed and can operate even during rest periods.

In Road mode, the compressor is operated by a laminated diesel engine via an axial joint.

The diesel engine also operates a 12 VDC alternator which:

- provides supply to the control components of the fridge circuit and the various control circuits services;
- recharges the dedicated start battery.

3.3.2 Operation in "External power supply" mode (optional)

On request, it is possible to connect the unit via a plug to the mains ("External power supply" mode).

By connecting the unit to the external socket, the "External power supply" mode is automatically triggered and the diesel engine is turned off after approximately four and a half minutes (255 seconds).



CAUTION

The "External power supply" option is a dimensioned operating mode for occasional and non-intensive use. It cannot be considered as a replacement for a system with a fixed cold room, without having the same technical characteristics.

3.3.3 Defrosting

Because of the cooling it is subjected to, the air releases moisture that accumulates while gradually freezing on the fins of the evaporator. This would result in a progressive obstruction of the circulation of air resulting in a reduction in the efficiency of the system.

Over time, this could also cause damage.


As a result, the hydraulic unit periodically performs defrosting cycles to reduce the accumulation of ice, thereby avoiding the problems mentioned above. The water is discharged externally.

The in-cab controller manages autonomously and periodically the beginning and end of the defrosting.

During the defrosting phase, "hot gas" is exploited, i.e. the heat created by the compression of the refrigerant gas is diverted directly into the evaporator to melt the accumulated ice.

Tips

The efficiency of the defrosting is inextricably linked to the accuracy with which the water discharge line generated as a result of the ice melting is achieved. Therefore:

- Make sure that the slope of the discharges is such as to ensure the correct flow of condensation.
- Periodically check the water outflow from the condensate drain hose.
- Minimise the cold room openings and switch off the unit during loading and unloading of the goods, in order to minimise the inlet of damp external air.
- In case of intensive use of the unit, regularly check the accumulation of ice in the evaporator and, if necessary, perform manual defrosting  by pressing the button (5, Figure 11).

3.3.4 Temperature control

It is possible to set the temperature control in two different ways:



AUTOMATIC (start/stop)

The unit stops as soon as the set temperature has been reached. When the unit detects that the temperature has exceeded the set-point by 2K (2°C), the in-cab controller restarts the unit. In this mode, temperature control is obtained by means of stops and starts.



CONTINUOUS

When carrying delicate loads, such as fresh meat, vegetables and cheese, it is possible to select the continuous operation mode.



NOTE

In order to keep the quality of the goods intact, during delivery cycles that require frequent door stops and opening, it is recommended to keep the unit in automatic operation.

3.3.5 Heating

In case of particularly low ambient temperatures (in certain circumstances and/or periods of the year), it may be necessary to heating the cold room as an alternative to keeping it cool.

This, in order to maintain the correct temperature of the product, regardless of the external conditions for the entire necessary period.

This occurs, for example, in the case of transporting foil flowers or plants for which a temperature between 5 and 10°C (41-50°F) must be guaranteed, even when the external temperature falls below zero.

From a technical point of view, the heating uses the same principles as for the hot gas defrosting described above.

In the event that the set-point temperature of the cold room exceeds that measured, the unit automatically switches to the heating mode if required by the operating conditions.

3.4 Multi-Temperature unit (U800 Multi | U1000 Multi)

The Multi temperature unit allows the management of two compartments at a different temperature. The unit is equipped with two evaporators (1 and 2, Figure 6) and a dedicated in-cab controller (3), which manages the two temperatures independently of each other. The heating function is also included in the operating logics.

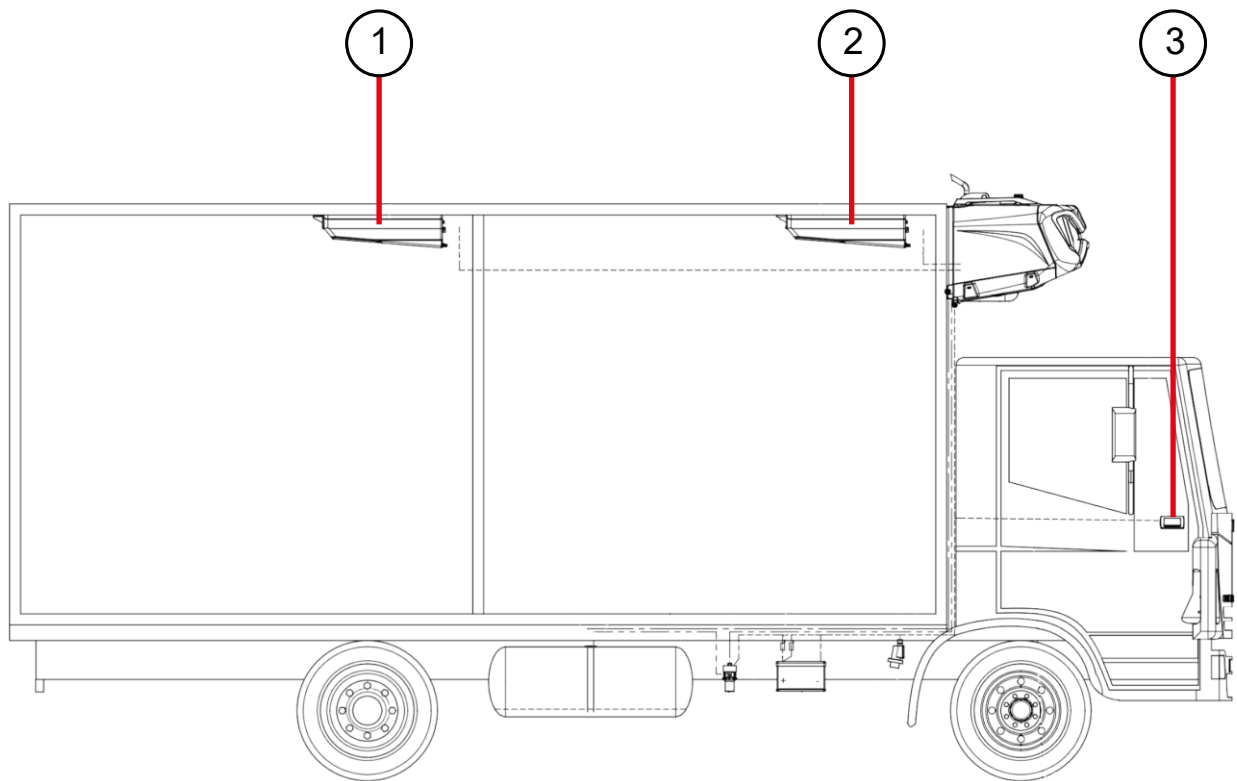


Figure 6 - Multi temperature unit evaporators

In Multi-Temperature units, if one circuit is dedicated to cooling and the other to heating, it is possible to set the priorities as follows:

- A) **COLD work priority:** dependent circuits with cooling priority.
Cooling has priority. Heating starts only after the cooling operations have finished.
- B) **HOT work priority:** dependent circuits with heating priority.
Heating has the priority. Cooling will start only after heating operations are completed.

4 USE

4.1 On/Off unit



NOTE

With the unit off, the display and the electronic board are not powered. This prevents the battery from being discharged.

4.1.1 Refrigeration unit with final serial letter A

To turn the unit on, press and hold the button (1, Figure 7) - located on the in-cab controller - for longer than 3 seconds.

The display and the electronic board come on. After the initialisation phase, identified by indications on the display, it is possible to start the refrigeration unit by pressing the ON/OFF key on the in-cab controller (see instructions in the following paragraphs).

To turn off the unit, press and release the button (1).



Figure 7 - On/off Button A

4.1.2 Refrigeration unit with final serial letter **B** and subsequent letters

To turn the unit on, move the switch (1, Figure 8) located on the in-cab controller to position “1” (ON).

The display and the electronic board come on. After the initialisation phase, identified by indications on the display, the procedure for switching on the refrigeration unit starts automatically.

It is possible to switch off the refrigeration unit and stop the temperature control by pressing the ON/OFF key on the in-cab controller (see instructions in the following paragraphs).

To turn off the unit, turn the switch (1) to the “0” (OFF) position.

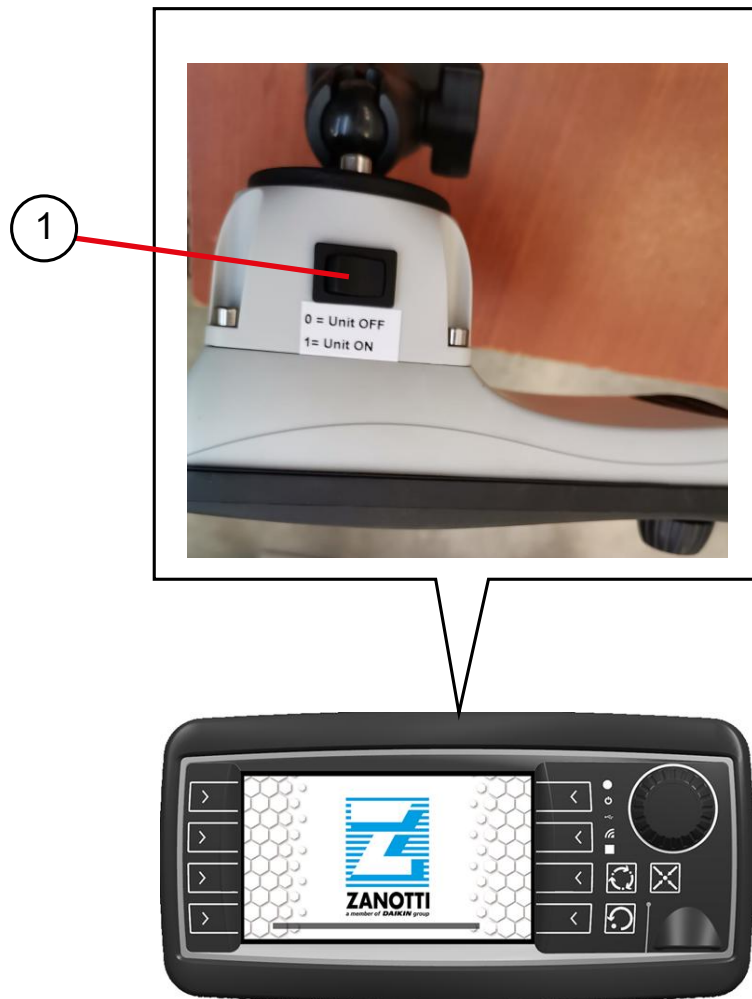


Figure 8 - On/off Button B

4.1.3 Refrigeration unit with final serial letter C and subsequent letters

To turn the unit on, move the switch (1, Figure 8) located on the in-cab controller to position ON.

The display and the electronic board come on. After the initialisation phase, identified by indications on the display, the procedure for switching on the refrigeration unit starts automatically.

It is possible to switch off the refrigeration unit and stop the temperature control by pressing the ON/OFF key on the in-cab controller (see instructions in the following paragraphs).

To turn off the unit, turn the switch to OFF position.

4.1.4 Emergency start and stop button

In special cases, and when the in-cab controller does not work, the unit can be switched on and off by the emergency button (1, Figure 9) located on the electrical panel closing panel.



DANGER

To access this ignition button, it is necessary to reach the unit where it is installed, climbing onto the roof of the driver's cab. For this reason the user must use the appropriate PPE necessary for activities at height.



NOTE

If you turn on the unit by pressing the emergency button, the temperature control is activated with the last settings adjusted.

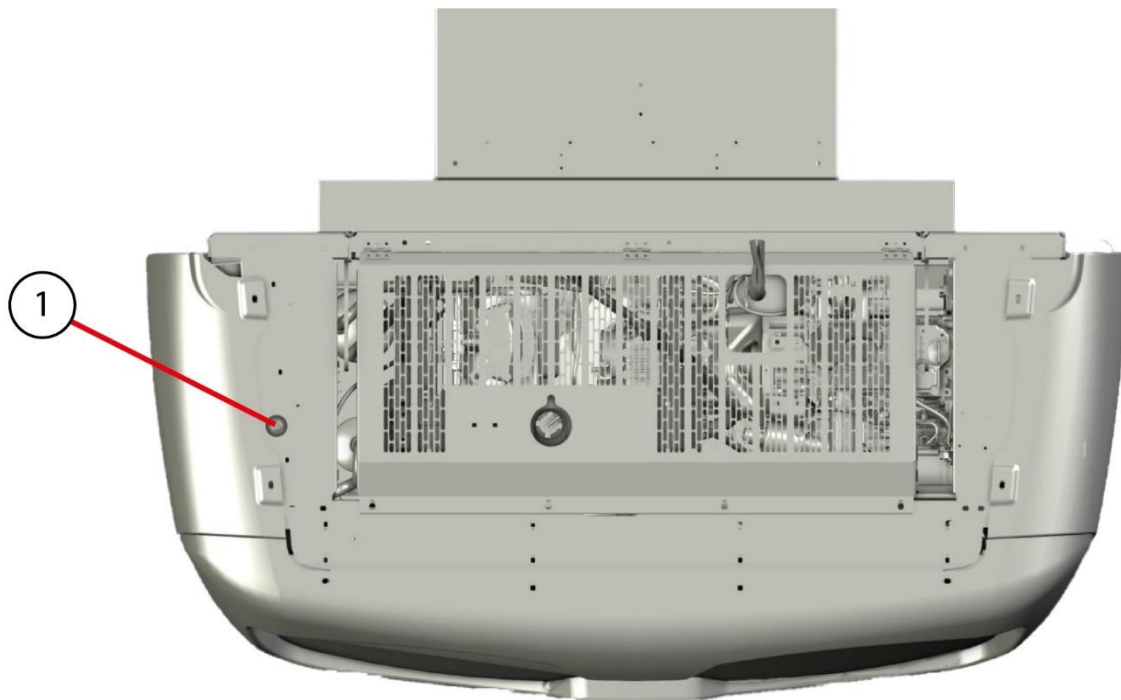


Figure 9 - Emergency start and stop button

4.2 In-cab controller

The main control unit, located inside the vehicle cab (in-cab controller), allows the management and monitoring of the unit.

By setting the Set-Point temperature, the unit executes the thermoregulation autonomously in the operating mode selected (Continuous or Automatic).

Road mode (diesel engine) or External power supply (Electric Compressor) operations are automatically managed by evaluating the connection to the power supply. It is possible to prevent the thermal engine from starting, in the event of a power failure or an interruption of electrical power, by inhibiting its starting (see. 4.2.2).



Figure 10 - In-cab controller

4.2.1 Control description

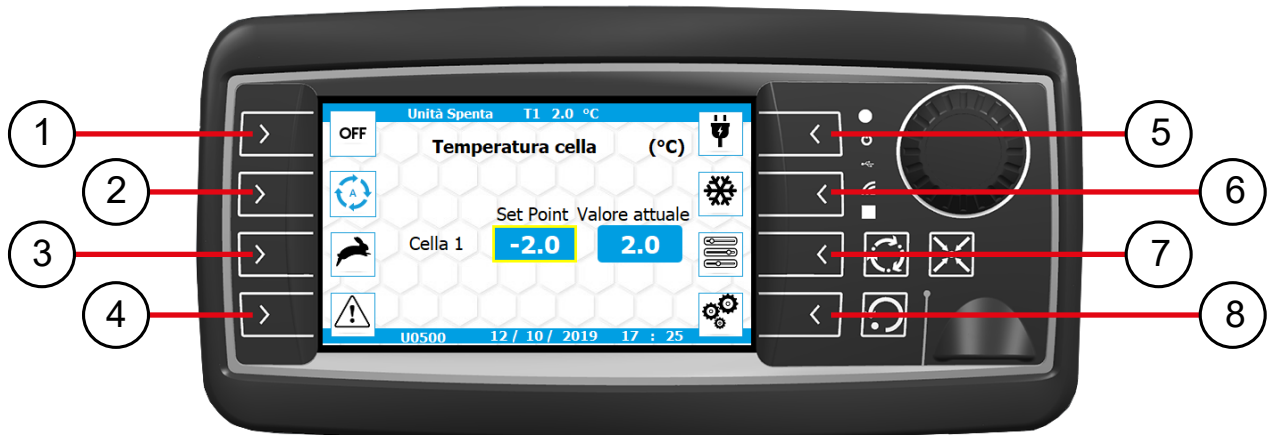










Figure 11 - Menu Controls

1		Temperature control ON/OFF key. By pressing this key, the unit will start the refrigeration unit in "Road" or "External power supply" mode if connected to a three-phase external socket. The temperature control will try to reach the set temperature by automatically adjusting fans and valves.
2		Key for selecting Continuous mode (the engine is always on during the temperature control phase) or Start - Stop mode (the engine switches on and off during the temperature control phase).
3		Key for selecting Normal-Hare mode (the engine operates at normal speed) or City/Silent-Turtle mode (the engine works at a lower rpm to reduce emissions). The icon represents the selectable mode.
4		Alarms key. By pressing this key the alarm menu is opened.
5		Multifunction key. The upper part acts as a "Road" or "External power supply" status indicator (the presence of voltage causes the automatic change from one state to another). With this key it is also possible to inhibit "Road mode" operation if the voltage of the mains fluctuates causing the diesel engine to start (see paragraph 4.2.2).
6		Temperature control Status key. By pressing this key it is possible to view the status of the temperature control. This key can also be used to start manual defrosting. If this is not possible - due to a temperature that is too high or in the event of the temperature control being switched off - a pop-up window will indicate the non-start and list of the possible causes.
7		Password-protected parameter page access key.
8		Access key to the interface setup page.

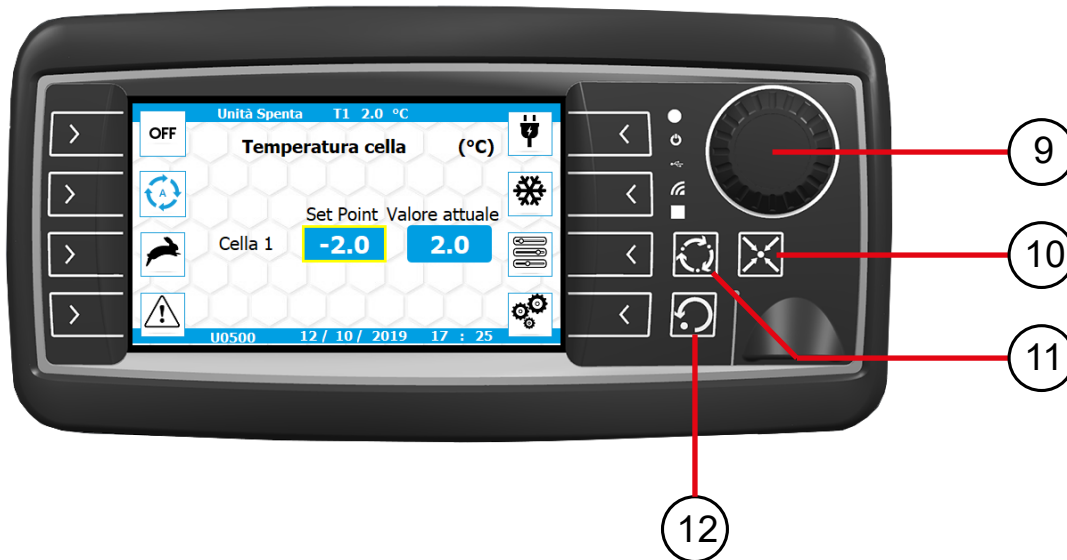






Figure 12 - Navigation Controls

9		<p>Scroller button. It allows the user is to navigate within the page by rotating and, subsequently, selecting a field by pressing it to modify it, increasing its value by rotating clockwise, or reducing it by rotating anticlockwise. Confirm by pressing again.</p>
10		<p>Return key to the Home page. By pressing this key it is possible, from anywhere, to return to Home page.</p>
11		<p>Page selection key (Engine data, Fridge circuit data, Fan data, etc.).</p>
12		<p>Return key to the previous page.</p>

4.2.2 Road mode/External power supply mode operation and blackout mode.

As indicated in the previous chapters, by connecting the unit to the mains via the special plug provided (if present), the system switches automatically to "mains" mode, turning off the diesel engine . However, to maintain the correct temperature inside the cold room, the diesel engine may start automatically if the system detects there is no main power supply for more than 255 seconds (blackout mode).

To deactivate the automatic ignition of the diesel engine, keep the key 5 (Figure 11) pressed until the icon of the engine with the red X appears (see. Figure 13).



Figure 13 - Blackout Mode Deactivation



DANGER

It is compulsory to disable the automatic ignition of the diesel engine when the vehicle is in a closed place and in External power supply mode. Danger of suffocation.

4.3 Display pages diagram

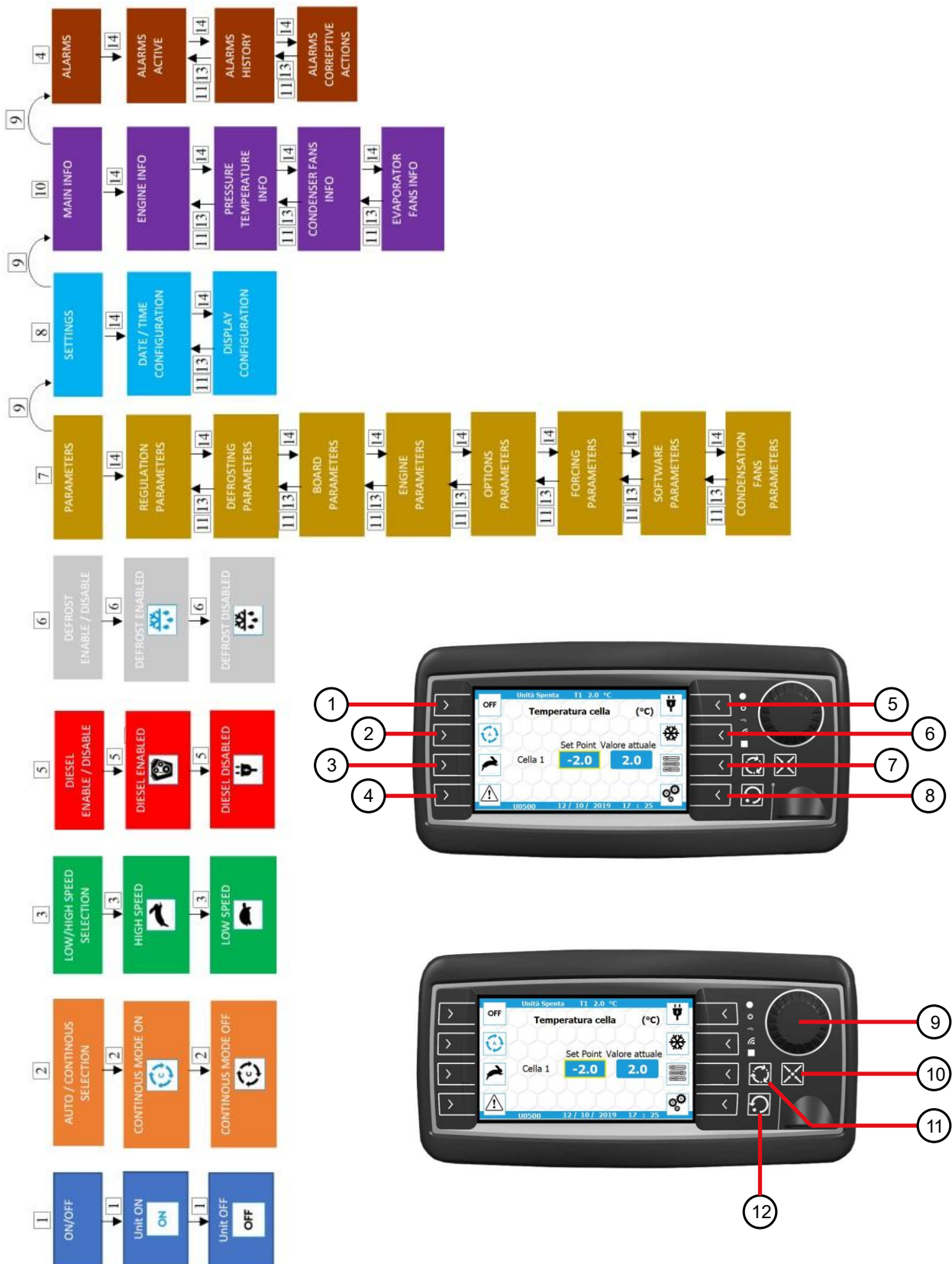


Figure 14- Display pages diagram

4.4 Using the in-cab controller (HMI)

When starting the system, the welcome page (Figure 15) appears.

The bottom bar indicates the load status.



Figure 15 - Start page

Once the system has been loaded, the Home page appears.

4.4.1 Refrigeration A in-cab controller Page

The bottom bar of the refrigeration A power unit shows the following information (Figure 16):

- Model

Date

Time

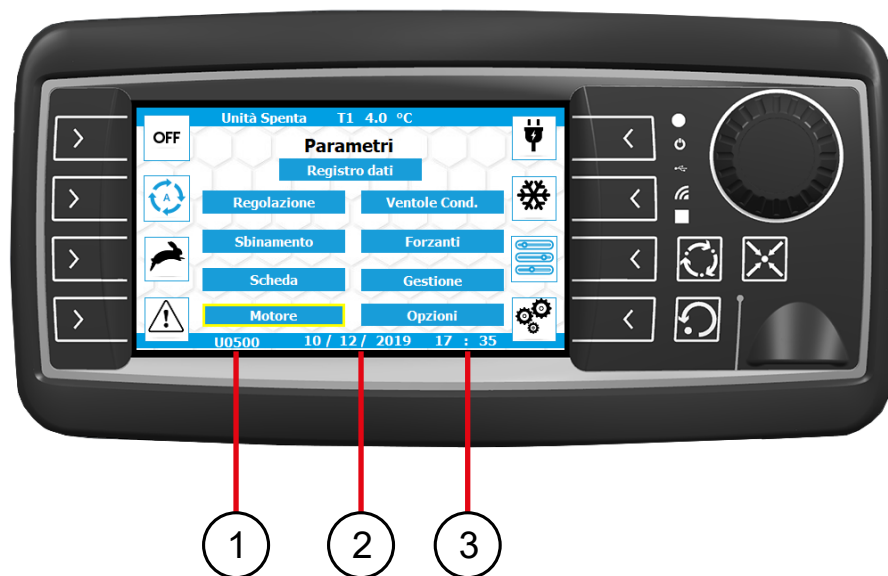


Figure 16 - A power unit Page

4.4.2 Refrigeration B in-cab controller Page

The bottom bar of the refrigeration B power unit shows the following information (Figure 17):

- Cold room 1 Evaporator Status

Cold room 2 Evaporator Status (U800 Multi and U1000 Multi only)

Temperature control mode (Auto / Continuous)

Engine speed setting: Normal (Hare) or City/Silent (Turtle)



NOTE

The icon on the bottom bar represents the mode selected, while the icon on the corresponding control represents the selectable mode.

Time

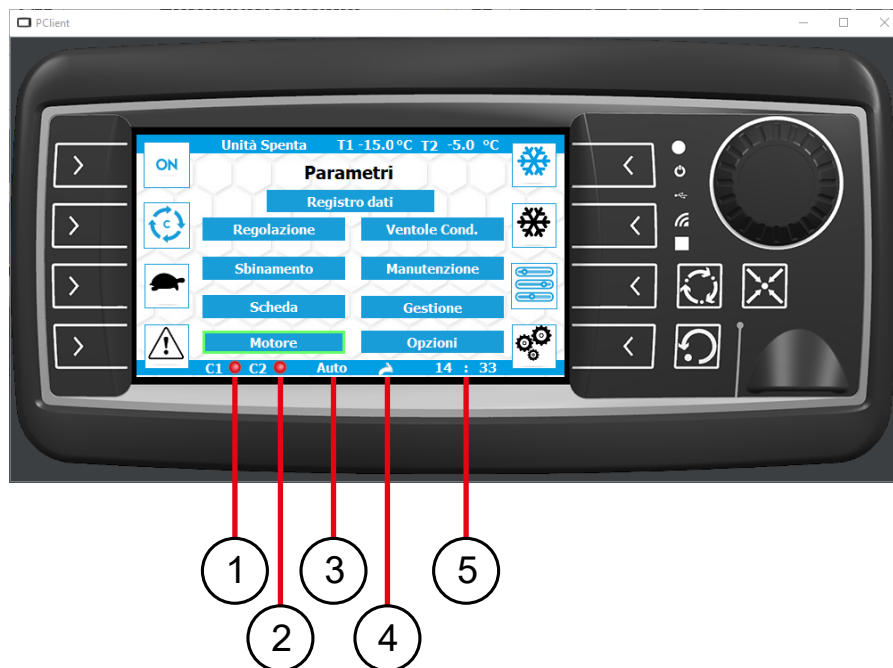


Figure 17 - power unit B Page

4.4.3 Home Page

Through this page it is possible to view the current temperature of the cold room and modify the set-point.

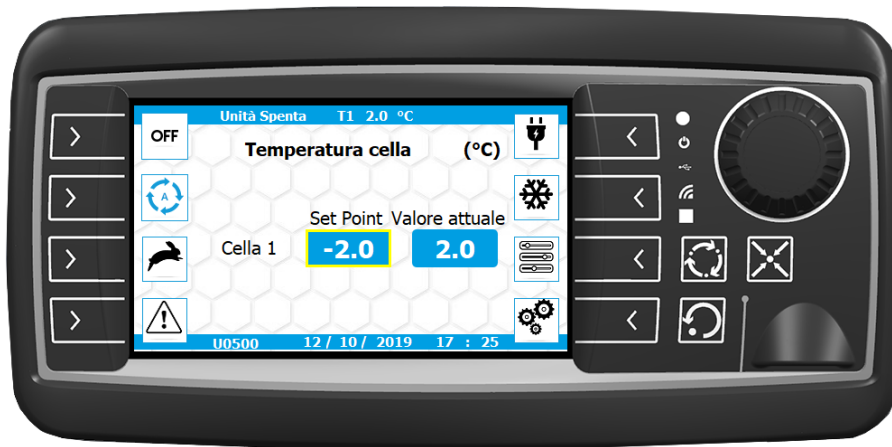


Figure 18 - Home Page - Standard Version

To modify the set-point, proceed as follows:

- Rotate the scroller to highlight the set-point value to be modified.

Press the scroller to change the value.

Turn the scroller clockwise to increase the size, or anticlockwise to decrease it.

Press the scroller to confirm. The following confirmation page will appear:

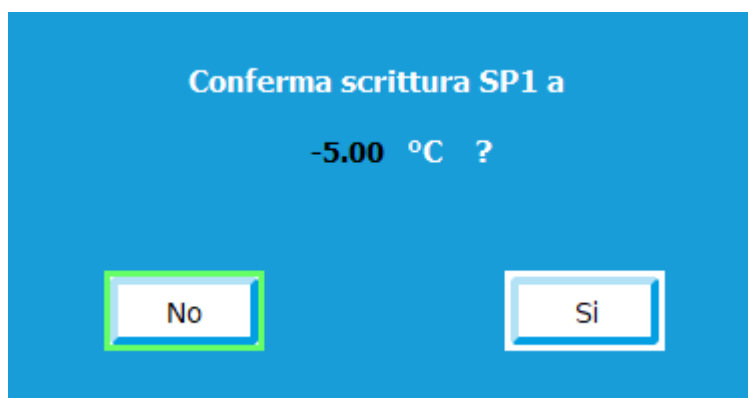


Figure 19 - Set-point Change Confirmation Page

Turn the scroller to highlight the "Yes" button.

Press the scroller to confirm.

4.4.4 Setting Multi models cold room temperature

For the U800 Multi and U1000 Multi models, you can view individual cold room temperatures and edit the set-points separately.

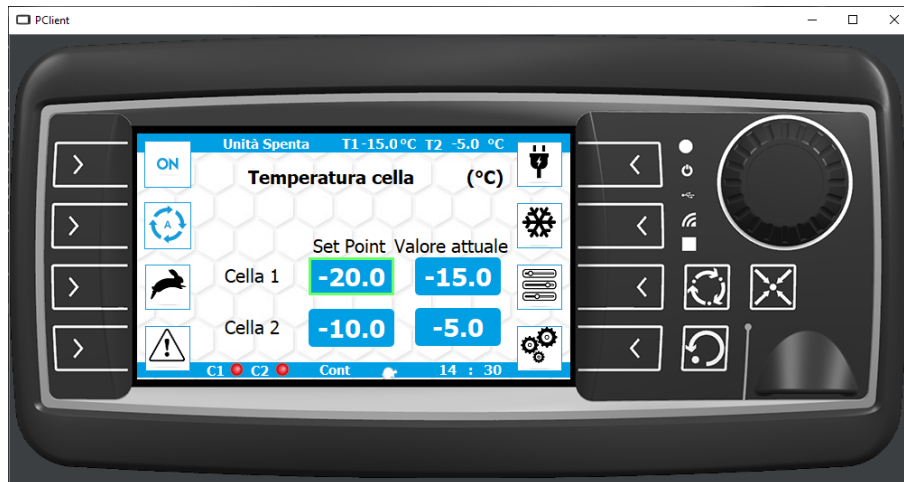


Figure 20 - Home Page - Multi-Temperature version

To modify the set-point for ROOM1, proceed as follows:

- Rotate the scroller to highlight the set-point value of ROOM1.

Press the scroller to change the value.

Turn the scroller clockwise to increase the size, or anticlockwise to decrease it.

Press the scroller to confirm. The following confirmation page will appear:

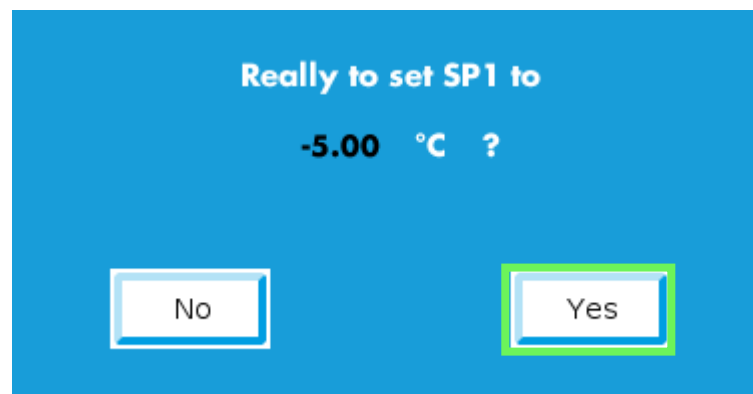


Figure 21 – Room1 Set-point change confirmation page

Turn the scroller to highlight “Yes” button.

Press the scroller to confirm.

To modify the set-point for ROOM2, proceed as follows:

- Rotate the scroller to highlight the set-point value of ROOM2.

Press the scroller to change the value.

Turn the scroller clockwise to increase the size, or anticlockwise to decrease it.

Press the scroller to confirm, the following confirmation page will appear:

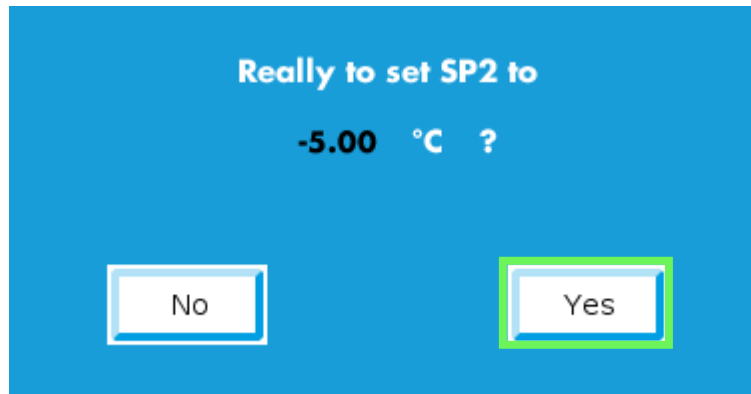


Figure 22 – Room2 Set-point change confirmation page

Turn the scroller to highlight “Yes” button.

Press the scroller to confirm.

To activate thermoregulation, press Thermoregulation ON button, the following confirmation page will appear:

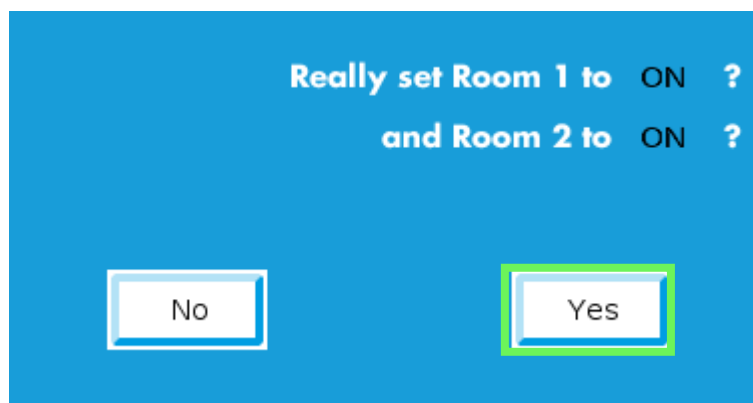


Figure 23 – Multi-temp thermoregulation confirmation page

Turn the scroller to highlight “Yes” button.

Press the scroller to confirm.

To change “Working Priority”, access “Management” program MENU (See Appendix B):

Set “Hot” if the cooling operations (both rooms) can start only if all heating procedures are completed.

Set “Cold” if the heating operation (both rooms) can start only if both rooms are in cooling setpoint.

4.4.5 Engine data page

Through this page it is possible to view the following data relative to the endothermic engine (Figure):

- Current engine rotation speed.
- Current engine cooling liquid temperature.
- Total operating time counter (Road mode + External power supply mode).
- Road mode operating time counter.
- External power supply mode operation time counter.

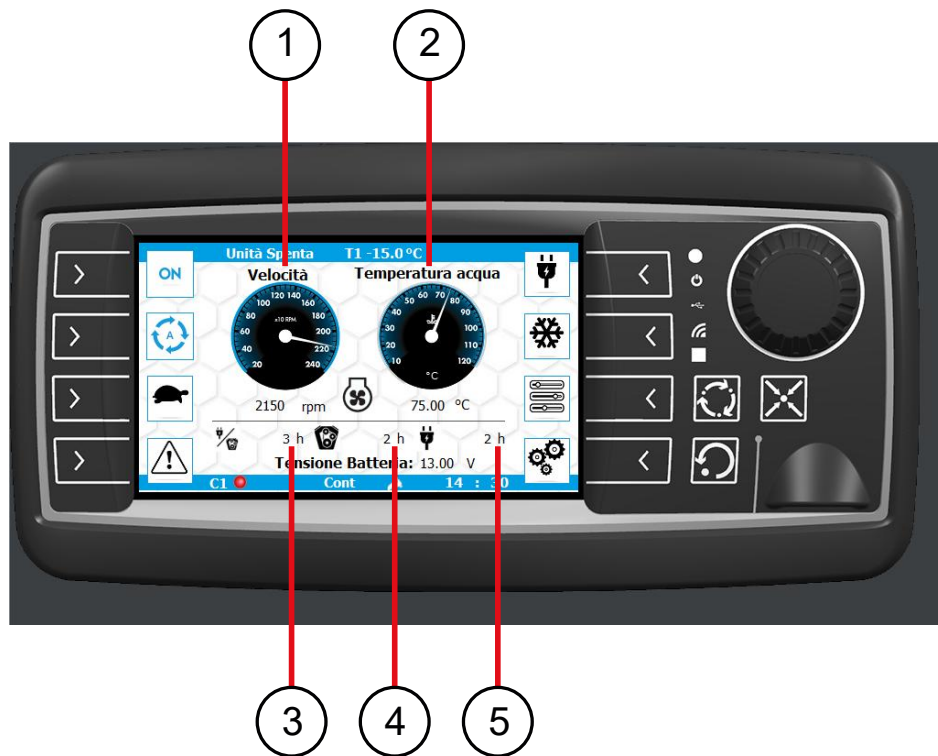



Figure 22 - Engine data page

By pressing the key , the fridge circuit data page is reached.

4.4.6 Fridge circuit data page

Through this page it is possible to view the pressure HP, LP and the temperature measurements of the sensors present on the unit.

Scaling and units of measurement of the displayed quantities update based on the settings selected.

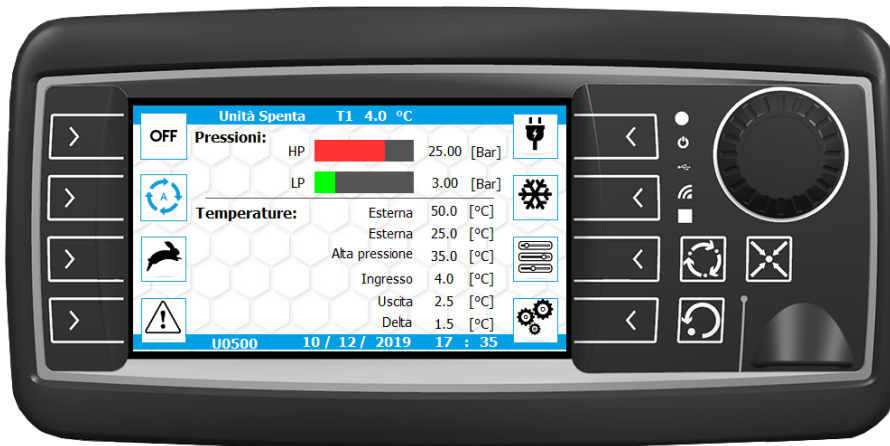



Figure 23 - Fridge circuit data page

By pressing the  key the next page is reached.

4.4.7 Evaporator temperature page - Multi temperature versions only

Through this page it is possible to view the temperature measurements of the sensors of cold room 1 and cold room 2.

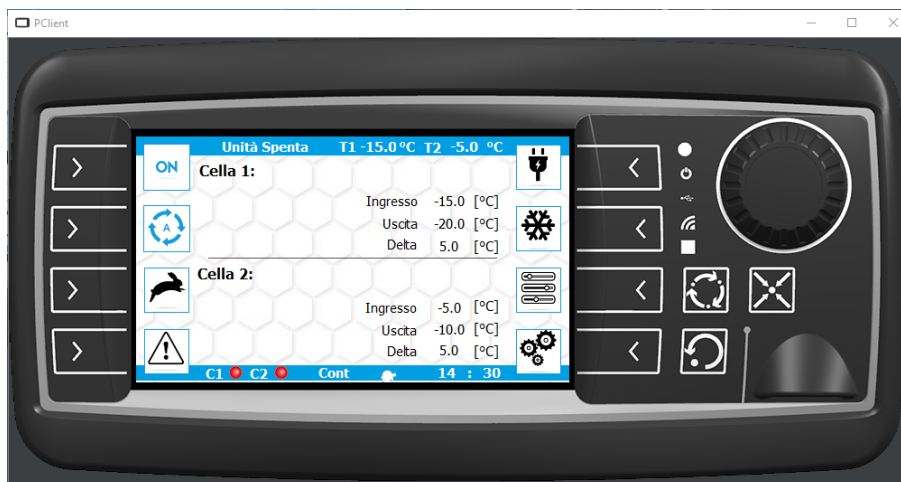


Figure 21 - Evaporator temperature page (Multi temperature versions only)

By pressing the key , the fan data page is reached.

4.4.8 Fan data page

Through this page it is possible to view the speed percentage of both condenser fans and evaporator fans.

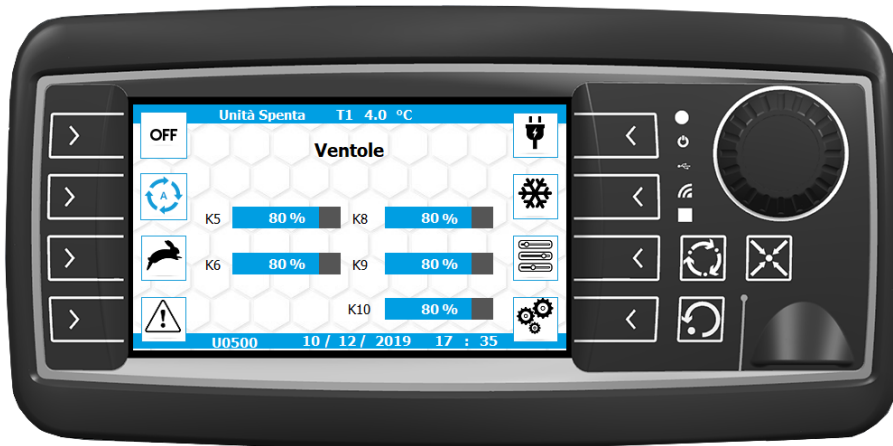


Figure 22 - Fan data page - Standard Version

K5 Condenser fan

K8 Evaporator fan

K6 Condenser fan

K9 Evaporator fan

K10 Evaporator fan

The U800 Multi and U1000 Multi models display cold room 1 and cold room 2 values separately.



Figure 23 - Fan Data Page - Multi temperature version

4.4.9 Parameters


By pressing the  key, the parameters page is reached via a service password.



Figure 24 - Password Request Page



CAUTION

To avoid accidental tampering, the parameter page is accessible only by authorised personnel.

4.4.10 Interface Setup


By pressing the  key the interface setup page is reached.



Figure 25- Settings Menu

Brightness can be adjusted manually between 0 and 100%. If set beyond 100, the writing appears and the adjustment becomes automatic

AUTO

4.4.11 Alarms


By pressing the  key, the alarms page is reached.



Figure 26 - Alarm menu

If the "**Alarms**" icon appears red (alarms present) by pressing it once, the **Active Alarms** page is reached from any page of the interface. By pressing it a second time, you access the **Alarms** page.

4.4.12 Active alarms

This display shows the alarms that are currently active.

If there are more than one alarm, it is possible to scroll the table using the "UP" and "DOWN" keys



selectable by rotating the scroller .



Figure 27 - Active alarms page

Through the description and the alarm code shown, it is possible to trace the extended description and the troubleshooting from the alarm menu.

4.4.13 Alarms menu

By means of the encoder scroller , it is possible to choose one of the following subsections:

- **History of alarms.** List of all displayed and acquired alarms.
- **Description of alarms.** Expanded alarm description.
- **Resolution of alarms.** Description of the operations recommended for the resolution of the alarm.
- **Active alarms.** List of alarms that are currently active.



Figure 28 - Alarm menu

4.4.14 Description of alarms

From this subsection it is possible to view the extended description of the selected alarm.



Figure 29 - Alarm description page

By selecting the desired alarm, the following screen appears. By pressing the "**Resolution**" key, the resolution page is reached. By pressing the "**Close**" key, the window is closed.



Figure 30 - Alarm page

4.5 List of alarms and warnings

CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A01	R phase alarm (L1)	L1	VR_LACK_ALARM	Problem detected on grid supply "R" phase.	Check the presence of voltage at input R: can be disconnected or shorted.
A02	S phase alarm (L2)	L2	VS_LACK_ALARM	Problem detected on grid supply "S" phase.	Check the presence of voltage at input S: can be disconnected or shorted.
A03	T phase alarm (L3)	L3	VT_LACK_ALARM	Problem detected on grid supply "T" phase..	Check the presence of voltage at input T: can be disconnected or shorted.
A04	Grid supply voltage alarm		GRID_VOLTAGE_ALARM	Grid supply AC voltage not present or out of range $\pm 10\%$ (rated voltage value is related to the programmed configuration 220-230Vac or 380-400Vac).	The electrical supply voltage is out of the limits of correct operation. Check the supply voltage value and check the wiring harnesses of the mains section.
A05	Scroll compressor temperature switch protection alarm intervention (TCS)	TCS	FGS_ALARM	Scroll compressor temperature switch protection alarm intervention.	Check the refrigerant charge, temperature of discharge line and functionality of the scroll compressor.
A06	Grid supply magneto thermic protection alarm (FMS)	FMS	FMIS_ALARM	Intervention of the circuit breaker on grid supply.	Check the status of the FMS circuit breaker, supply voltage value.
A07	Electronic board 12 Vdc supply error	PB1/NB1	V12_ALARM	Main electronic board 12 V DC supply error detected.	Check the battery voltage at battery poles and at electronic board input. if the problem persist, replace the electronic board.

CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A08	Electronic board overcurrent alarm	PB1/NB1	IPRT_ALARM	Main electronic board max current absorption threshold reached.	Check the battery voltage at battery poles and at electronic board input. Switch-off the unit, restore the power, if the problem persist, replace the electronic board.
A09	Electronic board grid power conversion stage alarm	Electronic board	VIN_ALARM	Main electronic board power conversion stage voltage (AC/DC output) out of range.	Check grid supply voltage and current drawn. Switch-off the unit, restore the power, if the problem persist, replace the electronic board.
A10	Electronic board HW Alarm	Electronic board	HW_ALARM	Critical error occurred on electronic board.	Switch-off the unit, restore the power, if the problem persist, replace the electronic board.
A11	Electronic board temperature protection warning	Electronic board	CARD_PROT1_ALARM	The main electronic board circuits temperature has reached the warning threshold. Thermoregulation <u>is not stopped</u> .	If possible, switch to diesel mode, or wait for the board to cool down (in diesel mode AC/DC power conversion circuits are not active). If impossible, the thermoregulation will continue until the intervention of A12.
A12	Electronic board temperature protection alarm (regulation parameter ref. TCP = def 5 min)	Electronic board	CARD_PROT2_ALARM	The main electronic board circuits temperature has reached the alarm threshold. Thermoregulation <u>is stopped</u> . It will restart after the timeout defined by " TCP " parameter or if the board temperature returns below the alarm limit.	If possible, switch to diesel mode, or wait for the card to cool down (in diesel mode AC/DC power conversion circuits are not active). If impossible, the temperature control could be restarted until the intervention of A14.

CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A13	Electronic board temperature sensor fault alarm	Electronic board	CARD_PROBE_A LARM	An error measure is detected on the temperature probe sensor installed in the main electronic board.	The probe could be damaged or burnt. Switch-off the unit, restore the power, if the problem persists, replace the electronic board.
A14	Electronic board thermal protection	Electronic board	CARD_PROT3_A LARM	The main electronic board circuits temperature has reached the fault threshold. Thermoregulation is <u>stopped</u> . It will not restart until the board temperature returns below the alarm limit.	If possible, switch to diesel mode (in diesel mode AC/DC power conversion circuits are not active). Otherwise wait for the card to cool down. If the problem persists, replace the electronic board.
A21	Alternator alarm	VAS	ALTERNATOR_A LARM	Diesel engine battery charger alternator malfunction.	The alternator does not charge the battery. Check the alternator belt or alternator brushes. Check for the correct operation of the alternator, check the outlet voltage, check the connections. If the problem persists, replace the alternator.
A22	Low Battery alarm	PB1/NB1	LOW_BATTERY_ ALARM	12V Battery voltage below limit.	Check battery and alternator connections. Check the correct operation of the alternator. See the action A21.
A23	Diesel start alarm	ESC	DIESEL_START_ ALARM	Engine cranking procedure failed.	Check the fuel level/line, engine glow plugs, solenoid Hold & Pull, battery charge level, battery temperature, engine starter and power cables.

CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A24	Oil pressure alarm	OPS	OIL_PRESSURE_ALARM	Engine oil pressure out of safety levels (low pressure).	Check the oil level, check the correct engine lubrication, check the correct pressure switch reading.
A25	Engine water temperature probe alarm	WTP	WATER_TEMPERATURE_ALARM	Diesel engine cooling liquid out of safety limits (high temperature – analog sensor).	Check the cooling system, the coolant level, engine coolant pump, belt and fan radiator. Check that the radiator is not covered or dirty.
A26	Engine water temperature switch alarm	WTS	FQT_ALARM	Diesel engine cooling liquid out of safety limits (high temperature – switch thermostat).	Check for the correct engine cooling, correct thermostat of the radiator fan, check the coolant level, check that there are no impediments to the flow of air directed to the engine radiator. If the problem persists, replace the temperature switch.
A27	Diesel fuel pump alarm (FP)	FP	KFP_ALARM	Diesel fuel pump malfunction	Check the electrical connection, protection fuse and fuel line/pump.
A28	Engine pre-heating alarm (GP)	GP	KPR1_CPLD_ALARM	Detected malfunction of diesel engine glow plugs during cranking procedure.	Check the electrical connection and functionality. Replace the plugs if necessary.
A29	Diesel fuel heater resistance malfunction alarm (IAR)	IAR	KEC_ALARM	Detected malfunction of diesel fuel heater resistor.	Check the electrical connection and functionality. Replace the resistor if necessary.
A30	Air filter heater resistance failure (AFR)	AFR	AIR_RES_HW_ALARM	Detected malfunction of air filter heater resistor.	Check the electrical connection and functionality. Replace the resistor if necessary.

CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A31	Engine speed solenoid actuator alarm (SS)	SS	THROTTLE_ALARM	Diesel engine speed solenoid actuator malfunction	Check the electrical connection and functionality. Replace the solenoid actuator if necessary.
A32	Compressor capacity regulation solenoid alarm (YCR)	YCR	KP_ALARM	Compressor capacity control malfunction	Check the electrical connection and functionality. Replace the solenoid if necessary.
A33	Engine Hold&Pull solenoid alarm (Pull)	H/P	KYAVP_ALARM	Malfunction detected on Hold&Pull solenoid actuator (Pull)	Check the electrical connection, fuse and functionality. Replace the solenoid actuator if necessary.
A34	Engine Hold&Pull solenoid alarm (Hold)	H/P	KYAVH_ALARM	Malfunction detected on Hold&Pull solenoid actuator (Hold)	Check the electrical connection, fuse and functionality. Replace the solenoid actuator if necessary.
A35	Engine speed sensor alarm	PNP	RPM_ALARM	Engine magnetic speed sensor malfunction	Check the electrical connection and functionality, check if the distance between sensor and engine flywheel is correct. Replace the magnetic speed sensor if necessary.
A36	Diesel fuel pre-heating protection alarm	GP	KPR1_ALARM	Protection alarm detected on pre-heating system of diesel engine.	Check the electrical connection. Replace the component if necessary.
A37	Air filter heating protection alarm	AFR	AIR_RES_ALARM	Protection alarm detected on air filter heating system.	Check the electrical connection. Replace the resistor if necessary.
A38	Air resistor protection alarm	AFR	KEC_HW_ALARM	Protection alarm detected on air filter resistor.	Check the electrical connection. Replace the resistor if necessary.

CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A41	LPS Minimum pressure switch alarm	LPS	MIN_PRESSURE_ALARM	<p>Low pressure switch intervention.</p> <p>Hysteresis levels:</p> <ul style="list-style-type: none"> -0,3 bar OFF; 0,6 bar ON; <p>The alarm auto reset itself and the unit try to start again. After LPN attempts in a LPT time, the alarm becomes manual.</p>	<p>Check the correct operation of the evaporator fans.</p> <p>Check for correct defrosting of the evaporator.</p> <p>Check the operating pressures to identify any lack of refrigerant.</p> <p>Check for clogging in the liquid line by controlling the efficiency of the filter and the expansion valve.</p>
A42	HPS Maximum pressure switch alarm	HPS	MAX_PRESSURE_ALARM	<p>High pressure switch intervention.</p> <p>Hysteresis levels:</p> <ul style="list-style-type: none"> 32 bar OFF; 27 bar ON; <p>The alarm auto reset itself and the unit try to start again. After HPN attempts in a HPT time, the alarm becomes manual.</p>	<p>Check the correct operation of the condenser fans.</p> <p>Check the correct air flow in the condenser, controlling the degree of cleanness and the absence of obstacles.</p> <p>Check the operating pressures in order to identify any overload of coolant.</p> <p>Check the presence of moisture in the circuit through the liquid indicator.</p> <p>Check for clogging in the liquid power line by controlling the efficiency of the filter and the expansion valve.</p>
A43	Cold room 1 inlet air temperature probe error	SAP1	CELL1_PROBE_ALARM	Cold room 1 evaporator air inlet temperature sensor error	Check probe connection. Replace the NTC sensor if necessary.
A44	Cold room 2 inlet air temperature probe error	SAP2	CELL2_PROBE_ALARM	Cold room 2 evaporator air inlet temperature sensor error	Check probe connection. Replace the NTC sensor if necessary.

CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A45	Water temperature probe error	WPT	WATER_PROBE_ALARM	Engine liquid temperature sensor measurement error	Check probe connection. Replace the NTC sensor if necessary.
A46	Ambient temperature sensor error	APT	ENV_PROBE_ALARM	External ambient temperature sensor error	Check probe connection. Replace the NTC sensor if necessary.
A47	Cold room 1 outlet air temperature probe error	RAP1	BA2_PROBE_ALARM	Cold room 1 outlet air temperature measurement error	Check probe connection. Replace the NTC sensor if necessary.
A48	Cold room 2 outlet air temperature probe error	RAP2	BA4_PROBE_ALARM	Cold room 2 outlet air temperature measurement error	Check probe connection. Replace the NTC sensor if necessary.
A49	HPT High pressure transducer alarm	HPT	P1MX_PROBE_ALARM_1B	High pressure alarm Following the intervention of the high pressure, the display shows the alarm A49 . When the correct pressure value is restored, the unit restarts automatically. In case of a frequent number of interventions HPN in a given period HPD , the alarm stops the unit completely.	Check the electrical connection and pressure sensor functionality, value set and the action A42

CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A50	LPT Low pressure transducer alarm	LPT	PMI_PROBE_ALARM_1B	Low pressure alarm Following the intervention of the low pressure switch, the display shows the alarm A50 When the correct pressure value is restored, the unit restarts automatically. In case of a frequent number of interventions LPN in a given period LPD , the alarm stops the unit completely.	Check the electrical connection and pressure sensor functionality, value set and the action A41
A51	Solenoid valve coil alarm (HS2)	HS2	KC2_ALARM	Evaporator defrost (hot) solenoid valve coil malfunction.	Check the electrical connection, fuse and operation of the defrost solenoid 2. Replace the solenoid valve if necessary.
A52	Solenoid valve coil alarm (HS1)	HS1	KC1_ALARM	Evaporator defrost (hot) solenoid valve coil malfunction..	Check the electrical connection, fuse and operation of the defrost solenoid 1. Replace the solenoid valve if necessary.
A53	Solenoid valve coil alarm (CS2)	CS2	KF2_ALARM	Evaporator liquid (cold) solenoid valve coil malfunction	Check electrical connection, fuse and refrigeration solenoid function 2. Replace the solenoid valve if necessary.
A54	Solenoid valve coil alarm (CS1)	CS1	KF1_ALARM	Evaporator liquid (cold) solenoid valve coil malfunction.	Check electrical connection, fuse and refrigeration solenoid function 1. Replace the solenoid valve if necessary.
A55	Three-way solenoid valve coil alarm (YTV)	YTV	KYS_ALARM	Three-way coil valve malfunction detected.	Check the electrical connection, fuse and functionality of the solenoid valves. Replace the solenoid valve if necessary.


CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A56	LPT Low pressure transducer error	LPT	PMI_PROBE_NO K_ALARM_1D	Low pressure transducer measurement error.	Check value on HMI and the plug connection. Replace the transducer if necessary.
A57	HPT High pressure transducer error	HPT	P1MX_PROBE_N OK_ALARM_1D	High pressure transducer measurement error.	Check value on HMI and the plug connection. Replace the transducer if necessary.
A61	Engine radiator fan alarm	DF	FAN_MOT_HW_ ALARM	Engine cooling fan malfunction.	Check the electrical connection and fuse. Check that the fan is not locked or short-circuited. Replace the fan if necessary.
A62	Condenser Fan malfunction alarm (K6)	FAN K6	K6_ALARM	Fan malfunction condenser K6.	Check the connection of the condenser K6 fans, fuse and make sure they are not blocked.
A63	Condenser Fan malfunction alarm (K5)	FAN K5	K5_ALARM	Fan malfunction condenser K5.	Check the connection of the condenser K5 fans, fuse and make sure they are not blocked.
A64	Evaporator Fan malfunction alarm (K10A)	FAN K10A	K10A_ALARM	K10A evaporator fan malfunction (cold room 2).	Check the connection of the K10A evaporator fans, fuse and make sure they are not blocked.
A65	Evaporator Fan malfunction alarm (K10)	FAN K10	K10_ALARM	K10 evaporator fan malfunction (cold room 1).	Check the connection of the K10 evaporator fan, fuse and make sure they are not blocked.
A66	Evaporator Fan malfunction alarm (K9A)	FAN K9A	K9A_ALARM	K9A evaporator fan malfunction (cold room 2).	Check the connection of the K9A evaporator fan, fuse and make sure they are not blocked.

CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A67	Evaporator Fan malfunction alarm (K9)	FAN K9	K9_ALARM	K9 evaporator fan malfunction (cold room 1).	Check the connection of the K9 evaporator fan, fuse and make sure they are not blocked.
A68	Evaporator Fan malfunction alarm (K8A)	FAN K8A	K8A_ALARM	K8A evaporator fan malfunction (cold room 2).	Check the connection of the K8A evaporator fans, fuse and make sure they are not blocked.
A69	Evaporator Fan malfunction alarm (K8)	FAN K8	K8_ALARM	K8 evaporator fan malfunction (cold room 1).	Check the connection of the K8 evaporator fan, fuse and make sure they are not blocked.
A70	Radiator Fan protection alarm	DF	FAN_MOT_ALARM	Engine cooling fan protection detected.	Check the connection of the diesel engine radiator fan, fuse and make sure it is not blocked.
A81	Hood of the condenser unit open	RDM	OPEN_HOOD_ALARM	Open hood detected, close the hood or check door switch contact.	Check that the hood of the condenser unit is not open. Check the correct connection and operation of the unit hood door switch.
A82	Cold room door open alarm	CRS	OPEN_DOOR_ALARM	Open door detected, close door, or check contact	Make sure that the cold room door is not open. Check for the correct operation and connection of the door switch.
A83	Grid compressor motor protection breaker FM1	TCP	FM1_NO_ALARM	Grid compressor motor protection breaker intervention detected by aux contact (NO type).	Check FM1 breaker connections and aux contact, try to re-arm manually to start again the unit in grid mode, switch to road mode, if the issue persist, replace FM1 breaker.

CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A84	System enable error	Electronic board	SYSEM_ENABLE_ALARM	The control unit cannot initialize properly all the peripherals.	Try to remove supply from the unit to make a new startup procedure. If the problem persists, replace the electronic board.
A85	Reference voltage alarm	Electronic board	RFF_ALARM	The control unit detects an error in the reference voltage power conversion stage.	Try to remove supply from the unit to make a new startup procedure. If the problem persists, replace the electronic board.
A86	Power conversion bus voltage alarm (primary)	Electronic board	VBUS_ALARM	The control unit detects an error in the primary bus voltage power conversion stage.	Try to remove supply from the unit to make a new startup procedure. If the problem persists, replace the electronic board.
A87	Power conversion bus voltage alarm (secondary)	Electronic board	VBUS2_ALARM	The control unit detects an error in the secondary bus voltage power conversion stage.	Try to remove supply from the unit to make a new startup procedure. If the problem persists, replace the electronic board.
A91	Compressor discharge temperature probe alarm	DTP	NTC_MISSING	Broken or disconnected compressor discharge temperature probe.	Check probe connection. Replace the NTC sensor if necessary.
A92	Compressor discharge temperature warning pre-alarm	DTP	CMP_TEMP_WARNING	High temperature detected from compressor discharge probe, it's still possible to run the unit until A93.	Check if the problem occurs only in road or grid mode. Check if the compressor works under correct operating conditions.
A93	Compressor Discharge temperature alarm	DTP	CMP_TEMP_ALARM	High temperature detected from compressor discharge probe, it's not possible to run the unit.	Check if the problem occurs only in road or grid mode. Check if the compressor works under correct operating conditions.

CODE	ALARM VISUALIZATION	E-DRAWING REFERENCE	ALARMS TABLE REFERENCE	DESCRIPTION	ACTION
A94	Cold room temperature too high	Cold room	FRIDGE_ALARM	Cold room internal temperature found too high compared to set point.	Leave the unit running until the set point is reached.
A94	Coolant liquid level alarm	WLS	LVLCOOL_ALARM	Low engine cooling liquid, check liquid level.	Check the coolant level, check coolant circuit for leaks.
A95	No operational evaporator fan alarm	K8-K8A-K9-K9A-K10-K10A	NO_EVP_FANS	Evaporator fans not present or faulty, check fan connections.	Check the connection of the evaporator fans.
A96	No operational condenser fan alarm	K5-K6	NO_CND_FANS	Condenser fans not present or faulty, check fan connections.	Check the connection of the condenser fans.

5 MAINTENANCE

Each time the threshold is reached as for hours of maintenance, the  icon appears.

By pressing the relative key, the description related to mandatory Maintenance A-B for standby operation RA-RC-RD-RE for road operation appears, depending on those required.



Figure 31 - Required maintenance icon



CAUTION

Prior to any intervention, ensure that the in-cab controller is turned OFF and that the unit cannot start up during service.

In addition to the maintenance described, it is recommended to replace the engine oil at least once a year, even if the engine has not carried out the expected number of operating hours.



CAUTION

When the code A10x "Required Maintenance x" appears, all functionality of the unit is still available. However, it is recommended to perform maintenance as soon as possible.

5.1 Maintenance alerts

Through this page it is possible to view the maintenance intervals for the unit. The default values cannot be modified.

One time intervals:

- First intervention “RA” after 500h in road operation;
- First intervention “A” after 500h in standby operation or when “RA” is activated;

Cyclic intervals:

- Intervention “B” every 2000h of standby operation;
- Cyclic interval “RC” after 2500h of road operation and subsequently every 5000h;
- Cyclic interval “RD” after 1000h of road operation since last “RC” or “RE” maintenance;
- Cyclic interval “RE” every 5000h of road operation;



Figure 32 – Maintenance Intervals page

Entering the second page “**Diesel Maintenance Control**” it is possible to see active alerts and hours left before maintenance alert activation.

For each alert, you can use the scroller to move the cursor to the button corresponding to the alert:

- The alerts RA-RC-RD-RE are related to the road operation counter.
- The alerts A-B are related to the standby operation counter.



Figure 33 – Maintenance Control – road intervals

In the second page “**Standby Maintenance Control**”, there are other alerts triggered on standby operation hours which can be monitored and updated in the same way as before:

The alerts A-B are related to the standby operation counter.



Figure 34 – Maintenance Control – total operation intervals

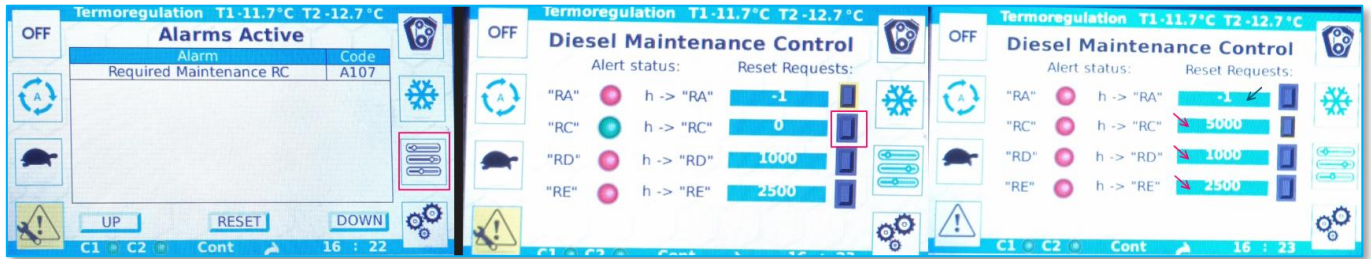


Figure 35 – Maintenance Control – Example C interval

In the example, after the first service (-1 hours means it's done), the unit operates up to 2500h of road operation, enough to trigger interval "RC" alert (figure 35 part 1).

Entering in the Maintenance control setup:

- In the "Diesel Maintenance Control" page, "RC" can be cleared moving the cursor on the correspondent button and clicking the scroller (figure 35 part 2).
- When the alert is cleared, the hours left counter returns to the cyclic preset value.
- By looking at the display, it's clear that the next maintenance interval will appear after 1000h "RD" and "RE" alert after additional 1500h (figure 35 part 3).

5.2 Diesel engine maintenance

First commissioning (*)	First 500 hours RA	Every 2500 hours RC	After 1000 hours since last RC or RE RD	Every 5000 hours RE	Inspections and maintenance programmes
X			X		Oil level check.
X			X		Cooling liquid level check.
X	X		X		Belt check and state of wear and correct tension check
				X	Hot oil pressure in high speed mode check Min. 276 kPa / 2.76 bar / 40 psi
X	X	X	X	X	Unusual noises, vibrations, etc. check
		X		X	Engine oil replacement.
		X		X	Oil filter replacement.
		X		X	Air filter replacement.
		X		X	Fuel filter replacement.
		X		X	Inspection and cleaning of the fuel pre-filter and fuel pump electro-filter.
				X	Thorough cleaning of the fuel tank and vent control.
				X	Cooling liquid replacement.
				X	Control and tuning of diesel engine speed (high and low).
		X		X	Flexible joint rubber elements check and replace if needed
		X		X	Water pump belt and alternator belt replacement.
				X	Check of the condition of diesel engine supports.

(*) The programme is based on hours of diesel engine operation.

5.3 Electric System Maintenance

First 500 hours (**) A/RA	Every 2000 hours B	Inspections and maintenance programmes
X	X	Historical alarm recording from the user interface.
X	X	Check of the tightening of terminals, battery cables and check of electrolyte level.
X	X	Check of the electrical wiring, with particular attention to water infiltration.
X	X	Check of rubbing or carelessness damages to cables.
X	X	Check of presence of water or dust infiltration inside the electrical panel.
	X	Brushes and alternator bearings check. If necessary, replace them.
	X	Alternator brushes replacement.

(**) First service "A" is triggered the first time "RA" is active.

5.4 Cooling system maintenance

<p>Every 2000 Hours of Standby operation or every 2500 in road operation whichever comes first</p> <p>B / RC / RE</p>	<p>Inspections and maintenance programmes</p>
X	Coolant level check.
X	Compressor oil level check.
X	Check of the suction pressure regulator and operation of the limiter valve in defrosting or heating mode.
X	Check of the suction and air supply pressure values.
X	Check of the evaporator fan motor brushes.
X	Evaporator fan motor brushes replacement.
X	Check dry filter and replace it if needed.

5.5 Structural components maintenance

First commissioning (*)	First 500 hours A / RA	Every 2500 hours RC / RE	Inspections and maintenance programmes
X	X	X	Check of the unit and check for leaks of liquids (cooling liquid, oil, coolant).
		X	Cleaning of condenser, evaporator and defrost discharges.
		X	Check of the mounting bolts, brackets, power lines, pipes, etc. of the entire fuel tank unit.

(*) The programme is based on hours of diesel engine operation.



CAUTION

If more than a year has passed since the last maintenance, perform maintenance as soon as possible.

5.6 Scheduled maintenance tables

Road operation:

MODEL	HOURS						
	500	2000	2500	3500	4000	5000	6000
U600 U800 U1000 U800 MULTI U1000 MULTI	RA/A		RC	RD		RE	RD
	7500	8000	8500	10000	11000	12000	12500
U600 U800 U1000 U800 MULTI U1000 MULTI	RC		RD	RE	RD		RC

Standby operation:

MODEL	HOURS						
	500	2000	2500	3500	4000	5000	6000
U600 U800 U1000 U800 MULTI U1000 MULTI	A	B			B		B
	7500	8000	8500	10000	11000	12000	12500
U600 U800 U1000 U800 MULTI U1000 MULTI		B		B		B	

5.7 Oil and other liquids table

	Diesel engine oil		
	U600	U800	U1000
Type	10W-40	10W-40	10W-40
Quantity	7 l	7.4 l	7.4 l
Operating temperature range	-15 ÷ +35 °C (5 ÷ 95°F)	-15 ÷ +35 °C (5 ÷ 95°F)	-15 ÷ +35 °C (5 ÷ 95°F)

	Cooling liquid (*)		
	U600	U800	U1000
Quantity	6.0 (**)	6.5 (**)	6.5 (**)
Operating temperature range	guard under -38°C (-36.4°F)	guard under -38°C (-36.4°F)	guard under -38°C (-36.4°F)

(*) Add water to the permanent anti-freeze (only ETHYLENE GLICOL), pre-mixed 50/50 as necessary.

(**) Check the level by the level indicator light.



CAUTION

The cooling liquid (guard up to -36°C (-32.8°F) Long Life "B") must be replaced at most every 2 years.



NOTE

The engine oil and the cooling liquid are polluting materials. They must not be discharged into the environment, but must be recovered with the appropriate equipment. Refer to the paragraph "Disposal of used materials" in this manual for instructions on disposal.

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)
------	-------	-----	--------------------------------	--

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)
------	-------	-----	--------------------------------	--

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)
------	-------	-----	--------------------------------	--

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)
------	-------	-----	--------------------------------	--

Alarms Log

Parts replaced

Notes

Maintenance Intervention Card _____ hours

Date	Model	S/N	Operating Hours (Road mode)	Operating Hours (External power supply mode)

Alarms Log

Parts replaced

Notes

Fuse name	Description	Amps
F1	Cooling cycle solenoid valve 2	5
F2	Off-loading solenoid	5
F3	Three way solenoid	5
F4	Heating cycle solenoid valve1	5
F5	Cooling cycle solenoid valve1	5
F6	Heating cycle solenoid valve2	5
F7	Evaporator fan K8	20
F8	Evaporator fan K9	20
F9	Evaporator fan K10	20
F10	Evaporator fan K8A	20
F11	Evaporator fan K9A	20
F12	Evaporator fan K10A	20
F13	Condenser fan K5	20
F14	Condenser fan K6	20
F15	Battery charger	10
F16	Relay hold	5
F17	Air resistor	10
F18	Fuel filter resistor	10
F19	Relay pull	30
F20	Fuel tank resistor	10
F21	Diesel fuel pump	5
F22	Enable alternator	5
F23	Starting up (crank) relay	30
F24	Diesel engine fan	20
F25	Glow plugs	30
F26	Auxiliary supply	5

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