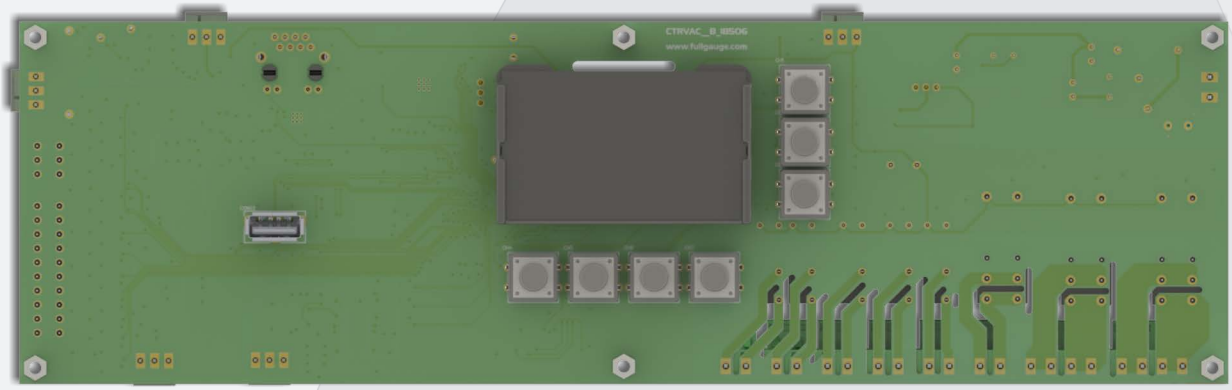
Instruction Manual

07/2025

VC-108 Log

Version 3

VACCINE REFRIGERATOR/ULTRAFREEZER CONTROLLER



Redundant Control Support

Supervisory System

Support for Emergency Systems

Alarms

Overload Protection

USB

Datalogger

Preset Management System

Dialer Support

Polarity Protection

Under/Over Voltage Protection

Graphic display

Variable Compressor

Modbus Protocol

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TABLE OF CONTENTS

SAFETY

BEFORE INSTALLING THE CONTROLLER, WE RECOMMEND THAT YOU READ THE ENTIRE INSTRUCTION MANUAL TO AVOID POSSIBLE DAMAGE TO THE PRODUCT.

PRECAUTION DURING PRODUCT INSTALLATION:

• Before performing any procedure on this instrument, disconnect it from the electrical grid and the battery;

• Ensure that the instrument has adequate ventilation, avoiding installation in panels that contain devices that could cause it to operate outside of the specified temperature thresholds;

• Install the product away from sources that may generate electromagnetic disturbances, such as: motors, contactors, relays, solenoid valves, etc.

AUTHORIZED SERVICE:

Installation or maintenance of the product must only be performed by qualified professionals.

ACCESSORIES:

Use only genuine Full Gauge Controls accessories.

In case of doubt, contact technical support.

DUE TO CONTINUOUS ADVANCEMENTS, FULL GAUGE CONTROLS RESERVES THE RIGHT TO MODIFY THE INFORMATION IN THIS MANUAL AT ANY TIME, WITHOUT PRIOR NOTICE.

1 • DESCRIPTION

The **VC-108 Log** Controller is a high-performance device designed to ensure proper cooling of extremely sensitive products, such as vaccines and other medications. To guarantee optimal safety and reliability, the **VC-108 Log** provides distinctive features, such as emergency systems for power outages, redundant ambient temperature sensors, a datalogger with a lifespan exceeding five years, and compatibility with the **Sitrad PRO** supervisory system, in addition to redundant controls. The device comes in a PCB (Printed Circuit Board) format, enabling seamless integration into the mechanical structure of the Vaccine Refrigerator or Ultrafreezer. This offers a highly accurate and reliable solution for critical applications.

2 • APPLICATIONS

- Vaccine Refrigerators.
- Ultrafreezers.

3 • FEATURES

- Temperature sensors
For Vaccine Refrigerator applications:
- 2 ambient sensors;
- 1 evaporator sensor;
- 1 condenser sensor;
- 6 drawer sensors.
For Ultrafreezer applications:
- 2 ambient sensors;
- 1 evaporator sensor;
- 1 condenser sensor;
- 2 stage-2 sensors;
- 1 external temperature sensor.
- Relays for load activation
For Vaccine Refrigerator applications:
- 1 compressor;
- 1 defrost (natural, resistance, or hot gas);
- 1 fan;
- 1 lighting;
- 1 frequency inverter;
- 1 power exchange;
- 1 alarm;
- 1 redundancy system activation.
For Ultrafreezer applications:
- 1 stage-1 compressor;

- 1 stage-2 compressor;
- 1 CO_2 valve;
- 1 lighting;
- 1 alarm;
- 1 redundancy system activation.

- Electrical grid monitoring
- Support for emergency system during power outages (Vaccine Refrigerator application)
- Monitoring of emergency system battery charge (Vaccine Refrigerator application)
- Supports dialer activation for critical alarms
- Datalogger
  - Adjustable intervals between log records;
  - Event recording capability;
  - Extensive data storage capacity, lasting over 10 years (depending on settings);
- Integration with Sitrad supervisory system;
- Seven-key graphic display interface;
- Maintenance schedule management;
- Four levels of access to settings;
- Temperature alarm simulation;
- USB port for datalogger export, preset import/export, and equipment updates.
- Frequency output for variable compressor control

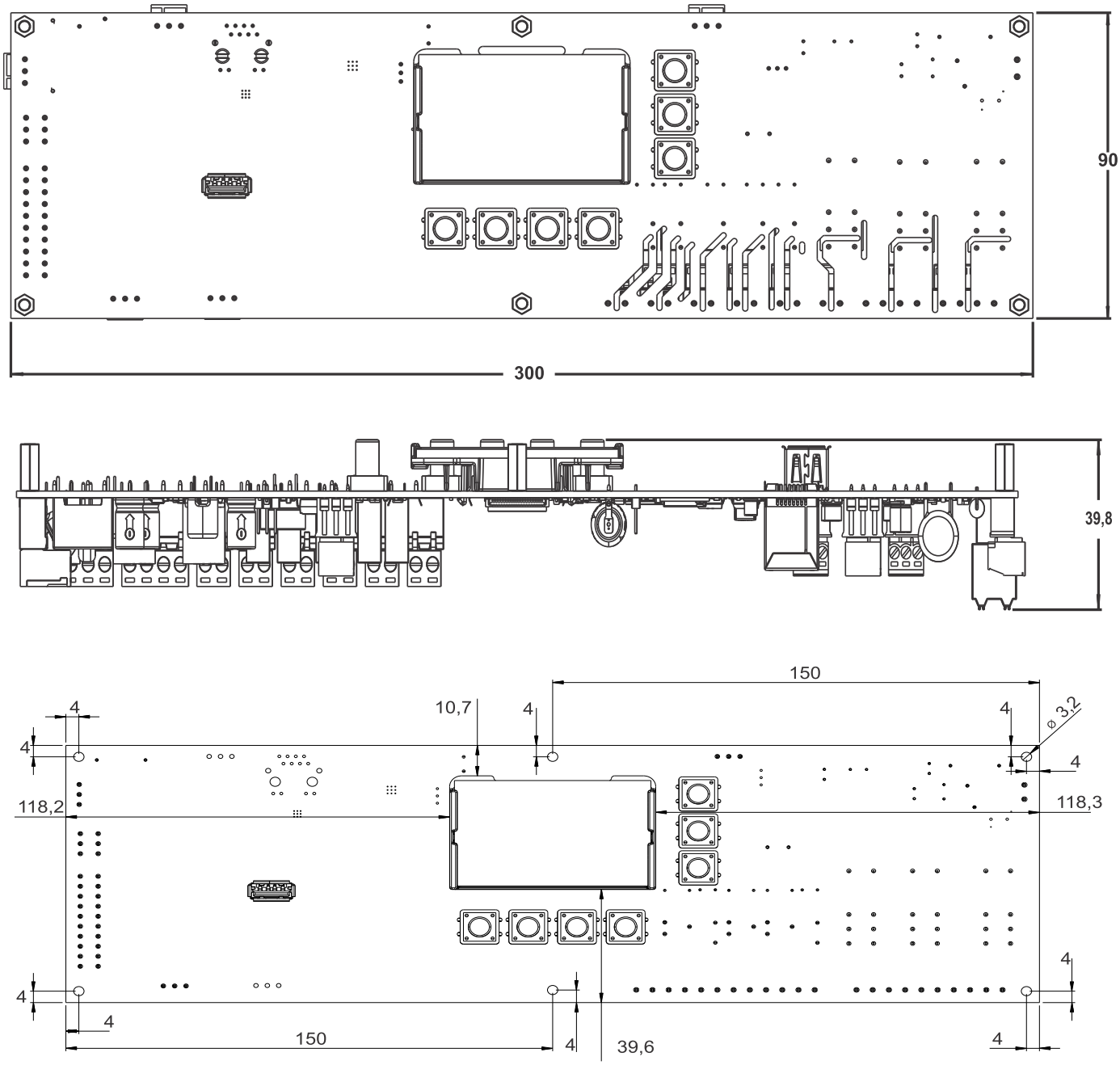
4 • TECHNICAL SPECIFICATIONS

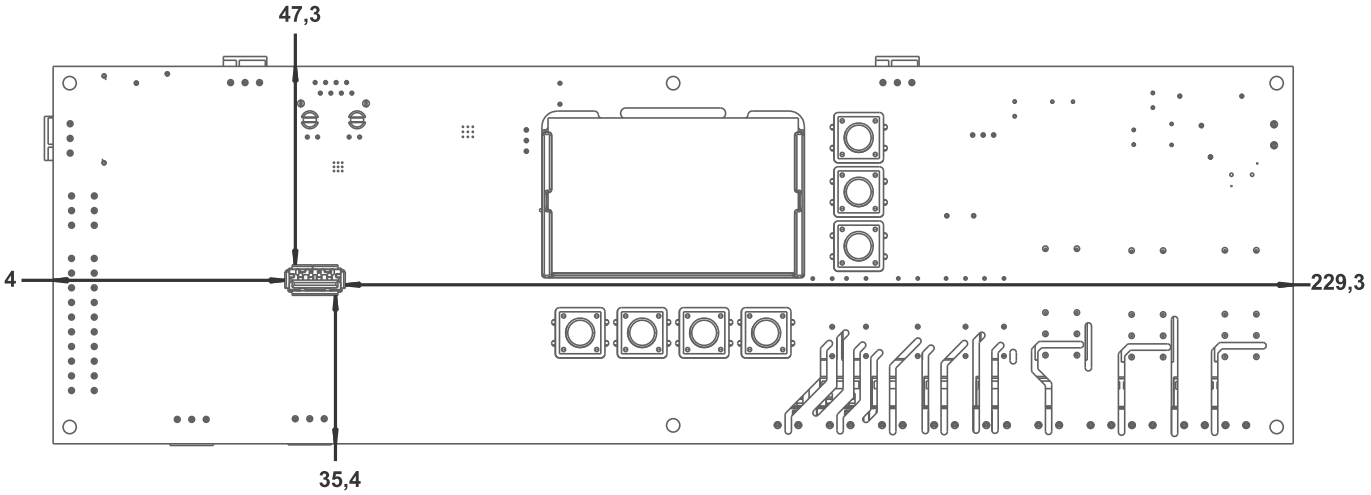
Power supply	12 Vdc ±10%
Maximum consumption	5.84W
Operating humidity	10 to 90% RH (without condensation)
Maximum voltage supported	20Vdc
Control temperature	**For sensors 1 to 10 configured as NTC:** -50 to 105°C / -58 to 221°F **For sensor 1 configured as PT100:** -200 to 300°C / -328 to 572°F
Temperature resolution	0.1°C (0.1°F) For temperatures above -99.9°C or -99.9 °F 1°C (1°F) For temperatures equal or below -100° or -100°F
Electrical grid monitor	15 to 265Vac
Temperature sensors	**For Vaccine Refrigerator applications:** S1 and S4: ambient sensors S2: evaporator sensor S3: condenser sensor S5 to S10: drawer sensors **For Ultrafreezer applications:** S1 and S4: ambient sensors S2: evaporator sensor S3: condenser sensor S8 and S9: stage-2 temperature sensors S10: external temperature sensor
Digital input	D1: door sensor (Logic N/A) D2: pressure switch sensor (for Ultrafreezers)

Relay outputs	**For Vaccine Refrigerator applications:** O1: compressor - 16A / 250Vac; O2: defrost - 16A / 250Vac; O3: fan - 16A / 250Vac; O4: lamp - 5A / 250Vac; O5: inverter - 5A / 250Vac; O6: power exchange - 5A / 250Vac; O7: alarm / dialer - 5A / 250Vac; O8: redundancy - 5A / 250Vac. **For Ultrafreezer applications:** O1: compressor 1 - 16A / 250Vac; O2: compressor 2 - 16A / 250Vac; O3: CO_2 valve - 16A / 250Vac; O4: lamp - 5A / 250Vac; O7: alarm / dialer - 5A / 250Vac; O8: redundancy - 5A / 250Vac.
Frequency output	O9: variable compressor -12 Vcc (±25%) 0~300Hz (duty-cycle = 50%)
USB interface	Compatible with the standard USB 2.0 Full-Speed Module (USBFS) Data format for *USB drive* (FAT32 file system, maximum capacity of 32GB)
RS-485 communication	RS485 Sitrad: Not isolated RS485 Modbus: isolated
Product dimensions	300.0 x 90.0 x 39.8mm / 11.81” x 3.54” x 1.56”

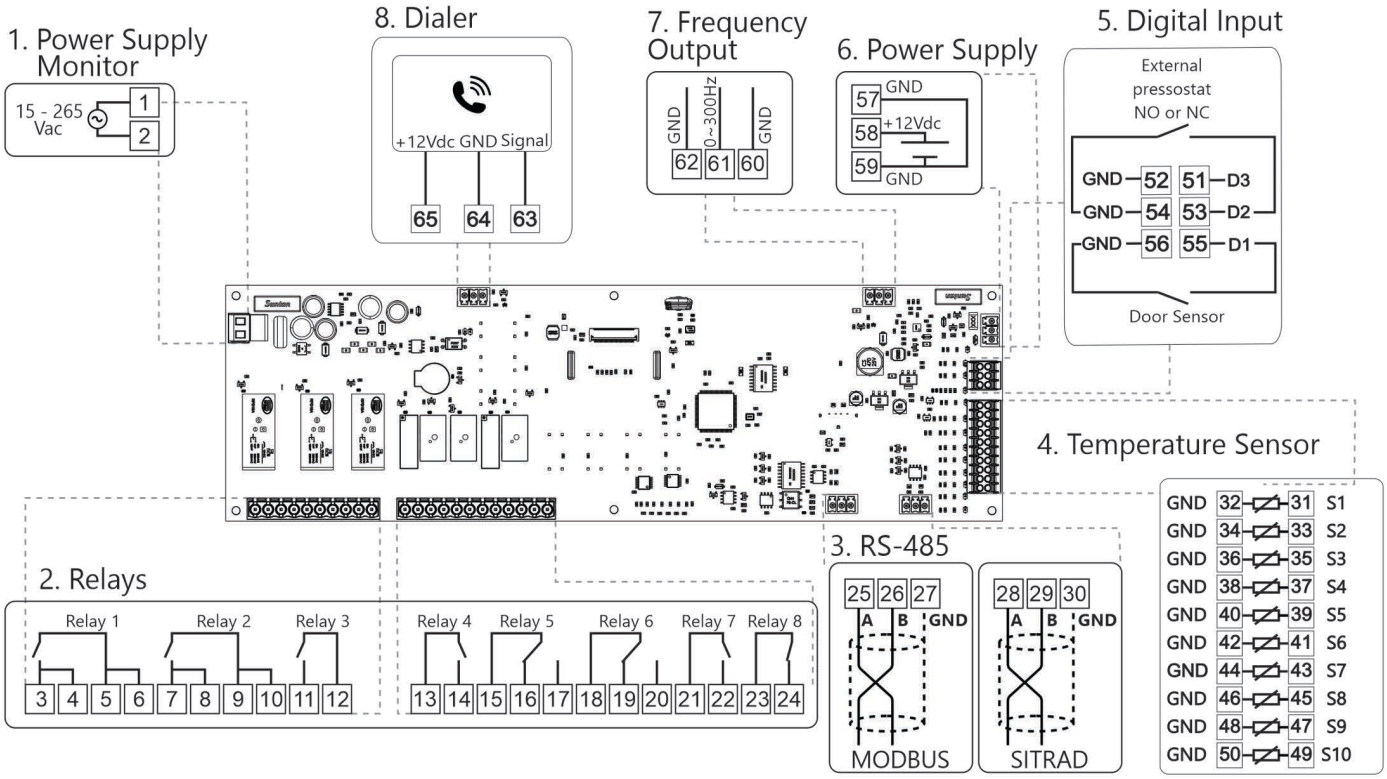
Power protection	Condition	Minimum	Typical	Maximum	Unit
Under voltage	Reducing Vin	9.01	9.36	9.72	V
Under voltage hysteresis	-	150	260	390	mV
Over voltage	Increasing Vin	17.32	18.02	18.47	V
Over voltage hysteresis	-	220	440	660	mV
Over current	Vin=12V	-	0,8	-	A

5 • DIMENSIONS





6 • WIRING DIAGRAM



2. Relays

For VACCINE REFRIGERATOR applications:	For ULTRAFREEZER applications:
3. Compressor (N.O)	3. Compressor-1 (N.O)
4. Compressor (N.O)	4. Compressor-1 (N.O)
5. Compressor (common)	5. Compressor-1 (common)
6. Compressor (common)	6. Compressor-1 (common)
7. Defrost (N.O)	7. Compressor-2 (N.O)

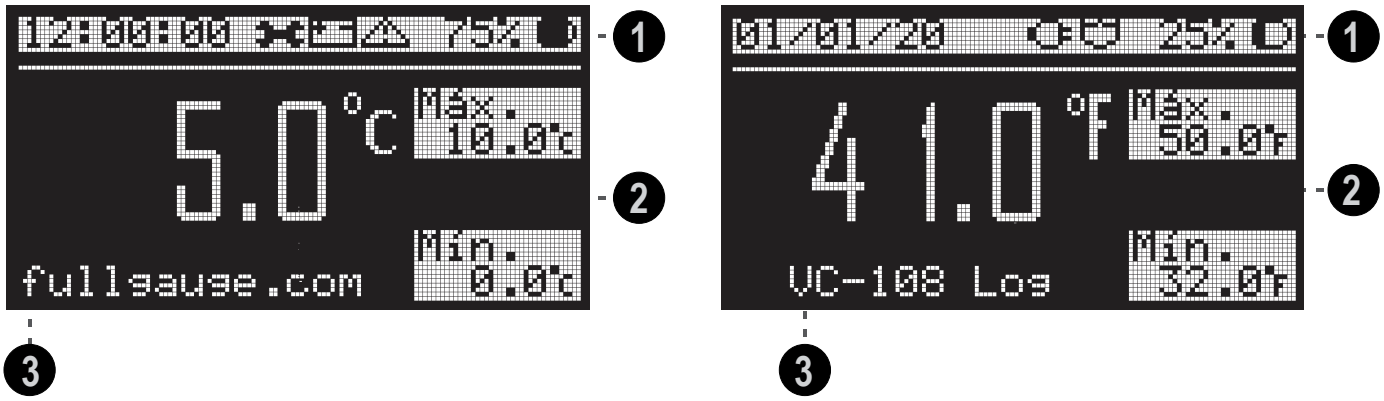
For VACCINE REFRIGERATOR applications:	For ULTRAFREEZER applications:
8. Defrost (N.O)	8. Compressor-2 (N.O)
9. Defrost (common)	9. Compressor-2 (common)
10. Defrost (common)	10. Compressor-2 (common)
11. Fan (N.O)	11. CO_2 valve (N.O)
12. Fan (common)	12. CO_2 valve (common)
13. Lamp (common)	13. Lamp (common)
14. Lamp (N.O)	14. Lamp (N.O)
15. Frequency inverter (common)	15. Not used
16. Frequency inverter (N.C)	16. Not used
17. Frequency inverter (N.O)	17. Not used
18. Power exchange (common)	18. Not used
19. Power exchange (N.C)	19. Not used
20. Power exchange (N.O)	20. Not used
21. Alarm (common)	21. Alarm (common)
22. Alarm (N.O)	22. Alarm (N.O)
23. Redundancy (common)	23. Redundancy (common)
24. Redundancy (N.C)	24. Redundancy (N.C)

7 • INTERFACE AND CONTROL KEYS

The interface consists of a graphical display of 128 x 64 pixels and seven keys. Four keys are used for navigation: **SET**, **UP**, **DOWN** and **BACK**. The other three keys are used for turning on the lamp (**LAMP**), muting the buzzer and alarm relay (**MUTE**) and displaying active and alarm history (**ALARMS**).

SET key	Confirms and edits parameters and values.
UP key	Increments values and navigates "up" in the menus.
DOWN key	Decrements values and navigates "down" in the menus.
BACK key	Returns to the previous screen without confirming parameter changes.
MUTE key	Silences the buzzer.
LAMP key	Turns the lighting on and off.
ALARMS key	Accesses the view of: active and alarm history. Press the ALARM key to switch between Active Alarms and Alarm History screens.

8 • Main Screen



The Main Screen consists of the Status Bar at the top, the ambient temperature information in the center, and alert messages at the bottom.

1 - The Status Bar shows the time, battery charge, status of the electrical grid or emergency system, status of alarms, and maintenance functionality.

2 - The temperature information area displays the current temperature of the chamber on the left and the maximum and minimum temperatures on the right.

3 - The message area typically shows the name of the equipment and the instrument manufacturer. In case of active alarms, it displays the alarm description for user acknowledgment.

NOTE: *To access the list of all alarms displayed on the main screen, see chapter 16. Alarms.*

8.1 • Status Bar

The Status Bar displays the following information:

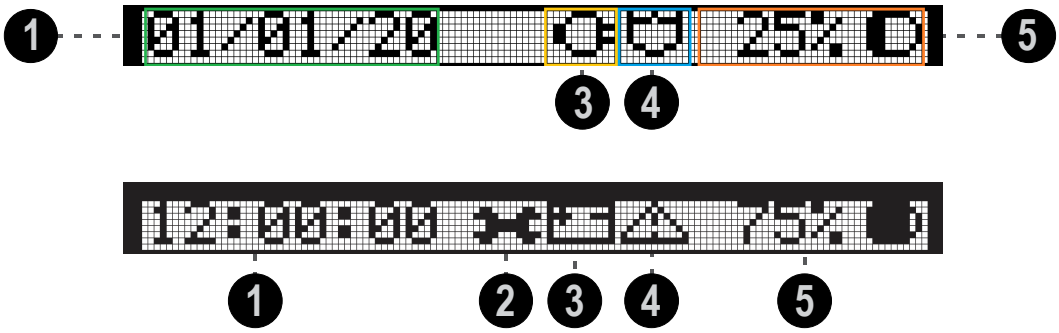
1 - Time: Alternates between date and time every 5 seconds;

2 - Maintenance: Displays a key when the maintenance period has expired;

3 - Power/Emergency: Displays a plug icon when the equipment is powered by the electrical grid, and a stationary battery icon when powered by battery;

4 - Alarm: Displays a triangle with an exclamation point when an alarm is active, and a shield when the alarm relay/dialer is enabled/cycling;

5 - Battery level: Displays the battery charge percentage, accompanied by a battery icon indicating the charge level. A charging animation appears when the battery is charging.



	Fully discharged battery.		Maintenance period expired.
	Low battery charge.		Equipment powered by the electrical grid.
	Medium battery charge.		Equipment powered by the emergency system.
	High battery charge.		Active alarm.
	Fully charged battery.		Active alarm. Alarm relay or dialer activated/cycling.

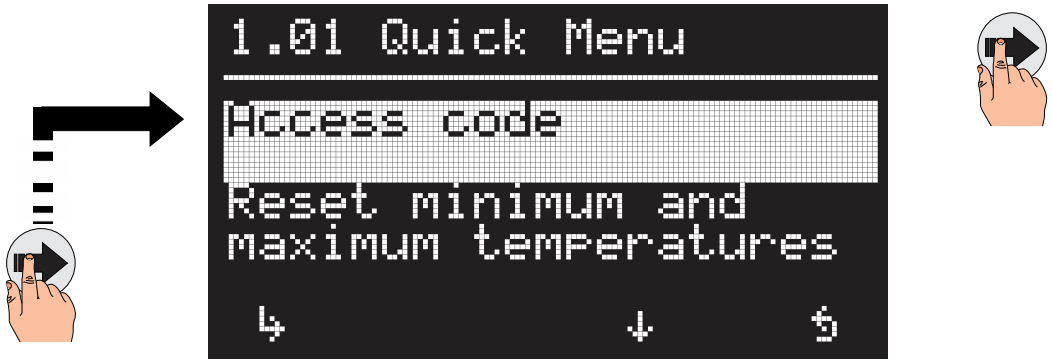
9 • MENUS AND NAVIGATION

The Main Screen displays crucial information about the controller's operation. Use the menu system to access additional information, carry out actions, and modify controller parameters. Navigate through the menus using the **SET**, **UP**, **DOWN**, and **BACK** keys. In all menus, the navigation bar is displayed, indicating the function of each key within the menu. Below is a list of navigation bar icons and their meanings:

	Confirms item selection.		Returns to the previous menu.
	Selects the previous item.		Selects the next item.
	Confirms action/editing.		Cancels action/editing.
	Selects the previous screen.		Selects the next screen/ character.
	More information.		Clears maximum and minimum values.

10 • QUICK MENU

The quick menu allows access to other configuration menus or performs simple actions. To access it from the Main Screen, press the **SET** key.



The highlighted item indicates the current selection. Use the **UP** and **DOWN** keys to navigate between items. Select the desired item by pressing the **SET** key again. To return to the Main Screen, press the **BACK** key.

10.1 • Access Code

Use the Quick Menu to access other menus by entering an access code through item 1.01 Access Code.

The highlighted digit indicates the current selection. Use the **UP** and **DOWN** keys to select the desired value. Press the **SET** key to move to the next digit or to confirm the entry of the selected code when the last digit is highlighted.

Below is a list of available codes and the menus they grant access to:

0123	**Basic Menu**	0456	**Advanced Menu**
0234	**Equipment Name**	0789	**Maintenance Menu**

10.2 • Reset of Minimum and Maximum Temperatures

This function quickly resets the maximum and minimum ambient temperatures (sensors S1 and S4). This procedure replaces the recorded minimum and maximum temperatures with the current ambient temperature.

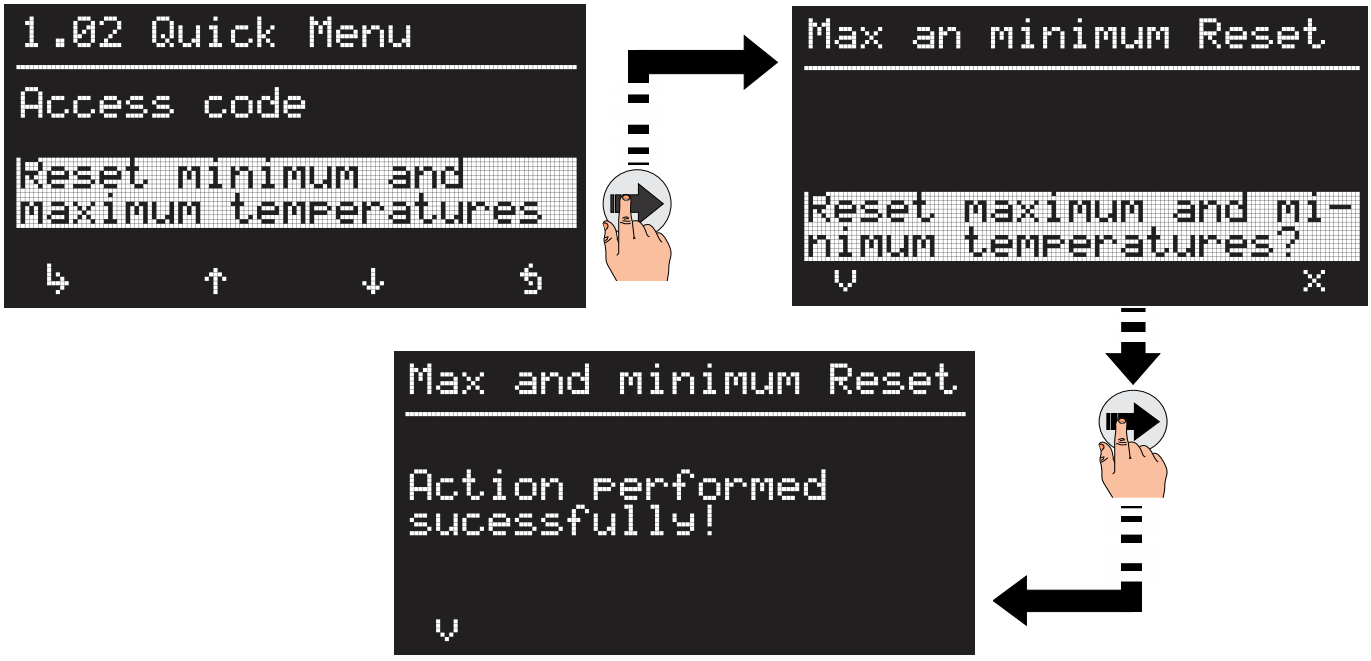
Go to Quick Menu 1.02 using the **UP** and **DOWN** keys.

Press **SET** to select it.

Press **SET** again to confirm the operation or **BACK** to cancel.

If confirmed, the following message will appear: "Action executed successfully".

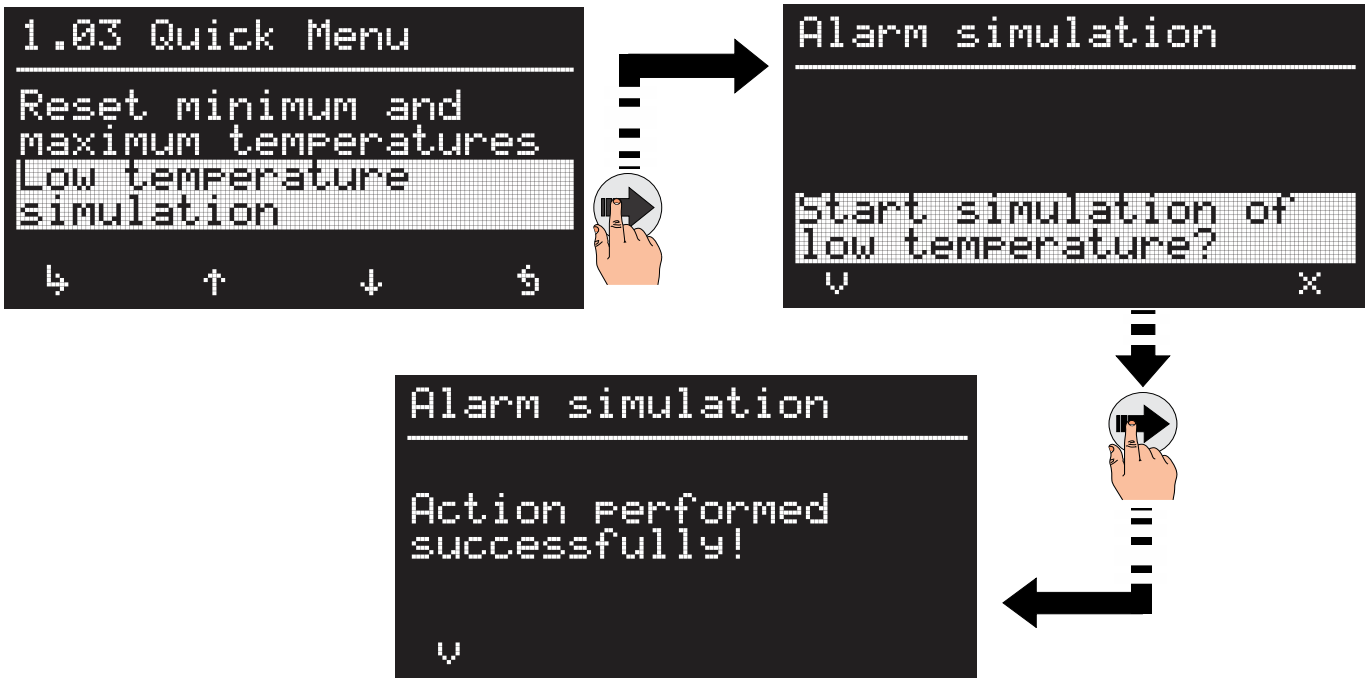
Press **SET** to return to the previous Quick Menu screen.



10.3 • Temperature Alarm Simulation

To test the alarm system activation, you can initiate a high or low temperature alarm simulation, which triggers the buzzer and alarm/dialer relay, as configured in parameters F3.46 (Temperature alarm simulation time) and F3.42 (Duration to automatically silence the alarm).

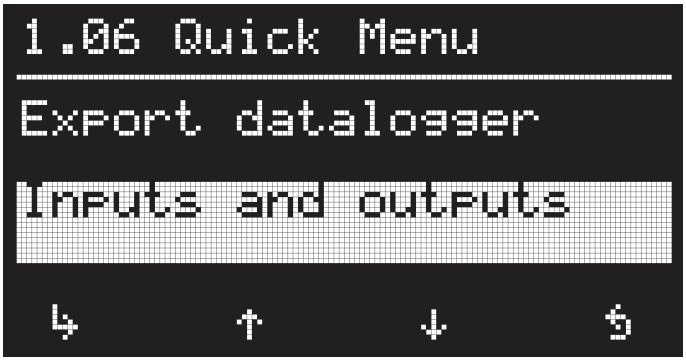
To start or stop a temperature alarm simulation, select options 1.03 (Low temperature simulation) or 1.04 (High temperature simulation) from the Quick Menu and press the **SET** key. Then, the confirmation screen will be displayed. Press **SET** again to proceed with the action or press **BACK** to cancel.

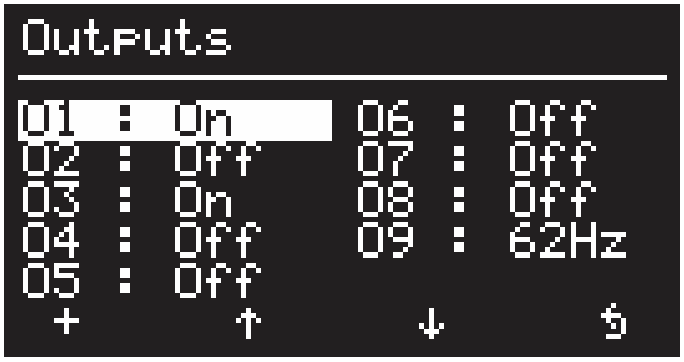


10.4 • Inputs and Outputs

10.4.1 • Displaying inputs and outputs

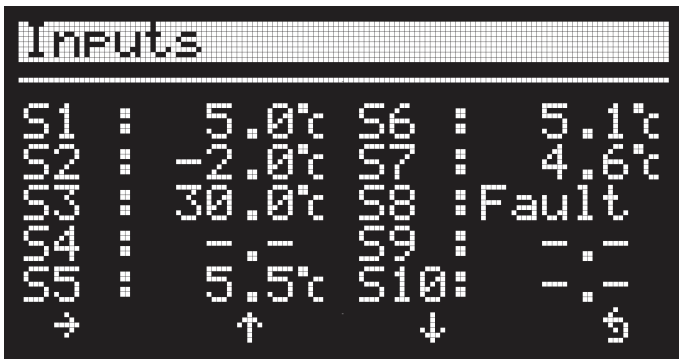
All inputs and outputs can be easily displayed through the Quick Menu. To do so, select option `1.06` (Inputs and Outputs) and press the **SET** key. The input and output display consists of four screens. Navigate between them using the **UP** and **DOWN** keys.



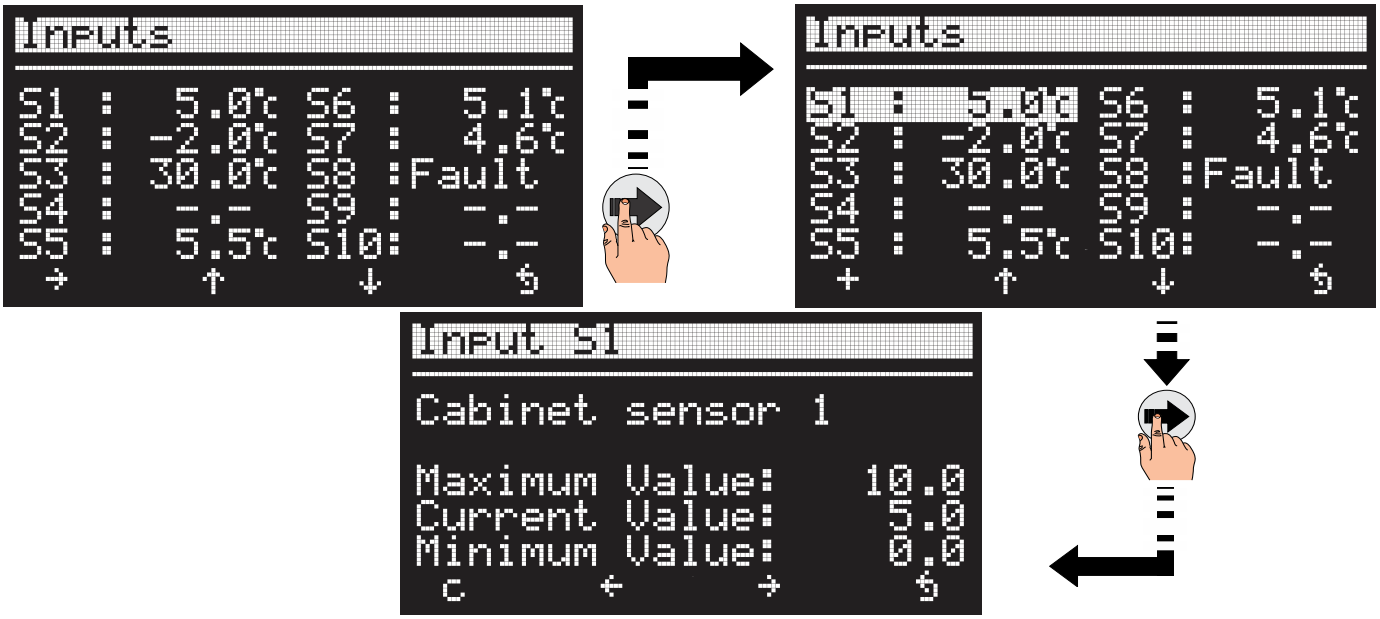


The first screen shows the state of the digital outputs (relays), represented by the letter O followed by the output number 1 to 8. Its value can be On (if it is turned on) or Off (if it is turned off). O9 logs the frequency of the variable-speed compressor.

The last three screens represent the state of the analog (temperature and voltage) and digital inputs. Temperature sensors are represented by the letter S followed by their number (1 to 10). Their current values are displayed in the selected unit (°C or °F). Disabled sensors are displayed as `-.-`.



Voltage monitors are represented by the letter V followed by their number (1 to 2). Their current values are displayed in volts (V).



Digital inputs are represented by the letter D followed by the entry number, 1 to 2.

D1 represents the port:

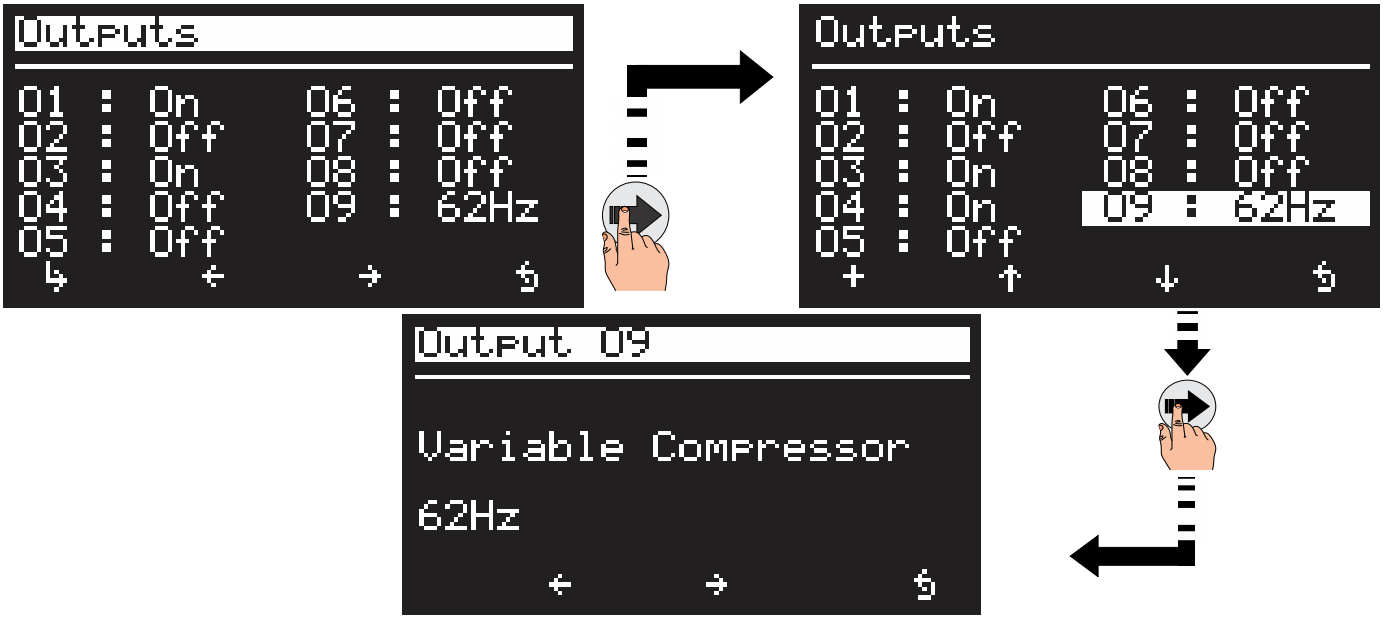
On, for open door. Off for closed door.

D2 represents the pressure switch in the Ultrafreezer application:

On for activated pressure switch. Off for deactivated pressure switch.

If the application type is configured as Ultrafreezer and the pressure switch alarm is disabled in F3.69, D2 will show the following on the display (D2: -.-).

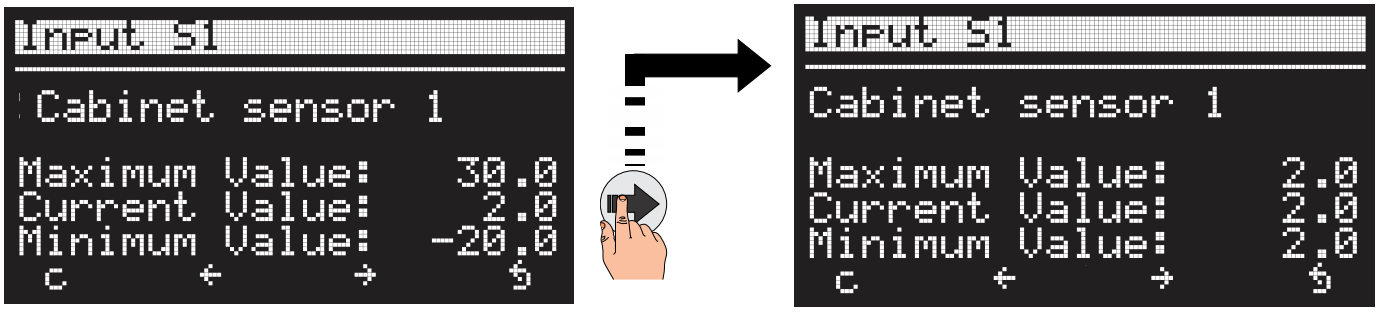
To view more details about the state of an input or output, press the **SET** key on the respective screen. Navigate to it using the **UP** and **DOWN** keys and press **SET** to open its screen.



The equipment stores the highest and lowest values for each analog input since it was powered on. If needed, you can delete these values individually.

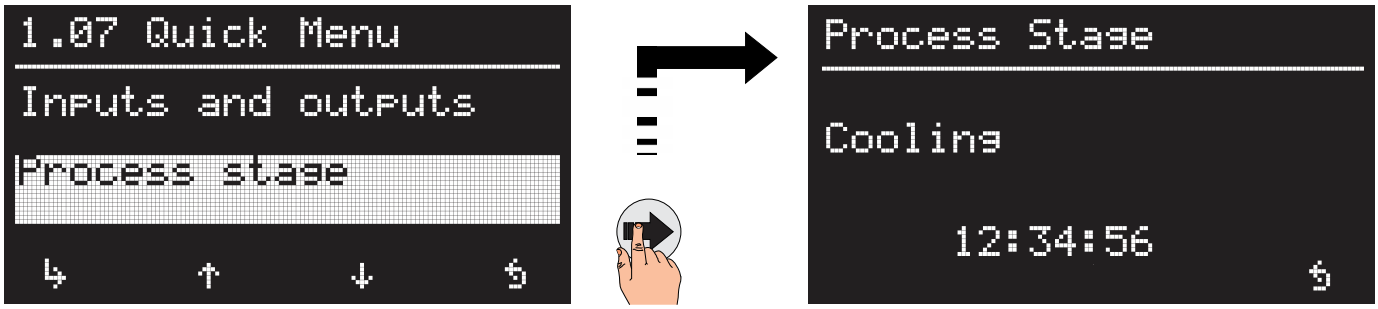
10.4.2 • Deleting Maximums and Minimums of Analog Inputs

To delete the maximum and minimum records of an analog input, select the desired input through the Input and output display screen and confirm by pressing the **SET** key. Then, press and hold the **SET** key for 5 seconds.



10.5 • Process Stages

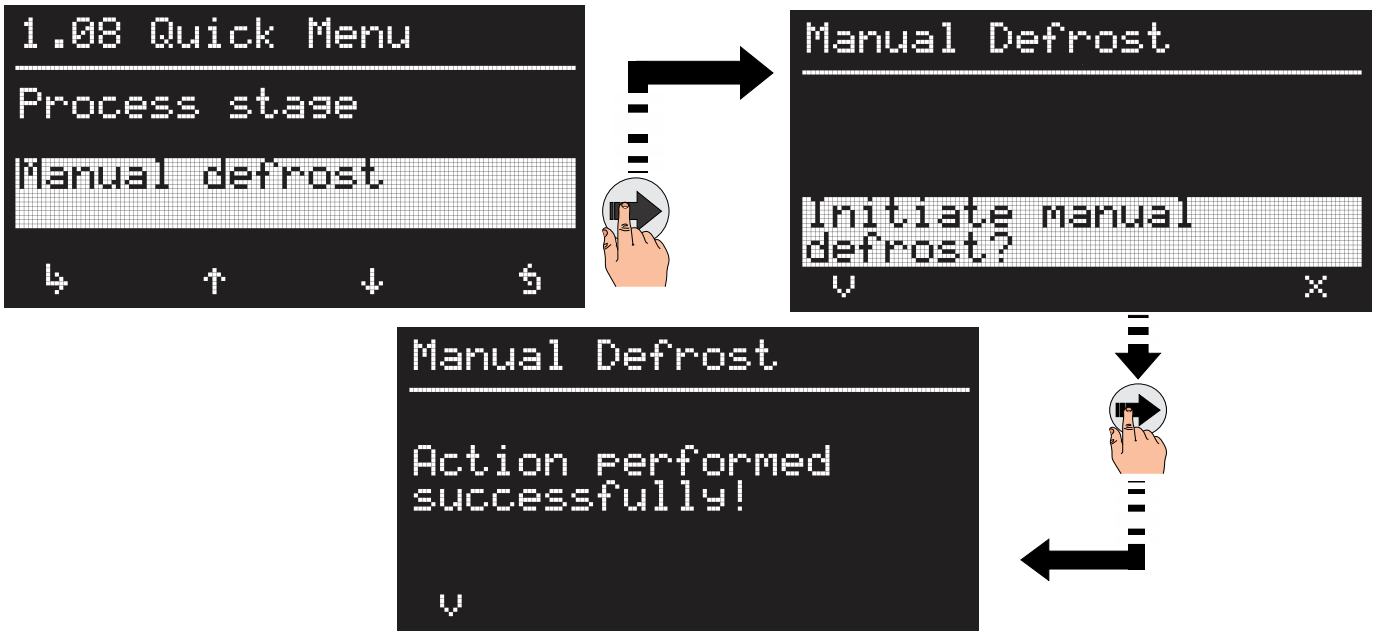
To check the current stage of the controller's cooling process and the time elapsed in that stage, access item `1.07` (Process Stage) in the Quick Menu and press the **SET** key.



The process stages are: Waiting for Initialization Time; Cooling; Pre-Defrost; Defrost; Drainage; Fan Delay.

10.6 • MANUAL DEFROST

You can initiate or stop a manual defrost cycle if necessary. To do so, select item 1.08 (Manual Defrost) from the Quick Menu and press the **SET** key. Then, press **SET** again to confirm the action.



Initiating or stopping a defrost action has some restrictions. They are:

The equipment must have defrost enabled: F3.15 – Defrost type must be different from 0 (Disabled);

To initiate a manual defrost, the process must be in one of the following stages:

1 - Cooling;

2 - Fan Delay;

3 - To initiate a manual defrost, the values read by the ambient (S1 or S4) and evaporator (S2) sensors must meet the following restrictions:

4 - Ambient sensor: (S1 or S4) < F3.21 – Ambient temperature to end defrost;

5 - Evaporator sensor: (S2) < F3.20 – Evaporator temperature to end defrost;

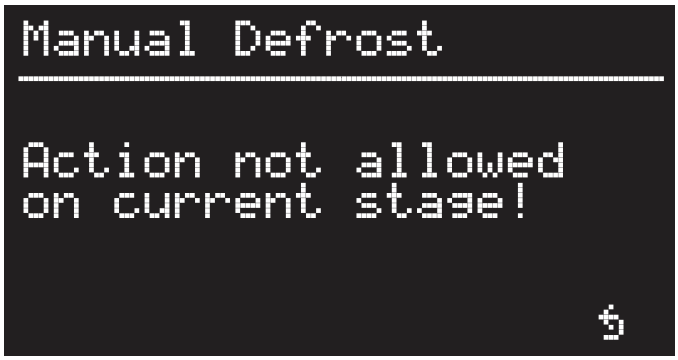
6 - Evaporator sensor: (S2) < F3.18 – Minimum evaporator temperature to initiate manual defrosting;

7 - To stop a manual defrost, the process must be in one of the following stages:

8 - Pre-Defrost;

9 - Defrost.

If the current stage of the process is not listed as one in which defrosting can be initiated or stopped, the controller will display a message next to it.

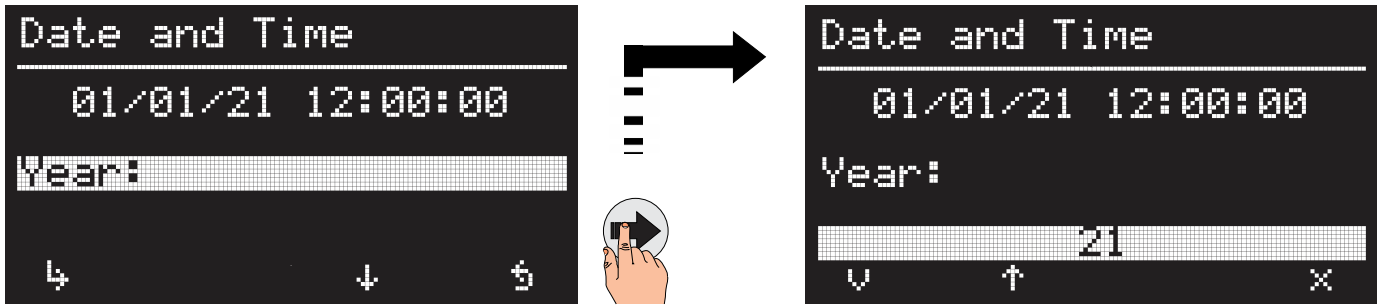


In this case, it is necessary to wait for the process to move on to the next stage (timed) so that a new attempt can be made.

10.7 • Date and Time

To change the equipment's date and time, select item `1.09` (Date and Time) from the Quick Menu and press the **SET** key.

This screen displays the current date and time. To edit, select between the Year, Day, Month, Hour, Minute, and Second fields using the **UP** and **DOWN** keys and enter the field to be edited by pressing the **SET** key.



Select the field value using the **UP** and **DOWN** keys. Confirm the edit by pressing **SET** or cancel by pressing **BACK**. The time change is applied after editing each field.

10.8 • Language

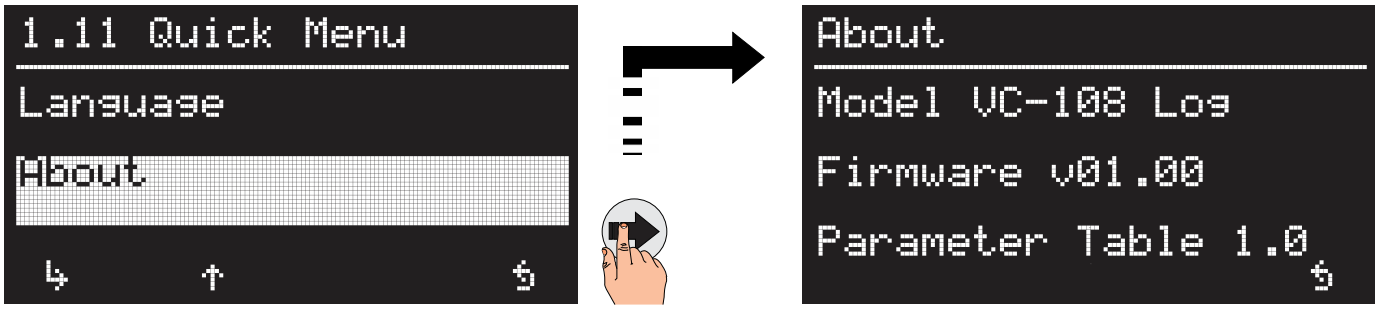
The equipment can operate in three languages:

- Portuguese;
- English;
- Spanish.

To change the language, select item `1.10` (Language) from the Quick Menu and press the **SET** key. Then, select the desired language using the **UP** and **DOWN** keys and confirm by pressing the **SET** key or cancel by pressing **BACK**.

10.9 • About the Equipment

To access basic information about the controller, go to the Quick Menu and select item `1.11` (About). Then, press the **SET** key. The screen will display the equipment model, *firmware* version, and Parameter Table version in sequence.



11 • Basic and Advanced Menus

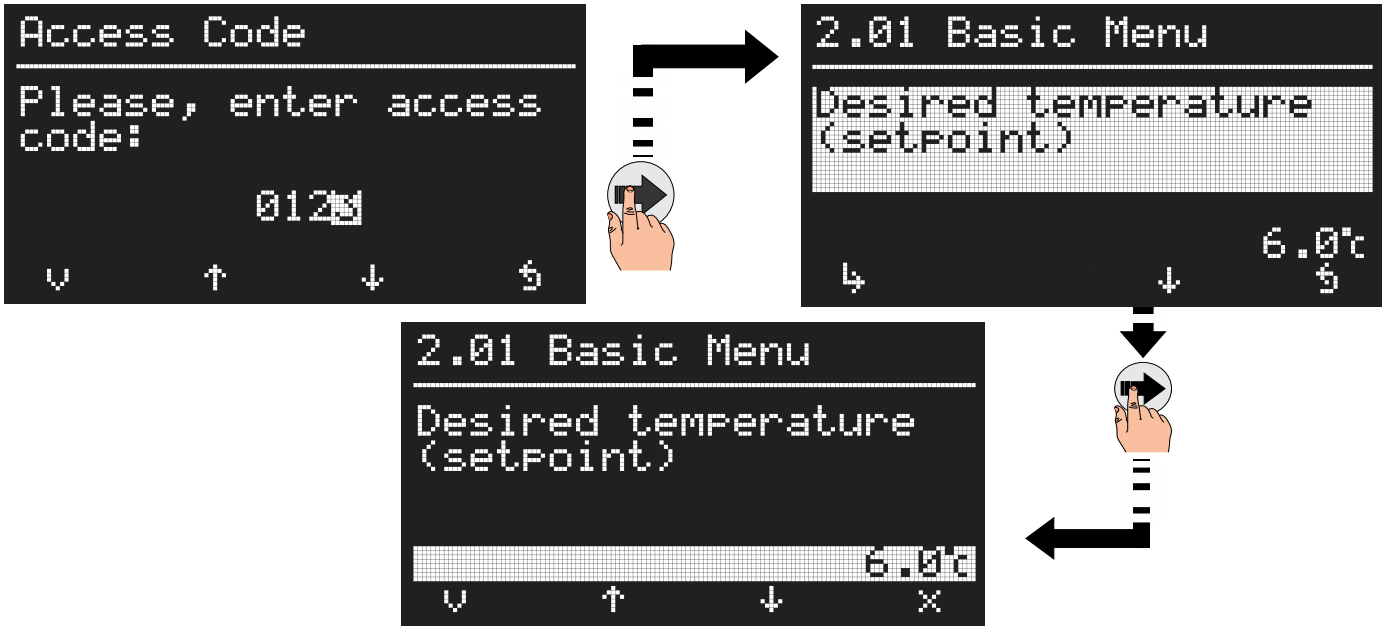
The Basic Menu contains user-level parameters. The Advanced Menu contains technical level parameters. To access these menus, select item `1.01` (Access Code) from the Quick Menu and enter the code: `0123` for Basic Menu; `0456` for Advanced Menu.

The elements of the Basic and Advanced Menu screens are listed below:

1 - Parameter number;

2 - Parameter name;

3 - Parameter value.



To switch between parameters, use the **UP** and **DOWN** keys. Select the desired parameter for editing with the **SET** key.

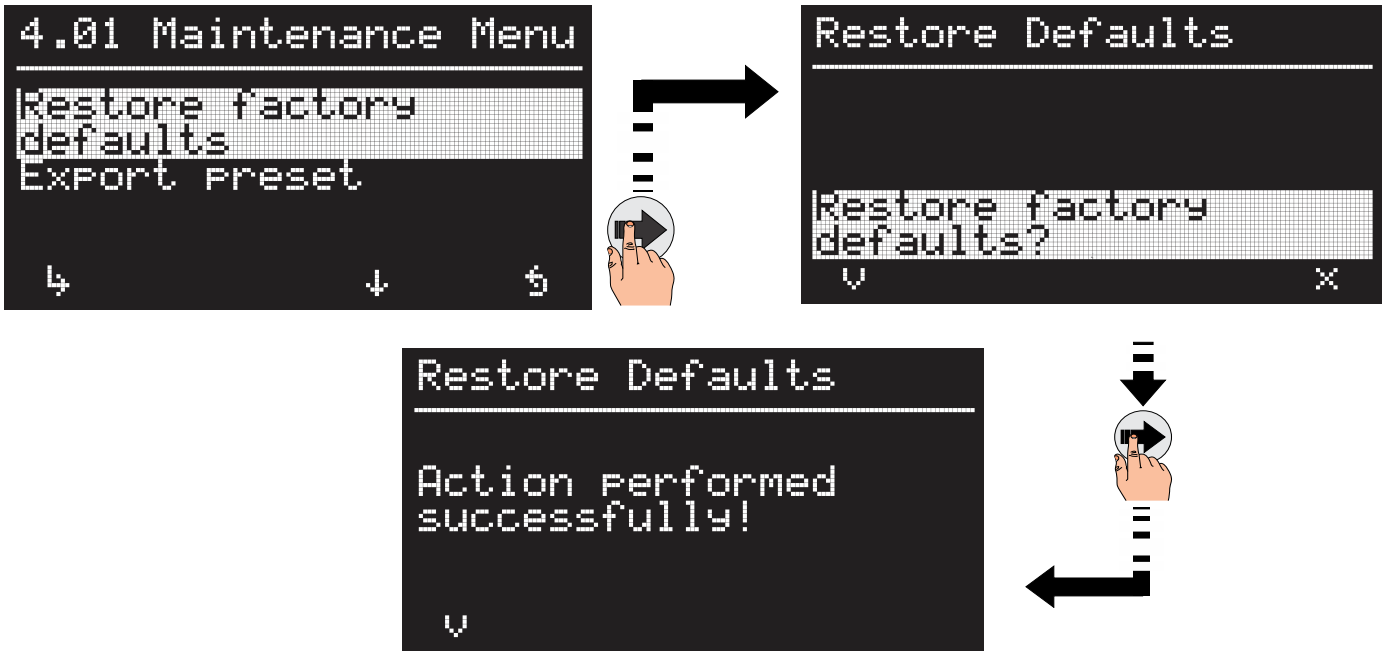
Using the **UP** and **DOWN** keys, edit the parameter value and press **SET** to change it. If you wish to cancel editing, press the **BACK** key.

12 • Maintenance Menu

The Maintenance Menu contains functions intended for use by the Vaccine Refrigerator or Ultrafreezer manufacturer. To access this menu, select item `1.01` (Access Code) from the Quick Menu and enter the code `0789`.

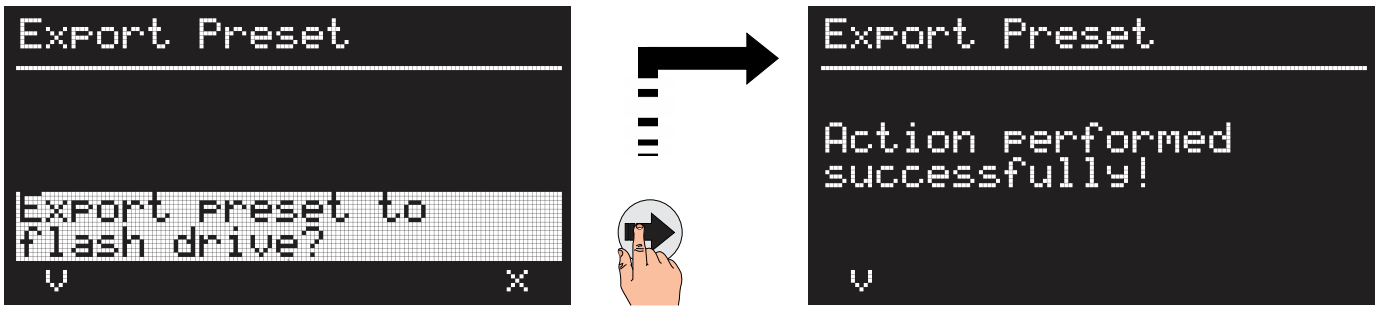
12.1 • Factory Reset

This action reloads all parameters with default values, including Language and Equipment Name. Proceed with caution since this action cannot be undone. In the Maintenance Menu, select item `4.01` (Factory Reset) and press the **SET** key.



12.2 • Exporting Preset

The **VC-108Log** controller allows the user to import and export presets, which are files containing all controller parameters. To export a preset with all current controller parameters, insert a *USB drive* into the USB port, access item `4.02` (Export Preset) through the Maintenance Menu, and press the **SET** key.



NOTE: *To avoid data loss or corruption, DO NOT REMOVE THE USB DRIVE FROM THE PORT OR TURN OFF THE EQUIPMENT during the export preset process.*

The parameters are saved to a file named in the following format:

VC-108_YYMMDD-hhmm.rec

Where:

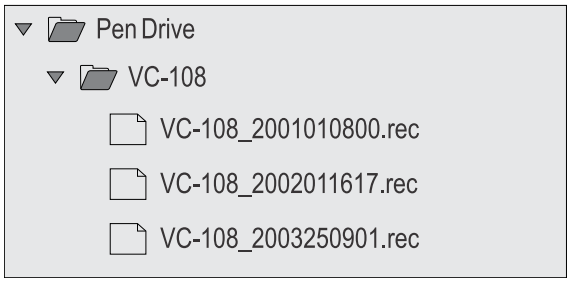
- YYMMDD: Represents the current date in Year, Month, Day format;
- hhmm: Represents the current time in Hour, Minute format.

The exported file is found in the VC-108 folder on the *USB drive's* root file system, which is automatically created if it does not exist.

NOTE: *The USB drive used to export these files must have at least 200MB of free space available.*

NOTE: *If there is already a file with the same name in the VC-108 folder, a number is added to the end of the file name in the following format:* **VC-108_YYMMDDhhmm_1.rec**.

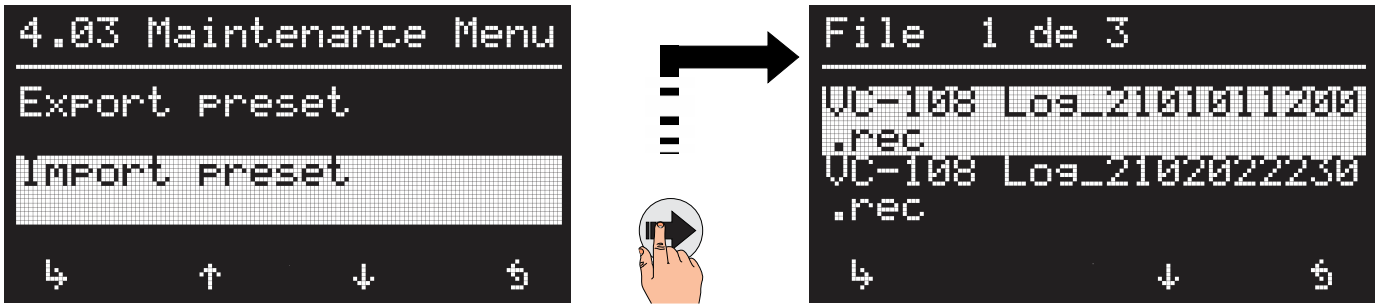
12.3 • IMPORTING A PRESET



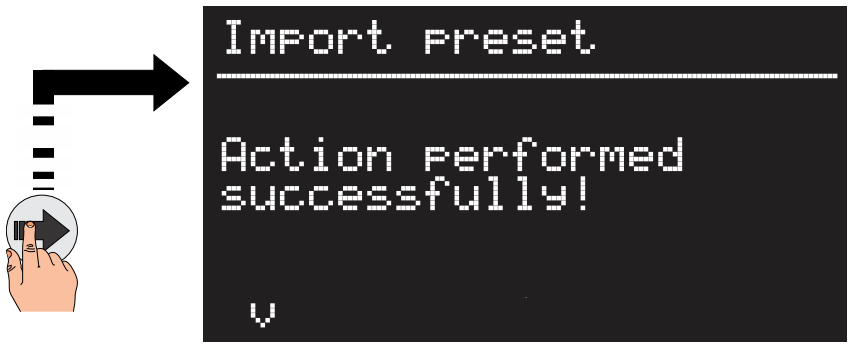
It is possible to import a preset containing the controller parameters that was exported from another controller or created through the **SitradPRO** preset generator. The preset file with the **.rec** extension must be placed in the **VC-108** folder on the *USB drive's* root file system.

NOTE: *The equipment can list a maximum of 32 update files. To ensure proper display, it is recommended that file names with extensions do not exceed 42 characters.*

To import a preset to the controller, insert a *USB drive* into the port, access item **4.03** (Import preset) through the Maintenance Menu, and press the **SET** key.



Next, select the desired preset from the list displayed by the controller using the **UP** and **DOWN** keys, and press the **SET** key.



NOTE: *The preset contains the parameter* `F3.104` *(Sitrad Address). Keep this in mind when replicating the same preset for controllers within the same network. Presets do not include the Equipment Name parameter.*

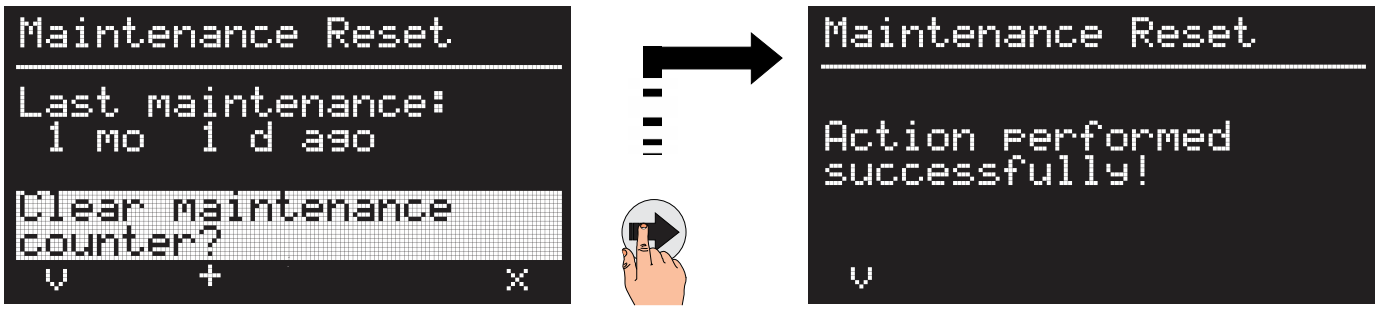
12.4 • Firmware Update

To initiate a *firmware* update, access the Maintenance Menu, select item `4.04` (*Firmware* Update), and press the **SET** key.

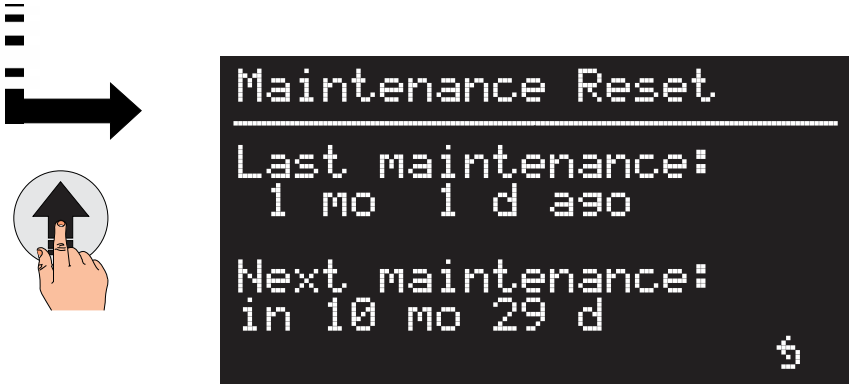
12.5 • Maintenance Reset

To view or reset the maintenance counter, access the Maintenance Menu and select item `4.05` (Maintenance Reset).

The Maintenance Reset screen displays the elapsed time since the last registered maintenance, in months and days. To reset the maintenance counter, confirm the action by pressing **SET**.



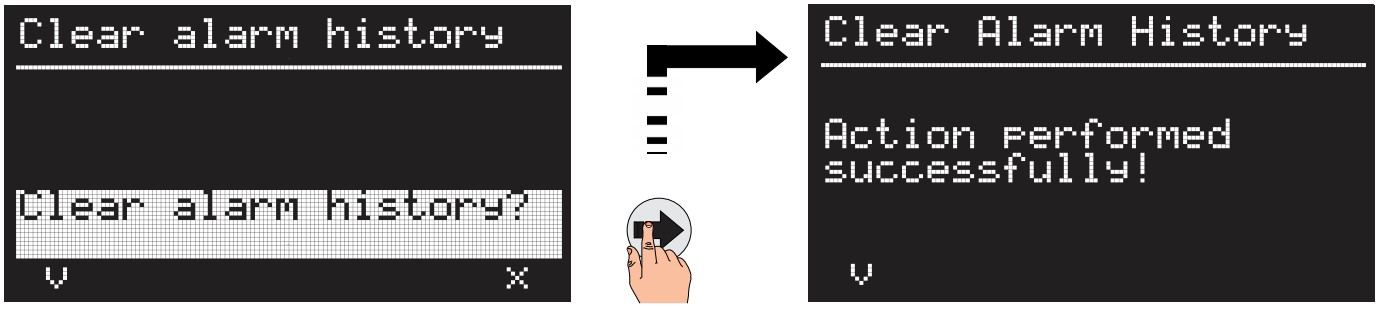
You can check the remaining time until the next maintenance by pressing the **UP** key.



NOTE: *If maintenance is disabled (*`F3.83`*), the message "Maintenance is disabled" will be displayed.*

12.6 • Clear Alarm History

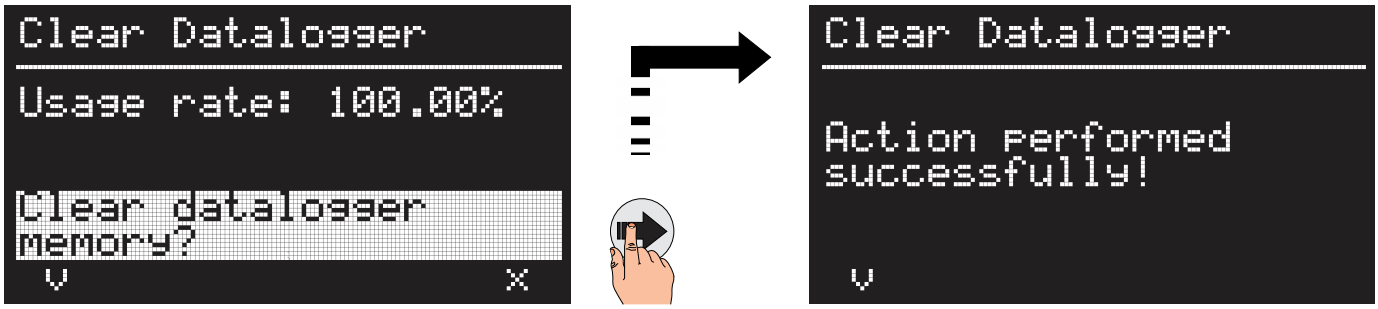
To clear the equipment's alarm history, access the Maintenance Menu, select item `4.06` (Clear Alarm History), and press the **SET** key. Confirm the action by pressing **SET** again.



NOTE: *Clearing the alarm history does not affect active alarms. They remain active and will be displayed in the history once they are terminated.*

12.7 • Clear Datalogger

To clear all datalogger records, access the Maintenance Menu, select item `4.07` (Clear Datalogger), and press the **SET** key. Confirm the action by pressing **SET** again.



13 • Equipment Name

The Equipment Name is displayed on the screen and can be used to differentiate controllers in relation to the products they store. It also serves to differentiate equipment when *log* files are exported.

To change the Equipment Name, select item `1.01` - Access Code on Quick Menu and enter code `0234`.

The name can have up to 26 characters, displayed in two lines of 13 characters each, which is the name display format on the Main Screen.

The Equipment Name screen displays the editing area for the name in white and highlights the character being edited. Select from available characters using the **UP** and **DOWN** keys. The available characters are: A-Z, a-z, 0-9, ., -, [and]. Advance to the next character with the **BACK** key. Pressing **BACK** when the last character is selected returns the selection to the first.

Once you have selected a name, you cannot cancel the change, so be careful when editing. Press **SET** to save the name to memory.

14 • Function Table

14.1 • Basic (password 0123)

FUN	DESCRIPTION	MIN	MAX	UNIT	DEFAULT
F2.01	Desired temperature (setpoint stage-1) (S1/S4)	F3.02	F3.03	°C (°F)	6.0 (42.8)
F2.02	Low sensor temperature alarm (S1/S4)	-200.0 (-328.0)	F2.03	°C (°F)	0.0 (32.0)
F2.03	High sensor temperature alarm (S1/S4)	F2.02	300.0 (572.0)	°C (°F)	10.0 (50.0)
F2.04	Lamp ON time	0 (Off)	9999	seconds	120
F2.05	Door open alarm time	0 (Off)	9999	seconds	120

F2.01 - Desired Temperature (setpoint stage-1) (S1/S4)

Control temperature. When the ambient temperature measured by sensor (S1/S4) is lower than the value set in this function, the compressor will turn off.

F2.02 - Low sensor temperature alarm (S1/S4)

When the temperature measured by ambient sensor (S1/S4) falls below this value, the buzzer alarm will be activated. If the alarm persists, the alarm relay will be activated after the time set in F3.43. The temperature set here can be absolute (default) or relative, depending on the operating mode set in F3.34.

The display will show "Absolute Alarm" if F3.34 = 0 (Absolute).

The display will show "Relative Alarm" if F3.34 = 1 (Relative).

NOTE: *The equipment will always use sensor S1 to validate this alarm. If sensor S1 fails, the equipment will use sensor S4 only if it is enabled in* F3.62.

F2.03 - High sensor temperature alarm (S1/S4)

When the temperature measured by ambient sensor (S1/S4) exceeds this value, the buzzer alarm will be activated. If the alarm persists, the alarm relay will be activated after the time set in F3.43. The temperature set here can be absolute (default) or relative, depending on the operating mode set in F3.34.

The display will show "Absolute Alarm" if F3.34 = 0 (Absolute).

The display will show "Relative Alarm" if F3.34 = 1 (Relative).

NOTE: *The equipment will always use sensor S1 to validate this alarm. If sensor S1 fails, the equipment will use sensor S4 only if it is enabled in* F3.62.

F2.04 - Lamp ON time

Time that the lamp remains on after the equipment is powered-up or after the lamp button is pressed.

This function can be disabled by setting it to the minimum value (Off).

F2.05 - Door Open Alarm Time

Duration of time that the door must remain open to activate the buzzer alarm.

This function can be disabled by setting it to the minimum value (Off).

14.2 • ADVANCED (PASSWORD 0456)

FUN	DESCRIPTION	MIN	MAX	UNIT	DEFAULT
F3.01	Application type	0 (Conser-vative)	1 (Ultra-freezer)	-	0 (Conser-vative)
F3.02	Minimum setpoint of temperature allowed for the end-user	-200.0 (-328.0)	F3.03	°C (°F)	2.0 (35.6)
F3.03	Maximum setpoint of temperature allowed for the end-user	F3.02	300.0 (572.0)	°C (°F)	8.0 (46.4)
F3.04	Control differential (hysteresis) for stage-1 (S1/S4)	0.1 (0.2)	30.0 (54.0)	°C (°F)	2.0 (3.6)
F3.05	Minimum time of compressor 1 turned on	0 (Off)	9999	seconds	0 (Off)

FUN	DESCRIPTION	MIN	MAX	UNIT	DEFAULT
F3.06	Minimum time of compressor 1 turned off	0 (Off)	9999	seconds	120
F3.07	Time of compressor turned on if room sensor error (S1/S4)	0 (Off)	999	minutes	20
F3.08	Time of compressor turned off if room sensor error (S1/S4)	0 (Off)	999	minutes	10
F3.09	Delay time on controller power-up	0 (Off)	999	minutes	0 (Off)
F3.10	Desired temperature (setpoint stage 2) (S8/S9 Ultrafreezer)	-50.0 (-58.0)	105.0 (221.0)	°C (°F)	-5.0 (23.0)
F3.11	Control differential (hysteresis) stage 2 (S8/S9 Ultrafreezer)	0.1 (0.2)	30.0 (54.0)	°C (°F)	15.0 (27.0)
F3.12	Minimum time of compressor 2 turned on (Ultrafreezer)	0 (Off)	9999	seconds	0 (Off)
F3.13	Minimum time of compressor 2 turned off (Ultrafreezer)	0 (Off)	9999	seconds	60
F3.14	Time between start-up of compressors 1 and 2 (Ultrafreezer)	0 (Off)	9999	seconds	30
F3.15	Defrost type	0 (Off)	3	-	2
F3.16	Interval between defrosts	1	9999	minutes	240
F3.17	Defrost on controller power-up	0 (No)	1 (Yes)	-	0 (No)
F3.18	Minimum evaporator temperature to start manual defrost	-50.0 (-58.0)	105.0 (221.0)	°C (°F)	5.0 (41.0)
F3.19	Pre-defrost time	0 (Off)	999	minutes	0 (Off)
F3.20	Evaporator temperature to end defrost	-50.0 (-58.0)	105.0 (221.0)	°C (°F)	30.0 (86.0)
F3.21	Room temperature to end defrost	-200.0 (-328.0)	300.0 (572.0)	°C (°F)	20.0 (68.0)
F3.22	Maximum defrost time (for safety)	1	999	minutes	30
F3.23	Drainage time (water dripping)	0 (Off)	999	minutes	0 (Off)
F3.24	Fan operation mode	0	2	-	0

FUN	DESCRIPTION	MIN	MAX	UNIT	DEFAULT
F3.25	Fan ON time	1	99	minutes	2
F3.26	Fan OFF time	1	99	minutes	8
F3.27	Turns off fan when door is opened	0 (No)	1 (Yes)	-	1 (Yes)
F3.28	High evaporator temperature to stop the fan	-50.0 (-58.0)	105.0 (221.0)	°C (°F)	50.0 (122.0)
F3.29	Evaporator temperature to restart the fan after drainage	-50.0 (-58.0)	105.0 (221.0)	°C (°F)	20.0 (68.0)
F3.30	Maximum time for fan restart after drainage	0 (Off)	999	minutes	1
F3.31	CO_2 valve ON time (Ultrafreezer)	0 (Off)	20	seconds	3
F3.32	CO_2 valve OFF time (Ultrafreezer)	1	9999	seconds	10
F3.33	Delay to activate CO_2 after door closing (Ultrafreezer)	0 (Off)	9999	seconds	30
F3.34	Operation mode of ambient temperature alarm	0 (Absolute)	1 (Relative)	-	0 (Absolute)
F3.35	Temperature alarm hysteresis (S1/S4)	0.1 (0.2)	20.0 (36.0)	°C (°F)	2.0 (3.6)
F3.36	Temperature alarm validation time (S1/S4)	0 (Off)	9999	seconds	30
F3.37	Temperature alarm inhibition time on power-up (S1/S4)	0 (Off)	9999	minutes	120
F3.38	Temperature alarm inhibition time after defrost (S1/S4)	0 (Off)	9999	minutes	30
F3.39	High condenser temperature alarm stage 1 (S3)	-50.0 (-58.0)	105.0 (221.0)	°C (°F)	10.0 (50.0)
F3.40	Turns off control outputs on high condenser temperature (S3)	0 (No)	1 (Yes)	-	0 (No)
F3.41	Time for alarm of compressor turned on without reaching setpoint (S1/S4)	0 (Off)	9999	minutes	0 (Off)

FUN	DESCRIPTION	MIN	MAX	UNIT	DEFAULT
F3.42	Time to mute alarm automatically	59 (Off)	9999	seconds	600
F3.43	Alarm relay activation delay time	0 (Off)	9999	seconds	10
F3.44	Alarm relay ON time	0 (Off)	9999	seconds	60
F3.45	Alarm relay OFF time	0 (Off)	9999	seconds	60
F3.46	Temperature alarm simulation time	9 (Off)	9999	seconds	600
F3.47	Enables alarm output during power outage	0 (Off)	9999	minutes	1
F3.48	Minimum DC voltage for controller power supply	10.6	F3.49	Vdc	11.0
F3.49	Maximum DC voltage for controller power supply	F3.48	16.0	Vdc	16.0
F3.50	Time delay for DC power supply alarm activation	2	30	seconds	5
F3.51	Offset indication for DC power supply voltage	-5	5	Vdc	0
F3.52	Low external temperature alarm (S10 Ultrafreezer)	-50.0 (-58.0)	F3.53	°C (°F)	-5.0 (23.0)
F3.53	High external temperature alarm (S10 Ultrafreezer)	F3.52	105.0 (221.0)	°C (°F)	30.0 (86.0)
F3.54	External temperature alarm validation time (S10 Ultrafreezer)	0 (Off)	9999	seconds	600
F3.55	Temperature sensor type 1 (S1)	0 (NTC)	1 (PT100)	-	0 (NTC)
F3.56	Selection of room temperature sensor for control	S1 (Glycerol)	S4 (Air)	-	S1 (Glycerol)
F3.57	Digital filter intensity for sensor S1	0 (Off)	20	seconds	0 (Off)
F3.58	Digital filter intensity for sensor S4	0 (Off)	20	seconds	0 (Off)
F3.59	Indication offset for sensor S1	-20.0 (-36.0)	20.0 (36.0)	°C (°F)	0
F3.60	Indication offset for sensor S2 (evaporator)	-20.1 (Off) -36.2 (Off)	20.0 (36.0)	°C (°F)	0

FUN	DESCRIPTION	MIN	MAX	UNIT	DEFAULT
F3.61	Indication offset for sensor S3 (condenser)	-20.1 (Off) -36.2 (Off)	20.0 (36.0)	°C (°F)	-20.1 (Off) -36.2 (Off)
F3.62	Indication offset for sensor S4	-20.1 (Off) -36.2 (Off)	20.0 (36.0)	°C (°F)	0
F3.63	Indication offset for sensor S5 (drawer 1/opt. Ultrafreezer)	-20.1 (Off) -36.2 (Off)	20.0 (36.0)	°C (°F)	-20.1 (Off) -36.2 (Off)
F3.64	Indication offset for sensor S6 (drawer 2/opt. Ultrafreezer)	-20.1 (Off) -36.2 (Off)	20.0 (36.0)	°C (°F)	-20.1 (Off) -36.2 (Off)
F3.65	Indication offset for sensor S7 (drawer 3/opt. Ultrafreezer)	-20.1 (Off) -36.2 (Off)	20.0 (36.0)	°C (°F)	-20.1 (Off) -36.2 (Off)
F3.66	Indication offset for sensor S8 (drawer 4/stage-2 Ultrafreezer)	-20.1 (Off) -36.2 (Off)	20.0 (36.0)	°C (°F)	-20.1 (Off) -36.2 (Off)
F3.67	Indication offset for sensor S9 (drawer 5/stage-2 Ultrafreezer)	-20.1 (Off) -36.2 (Off)	20.0 (36.0)	°C (°F)	-20.1 (Off) -36.2 (Off)
F3.68	Indication offset for sensor S10 (drawer 6/external temperature Ultrafreezer)	-20.1 (Off) -36.2 (Off)	20.0 (36.0)	°C (°F)	-20.1 (Off) -36.2 (Off)
F3.69	Enables pressure switch alarm - digital input 2 (Ultrafreezer)	0 (Off)	2	-	1
F3.70	External pressure switch alarm validation time (Ultrafreezer)	0 (Off)	9999	seconds	5
F3.71	Time after pressure switch alarm to activate stage-2 (Ultrafreezer)	0 (Off)	9999	minutes	2
F3.72	Datalogger sampling period	30	999	seconds	300
F3.73	Minimum temperature variation to generate log record	0 (Off)	20.0 (36.0)	°C (°F)	0 (Off)
F3.74	Generates log record due to input/ output variation	0 (No)	1 (Yes)	-	0 (No)
F3.75	Overwrites older log records	0 (No)	1 (Yes)	-	1 (Yes)
F3.76	Minimum AC operating voltage	90	F3.77	Vac	90

FUN	DESCRIPTION	MIN	MAX	UNIT	DEFAULT
F3.77	Maximum AC operating voltage	F3.76	265	Vac	140
F3.78	AC voltage validation time	0 (Off)	99	seconds	3
F3.79	AC voltage validation time on equipment power-up	0 (Off)	999	seconds	30
F3.80	Enables emergency mode control	0 (No)	1 (Yes)	-	1 (Yes)
F3.81	Minimum time in emergency mode	2	20	minutes	15
F3.82	AC voltage indication offset	-20	20	Vac	0
F3.83	Maintenance interval	0 (Off)	12	months	0 (Off)
F3.84	Compressor type	0	1	-	0
F3.85	Proportional gain (P)	1	100	-	2
F3.86	Integral time (I)	1	500	seconds	50
F3.87	Derivative time (D)	0 (Off)	500	seconds	0 (Off)
F3.88	Minimum compressor frequency for PID control	30	F3.89	Hz	60
F3.89	Maximum compressor frequency for PID control	F3.88	300	Hz	120
F3.90	Maximum compressor operating frequency	30	300	Hz	150
F3.91	Compressor stop frequency (shutdown)	0	50	Hz	30
F3.92	Compressor frequency during hot gas defrost	30	F3.90	Hz	120
F3.93	Compressor frequency on S1 sensor error	F3.88	F3.89	Hz	100
F3.94	Compressor soft start frequency	F3.88	F3.89	Hz	60
F3.95	Compressor soft start time	1	999	seconds	30
F3.96	Compressor on-time after reaching setpoint	0 (Off)	999 (On)	minutes	120

FUN	DESCRIPTION	MIN	MAX	UNIT	DEFAULT
F3.97	Compressor time below minimum frequency for lubrication	10 (Off)	1440	minutes	10 (Off)
F3.98	Compressor time at frequency for lubrication	10	999	seconds	30
F3.99	Minimum compressor frequency for lubrication	F3.88	F3.89	Hz	80
F3.100	Maximum time at maximum compressor frequency	0 (Off)	9999	minutes	600
F3.101	Low temperature limit (setpoint offset)	1,0 (Off) (1,8 (Off))	99,9 (179,8)	°C (°F)	3,0 (5,4)
F3.102	High temperature limit (setpoint offset)	1,0 (Off) (1,8 (Off))	99,9 (179,8)	°C (°F)	11,0 (19,8)
F3.103	Temperature unit	Celsius (°C)	Fahrenheit (°F)	-	Celsius (°C)
F3.104	Sitrad Address	1	247	-	1

F3.01 - Application type

Application type in which the **VC-108 Log** will be used:

0 = Vaccine Refrigerator

1 = Ultrafreezer

NOTE: *When changing the type of application, the* **VC-108 Log** *displays the following behavior: - If the operator changes the type of application directly on the controller, the* **VC-108 Log**, *will be reset when returning to the main screen.*

- If the operator changes the type of application via Sitrad, the **VC-108 Log** *will be restarted after 30 seconds.*

F3.02 - Minimum setpoint of temperature allowed for the end-user

F3.03 - Maximum setpoint of temperature allowed for the end-user

These thresholds are set to prevent the user from accidentally setting excessively high or low temperature setpoints, which can result in high energy consumption by keeping the system continuously on.

F3.04 - Control differential (hysteresis) stage-1 (S1/S4)

Temperature control differential in relation to the setpoint. When the ambient sensor (S1 or S4) temperature is higher than F2.01 + F3.04, the compressor will be turned on.

F3.05 - Minimum time of compressor-1 turned ON

Minimum time the compressor will remain on, that is, the time between the last start and the next stop. This is used to avoid high voltage surges on the electrical network.

This function can be disabled by setting it to the minimum value (Off).

F3.06 - Minimum time of compressor-1 turned OFF

Minimum time that the compressor will remain off, that is, the time between the last stop and the next start. This is used to relieve discharge pressure and increase the compressor's lifespan.

This function can be disabled by setting it to the minimum value (Off).

F3.07 - Time of compressor turned ON if room sensor error (S1/S4)

F3.08 - Time of compressor turned OFF if room sensor error (S1/S4)

If the ambient sensor (S1) is disconnected or out of the measuring range, the compressor will be turned on and off according to the parameters set in these functions.

These functions can be disabled by setting them to the minimum value (Off).

NOTE: *If sensor S4 is enabled in F3.62, the control will be based on the value of sensor S4.*

F3.09 - Delay time on controller power-up

The control can be disabled for a certain period when the instrument is turned on, delaying the process start. During this time, it only functions as a temperature indicator. This avoids spikes in electricity demand during power outages and subsequent restoration, especially when multiple equipment are connected to the same power line. Set by adjusting the time settings for each individual equipment. The delay can be set for either the compressor or defrost function, depending on whether defrost at controller startup is enabled in F3.17).

This function can be disabled by setting it to the minimum value (Off).

F3.10 - Desired temperature (setpoint stage 2) (S8/S9 Ultrafreezer)

The desired temperature setpoint for stage-2 of the Ultrafreezer. Sensor S8 is used as the primary sensor, and if enabled, sensor S9 acts as a backup (redundancy) for S8. This function is used only for the Ultrafreezer.

F3.11 - Control differential (hysteresis) stage 2 (S8/S9 Ultrafreezer)

The control differential (hysteresis) for stage-2 of the Ultrafreezer. This function is not used for Vaccine Refrigerator. Sensor S8 is used as the primary sensor, and sensor S9 is optional and serves as a backup for S8. Sensors S8 and S9 are enabled in F3.66 and F3.67.

F3.12 - Minimum time of compressor-2 turned ON (Ultrafreezer)

Minimum time the compressor will remain on, that is, the time between the last start and the next stop. This is used to avoid high voltage surges on the electrical network. Used only for Ultrafreezer applications.

This function can be disabled by setting it to the minimum value (Off).

F3.13 - Minimum time of compressor-2 turned OFF (Ultrafreezer)

Minimum time that the compressor will remain off, that is, the time between the last stop and the next start. This is used to relieve discharge pressure and increase the compressor's lifespan. Used only for Ultrafreezer applications.

This function can be disabled by setting it to the minimum value (Off).

F3.14 - Time between start-up of compressors 1 and 2 (Ultrafreezer)

The time between the start-up of compressors 1 and 2 is defined by this function. This is used to reduce demand and voltage surges on the electrical grid. Used only for Ultrafreezer applications.

This function can be disabled by setting it to the minimum value (Off).

F3.15 - Defrost type

The following options are available for Vaccine Refrigerator applications:

0 - Disabled: No defrost cycle;

1 - Natural: Only the fan output is activated;

2 - Resistance: Only the defrost output is activated;

3 - Hot Gas: Both the compressor and defrost outputs are activated.

This function can be disabled by setting it to the minimum value (Off).

NOTE: *For Ultrafreezer applications, defrost occurs only in Natural mode (with fan turned off). For other configurations, defrost is not initiated.*

F3.16 - Interval between defrost cycles

Determines the time interval between defrost cycles, counted from the end of the previous defrost cycle.

F3.17 - Defrost on controller power-up

Enables defrost to be initiated when the controller is powered-up, such as when power is restored after an outage.

F3.18 - Minimum evaporator temperature to start manual defrost

The evaporator (sensor S2) must be below this temperature value for the user to initiate manual defrost through the quick menu. Otherwise, the action will be rejected.

F3.19 - Pre-defrost time

At the start of the defrost cycle, the controller will be activated only the fan during this time, in order to use the residual energy of the gas.

This function can be disabled by setting it to the minimum value (Off).

F3.20 - Evaporator temperature to end defrost

If the temperature in the evaporator (sensor S2) reaches the set value, the defrost cycle will end according to the desired temperature, optimizing the defrosting process.

F3.21 - Room temperature to end defrost

If the ambient temperature (sensor S1 or S4) reaches the set value, the defrost cycle will end according to the temperature.

F3.22 - **Maximum defrost time (for safety)**

This parameter sets the maximum duration of defrost. If the defrost is not completed by temperature (see parameters F3.20 or F3.21) within this period, the defrost will be completed by time.

F3.23 - **Drainage time (water dripping)**

The time required for the last drops of water to drain from the evaporator is set in this parameter. During this period, all outputs remain off.

This function can be disabled by setting it to the minimum value (Off).

F3.24 - **Fan operation mode**

0 - Dependent: The fan will be activated together with the compressor.

1 - Cyclical: The fan will be on when the compressor is running. When the compressor is off, the fan will alternate according to the durations set in F3.25 and F3.26.

2 - Continuous: The fan will always be on.

F3.25 - **Fan ON time**

This parameter sets the duration that the fan will remain on in cyclical mode.

F3.26 - **Fan OFF time**

This parameter sets the duration that the fan will remain off in cyclical mode.

F3.27 - **Fan turns off when the door is opened**

This parameter keeps the fan off while the door is open to avoid exchanging heat with the external environment.

F3.28 - **High evaporator temperature to stop the fan**

If the temperature of the evaporator (sensor S2) exceeds this value, the fan will turn off. A temperature differential of 2.0°C (3.6°F) is required to turn the fan back on.

This parameter is used to turn off the fan until the ambient temperature approaches the expected temperature in the refrigeration system design, preventing high temperatures and suction

pressures that could damage the compressor. This function is useful when starting up equipment that has been idle for a long time.

F3.29 - Evaporator temperature to restart the fan after drainage

After drainage, the *fan-delay* cycle starts. The compressor is immediately activated because the temperature in the evaporator is high, but the fan will only be activated after the temperature in the evaporator drops below the set value. This function is used to remove the heat that still exists in the evaporator due to defrosting, avoiding its release into the environment.

F3.30 - Maximum time for fan restart after drainage

For safety purposes, if the temperature in the evaporator does not reach the value set in function F3.29, or if sensor S2 is disconnected or malfunctioning, the fan will restart after the time set in this function has elapsed.

This function can be disabled by setting it to the minimum value (Off).

F3.31 - CO_2 valve ON time (Ultrafreezer)

F3.32 - CO_2 valve OFF time (Ultrafreezer)

For Ultrafreezer applications, the CO_2 valve will cycle on and off according to the set times when a high ambient temperature alarm is triggered. To disable this feature, set F3.31 to "Off". This feature will only be enabled once the desired ambient temperature (setpoint) is reached when turning on the equipment.

The function F3.31 can be disabled by setting it to the minimum value (Off).

NOTE: *The CO_2 functions are only available for Ultrafreezer applications.*

F3.33 - CO_2 delay activation after door closure (Ultrafreezer)

This function blocks the CO_2 valve during door opening and for a duration set in this function after the door is closed.

This function can be disabled by setting it to the minimum value (Off).

F3.34 - Ambient temperature alarm operating mode

The ambient temperature alarm can be configured in two modes:

0 - Absolute mode. The low and high ambient temperature alarms (F2.02 and F2.03) must be set with the desired absolute temperature.

1 - Relative mode. The low and high ambient temperature alarms (F2.02 and F2.03) must be set relative to the desired temperature (F2.01). In this mode, F2.02 and F2.03 indicate how many degrees below and above the setpoint temperature (F2.01) the low and high temperature alarms will be activated.

Examples 1 and 2 below produce the same result.

Example 1:

F3.34 = 0 (Absolute)

F2.01 = 6°C (desired setpoint or ambient temperature, S1/S4 sensor)

F2.02 = -4°C (absolute value for low ambient temperature alarm, S1/S4 sensor)

F2.03 = 16°C (absolute value for high ambient temperature alarm, S1/S4 sensor)

Example 2:

F3.34 = 1 (Relative)

F2.01 = 6°C (desired setpoint or ambient temperature, S1/S4 sensor)

F2.02 = -10°C (relative value for low ambient temperature alarm, S1/S4 sensor)

F2.03 = 10°C (relative value for high ambient temperature alarm, S1/S4 sensor)

F3.35 - Temperature alarm hysteresis (S1/S4)

When a high or low temperature alarm is triggered, the differential set in this parameter will be used to turn off the alarm.

F3.36 - Temperature alarm validation time (S1/S4)

Minimum time required for a high or low temperature condition to persist before activating the respective alarm. If set to 0 (Off), the alarm will be activated immediately upon the condition being met.

This function can be disabled by setting it to the minimum value (Off).

F3.37 - Temperature alarm inhibition time at power-up (S1/S4)

The ambient temperature alarm (sensors S1 and S4) is inhibited when **VC-108 Log** controller is turned on / energized. The Alarm is enabled after this time or after the setpoint is reached, the whichever occurs first.

This function can be disabled by setting it to the minimum value (Off).

F3.38 - Temperature alarm inhibition time after defrosting (S1/S4)

After a defrosting cycle, the temperature alarms will only be activated after this time has elapsed.

This function can be disabled by setting it to the minimum value (Off).

F3.39 - High condenser temperature alarm stage 1 (S3)

When the condenser temperature (sensor S3) is above this value, the alarm (buzzer) will be activated and if function F3.40 is enabled, the control outputs will be deactivated. To deactivate this alarm, a temperature differential of 4.0°C (7.2°F) will be considered. If function F3.61 is set to -20.1 (Off), this functionality will be disabled.

F3.40 - Turns off control outputs on high condenser temperature (S3)

If this function is enabled, the control outputs will be turned off when a high temperature alarm occurs in the condenser (sensor S3). If function F3.61 is set to -20.1 (Off), this functionality will be ignored.

F3.41 - Time for alarm of compressor turned on without reaching setpoint (S1/S4)

If the compressor remains on for a duration longer than that set in this function without reaching the setpoint, the buzzer alarm will be activated. If set to 0 (Off), this alarm will be disabled.

This function can be disabled by setting it to the minimum value (Off).

F3.42 - Time to mute alarm automatically

After being activated, the buzzer and relay alarm will automatically be silenced after the duration set in this parameter has elapsed. If set to 59 (Off), the alarm will remain active until the user silences it by pressing the MUTE key, or until the alarm condition ends.

This function can be disabled by setting it to the minimum value 59 (Off).

F3.43 - Alarm relay activation delay time

The alarm relay will only be activated after this duration has elapsed following the activation of the buzzer alarm. If set to 0 (Off), the alarm relay will be activated simultaneously with the buzzer.

This function can be disabled by setting it to the minimum value (Off).

NOTE: *Some alarms activate the alarm/dialer relay, while others do not. For more details, refer to the alarm table.*

NOTE: *If function F3.44 is set to 0 (Off), the alarm relay will not be activated.*

F3.44 - Alarm relay ON time

F3.45 - Alarm relay OFF time

These functions determine the behavior of the alarm relay after activation. When both parameters are enabled, the relay alternates between being on for the duration set in F3.44 and off for the duration set in F3.45. If F3.44 is set to 0 (Off), the alarm relay will not activate. Otherwise, if F3.45 is set to 0 (Off), the relay will remain on continuously.

These functions can be disabled by setting them to the minimum value (Off).

F3.46 - Temperature alarm simulation time

Temperature alarm simulation time only applies to high and low temperature alarm simulation commands accessed through the quick menu. If enabled, the simulation will behave like a normal temperature alarm. If set to 9 (Off), the simulation will last for 10 seconds and will be terminated without activating the relay.

This function can be disabled by setting it to the minimum value 9 (Off).

F3.47 - Enables alarm output in case of power outage

Alarm relay activation delay time only applies when a power failure occurs. If set to 0 (Off), only the buzzer will be activated based on the logic described in parameter F3.80.

This function can be disabled by setting it to the minimum value (Off).

F3.48 - Minimum DC voltage for controller power supply

If the voltage of the controller power supply drops below this value, the buzzer alarm will be activated.

F3.49 - Maximum DC voltage for controller power supply

If the voltage of the controller power supply exceeds this value, the buzzer alarm will be activated.

F3.50 - Time delay for DC power supply alarm

This parameter sets the minimum time delay required to activate the high or low DC voltage alarm. If set to 0 (Off), the alarm will be activated immediately upon the condition being met.

F3.51 - Indication offset for DC power supply voltage

Allows compensation for any deviations in the power supply voltage reading.

F3.52 - Low external temperature alarm (S10 Ultrafreezer)

Low external temperature alarm for the S10 sensor. Used only for Ultrafreezer applications.

F3.53 - High external temperature alarm (S10 Ultrafreezer)

High external temperature alarm for the S10 sensor. Used only for Ultrafreezer applications.

F3.54 - Validation time delay for the external temperature alarm (S10 Ultrafreezer)

Determines the minimum time delay required to validate the external temperature alarm from the S10 sensor. Used only for Ultrafreezer applications.

This function can be disabled by setting it to the minimum value (Off).

F3.55 - Type of temperature sensor for S1

Determines the type of sensor used for temperature sensor S1. Set 0 for NTC and 1 for PT100.

F3.56 - Selection of room temperature sensor for control

Determines which ambient temperature sensor will be used for process control.

NOTE: *Even if the S4 sensor is selected, the temperature reading from S1 will still be displayed on the screen, and temperature alarms will be activated by S1.*

NOTE: *If the selected sensor fails, the other sensor will be used for process control and temperature alarms, as long as it is enabled (in the case of S4, enabled by F3.62 - S1 sensor is always enabled).*

F3.57 - **Digital filter intensity for S1 sensor**

F3.58 - **Digital filter intensity for S4 sensor**

Determines the time for the recorded temperature to vary by 0.1°C on temperature rise or fall.

These functions can be disabled by setting them to the minimum value (Off).

NOTE: *If the S1 sensor is selected in F3.56 and it fails, function F3.57 will be used as a filter applied to sensor 4 if it is enabled in F3.62.*

NOTE: *This type of filter is commonly used in freezers for ice cream and frozen foods, where opening the door causes warm air to directly hit the temperature sensor. This can cause a rapid increase in temperature reading, leading to unnecessary compressor activation.*

F3.59 - **Indication offset for S1 sensor**

Allows compensating for any deviations in the temperature reading of the sensor caused by sensor replacement or changes in cable length.

F3.60 - **Indication offset for S2 sensor (evaporator)**

F3.61 - **Indication offset for S3 sensor (condenser)**

F3.62 - **Indication offset for S4 sensor**

F3.63 - **Indication offset for S5 sensor (drawer 1/opt. Ultrafreezer)**

F3.64 - **Indication offset for S6 sensor (drawer 2/opt. Ultrafreezer)**

F3.65 - **Indication offset for S7 sensor (drawer 3/opt. Ultrafreezer)**

F3.66 - **Indication offset for S8 sensor (drawer 4/Stage-2 Ultrafreezer)**

F3.67 - **Indication offset for S9 sensor (drawer 5/Stage-2 Ultrafreezer)**

F3.68 - **Indication offset for S10 sensor (drawer 6/external temperature Ultrafreezer)**

Allows compensating for any deviations in the temperature reading of the sensor caused by sensor replacement or changes in cable length. The sensor can be disabled by setting the function to the minimum value (-20.1 = Off). When disabled, all functions that depend on the temperature reading of the sensor will not operate.

These functions can be disabled by setting them to the minimum value °C -20.1 (Off) / °F -36.2 (Off).

F3.69 - Enables pressure switch alarm - digital input 2 (Ultrafreezer)

This function enables the pressure switch alarm on digital input 2 (D2).

0 - Pressure switch disabled

1 - Pressure switch with normally open (NO) contact

2 - Pressure switch with normally closed (NC) contact

This function is valid only for Ultrafreezer applications (F3.01 = 1).

This function can be disabled by setting it to the minimum value (Off).

F3.70 - Time delay for pressure switch alarm validation (Ultrafreezer)

This function sets the time delay, in seconds, for validating the pressure switch alarm on digital input 2 (D2).

This function can be disabled by setting it to the minimum value (Off).

F3.71 - Time after pressure switch alarm to activate stage-2 (Ultrafreezer)

This function sets the time delay, in minutes, after the pressure switch alarm to operate stage 2 of the Ultrafreezer.

This function can be disabled by setting it to the minimum value (Off).

F3.72 - Datalogger sampling period

This function sets the time interval between periodic records in the datalogger, which provides an approximate duration for the datalogger.

F3.73 - Minimum temperature variation to generate log record

This function sets the minimum temperature variation needed to create a new datalogger record before the time interval set in F3.72 has elapsed. If set to 0 (Off), no recording will occur due to temperature variation.

This function can be disabled by setting it to the minimum value (Off).

NOTE: *Temperature variation records do not affect datalogger periodicity. In other words, the next periodic record will be made with a fixed interval in relation to the last periodic record.*

F3.74 - Generates log record due to input/output variation

If enabled, it forces the writing of a new register before the time configured in F3.72 if there is a change in a digital input, in a relay, in the AC network voltage or in the DC voltage. If set to 0 (No), there will be no recording due to variation in an input or output.

NOTE: *Variation records do not affect datalogger periodicity. In other words, the next periodic record will be made with a fixed interval in relation to the last periodic record.*

F3.75 - Overwrites older log records

This function, when enabled, overwrites the oldest records when the datalogger memory is full, meaning that the oldest data will be lost. If disabled, when the datalogger memory is full, no new records will be written, meaning that the latest data will be discarded.

F3.76 - Minimum AC operating voltage

F3.77 - Maximum AC operating voltage

If the mains voltage falls outside of this range, the buzzer alarm will be triggered, and the loads will be deactivated. If the emergency mode control F3.80 is enabled, the system activation process for emergency mode will be initiated.

F3.78 - AC voltage validation time

The minimum duration of AC voltage being outside the specified range or power outage needed to activate the corresponding alarm. If set to 0 (Off), the alarm will be activated immediately upon the condition being met.

This function can be disabled by setting it to the minimum value (Off).

F3.79 - AC voltage validation time on equipment power-up

When the emergency mode control F3.80 is enabled, the equipment will wait for the specified duration to ensure electrical grid stability before powering up.

This function can be disabled by setting it to the minimum value (Off).

F3.80 - Enables emergency mode control

This function must be enabled for equipment that is equipped with an emergency system consisting of a battery and inverter designed to activate loads in the event of a power outage or

when the AC voltage is outside the operating range. This is only valid for Vaccine Refrigerator applications.

F3.81 - Minimum time in emergency mode

When a power outage is detected and the emergency system is activated, the controller will be powered by the emergency system for a duration equal to or longer than the time set in this function, even if power is restored before that period ends. This function is ignored if F3.80 is set to 0 (Off).

F3.82 - AC voltage indication offset

Allows compensating for any deviations in the mains voltage reading.

F3.83 - Maintenance interval

Elapsed time for the controller to display a warning message requesting periodic maintenance. The maintenance counter can be reset through the maintenance menu. If set to 0 (Off), no warning message will be displayed to the user, but the time will still be counted.

This function can be disabled by setting it to the minimum value (Off).

NOTE: *The counter resolution is in days, and the equipment needs to remain continuously powered on for at least 24 hours to count as one day.*

F3.84 - Compressor type

0 – Fixed-speed ON-OFF compressor (relay output);

1 – Viariable Capacity Compressor (VCC) with frequency output from 0 to 300Hz.

F3.85 - Proportional Gain (P)

Defines the proportional gain of the PID control algorithm.

F3.86 - Integral Time (I)

Defines the integral time of the PID control algorithm.

F3.87 - Derivativo Time (D)

Defines the derivative time of the PID control algorithm.

This function can be disabled by setting it to the minimum value (Off).

F3.88 - Minimum compressor frequency for PID control

Defines the minimum operating frequency for the variable compressor when operating in automatic (PID) control mode.

NOTE:
refer to the technical manual of the variable compressor.

F3.89 - Maximum compressor frequency for PID control

Defines the maximum operating frequency for the variable compressor in automatic (PID) control mode.

NOTE:
refer to the technical manual of the variable compressor.

F3.90 - Maximum compressor operating frequency

Defines the maximum frequency for compressor operation. This frequency is used when rapid cooling of the controlled environment is required.

NOTE:
refer to the technical manual of the variable compressor.

F3.91 - Compressor stop frequency (shutdown)

Defines the frequency that signals the compressor to stop. This value is lower than the minimum operating frequency.

NOTE:
refer to the technical manual of the variable compressor.

F3.92 - Compressor frequency during hot gas defrost

Defines the variable compressor frequency during the hot gas defrost process.

F3.93 - Compressor frequency on S1/S4 sensor error

Defines the variable compressor frequency in case a room temperature sensor error is detected. This parameter works in conjuction with F3.07 and F3.08.

F3.94 - Compressor soft start time

When the variable compressor is switched on, it runs at a low speed for a few seconds, as configured in F3.95. This function is intended to improve compressor lubrication.

F3.95 - Compressor soft start time

Time the variable compressor remains operating at the soft start frequency. This feature is intended to improve compressor lubrication.

F3.96 - Compressor on-time after reaching setpoint

After reaching the temperature setpoint, the compressor can remain on at a frequency calculated by the PID control algorithm. This helps avoid frequent compressor cycling, leading to energy efficiency and reduced temperature oscillation. If set to OFF, the compressor turns off immediately after reaching the temperature setpoint. If set to ON, the compressor remains constantly on. If the temperature reaches the low limit F3.101, the compressor turns off and will resume operation according to the setpoint and control hysteresis.

This function can be disabled by setting it to the minimum value (Off).

F3.97 - Compressor time below minimum frequency for lubrication

Time the variable compressor should operate below the frequency configured in F3.99 before switching to the frequency configured in F3.90 for the time set in F3.98. This periodic acceleration process promotes compressor lubrication through oil migration.

This function can be disabled by setting it to the minimum value 10 (Off).

F3.98 - Compressor time at frequency for lubrication

Duration the variable compressor remains at the frequency defined in F3.90 for lubrication purposes.

F3.99 - Minimum compresssor frequency for lubrication

Minimum frequency required for the lubrication process of the variable compressor to be executed.

F3.100 - Maximum time at maximum compressor frequency

Maximum amount of time the variable compressor can operate at its maximum frequency. This parameter works in conjunction with F3.90.

This function can be disabled by setting it to the minimum value (Off).

F3.101 - Low temperature limit (setpoint offset)

Defines the low temperature limit to turn off the variable compressor. This parameter sets the differential value in relation to the temperature setpoint.

Example: (Setpoint = -6.0) and (F3.101 =3.0).

In this case, the compressor will turn off at -9.0 (-6.0 - 3.0).

This function can be disabled by setting it to the minimum value °C 1.0 (Off) / °F 1.8 (Off).

F3.102 - High temperature limit (setpoint offset)

Defines the high temperature limit to activate the variable compressor at its maximum frequency. The goal is to quickly lower the ambient temperature 1.0°C (1.8°F).

Example: (Setpoint = -6.0 and (F3.103 = 11.0)

In this case, the compressor will operate at maximum frequency F3.90 when the temperature is above 5.0 (-6.0 + 11.0) and will returno to normal speed (between F3.88 and F3.89) when the temperature drops below 4.0 (-6.0 + 11.0 - 1.0).

This function can be disabled by setting it to the minimum value °C 1.0 (Off) / °F 1.8 (Off).

F3.103 - Temperature unit

Selects the unit for temperature display and parameter configuration.

F3.104 - Sitrad address

The address used for communication between the controller and the Sitrad supervisory system. The instrument address must be unique within the network.

15 • PROCESS CONTROL

For Vaccine Refrigerator applications:

- The ambient sensor, either S1 or S4, is used to control the temperature inside the equipment (F2.01) and detect the end of a defrost cycle (F3.21).
- The evaporator sensor is used to detect the end of the defrost cycle (F3.20), enable the start of a manual defrost cycle (F3.18), and control the operation of the fan (F3.28 and F3.29).
- By default, the condenser sensor (S3) does not affect thermal control. However, if function F3.40 is enabled, then the thermal control outputs will be turned off when a high-temperature alarm is triggered in the condenser. For Vaccine Refrigerator applications, the drawer sensors (S5 to S10) do not affect thermal process control.

For Ultrafreezer applications:

- The ambient sensor (S1) is used to control the temperature of stage-1.
- Sensors S8 and S9 are used to control the temperature of stage-2. They can be enabled/disabled through functions F3.66 and F3.67.
- The condenser sensor (S3) can be set to turn off the control outputs when its temperature triggers an alarm.
- Sensor S10 measures the external temperature and triggers an alarm if the temperature falls outside the thresholds set in F3.52 and F3.53. Function F3.68 enables/disables sensor S10. However, sensor S10 does not affect thermal control.
- Sensors S2, S4, S5, S6, and S7 are optional and are usually disabled in functions F3.60, F3.62, F3.63, F3.64, and F3.65, respectively.
- Optional sensors:
  - By default, sensors S2 and S4 are enabled, but in Ultrafreezer applications, they are usually disabled in functions F3.60 and F3.62, respectively.
  - Sensors S5, S6, and S7 are disabled by default but can be enabled in functions F3.63, F3.64, and F3.65, respectively.

15.1 • Selection of the Ambient Temperature Sensor

The equipment features two sensors for measuring ambient temperature:

- S1 - Sensor located inside a capsule containing glycerol to simulate the thermal behavior of stored vaccines;
- S4 - Sensor in direct contact with the air inside the equipment cabin. For Ultrafreezer applications, S4 is usually disabled in F3.62.

Only one of these sensors is used for control, according to parameter F3.56 (Selection of ambient temperature sensor for control). The following logic is used from this parameter:

- If F3.56 = S1 (Glycerol):
  - The temperature in S1 is used for process control, display, and alarms.
- If F3.56 = S4 (Air):
  - The temperature in S4 is used for process control;
  - The temperature in S1 is used for display and alarms.

In case of failure in the sensor selected in F3.56, the other sensor is used as a backup for process control, display, and alarms.

NOTE: *If sensor S4 is not enabled, meaning that F3.62 (Indication offset for sensor S4) = Off (ambient 2-air), parameter F3.56 will be ignored. In this configuration, sensor S4 cannot be used as a backup in case of a failure in sensor S1.*

16 • Emergency System

The vaccine control application supports an emergency system with inverter and battery control logic. This system is triggered in case of a power outage or when the network voltage is outside the defined range.

To enable the emergency system, adjust parameter F3.80 (Enable emergency mode control). The following parameters affect the control of the emergency system:

- F3.76 - Minimum AC operating voltage;
- F3.77 - Maximum AC operating voltage;
- F3.78 - AC voltage validation time;
- F3.79 - AC voltage validation time on equipment power-up;
- F3.80 - Enable emergency mode control;
- F3.81 - Minimum duration of emergency mode.

16.1 • Operation with Emergency System Enabled

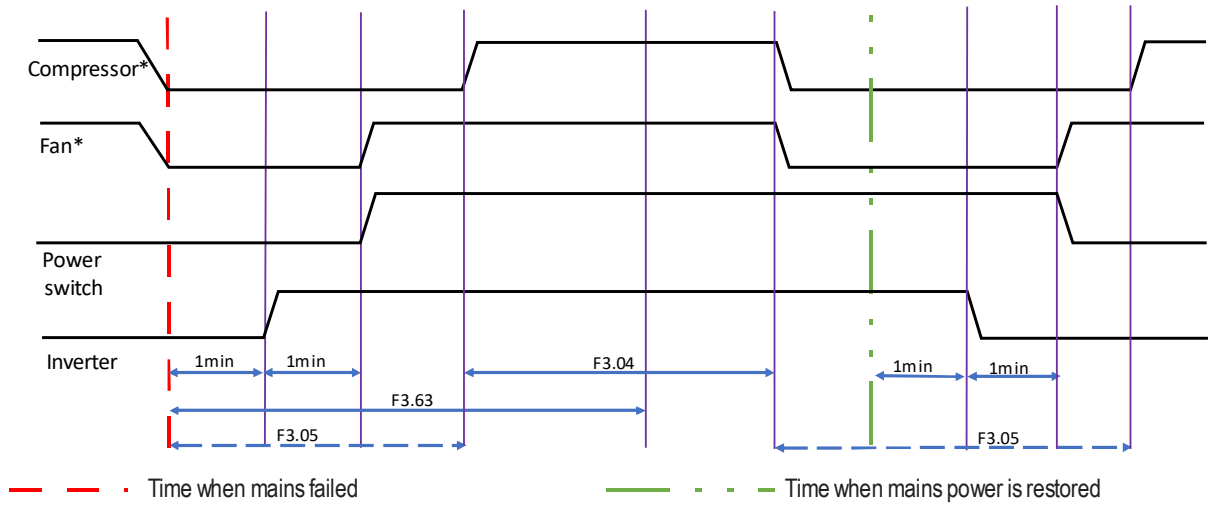
When the emergency system is enabled (F3.80 = Yes), the following rules apply:

- A power outage is detected when the network voltage exceeds the thresholds set in F3.76 and F3.77 for a period greater than F3.78;
- The network voltage is considered restored when it remains within the thresholds set in F3.76 and F3.77 for a period greater than F3.78;
- Upon equipment start-up, process control is only enabled after the time set in F3.79 has elapsed without a network voltage failure;
- During a power outage, the Compressor, Defrost, and Fan outputs are turned off;
- The Inverter relay is activated 1 minute after the power outage;
- The Energy Exchange relay is activated 1 minute after the Inverter relay;
- Starting from the activation of the Energy Exchange relay, the outputs are powered by the emergency system, and the Compressor and Fan outputs can be activated;
- The compressor activation always respects the time set in F3.06 (Minimum compressor off time);
- After the network voltage is restored, the compressor and fan outputs are turned off once the time set in F3.81 has elapsed.

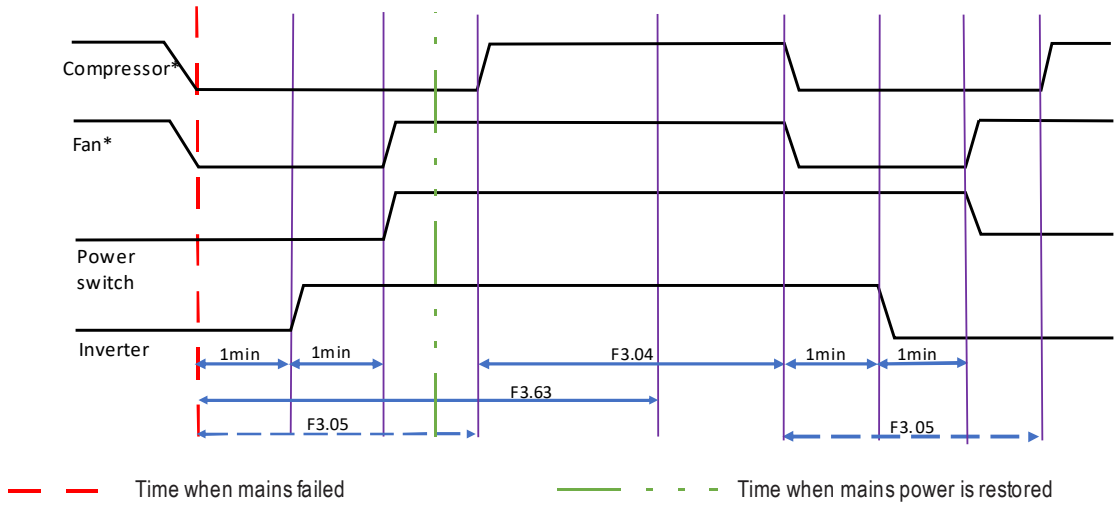
NOTE: *If the compressor is running, it will continue to operate for the minimum time set in F3.05 (Minimum compressor on time) before the outputs are turned off.*

- The Inverter output remains on for 1 minute and then turns off.
- The Energy Exchange relay is deactivated 1 minute after the Inverter relay;
- Starting from the deactivation of the Energy Exchange relay, the outputs are powered again by the electrical grid, and all outputs can be activated after the time set in F3.06 has elapsed.
- During the emergency system operation, the Defrost relay is never activated. If a defrost cycle occurs during this period, it will occur naturally.

Example of power outage for a period greater than that set in F3.81



Example of power outage for a period shorter than that set in F3.81

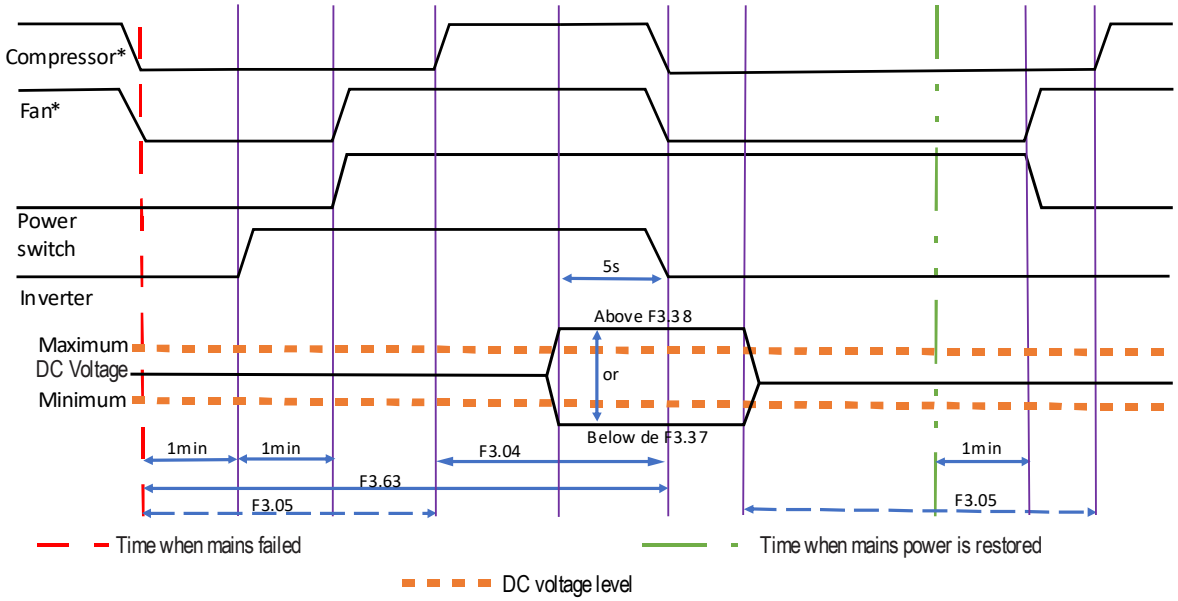


When in emergency mode, after activating the power source changeover relay, control activation occurs after 5 seconds.

The graph shows the activation of the Compressor and Fan relays, indicating that process control has the authority to activate these outputs. If the DC voltage remains outside the thresholds set in F3.48 (Minimum DC voltage for controller supply) and F3.49 (Maximum DC voltage for controller supply) for 5 seconds, all outputs, including the Inverter output, will be turned off, except

for the Energy Exchange output. The equipment will remain in this state until the AC network is restored and 1 minute has elapsed to turn off the Energy Exchange relay.

Example of emergency system with DC voltage out of range



NOTE: *The equipment exits this state even if the DC voltage is out of range, provided that the AC network has been restored.*

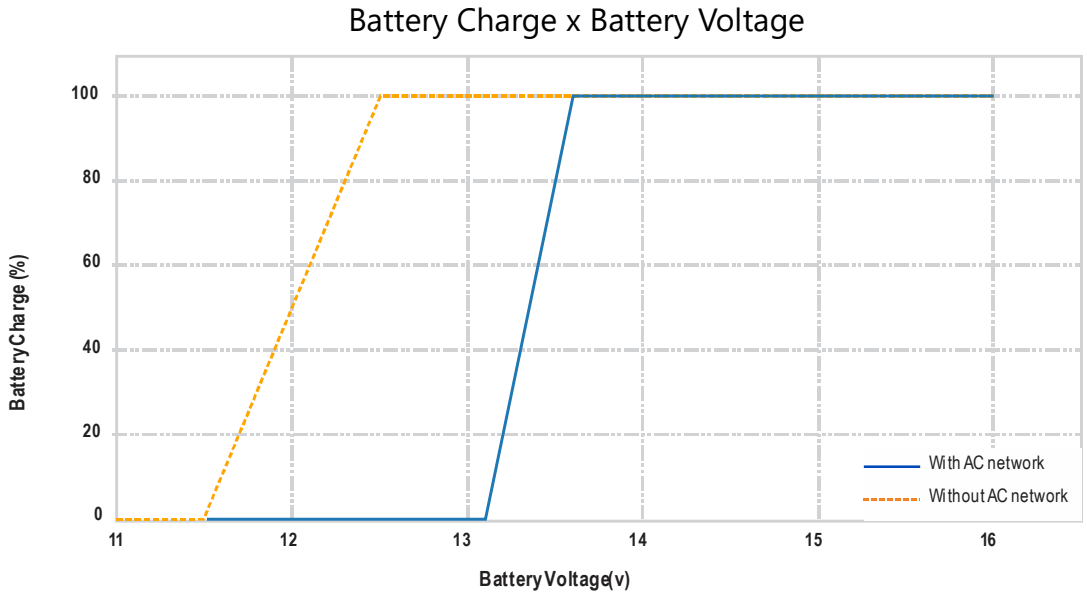
16.2 • Operation with Emergency System Disabled

When the emergency system is disabled (F3.81 = No), the following rules apply:

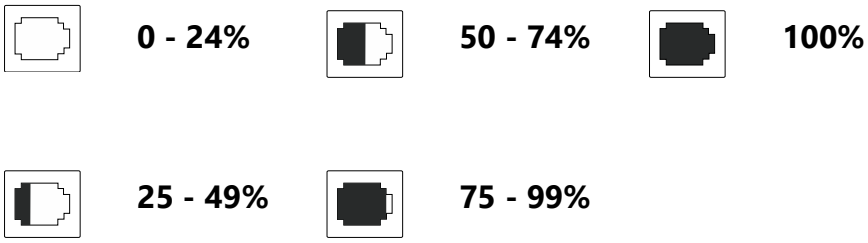
- A power outage is detected when the network voltage exceeds the thresholds set in F3.76 and F3.77 for a period greater than F3.78;
- The network voltage is considered restored when it remains within the thresholds set in F3.76 and F3.77 for a period greater than F3.78;
- During a power outage, the Compressor, Defrost, and Fan outputs are turned off;
- After the network voltage is restored, the outputs can be activated again. The compressor activation time respects the duration set in F3.06 - Minimum compressor off time.
- If the application is set to Ultra Freezer, the equipment is without AC power, and a high temperature alarm occurs, the CO_2 valve will begin to cycle.

16.3 • Battery Charge

The emergency system also monitors the equipment's battery charge, This is an estimated value based on the supply voltage. The percentage relationship between battery charge and voltage is calculated differently based on whether the equipment is connected to the electrical grid or not, and is shown in the graph below.

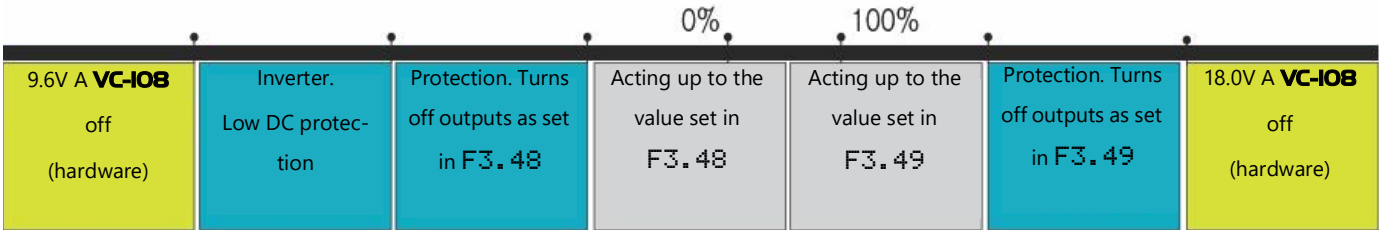


The percentage of battery charge is shown on the right side of the Status Bar, along with the battery icon.



When the equipment is not connected to the electrical grid, the charge percentage represents exactly the value described in the table, and a stationary battery symbol is displayed on the Status Bar. When the equipment is connected to the electrical grid, the charge icon is an animation that alternates sequentially between the levels in the table, and a plug symbol is shown on the Status Bar.

Instrument behavior with battery level variation:



17 • ALARMS

The Vaccine Refrigerator Controller features an alarm system with multiple logic types and multiple levels of alarm severity.

It includes visual and audible alarm indications (buzzer), activation of an auxiliary relay, and supports dialer. It also features an alarm history that displays the start and end times of each alarm. The table below shows the complete list of alarms and the corresponding activated outputs:

Code	Description	Buzzer	Message	Relay (dialer)
ALR01	PPPP - Invalid parameters	•	•	
ALR02	ECAL - Calibration failure		•	
ALR03	Invalid date and time	•	•	
ALR04	Data logger memory full	•	•	1
ALR05	Low temperature	•	•	1
ALR06	High temperature	•	•	1
ALR07	Low temperature simulation	•	•	2
ALR08	High temperature simulation	•	•	2
ALR09	High condenser temperature	•	•	1
ALR10	Setpoint not reached	•	•	
ALR11	Door open	•	•	
ALR12	Low DC voltage	•	•	1
ALR13	High DC voltage	•	•	1
ALR14	Low AC voltage		•	
ALR15	High AC voltage		•	
ALR16	Power failure (AC voltage)		•	3
ALR17	Temperature sensor S1 failure	•	•	1
ALR18	Temperature sensor S2 failure		•	
ALR19	Temperature sensor S3 failure	•	•	
ALR20	Temperature sensor S4 failure	•	•	1
ALR21	Temperature sensor S5 failure		•	

Code	Description	Buzzer	Message	Relay (dialer)
ALR22	Temperature sensor S6 failure		•	
ALR23	Temperature sensor S7 failure		•	
ALR24	Temperature sensor S8 failure	•	•	4
ALR25	Temperature sensor S9 failure	•	•	4
ALR26	Temperature sensor S10 failure		•	
ALR27	Hardware failure: RTC	•	•	
ALR28	Hardware failure: Internal memory	•	•	
ALR29	External pressostat stage 2 (Ultrafreezer)	•	•	1
ALR30	Low external temperature (S10 - Ultrafreezer)	•	•	
ALR31	High external temperature (S10 - Ultrafreezer)	•	•	

In some cases, the activation of the buzzer and alarm/dialer relay depends on certain parameters listed below:

- F3.43 - Alarm relay activation delay time;
- F3.46 - Temperature alarm simulation time;
- F3.47 - Enables alarm output in case of power outage;
- F3.80 - Enables emergency mode control.

These cases are represented by numbers in the following alarm table:

1. The alarm/dialer relay is activated after the time set in F3.43;

2. Depends on F3.46:

    - If F3.46 = 9 (Off) - The alarm/dialer relay is not activated;
    - If F3.46 > 9 - The alarm/dialer relay is activated after the time set in F3.43.

3. Depends on F3.47 and F3.80:

- If F3.47 = 0 (Off):
    - If F3.80 = No, the buzzer is activated normally;
    - If F3.80 = Yes, the buzzer is activated every 3 minutes emitting 4 beeps;
    - The alarm/dialer relay is activated after the time set in F3.47.

NOTE: *If* F3.47 *> 0 and* F3.80 *= Yes, the alarm will be activated normally, but if the alarm is silenced, either by time or by pressing the* **MUTE** *key, the buzzer will be activated every 3 minutes.*

4. In Ultrafreezer applications, if all enabled temperature sensors in stage-2 (S8 and S9) fail, then the alarm/dialer relay will be activated and the stage-2 compressor will be turned off.

17.1 • Alarm Silencing

All alarms can be silenced, meaning the buzzer and alarm/dialer relay activation can be interrupted. The alarms can be silenced in two ways: automatically by time or by using the **MUTE** key.

NOTE: ALR14, ALR15, *and* ALR16 *alarms cannot be silenced if the buzzer is activated every 3 minutes (*F3.80 *= Yes) and* F3.47 *= 0 (Off).*

17.2 • Alarm Silencing by Time

The alarm silencing by time depends on parameter F3.42 (Duration to automatically silence the alarm) and follows this logic:

- If F3.42 = 59 (Off) - The buzzer and the alarm relay/dialer remain activated until the **MUTE** key is pressed or until the equipment exits the condition that triggered the alarm.
- If F3.42 > 59 (Off) - The buzzer and the alarm relay/dialer remain activated until the time set in F3.42 has elapsed, until the **MUTE** key is pressed or until the equipment exits the condition that triggered the alarm.

NOTE: F3.42 *(Duration to automatically silence the alarm) parameter, must be set very carefully, as if the time is shorter than the time set in* F3.43 *(or* F3.47*),* **the alarm relay will not be activated.**

17.3 • Viewing Active Alarms

Whenever an alarm is active, an alarm icon is shown ⚠ in the Status Bar. The alarms are displayed in the message area of the Main Screen, as indicated in the Alarm Table. To view which alarm is active and to obtain more information, access the Active Alarm Display Screen by pressing the **ALARMS** key from the Main Screen.

To return to the Main Screen, press the **BACK** key.

The elements of the Active Alarm Display Screen are listed below:

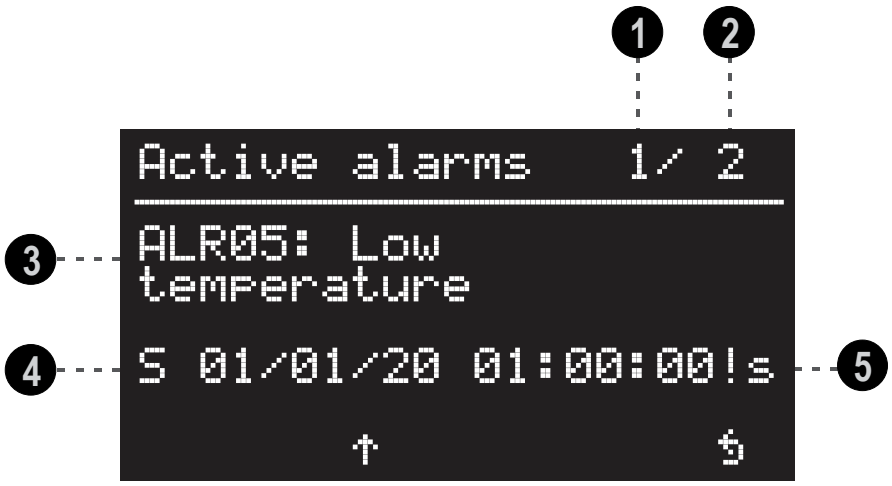
1 - Order of alarm occurrence (most recent first);

2 - Number of active alarms;

3 - Alarm code and name;

4 - Start time of the alarm;

5 - Observations about the alarm.



When there is more than one active alarm, it is possible to navigate through the alarms by pressing the **UP** and **DOWN** keys. The observation field may have the following information:

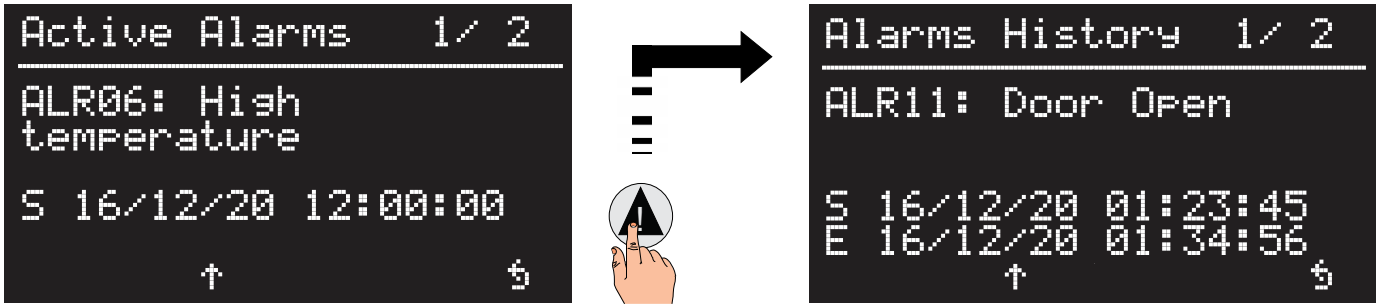
! Alarm started with clock not set. The registered time is not valid.

s Alarm has been silenced (by time or by the user).

17.4 • VIEWING ALARM HISTORY

The Vaccine Refrigerator Controller stores the history of occurred alarms in its memory. A total of 99 alarm records can be stored (including active alarms, that is, if there are 2 active alarms, there can be a maximum of 97 alarm history records).

To view the Alarm History screen, press the **ALARMS** key from the Active Alarm Display Screen. Press the **ALARMS** key again to return to the Active Alarm Display Screen.



To return to the Main Screen, press the **BACK** key.

The elements of the Active Alarm Display Screen are listed below:

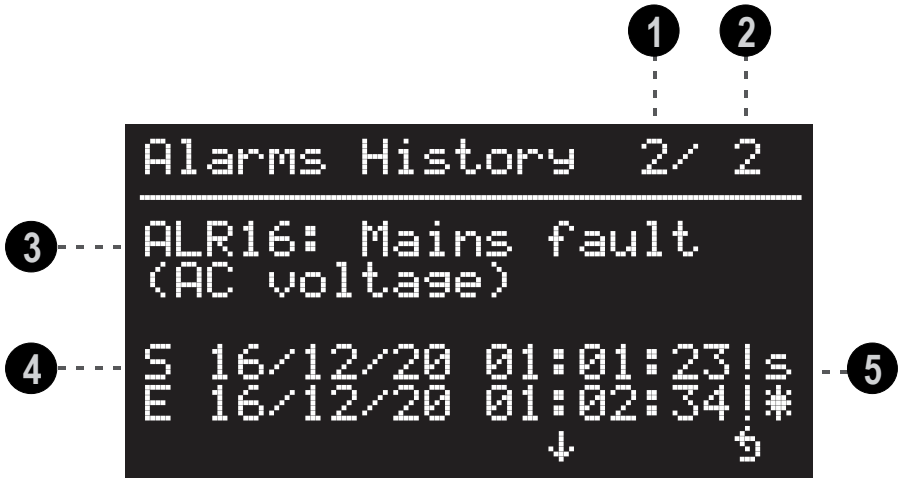
1 - Order of alarm occurrence (most recent first);

2 - Number of active alarms;

3 - Alarm code and name;

4 - Start (S) and end (E) times of the alarm;

5 - Observations about the alarm.



When there is more than one active alarm, it is possible to navigate through the alarms by pressing the **UP** and **DOWN** keys. The observation field may have the following information:

! Alarm started with clock not set. The registered time is not valid.

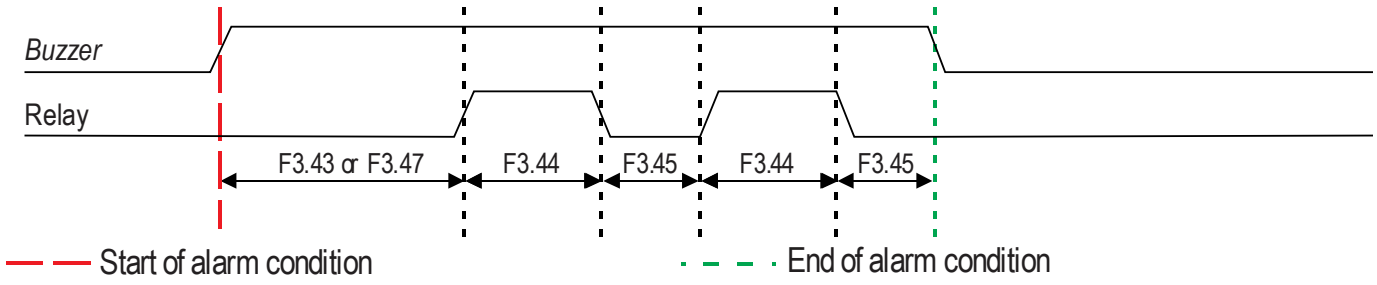
***** The alarm was terminated at equipment startup because the equipment was turned off with the alarm still active.

s Alarm has been silenced (by time or by the user).

17.5 • Activation of the Alarm relay/dialer

For alarms that enable the alarm relay/dialer output, the activation can be oscillatory or continuous. There is also the possibility of not activating the relay. The activation is defined by the parameters:

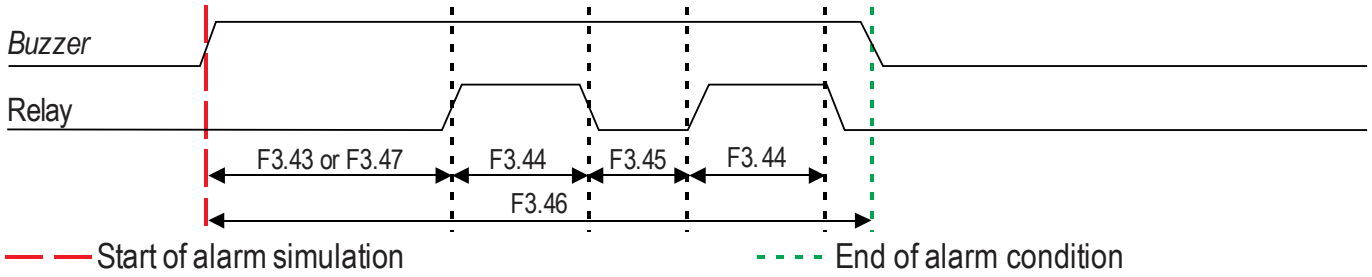
- F3.44 - Alarm relay ON time;
- F3.45 - Alarm relay OFF time.



During the period of activation of the alarm relay/dialer, a shield icon is shown on the Status Bar.

17.6 • ALARM SIMULATION

To test the alarm outputs, the instrument includes the alarm simulation function. The alarm simulation can be initiated or stopped using items F1.03 - Low Temperature Simulation and F1.04 - High Temperature Simulation in the Quick Menu. When the alarm simulation is initiated, the equipment activates the buzzer and displays the message "Temperature Simulation" in the message area of the Main Screen. The simulation duration depends on the function F3.46 - Temperature alarm simulation time.



When the F3.46 function is set to 9 (Off), the alarm simulation lasts for 10 seconds, and the alarm relay/dialer **is not activated.**

NOTE: *If the F3.46 parameter is set to a time shorter than the one set in F3.43, the alarm relay will not be activated.*

18 • DATALOGGER

The Vaccine Refrigerator Controller features a datalogger functionality designed to store records for more than a decade*. The records contain the following information:

**Estimated capacity using the default sampling interval and with event logging disabled.*

- Date and time;
- Temperatures read from sensors S1 to S10;
- Battery charge percentage;
- Electrical grid voltage;
- Process stage;
- Alarms;
- Inputs and outputs values (relays).

The datalogger is always enabled and stores records respecting the interval determined in function F3.72 (Datalogger sampling interval).

18.1 • Event Logging

In addition to periodic records, it is possible to store records based on events identified by the controller. These event records can be enabled through the following functions:

- F3.73 - Minimum temperature variation to generate log record. If different from 0 (Off), a record will be logged when the variation of the ambient temperature sensor since the last record (S1 or S4) is greater than the value set in this function;
- F3.74 - Generates log record due to input/output variation. If configured as Yes, a record will be logged if:
  - There is a variation in the digital input (door sensor);
  - There is a variation in any of the outputs (relays);
  - The grid voltage undergoes a variation of ±10% in relation to the last record.

The event record does not affect the interval of periodic records.

18.2 • Storage Capacity

Sampling interval (seconds)	Capacity* (days)	Capacity* (years)
30	955	2,6
120	3822	-
300 (default)	9557	26,2
900	28672	-

**Estimated value considering recording of disabled events.*

When the datalogger memory is full, the equipment generates an alarm recording the event and displays the message "Datalogger Full" in the Main Screen message area. In this situation, the oldest records are overwritten by the newest ones. It is possible to disable the overwrite of records through the parameter F3.75 (Overwrite older log records). When overwriting is disabled, the equipment will not generate new datalogger records when the memory is full.

NOTE: *To avoid losing datalogger records, always synchronize with* **SitradPRO** *or perform datalogger export and cleaning periodically.*

18.3 • Datalogger Export

The datalogger records can be exported to a file on a *USB drive* for later analysis using **SitradPRO** or **Datalogger Viewer.**

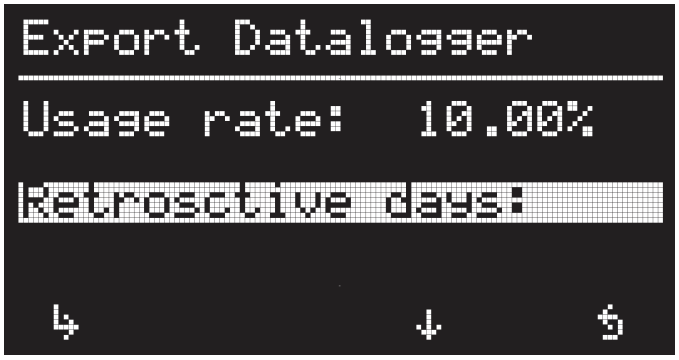
NOTE: *The USB drive used for exporting must have sufficient space to store the records, which* **can take up to 200MB.**

From the Main Screen, when a *USB drive* is inserted into the USB port, the controller displays the "Datalogger export" screen. This screen can also be accessed at any time by selecting item 1.05 "Datalogger export" in the Quick Menu.

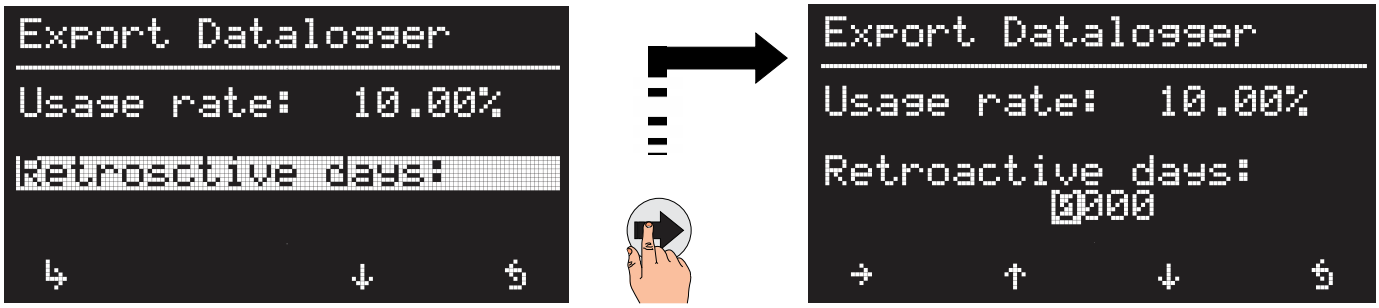
The screen displays the percentage of datalogger memory usage.

The export can be done in two ways:

- Retroactive days: Only the records from the last few days are exported, with the number of days defined by the user;
- Full: All records are exported.



The **Retroactive days** option is selected by default. Press the **SET** key to proceed to the selection of the number of days.

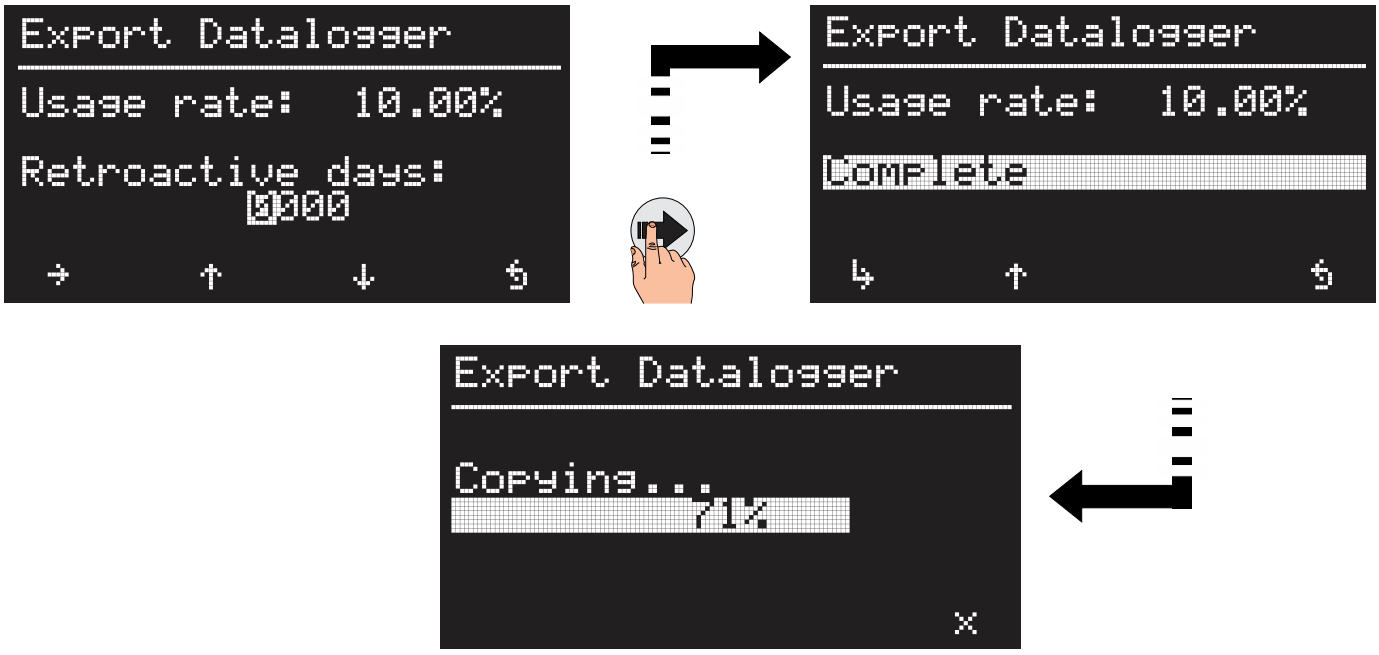


Then, select the number of days by editing each digit with the **UP** and **DOWN** keys. To advance or go back in the selection, press **SET** or **BACK**. When the last digit is selected, press **SET** to start the export.

If necessary, the export can be interrupted at any time by pressing the **BACK** key.

NOTE: *For each retroactive day, 24 hours are considered. For example, if the export is started at 8:00 a.m. and one day is selected, the export is done from 8:00 a.m. of the previous day until 8:00 a.m. of the current day. In the specific case of selecting 0 days, the export is done from midnight of the current day.*

To export all datalogger records, from the first screen, press the **DOWN** key. The "Full" option is displayed. Press **SET** to start the export.



NOTE: *Exporting the full datalogger can take several minutes, depending on the number of records.*

CAUTION: *To avoid data loss or corruption, DO NOT REMOVE THE USB DRIVE FROM THE PORT OR TURN OFF THE EQUIPMENT during the export datalogger process.*

The datalogger records are saved to a file named in the following format:

VC-108_YYMMDDhhmm.fgd

Where:

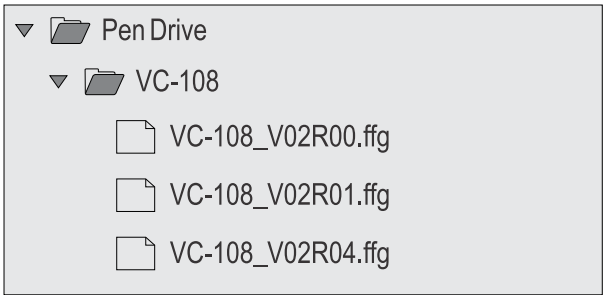
- YYMMDD: Represents the current date in Year, Month, Day format;
- hhmm: Represents the current time in Hour, Minute format.

The exported file is saved in the **VC-108** folder on the *USB drive's* root file system, which is automatically created if it does not exist.

NOTE: *If there is already a file with the same name in the VC-108 folder, a number is added to the end of the file name in the following format:* **VC-108_YYMMDDhhmm_1.fgd**.

19 • FIRMWARE UPDATE

The controller *firmware* update is performed through the USB port, using a *USB drive*. The update files are provided by Full Gauge in binary format with *.ffg* extension, and must be placed in the **VC-108** folder on the *USB drive's* root file system.

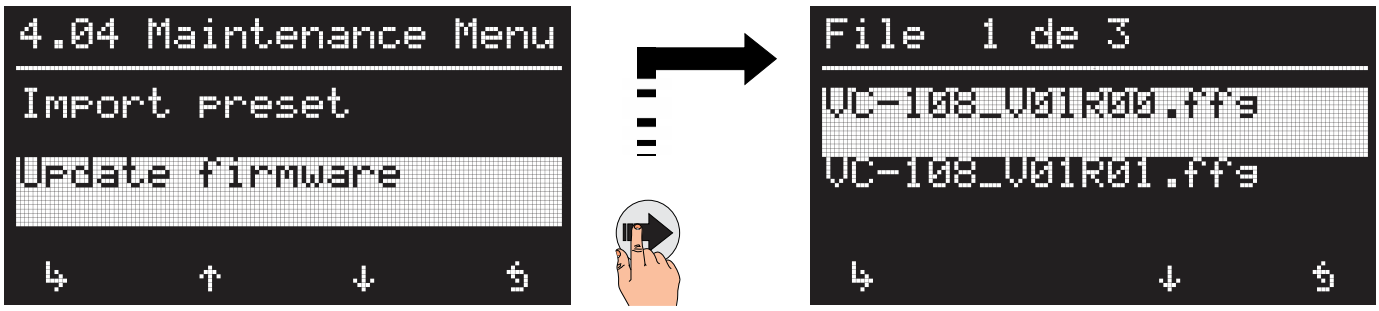


NOTE: *The equipment is capable of listing a maximum of 32 firmware files. To ensure proper display, it is recommended that file names with extensions do not exceed 42 characters.*

The update process consists of three steps:

- The first step is the validation of the selected binary file for update;
- The second step is the copying of the file content to the data memory of the controller;
- Lastly, the third step is the writing of the *firmware* content to the program memory.

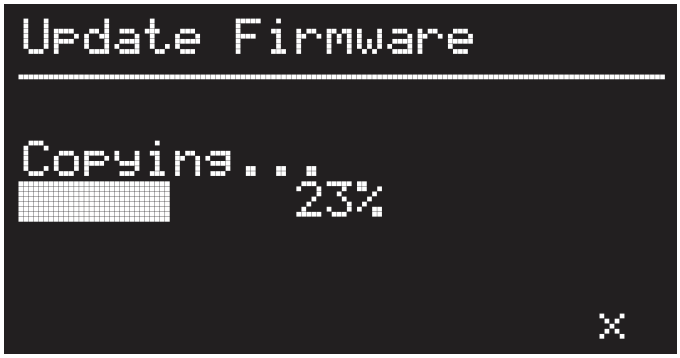
To update the equipment *firmware*, insert the *USB drive* into the USB port, access the Maintenance Menu, select the item F4.04 *Firmware* Update and press the **SET** key.



Next, the list of **.ffg** files present in the **VC-108** folder should appear. Navigate to the desired file using the **UP** and **DOWN** keys and press **SET**.

Once initiated, the update process begins with the controller validating the integrity and version of the selected file. If the file is found to be corrupted, an error message will appear and the process will not proceed.

While verifying the firmware, the controller also checks the version of the Parameters Table included in the new *firmware*. If it differs from the current version, a message will appear requesting the user's authorization to proceed. If the user chooses to proceed, all parameters will be reset to factory default, including the Equipment Name and Language, at the end of the update process.

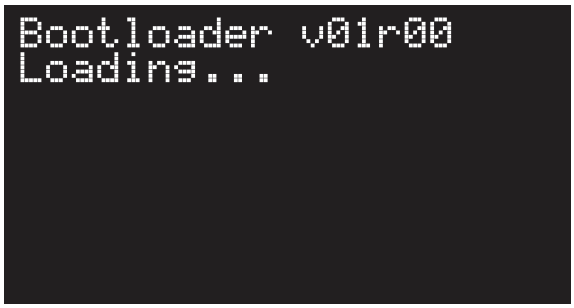


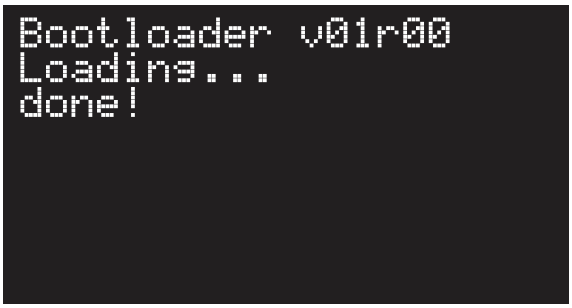
If you wish to proceed, press the **SET** key. If you want to take any measures before updating, press the **BACK** key to interrupt the update process.

If there is no change in the version of the Parameters Table, or if the user chooses to proceed with the update, the file copying stage to the data memory will begin. Once this stage is complete, the equipment will restart.

NOTE: *During the first and second stages, you can cancel the update by pressing the* **BACK** *key. If you cancel, you will need to redo all stages to complete the update.*

The last stage starts after the equipment restarts. The *bootloader* copies the *firmware* to the program memory, and after a few seconds, a success message briefly appears before the equipment restarts.





The newly copied *firmware* version appears on the Startup Screen. It is also possible to check the *firmware* version, as well as the Parameters Table version, on the **About Equipment** screen.

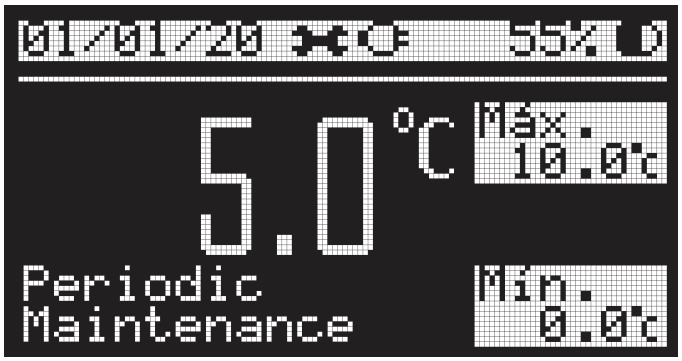
NOTE: *To avoid data loss or corruption, DO NOT REMOVE THE USB DRIVE FROM THE PORT OR TURN OFF THE EQUIPMENT during the firmware update process.*

20 • Periodic Maintenance

The controller features periodic maintenance control, which can be set between 1 and 12 months using the F3.83 (Maintenance Interval) parameter. Maintenance control can be disabled by setting the parameter to 0 (Off).

The maintenance period is counted in days, and to increment the maintenance counter by one day, the equipment must remain powered for a continuous period of 24 hours. The maintenance counter is incremented even if the F3.83 (Maintenance Interval) parameter is set to 0 (Off).

When the counter reaches the number of months set for the maintenance interval, an alert message is displayed in the Main Screen message area, and a wrench icon is displayed in the Status Bar.



Upon seeing the warning, the end-user must contact the technical responsible for the equipment to have maintenance performed. At the end of the maintenance service, the technician must reset the counter by accessing the F4.05 (Reset Maintenance) function.

21 • Redundant Control Support

The Vaccine Refrigerator Controller features Redundant Control Support. The redundant system operates concurrently with the primary control system, and if the primary control system fails or malfunctions, the **VC-108 Log** ensures that the redundant control system is always active/turned on.

The redundant control system is turned off:

- During the defrost process;
- When the alarm inhibition time after defrosting has not elapsed;
- When the temperature alarm inhibition time on power-up has not elapsed.

22 • IMPORTANT PRECAUTIONS

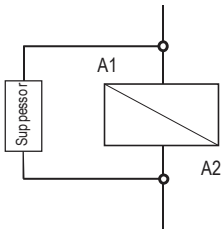
In accordance with the NBR 5410 standard, please note the following:

1 - Install surge protectors in the power supply.

2 - Sensor and serial communication cables may be routed together, but must not be in the same conduit as electrical power and load switching.

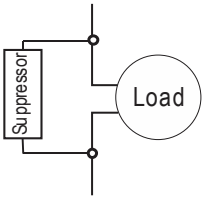
3 - Install transient suppressors (RC filter) in parallel with loads to increase the lifespan of relays.

Wiring diagram for suppressors in the contactors



A1 and A2 are the contactor coil terminals.

Wiring diagram for suppressors on direct loads



Take the maximum specified current into account when using direct activation

Suppressors are available for purchase from Full Gauge

23 • WARRANTY AND ENVIRONMENT

ENVIRONMENTAL INFORMATION:

PACKAGE:
The materials used in the packaging of Full Gauge products are 100% recyclable. Try to dispose of it through specialized recycling agents.

PRODUCT:
The components used in Full Gauge controllers can be recycled and reused if disassembled by specialized companies.

DISPOSAL:
Do not burn or dispose of household controllers that reach the end of their life.

Obey existing legislation in your region regarding the disposal of electronic waste. If in doubt, contact Full Gauge Controls.

WARRANTY - FULL GAUGE CONTROLS

The products manufactured by Full Gauge Controls after May 2005, have a warranty
period of 10 (ten) years directly with the factory and 01 (one) year with accredited resellers, counted from the date of sale included on the invoice. After this year with resellers, the guarantee will continue to be valid if the instrument is sent directly to Full Gauge Controls. The products are guaranteed in case of manufacturing failure that makes them unsuitable or improper for the applications for which they are intended. The warranty is limited to the maintenance of instruments manufactured by Full Gauge Controls, disregarding other types of expenses, such as indemnity due to damage caused to other equipment.

EXCEPTIONS TO WARRANTY

The warranty does not cover transport and/or insurance costs for sending products with defects or malfunctions to Technical Assistance. The following events are also not covered: natural wear of parts, external damage caused by drops or improper packaging of products.

LOSS OF WARRANTY

The product will automatically lose its warranty if:
- The instructions for use and assembly contained in the technical description and the installation procedures present in Standard NBR5410 are not observed;
- It is subjected to conditions beyond the limits specified in its technical description;
- It is violated or repaired by a person who is not part of Full Gauge's technical team;
- The damage is caused by a fall, blow and/or impact, water infiltration, overload and/or atmospheric discharge.

WARRANTY USE

To take advantage of the warranty, the customer must send the product properly packed together with the corresponding purchase invoice, to Full Gauge Controls. Shipping costs for products are borne by the customer. It is also necessary to send as much information as possible regarding the detected defect, allowing us to streamline the analysis, testing and execution of the service.

These procedures and the eventual maintenance of the product will only be carried out by Full Gauge Controls' Technical Assistance, at the Company's headquarters - Rua Júlio de Castilhos, 250 - CEP 92120-030 - Canoas - Rio Grande do Sul - Brazil.