TECHNISCHE DOKUMENTATION

EWPlus 974 EO

Electronic controllers for refrigeration units

User manual

09/2017

The information given in this document contains general descriptions and/or technical characteristics concerning the performance of the products found in it. This document is not intended to replace these products nor must it be used to determine their suitability and reliability for any users' specific applications. Each user or integrator is responsible for performing the risk analysis, evaluation and appropriate and complete testing of the products according to the specific application or use in question. Eliwell and its sister companies or subsidiaries shall not be legally or economically liable for any incorrect use of the information contained in this documentation.
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The installation and use of this product must comply with all applicable state, regional and local safety regulations. For safety reasons and to ensure greater compliance with the data of the documented system, component repairs must be performed exclusively by the manufacturer.

When using devices for applications with technical safety requirements, comply with the relevant instructions.

Failure to use Eliwell software or other software approved by Eliwell with our hardware products can result in injury, damage or incorrect operating results.

Failure to comply with this information can result in injury or damage to the equipment.

CONTENTS

Document objective

This document describes the new **EWPlus EO** for refrigerated cabinets and relative accessories, including information on installation and wiring. Use this document to:

• Install and use the new **EWPlus EO** controllers.

• Connect the new range of **EWPlus EO** controllers to a programming device equipped with Device Manager software.

• Become familiar with the functions on the controllers in the new **EWPlus EO** range.

NOTE: Read this document and all related documents carefully before installing, operating or carrying out maintenance work on the controller.

Note regarding validity

This document is valid for **Device Manager**.
The technical characteristics of the devices described in this manual can also be consulted on line.
The characteristics illustrated in this manual should be identical to those which can be consulted on line.
In line with our policy of continuous improvement, we may revise the contents to improve clarity and accuracy. If you note any discrepancies between the manual and the information consulted on line, please use the latter as a reference.

SAFETY INFORMATION

Important information

Read these instructions carefully and visually inspect the equipment to familiarise yourself with the device before attempting to install it, put it into operation or service it. The following warning messages may appear anywhere in this documentation or on the equipment to warn of potential dangers or to call attention to information that can clarify or simplify a procedure.

The addition of this symbol to a danger warning label indicates the existence of an electrical danger that could result in personal injury should the user fail to follow the instructions.

This is the safety warning symbol. It is used to warn the user of the potential dangers of personal injury. Observe all the safety warnings that follow this symbol to avoid the risk of serious injury or death.

⚠ DANGER

DANGER indicates a dangerous situation which, if not prevented, **may cause** serious injury or death**.**

⚠ WARNING

WARNING indicates a potentially dangerous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a potentially dangerous situation which, if not avoided, **can result in minor** or moderate injury.

NOTICE

NOTICE used in reference to procedures not connected to physical injuries.

NB

Electrical equipment must be installed, used and repaired by qualified personnel only.
Eliwell accepts no responsibility for any consequences resulting from the use of this material.
A qualified person is someone who has specific skills and knowledge regarding the structure and the operation of electrical equipment and who has received safety training on how to avoid the inherent dangers.

Permitted use

This product is intended for controlling refrigerated cabinets.

For safety reasons, the device must be installed and used in accordance with the instructions provided. In particular, parts carrying dangerous voltages must not be accessible under normal conditions.

The device must be adequately protected from water and dust with regard to the application, and must only be accessible using tools (with the exception of the front panel).

The device is also suitable for use in commercial and household refrigeration appliances and/or similar equipment and has been tested for safety aspects in accordance with the harmonised European reference standards.

Prohibited use

Any use other than that described in the previous paragraph, Permitted Use, is strictly forbidden.

The relay contacts supplied are electromagnetic and are subject to wear. The protection devices required by international or local laws must be installed outside the instrument.

Liability and residual risks

The liability of Eliwell is limited to the correct and professional use of the product according to the directives referred to herein and in the other supporting documents, and does not cover any damage (including but not limited to) the following causes:

- unspecified installation/use and, in particular, in contravention of the safety requirements of established legislation or specified in this document
- use on equipment which does not provide adequate protection against electrocution, water and dust in the actual installation conditions
- use on equipment in which dangerous components can be accessed without the use of specific tools
- installation/use on equipment which does not comply with established legislation and technical standards.

Disposal

The equipment (or product) must be subjected to separate waste collection in compliance with the local legislation on waste disposal.

Product related information

```
⚡ ⚠  DANGER
```

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH
- Turn off all devices, including connected devices, before removing any covers or doors, or installing/uninstalling accessories, hardware, cables, or wires.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated.
- Before powering the device back up, fit back and fix all the covers, hardware components and wiring.
- Check the earthing connections on all earthed devices.
- Use this device and all connected products only at the specified voltage.

Failure to follow these instructions will resultin death or serious injury.

This device is designed to operate outside of any dangerous location.
Install this device only in areas known to be free from dangerous surroundings.

```
⚠  DANGER
```

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

Failure to follow these instructions will result in death or serious injury.
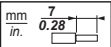
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⚡ ⚠  DANGER
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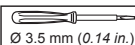
LOOSE WIRING CAN RESULT IN ELECTRIC SHOCK

Tighten the connections in compliance with the technical specifications for pairs.

Failure to follow these instructions will result in death or serious injury.

The table below shows the type and size of cables to use for quick disconnect terminals with spacing **5.00** mm (0.197 in.) or **5.08** mm (0.2 in.).

mm / in.	7 / 0.28								
mm²	0.2…2.5	0.2…2.5	0.25…2.5	0.25…2.5	2 x 0.2…1	2 x 0.2…1.5	2 x 0.25…1	2 x 0.5…1.5
AWG	24…13	24…13	22…13	22…13	2 x 24…18	2 x 24…16	2 x 22…18	2 x 20…16

Ø 3.5 mm (0.14 in.)	c	N•m	0.5…0.6
		lb-in	4.42…5.31

```
⚠  DANGER
```

POTENTIAL OF OVERHEATING AND FIRE
- Do not use with loads other than those indicated in the technical specification.
- Do not exceed the maximum permitted current; for higher loads, use a meter with sufficient power capacity.

Failure to follow these instructions will result in death or serious injury.

This device is designed to operate outside of any dangerous location.
Install this device only in areas known to be free from dangerous surroundings.

⚠ **WARNING**
UNINTENDED EQUIPMENT OPERATION
• Use appropriate safety interlocks where personnel and/or equipment hazards exist. • Install and operate this equipment in an enclosure appropriately rated for its intended environment. • For power line and output circuit fuses and connections, comply with local and national regulations corresponding to the nominal current and voltage of the device being used. • Do not use this equipment in safety-critical machine functions. • Do not disassemble, repair, or modify this equipment. • Do not mount devices in extremely damp and/or dirt-laden areas.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ **WARNING**
UNINTENDED EQUIPMENT OPERATION DUE TO CONNECTIONS
The device's signal cables (probes, digital inputs, communication, and relative power supplies), must be laid separately from the power cables.
Failure to follow these instructions can result in death, serious injury, or equipment damage.

The temperature probes (NTC) are not characterised by any insertion polarity and can be extended using normal bipolar cable (it should be pointed out that the extension of the probes affects the behaviour of the device from an EMC electromagnetic compatibility point of view: extreme care should be given to the cabling).

CHAPTER 1

INTRODUCTION

The **NEW** family of EWPlus EO instruments is made up of microprocessor electronic regulators developed to manage plug-in refrigerated cabinets and stands out for the high performance and flexibility it offers through energy saving algorithms and compressor control.

1.1. MAIN FEATURES

The following table lists the main features of models in the EWPlus EO family.

Feature	EWPlus 974 EO
4-key keypad	✓
Set point edit lock to prevent tampering	✓
Password-controlled access to configuration parameters	✓
Display range	NTC: -50.0 °C ... +110 °C
Configurable decimal point	✓
Configurable °C/°F display	✓
LEDs present on display	❄ ❄ ✖ ⬤ AUX ((•)) ℃ ℉
Defrost: end defrost by timeout	✓
end defrost by temperature	✓
Number of analogue inputs for PTC probes	2
Analogue inputs Pb3 / Digital input D.I.1	1
Digital input D.I.2	1
Display probe 3	✓
Relay outputs (*)	❄ ✖ AUX
Relay ratings	2 Hp / 8 A + 5 A
TTL for connection to Copy Card	✓
Buzzer	✓
Quick fitting to panel using brackets	✓

(*) refer to the label on the device

NOTE: check if the specified features are available on each model.

CHAPTER 2

TECHNICAL DATA

2.1. TECHNICAL SPECIFICATIONS (EN 60730-2-9)

Classification:	operating (not safety) device for incorporation
Installation:	panel mounting with 71x29mm drilling template
Type of action:	1.B
Pollution class:	2
Insulating material group:	IIIa
Over-voltage category:	II
Nominal pulse voltage:	2500 V
Temperature:	Use: -5 … +55 °C (23 ... 131 °F)
	Storage: -30 … +85 °C (-22 ... 185 °F)
Power supply:	230 Vac (±10%) 50/60 Hz
Power consumption:	4.5 W max
Digital outputs (relays):	see paragraph "Output characteristics"
Fire resistance category:	D
Software class:	A

NOTE: check the power supply rating on the device's label; contact our Sales Office for power and relay ratings.

2.2. FURTHER INFORMATION

2.2.1. Input Characteristics

Display range:	**NTC**: -50.0 °C ... +110 °C (-58 ... 230 °F) on display with 3 digits + sign
Accuracy:	Better than 0.5% of integral-scale +1 digit.
Resolution:	0.1 °C / °F
Buzzer:	YES (depends on model)
Analogue Inputs:	2 NTC inputs
Digital Inputs:	2 voltage-free digital inputs (DI1 and DI2)

NOTES: - DI1 can also be configured as a probe input (**H11** = 0 and **H43** = y)
- DI2, if activated, should be connected to terminals 1-2 of the TTL connector (**H12** ≠ 0)

2.2.2. Output Characteristics

Relay	EN60730- 230 Vac	UL60730- 230 Vac
Compressor	12(8) A max 250 Vac	2 Hp - 12 FLA - 72 LRA max 240 Vac
Fans	NA 8(4)A - N.C. 6(3)A max 250 Vac	NA 8(4)A - N.C. 6(3)A max 250 Vac NA 2.9 FLA / 17.4 LRA
AUX	NA 5(2) A max 250 Vac	

2.2.3. Mechanical Characteristics

Casing:	PC+ABS UL94 V-0 resin casing, polycarbonate window, thermoplastic resin keys
Dimensions:	front 78.6x37 mm (3.09x1.45 in), depth 59 mm (2.32 in) (without terminals)
Terminals:	screw/disconnectable terminals for wires with cross-section of 2.5 mm^2
Connectors:	TTL for Copy Card connection + DI2 maximum length = 3 m - 9.84 ft)
Humidity:	Operation / Storage: 10...90% RH (non-condensing)

2.2.4. Normative

Food Safety: The device complies with Standard EN13485 as follows:
- suitable for storage
- climate range A
- measurement class 1 in the range -35 ... 25 °C (-31 ... 77 °F) (*)
(*** with Eliwell NTC probes only**)

NOTE: The technical specifications stated in this document regarding the measurement (range, accuracy, resolution, etc.) refer strictly to the instrument and not to any accessories provided, such as the probes.

2.3. CONNECTIONS
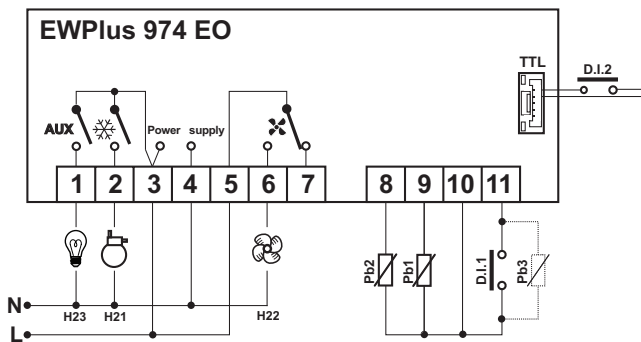
TERMINALS	
1-3	AUX Relay - AUX
2-3	Compressor Relay - ❄
3-4	Power inlet 230 Vac
N-L	Power supply 230 Vac
5-6-7	Fan Relay - ✺
8-10	Probe Pb2
9-10	Probe Pb1
11-10	- Digital 1 input (**H11≠0** and **H43**=n) - Probe Pb3 (**H11**=0 and **H43**=y)
TTL	TTL Input or Digital Input 2 (**H12≠0**)

CHAPTER 3

USER AND START-UP INTERFACE

2.4. LED

EWPlus 974 EO has the following display fitted:
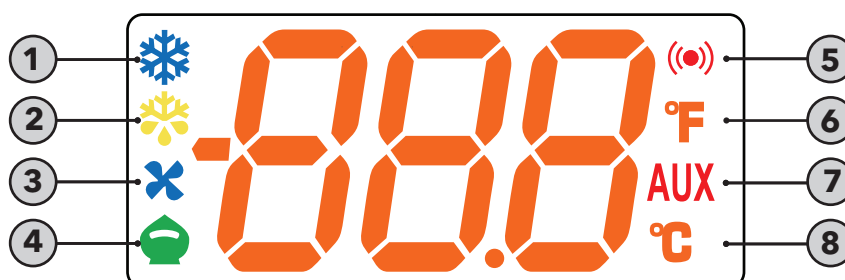
Meaning of LEDs:

No	Icon	LED	Operation	Meaning
1	❄	Compressor	Permanently on	Compressor on
			Flashing	Delay, protection or activation blocked
			OFF	Otherwise
2	❄	Defrost	Permanently on	Defrost active
			Flashing	Manual activation or from digital input
			OFF	Otherwise
3	�ખ	Fans	Permanently on	Fans active
			OFF	Otherwise
4	🝙	Reduced SET / Economy	Permanently on	Energy Saving active
			Flashing	Reduced set active
			Rapid blinking	Access to installer parameters
			OFF	Otherwise
5	((●))	Alarm	Permanently on	Presence of an alarm
			Flashing	Alarm acknowledged
			OFF	Otherwise
6	°F	°F readout	Permanently on	°F setting (**dro** = 1)
			OFF	Otherwise

No	Icon	LED	Operation	Meaning
7	**AUX**	AUX	Permanently on	Aux output active (according to model)
			Flashing	Deep cooling cycle active
			OFF	Otherwise
8	**°C**	°C readout	Permanently on	°C setting (**dro** = 0)
			OFF	Otherwise

NOTE: The tool carries out a Lamp Test when turned on; the display and LED flash for a few seconds, to check their integrity and that they are working properly.

2.5. KEYS

The **EWPlus 974 EO** has 4 keys as shown in the figure:
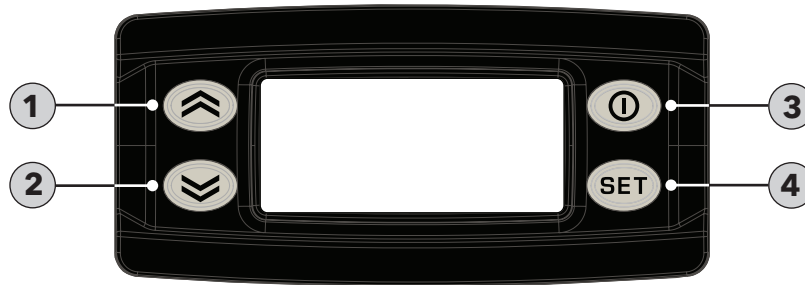
Each key has a different function depending on whether it is:
- pressed and released
- pressed for at least 5 seconds
- pressed and held at start-up
- pressed in combination with another key.

The following table summarises the function of each key:

No	Key	Action		
		Press and release	**Press for at least 5 secs**	**Start-up**
1	⏫	- Scrolls through menu items - Decreases values	- Activates the manual Defrost function (from outside menus)	---
2	⏬	- Scrolls through menu items - Decreases values	- Function can be configured by the user (from outside menus) (see parameter **H32**)	---
3	⏻	- Returns to a level compared to the current menu - Confirms parameter value	- Activates the Stand-by function (from outside menus)	---
4	**set**	- Displays any alarms (if present) - Opens Machine Status menu	- Open programming menu (User and Installer parameters) - Confirms commands	when pressed during start-up, it enables the user to select the application to be loaded.

2.6. PRELIMINARY CONFIGURATIONS

After making the electrical connections, simply power up the device to start operation.
At first start-up, Eliwell recommends that you:

1. Select the preset Application that most closely matches your own.

2. Configure the main parameters listed in the USER menu to suit your requirements.

3. Make sure there are no active alarms (icon " ((●)) " off and no **E1**, **E2** or **E3** labels appear).

2.6.1. SELECTING APPLICATIONS

The procedure for loading one of the default applications is:

• At power-on of the device, keep the **set** key pressed: the label **AP1** will appear.

• browse the various applications (**AP1-AP2-AP3**) using the keys ⊗ and ⊗;

• select the desired application using the **set** key (**AP3** in the example) or cancel the procedure by pressing the ⊙ key; alternatively wait for the timeout;

• if the operation is successful, the display will show **y**, if not, it will show **n**;

• after a few seconds the instrument will return to the main display.

2.6.2. RESET PROCEDURE

EWPlus 974 EO can be **RESET** and the default factory settings restored in a simple and user-friendly way.
This is done by simply reloading one of the basic applications (see "Loading default applications").

You may need to **RESET** the instrument in circumstances in which the normal operation of the instrument is compromised or if you decide to restore the instrument to its default configuration (e.g. Application 1 values).

NOTE: This operation resets the instrument to its initial state, returning all parameters to their default values. This means that all changes that may have been made to operating parameters will be lost.

2.6.3. SET POINT: SETTING and EDIT LOCK

To display the set point value, press the key **set** and enter the **Machine Status** menu, then press the **set** key again when the **SEt** label is displayed.
The set point value appears in the display. To change the set point value, press the ⊗ and ⊗ keys within 15 seconds. Press **set** to confirm the modification.

It is possible to disable the keypad on this device.
The keypad can be locked by programming the **LOC** parameter.
In the event of a locked keypad, the **Machine Status** can always be accessed by pressing the key **set** and view the set point, but the value cannot be changed. To disable the keypad lock, repeat the locking procedure.

2.6.4. VIEWING PROBE VALUES

To display the value read from probes connected to the device, press the key **set** and enter the **Machine Status** menu, then press the key again when one of the probe related labels "Pb1, Pb2 or Pb3" is displayed **set**. The value measured by the associated probe will appear on the display.

NOTES: The displayed value is read-only and cannot be modified.

2.6.5. KEY-ACTIVATED FUNCTIONS

All models have the **UP** key set to activate the "Manual Defrost" function.
The DOWN and ESC keys can also be set to activate a specific function chosen by the client.
The parameters for configuring the two keys are:

- **H32** = DOWN key configuration

- **H33** = ESC key configuration

The values that can be set apply to both keys and the functions that can be activated are:

H32/H33 value	Description
0	disabled
1	defrost
2	aux
3	reduced set
4	stand-by
5	quick chill cycle
6	energy saving

CHAPTER 4

FUNCTIONS AND REGULATORS

This section describes the various functions of the devices.

3.1. SETTINGS

3.1.1. PROBE SETTING AND CALIBRATION

Depending on the model, the devices are equipped with:
- 1 or 2 analogue inputs Pb1 and Pb2;
- 1 multifunctional analogue/digital input that can be configured as:
    - Digital input (**H11** ≠ 0 and **H43** = n) or
    - Analogue probe Pb3 (**H11** = 0 and **H43** = y).

The probes used can **ONLY** by NTC type.

After installation, the values read by the probes can be corrected/calibrated using the following parameters:
- **CA1**: probe 1 offset. Positive or negative value to be added to the value read by Pb1 (Range: **-12.0 ... +12.0**)
- **CA2**: probe 2 offset. Positive or negative value to be added to the value read by Pb2 (Range: **-12.0 ... +12.0**)
- **CA3**: probe 3 offset. Positive or negative value to be added to the value read by Pb3 (Range: **-12.0 ... +12.0**)

3.1.2. DISPLAY SETTINGS

diS folder contains the parameters used to set the temperature readout, decimal point usage, unit of measure and display during defrost.

- **ndt**: enables/disables decimal point display (with resolution of one-tenth of a degree; e.g.: 10.0 °C)
  Display with decimal point is only possible within the range of values from -99.9 °C to +99.9 °C
    - ndt = y ➔ displays the read values with decimal point
    - ndt = n ➔ displays read values without decimal point

NOTE: enabling/disabling the decimal point only affects the on-screen display of values. The controller will continue to perform calculations with decimal point.

- **ddL**: sets the type of display during and up to the end of defrost
    - ddL = 0 ➔ displays the value of Pb1
    - ddL = 1 ➔ continues to display the value read by Pb1 at the start of defrosting
    - ddL = 2 ➔ displays the fixed "**dEF**" label

- **dro**: sets temperature display to °C or °F.
    - dro = 0 ➔ °C readout
    - dro = 1 ➔ °F readout

NOTE: switching between °C and °F DOES NOT modify the temperature parameter values (e.g. set=10 °C becomes 10 °F) This means that the maximum and minimum limits of parameters as absolute values are the same for both units of measure and hence the ranges are different.

- **ddd**: determines whether to display the value of the set point, probe Pb1, probe Pb2 or the multifunction input (analogical or digital) Pb3. All other display and adjustment modes are the same.
    - **ddd** = 0 ➔ displays the set point value
    - ddd = 1 ➔ displays the values read by Pb1
    - ddd = 2 ➔ displays the values read by Pb2
    - ddd = 3 ➔ displays the values read by Pb3

3.2. FUNCTIONS

3.2.1. UPLOAD, DOWNLOAD, FORMAT

Description

The Copy Card must be connected to the serial port (TTL) and allows the rapid programming of instrument parameters.

NOTE: **DOWNLOAD** only from reset operating mode: at power-on, the Unicard/Copy Card if it is inserted in the device, the controller automatically downloads data.

After connecting the Unicard/Copy Card with the device switched off and on completion of the lamp test, one of the following labels will be displayed:

- **dLY** if the operation was successful
- **dLn** if the operation was not successful

After about 5 seconds, the display will display the probe or set point value, depending on the default settings.

NOTE: once download has been completed success integrally, the controller will start to work with the new map loaded.

Operating mode: access **Installer** parameters by entering the password **PA2** if enabled (**PA2≠0**), scroll through the folders 🔼 and 🔽 until the **FPr** folder appears. Select it using (set), scroll through the parameters using 🔼 and 🔽 then select one of the functions by pressing (set):

- **UL** (Upload): This function uploads the programming parameters from the instrument to the card. If the operation is successful, the display will show **y**, otherwise it will show **n**.
- **Fr** (Format): This command is used to format the copy card (which is necessary when using the card for the first time). **NOTE**: The use of the **Fr** parameter deletes all data present and this operation cannot be reversed.
- **Download**: Connect the Unicard/Copy Card with the instrument switched off. At power-on, data will automatically start downloading from the Unicard/Copy Card to the instrument. At the end of the lamp test, the display will show **dLy** if the operation was successful and **dLn** if it failed.

User parameters

The parameters that control this function are:

Label	Description
UL	Transfer programming parameters from instrument to CopyCard
Fr	Format Copy Card. To erase all data on the Copy Card.

COPY CARD

The Copy Card lets you download/upload a parameter map from/to a controller.
Regardless of whether you are down or uploading a parameter map, the controller must be connected to a power supply and switched on.

UNICARD

The Unicard lets you download/upload a parameter map from/to a controller, in the same way as the Copy Card.
It is a versatile tool that also allows you to quickly and easily customise devices.
It differs from the Copy Card in the following ways:
> • **1)**: It can be connected to a computer via USB.
> • **2)**: It can be plugged into a USB socket or USB battery pack, and power the device directly during upload/download.

The Unicard can be powered in the following ways:

A) Cabinet powered

UNICARD power supply   UNICARD   Controller

B) Site powered

UNICARD   Controller   Controller power supply

UNICARD power supply   UNICARD   Controller
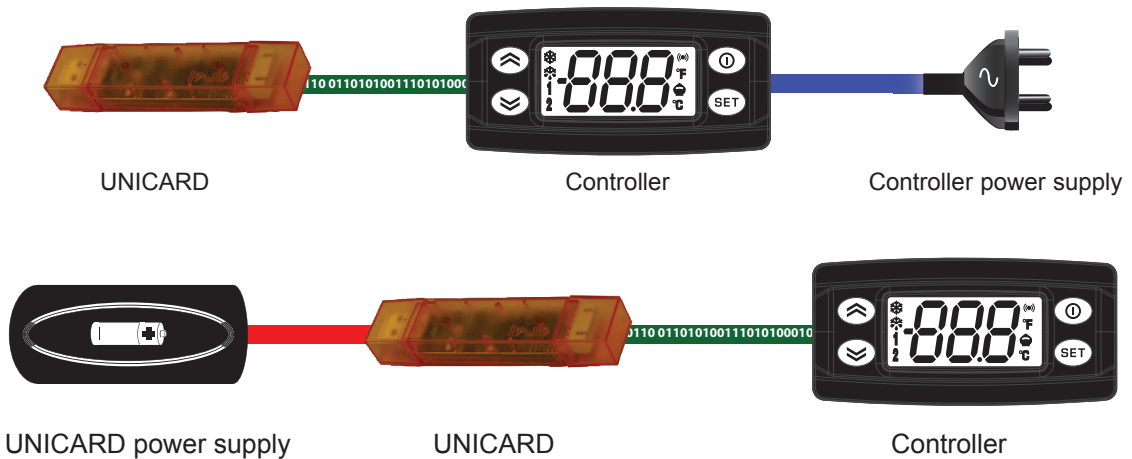
3.3. REGULATORS

3.3.1. COMPRESSOR/GENERAL

Description

The compressor is controlled by the device's relay. It will be switched on or off depending on:

- the temperature status readings from probe Pb1
- the temperature control functions set
- defrost/coil drainage functions (see **"3.3.3. DEFROST/DRIPPING" on page 23**)

See the wiring diagrams for details of how to connect the compressor to the device.
The polarity of the relay is fixed and is NOT configurable.
When an offset is activated (**OSP** parameter) for function or digital input, at the **SEt** value the **Set+OSP** value is replaced, bearing in mind the **OSP** sign.
This **SEt** replacement condition with the value **Set+OSP** is stored by the instrument so on return after a blackout, the device will restart in the status that was active prior to the blackout itself.
NOTE: digital output 1 is always set as "**Compressor**".

Operating conditions

The regulator is active when:

- the device is ON
- there is no control probe fault alarm **E1**
- the time set by the **OdO** parameter has elapsed (if **OdO** ≠ 0)
- a defrost cycle is not active (except in FREE mode)
- it is not an External Alarm that locks the compressor
- there is not over Heating alarm on probe Pb3 (when **H11** = 0 and **H43** ≠ 0)

(There is a fixed interval of one second between the request and activation of the relay)
The diagrams below indicate the compressor activation mode for heating/cooling based on parameters **SEt** and **diF > 0**:
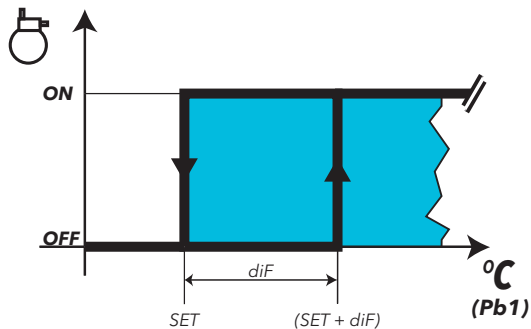
User parameters

The parameters that manage this regulator are:

Label	Description
SEt	Regulation set point
diF	diFferential. Regulator activation differential
HSE	Higher SEt. Maximum value settable for set point
LSE	Lower SEt. Minimum value settable for set point
OSP	Offset on set point
OdO	Output activation delay from power-on

3.3.2. COMPRESSOR/GENERAL PROTECTIONS

Description

If the cold room probe is in error **E1** the output relay configured as compressor/general regulates in accordance with the times set in parameters **Ont** and **OFt**.
The first time to consider is **Ont**.
If **Ont > 0**, the protection programmed in parameters
dOn-**dOF**-**dbi** (see **"Compressor safety timings" on page 22**).

NOTE: you are reminded that parameter **OdO** inhibits the activation of all outputs commanding a relay for its entire duration (compressor/general, defrost, fans), excluding buzzers or alarm relays.

Operating conditions

The table below lists the ways the compressor relay output can be managed:

Ont	OFt	Compressor OUT
0	0	OFF
0	>0	OFF
>0	0	ON
>0	>0	DUTY CYCLE

If **Ont** > 0 and **OFt** = 0, the compressor regulator will remain on.
If **Ont** > 0 and **OFt** > 0, the compressor regulator activates in operating cycle mode irrespective of the values read by the probes (cabinet probe failure) and of requests from other utilities (**Duty Cycle** mode).
If the cold room probe is working properly, the Duty Cycle mode does **NOT** activate as it does not have priority over normal compressor regulator settings.

The following diagram shows the **Duty Cycle** operating mode based on parameters **Ont** and **OFt > 0**:
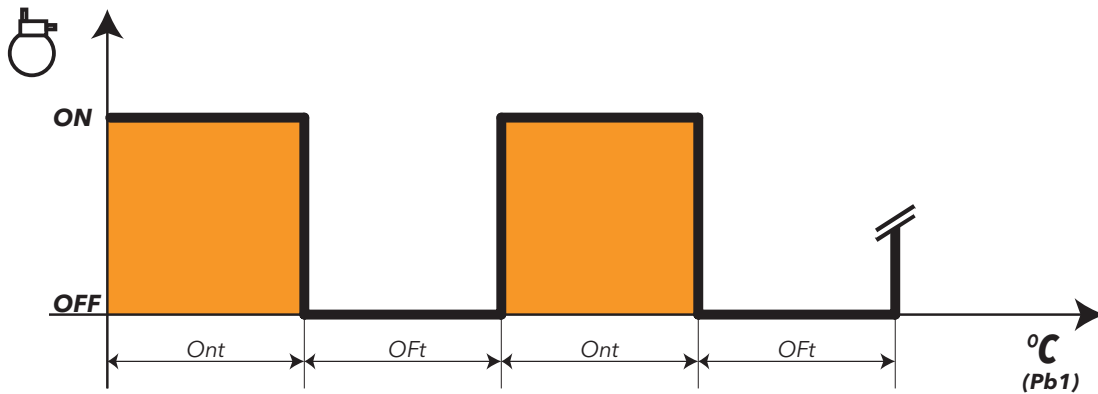
User parameters

The parameters that manage this regulator are:

Label	Description
Ont	Compressor output ON time in the event of a faulty Pb1 probe
OFt	Compressor output OFF time in the event of a faulty Pb1 probe
dOn	Compressor output activation delay from request
dOF	Compressor output activation delay from shutdown
dbi	Delay between two consecutive starts of the compressor output
OdO	Output activation delay from power-on

Compressor safety timings

Compressor on-off operations must respect the safety times that you can set using the special parameters as described below.

The compressor LED will flash to indicate when an activate compressor request has been received but a safety protection exists.

A safety time (compressor On... Off safety time) regulated by the parameter **dOF** must be respected between a switch-off and switch-on of the same compressor. This waiting time also occurs at switch-on of the device.

A safety time regulated by the parameter **dbi** must be respected between one switch-on and the next.

The safety time set in parameter **dOn** must elapse between a start-up request and actual start-up.

Times set with parameters **dOn**, **dOF** and **dbi**, if active, are not accumulative but parallel.

The following diagram illustrates the operation of the compressor protection with parameters **dOn**, **dOF**, **dbi** set where:

IN	Input status for compressor regulator.
OUT	Output status for compressor regulator.
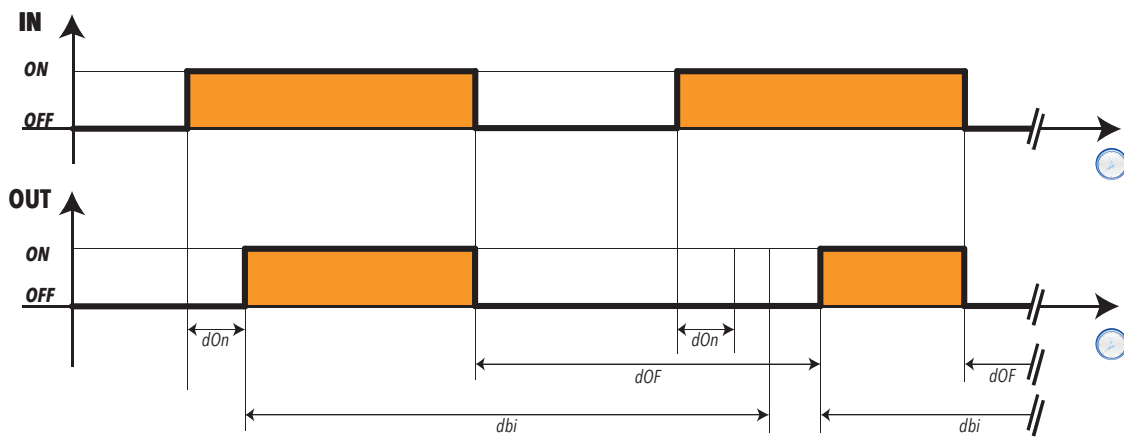
NOTE: See the section entitled Compressor Function During Defrost for other safety measures and compressor timings.

3.3.3. DEFROST/DRIPPING

Description

Defrost is used to stop ice from forming on the surface of the evaporator.
Defrost (see Defrost Modes) basically heats up the evaporator by means of:

- Electrical resistances.

- Hot gas

- Stopping the compressor and hence the "cooling" cycle.

Dripping

On completion of defrost, given that there will be water on the evaporator, it is better not to start "cooling" right away as this would ruin the effect of the defrost by creating ice immediately.
The dripping interval is regulated via parameter **dt**.

Defrost conditions and operation

Defrosting is enabled if:

- The evaporator temperature, read by Pb2, is lower than the defrost end set point configured via parameter **dSt**. (**Pb2 present - H42 ≠ 0**)

- Manual defrosting has not already been activated, in which case the request for automatic defrost will be cancelled.

Defrost requests can be made in the following ways:

Device power-on	if parameter **dPO** (defrost at power-on) is programmed accordingly.
Time intervals	If **dit** > 0 whenever the defrost time interval set in parameter **dit** elapses.
Manually via a key	by pressing the ⊗ key if enabled (**H31** = 1). The cycle will not start if **OdO≠0** the request will be refused and the display will flash three times to indicate that defrost is impossible.
External request via D.I.	If D.I. appropriately configured. Activation from D.I. respects the protections of the automatic cycle. The cycle will not start if **OdO≠0** the request will be refused and the display will flash three times to indicate that defrost is impossible.

User parameters

The parameters that manage this regulator are:

Label	Description
dty	Selects defrost type
dit	Time interval between 2 consecutive defrost cycles
dCt	Selects the count mode for the defrost interval
dOH	Defrost cycle activation delay after request
dEt	Defrost timeout. Determines the maximum defrost duration
dSt	Defrost end temperature determined by probe Pb2
dPO	Determines whether the instrument must enter defrost mode at power-on
Fdt	Fan activation delay after a defrost cycle
dt	Dripping time
dFd	Allows exclusion of the evaporator fans to be selected or not selected during defrosting
dAO	Temperature alarm disabling time after defrost cycle
dAt	Alarm signalling end of defrost due to timeout
ddL	Display mode during defrost cycle (lock display)
dSE	Temperature threshold for starting defrost
dtt	Time for which the temperature of the evaporator must remain below **dSE**
Ldd	Timeout value for display unlock - label dEF

Automatic defrosting

The defrost cycle is programmed to start at intervals.

NOTE: To disable the automatic cycle, set **dit**=0.

If **dit**>0, then defrost cycles will be run at fixed intervals, as indicated in parameter**dit** and the interval time is counted as follows:

Par.	Value	M.U.	Description	Notes
dCt	0 (dF)	Flag	Hours of compressor compressor (DIGIFROST® method)	In this case, the counter runs only if the compressor is on. A new count starts when the defrost interval elapses and a new defrost cycle starts if conditions permit. **NOTE**: compressor running time is counted separately from the evaporator temperature. If the evaporator probe were missing or faulty, the count would still be active for the period of activity of the compressor.
	1 (rt)	Flag	Controller running time	The defrosting interval is counted continuously when the device is on and starts at each power-on. A defrost cycle starts when the defrosting interval elapses (indicated by dit) if conditions permit and the controller immediately starts counting a new defrosting interval.
	2 (SC)	Flag	Compressor Stop	Each time the compressor stops, a defrost cycle is run according to the mode set in parameter **dty**.
	3 (te)	Flag	Temperature	Defrost is activated when the evaporator temperature remains below the **dSE** threshold for the time **dtt**. The time count is only active when defrosting is off. If probe Pb2 is in error, the defrost is activated according to the interval **dit**.

NOTE: regardless of how the interval is counted, the following conditions apply:
If parameter **OdO** is under way or the temperature read by the evaporator probe (Pb2) is greater than **dSt** then defrost will not be permitted: a new interval will be counted and only at the end of this subsequent count will conditions be tested for the start of a defrost cycle.

Manual defrost

Press the manual defrost key ⏏ (or from digital input if appropriately configured **H11 or H12 = 1**), the appliance enters defrost. Procedures for the activation of this defrost cycle are the same as for external defrost.

The defrosting interval will now be counted as described for Automatic Defrost (time **dEt** is not cleared, it continues).

If the following conditions are NOT present:

• the time set in parameter **OdO** has not elapsed.

• the evaporator temperature is higher than the value set in parameter **dSt.**

this will be signalled on the display (screen flashes three times) and defrost will stop.

Manual defrost is always enabled except when **dit** = 0.

External defrost

If the digital input is configured for this function (if **H11 or H12 = 1**) and if conditions permit, defrost can be requested and the relative regulator activated.
Time graphs for signals in each of the various function modes are presented below.

NOTE: Defrost activation occurs when the signal is toggled and the polarity can be selected. Hence you can only activate a defrost, NOT stop one that is underway.
Defrost or dripping currently underway and the defrost or dripping interval count cannot be suspended

IN (Digital Input)	Input status for defrost regulator, with activation from digital input.
OUT (Defrost)	Output status for defrost regulator.
DurDI	Duration of digital input.
NOTE	**dSt** indicates end defrost time when set point temperature reached and **dEt** indicates end of defrost due to timeout.

The control diagram is as follows:
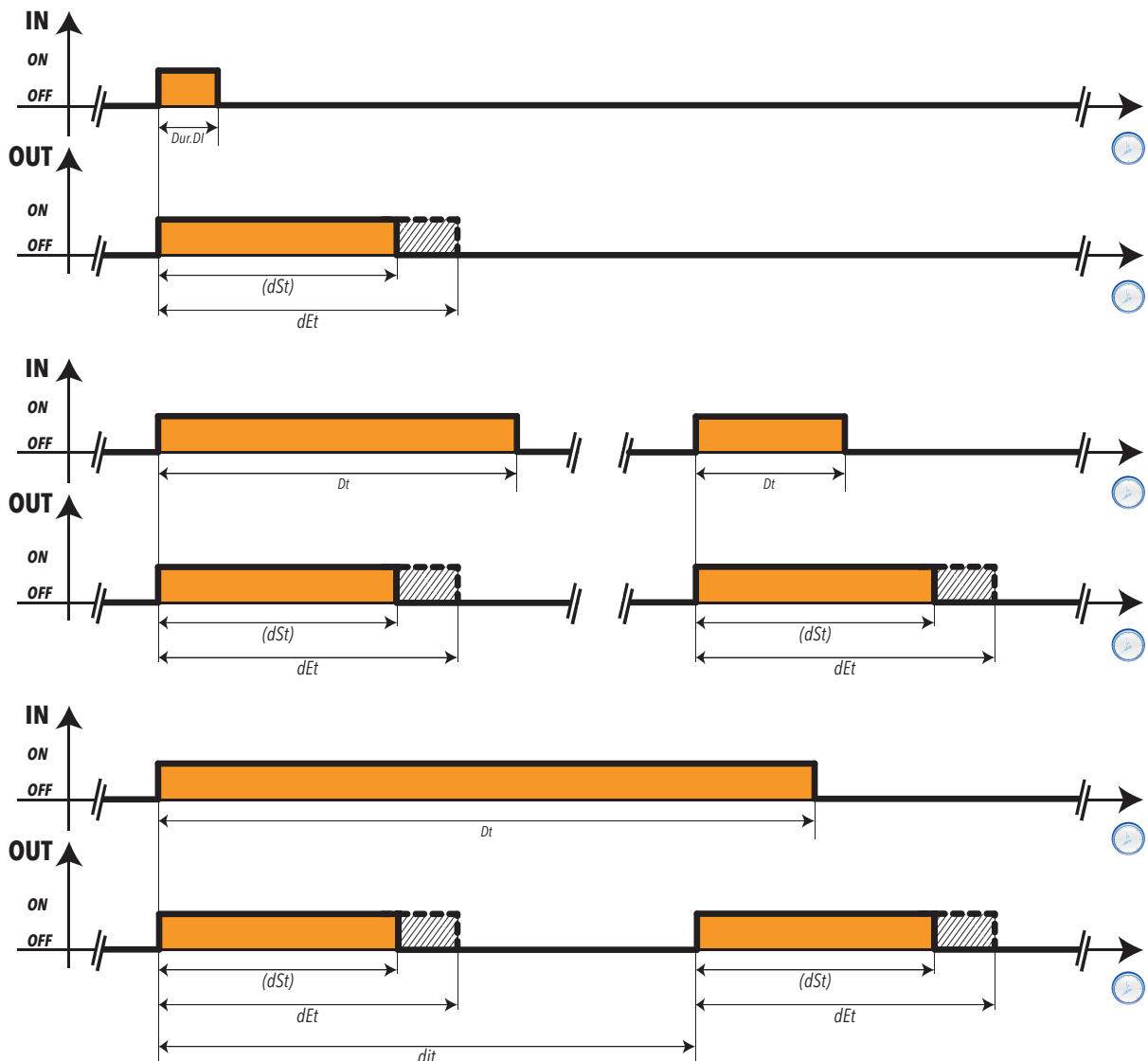
3.3.4. Defrost cycle

Defrost can be activated in 4 different ways, described below and as defined by the parameter **dtY**.

Defrost with electric heaters

Defrost with electrical heaters is configured by setting **dtY = 0 EL**.
It is used in "**LOW TEMPERATURE**" applications.

The compressor remains stopped for the duration of the defrost cycle and the relay configured as defrost regulator output, to which the electrical heaters are connected, activates. On completion of defrost, the electrical heaters are switched off and the compressor remains off for the dripping time set in parameter **dt**, if it is not equal to zero.

Defrost ends due to:

Evaporator probe (Pb2)	Value of H42	End of defrost description
Pb2 ABSENT	**H42**=0	Due to timeout set in parameter **dEt** (defrost timeout).
Pb2 PRESENT	**H42**=1	Temperature set point for the end of defrost set in parameter **dSt** reached. If this set point is not reached within the time set in parameter **dEt** (defrost timeout), the defrost will end due to timeout.

NOTES:

• **dSt** intervenes before **dEt**, dripping (**dt** and **Fdt**) aligns with **dSt**.

• If **Fdt** < **dt** then **Fdt** = **dt**.

• During defrost, fans are OFF if parameter **dFd** is set accordingly, otherwise they will behave as set for the fan regulator.

The operating diagram is as follows:
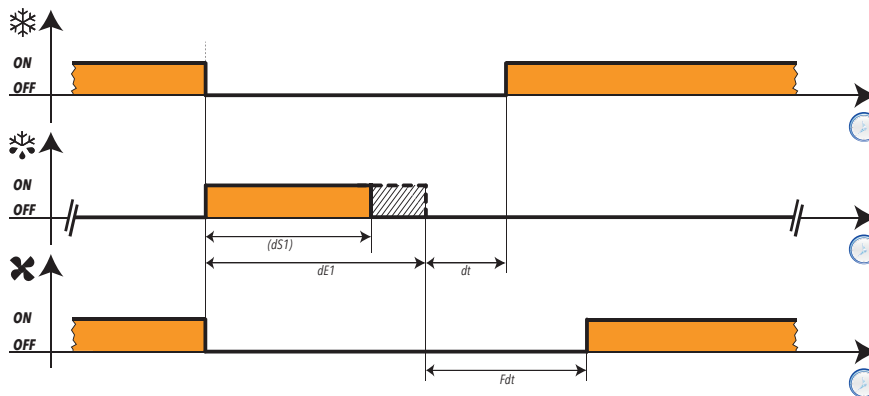
Legend:

❄	Output status for Compressor regulator
❄	Output status for Defrost regulator
✖	Output status for Evaporator Fan regulator

Defrost with compressor stopped

The defrost cycle with the compressor stopped is configured by setting parameter **dtY = 0**.
It is used in "**NORMAL TEMPERATURE**" applications.

The compressor stops for the duration of the defrost and there is no defrost relay.

Defrost ends due to:

Evaporator probe (Pb2)	Value of H42	End of defrost description
Pb2 ABSENT	**H42**=0	Due to timeout set in parameter **dEt** (defrost timeout).
Pb2 PRESENT	**H42**=1	Temperature set point for the end of defrost set in parameter **dSt** reached. If this set point is not reached within the time set in parameter **dEt** (defrost timeout), the defrost will end due to timeout.

NOTE: on completion of defrost, the compressor relay stays de-energised for the time of duration of the dripping set by the parameter **dt** (if not equal to zero).

The operating diagram is as follows:
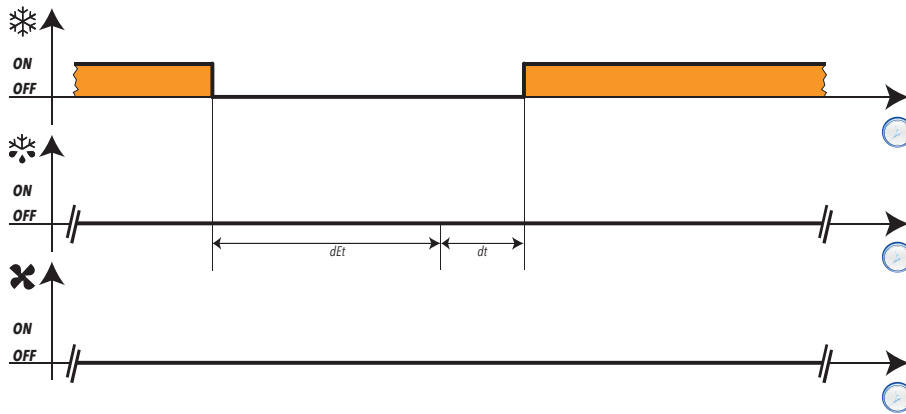
Legend:

❄		Output status for Compressor regulator
❄		Output status for Defrost regulator
✖		Output status for Evaporator Fan regulator

Cycle inversion defrost (hot gas)

Hot gas defrost is configured by setting parameter **dtY = 1**.
It is used in "**LOW TEMPERATURE**" applications.

The compressor stays on for the entire duration of the defrost cycle and the relay configured as defrost regulator output, and that the solenoid valve is connected to, activates.

On completion of the defrost cycle, the solenoid valve relay is de-energised and the dripping phase set in parameter **dt** (if not equal to zero) is interrupted. The compressor relay is once again controlled by the compressor regulator.

Defrost ends due to:

Evaporator probe (Pb2)	Value of H42	End of defrost description
Pb2 ABSENT	**H42**=0	Due to timeout set in parameter **dEt** (defrost timeout).
Pb2 PRESENT	**H42**=1	Temperature set point for the end of defrost set in parameter **dSt** reached. If this set point is not reached within the time set in parameter **dEt** (defrost timeout), the defrost will end due to timeout.

NOTE: The parameters **dOn**, **dOF** and **dbi** (see "Compressor safety timings" on page 22) still have priority.

NOTES:

- **dSt** intervenes before **dEt**, dripping (**dt** and **Fdt**) aligns with **dSt**.

- If **Fdt** < **dt** then **Fdt** = **dt**.

- During defrost, fans are OFF if parameter **dFd** is set accordingly, otherwise they will behave as set for the fan regulator.

The operating diagram is as follows:

1st DIAGRAM

2nd DIAGRAM
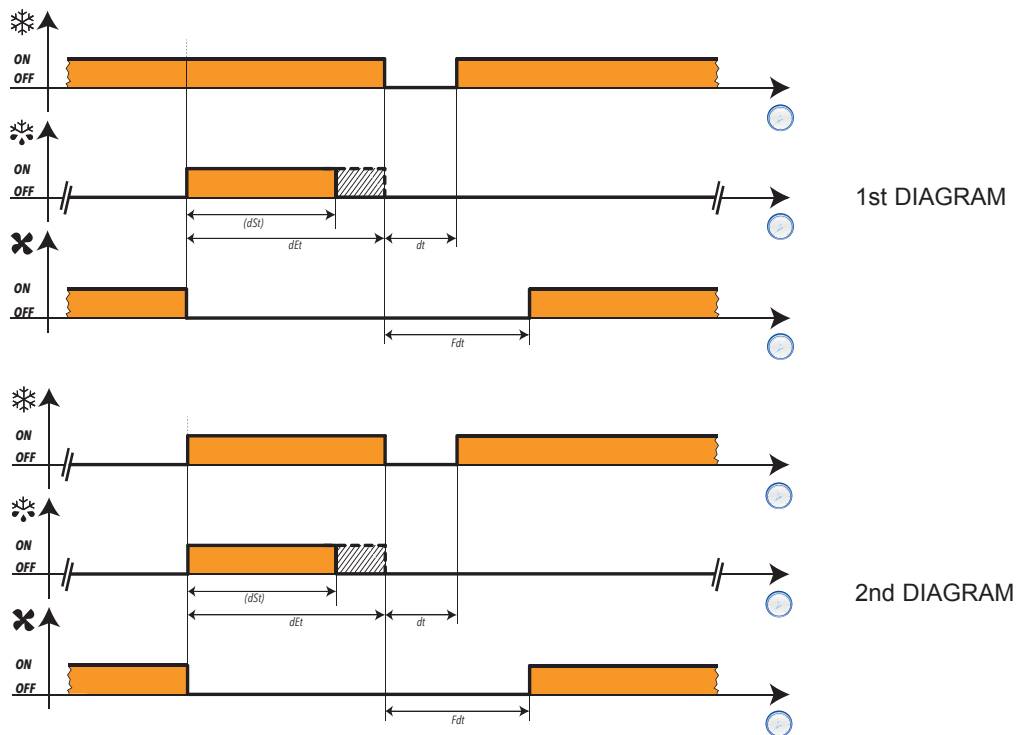
Legend:

❄	Output status for Compressor regulator
❄	Output status for Defrost regulator
✾	Output status for Evaporator Fan regulator

FREE mode defrosting

The defrost cycle with the compressor stopped is configured by setting parameter **dtY = 2**.

The compressor remains under the control of the compressor regulator for the duration of the defrost cycle and the relay configured as defrost, and that the defrost heaters are connected to, activates.
The heaters are switched off on completion of the defrost cycle. During coil drainage, the compressor continues to thermoregulate.
Defrost ends in the same way as the previous case.

Defrost end for Time out

If the defrost cycle does not terminate on reaching the end of defrost temperature set in parameter **dSt**, a maximum defrost time interval can be set in parameter **dEt**.

NOTE: Defrost can only be terminated manually by switching the device on and off again using the ON/OFF function.

Alarm function during defrosting

If the defrost cycle ends due to time out, an alarm can be activated by configuring parameter **dAt** (see 'end of defrost due to time out alarm).
In the event of an environment probe fault (Pb1), defrosting will be done anyway.
During defrost, the temperature values recorded by the Evaporator probe (Pb2) and probe 3 (Pb3) may be false readings. For this reason, the temperature alarm is excluded.

Display function during defrosting

By setting parameter **ddL** (Display mode during defrost cycle - lock display), when the instrument enters defrost mode, the value shown on the display can be:

*   left free to show the temperature read by the environmental probe (Pb1).

*   at value read by the environmental probe (Pb1) at the start of the defrost cycle.

*   locked on the label display **dEF** (defrost).

Display lock

The display can be set to unlock:

*   to achieve defrosting temperature.

*   the timeout value for unlocking the display elapses, as defined in parameter **Ldd** (Lock defrost disable).

NOTE:

1. The parameter **Ldd** can be used in a link network to unlock both the display and other resources.

2. If set, the display will be unlocked after the coil drainage cycle since it locks the regulators.

3.3.5. FANS

Operating conditions

The regulator is active when:
- the time set in parameter **OdO** has elapsed.
- the evaporator probe temperature (Pb2) is lower than the value of parameter **FSt**.
- during defrost it is not excluded by the parameter **dFd** (**dFd = y**).
- dripping is not active (**dt**).
- the fan delay is not active after defrost (**Fdt**).

The request to switch fans on or off can be made in the following ways:
- by the compressor regulator to help in the "cooling" process (temperature control mode)
- by the defrost regulator to check and/or limit the diffusion of hot air

	H42	FCO	DAY		NIGHT (Energy Saving)	
			Compressor ON	Compressor OFF	Compressor ON	Compressor OFF
Pb2 probe present	y	0	THERMOSTAT CONTROLLED	OFF	THERMOSTAT CONTROLLED	OFF
		1	THERMOSTAT CONTROLLED	ON	THERMOSTAT CONTROLLED	THERMOSTAT CONTROLLED
		2	THERMOSTAT CONTROLLED	DUTY-CYCLE DAY	THERMOSTAT CONTROLLED	DUTY-CYCLE NIGHT
		3	DUTY-CYCLE DAY	DUTY-CYCLE DAY	DUTY-CYCLE NIGHT	DUTY-CYCLE NIGHT
Pb2 probe error E2	y	0	DUTY-CYCLE DAY	OFF	DUTY-CYCLE NIGHT	OFF
		1	DUTY-CYCLE DAY	DUTY-CYCLE DAY	DUTY-CYCLE NIGHT	DUTY-CYCLE NIGHT
		2	DUTY-CYCLE DAY	DUTY-CYCLE DAY	DUTY-CYCLE NIGHT	DUTY-CYCLE NIGHT
		3	DUTY-CYCLE DAY	DUTY-CYCLE DAY	DUTY-CYCLE NIGHT	DUTY-CYCLE NIGHT
Pb2 probe present	n	0	ON	OFF	ON	OFF
		1	ON	DUTY-CYCLE DAY*	ON	DUTY-CYCLE NIGHT*
		2	ON	DUTY-CYCLE DAY*	ON	DUTY-CYCLE NIGHT*
		3	DUTY-CYCLE DAY	DUTY-CYCLE DAY	DUTY-CYCLE NIGHT	DUTY-CYCLE NIGHT

* see paragraph **"Fan operation without probe" on page 32**.

Fan operation in thermoregulation mode

During "cooling", the fans operate as shown in this diagram:

Thermostat control of fans takes place at the values set in parameters
- **FSt** (fans disabling temperature) and **FAd** (fans differential).

The fan disabling temperature, set via parameters **FSt** (fan disabling temperature) and **FAd** (fan differential), is an absolute value as **FPt = 0** (actual temperature value).
NOTE: around the fan start temperature (-50°C) the differential will always take account of the parameter **FAd** but with the sign inverted.

The fan regulator operates as indicated below:
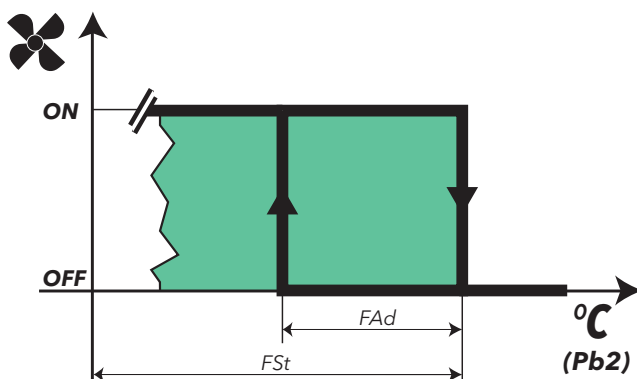
Fan operation in Duty Cycle mode

There are two Duty Cycle modes: **Day** (DAY) and **Night** (NIGHT - Energy saving).
The activation of the **Night** mode depends on parameter **ESF**:

ESF = n	Night mode disabled
ESF = y	Night mode active when Energy Saving mode is active

Duty Cycle operation depends on the operating mode, e.g.:

- **Day**: parameters **Fon** and **FoF** must be set accordingly

- **Night**: parameters **Fnn** and **FnF** must be set accordingly;

The fans operate as follows:

DUTY-CYCLE DAY (Day)

Fon	FoF	Fan operation
0	0	**OFF**
0	≠0	**OFF**
≠0	0	**ON**
≠0	≠0	**DUTY-CYCLE DAY**

DUTY-CYCLE NIGHT (Night)

Fnn	FnF	Fan operation
0	0	**OFF**
0	≠0	**OFF**
≠0	0	**ON**
≠0	≠0	**DUTY-CYCLE NIGHT**

The fan regulator will operate in Duty Cycle mode as illustrated below:
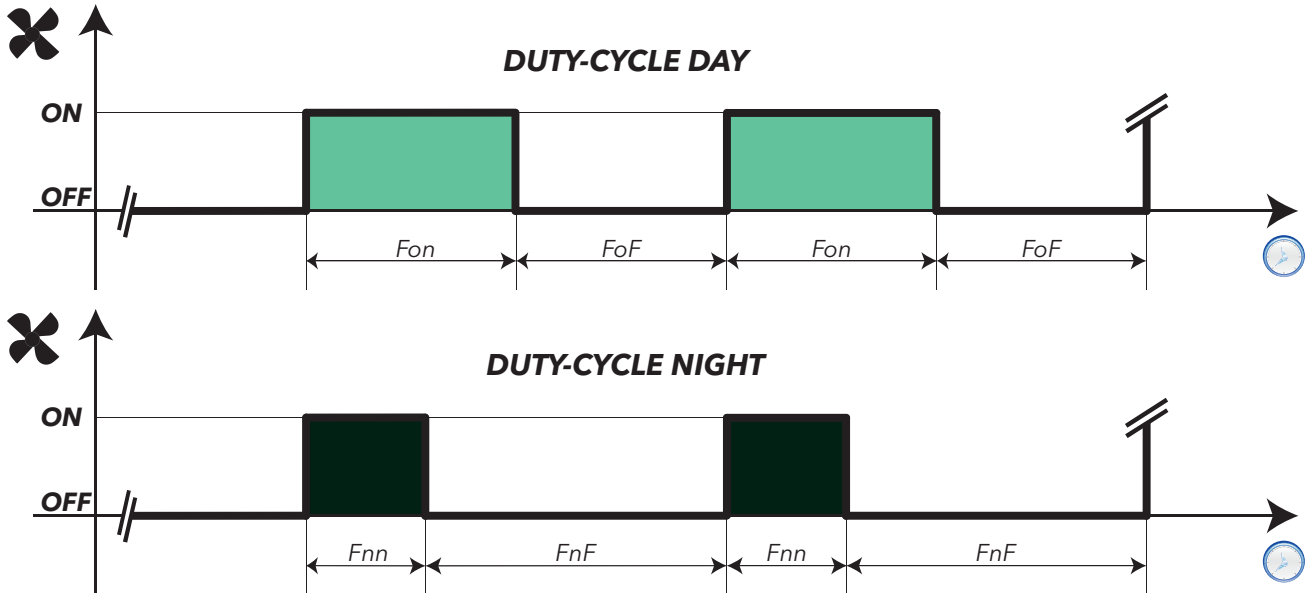
Fan operation in defrost

During defrost, the fans operate as shown in this diagram

dFd = y : exclusion of fans during defrost	**OFF**
dFd = n : fans are not excluded during defrost (see parameters **FCO**, **Fon**, **FoF**, **Fnn** and **FnF**)	**THERMOREGULATION / DUTY-CYCLE**

Thermostat control of fans takes place at the values set in parameters:
• **FSt** (fans disabling temperature) and **FAd** (fans differential).

NOTE: during defrost with electrical heaters, the compressor is OFF but the fans work as if the compressor was still ON, unless they have been disabled during defrost (see parameter **dFd**).

When the evaporator fans are enabled in defrost (**dFd = n**) and regulate the evaporator probe Pb2 in thermoregulated mode, when the latter enters error **E2** during defrost, the fans must always be ON, regardless of the values set via the Duty Cycle.

Fan operation without probe

If parameter **H42 = n** (probe Pb2 absent), depending on the **FCO** value and the status of the compressor, the fans may assume the status "On", "Off", "Duty Cycle Day" and "Duty Cycle Night".

The parameter **FCO** will determine the operating mode of the evaporator fans during the DAY phase and the NIGHT phase.

The following is an example of fan operation on the basis of the value set for **FCO**.

9MA10284 00   09/2017
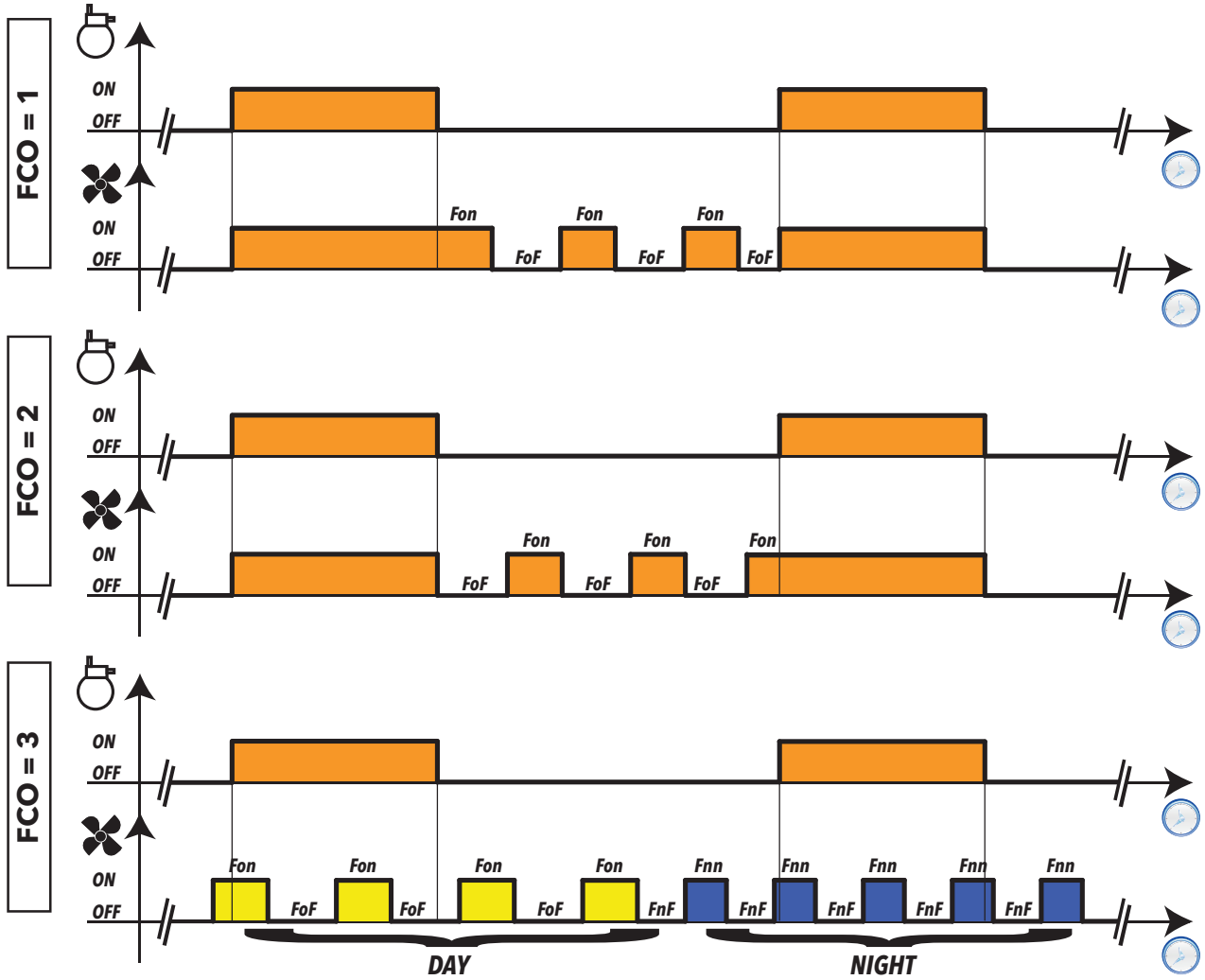
Fan function during dripping

If parameter **dt ≠ 0** (dripping time), the fans will stay OFF for the time set in this parameter.
See **"Defrost with electric heaters" on page 26**.
Note that if **Fdt** (fan delay time) is greater than **dt** (dripping time) the fans stay OFF for the time set in **Fdt** rather than **dt** (e.g. whichever timing is longer will be applied).

Post-ventilation

Parameter **FdC** delays the switching off of the fans after the compressor has stopped (increasing efficiency of the system by making better use of inertia). Post-ventilation must be active with any **FCO** value and without a configured probe.
If **FdC = 0** the function is disabled.
NOTE: Post-ventilation does not have priority over the delay set by parameter **dcd**.

User parameters

The parameters that manage the fan regulator are:

Label	Description
FPt	Characterises the **FSt** parameter which can be expressed either as an absolute temperature value or as a value relative to the set point
FSt	Evaporator fans disabling temperature
Fdt	Evaporator fans delay after defrost cycle
dFd	Evaporator fans disabling during defrost time
FCO	Evaporator fans operating mode
FAd	Evaporator fans activation differential
dt	Dripping time
FdC	Evaporator fans switch-off delay after compressor disabled
Fon	Evaporator fans ON time in duty cycle day mode
FoF	Evaporator fans OFF time in duty cycle day mode
Fnn	Evaporator fans ON time in duty cycle night mode
FnF	Evaporator fans OFF time in duty cycle night mode
ESF	Night mode activation (Energy saving)

3.3.6. AUXILIARY OUTPUT (AUX/LIGHT)

Description

If the parameter **H21**, **H22** or **H23** is set to the value **H2x=5**, it anticipates the relay control as AUX and, by pressing the associated key **H32** (DOWN key) or **H33** (ESC key) which should be set to the value **H3x = 2**, the relay is activated if it was off previously and vice-versa.

The on/off status is saved in non-volatile memory hence when power returns after a blackout, the device will restart in the status that was active prior to the blackout.

If the parameter **H11** or **H12** is set to the value **H1x=3**, it anticipates the AUX relay control by the digital input; in this case the relay will mirror the status of the input. In this case, on/off status is not saved in non-volatile memory.

NOTE: the meaning of the DI must always remain the same: for example, if the relay is activated by DI and switched off by key, when the DI is reset to the starting position, the relay does not change status (since it was already de-energised by key). With the instrument OFF, if set accordingly, only the digital input (DI) and the associated key can change the status of the output.

Operating conditions

The regulator is activated by:

• Key

• Function

• Digital input

• Activate Energy Saving Mode

if configured accordingly. The regulator is not active when:

Condition	AUX output status
During start-up	OFF
During stand-by	Status depending on parameter **H08**

The values that the **ESA** parameter (AUX/Light output status during Energy Saving) can take on are:

• **0**: disabled (has no influence on the AUX status)

• **1**: AUX off (**LIGHT OFF**);

• **2**: AUX on

NOTE: The management of LIGHT only occurs by setting **ESA = 1**.

The control diagram is as follows:
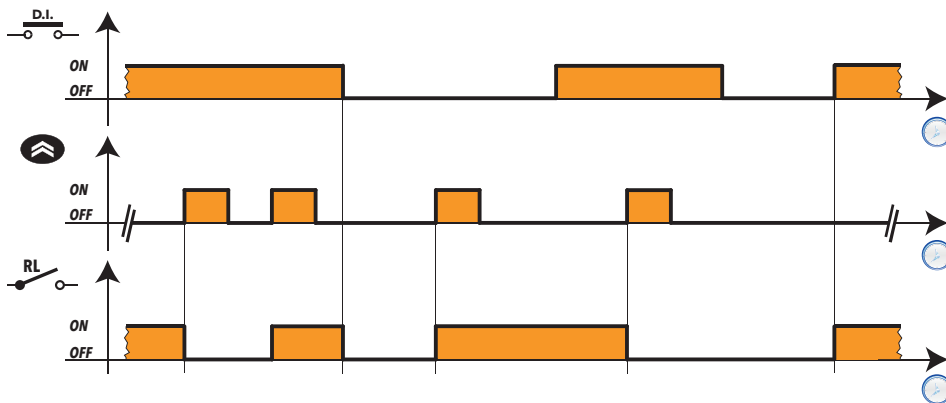
User parameters

The parameters that manage the auxiliary (AUX) output regulator are:

Label	Description
ESA	AUX status during energy saving: **0** = Disabled (no effect on AUX); **1** = AUX off; **2** = AUX on
H11	Configuration of digital input 1 / Polarity
H12	Configuration of digital input 2 / Polarity
H21	Configuration of digital output 1
H22	Configuration of digital output 2
H23	Configuration of digital output 3
H32	Configuration of DOWN key
H33	ESC key configuration

3.3.7. PRESSURE SWITCH

Description

This regulator performs diagnostic operations over a digital input activated by setting parameters:

- **H11** (DI1) = ±7

- **H12** (DI2) = ±7

If a pressure switch input is activated, power to the compressor is immediately cut off, the relative alarm LED lights up to provide a visual warning and the folder **nPA** in the alarms folder **AL** is also displayed. The folder contains the label with the number of pressure switch activations (up to the maximum value set in parameter **PEn**).

When the pressure switch is deactivated because the pressure returns to normal levels, the time set in parameter **PEt** before the cooling regulation resumes.

If the number of activations exceeds the maximum number defined by parameter **PEn** in a time less than the value of **PEI**, the following conditions occur:

- The compressor, fan and defrost outputs are disabled

- In the alarms folder **AL** the label **PA** (pressure alarm) is displayed in place of folder **nPA**

- **PAL** label shown on display

- The alarm relay comes on (if configured).

NOTE:

1. If the number of activations exceeds the number set in **PEn** in the **PEI** time, the alarm is automatically reset.

2. The input must be closed on itself if not used and the input is normally closed active, or must be open if not used and normally open active, or deactivated by digital input configuration parameter.

NOTES:

1. Once the controller is in alarm state, it must be powered off then on, or RESET by activating function **rPA** in the functions folder **FPr**.

2. If parameter **PEn = 0**, the function is disabled and alarms and counters are also disabled.

3. The pressure switch alarm is not stored in EEPROM.

4. During the pressure switch activation period the defrost interval count runs as normal.

Operating conditions

The number of pressure switch errors is counted using a FIFO method. The time interval **PEI** is divided into 32 parts; the counter is incremented by one unit if there are one or more activations during one part of the entire interval **PEI**.

Two operating examples are given below: In both cases, suppose that **PEI** = 32 minutes (equal to 32 minutes/32 = 1 minute) and **PEn** = 7.

Example 1: **ALARM SIGNALLED**. The interval for storing activations is 1 minute: all activations within that minute are counted as a single activation and the alarm is activated when the sampling interval has elapsed. In this example the pressure switch alarm is signalled because there have been 7 activations during the 32' time window.

Case 2: **ALARM NOT SIGNALLED**. In this example the alarm is activated because in the 32' time window the number of interventions
set to the **PEn** parameter has not been reached. In practice the time window is a rolling window and all activations that are outside of it are deleted: the reference point is the last activation and the time **PEI** is subtracted from that point to establish how many activations are included in the count.

Example 1

The time between the 1st and 7th activation is 11' < PEI (32') → **ALARM ALERT**

Case 2

The time between the 1st and 7th activation is 33' < PEI (32') → **NO ALARM ALERT**
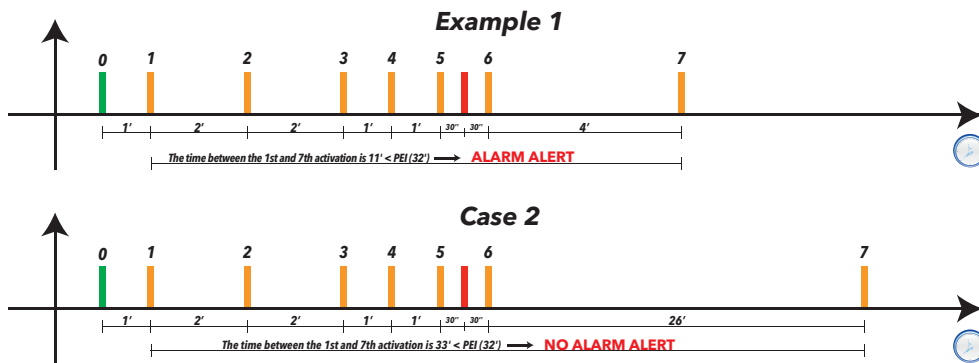
User parameters

The parameters that manage the pressure switch regulator are:

Label	Description
PEn	Number of errors allowed per maximum/minimum pressure switch input
PEI	Minimum/maximum pressure switch error count interval (in 32 parts)
PEt	Delay in activating compressor after pressure switch deactivation

3.3.8. DEEP COOLING CYCLE - DCC

Description

This regulator ensures that the compressor regulates the set point **dCS**, with differential equal to the value set via parameter **diF**. When the **DCC** (Deep Cooling Cycle) activates, the interval between defrost cycles is cleared and defrosts disabled. The ending of the **DCC** can be time-based, by setting the parameter **tdc≠0**, or when the set point **dCS** is reached if **tdc = 0**. When a **DCC** has ended and once the time set in parameter **dcc** has elapsed, a defrost cycle is forced and the counters restart for the interval between defrost cycles (value set via parameter **dit**). If **dcc=0** defrost begins at the end of the **DCC**. During the **DCC** the temperature alarms are disabled.
Normal temperature alarm management is restored at the end of the **DCC**, when the temperature value read by probe Pb1 reaches the regulation set point value **SEt**.

Operating conditions

Based on the value set for the **dCA** parameter we will have the activation of the Deep Cooling Cycle) will be:

*   **dCA = 0**: disabled

*   **dCA = 1**: manual (activated by key or digital input if suitably configured)

*   **dCA = 2**: automatic (activated if the temperature of **Pb1 > Sid** for a time equal to **toS**);

Manual mode

Is activated by setting **dCA = 1** and we will have that the Deep Cooling Cycle will be activated via Digital Input or using a key if suitably configured.
In the event of a probe error and/or power failure, the Deep Cooling Cycle is stopped and standard controller function restored.
If the **dCS** parameters are changed, **tdc** and **dcc** the functioning of the Deep Cooling Cycle is recalculated with new set values.
After a Deep Cooling Cycle the **dcc** time must elapse before a new cycle can begin.

The control diagram is as follows:
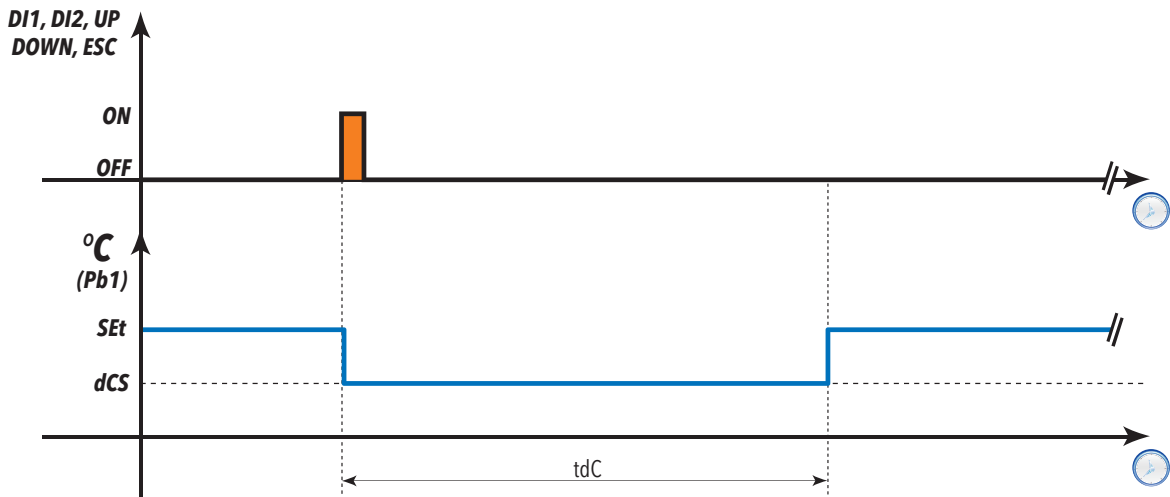
Automatic mode

It is activated by setting **dCA = 2** and we will have that the Deep Cooling Cycle will activate as soon as the value read by the probe **Pb1 ≥ Sid** for a time **T ≥ toS** and ends when the **dCS** temperature is reached.
In the event of a probe error and/or power failure, the Deep Cooling Cycle is stopped and standard controller function restored. The control diagram is as follows:
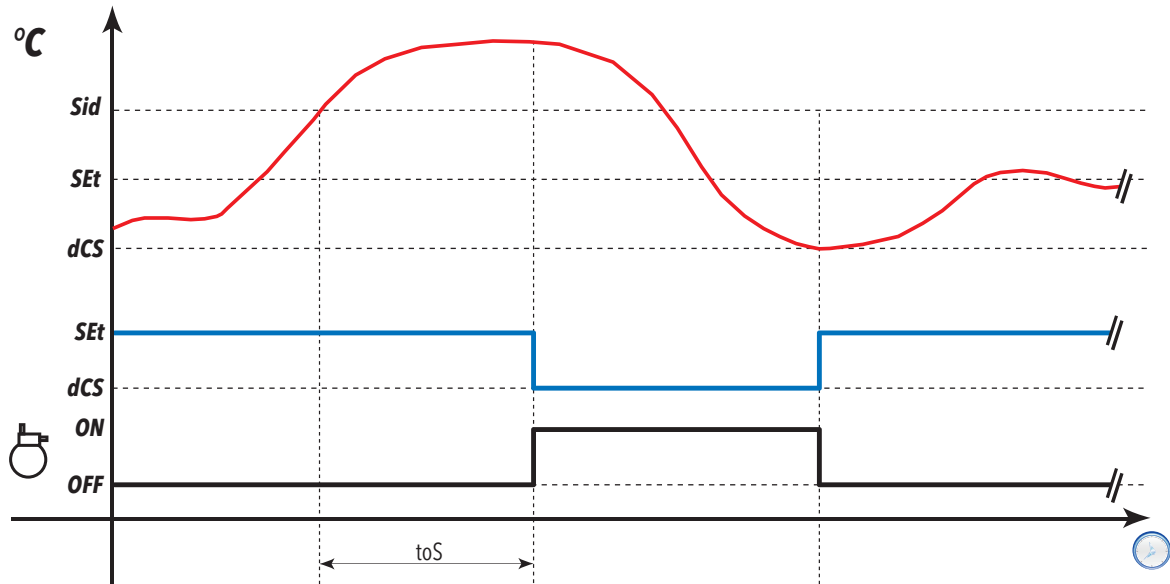
User parameters

The parameters that manage the Deep Cooling Cycle are:

Label	Description
dCA	Deep cooling duration (**0** = Disabled; **1** = Manual; **2** = Automatic).
dCS	Deep Cooling set point
tdc	Deep Cooling Time
dcc	Defrost Delay after Deep Cooling.
Sid	Threshold for Deep Cooling input
toS	Deep cooling activation time

3.3.9. ENERGY SAVING

Description

EWPlus 974 EO stands out for performance and flexibility thanks to specific energy saving algorithms and configurations dedicated to the key applications:

- Open bottle-coolers
- Bottle-coolers with door
- Vertical display units with door.

The ECO led will light up in all cases in which the function is active.

Operating conditions

The "Energy saving" function can be activated in the following ways:

- from DOWN/ESC key (setting **H32/H33** = 6)

- DI1/DI2 Digital Input (setting **H11/H12** = 9 or 10)

- remotely

- in automatic mode via "virtual" microport (see parameter (**ESP**≠0).

The operating algorithms are determined by the **Est** parameter.
The ECO led will light up in all cases in which the function is active. The values that can be assigned to parameter **ESt** (Energy Saving Mode) are:

- **0**: disabled

- **1**: offset on set-point

- **2**: offset on differential

- **3**: offset on set-point and differential

- **4**: open bottle cooler algorithm

- **5**: bottle cooler with door algorithm

- **6**: vertical display units with door algorithm.

The values that the **ESA** parameter (AUX/Light output status during Energy Saving) can take on are:

- **0**: disabled (has no influence on the AUX status)

- **1**: AUX off (**LIGHT OFF**);

- **2**: AUX on

The Energy saving can be enabled even by a "virtual" micro port (only in the case of Bottle Cooler with door - **ESt** = 5).
With the **ESP** parameter the sensitivity of the regulator is established (temperature difference measured by the probe 1).
The higher the value (max 5) the more the system becomes sensitive to the temperature variation.

1. If the "virtual" micro port is used (**ESP ≠ 0**) only to manage the Energy Saving mode, the **dOt** parameter must be at zero (**dOt = 0**).

2. If you also want to disable the fans when opening the door, we recommend setting **dOt > 0**.
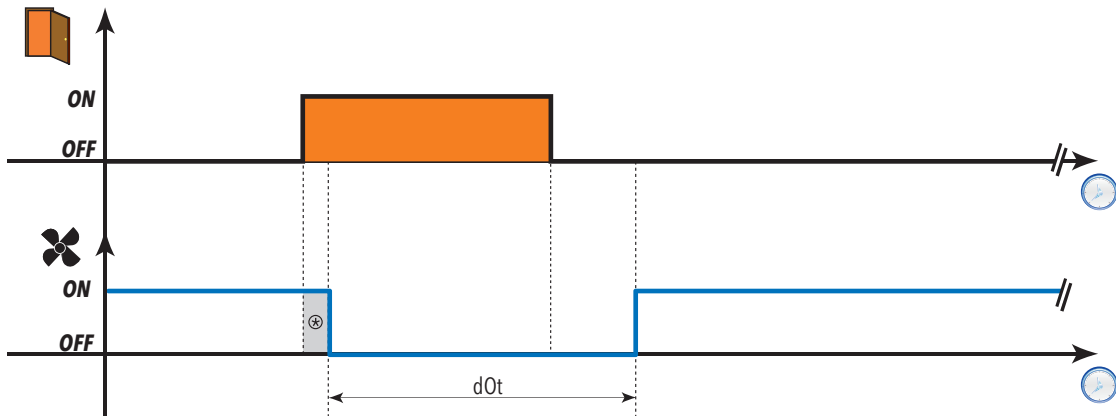
NOTE (*): The virtual micro port used the **Pb1** probe.
The algorithm takes a few seconds to reveal the opening based on the structure of the bench and probe position. The ideal position of **Pb1** is on the "recovery grid" as near as possible to the door.

OPEN-FRONTED BOTTLE COOLERS

Each time the function is enabled, the timers for the time count **dnt** and **dFt** are "reset".
Each time the controller is turned on, the timer for the time count **dnt** and **dFt** are "reset" even if have not expired; if, on the other hand, they were previously expired, the conditions prior to turning off are restored.
The activation and de-activation of the "Energy Saving" function only occurs via digital input (closure of the shutter).
If **dnt = 0** and **dFt = 0** the "Energy Saving" function is not active.

The graph below shows the algorithm operation.
The settings are:

- **ESt = 4**

- **H11 = 9**

- **ESP = 0 (Real - physical Digital Input)**.

NOTE:
If the shutter is opened during "Energy saving" stage, the Fast Cooling stage starts immediately.
If the shutter is opened during the Fast Cooling stage, the function ends when the **dFt** expires.
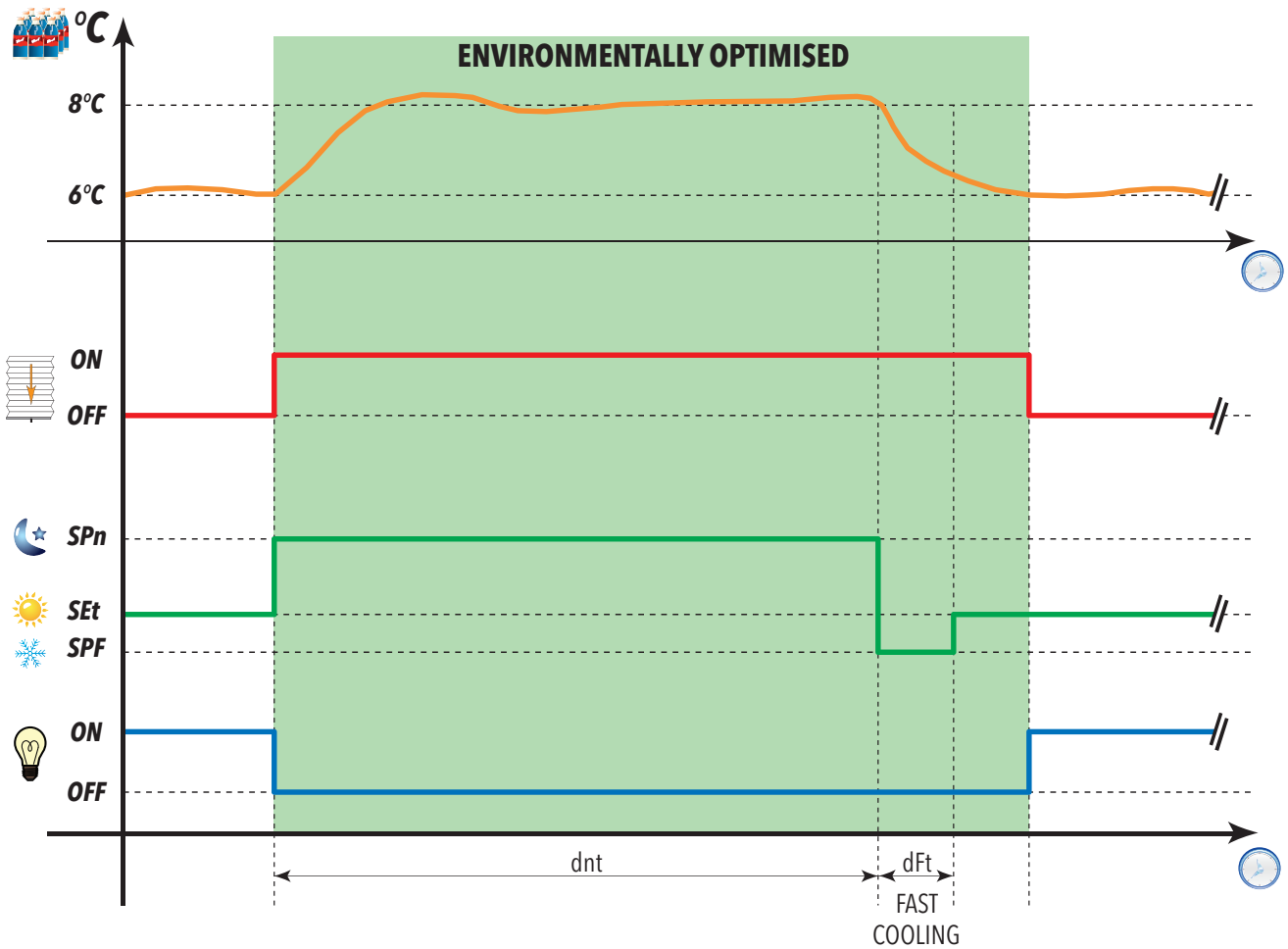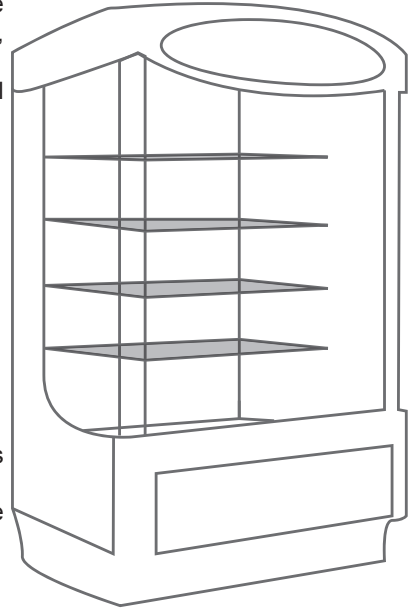
BOTTLE COOLERS WITH DOOR

If the door stays shut for a period of time greater than the **cdt** parameter and the SEt was reached during this period, the "Energy Saving" mode is activated and will disable when the set time expires with the **dnt** parameter or opening of the door. The constraint that the temperature has reached the SEt value is due to the fact that, if the cooling system is not working properly (e.g.: not much refrigerating gas) or the room temperature is too high and the system cannot reach an ideal temperature during the day, if it enters "Energy Saving" mode at the system's output, the system will be unable to restore the temperature of the bottles to the set value.

At the end of the "Energy Saving" period, a mode known as "Quick Chill" Starts. This mode allows for the temperature of the bottles to be restored to the required value in as short a period of time as possible and completely automatically (the algorithm can recognise the characteristics of the application and adapt them).

If **dnt = 0** the Quick Chill and "Energy Saving" mode are disabled.

The graph below shows the algorithm operation.

The settings are:

- • **ESt = 5**

- • **H11/H12 = 10 and ESP = 0 (if I have the physical Digital Input)**

- • **ESP≠0 and H11/H12 ≠ 2,4,9 and 10 (if I have virtual Digital Input)**

NOTE:

1) If **ESt = 5**, after a current interruption, the instrument always functions in standard mode (day) until the first closure of the door. In the absence of an open/closure of the door, after a time equal to **Cdt**, the device will always function in Economy (Energy Saving) mode for a period equal to: **dnt**.

2) If the door is opened during the Energy Saving stage, the Quick Chill stage starts immediately. If the door is opened during the Quick Chill stage, the function is stopped regularly.
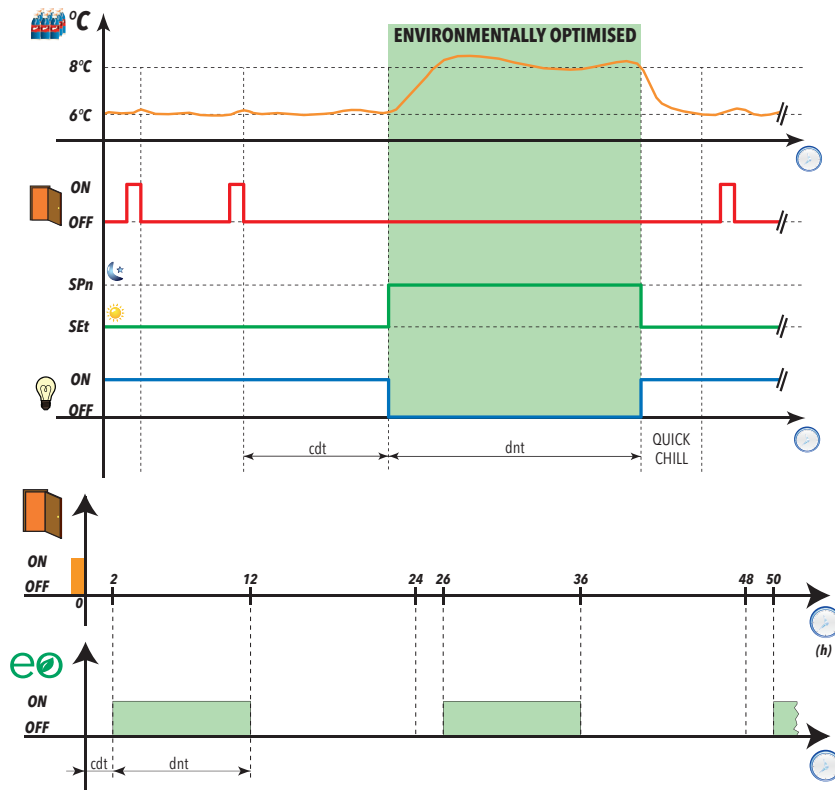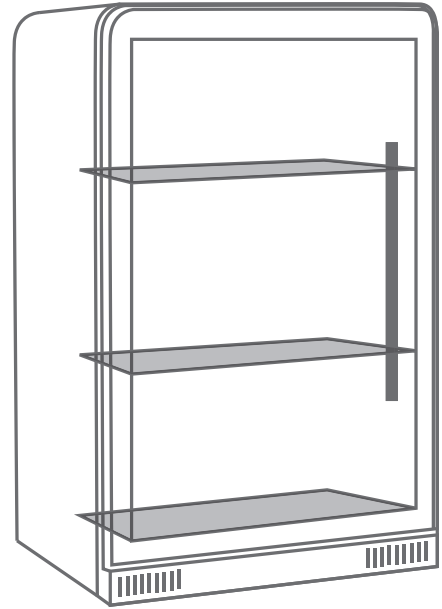
VERTICAL DISPLAY UNITS WITH DOOR

If the door remains closed for a period of time greater than the **cdt** parameter, the Energy saving mode is enabled.

The "Energy Saving" mode is disabled in automatic mode according to the conditions of use of the cabinet itself (amount of hot air that enters the cabinet).

Via the **ESo** parameter you can set the disabling "threshold".

For example:

- **ESo** = 0   high use before disabling "Energy savings"

- **ESo** = 10   low use before disabling "Energy savings".

This mode disables automatically even in the event that a "Resistance defrost" cycle is activated.

The graph below shows the algorithm operation.

The settings are:

- **ESt = 6**

- **H11 = 10**

- **ESP = 0 (Real - physical Digital Input)**.
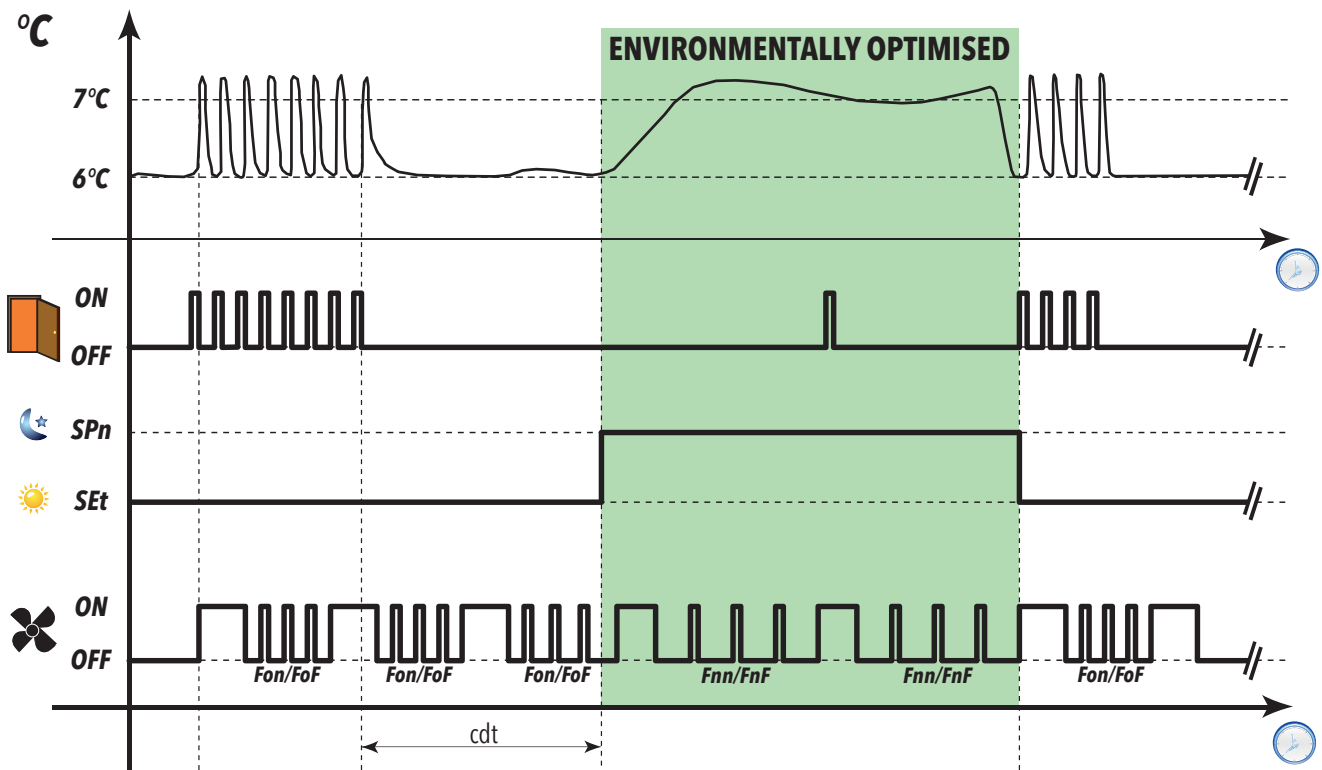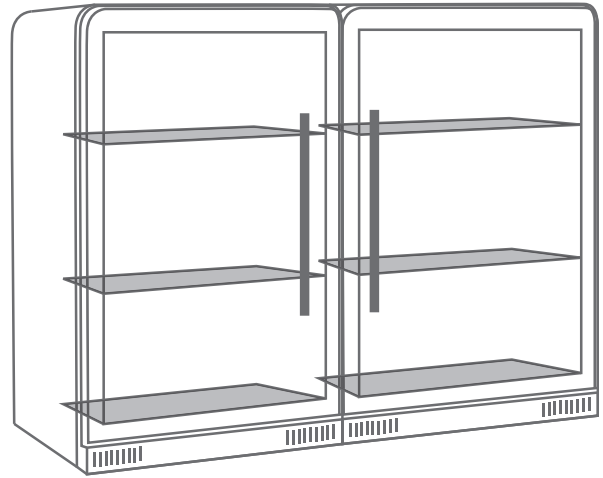
User parameters

The parameters that manage the Energy saving cycle are:

Label	Description
ESt	Energy Saving mode: **0** = Disabled; **1** = Offset on set point; **2** = Offset on differential **3** = offset on set point and differential; **4** = "Open front bottle cooler" algorithm; **5** = "Glass door bottle cooler" algorithm; **6** = "Vertical glass door merchandiser" algorithm.
ESA	AUX status during energy saving: **0** = Disabled (no effect on AUX); **1** = AUX off; **2** = AUX on
Cdt	Door close time
ESo	Cumulative door open time for disabling Energy Saving mode
OSP	Offset set point
OdF	Differential offset
dnt	Night duration mode
dFt	Rapid Deep Cooling Time
SPn	Night set point mode
dn1	Night differential mode
SPF	Rapid deep cooling time
dFF	Rapid deep cooling differential
Sid	Threshold for Deep Cooling input
ESP	Sensitivity of virtual door regulator
dOt	Maximum time of door open with virtual microport

3.3.10. COOL PROTECTION

Description

When the temperature measured by the probe 1 falls below the temperature set by the **cPS** parameter for the **cPt** time, the antifreeze protection mode is enabled so an attempt is made to warm the cabinet by activating the light and fans, until the temperature is reached (**cPS** + differential **cPd**). If **cPt = 0** the function is disabled.

Regulation diagram
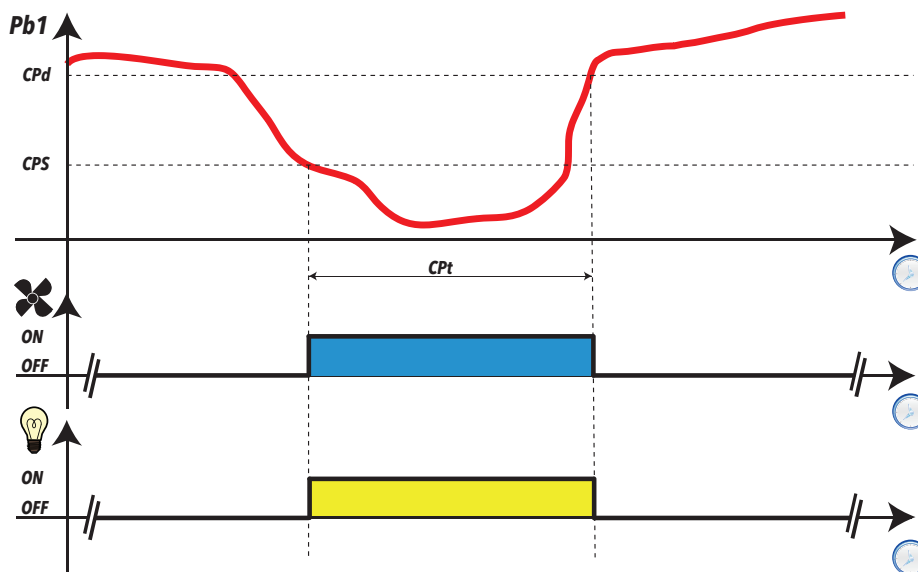
User parameters

The parameters that manage the auxiliary (AUX) output regulator are:

Label	Description
CPS	Enable utility switch-off on activation of digital input (set as door switch)
CPd	Activation delay for digital inputs
CPt	Compressor switch off delay from door switch

3.3.11. CONDENSER FANS

Operating conditions

The regulator is active if one of the relays is configured as "Condenser fans inversion" (**H21 = ±8** or **H22 = ±8** or **H23 = ±8**) and the defrosting is configured per stop. (**dty = +0**).
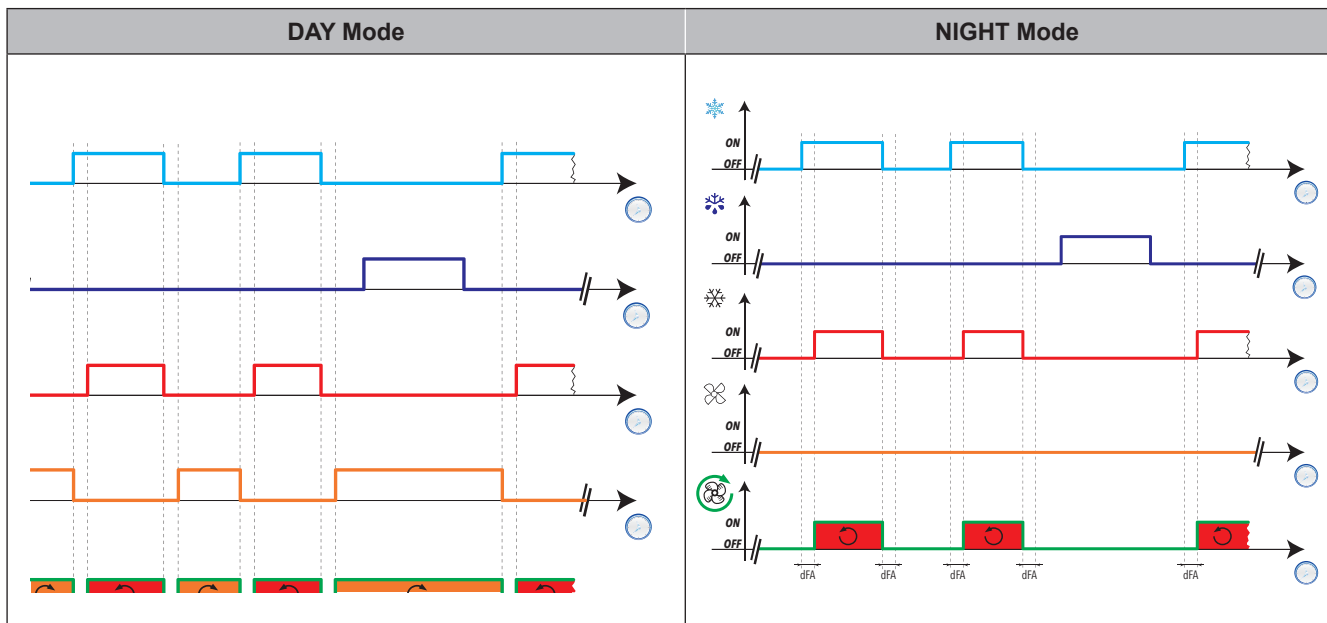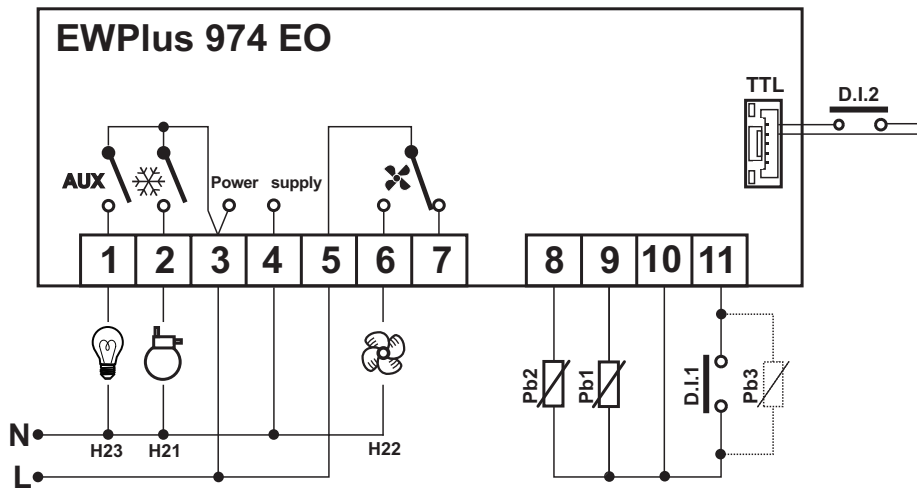
User parameters

The parameters that manage the condenser fans are:

Label	Description
dFA	Activation delay of compressor and condenser fans from the call
dty	Type of defrost. **0** = Electric defrost **1** = Reverse cycle defrost **2** = Free mode defrost.
H21	Configurability of digital output 1.
H22	Configurability of digital output 2.
H23	Configurability of digital output 3.

3.3.12. WITHDRAWAL VALVE

Operating conditions

Suitably configuring one of the digital outputs (**H21 = ±9** or **H22 = ±9** or **H23 = ±9**) it is possible to manage a withdrawal valve to avoid a "migration" and subsequently a lost of part of the refrigerating gas inside the fridge circuit when the compressor is off.
The valve is active when the compressor is on or when a defrosting cycle is running.
The valve is off when the compressor is off and no defrosting cycles are active.
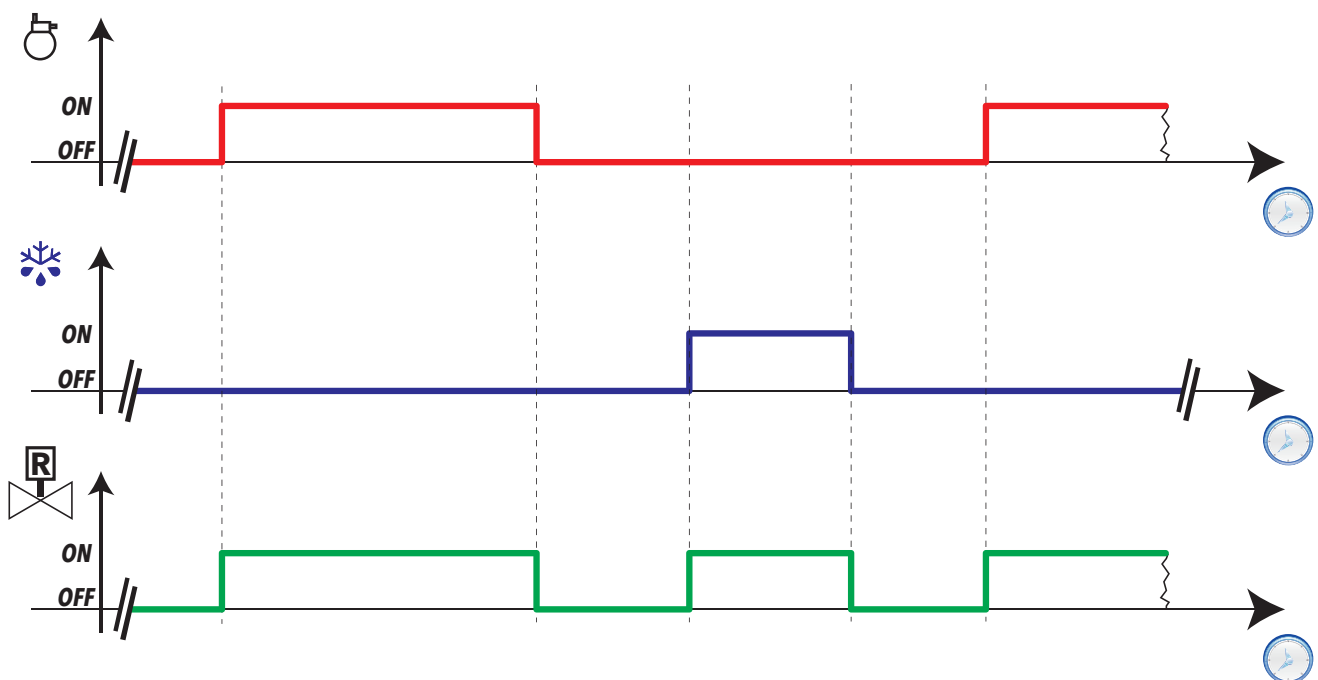
User parameters

The parameters that manage the withdrawal valve are:

Label	Description
H21	Configurability of digital output 1.
H22	Configurability of digital output 2.
H23	Configurability of digital output 3.

3.3.13. DOOR SWITCH INPUT

Operating conditions

The microswitch input is associated with an appropriately configured digital input (**H11 = ±4** or **H12 = ±4**).
By controlling the opening of the door, it is possible to deactivate the compressor output and/or the fans.
It is also possible to associate a deactivation delay to the compressor output by means of parameter **dCO**.

If the door is opened during a defrost cycle, the cycle is not shut down.
When the door is opened, the controller operates as follows based on the value of parameters **dOd** and **dCO**:

dOd	Fans (FAN)	Compressor (COMP)
dOd = 0	ON	ON
dOd = 1	OFF	ON
dOd = 2	ON	OFF after time dCO
dOd = 3	OFF	OFF after time dCO

User parameters

The parameters that manage the auxiliary (AUX) output regulator are:

Label	Description
dOd	Enable utility switch-off on activation of digital input (set as door switch)
dAd	Digital input activation delay
OAO	Alarms signalling delay after disabling of digital input (door closing)
tdO	Door open alarm delay time
dCO	Compressor switch off delay from door switch

3.3.14. STAND-BY

Operating conditions

The stand-by regulator can be activated by digital input (if configured) or by key (if programmed).
With the device OFF the display shows "OFF" and all regulators are blocked including alarms.
When the device is switched on via a key or an appropriately configured digital input, regular operation commences, the same as from power-on. After power-on, the temperature alarm is excluded for a time set in parameter **PAO**, and the delay set by parameter **OdO** is activated.
Each time that the device is switched off, all cycle times are reset.
The on/off status is saved in non-volatile memory hence when power returns after a blackout, the device will restart in the status that was active prior to the blackout.
The output from stand-by is linked to the delay set in parameter **OdO**.

NOTE: With the controller off, all relays are de-energized except for Aux: button/aux input-light-door switch are active.

User parameters

The parameters that manage the stand-by regulator are:

Label	Description
PAO	Alarm disabling after power-on
OdO	Output activation delay from power-on
OAO	High/low temperature alarm exclusion time after door closing

3.4. Smart Defrost

Operating conditions

The smart defrost will activate if:

- Temperature Pb2 < **dSE**

- The compressor must be on at least for the time indicated by the **dtt** parameter.

In the event of defrosting probe error or it is disconnected it is possible to automatically start the smart defrost if **dit** > 0. The smart defrost will deactivate if:

- Temperature Pb2 < **dS1**
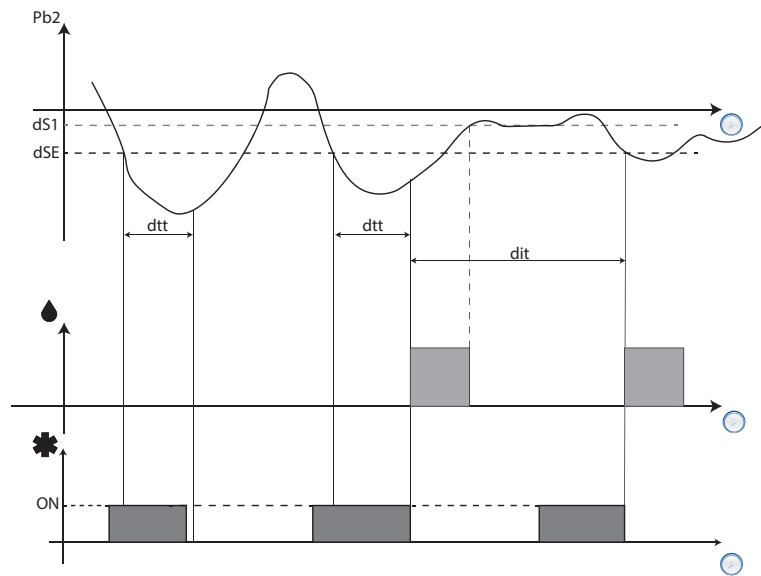
CHAPTER 5

PARAMETER TABLES

Par.	Description	Range	M.U.	Value x APP		
				1	2	3
SEt	Control set point within the range between the minimum set point **LSE** and the maximum set point **HSE**. The set point value is located in the Machine Status menu.	LSE...HSE	°C/°F	3.5		
	COMPRESSOR (folder "CP")					
dF1	diFferential. Compressor relay activation differential; the compressor stops on reaching the set point value (as indicated by the regulation probe) and restarts at a temperature value equal to the set point plus the value of the differential. **Note: cannot be equal to 0.**	0.1...30.0	°C/°F	2.0	3.0	3
HSE	Maximum value that can be assigned to the set point.	LSE...320	°C/°F	20.0	8.0	10.0
LSE	Minimum value that can be assigned to the set point.	-67.0...HSE	°C/°F	-2.0	-2.0	-22.0
Cit	Minimum compressor output activation time.	0 ... 250	min	0	0	0
CAt	Maximum compressor output activation time.	0 ... 250	min	0	0	0
Ont	Controller switch-on time in the event of faulty probe: • If **Ont** = 1 and **OFt** = 0, the compressor will always stay ON. • If **Ont** = 1 and **OFt** > 0, it operates in duty cycle mode.	0 ... 250	min	15	20	20
OFt	Controller switch-off time in the event of faulty probe: • If **OFt** = 1 and **Ont** = 0, the controller will always stay OFF. • If **OFt** = 1 and **Ont** > 0, it operates in duty cycle mode.	0 ... 250	min	10	10	10
dOn	Compressor relay activation delay after request.	0 ... 250	sec	0	0	0
dOF	Delay time after power-off: the delay time indicated must elapse between deactivation of the compressor relay and the next power-on.	0 ... 250	min	0	0	0
dbi	Delay between switch-ons; the delay time indicated must elapse between two consecutive compressor power-ons.	0 ... 250	min	0	0	0
OdO	Delay in activating outputs after the instrument is switched on or after a power failure. **0** = Not active	0 ... 250	min	0	0	0
dFA	Activation delay of compressor and condenser fans from the call	0 ... 255	sec	0	0	0
	DEFROST (folder "dEF")					
dty	Type of defrost. **0** = Electric defrosting - compressor off (OFF) during defrosting **1** = Reverse cycle defrost (hot gas); compressor on during defrost; **2** = Free mode defrost; defrost independent of the compressor.	0/1/2	num	0	0	0
dit	Interval between the start of two consecutive defrost cycles.	0 ... 250	hours	8	6	6
dt1	Unit of measure for defrost intervals (parameter **dit**) **0** = Hours; **1** = Minutes; **2** = Seconds.	0 ... 2	num	0	0	0
dt2	Unit of measure for duration of defrost (parameter **dEt**) **0** = Hours; **1** = Minutes; **2** = Seconds.	0 ... 2	num	1	1	1
dCt	Selects the count mode for the defrost interval: **0** = compressor running time (DIGIFROST® method); defrost active ONLY when the compressor is on. **NOTE: compressor running hours are counted separately from the evaporator probe (count active also when evaporator probe missing or faulty).** **1** = Appliance running time; defrost counting is always active when the machine is on and starts at each power-on **2** = Compressor stop. Every time the compressor stops, a defrost cycle is performed according to parameter**dtY** **3** = Reserved.	0/1/2/3	num	1	1	1
dOH	Delay preceding start of first defrost after call.	0 ... 59	min	0	0	0

Par.	Description	Range	M.U.	Value x APP 1	Value x APP 2	Value x APP 3
dEt	Defrost timeout; determines the maximum defrost duration.	1 ... 250	min	30	30	30
dS1	Defrost end temperature (determined by probe Pb2).	-67.0...320	°C/°F	50.0	12.0	12.0
dPO	Determines whether the instrument must enter defrost mode (if the temperature measured by Pb2 allows this operation). **n** (0) = no; **y** (1) = yes.	n/y	flag	0	0	0
tcd	Compressor output activation/deactivation time before a defrost.	-31 ... 31	min	0	0	0
Cod	Compressor OFF time before defrost.	0 ... 60	min	0	0	0
dSE	Temperature threshold for starting defrost.	-67.0...320	°C/°F	-30.0	-15.0	-30.0
dtt	Time for which the temperature of the evaporator must remain below **dSE**	0 ... 255	min	0	0	0

FANS ("FAn" folder)

Par.	Description	Range	M.U.	Value x APP 1	Value x APP 2	Value x APP 3
FPt	Characterises the **FSt** parameter which can be expressed either as an absolute temperature value or as a value relative to the set point. **0** = Absolute; **1** = Relative.	0/1	flag	0	0	0
FSt	Fans stop temperature; if **Pb2 > FSt**, the fans are stopped. The value is either positive or negative and, depending on parameter **FPt**, can be either the absolute temperature or the temperature relative to the set point.	-67.0 ... 320	°C/°F	50.0	35.0	35.0
FSS	Evaporator fans activation temperature difference.	0.0 ... 100	°C/°F	0.0	0.0	0.0
Fot	Evaporator fans start temperature.	-67.0 ... 320	°C/°F	-50.0	-50.0	-50.0
FAd	Fan activation intervention differential (see parameters **FSt** and **Fot**).	1.0 ... 50.0	°C/°F	2.0	2.0	2.0
Fdt	Fan activation delay after a defrost cycle.	0 ... 250	min	0	4	4
dt	Dripping time.	0 ... 250	min	3	3	3
dFd	Allows exclusion of the evaporator fans to be selected or not selected during defrost. **n** (0) = No (depending on the **FCO** parameter); **y** (1) = yes (fan off).	n/y	flag	0	1	1

FCO — Evaporator fans operating mode. The status of the fans will be:

		DAY		NIGHT	
H42	FCO	COMP. ON	COMP. OFF	COMP. ON	COMP. OFF
H42 = y	0	Thermostat controlled	OFF	Thermostat controlled	OFF
	1	Thermostat controlled	Thermostat controlled	Thermostat controlled	Thermostat controlled
	2	Thermostat controlled	Dutycycle Day	Thermostat controlled	Dutycycle Night
	3	Dutycycle Day	Dutycycle Day	Dutycycle Night	Dutycycle Night
H42 = n	0	ON	OFF	ON	OFF
	1	ON	Dutycycle Day	ON	Dutycycle Night
	2	ON	Dutycycle Day	ON	Dutycycle Night
	3	Dutycycle Day	Dutycycle Day	Dutycycle Night	Dutycycle Night

Duty cycle Day: controlled by means of **Fon** and **FoF** parameters.
Duty cycle Night: controlled by means of **Fnn** and **FnF** parameters.

FCO Range: 0 ... 3 num — Value x APP 1: 1, 2: 1, 3: 1

Par.	Description	Range	M.U.	Value x APP 1	Value x APP 2	Value x APP 3
FdC	Evaporator fans switch-off delay after compressor disabled	0 ... 99	min	0	0	0
Fon	Fans ON time in duty cycle. Fans used in duty cycle mode; valid when **FCO = dc** and **H42=1** (probe Pb2 present)	0 ... 250	sec*10	6	6	6
FoF	Fans OFF time in duty cycle. Fans used in duty cycle mode; valid when **FCO = dc** and **H42=1** (probe Pb2 present)	0 ... 250	sec*10	0	6	6
Fnn	Time fans remain ON during night-time duty cycle. Fans used in duty cycle mode; valid when **FCO = dc** and **H42=1** (probe Pb2 present)	0 ... 250	sec*10	4	4	4
FnF	Time fans remain OFF during night-time duty cycle. Fans used in duty cycle mode; valid when **FCO = dc** and **H42=1** (probe Pb2 present)	0 ... 250	sec*10	0	6	6

Par.	Description	Range	M.U.	Value x APP 1	Value x APP 2	Value x APP 3
	ALARMS (folder "AL")					
Att	Can be used to select absolute (**Att=0**) or relative (**Att=1**) values for **HAL** and **LAL** parameters. **NOTE**: In case of relative values (par. **Att**=1), the **HAL** parameter should be set to positive values, while the **LAL** parameter should be set to negative values (-**LAL**).	0/1	num	0	0	0
AFd	Alarms cut-in differential.	1.0 ... 50.0	°C/°F	2.0	2	2
HAL	Maximum alarm. Temperature value (intended either as distance from set point or as an absolute value based on **Att**) above which the probe will trigger activation of the alarm signal. **See "Max/Min temperature alarms".**	LAL...320	°C/°F	50.0	50.0	50.0
LAL	Minimum alarm. Temperature value (intended as distance from set point or as an absolute value based on **Att**) beneath which the probe will trigger activation of the alarm signal. **See "Max/Min temperature alarms".**	-67.0...HAL	°C/°F	-50.0	-50.0	-50.0
PAO	Alarm exclusion time after device is switched on following a power failure. **This parameter refers to high/low temperature alarms only.**	0 ... 10	hours	10	10	10
dAO	Temperature alarm exclusion time after defrost.	0 ... 999	min	999	10	10
OAO	Alarm indication delay (high and low temperature) following deactivation of digital input (port closed).	0 ... 10	hours	0	0	0
tdO	Door open alarm activation delay.	0 ... 250	min	0	0	0
tAO	Delay preceding temperature alarm signal. **This parameter refers to high/low temperature alarms only.**	0 ... 250	min	0	0	0
dAt	Alarm indicating end of defrost as a result of timeout. **n** (0) = Does not activate alarm; **y** (1) = activates alarm.	n/y	flag	n	1	1
rLO	An external alarm locks the regulators. **n** (0) = Does not lock; **y** (1) = Locks	n/y	flag	n	0	0
AOP	Alarm output polarity. **0** = Alarm active and output disabled; **1** = Alarm active and output enabled.	0/1	num	1	1	1
SA3	Probe 3 alarm set point.	-67.0...320	°C/°F	50.0	50.0	50.0
dA3	Probe 3 alarm differential.	1.0 ... 50.0	°C/°F	1.0	1.0	1.0
	ENVIRONMENT LOW TEMPERATURE PROTECTION ("CPr" folder)					
CPS	Environment low temperature protection set point	-67.0...320	°C/°F	-10.0	-10.0	-10.0
CPd	Environment low temperature protection differential	0.1...30.0	°C/°F	1.0	1.0	1.0
Cpt	Time that the temperature remains below the environment low temperature protection set point (**CPS**).	0 ... 255	min	0	0	0
	LIGHTS & DIGITAL INPUTS (folder "Lit")					
dOd	Digital input for switching off loads: **0** = Disabled; **1** = Disables the fans; **2** = Disables the compressor; **3** = Disables fans and compressor.	0 ... 3	num	0	0	0
dAd	Activation delay for digital input	0 ... 255	min	0	0	0
dCO	Compressor activation delay from acknowledgement	0 ... 255	min	0	0	0
dCd	Delay in activating fans after door closed	0 ... 250	sec	0	0	0
	PRESSURE SWITCH (folder "PrE")					
Pen	Number of errors allowed per maximum/minimum pressure switch input	0 ... 15	num	0	0	0
PEI	Minimum/maximum pressure switch error count interval.	1 ... 99	min	1	1	1
PEt	Delay in activating compressor after pressure switch deactivation.	0 ... 255	min	0	0	0
	DEEP COOLING (folder "dEC")					
dCA	Deep cooling duration. **0** = Disabled; **1** = Manual; **2** = Automatic.	0/1/2	num	0	0	0
dCS	Deep Cooling set point.	-67.0...320	°C/°F	-2.0	-2.0	-2.0
tdC	Deep Cooling Time.	0 ... 255	min	0	0	0

Par.	Description	Range	M.U.	Value x APP 1	2	3
dCC	Defrost Delay after Deep Cooling.	0 ... 255	min	0	0	0
Sid	Threshold for Rapid Deep Cooling activation.	-67.0...320	°C/°F	50.0	50.0	50.0
tOS	Deep cooling activation time.	0 ... 255	min	5	5	5
	ENERGY SAVING ("EnS" folder)					
ESt	Energy Saving mode: **0** = Disabled; **1** = Offset on set point; **2** = Offset on set point and differential; **3** = Offset on set point and differential; **4** = "Open bottle cooler" algorithm; **5** = "Bottle cooler with door" algorithm; **6** = "Vertical display units with door" algorithm.	0 ... 6	num	0	0	0
ESA	AUX status during energy saving: **0** = Disabled (no effect on AUX); **1** = AUX off; **2** = AUX on	0/1/2	num	0	0	0
ESF	Activation of fans in night mode (energy saving). **n** (0) = Disabled; **y** (1) = Enabled if the energy saving mode is active (**ESt ≠ 0**).	n/y	flag	n	0	0
Cdt	Door close time	0 ... 255	min *10	6	6	6
OSP	Offset set point.	-30.0...30.0	°C/°F	3.0	3.0	3.0
OdF	Differential offset.	0.0 ... 30.0	°C/°F	4.0	4.0	4.0
dnt	Night duration mode.	0 ... 24	hours	11	11	11
dFt	Rapid Deep Cooling Time.	0 ... 24	hours	0	0	0
SPn	Night set point mode.	LSE ... HSE	°C/°F	20.0	8.0	10.0
dn1	Night differential mode.	0.1 ... 30.0	°C/°F	4.0	4.0	4.0
SPF	Rapid deep cooling time.	LSE ... HSE	°C/°F	20.0	8.0	10.0
dFF	Rapid deep cooling differential.	0.1 ... 30.0	°C/°F	1.0	1.0	1.0
ESP	Sensitivity of virtual door regulator.	0 ... 5	num	0	0	0
dOt	Maximum time of door open with virtual microswitch.	0 ... 255	sec	0	0	0
	COMMUNICATION (folder "Add")					
PtS	Selection of communication protocol. **t** (0) = Televis; **d** (1) = Modbus	t/d	flag		t	
dEA	Index of the device within the family (valid values from 0 to 14)	0 ... 14	num		1	
FAA	Device family (valid values from 0 to 14). The pair of values **FAA** and **dEA** are the network address of the device and are given in the format "FF.DD" (where FF = **FFA** and DD=**dEA**).	0 ... 14	num		0	
Pty	Modbus parity bit. **n** (0) = None; **E** (1)=Even; **or** (2)=Odd	n/E/o	flag		n	
StP	Modbus stop bit. **1b** (0) = 1 bit; 2b (1) = 2 bit	1b - 2b	flag		1b	
	DISPLAY ("diS" folder)					
LOC	LOCk. set point edit lock. See corresponding paragraph. The parameter programming menu can still be accessed, and the settings changed, which means also that the status of this parameter can be changed so as to unlock the keypad. **n** (0) = No. **y** (1) = Yes.	n/y	flag	n	n	n
PS1	PAssword1. When enabled (**PS1≠0**) it is the password to the **User** parameters.	0 ... 250	num	0	0	0
PS2	PAssword2. When enabled (**PS2≠0**) it is the password to the **Installer** parameters.	0 ... 250	num	15	15	15
ndt	Display with decimal point. **n** (0) = No; **y** (1) = yes;	n/y	flag	y	y	y
CA1	Calibration 1. Positive or negative temperature value to be added to the value of Pb1.	-12.0...+12.0	°C/°F	0.0	0.0	0.0
CA2	Calibration 2. Positive or negative temperature value to be added to the value of Pb2.	-12.0...+12.0	°C/°F	0.0	0.0	0.0

Par.	Description	Range	M.U.	Value x APP 1	Value x APP 2	Value x APP 3
CA3	Calibration 3. Positive or negative temperature value to be added to the value of Pb3.	-12.0...+12.0	°C/°F	0.0	0.0	0.0
CAI	Calibration operation **0** = Only the temperature shown is modified. **1** = Sum with only the temperature used by the regulators and not for the display, which remains unchanged **2** = Sum with the displayed temperature, which is also used by the regulators.	0 ... 2	num	0	0	0
LdL	Minimum displayable value.	-67.0 ... HdL	°C/°F	-55.0	-55.0	-55.0
HdL	Maximum visible value.	LdL ... 320	°C/°F	230	230	230
ddL	Display mode during defrost. **0** = Displays the temperature read by probe **Pb1**; **1** = Locks the reading at the temperature value read by probe **Pb1** when defrost starts and until the next time the **SEt** is reached **2** = Displays the label **dEF** during defrosting and until the next time the **SEt** is reached (or until **Ldd** has elapsed).	0/1/2	num	1	1	1
Ldd	Timeout value for display unlock - label **dEF**	0 ... 255	min	30	30	30
dro	Select the unit of measurement used when displaying the temperature recorded by the probes. (**0** = °C, **1** = °F). **NOTE**: switching between °C and °F or vice versa DOES NOT modify the SEt, **diF** values, etc. (e.g. set=10°C becomes 10°F)	0/1	num	0	0	0
ddd	Selects the type of value to show in the display. **0** = Set point; **1** = Probe Pb1; **2** = Probe Pb2; **3** = Probe Pb3	0 ... 3	num	1	1	1
FSE	Window filter setting. **0** = Disabled filter.	0 ... 7	num		0	
FHt	Sampling interval for filtering.	1 ... 250	num		1	
	CONFIGURATION (folder "CnF")					
H02	Activation time for keypad functions.	0 ... 15	sec	3	3	3
H06	Key or auxiliary digital input/light on with device Off. **n** (0) = Not enabled; **y** (1) = Enabled.	n/y	flag	n	n	n
H08	Stand-by operating mode. **0** = Display the regulators are active and the device re-activates the display to signal any alarms **1** = Display shows OFF label; regulators and alarms inhibited **2** = display shows OFF label; regulators and alarms inhibited.	0/1/2	num	0	0	0
H11	Configuration of digital input 1/polarity. **0** = Disabled; **±1** = Defrost; **±2** = Reduced set; **±3** = AUX; **±4** = Microswitch; **±5** = External alarm; **±6** = Stand-by; **±7** = Pressure switch; **±8** = Deep Cooling; **±9** = Energy saving; **±10** = Microswitch + energy saving **NOTE**: • sign **+** indicates that the input is active if the contact is closed. • Sign **-** indicates that the input is active if the contact is open.	-10 ... +10	num	0	0	0
H12	Configuration of 2/polarity digital input. Similar to **H11**.	-10 ... +10	num	0	0	0

Par.	Description	Range	M.U.	Value x APP 1	2	3
H21	Configurability of digital output 1. **0** = Disabled; **1** = Compressor; **2** = Defrost; **3** = Fans; **4** = Alarm; **5** = AUX; **6** = Stand-by; **7** = Reserved; **8** = Condenser fans inversion; **9** = Withdrawal value; **10** = Defrost 2nd evaporator; **11** = 2nd compressor; **12** = Dish heater.	0 ... 12	num	1	1	1
H22	Configurability of digital output 2. Similar to **H21**.	0 ... 9	num	0	2	2
H23	Configurability of digital output 3. Similar to **H21**.	0 ... 9	num	3	3	3
H31	Configurability of UP key. **0** = Disabled; **1** = Defrost; **2** = AUX; **3** = Reduced set; **4** = Stand-by; **5** = Deep cooling; **6** = Energy saving.	0 ... 6	num	1	1	1
H32	DOWN key configuration. Similar to **H31**.	0 ... 6	num	0	0	0
H33	ESC key configuration. Similar to **H31**.	0 ... 6	num	0	0	0
H41	Probe Pb1 present. **n** (0) = Not present; **y** (1) = Present.	n/y	flag	y	y	y
H42	Probe Pb2 present. **n** (0) = Not present; **y** (1) = Present.	n/y	flag	n	y	y
H43	Probe Pb3 present. **n** (0) = Not present; **y** (1) = Present.	n/y	flag	n	n	n
H60	Select the application.	1 ... 3	num	1		
reL	Device version. Read-only parameter.	/	/	/	/	/
tAb	tAble of parameters. Reserved: read-only parameter.	/	/	/	/	/
	COPY CARD (folder "FPr")					
UL	Transfer programming parameters from instrument to CopyCard	/	/	/	/	/
Fr	Format Copy Card. To erase all data on the Copy Card. **NOTE: If parameter Fr is used, the data entered will be permanently lost. This operation cannot be reversed.**	/	/	/	/	/
	FUNCTIONS (folder "FnC")					
rAP	Reset pressure switch alarms	/	/	/		

NOTE: The device must be switched off and then on again each time the configuration of the parameters is changed.

CHAPTER 6

ALARMS TABLES

6.1. ALARMS AND SIGNALS TABLE

When an alarm condition is detected, the alarm icon " $((\bullet))$ " will come on.
If present and enabled, the buzzer and alarm relay will also activate. To silence the buzzer, press and release any key, the relative icon will continue to flash. All alarms reset automatically (e.g. they switch off when the cause of the alarm is removed) except for the pressure switch and, which must be reset manually using function **rAP**.

6.1.1. Cause/effect table

EWPlus 974 EO can run integral diagnostics on the installation, signalling any operating faults with specific alarms found, and record and signal any user-defined unusual events to have greater control over the installation as a whole.

Label	Fault	Cause	Effects	Remedy
E1	Pb1 probe error	• Measured values are outside operating range • Probe inoperable / short-circuited / open	• **E1** label shown on display • Alarm icon permanently on • High/low alarm regulator disabled • Compressor operation based on parameters **Ont** and **OFt**	• Check the probe wiring • Replace probe
E2	Pb2 probe error	• Measured values are outside operating range • Probe inoperable / short-circuited / open	• **E2** label shown on display • Alarm icon permanently on • Defrost will end due to timeout (**dEt**) • The evaporator fans will function in Duty Cycle mode	• Check the probe wiring • Replace probe
E3	Pb3 probe error	• Measured values are outside operating range • Probe inoperable / short-circuited / open	• **E3** label shown on display • Alarm icon permanently on • No effect on regulation	• Check the probe wiring • Replace probe
AH1	HIGH temperature Temperature Pb1	Value read by probe Pb1 > **HAL** after time equal to **tAO**. (see "MAX/MIN TEMPERATURE ALARMS")	• Recording of label **AH1** in folder **AL** • No effect on regulation	Wait until temperature value read by Pb1 returns below (**HAL-AFd**).
AL1	LOW temperature Temperature Pb1	Value read by Pb1 < **LAL** after time of **tAO** (see "MAX/MIN TEMPERATURE ALARMS")	• Recording of label **AL1** in folder **AL** • No effect on regulation	Wait for the temperature value read by Pb1 to come back above (**LAL+AFd**).
Ad2	End of defrosting due to timeout	End of defrost cycle due to timeout rather than due to defrosting end temperature being read by Pb2.	• Recording of label **Ad2** in folder **AL** • Alarm icon permanently on	Await next defrost cycle for automatic return to normal
Ad3	End of defrosting due to timeout	Activation of defrosting for temperature separately from **dAt** (active if **dCt = 3**)	• Recording of label **Ad3** in folder **AL** • Alarm icon permanently on	Await next defrost cycle for automatic return to normal
EA	Alarm alarm	Digital input activated (**H11 = ±5**)	• Label **EA** recorded in folder **AL** • Alarm icon permanently on • Regulation blocked if **rLO = y**	Await and remove external cause of alarm on DI
OPd	Alarm Door Open	Digital input activated (**H11 = ±4**) (for a time greater than **tdO**).	• Recording of label **Opd** in folder **AL** • Alarm icon permanently on • Regulator blocked	• Close the door • Delay function defined by **OAO**
COH	Alarm due to Over Heating	Value set by parameter **SA3** exceeded	• Display of label **COH** • Alarm icon permanently on • Regulation locked (Compressor)	Wait for the temperature to return to a value of **SA3** (set point) minus **dA3** (differential).

Label	Fault	Cause	Effects	Remedy
nPA	Alarm Pressure switch alarm	Activation of pressure switch alarm by general pressure switch (**H11 = ±7**)	If the number **N** of pressure switch activations is **N < PEn**: • Recording of folder **nPA** in folder AL with the number of pressure switch activations • Regulation inhibited (Compressor and Fans)	Check and remove the cause of the alarm on the DI (Automatic Reset)
PAL	Alarm Pressure switch alarm	Activation of pressure switch alarm by general pressure switch (**H11 = ±7**)	If the number **N** of pressure switch activations is **N = PEn**: • Label **PAL** displayed • **PA** recorded in folder AL deleting folder **nPA** from folder AL • Alarm Led permanently on • Regulation inhibited (Compressor and Fans)	• Switch the device off and back on again • Reset alarms by entering the functions folder and selecting the **rAP** (Manual Reset)

6.2. DESCRIPTION OF ALARMS

6.2.1. Probe alarm

OPERATING CONDITIONS

When one of the probes is out of the nominal operating range or in the case of an open probe or a probe in short circuit, an alarm is generated if this condition persists for longer than 10 seconds.
The alarm condition is indicated on the display by means of the following error codes:

- **E1** = Probe Pb1 error

- **E2** = Probe Pb2 error

- **E3** = Probe Pb3 error

The alarm LED and alarm relay are activated.
The error code **E1** when active is displayed as permanently on.
The error code **E2** is displayed alternating with the cell probe temperature reading with fixed expiry of 2 seconds.
The codes **E1**, **E2** and **E3**, when occurring at the same time, are show in the following sequence: **E1** x 2 secs., **E2** x 2 sec, **E3** x 2 secs. etc.

ACTIONS ON CURRENT REGULATION

Probe Pb1: An error condition in the cabinet probe causes one of the following actions:
- The display shows code **E1**
- Activation and permanent display of alarm icon and activation of buzzer/alarm relay (if present)
- Activation of compressor as shown by parameters **Ont** and **Oft**
- Disabling of maximum and minimum alarm regulator

When the faulty probe condition ceases, regulation resumes as normal.
During the probe error, the defrost interval count continues as normal.

Probe Pb2: A defrost probe error causes the following actions:
- The display shows code **E2**
- Activation and permanent display of alarm icon and activation of buzzer/alarm relay (if present)
- End of defrost due to timeout (if enabled)

When the defrost probe error condition ceases, regulation resumes as normal: if a defrost was in progress, it may terminate on reaching the end of defrost set point.
The probe alarm error is not stored by the controller.

Probe Pb3: An over heating probe error causes the following actions:
- The display shows code **E3**
- Activation and permanent display of alarm icon and activation of buzzer/alarm relay (if present)

The probe alarm error is not stored by the controller.

SIGNALLING

Code	Meaning
E1	Probe error Pb1
E2	Probe error Pb2
E3	Probe error Pb3

ALARM ACKNOWLEDGEMENT

In the alarm condition, it is possible to acknowledge the alarm and/or relay configured as an alarm, even if the alarm condition persists, by pressing any key or using the corresponding function in the menu The alarm LED will start to blink.
Eliminating the cause of the alarm disarms the acknowledgement.
The probe fault alarm is not stored by the controller.

USER PARAMETERS

Label	Description
Ont	ON time for compressor output with faulty control probe
OFt	OFF time for compressor output with faulty control probe

6.2.2. MINIMUM AND MAXIMUM TEMPERATURE alarm

OPERATING CONDITIONS

The alarm regulation is carried out on environmental probe Pb1. The temperature limits defined in parameters **HAL** and **LAL** are determined by parameter **Att** which specifies if they represent the absolute temperature value or a set point differential (in the case of offset on the entered set point, the high and low alarms will refer to this new control set point).

- If Att =0 Ab(solute), the temperature limits for probe Pb1 are absolute.

- If Att =1 rE(lative), the temperature limits for probe Pb1 refer to the SEt.

NOTE: To obtain the minimum alarm below the set point in the case of **Att**=1 (relative) it is necessary to set **LAL** < 0.

ALARM CONDITIONS

A maximum/minimum alarm is generated when the Pb1 temperature is:

- Maximum alarm: ≥ **HAL** if **Att=Ab(solute)** and≥ (**SEt + HAL**) if **Att=rE(lative)**

- Minimum alarm: ≤ **LAL** if **Att=Ab(solute)** and ≤ (**SEt + LAL**) if **Att=rE(lative)**

If **Att=Ab(solute)** the values of **HAL and LAL** must be with sign, if **Att=rE(lative)** it is necessary that **HAL > 0 and LAL < 0**.

When one of the two aforementioned conditions occurs, if no alarm override times apply (see alarm override parameters), the alarm LED lights up, the buzzer sounds (if present) and/or the relay configured as alarm activates.

The maximum/minimum alarm will be reset when the temperature of probe Pb1 is:

- Returning from maximum: ≤ (**HAL - AFd)** if **Att=Ab(solute)** and ≤ (**SEt + HAL - AFd)** if **Att=rE(lative)**

- Returning from minimum: ≥ (**LAL + AFd**) if **Att=Ab(solute)** and ≥ (**SEt + LAL + AFd**) if **Att=rE(lative)**

TEMPERATURE AS AN ABSOLUTE VALUE (Att=0)	TEMPERATURE AS A VALUE RELATIVE TO SEt (Att=1)
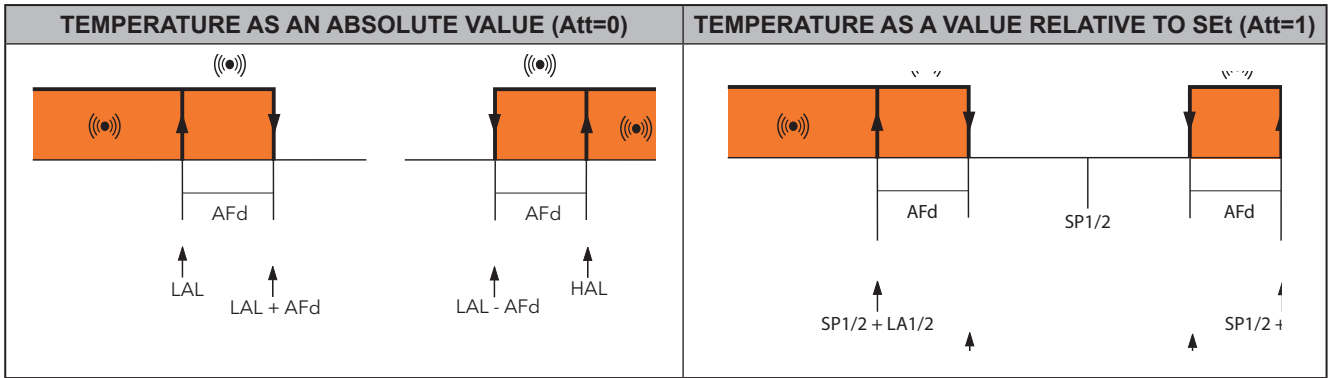
NOTES:

- During a defrost cycle, high and low temperature alarms are overridden.

- The checking of this alarm does not effect any regulation in progress.

SIGNALLING

Code	Meaning
AH1	High temperature alarm, refers to probe Pb1
AL1	Low temperature alarm, refers to probe Pb1

ALARM ACKNOWLEDGEMENT

In the alarm condition, it is possible to acknowledge the buzzer (if present) and/or relay configured as an alarm, even if the alarm condition persists, by pressing any key or using the corresponding function in the menu. The alarm LED will start to blink. Eliminating the cause of the alarm disarms the acknowledgement.
The probe fault alarm is not stored by the controller.

USER PARAMETERS

Label	Description
Att	**HAL** and **LAL** parameter mode (absolute or relative)
Afd	Alarm activation differential
HAL	Maximum alarm threshold
LAL	Minimum alarm threshold
PAO	Temperature alarm exclusion time from power-on
dAO	Temperature alarm disabling time after defrost cycle
OAO	High/low temperature alarm exclusion time after door closing
tAO	Temperature alarms delay time

6.2.3. DEFROST alarm

END OF DEFROST DUE TO TIMEOUT ALARM

OPERATING CONDITIONS

The regulator is activated without any delay in the case of end of defrost due to timeout, instead of probe 2 reaching the defrost end temperature.
The action consists of:

* Alarm led permanently on

* Recording of label **Ad2** in the alarms menu.

Automatic reset occurs with the start of the next defrost cycle.
The alarm LED can be switched off using the normal acknowledgement procedure, although the alarm signal is only actually cancelled at the start of the next defrost cycle.

SIGNALLING

Code	Meaning
Ad2	Defrost alarm on Pb2

USER PARAMETERS

Label	Description
dEt	Defrost timeout
dAt	Alarm signalling end of defrost due to timeout

6.2.4. EXTERNAL alarm

OPERATING CONDITIONS

In the case of activation of the digital input, the alarm regulator is activated with the delay set by parameter **dAd**, and this alarm persists until the next time the digital input is deactivated. The action consists of:

- Alarm led permanently on

- Recording of label **EA** in the alarms menu

- Activation of the buzzer (if present and enabled)

- Activation of the relay configured as alarm (if enabled)

- Deactivation of the compressor, defrost and fan regulators depending on the configuration of parameter **rLO**.

It is possible to acknowledge the buzzer (if present) / alarm relay but the regulators still remain locked until the next time the digital input is deactivated.

The values that **rLo** can be assigned to parameter:

- **rLO = n**: an external alarm locks the regulators

- **rLO = y**: an external alarm locks the regulators.

SIGNALLING

Code	Meaning
EA	External alarm

USER PARAMETERS

Label	Description
rLO	An external alarm blocks the regulators
dAd	DI activation delay

6.2.5. DOOR OPEN alarm

OPERATING CONDITIONS

The door switch alarm is associated to a specially configured digital input:

- **H11/12 = ±4**

On activation of the digital input (door open) and after delay **tdO**, has elapsed, the door open alarm must be signalled in the alarms folder and the LED and alarm relay. The label **OPd** is displayed.
The action consists of:

- Alarm led permanently on

- Recording of label **OPd** in the alarms menu

- Activation of the relay configured as alarm.

The parameter **tdO** will start to decrease once the time set in parameter **dAd** has elapsed.
As in the case of the other alarms, the relay may be deactivated by pressing an acknowledgement key, the alarm LED will blink and label **OPd** will remain in the alarms menu until the door is closed.
If the door is opened, the regulator will operate on the basis of the value of parameter **dOd**. The values that can be assigned to it are:

- **dOd = 0**: No resource is locked

- **dOd = 1**: The fans are locked (FAN)

- **dOd = 2**: The compressor is locked (COMPR)

- **dOd = 3**: Both the fans (FAN) and compressor (COMPR) are locked.

If the door open alarm locks the compressor, it can still be reactivated even if the door remains open, by setting the parameter **dCO**.

SIGNALLING

Code	Meaning
OPd	Door open alarm

USER PARAMETERS

Label	Description
dAd	DI activation delay
dOd	Digital input for switching off loads: **0** = Disabled **1** = Disables the fans **2** = Disables the compressor **3** = Disables fans and compressor.
dCO	Compressor activation delay from acknowledgement
tdO	Open door disabling time

6.2.6. COMPRESSOR OVERHEATING alarm

OPERATING CONDITIONS

Probe Pb3 is associated to a "Compressor Overheating" alarm triggered when the value set in parameter **SA3** is exceeded. This alarm is reset automatically when the temperature returns to a value of:

* Value Pb3 < **SA3 - dA3** (set point - differential).

The compressor will at that point be free to restart, if requested, respecting the relevant protections. The alarm will be treated like a normal temperature alarm, therefore for the alarm signalling delays refer to the standard delays.

Activation of the alarm results in:

* Display of label **COH**

* Illumination of alarm LED

* Activation of the buzzer (if present and enabled)

* Activation of the relay configured as alarm (if enabled)

* Deactivation of compressor relay

SIGNALLING

Code	Meaning
COH	compressor overheating alarm

USER PARAMETERS

Label	Description
SA3	Probe 3 alarm set point.
dA3	Probe 3 alarm differential

CHAPTER 7

MODBUS FUNCTIONS AND RESOURCES MSK623

Modbus is a client/server protocol for communication between devices connected in a network.

Modbus devices communicate using a master-slave technique in which only one device (master) can send messages.

The other devices in the network (slave) respond, returning the data requested by the master or executing the action contained in the message sent.

A slave is a device connected to a network that processes information and sends the results to the master using the Modbus protocol.

The master device can send messages to individual slaves or to the entire network (broadcast) whilst slaves can only respond individually to the master.

The Modbus standard used by Eliwell employs the RTU code for data transmission.

7.1. DATA FORMAT (RTU)

The coding model used defines the structure of messages transmitted on the network and the way in which this information is deciphered. The type of coding is usually selected on the basis of specific parameters (baud rate, parity, etc.); furthermore, some devices support only specific coding models, although it must be the same one for all devices connected in a Modbus network.

The protocol uses the RTU binary method with bytes configured as follows:

8 bit for data, even parity bit (configurable), 1 stop bit.

NOTE: the transmission speed must be set at 9600 baud.

Parameter setting allows the integral configuration of the device
Changes can be made via:

- Device keypad

- Copy Card

- Data via Modbus protocol directly to an individual controller or broadcasting it,

- Using the address 0 (broadcast)

7.2. NETWORK

The 2 connection diagrams for using Modbus are shown below:

ModBus - Connection diagram of Single controller via TTL	ModBus connection to multiple devices Via RS485
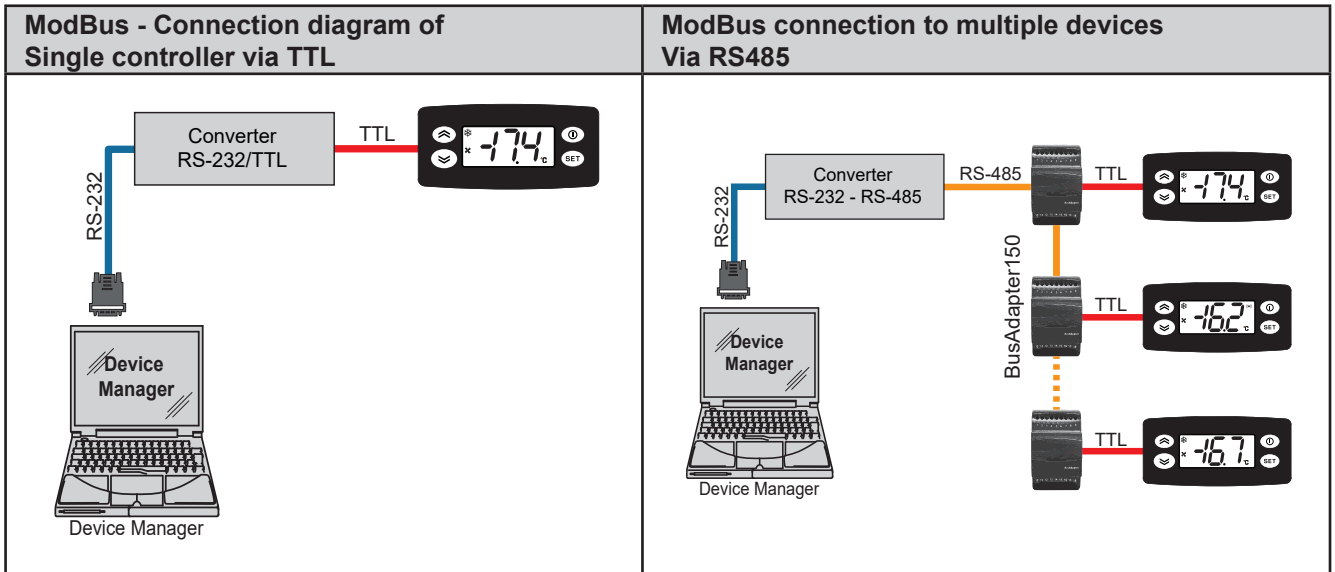
PC connection / Interface	RS232 cable
Device / Bus Adapter connection	*5-way TTL connector cable (30 cm) (other sizes/lengths available)
Bus Adapter	BA150
Bus Adapter / Interface connection	Shielded and twisted RS485 cable (e.g. Belden model 8762)

7.3. MODBUS COMMANDS AVAILABLE AND DATA AREAS

The following commands are implemented:

Modbus command	Command description
3	Read 16 consecutive registers for Client side Read 1 single register for parameters.
16	Write 15 consecutive registers for Client side. Write 1 register for the parameters.
43	Read device ID. It is possible to read the following 3 fields: | Field code	Field description
0	Manufacturer ID (="Invensys")
1	Device model/polycarbonate ID
2	Device family (MSK623)/version ID	

Length restrictions

maximum length in bytes of messages sent to device	30 BYTE
maximum length in bytes of messages received by the device	30 BYTE

7.4. ADDRESS CONFIGURATION

The serial TTL - which we will call COM1 – can be used to configure the device, parameters, states, and variables with Modbus via the Modbus protocol.
The address of a device inside a ModBus message is made up of a byte and is formed by a family code and instrument code, indicated by dBA, made up respective of the parameters **FAA** and **dEA**.
The address (Device Address) is thus formed of two nibbles:

dEA: low nibble
FAA: high nibble

To calculate the address starting from parameters **FAA** and **dEA**:

dBA = **FAA** x 16 + **dEA**

The address 0 is used for broadcast messages that all slaves recognise. Slaves don't respond to broadcast messages.
The parameters for configuring the device are:

Parameter	Description	Values	Range
PtS	Select COM1 (TTL) protocol	d	t = Televis d = Modbus
dEA	Device index in family	0	0 ... 14
FAA	Device family	0	0 ... 14
Pty	Modbus protocol parity bit	n	• n= NONE • E= EVEN • o= ODD
StP	Modbus protocol stop bit	1b	• 1b= 1 BIT • 2b= 2 BIT

NOTE: Turn the controller off and back on again after the parameters Pty and StP have been changed.

7.5. PARAMETER VISIBILITY AND VALUES

In the parameter/visibility table, parameters that are not present will be indicated in the default column by means of a grey rectangle.

NOTE:

1. Unless otherwise indicated, the parameter is always visible and modifiable, unless customized settings have been configured via serial.

2. If folder visibility is modified, the new setting will apply to all parameters in the folder.

7.6. PARAMETER/VISIBILITY TABLE AND CLIENT TABLE

The tables below list all information required to read, write and decode all accessible resources in the device. There are 3 tables:

- the "PARAMETER TABLE"contains all device configuration parameters stored in the controller's non-volatile memory, including visibility

- "FOLDER VISIBILITY TABLE" indicates the visibility of the folders containing the parameters

- the "CLIENT TABLE" includes all I/O and alarm status resources available in the volatile memory of the instrument.

Description of the columns:

FOLDER

Indicates the label of the folder containing the parameter in question.

LABEL

Indicates the label used to display the parameters in the menu of the controller.

PAR. VALUE ADDRESS

The whole part represents the address of the MODBUS register containing the value of the resource to be read or written in the controller. The value after the decimal point indicates the position of the most significant data bit inside the register; if not indicated it is taken to be zero. This information is always provided when the register contains more than one information item, and it is necessary to distinguish which bits actually represent the data (the working size of the data indicated in the column DATA SIZE is also taken into consideration).

Given that the modbus registers have the size of one WORD (16 bit), the index number after the point can vary from 0 (least significant bit -LSb-) to 15 (most significant bit -MSb-)

Examples (in binary form the least significant bit is the first on the right):

PAR. VALUE ADDRESS	DATA SIZE	Value	Content of register	
8806	WORD	1350	1350	(0000010101000110)
8806	BYTE	70	1350	(0000010101000110)
8806,8	BYTE	5	1350	(0000010101000110)
8806,14	1 BIT	0	1350	(0000010101000110)
8806,7	4 BIT	10	1350	(0000010101000110)

NOTE: when the register contains more than one piece of data, the writing procedure is as follows:

- Read current value of register

- Modify the bits for the resource concerned

- Write register

VIS PAR. ADDRESS

The same as above. In this case, the MODBUS register address contains the visibility value of the parameter.

By default all parameters have:

- Data size   2 bit

- Range   0…3

- **Visibility   3

- M.U.   num

**Value Meaning

- Value 3 = parameter or folder always visible

- Value 2 = manufacturer level; these parameters can only be viewed by enter the manufacturer's password (see parameter **PS2**) (all parameters declared as always visible, parameters visible at the installation engineer level and manufacturer's level will be visible)

- Value 1 = user level; these parameters can only be viewed by entering the installer password

- (see parameter **PS1**) (all parameters specified as always visible and parameters visible at the installer level will be visible)

- Value 0 = parameter or folder NOT visible

1. Parameters and/or folders with a level of visibility <>3 (password-protected) will be visible only if the correct password is entered (installer or manufacturer) following this procedure:

2. Parameters and/or folders with a level of visibility =3 are always visible even without a password: in this case, the following procedure is not necessary.

Examples (in binary form the least significant bit is the first on the right):

Default visibility:

PAR. VALUE ADDRESS	DATA SIZE	Value		Content of register
49336,6	2 BIT	3	65535	-------------(0000000011111111111111)
49337	2 BIT	3	65535	(0000000011111111111111)
49337,2	2 BIT	3	65535	(0000000011111111111111)
49337,4	2 BIT	3	65535	(0000000011111111111111)
49337,6	2 BIT	3	65535	(0000000011111111111111)

R/W

Indicates the option of reading or writing the resource

    R   The resource is read-only
    W   The resource is write-only
    RW   The resource can be both read and written

DESCRIPTION

This is the description of the meaning of parameters in the LABEL column.

DATA SIZE

Indicates the size of the data in bits.

    WORD   =   16 bit
    Byte   =   8 bit
    "n" bit   =   0...15 bit based on the value of "n"

CPL

When the field indicates "**Y**", the value read by the register needs to be converted because the value represents a number with a sign. In the other cases the value is always positive or null.
To carry out conversion, proceed as follows:

- If the value in the register is between 0 and 32.767, the result is the value itself (zero and positive values)

- If the value in the register is between 32.768 and 65.535, the result is the value of the register – 65.536 (negative values)

RANGE

Describes the interval of values that can be assigned to the parameter. It can be correlated with other parameters in the instrument (indicated with the parameter label).

DEFAULT

Indicates the factory-set value for the standard model of the instrument.

U.M.

Unit of measurement for values converted according to the rules indicated in the CPL and EXP columns.

7.6.1. Table of parameters

Folder	Label	Address Value	Address Visibility	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
/	SEt	16416	49381,0	RW	Regulation set point	RW	Y	LSE...HSE	°C/°F
CP	dF1	16386	49381,2	RW	Differential of set point	RW		0.1...30.0	°C/°F
CP	HSE	16418	49381,4	RW	Maximum value settable for set point	RW	Y	LSE...320	°C/°F
CP	LSE	16420	49381,6	RW	Minimum value settable for set point	RW	Y	-67.0 ... HSE	°C/°F
CP	Cit	49199	49382,2	RW	Minimum compressor output activation time	BYTE		0 ... 250	min
CP	CAt	49200	49382,4	RW	Maximum compressor output activation time	BYTE		0 ... 250	min
CP	Ont	49203	49382,6	RW	ON time for compressor output with faulty control probe	BYTE		0 ... 250	min
CP	OFt	49204	49383,0	RW	OFF time for compressor output with faulty control probe	BYTE		0 ... 250	min
CP	dOn	49205	49383,2	RW	Compressor output activation delay from request	BYTE		0 ... 250	s
CP	dOF	49206	49383,4	RW	Compressor output activation delay from shutdown	BYTE		0 ... 250	min
CP	dbi	49207	49383,6	RW	Delay between two consecutive starts of the compressor output	BYTE		0 ... 250	min
CP	OdO	49208	49384,0	RW	Output activation delay from power-on	BYTE		0 ... 250	min
CP	dFA	49288	49384,2	RW	Activation delay of compressor and condenser fans from the call	BYTE		0 ... 255	s
dEF	dty	49209	49384,4	RW	Type of defrost	BYTE		0/1/2	num
dEF	dit	49252	49384,6	RW	Interval between defrost cycles	BYTE		0 ... 250	hours
dEF	dt1	49210	49385,0	RW	Unit of measurement for defrost interval	BYTE		0 ... 2	num
dEF	dt2	49211	49385,2	RW	Unit of measurement for defrost duration	BYTE		0 ... 2	num
dEF	dCt	49212	49385,4	RW	Defrost interval count mode	BYTE		0/1/2/3	num
dEF	dOH	49213	49385,6	RW	Defrost cycle enabling delay from request	BYTE		0 ... 59	min
dEF	dEt	49214	49386,0	RW	Defrost timeout	BYTE		1 ... 250	min
dEF	dS1	16390	49386,2	RW	Defrost end temperature	WORD	Y	-67.0...320	°C/°F
dEF	dPO	49215	49386,4	RW	Defrost activation request from power-on	BYTE		n/y	flag
dEF	tcd	16392	49386,6	RW	Compressor output activation/deactivation time before a defrost	WORD	Y	-31 ... 31	min
dEF	Cod	49216	49387,0	RW	Compressor OFF time before defrost	BYTE		0 ... 60	min
dEF	dSE	16498	49387,2	RW	Defrost start temperature threshold	WORD	Y	-67.0...320	°C/°F
dEF	dtt	49289	49387,4	RW	time for which the temperature of the evaporator must remain below the threshold	BYTE		0 ... 255	min
FAn	FPt	49217	49387,6	RW	Parameter mode **FSt** (absolute or relative)	BYTE		0/1	flag
FAn	FSt	16394	49388,0	RW	Evaporator fans disabling temperature	WORD		-67.0 ... 320	°C/°F
FAn	FSS	16566	49412,0	RW	Evaporator fans activation temperature difference	WORD		0.0 ... 100	°C/°F
FAn	Fot	16396	49388,2	RW	Evaporator fans start temperature	WORD		-67.0 ... 320	°C/°F
FAn	FAd	16398	49388,4	RW	Evaporator fans activation differential	WORD	Y	1.0 ... 50.0	°C/°F
FAn	Fdt	49218	49388,6	RW	Evaporator fans delay after defrost cycle	BYTE		0 ... 250	min
FAn	dt	49219	49389,0	RW	Dripping time	BYTE		0 ... 250	min
FAn	dFd	49220	49389,2	RW	Evaporator fans disabling during defrost time	BYTE		n/y	flag
FAn	FCO	49221	49389,4	RW	Evaporator fans status in event of compressor output OFF	BYTE		0 ... 3	num
FAn	FdC	49222	49389,6	RW	Evaporator fans switch-off delay after compressor disabled	BYTE		0 ... 99	min
FAn	Fon	49223	49390,0	RW	Evaporator fans ON time in duty cycle mode	BYTE		0 ... 250	s*10
FAn	FoF	49224	49390,2	RW	Evaporator fans OFF time in duty cycle mode	BYTE		0 ... 250	s*10
FAn	Fnn	49291	49390,4	RW	Evaporator fans ON time in duty cycle night mode	BYTE		0 ... 250	s*10
FAn	FnF	49292	49390,6	RW	Evaporator fans OFF time in duty cycle night mode	BYTE		0 ... 250	s*10
AL	Att	49227	49391,0	RW	**HAL** and **LAL** parameter mode (absolute or relative)	BYTE		0/1	flag
AL	AFd	16400	49391,2	RW	Alarm activation differential	WORD		1.0 ... 50.0	°C/°F
AL	HAL	16422	49391,4	RW	Maximum alarm threshold	WORD	Y	LAL...320	°C/°F

Folder	Label	Address Value	Address Visibility	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
AL	LAL	16424	49391,6	RW	Minimum alarm threshold	WORD	Y	-67.0...HAL	°C/°F
AL	PAO	49228	49392,0	RW	Alarm disabling after power-on	BYTE		0 ... 10	h
AL	dAO	16402	49392,2	RW	Temperature alarm disabling time after defrost cycle	WORD		0 ... 999	min
AL	OAO	49229	49392,4	RW	High/low temperature alarm exclusion time after door closing	WORD		0 ... 10	h
AL	tdO	49230	49392,6	RW	Open door disabling time	WORD		0 ... 250	min
AL	tAO	49231	49393,0	RW	Temperature alarms delay time	WORD		0 ... 250	min
AL	dAt	49232	49393,2	RW	Alarm signalling end of defrost due to time out	WORD		n/y	flag
AL	rLO	49233	49393,4	RW	An external alarm blocks the regulators	WORD		n/y	flag
AL	AOP	49234	49393,6	RW	Alarm output polarity	WORD		0/1	flag
AL	SA3	16500	49394,2	RW	Alarm set point related to probe 3	BYTE	Y	-67.0...320	°C/°F
AL	dA3	16502	49394,4	RW	Probe 3 alarm activation differential	BYTE		1.0 ... 50.0	°C/°F
CPr	CPS	16504	49394,6	RW	Set point cool protection	BYTE	Y	-67.0...320	°C/°F
CPr	CPd	16506	49395,0	RW	Cool protection differential	BYTE		0.1...30.0	°C/°F
CPr	CPt	49294	49395,2	RW	Time that the temperature remains below the set point cool protection	WORD		0 ... 255	min
CPr	dOd	49201	49395,4	RW	Enable utility switch-off on activation of door switch	WORD		0 ... 3	num
Lit	dAd	49202	49395,6	RW	Activation delay for digital inputs	WORD		0 ... 255	min
Lit	dCO	49295	49396,0	RW	Delay in deactivating compressor after door opened	WORD		0 ... 255	min
Lit	dCd	49310	49396,2	RW	Delay in activating fans after door closed	WORD		0 ... 250	s
PrE	Pen	49261	49396,4	RW	Number of errors allowed per maximum/minimum pressure switch input	WORD		0 ... 15	num
PrE	PEI	49284	49396,6	RW	Minimum/maximum pressure switch error count interval	WORD		1 ... 99	min
PrE	PEt	49285	49397,0	RW	Delay in activating compressor after pressure switch deactivation	WORD		0 ... 255	min
dEC	dCA	49324	49397,2	RW	Enables deep cooling	WORD		0/1/2	num
dEC	dCS	16496	49397,4	RW	Set point deep cooling	BYTE	Y	-67.0...320	°C/°F
dEC	tdC	49286	49397,6	RW	Deep cooling duration	WORD		0 ... 255	min
dEC	dCC	49287	49398,0	RW	Defrost delay after deep cooling	WORD		0 ... 255	min
dEC	Sid	16550	49398,2	RW	Threshold for start of deep cooling	BYTE	Y	-67.0...320	°C/°F
dEC	tOS	49323	49398,4	RW	time above threshold for start of deep cooling	WORD		0 ... 255	min
EnS	ESt	49301	49398,6	RW	Energy saving type	WORD		0 ... 6	num
EnS	ESA	49302	49399,0	RW	AUX Status during Energy Saving	WORD		0/1/2	num
EnS	ESF	49293	49399,2	RW	Night activation mode	WORD		n/y	flag
EnS	Cdt	49296	49399,4	RW	Door close time	WORD		0 ... 255	min*10
EnS	OSP	16388	49400,0	RW	Offset on set point	BYTE	Y	-30.0...30.0	°C/°F
EnS	OdF	16510	49400,2	RW	Differential offset	BYTE		0.0 ... 30.0	°C/°F
EnS	dnt	49303	49400,4	RW	Night mode duration	WORD		0 ... 24	h
EnS	dFt	49304	49400,6	RW	Fast cooling mode duration	WORD		0 ... 24	h
EnS	SPn	16508	49401,0	RW	Night mode set point	BYTE	Y	LSE ... HSE	°C/°F
EnS	dn1	16512	49401,2	RW	Night mode offset	BYTE		0.1 ... 30.0	°C/°F
EnS	SPF	16546	49401,4	RW	set point fast cooling	BYTE	Y	LSE ... HSE	°C/°F
EnS	dFF	16548	49401,6	RW	Offset fast cooling	BYTE	Y	0.1 ... 30.0	°C/°F
EnS	ESP	49311	49402,4	RW	Sensitivity of virtual door regulator	WORD		0 ... 5	num
EnS	dOt	49325	49410,4	RW	Maximum time of door open	WORD		0 ... 255	s
Add	PtS	49305	49372,2	RW	Protocol selection	WORD		t/d	flag
Add	dEA	49225	49372,4	RW	Device address	WORD		0 ... 14	num
Add	FAA	49226	49372,6	RW	Family address	WORD		0 ... 14	num
Add	Pty	49306	49373,0	RW	MODBUS Parity bit	WORD		n/E/o	num

Folder	Label	Address Value	Address Visibility	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
Add	StP	49307	49373,2	RW	MODBUS stop bit	WORD		1b - 2b	flag
diS	LOC	49236	49402,6	RW	Enable keypad lock	WORD		n/y	flag
diS	PS1	49253	49403,0	RW	Password 1 value	WORD		0 ... 250	num
diS	PS2	49254	49403,2	RW	Password Value 2	WORD		0 ... 250	num
diS	ndt	49237	49403,4	RW	Display with decimal point	WORD		n/y	flag
diS	CA1	16404	49403,6	RW	Cell probe calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CA2	16406	49404,0	RW	Evaporator probe calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CA3	16514	49404,2	RW	Probe 3 calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CAI	49238	49404,4	RW	Calibration operation	WORD		0 ... 2	num
diS	LdL	16408	49404,6	RW	Minimum possible value	BYTE	Y	-67.0 ... HdL	°C/°F
diS	HdL	16410	49405,0	RW	Maximum possible value	BYTE	Y	LdL ... 320	°C/°F
diS	ddL	49239	49405,2	RW	Resource locking after defrost end	WORD		0/1/2	num
diS	Ldd	49290	49405,4	RW	Display lock timeout from defrost end	WORD		0 ... 255	min
diS	dro	49256	49405,6	RW	°C/°F selection	WORD		0/1	num
diS	ddd	49240	49406,0	RW	Display of fundamental status	WORD		0 ... 3	num
diS	FSE	49343	49413,0	RW	Window filter setting	WORD		0 ... 7	num
diS	FHt	49347	49413,6	RW	Stay time above the threshold for filter disabling.	WORD		1 ... 250	num
CnF	H02	49241	49406,4	RW	Activation time for keypad functions	WORD		0 ... 15	s
CnF	H06	49257	49406,6	RW	Key or aux/light digital input on with device OFF	WORD		n/y	flag
CnF	H08	49258	49407,0	RW	Standby mode	WORD		0/1/2	num
CnF	H11	16412	49407,2	RW	Configurability of digital input 1	BYTE	Y	-10 ... +10	num
CnF	H12	16494	49407,4	RW	Configurability of digital input 2	BYTE	Y	-10 ... +10	num
CnF	H21	49242	49407,6	RW	Configurability of digital output 1	WORD		0 ... 12	num
CnF	H22	49243	49408,0	RW	Configurability of digital output 2	WORD		0 ... 9	num
CnF	H23	49244	49408,2	RW	Configurability of digital output 3	WORD		0 ... 9	num
CnF	H31	49247	49409,0	RW	Configurability of UP key	WORD		0 ... 6	num
CnF	H32	49248	49409,2	RW	Configurability of DOWN key	WORD		0 ... 6	num
CnF	H33	49249	49409,4	RW	Configurability of ESC key	WORD		0 ... 6	num
CnF	H41	49250	49409,6	RW	Probe cell present	WORD		n/y	flag
CnF	H42	49251	49410,0	RW	Evaporator probe present	WORD		n/y	flag
CnF	H43	49308	49410,2	RW	Probe 3 present	WORD		n/y	num
CnF	H60	49309	49373,0	RW	Start defrost mode for applications with double evaporator	WORD		1 ... 3	num
APPLICATION 1 PARAMETERS									
/	SEt	16672	49623,0	RW	Regulation set point	RW	Y	LSE...HSE	°C/°F
CP	dF1	16674	49623,2	RW	Differential of set point	RW		0.1...30.0	°C/°F
CP	HSE	16678	49623,4	RW	Maximum value settable for set point	RW	Y	LSE...320	°C/°F
CP	LSE	16680	49623,6	RW	Minimum value settable for set point	RW	Y	-67.0...HSE	°C/°F
CP	Cit	49517	49624,2	RW	Minimum compressor output activation time	BYTE		0 ... 250	min
CP	CAt	49518	49624,4	RW	Maximum compressor output activation time	BYTE		0 ... 250	min
CP	Ont	49519	49624,6	RW	ON time for compressor output with faulty control probe	BYTE		0 ... 250	min
CP	OFt	49520	49625,0	RW	OFF time for compressor output with faulty control probe	BYTE		0 ... 250	min
CP	dOn	49521	49625,2	RW	Compressor output activation delay from request	BYTE		0 ... 250	s
CP	dOF	49522	49625,4	RW	Compressor output activation delay from shutdown	BYTE		0 ... 250	min
CP	dbi	49523	49625,6	RW	Delay between two consecutive starts of the compressor output	BYTE		0 ... 250	min
CP	OdO	49524	49626,0	RW	Output activation delay from power-on	BYTE		0 ... 250	min
CP	dFA	49525	49626,2	RW	Activation delay of compressor and condenser fans from the call	BYTE		0 ... 255	s

Folder	Label	Address Value	Address Visibility	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
dEF	dty	49529	49626,4	RW	Type of defrost	BYTE		0/1/2	num
dEF	dit	49530	49626,6	RW	Interval between defrost cycles	BYTE		0 ... 250	hours
dEF	dt1	49531	49627,0	RW	Unit of measurement for defrost interval	BYTE		0 ... 2	num
dEF	dt2	49532	49627,2	RW	Unit of measurement for defrost duration	BYTE		0 ... 2	num
dEF	dCt	49533	49627,4	RW	Defrost interval count mode	BYTE		0/1/2/3	num
dEF	dOH	49534	49627,6	RW	Defrost cycle enabling delay from request	BYTE		0 ... 59	min
dEF	dEt	49535	49628,0	RW	Defrost timeout	BYTE		1 ... 250	min
dEF	dS1	16682	49628,2	RW	Defrost end temperature	WORD	Y	-67.0...320	°C/°F
dEF	dPO	49536	49628,4	RW	Defrost activation request from power-on	BYTE		n/y	flag
dEF	tcd	16686	49628,6	RW	Compressor output activation/deactivation time before a defrost.	WORD		-31 ... 31	min
dEF	Cod	49537	49629,0	RW	Compressor OFF time before defrost	BYTE		0 ... 60	min
dEF	dSE	16688	49629,2	RW	Defrost start temperature threshold	WORD	Y	-67.0...320	°C/°F
dEF	dtt	49538	49629,4	RW	time for which the temperature of the evaporator must remain below the threshold	BYTE		0 ... 255	min
FAn	FPt	49539	49629,6	RW	Parameter mode **FSt** (absolute or relative)	BYTE		0/1	flag
FAn	FSt	16690	49630,0	RW	Evaporator fans disabling temperature	WORD	Y	-67.0 ... 320	°C/°F
FAn	FSS	16692	49654,0	RW	Evaporator fans activation temperature difference	WORD		0.0 ... 100	°C/°F
FAn	Fot	16694	49630,2	RW	Evaporator fans start temperature	WORD	Y	-67.0 ... 320	°C/°F
FAn	FAd	16696	49630,4	RW	Evaporator fans activation differential	WORD		1.0 ... 50.0	°C/°F
FAn	Fdt	49540	49630,6	RW	Evaporator fans delay after defrost cycle	BYTE		0 ... 250	min
FAn	dt	49541	49631,0	RW	Dripping time	BYTE		0 ... 250	min
FAn	dFd	49542	49631,2	RW	Evaporator fans disabling during defrost time	BYTE		n/y	flag
FAn	FCO	49543	49631,4	RW	Evaporator fans status with OFF compressor output	BYTE		0 ... 3	num
FAn	FdC	49544	49631,6	RW	Evaporator fans switch-off delay after compressor disabled	BYTE		0 ... 99	min
FAn	Fon	49545	49632,0	RW	Evaporator fans ON time in duty cycle mode	BYTE		0 ... 250	s*10
FAn	FoF	49546	49632,2	RW	Evaporator fans OFF time in duty cycle mode	BYTE		0 ... 250	s*10
FAn	Fnn	49547	49632,4	RW	Evaporator fans ON time in duty cycle night mode	BYTE		0 ... 250	s*10
FAn	FnF	49548	49632,6	RW	Evaporator fans OFF time in duty cycle night mode	BYTE		0 ... 250	s*10
AL	Att	49549	49633,0	RW	**HAL** and **LAL** parameter mode (absolute or relative)	BYTE		0/1	flag
AL	AFd	16698	49633,2	RW	Alarm activation differential	WORD		1.0 ... 50.0	°C/°F
AL	HAL	16700	49633,4	RW	Maximum alarm threshold	WORD	Y	LAL...320	°C/°F
AL	LAL	16702	49633,6	RW	Minimum alarm threshold	WORD	Y	-67.0...HAL	°C/°F
AL	PAO	49550	49634,0	RW	Alarm disabling after power-on	BYTE		0 ... 10	h
AL	dAO	16704	49634,2	RW	Temperature alarm disabling time after defrost cycle	WORD		0 ... 999	min
AL	OAO	49551	49634,4	RW	High/low temperature alarm exclusion time after door closing	WORD		0 ... 10	h
AL	tdO	49552	49634,6	RW	Open door disabling time	WORD		0 ... 250	min
AL	tAO	49553	49635,0	RW	Temperature alarms delay time	WORD		0 ... 250	min
AL	dAt	49554	49635,2	RW	Alarm signalling end of defrost due to time out	WORD		n/y	flag
AL	rLO	49555	49635,4	RW	An external alarm blocks the regulators	WORD		n/y	flag
AL	AOP	49556	49635,6	RW	Alarm output polarity	WORD		0/1	flag
AL	SA3	16706	49636,2	RW	Alarm set point related to probe 3	BYTE	Y	-67.0...320	°C/°F
AL	dA3	16708	49636,4	RW	Probe 3 alarm activation differential	BYTE		1.0 ... 50.0	°C/°F
CPr	CPS	16710	49636,6	RW	Set point cool protection	BYTE	Y	-67.0...320	°C/°F
CPr	CPd	16712	49637,0	RW	Cool protection differential	BYTE		0.1...30.0	°C/°F
CPr	CPt	49558	49637,2	RW	Time that the temperature remains below the set point cool protection	WORD		0 ... 255	min
CPr	dOd	49559	49637,4	RW	Enable utility switch-off on activation of door switch	WORD		0 ... 3	num

Folder	Label	Address Value	Address Visibility	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
Lit	dAd	49560	49637,6	RW	Activation delay for digital inputs	WORD		0 ... 255	min
Lit	dCO	49561	49638,0	RW	Delay in deactivating compressor after door opened	WORD		0 ... 255	min
Lit	dCd	49562	49638,2	RW	Delay in activating fans after door closed	WORD		0 ... 250	s
PrE	Pen	49563	49638,4	RW	Number of errors allowed per maximum/minimum pressure switch input	WORD		0 ... 15	num
PrE	PEI	49564	49638,6	RW	Minimum/maximum pressure switch error count interval	WORD		1 ... 99	min
PrE	PEt	49565	49639,0	RW	Delay in activating compressor after pressure switch deactivation	WORD		0 ... 255	min
dEC	dCA	49566	49639,2	RW	Enables deep cooling	WORD		0/1/2	num
dEC	dCS	16714	49639,4	RW	set point deep cooling	BYTE	Y	-67.0...320	°C/°F
dEC	tdC	49567	49639,6	RW	Deep cooling duration	WORD		0 ... 255	min
dEC	dCC	49568	49640,0	RW	Defrost delay after deep cooling	WORD		0 ... 255	min
dEC	Sid	16716	49640,2	RW	Threshold for start of deep cooling	BYTE	Y	-67.0...320	°C/°F
dEC	tOS	49569	49640,4	RW	time above threshold for start of deep cooling	WORD		0 ... 255	min
EnS	ESt	49570	49640,6	RW	Energy saving type	WORD		0 ... 6	num
EnS	ESA	49571	49641,0	RW	AUX Status during Energy Saving	WORD		0/1/2	num
EnS	ESF	49572	49641,2	RW	Night activation mode.	WORD		n/y	flag
EnS	Cdt	49573	49641,4	RW	Door close time	WORD		0 ... 255	min*10
EnS	OSP	16718	49642,0	RW	Offset on set point	BYTE	Y	-30.0...30.0	°C/°F
EnS	OdF	16720	49642,2	RW	Differential offset	BYTE		0.0 ... 30.0	°C/°F
EnS	dnt	49575	49642,4	RW	Night mode duration	WORD		0 ... 24	h
EnS	dFt	49576	49642,6	RW	Fast cooling mode duration	WORD		0 ... 24	h
EnS	SPn	16722	49643,0	RW	Night mode set point	BYTE	Y	LSE ... HSE	°C/°F
EnS	dn1	16724	49643,2	RW	Night mode offset	BYTE		0.1 ... 30.0	°C/°F
EnS	SPF	16728	49643,4	RW	set point fast cooling	BYTE	Y	LSE ... HSE	°C/°F
EnS	dFF	16730	49643,6	RW	Offset fast cooling	BYTE	Y	0.1 ... 30.0	°C/°F
EnS	ESP	49578	49644,0	RW	Sensitivity of virtual door regulator	WORD		0 ... 5	num
EnS	dOt	49579	49652,4	RW	Maximum time of door open	WORD		0 ... 255	s
diS	LOC	49580	49644,6	RW	Enable keypad lock	WORD		n/y	flag
diS	PS1	49581	49645,0	RW	Password 1 value	WORD		0 ... 250	num
diS	PS2	49582	49645,2	RW	Password 2 value	WORD		0 ... 250	num
diS	ndt	49583	49645,4	RW	Display with decimal point	WORD		n/y	flag
diS	CA1	16734	49645,6	RW	Cell probe calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CA2	16736	49646,0	RW	Evaporator probe calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CA3	16738	49646,2	RW	Probe 3 calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CAI	49584	49646,4	RW	Calibration operation	WORD		0 ... 2	num
diS	LdL	16740	49646,6	RW	Minimum possible value	BYTE	Y	-67.0 ... HdL	°C/°F
diS	HdL	16742	49647,0	RW	Maximum possible value	BYTE	Y	LdL ... 320	°C/°F
diS	ddL	49585	49647,2	RW	Resource locking after defrost end	WORD		0/1/2	num
diS	Ldd	49586	49647,4	RW	Display lock timeout from defrost end	WORD		0 ... 255	min
diS	dro	49587	49647,6	RW	°C/°F selection	WORD		0/1	num
diS	ddd	49588	49648,2	RW	Display of fundamental status	WORD		0 ... 3	num
CnF	H02	49590	49648,4	RW	Activation time for keypad functions	WORD		0 ... 15	s
CnF	H06	49591	49648,6	RW	Key or aux/light digital input on with device OFF	WORD		n/y	flag
CnF	H08	49592	49649,0	RW	Standby mode	WORD		0/1/2	num
CnF	H11	16744	49649,2	RW	Configurability of digital input 1	BYTE	Y	-10 ... +10	num
CnF	H12	16746	49649,4	RW	Configurability of digital input 2	BYTE	Y	-10 ... +10	num
CnF	H21	49593	49649,6	RW	Configurability of digital output 1	WORD		0 ... 12	num

Folder	Label	Address Value	Address Visibility	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
CnF	H22	49594	49650,0	RW	Configurability of digital output 2	WORD		0 ... 9	num
CnF	H23	49595	49650,2	RW	Configurability of digital output 3	WORD		0 ... 9	num
CnF	H31	49598	49651,0	RW	Configurability of UP key	WORD		0 ... 6	num
CnF	H32	49599	49651,2	RW	Configurability of DOWN key	WORD		0 ... 6	num
CnF	H33	49600	49651,4	RW	Configurability of ESC key	WORD		0 ... 6	num
CnF	H41	49601	49651,6	RW	Probe cell present	WORD		n/y	flag
CnF	H42	49602	49652,0	RW	Evaporator probe present	WORD		n/y	flag
CnF	H43	49603	49652,2	RW	Probe 3 present	WORD		n/y	num
APPLICATION 2 PARAMETERS									
/	SEt	16898	49849,0	RW	Regulation set point	RW	Y	LSE...HSE	°C/°F
CP	dF1	16900	49849,2	RW	Differential of set point	RW		0.1...30.0	°C/°F
CP	HSE	16904	49849,4	RW	Maximum value settable for set point	RW	Y	LSE...320	°C/°F
CP	LSE	16906	49849,6	RW	Minimum value settable for set point	RW	Y	-67.0...HSE	°C/°F
CP	Cit	49743	49850,2	RW	Minimum compressor output activation time	BYTE		0 ... 250	min
CP	CAt	49744	49850,4	RW	Maximum compressor output activation time	BYTE		0 ... 250	min
CP	Ont	49745	49850,6	RW	ON time for compressor output with faulty control probe	BYTE		0 ... 250	min
CP	OFt	49746	49851,0	RW	OFF time for compressor output with faulty control probe	BYTE		0 ... 250	min
CP	dOn	49747	49851,2	RW	Compressor output activation delay from request	BYTE		0 ... 250	s
CP	dOF	49748	49851,4	RW	Compressor output activation delay from shutdown	BYTE		0 ... 250	min
CP	dbi	49749	49851,6	RW	Delay between two consecutive starts of the compressor output	BYTE		0 ... 250	min
CP	OdO	49750	49852,0	RW	Output activation delay from power-on	BYTE		0 ... 250	min
CP	dFA	49751	49852,2	RW	Activation delay of compressor and condenser fans from the call	BYTE		0 ... 255	s
dEF	dty	49755	49852,4	RW	Type of defrost	BYTE		0/1/2	num
dEF	dit	49756	49852,6	RW	Interval between defrost cycles	BYTE		0 ... 250	hours
dEF	dt1	49757	49853,0	RW	Unit of measurement for defrost interval	BYTE		0 ... 2	num
dEF	dt2	49758	49853,2	RW	Unit of measurement for defrost duration	BYTE		0 ... 2	num
dEF	dCt	49759	49853,4	RW	Defrost interval count mode	BYTE		0/1/2/3	num
dEF	dOH	49760	49853,6	RW	Defrost cycle enabling delay from request	BYTE		0 ... 59	min
dEF	dEt	49761	49854,0	RW	Defrost timeout	BYTE		1 ... 250	min
dEF	dS1	16908	49854,2	RW	Defrost end temperature	WORD	Y	-67.0...320	°C/°F
dEF	dPO	49762	49854,0	RW	Defrost activation request from power-on	BYTE		n/y	flag
dEF	tcd	16912	49854,6	RW	Compressor output activation/deactivation time before a defrost	WORD		-31 ... 31	min
dEF	Cod	49763	49855,0	RW	Compressor OFF time before defrost	BYTE		0 ... 60	min
dEF	dSE	16914	49855,2	RW	Defrost start temperature threshold	WORD	Y	-67.0...320	°C/°F
dEF	dtt	49764	49855,4	RW	time for which the temperature of the evaporator must remain below the threshold	BYTE		0 ... 255	min
FAn	FPt	49765	49855,6	RW	Parameter mode **FSt** (absolute or relative)	BYTE		0/1	flag
FAn	FSt	16916	49856,0	RW	Evaporator fans disabling temperature	WORD	Y	-67.0 ... 320	°C/°F
FAn	FSS	16918	49880,0	RW	Evaporator fans activation temperature difference	WORD		0.0 ... 100	°C/°F
FAn	Fot	16920	49856,2	RW	Evaporator fans start temperature	WORD	Y	-67.0 ... 320	°C/°F
FAn	FAd	16922	49856,4	RW	Evaporator fans activation differential	WORD		1.0 ... 50.0	°C/°F
FAn	Fdt	49766	49856,6	RW	Evaporator fans delay after defrost cycle	BYTE		0 ... 250	min
FAn	dt	49767	49857,0	RW	Dripping time	BYTE		0 ... 250	min
FAn	dFd	49768	49857,2	RW	Evaporator fans disabling during defrost time	BYTE		n/y	flag
FAn	FCO	49769	49857,4	RW	Evaporator fan status in event of compressor output OFF	BYTE		0 ... 3	num
FAn	FdC	49770	49857,6	RW	Evaporator fans switch-off delay after compressor disabled	BYTE		0 ... 99	min

Folder	Label	Address Value	Address Visibility	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
FAn	Fon	49771	49858,0	RW	Evaporator fans ON time in duty cycle mode	BYTE		0 ... 250	s*10
FAn	FoF	49772	49858,2	RW	Evaporator fans OFF time in duty cycle mode	BYTE		0 ... 250	s*10
FAn	Fnn	49773	49858,4	RW	Evaporator fans ON time in duty cycle night mode	BYTE		0 ... 250	s*10
FAn	FnF	49774	49858,6	RW	Evaporator fans OFF time in duty cycle night mode	BYTE		0 ... 250	s*10
AL	Att	49775	49859,0	RW	**HAL** and **LAL** parameter mode (absolute or relative)	BYTE		0/1	flag
AL	AFd	16924	49859,2	RW	Alarm activation differential	WORD		1.0 ... 50.0	°C/°F
AL	HAL	16926	49859,4	RW	Maximum alarm threshold	WORD	Y	LAL...320	°C/°F
AL	LAL	16928	49859,6	RW	Minimum alarm threshold	WORD	Y	-67.0...HAL	°C/°F
AL	PAO	49776	49860,0	RW	Alarm disabling after power-on	BYTE		0 ... 10	h
AL	dAO	16930	49860,2	RW	Temperature alarm disabling time after defrost cycle	WORD		0 ... 999	min
AL	OAO	49777	49860,4	RW	High/low temperature alarm exclusion time after door closing	WORD		0 ... 10	h
AL	tdO	49778	49860,6	RW	Open door disabling time	WORD		0 ... 250	min
AL	tAO	49779	49861,0	RW	Temperature alarms delay time	WORD		0 ... 250	min
AL	dAt	49780	49861,2	RW	Alarm signalling end of defrost due to timeout	WORD		n/y	flag
AL	rLO	49781	49861,4	RW	An external alarm blocks the regulators	WORD		n/y	flag
AL	AOP	49782	49861,6	RW	Alarm output polarity	WORD		0/1	flag
AL	SA3	16932	49862,2	RW	Alarm set point related to probe 3	BYTE	Y	-67.0...320	°C/°F
AL	dA3	16934	49862,4	RW	Probe 3 alarm activation differential	BYTE		1.0 ... 50.0	°C/°F
CPr	CPS	16936	49862,6	RW	Set point cool protection	BYTE	Y	-67.0...320	°C/°F
CPr	CPd	16938	49863,0	RW	Cool protection differential	BYTE		0.1...30.0	°C/°F
CPr	CPt	49784	49863,2	RW	Time that the temperature remains below the set point cool protection	WORD		0 ... 255	min
CPr	dOd	49785	49863,4	RW	Enable utility switch-off on activation of door switch	WORD		0 ... 3	num
Lit	dAd	49786	49863,6	RW	Activation delay for digital inputs	WORD		0 ... 255	min
Lit	dCO	49787	49864,0	RW	Delay in deactivating compressor after door opened	WORD		0 ... 255	min
Lit	dCd	49788	49864,2	RW	Delay in activating fans after door closed	WORD		0 ... 250	s
PrE	Pen	49789	49864,4	RW	Number of errors allowed per maximum/minimum pressure switch input	WORD		0 ... 15	num
PrE	PEI	49790	49864,6	RW	Minimum/maximum pressure switch error count interval	WORD		1 ... 99	min
PrE	PEt	49791	49865,0	RW	Delay in activating compressor after pressure switch deactivation	WORD		0 ... 255	min
dEC	dCA	49792	49865,2	RW	Enables deep cooling	WORD		0/1/2	num
dEC	dCS	16940	49865,4	RW	set point deep cooling	BYTE	Y	-67.0...320	°C/°F
dEC	tdC	49793	49865,6	RW	Deep cooling duration	WORD		0 ... 255	min
dEC	dCC	49794	49866,0	RW	Defrost delay after deep cooling	WORD		0 ... 255	min
dEC	Sid	16942	49866,2	RW	Threshold for start of deep cooling	BYTE	Y	-67.0...320	°C/°F
dEC	tOS	49795	49866,4	RW	time above threshold for start of deep cooling	WORD		0 ... 255	min
EnS	ESt	49796	49866,6	RW	Energy saving type	WORD		0 ... 6	num
EnS	ESA	49797	49867,0	RW	AUX Status during Energy Saving	WORD		0/1/2	num
EnS	ESF	49798	49867,2	RW	Night activation mode	WORD		n/y	flag
EnS	Cdt	49799	49867,4	RW	Door close time	WORD		0 ... 255	min*10
EnS	OSP	16944	49868,0	RW	Offset on set point	BYTE	Y	-30.0...30.0	°C/°F
EnS	OdF	16946	49868,2	RW	Differential offset	BYTE		0.0 ... 30.0	°C/°F
EnS	dnt	49801	49868,4	RW	Night mode duration	WORD		0 ... 24	h
EnS	dFt	49802	49868,6	RW	Fast cooling mode duration	WORD		0 ... 24	h
EnS	SPn	16948	49869,0	RW	Night mode set point	BYTE	Y	LSE ... HSE	°C/°F
EnS	dn1	16950	49869,2	RW	Night mode offset	BYTE		0.1 ... 30.0	°C/°F
EnS	SPF	16954	49869,4	RW	set point fast cooling	BYTE	Y	LSE ... HSE	°C/°F

Folder	Label	Address Value	Address Visibility	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
EnS	dFF	16956	49869,6	RW	Offset fast cooling	BYTE	Y	0.1 ... 30.0	°C/°F
EnS	ESP	49804	49870,4	RW	Sensitivity of virtual door regulator	WORD		0 ... 5	num
EnS	dOt	49805	49878,4	RW	Maximum time of door open	WORD		0 ... 255	s
diS	LOC	49806	49870,6	RW	Enable keypad lock	WORD		n/y	flag
diS	PS1	49807	49871,0	RW	Password 1 value	WORD		0 ... 250	num
diS	PS2	49808	49871,2	RW	Password 2 value	WORD		0 ... 250	num
diS	ndt	49809	49871,4	RW	Display with decimal point	WORD		n/y	flag
diS	CA1	16960	49871,6	RW	Cell probe calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CA2	16962	49872,0	RW	Evaporator probe calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CA3	16964	49872,2	RW	Probe 3 calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CAI	49810	49872,4	RW	Calibration operation	WORD		0 ... 2	num
diS	LdL	16966	49872,6	RW	Minimum possible value	BYTE	Y	-67.0 ... HdL	°C/°F
diS	HdL	16968	49873,0	RW	Maximum possible value.	BYTE	Y	LdL ... 320	°C/°F
diS	ddL	49811	49873,2	RW	Resource locking after defrost end	WORD		0/1/2	num
diS	Ldd	49812	49873,4	RW	Display lock timeout from defrost end	WORD		0 ... 255	min
diS	dro	49813	49873,6	RW	°C/°F selection	WORD		0/1	num
diS	ddd	49814	49874,0	RW	Display of fundamental status	WORD		0 ... 3	num
CnF	H02	49816	49874,4	RW	Activation time for keypad functions	WORD		0 ... 15	s
CnF	H06	49817	49874,6	RW	Key or aux/light digital input on with device OFF	WORD		n/y	flag
CnF	H08	49818	49875,0	RW	Standby mode	WORD		0/1/2	num
CnF	H11	16970	49875,2	RW	Configurability of digital input 1	BYTE	Y	-10 ... +10	num
CnF	H12	16972	49875,4	RW	Configurability of digital input 2	BYTE	Y	-10 ... +10	num
CnF	H21	49819	49875,6	RW	Configurability of digital output 1	WORD		0 ... 12	num
CnF	H22	49820	49876,0	RW	Configurability of digital output 2	WORD		0 ... 9	num
CnF	H23	49821	49876,2	RW	Configurability of digital output 3	WORD		0 ... 9	num
CnF	H31	49824	49877,0	RW	Configurability of UP key	WORD		0 ... 6	num
CnF	H32	49825	49877,2	RW	Configurability of DOWN key	WORD		0 ... 6	num
CnF	H33	49826	49877,4	RW	Configurability of ESC key	WORD		0 ... 6	num
CnF	H41	49827	49877,6	RW	Probe cell present	WORD		n/y	flag
CnF	H42	49828	49878,0	RW	Evaporator probe present	WORD		n/y	flag
CnF	H43	49829	49878,2	RW	Probe 3 present	WORD		n/y	num
APPLICATION 3 PARAMETERS									
/	SEt	17124	50075,0	RW	Regulation set point	RW	Y	LSE...HSE	°C/°F
CP	dF1	17126	50075,2	RW	Differential of set point	RW		0.1...30.0	°C/°F
CP	HSE	17124	50075,4	RW	Maximum value settable for set point	RW	Y	LSE...320	°C/°F
CP	LSE	17126	50075,6	RW	Minimum value settable for set point	RW	Y	-67.0 ... HSE	°C/°F
CP	Cit	49969	50076,2	RW	Minimum compressor output activation time	BYTE		0 ... 250	min
CP	CAt	49970	50076,4	RW	Maximum compressor output activation time	BYTE		0 ... 250	min
CP	Ont	49971	50076,6	RW	ON time for compressor output with faulty control probe	BYTE		0 ... 250	min
CP	OFt	49972	50077,0	RW	OFF time for compressor output with faulty control probe	BYTE		0 ... 250	min
CP	dOn	49973	50077,2	RW	Compressor output activation delay from request	BYTE		0 ... 250	s
CP	dOF	49974	50077,4	RW	Compressor output activation delay from shutdown	BYTE		0 ... 250	min
CP	dbi	49975	50077,6	RW	Delay between two consecutive starts of the compressor output	BYTE		0 ... 250	min
CP	OdO	49976	50078,0	RW	Output activation delay from power-on	BYTE		0 ... 250	min
CP	dFA	49977	50078,2	RW	Activation delay of compressor and condenser fans from the call	BYTE		0 ... 255	s
dEF	dty	49981	50078,4	RW	Type of defrost	BYTE		0/1/2	num

Folder	Label	Address Value	Address Visibility	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
dEF	dit	49982	50078,6	RW	Interval between defrost cycles	BYTE		0 ... 250	hours
dEF	dt1	49983	50079,0	RW	Unit of measurement for defrost interval	BYTE		0 ... 2	num
dEF	dt2	49984	50079,2	RW	Unit of measurement for defrost duration	BYTE		0 ... 2	num
dEF	dCt	49985	50079,4	RW	Defrost interval count mode	BYTE		0/1/2/3	num
dEF	dOH	49986	50079,6	RW	Defrost cycle enabling delay from request	BYTE		0 ... 59	min
dEF	dEt	49987	50080,0	RW	Defrost timeout	BYTE		1 ... 250	min
dEF	dS1	17134	50080,2	RW	Defrost end temperature	WORD	Y	-67.0 ... 320	°C/°F
dEF	dPO	49988	50080,4	RW	Defrost activation request from power-on	BYTE		n/y	flag
dEF	tcd	17138	50080,6	RW	Compressor output activation/deactivation time before a defrost	WORD		-31 ... 31	min
dEF	Cod	49989	50081,0	RW	Compressor OFF time before defrost	BYTE		0 ... 60	min
dEF	dSE	17140	50081,2	RW	Defrost start temperature threshold	WORD	Y	-67.0 ... 320	°C/°F
dEF	dtt	49990	50081,4	RW	time for which the temperature of the evaporator must remain below the threshold	BYTE		0 ... 255	min
FAn	FPt	49991	50081,6	RW	Parameter mode **FSt** (absolute or relative)	BYTE		0/1	flag
FAn	FSt	17142	50082,0	RW	Evaporator fans disabling temperature	WORD	Y	-67.0 ... 320	°C/°F
FAn	FSS	17144	50106,0	RW	Evaporator fans activation temperature difference	WORD		0.0 ... 100	°C/°F
FAn	Fot	17146	50082,2	RW	Evaporator fans start temperature	WORD	Y	-67.0 ... 320	°C/°F
FAn	FAd	17148	50082,4	RW	Evaporator fans activation differential	WORD		1.0 ... 50.0	°C/°F
FAn	Fdt	49992	50082,6	RW	Evaporator fans delay after defrost cycle	BYTE		0 ... 250	min
FAn	dt	49993	50083,0	RW	Dripping time	BYTE		0 ... 250	min
FAn	dFd	49994	50083,2	RW	Evaporator fans disabling during defrost time	BYTE		n/y	flag
FAn	FCO	49995	50083,4	RW	Evaporator fans status in event of compressor output OFF	BYTE		0 ... 3	num
FAn	FdC	49996	50083,6	RW	Evaporator fans switch-off delay after compressor disabled	BYTE		0 ... 99	min
FAn	Fon	49997	50084,0	RW	Evaporator fans ON time in duty cycle mode	BYTE		0 ... 250	s*10
FAn	FoF	49998	50084,2	RW	Evaporator fans OFF time in duty cycle mode	BYTE		0 ... 250	s*10
FAn	Fnn	49999	50084,4	RW	Evaporator fans ON time in duty cycle night mode	BYTE		0 ... 250	s*10
FAn	FnF	50000	50084,6	RW	Evaporator fans OFF time in duty cycle night mode	BYTE		0 ... 250	s*10
AL	Att	50001	50085,0	RW	**HAL** and **LAL** parameter mode (absolute or relative)	BYTE		0/1	flag
AL	AFd	17150	50085,2	RW	Alarm activation differential	WORD		1.0 ... 50.0	°C/°F
AL	HAL	17152	50085,4	RW	Maximum alarm threshold	WORD	Y	LAL...320	°C/°F
AL	LAL	17154	50085,6	RW	Minimum alarm threshold	WORD	Y	-67.0 ... HAL	°C/°F
AL	PAO	50002	50086,0	RW	Alarm disabling after power-on	BYTE		0 ... 10	h
AL	dAO	17156	50086,2	RW	Temperature alarm disabling time after defrost cycle	WORD		0 ... 999	min
AL	OAO	50003	50086,4	RW	High/low temperature alarm exclusion time after door closing	WORD		0 ... 10	h
AL	tdO	50004	50086,6	RW	Open door disabling time	WORD		0 ... 250	min
AL	tAO	50005	50087,0	RW	Temperature alarms delay time	WORD		0 ... 250	min
AL	dAt	50006	50087,2	RW	Alarm signalling end of defrost due to time out	WORD		n/y	flag
AL	rLO	50007	50087,4	RW	An external alarm blocks the regulators	WORD		n/y	flag
AL	AOP	50008	50087,6	RW	Alarm output polarity	WORD		0/1	flag
AL	SA3	17158	50088,2	RW	Alarm set point related to probe 3	BYTE	Y	-67.0 ... 320	°C/°F
AL	dA3	17160	50088,4	RW	Probe 3 alarm activation differential	BYTE		1.0 ... 50.0	°C/°F
CPr	CPS	17162	50088,6	RW	Set point cool protection	BYTE	Y	-67.0 ... 320	°C/°F
CPr	CPd	17164	50089,0	RW	Cool protection differential	BYTE		0.1 ... 30.0	°C/°F
CPr	CPt	50010	50089,2	RW	Time that the temperature remains below the set point cool protection	WORD		0 ... 255	min
CPr	dOd	50011	50089,4	RW	Enable utility switch-off on activation of door switch	WORD		0 ... 3	num
Lit	dAd	50012	50089,6	RW	Activation delay for digital inputs	WORD		0 ... 255	min

Folder	Label	Address Value	Address Visibility	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
Lit	dCO	50013	50090,0	RW	Delay in deactivating compressor after door opened	WORD		0 ... 255	min
Lit	dCd	50014	50090,2	RW	Delay in activating fans after door closed	WORD		0 ... 250	s
PrE	Pen	50015	50090,4	RW	Number of errors allowed per maximum/minimum pressure switch input	WORD		0 ... 15	num
PrE	PEI	50016	50090,6	RW	Minimum/maximum pressure switch error count interval	WORD		1 ... 99	min
PrE	PEt	50017	50091,0	RW	Delay in activating compressor after pressure switch deactivation	WORD		0 ... 255	min
dEC	dCA	50018	50091,2	RW	Enables deep cooling	WORD		0/1/2	num
dEC	dCS	17166	50091,4	RW	set point deep cooling	BYTE	Y	-67.0 ... 320	°C/°F
dEC	tdC	50019	50091,6	RW	Deep cooling duration	WORD		0 ... 255	min
dEC	dCC	50020	50092,0	RW	Defrost delay after deep cooling	WORD		0 ... 255	min
dEC	Sid	17168	50092,2	RW	Threshold for start of deep cooling	BYTE	Y	-67.0 ... 320	°C/°F
dEC	tOS	50021	50092,4	RW	time above threshold for start of deep cooling	WORD		0 ... 255	min
EnS	ESt	50022	50092,6	RW	Energy saving type	WORD		0 ... 6	num
EnS	ESA	50023	50093,0	RW	AUX Status during Energy Saving	WORD		0/1/2	num
EnS	ESF	50024	50093,2	RW	Night activation mode	WORD		n/y	flag
EnS	Cdt	50025	50093,4	RW	Door close time	WORD		0 ... 255	min*10
EnS	OSP	17170	50094,0	RW	Offset on set point	BYTE	Y	-30,0 ... 30.0	°C/°F
EnS	OdF	17172	50094,2	RW	Differential offset	BYTE		0.0 ... 30.0	°C/°F
EnS	dnt	50027	50094,4	RW	Night mode duration	WORD		0 ... 24	h
EnS	dFt	50028	50094,6	RW	Fast cooling mode duration	WORD		0 ... 24	h
EnS	SPn	17174	50095,0	RW	Night mode set point	BYTE	Y	LSE ... HSE	°C/°F
EnS	dn1	17176	50095,2	RW	Night mode offset	BYTE		0.1 ... 30.0	°C/°F
EnS	SPF	17180	50095,4	RW	Set point fast cooling	BYTE	Y	LSE ... HSE	°C/°F
EnS	dFF	17182	50095,6	RW	Offset fast cooling	BYTE	Y	0.1 ... 30.0	°C/°F
EnS	ESP	50030	50096,4	RW	Sensitivity of virtual door regulator	WORD		0 ... 5	num
EnS	dOt	50031	50104,4	RW	Maximum time of door open	WORD		0 ... 255	s
diS	LOC	50032	50096,6	RW	Enable keypad lock	WORD		n/y	flag
diS	PS1	50033	50097,0	RW	Password 1 value	WORD		0 ... 250	num
diS	PS2	50034	50097,2	RW	Password 2 value	WORD		0 ... 250	num
diS	ndt	50035	50097,4	RW	Display with decimal point	WORD		n/y	flag
diS	CA1	17186	50097,6	RW	Cell probe calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CA2	17188	50098,0	RW	Evaporator probe calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CA3	17190	50098,2	RW	Probe 3 calibration	BYTE	Y	-12.0...+12.0	°C/°F
diS	CAI	50036	50098,4	RW	Calibration operation	WORD		0 ... 2	num
diS	LdL	17192	50098,6	RW	Minimum possible value	BYTE	Y	-67.0 ... HdL	°C/°F
diS	HdL	17194	50099,0	RW	Maximum possible value	BYTE	Y	LdL ... 320	°C/°F
diS	ddL	50037	50099,2	RW	Resource locking after defrost end	WORD		0/1/2	num
diS	Ldd	50038	50099,4	RW	Display lock timeout from defrost end	WORD		0 ... 255	min
diS	dro	50039	50099,6	RW	°C/°F selection	WORD		0/1	num
diS	ddd	50040	50100,0	RW	Display of fundamental status	WORD		0 ... 3	num
CnF	H02	50042	50100,4	RW	Activation time for keypad functions	WORD		0 ... 15	s
CnF	H06	50043	50100,6	RW	Key or aux/light digital input on with device OFF	WORD		n/y	flag
CnF	H08	50044	50101,0	RW	Standby mode	WORD		0/1/2	num
CnF	H11	17196	50101,2	RW	Configurability of digital input 1	BYTE	Y	-10 ... +10	num
CnF	H12	17198	50101,4	RW	Configurability of digital input 2	BYTE	Y	-10 ... +10	num
CnF	H21	50045	50101,6	RW	Configurability of digital output 1	WORD		0 ... 12	num
CnF	H22	50046	50102,0	RW	Configurability of digital output 2	WORD		0 ... 9	num

Folder	Label	Address Value	Address Visibility	R/W	DESCRIPTION	DATA SIZE	CPL	RANGE	M.U.
CnF	H23	50047	50102,4	RW	Configurability of digital output 3	WORD		0 ... 9	num
CnF	H31	50050	50103,0	RW	Configurability of UP key	WORD		0 ... 6	num
CnF	H32	50051	50103,2	RW	Configurability of DOWN key	WORD		0 ... 6	num
CnF	H33	50052	50103,4	RW	Configurability of ESC key	WORD		0 ... 6	num
CnF	H41	50053	50103,6	RW	Probe cell present	WORD		n/y	flag
CnF	H42	50054	50104,0	RW	Evaporator probe present	WORD		n/y	flag
CnF	H43	50055	50104,2	RW	Probe 3 present	WORD		n/y	num

7.6.2. FOLDER visibility table

Label	ADDRESS	R/W	DESCRIPTION	DATA SIZE	RANGE	Address by Application AP1	AP2	AP3	M.U.
vis_CP	49376	RW	Compressor Folder Visibility	2 BIT	0 ... 3	49618	49844	50070	num
vis_dEF	49376	RW	Defrosting Folder Visibility	2 BIT	0 ... 3	49618	49844	50070	num
vis_FAn	49376	RW	Fans Folder Visibility	2 BIT	0 ... 3	49618	49844	50070	num
vis_AL	49376	RW	Alarm Folder Visibility	2 BIT	0 ... 3	49618	49844	50070	num
vis_CPr	49377	RW	Low Temperature Protection Folder Visibility	2 BIT	0 ... 3	49619	49845	50071	num
vis_Lit	49377	RW	Digital Input and Light Folder Visibility	2 BIT	0 ... 3	49619	49845	50071	num
vis_PrE	49377	RW	Pressure Switch Visibility	2 BIT	0 ... 3	49619	49845	50071	num
vis_dEC	49377	RW	Deep Cooling Folder Visibility	2 BIT	0 ... 3	49619	49845	50071	num
vis_EnS	49378	RW	Energy Saving Folder Visibility	2 BIT	0 ... 3	49620	49846	50072	num
vis_Add	49372	RW	Communication Folder Visibility	2 BIT	0 ... 3				num
vis_diS	49378	RW	Display Folder Visibility	2 BIT	0 ... 3	49620	49846	50072	num
vis_CnF	49378	RW	Configuration Folder Visibility	2 BIT	0 ... 3	49620	49846	50072	num
vis_FPr	49378	RW	Copy Card Folder Visibility	2 BIT	0 ... 3	49620	49846	50072	num
vis_PA2	49418	RW	Password 2 Folder Visibility	2 BIT	0 ... 3	49662	49888	50114	num

7.6.3. Client Table

LABEL	ADDRESS	R/W	DESCRIPTION	DATA SIZE	RANGE	M.U.
AI1	353	RW	Analogue input (display) 1	WORD	-67.0 … 320	°C/°F
AI2	355	RW	Analogical Input (display) 2	WORD	-67.0 … 320	°C/°F
AI3	357	RW	Analogue Input (display) 3	WORD	-67.0 … 320	°C/°F
Set	600	RW	Control set point value 1	WORD	-67.0 … 320	°C/°F
DI1	33114	RW	Digital input 1 status	1 BIT	0 … 1	num
DI1-LVD	33114	RW	Digital input 1 status	1 BIT	0 … 1	num
DI2	33114	RW	Digital input status 2	1 BIT	0 … 1	num
E1	32876	RW	Analogical input fault 1	1 BIT	0 … 1	num
E2	32876	RW	Analogical input fault 2	1 BIT	0 … 1	num
E3	32877	RW	Analogical input fault 3	1 BIT	0 … 1	num
PA	32876	RW	Critical pressure alarm	1 BIT	0 … 1	num
nPA	32878	RW	Pressure switch alarm	1 BIT	0 … 1	num
EA	32876	RW	Digital input external alarm	1 BIT	0 … 1	num
AH1	32876	RW	High analogical input 1 alarm	1 BIT	0 … 1	num
AL1	32876	RW	Analogical input basic alarm 1	1 BIT	0 … 1	num
OPd	32876	RW	Door open alarm	1 BIT	0 … 1	num
TOut_SBR	32878	RW	Defrost timeout	1 BIT	0 … 1	num
COH	32876	RW	Compressor Over Heating (alarm COH)	1 BIT	0 … 1	num
RL1	32827	RW	Relay 1	1 BIT	0 … 1	num
RL2	32827	RW	Relay 2	1 BIT	0 … 1	num
RL3	32827	RW	Relay 3	1 BIT	0 … 1	num
RL4	32827	RW	Relay 4	1 BIT	0 … 1	num
RL5	32827	RW	Relay 5	1 BIT	0 … 1	num
Comp1	32887	RW	Compressor step request 1	1 BIT	0 … 1	num
Comp2	32895	RW	Compressor step request 2	1 BIT	0 … 1	num
DEFRON1	32887	RW	Defrost 1 status	1 BIT	0 … 1	num
DEFRON2	32896	RW	Defrosting status 2	1 BIT	0 … 1	num
Fan	32889	RW	Evaporator fan status	1 BIT	0 … 1	num
Alarm	32892	RW	Alarm status	1 BIT	0 … 1	num
Reduced set	32882	RW	Reduced Set regulator	1 BIT	0 … 1	num
AUX	32882	RW	Auxiliary Status	1 BIT	0 … 1	num
modify parameters	32882	RW	Flag Parameters modified	1 BIT	0 … 1	num
stand-by	32883	RW	Access Device Status	1 BIT	0 … 1	num
Economy	32882	RW	Energy saving flag function active	1 BIT	0 … 1	num
door	32891	RW	Door status	1 BIT	0 … 1	num
Att_Sbr	32865	RW	Manual defrost activation	1 BIT	0 … 1	num
Att_SetR	32865	RW	Activate Economy mode	1 BIT	0 … 1	num
Disatt_SetR	32865	RW	Deactivate Economy mode	1 BIT	0 … 1	num
TelRSetPar	32865	RW	Reset flag parameters changed	1 BIT	0 … 1	num
ROnAux	32865	RW	Auxiliary On	1 BIT	0 … 1	num
ROffAux	32865	RW	Auxiliary Off	1 BIT	0 … 1	num
ROnOn	32865	RW	Device On	1 BIT	0 … 1	num
ROffOff	32865	RW	Instrument Off	1 BIT	0 … 1	num
AttEnSav	32866	RW	Energy saving function activation	1 BIT	0 … 1	num
DisattEnSav	32866	RW	Disable energy saving function	1 BIT	0 … 1	num

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