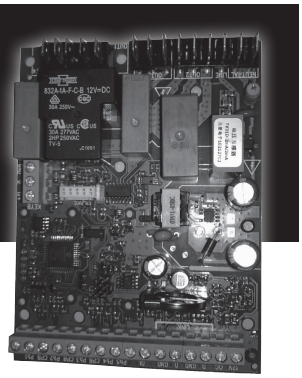
RTN400

Controllers for freezer cabinet and cold rooms with built-in compressor.

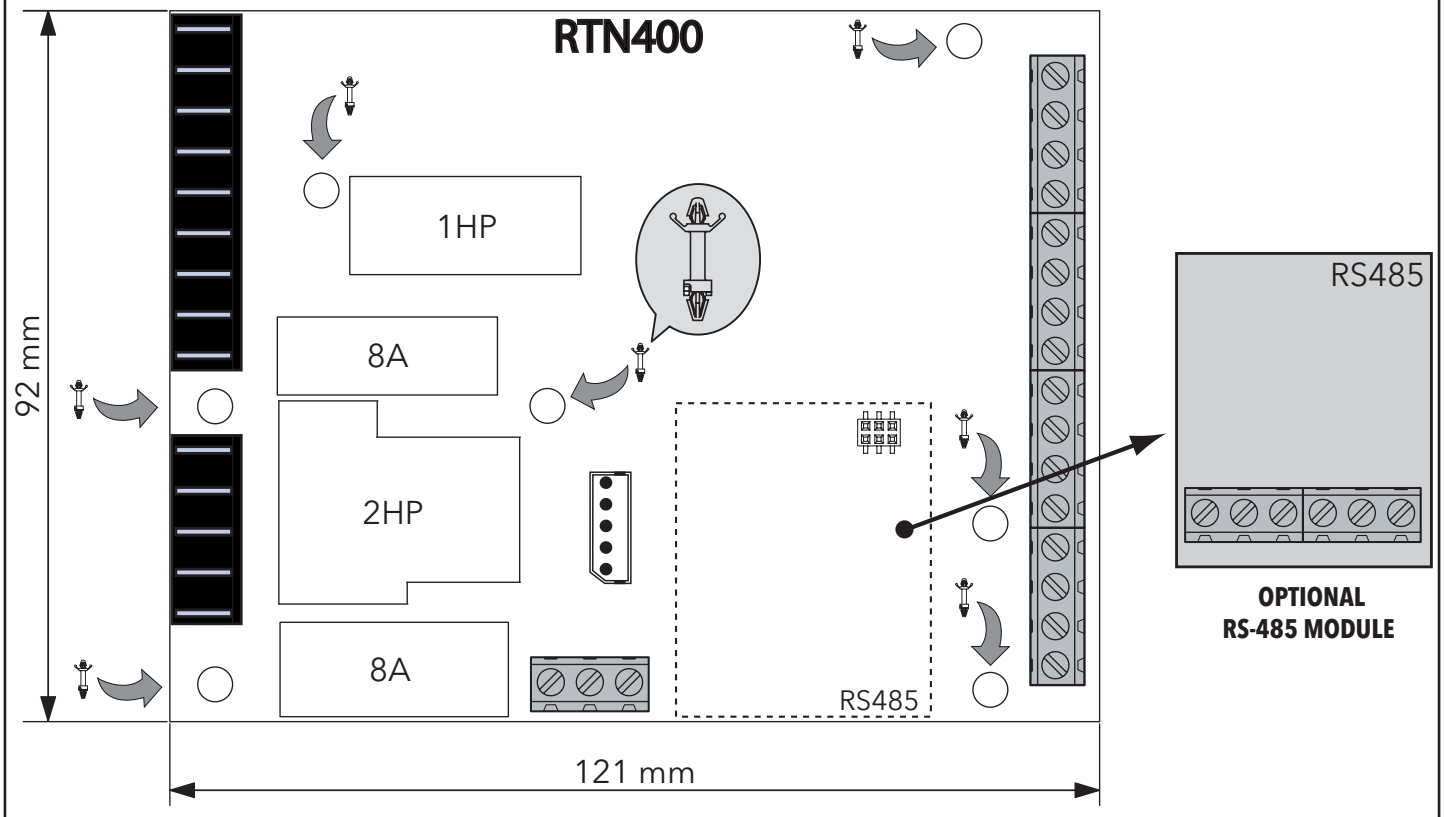


- Panel-mounted
- Energy Saving algorithms and optimised defrost control
- 8 preloaded applications
- Defrost at single/double evaporator
- Frame heater
- Local network auto-configuration
- Direct load connection (up to 2 HP)
- Supply voltage control LVD
- Easy to refit in Eliwell and third-party systems
- Presence of an open collector output

MECHANICAL INSTALLATION

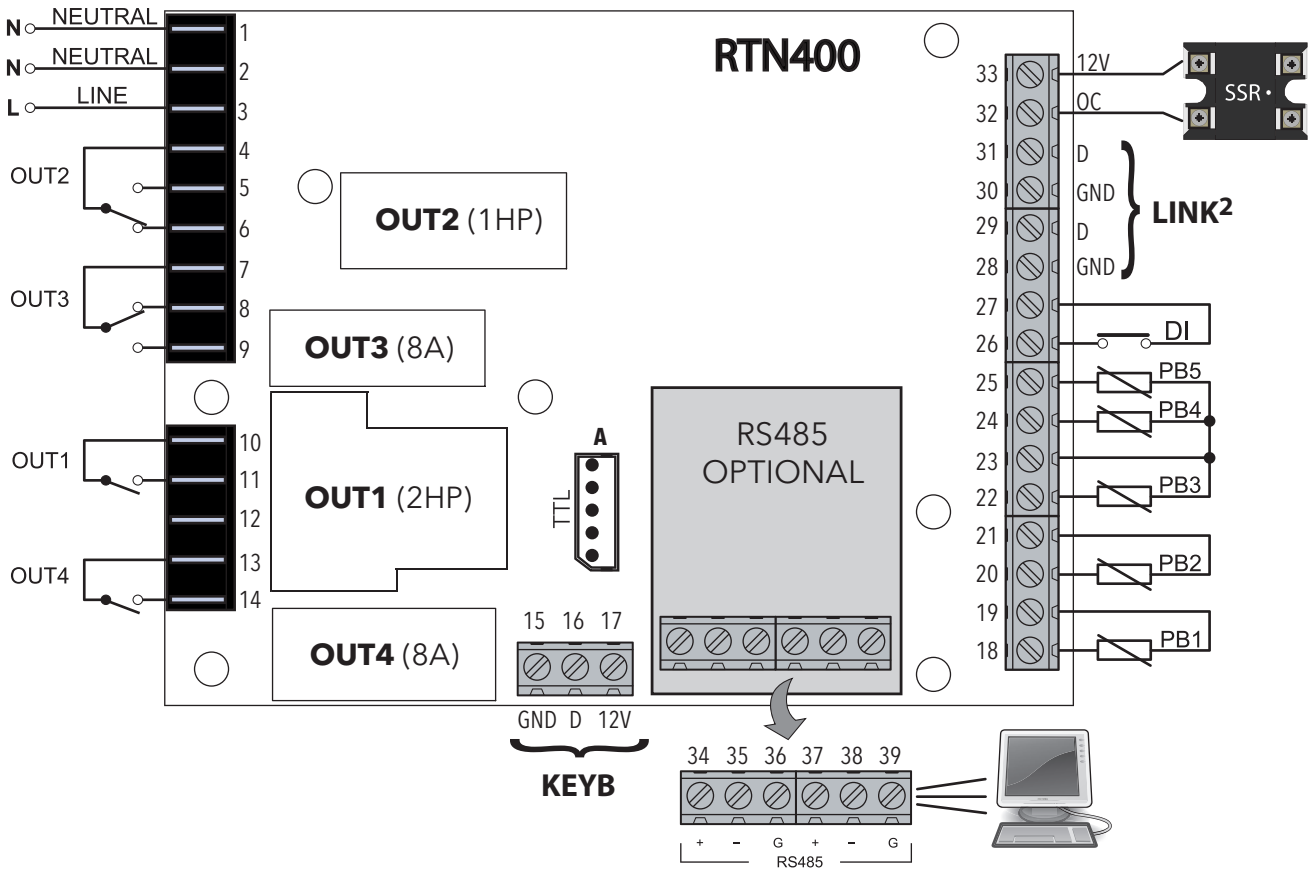
Do not install the device in places subject to high humidity and/or dirt; it is intended for use in sites with ordinary or normal levels of pollution.
Keep the area around the instrument cooling slots adequately ventilated.

RTN400



: identifies all holes to be used to assemble spacers.

WIRING DIAGRAM



* **NOTE:** analogue inputs PB1...PB5 can also be configured as Digital Inputs DI.

TERMINALS				
1-2	NEUTRAL. These are power supply terminals.		**15-16-17**	Connection to KDEPlus or KDWPlus external keyboard or ECPlus echo module.
3	LINE. These are power supply terminals.		**19-18**	PB1 probe connection.
4	OUT2 Shared Terminal		**21-20**	PB2 probe connection.
5	N.O. OUT2		**23-22**	PB3 probe connection.
6	N.C. OUT2		**23-24**	PB4 probe connection.
7	OUT3 Shared Terminal		**23-25**	PB5 probe connection.
8	N.C. OUT3		**27-26**	Digital input (DI).
9	N.O. OUT3		**28-29**	LINK². Connection 1 - Local area network.
10	OUT1 Shared Terminal		**30-31**	LINK². Connection 2 - Local area network.
11	N.O. OUT1		**32-33**	Open Collector Output (OC).
12	Not Used		**A**	TTL Unicard/DMI/Multi Function Key connection
13	OUT4 Shared Terminal		**34-35-36**	RS485. Connection 1 - Supervision Gateway.
14	N.O. OUT4		**37-38-39**	RS485. Connection 2 - Supervision Gateway.

DEFAULT APPLICATIONS

DESCRIPTION OF APPLICATIONS

AP1 (Dairy Products and Fruit/Vegetables):
Vertical cabinet/Serve over counter MT (2°C) - defrost cycle with the compressor stopped
- 1 probe.

AP2 (Dairy Products and Fruit/Vegetables):
Vertical cabinet/Serve over counter MT (-4°C) - resistance defrost (device hours)
- 2 probes.

AP3 (Frozen Foods):
Island/Glass Door Cabinet LT (-22°C) - resistance defrost (device hours)
- evaporator fans (FCO=2, duty cycle always ON in case of probe error)
- 2 probes.

AP4 (Frozen Foods):
Island/Glass Door Cabinet LT (-25°C) - resistance defrost (device hours)
- evaporator fans (FCO=2, duty cycle always ON in case of probe error)
- Frame Heater
- 2 probes.

AP5-6-7-8 (Dairy Products and Fruit/Vegetables):
Same parameters of application **AP1**.

FUNCTION	AP1	AP2	AP3	AP4	AP5	AP6	AP7	AP8
INPUT								
PB1 (NTC)	**REG1**	**REG1**	**REG1**	**REG1**	**REG1**	**REG1**	**REG1**	**REG1**
PB2 (NTC)		❄	❄/✣	❄				
PB3 (NTC)								
PB4 (NTC)								
PB5 (NTC)								
DI (par. **H18**)	**AUX**	**AUX**	**AUX**	**AUX**	**AUX**	**AUX**	**AUX**	**AUX**
OUTPUT								
OUT1 (2Hp relay)								
OUT2 (16A relay)		❄	❄	❄				
OUT3 (8A relay)	((●))	((●))	✣	✣	((●))	((●))	((●))	((●))
OUT4 (8A relay)	(AUX)	(AUX)	(AUX)	(AUX)	(AUX)	(AUX)	(AUX)	(AUX)
OC			((●))	Frame Heater				

CONTROL

RTN400 always regulates in standard mode.
The regulator will activate when the temperature exceeds T > SP1+dF1 and disables when T < SP1.
For these applications, the regulation differential is managed as a relative value.

LOCAL AND MONITORING NETWORK

A local network (LINK²) can comprise up to 8 RTN400 devices and allows only one of the devices to be connected to the Modbus supervision network.

The LINK² network allows you to simplify the supervision network cabling. More specifically, the RS485 supervision line can be connected to any of the LINK² boards. The latter will automatically "sort" communication with other boards. The RS485 network does not need any specific configuration for addresses as it uses those set for network supervision (Adr parameter).

The related parameters are as follows:

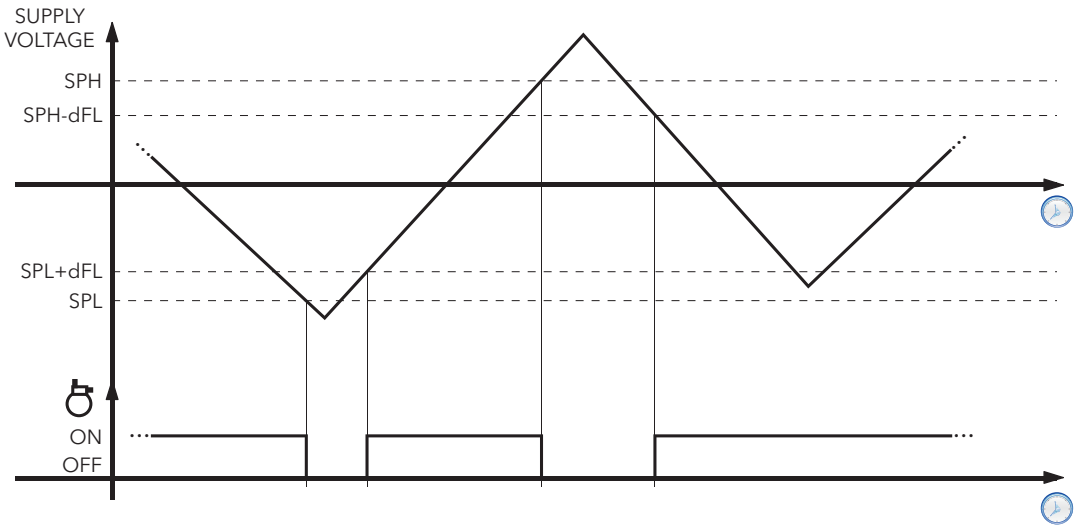
PAR.	DESCRIPTION	RANGE	AP1	AP2	AP3	AP4	AP5	AP6	AP7	AP8	M.U.
L00	Selects which probe to share: **diS** (0) = disabled **Pb1** (1) = will share probe Pb1 **Pb2** (2) = will share probe Pb2 **Pb3** (3) = will share probe Pb3 **Pb4** (4) = will share probe Pb4 **Pb5** (5) = will share probe Pb5 **Pbi** (6) = will share probe Pb6	diS, Pb1...Pb5, Pbi	diS	diS	diS	diS	diS	diS	diS	diS	num
L01	Shares the displayed value with the LAN.	0/1/2	0	0	0	0	0	0	0	0	num
L02	Sends setpoint value to the LAN network when it has been modified. **no** (0) = no; **yES** (1) = yes.	no/yES	no	no	no	no	no	no	no	no	flag
L03	Enables sending the defrost request to the LAN network. **no** (0) = no; **yES** (1) = yes.	no/yES	no	no	no	no	no	no	no	no	flag
L04	Defrost end mode. **ind** (0) = independent; **dEP** (1) = dependent.	no/yES	ind	ind	ind	ind	ind	ind	ind	ind	flag
L05	Enables synchronization of the Standby command. **no** (0) = no; **yES** (1) = yes.	no/yES	no	no	no	no	no	no	no	no	flag
L06	Enables synchronization of the lights command. **no** (0) = no; **yES** (1) = yes.	no/yES	no	no	no	no	no	no	no	no	flag
L07	Enables synchronization of the Energy Saving command. **no** (0) = no; **yES** (1) = yes.	no/yES	no	no	no	no	no	no	no	no	flag
L08	Enables synchronization of the AUX command. **no** (0) = no; **yES** (1) = yes.	no/yES	no	no	no	no	no	no	no	no	flag
L10	Sets the time delay to be set after the end of dependent defrosts.	0...250	30	30	30	30	30	30	30	30	min

SUPPLY VOLTAGE CONTROL

The supply voltage can be monitored by means of a dedicated analog input.
When the voltage is lower than the minimum threshold value (set by parameter **SPL**) or when it exceeds the maximum threshold value (set by parameter **SPH**), the outputs are deactivated (one, two or all outputs, depending on the value set at parameter **SoU**).
When the voltage exceeds the value **SPL+dFL** or when it is lower than the value **SPH-dFL**, the outputs are activated again, taking into consideration also the delays possibly set. If **SPL/SPH**=0, the low/high voltage control is deactivated.
Here below you can find the regulation diagrams and an example of the functioning of the compressor:

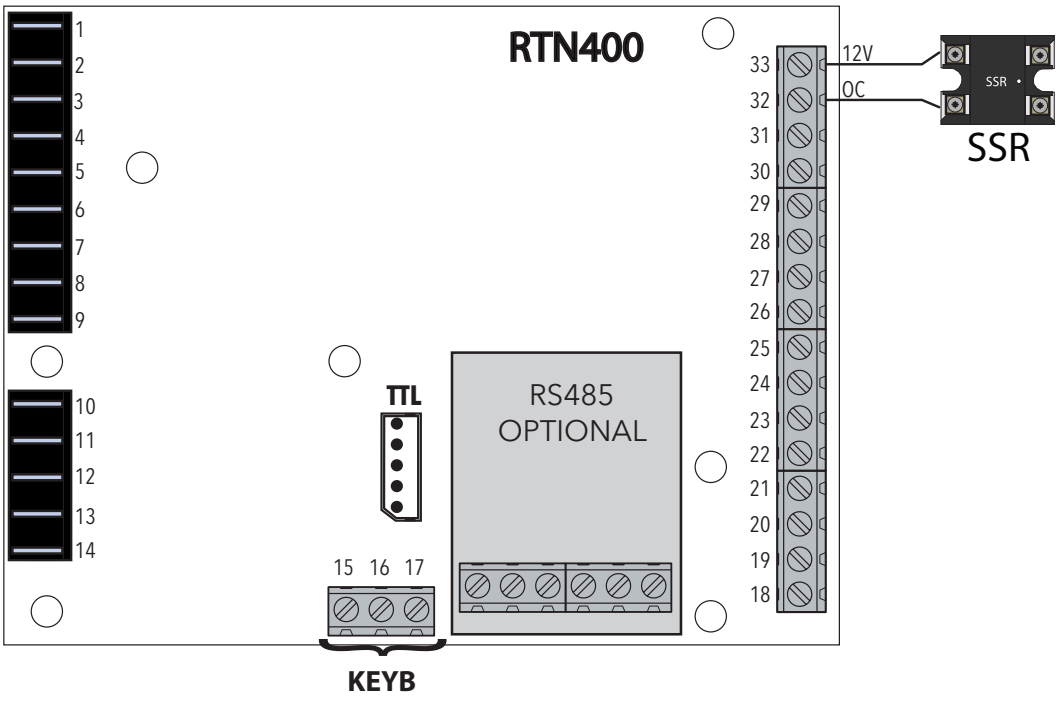
REGULATOR

Example of COMPRESSOR FUNCTIONING



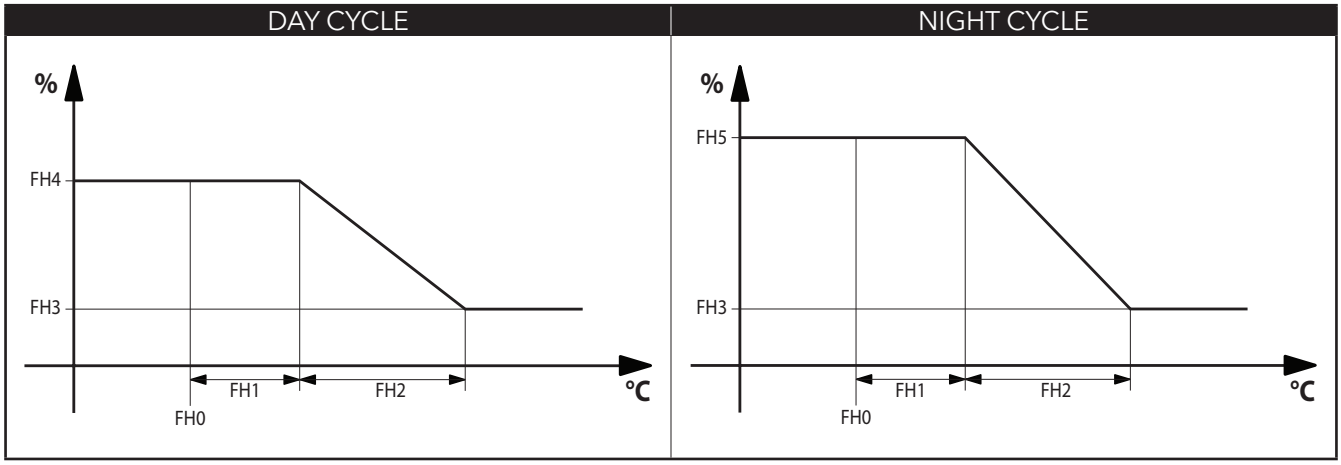
FRAME HEATER

This regulator makes it possible to activate the anti-sweat heaters of a display window or refrigerated cabinet.
The instrument can be used to control an OC relay output (external SSR controlled by means of an Open Collector output).
A connection example is given below:



Control can be:

- fixed Duty Cycle (with actuation percentage fixed at FH4).
- modulating based on the value read by the frame heater probe (see chart).

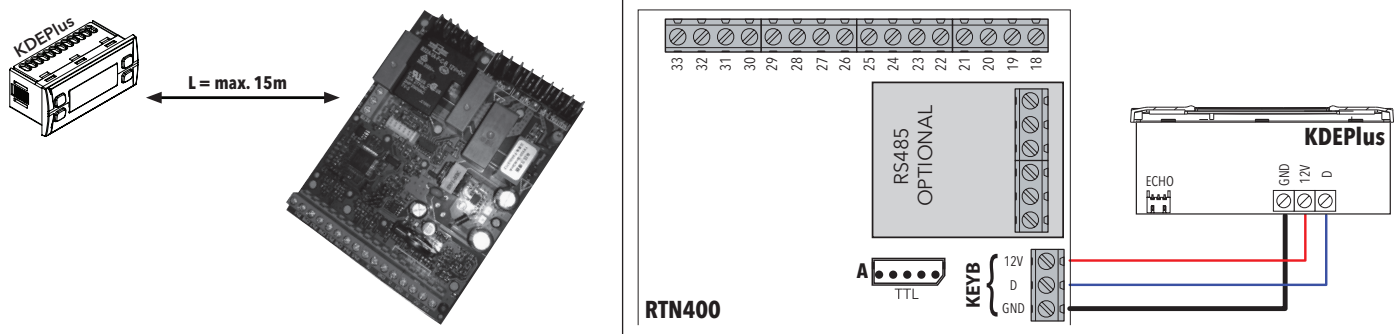


PAR.	DESCRIPTION	RANGE	AP1	AP2	AP3	AP4	AP5	AP6	AP7	AP8	M.U.
FH	Selects which probe will be used by the anti-sweat heaters (Frame Heater): **diS** (0) = disabled; **dc** (1) = operates in Duty Cycle mode **Pb1** (2) = will use probe Pb1; **Pb2** (3) = will use probe Pb2 **Pb3** (4) = will use probe Pb3; **Pb4** (5) = will use probe Pb4 **Pb5** (6) = will use probe Pb5; **Pbi** (7) = will use virtual probe	diS, dc, Pb1...Pb5, Pbi	dc	dc	dc	dc	dc		dc	Pb4	num
FHt	Frame Heater running time. **NOTE** = only used when OC output is used with SSR relay.	1...2500	30	30	30	30	30		30	30	secs*10
FH0	Sets setpoint for Frame Heater.	-58.0...302	0.0	0.0	0.0	0.0	0.0		0.0	0.0	°C/°F
FH1	Sets offset for Frame Heater.	0.0...25.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	°C/°F
FH2	Sets band for Frame Heater.	0.0...25.0	0.0	0.0	0.0	0.0	0.0		0.0	100.0	°C/°F
FH3	Sets minimum percentage for Frame Heater.	0...100	0	0	0	0	0		0	20	%
FH4	Sets maximum percentage for day Duty Cycle.	0...100	75	75	75	75	75		75	100	%
FH5	Sets maximum percentage for night Duty Cycle.	0...100	50	50	50	50	50		50	80	%
FH6	Sets percentage during defrost.	0...100	100	100	100	100	100		100	100	%

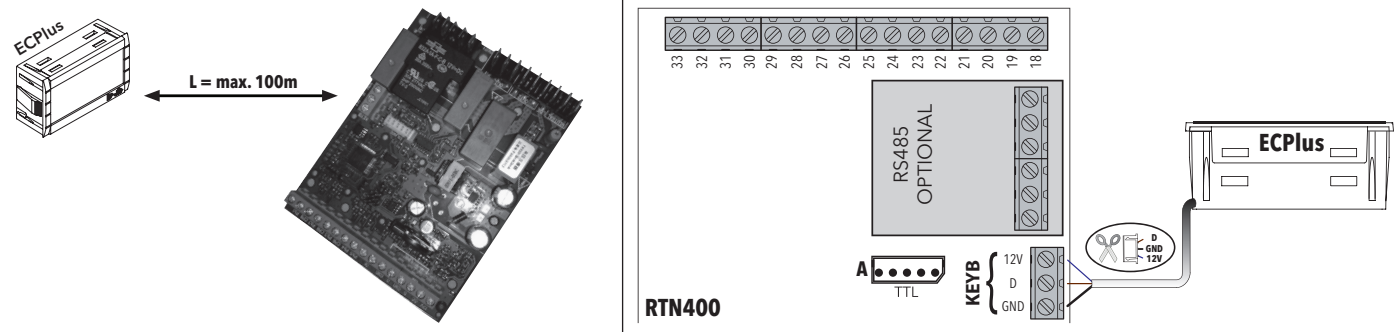
CONNECTIONS WITH USER TERMINAL AND REMOTE DISPLAY

Each power board can be connected to a single **KDEPlus** or **KDWPlus** keypad (user terminal) and if required to an **ECPlus** module (remote display) by means of the connector located on the keypad.

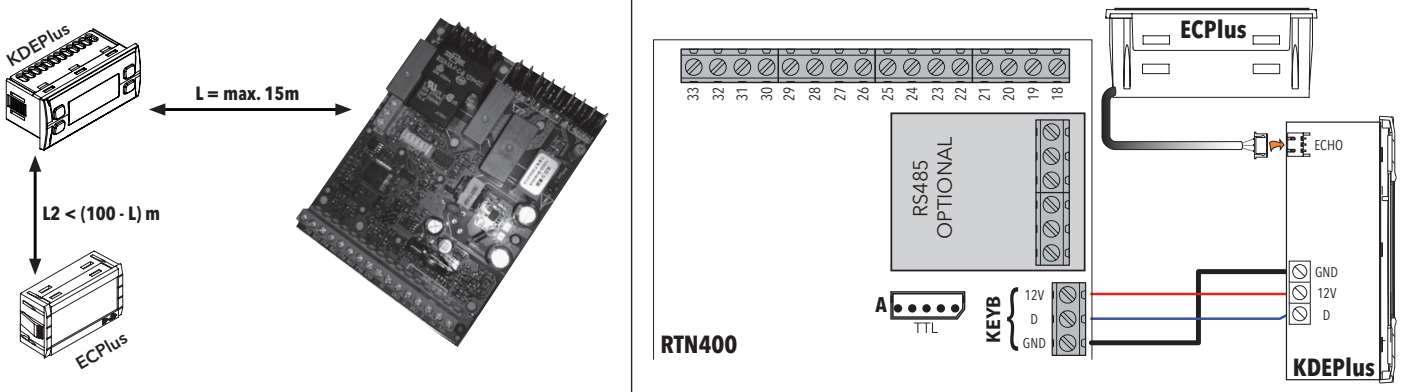
RTN400 + KDEPlus CONNECTION



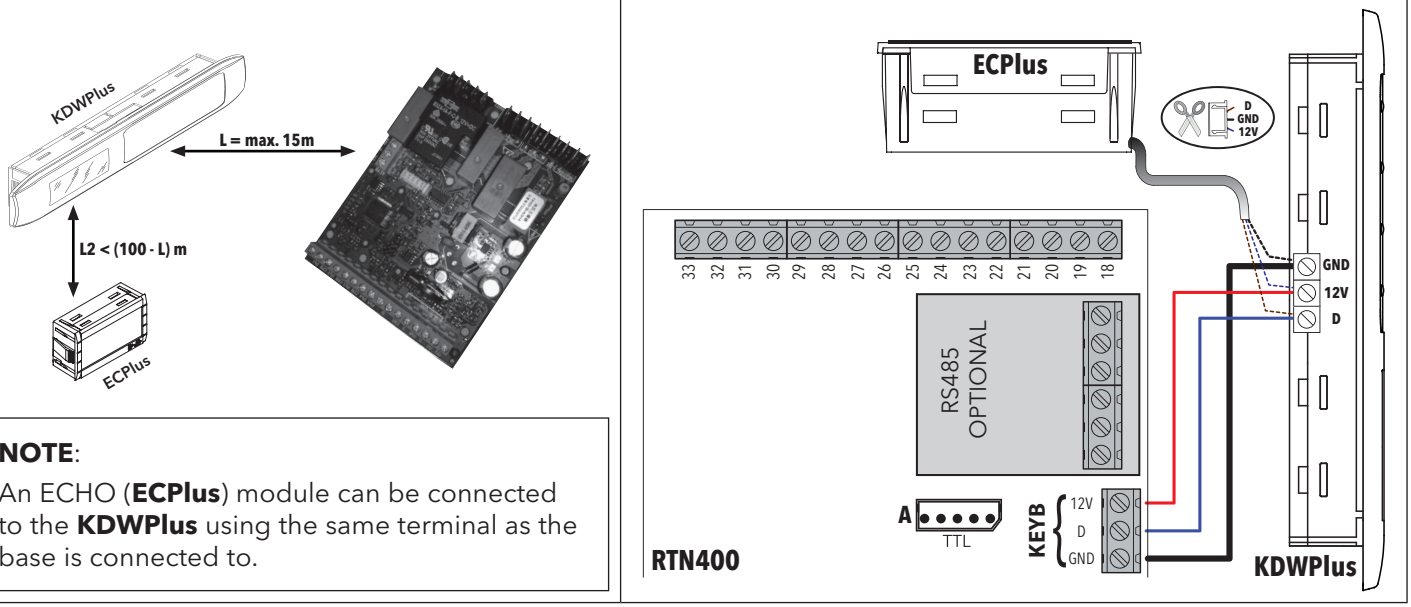
RTN400 + ECPlus CONNECTION



RTN400 + KDEPlus + ECPlus CONNECTION



RTN400 + KDWPlus + ECPlus CONNECTION



NOTE:
An ECHO (**ECPlus**) module can be connected to the **KDWPlus** using the same terminal as the base is connected to.

KDEPlus and KDWPlus KEYPAD INTERFACE

KDEPlus

KDWPlus

KDEPlus KEYS

UP
Press and release
Scroll through menu options
Increases values
Press for at least 5 sec
Defrost manual activation
User-configurable function (par. H31)

DOWN
Press and release
Scroll through menu options
Decreases values
Press for at least 5 sec
User-configurable function (par. H32)

STANDBY (ESC)
Press and release
Returns to the previous menu level
Confirms parameter value
Press for at least 5 secs
Manual activation of Stand-by
User-configured function (par. H33)

SET (ENTER)
Press and release
Displays any alarms (if active)
Opens Machine Status menu
Confirms commands
Press for at least 5 sec
Opens Programming menu

NOTE:
The 2 KDEPlus and KDWPlus keypads are equivalent and guarantee the same functions.

KDWPlus KEYS

UP
Press and release
Scroll through menu options
Increases values
Press for at least 5 sec
User-configurable function (par. H31)

DOWN
Press and release
Scroll through menu options
Decreases values
Press for at least 5 sec
User-configurable function (par. H32)

STANDBY
Press and release
Returns to the previous menu level
Confirms parameter value
Press for at least 5 secs
Manual activation of Stand-by
User-configured function (par. H33)

SET (ENTER)
Press and release
Displays any alarms (if active)
Opens Machine Status menu
Confirms commands
Press for at least 5 sec
Opens Programming menu

DEFROST (ESC)
Press and release
Manual defrost activation
Returns to the previous menu level

AUX / LIGHT
Press and release
Activates the AUX output / Switches on the light

ICONS/DISPLAY

Reduced Set/Economy LED
Permanently on: Energy Saving active
Blinking: reduced setpoint active
Off: otherwise

Alarms LED
Permanently on: alarm present
Blinking: alarm acknowledged
Off: otherwise

Compressor LED
Permanently on: compressor on
Blinking: delay, protection or start blocked
Off: otherwise

Defrost LED
Permanently on: output active
Blinking: activated manually or from DI
Off: otherwise

Fans LED
Permanently on: fans on
Off: otherwise

Aux LED
Permanently on: aux output active and/or light on
Blinking: Deep cooling on

°C LED
Permanently on: °C setting (dro =0)
Off: otherwise

°F LED
Permanently on: °F setting (dro =1)
Off: otherwise

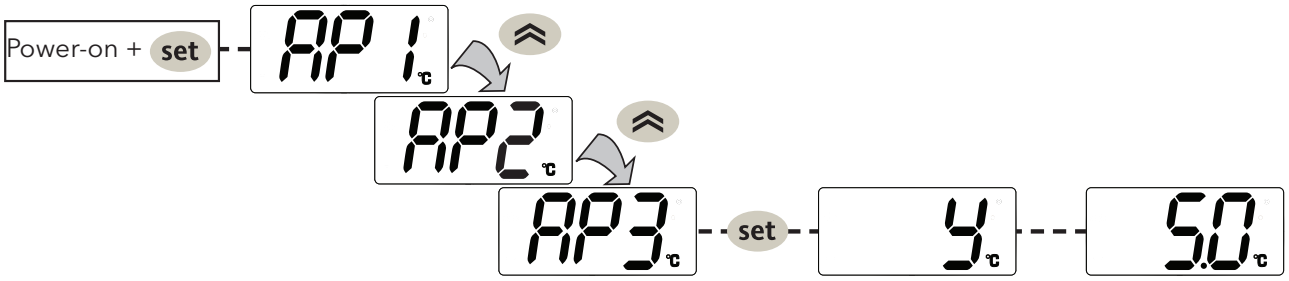
LED (KDWPlus ONLY)

RH%	Forces fan on (Hxx = 15)		Locked keypad
Aux	Light relay on from key		Defrost ON
	Device off		

LOADING DEFAULT 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.
- Scroll through the various applications ("AP1"... "AP8") using the ⩓ and ⩔ keys.
- Select the application you want using the SET key ("AP3" in the example) or cancel the operation by pressing the ⏻ key or by timeout.
- If the operation is successful, the display will show "yES", if not it will show "no".
- The instrument will reset and the lamp test will be performed.
- After a few seconds the instrument will return to the main display.



RESET PROCEDURE

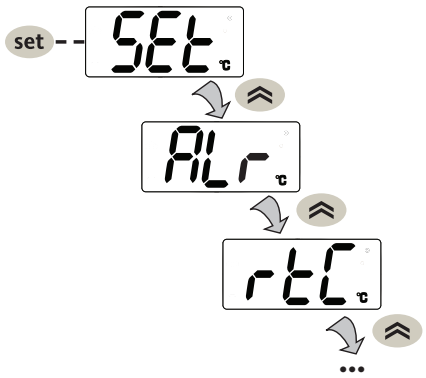
RTN400 instrument can be **RESET** and the default factory settings restored in a simple and user-friendly way. This is done by simply reloading one of the basic applications (see "Loading default applications").

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 AP1 values).

IMPORTANT! This operation restores the instrument to its initial state, returning all parameters to their default values. This means that all changes made to operating parameters will be lost.

MACHINE STATUS MENU

Access the "Machine Status" menu by pressing and releasing the SET key. If no alarms are active, the "SEt" label appears. By pressing the ⩓ and ⩔ keys you can scroll through all the folders in the menu:



- SEt: setpoint programming;
- ALr: alarms folder (only visible if an alarm is active).
- rtC: clock parameters folder - contains:
  - dAy: day of week
  - h: hours
  - ': minutes
- Pb1...Pb5: value of probes Pb1...Pb5
- idF: firmware mask number;
- reL: firmware release number;
- LAn: displays how many instruments of the Link2 have been recognized (if the instrument is off the network **LAn=0**).

Programming the setpoint: To display the Setpoint value press the SET key when the "SEt" label is displayed. The Setpoint value appears on the display. To change the Setpoint value, press the ⩓ and ⩔ keys within 15 seconds. Press SET to confirm the modification.

Displaying the probes: When labels Pb1 ... Pb5 are displayed, pressing the key shows the value measured by the associated probe (NOTE: the value cannot be modified).

PROGRAMMING MENU

To access the "Programming" menu hold down the SET key for more than 5 seconds. If enabled, the instrument will request an access PASSWORD, either **PA1** for "User" parameters or **PA2** for "Installer" parameters (see "PASSWORD" section).

"**User**" parameters: When accessed the display will show the first parameter (e.g. "**diF**"). Press ⩓ and ⩔ to scroll through all of the parameters in the current level. Select the desired parameter by pressing SET Press ⩓ and ⩔ to change it and SET to save the changes.

"**Installer**" parameters: When accessed the display will show the first folder (e.g. "**CP**"). (For the list of "Installer" parameters, see the User Manual which can be downloaded from the Eliwell website).

NOTE: It is strongly recommended that you switch the device off and on again each time the parameter configuration is changed, in order to prevent malfunctioning of the configuration and/or ongoing timings.

KEYBOARD SHARED ON LINK²

From each device of a Link² network it is possible, using the local keyboard, to navigate in any one of the other devices connected in the Link².

This menu is activated, from the default menu, by simultaneously holding down the ⌃⌃ and ⏻ keys for 5 seconds. When remote display is active, the **°C** and **°F** icons blink.

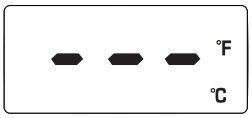
You will be asked to type in the value of **Adr**.

To return to the default menu:

- Hold down the ⌃⌃ and ⏻ keys for 5 seconds;
- By time-out, 60 seconds after a key was last pressed.

During "remote control of the display", the local keyboard (of the device of which the display has been remote controlled) is blocked. It is released 3 seconds after the release of the viewing of the display.

If the connection is lost during "remote control" viewing, the display will show:



PASSWORD

Password **PA1**: allows access to the "User" parameters. By default the password is disabled (**PS1=0**).
Password **PA2**: allows access to "Installer" parameters. By default the password is enabled (**PS2=15**).
(For more details, see the User Manual which can be downloaded from the Eliwell website).

The visibility of "PA2" is:

1) **PA1** and **PA2≠0**: Press and hold SET for longer than 5 seconds to display PA1 and PA2. You can then decide whether to access the "User" parameters (PA1) or the "Installer" parameters (PA2).
2) **Otherwise**: Password **PA2** is at the end of the level1 parameters. If enabled, it will be required in order to access "Installer" parameters.

Press SET for password entering, use ⌃⌃ / ⌄⌄ for value changing and SET for confirmation.

NOTE: If the entered value is incorrect, the label PA1/PA2 will be displayed once again and the procedure must be repeated.

FIRMWARE BOOT LOADER

The instrument is equipped with a Boot Loader, so it is possible to update the Firmware directly on the field.
Updating may be carried out using UNICARD or MULTI FUNCTION KEY (MFK).

Updating procedure:

- Connect the UNICARD/MFK equipped with the application;
- Power the instrument if it is off, otherwise switch it off and on again
  NOTE: the UNICARD/MFK can be connected even with the instrument powered.
- Wait until the led of the UNICARD/MFK is blinking (operation in progress);
- The operation will be concluded when the Led of the UNICARD/MFK is:
  - **ON**: operation concluded correctly;
  - **OFF**: operation not performed (application not compatible ...)

  ATTENTION: the led display is guaranteed only for UNICARDS produced from week 18-12 onward.

In order to download the Firmware application on the UNICARD (in CLONE mode as used for parameters maps) you must use the Device Manager (version 05.00.06 or later), which you can download from the Eliwell site after having registered at level 2.

NOTE: with this version of the Device Manager the UNICARD can be connected DIRECTLY without using the DMI.

CLOCK (RTC)

The clock can be used to set defrost times (6 time bands for weekdays and 6 time bands for weekends/public holidays), periodic defrost (every **n** days) and daily events (1 event for weekdays and 1 event for weekends/public holidays).

Description	Range	UM
Current time: minutes	0...59	min
Current time: hours	0...23	hours
Current time: day (**0** = Sunday; **1** = Monday; ... ; **6** = Saturday)	0...6	days

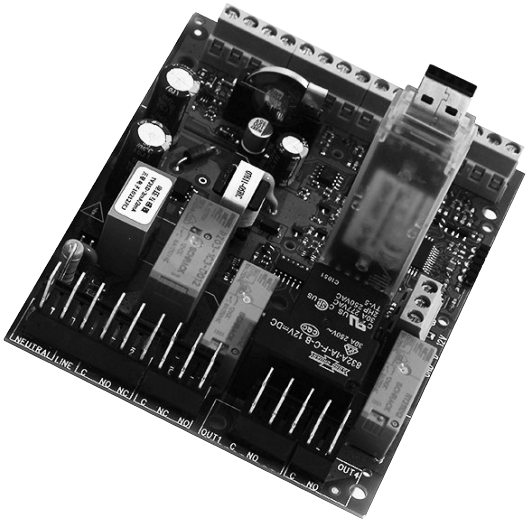
Time band defrosts and periodic defrost operate in a mutually exclusively way (they do not operate at the same time). If defrost by RTC has been enabled and the clock has failed, the defrost will run according to the mode set in **dit** (provided ≠ 0).

UNICARD / MULTI FUNCTION KEY

The Unicard/Multi Function Key must be connected to the serial port (TTL); it allows the rapid programming of instrument parameters. Access the "Installer" parameters by entering PA2, scroll through the folders using ⌃⌃ and ⌄⌄ until folder FPr is displayed. Select it using SET, scroll through the parameters using ⌃⌃ and ⌄⌄ and select the function using SET (e.g. UL).

- **Upload** (UL): select UL and press SET. This function uploads the programming parameters from the instrument to the card. If the operation is successful, the display will show "**yES**", otherwise it will show "**no**".
- **Format** (Fr): This command is used to format the Unicard/Multi function key (recommended when using for the first time).
  IMPORTANT!: the Fr parameter deletes all data present. This operation cannot be reversed.
- **Download**: Connect the Unicard/Multi Function Key with the instrument switched off. At power-on, data will automatically start downloading from the Unicard/Multi Function Key to the controller. At the end of the lamp test, the display will show "**dLy**" if the operation was successful and "**dLn**" if it failed.

NOTE: After the download, the instrument will use the newly uploaded map settings.



DEVICE MANAGER

RTN400 can interface with "Device Manager" software through the DMI interface.
This connection allows the value/visibility of fixed parameters and parameters present in vectors to be controlled via computer. The connection takes place directly on the instrument in the case of Unicard.

'USER' PARAMETERS TABLE

NOTE: for the full list of parameters, refer to the user manual available on the Eliwell website.

PAR.	DESCRIPTION	M.U.	RANGE	AP1-AP5-AP6-AP7-AP8	AP2	AP3	AP4
SP1	Temperature control SEtpoint **The SEtpoint is only visible in the "machine status" menu.**	°C/°F	LS1 ... HS1	2.0	-4.0	-22.0	-25.0
dF1	Activation differential (absolute or relative). **NOTA: dF1 ≠ 0.**	°C/°F	-58.0 ... 302	4.0	4.0	2.0	2.0
HS1	Maximum value assignable to setpoint SP1. **NOTE: The two setpoints are interdependent: HS1 cannot be less than LS1 and vice versa.**	°C/°F	LS1 ... HdL	10.0	10.0	-10.0	-10.0
LS1	Minimum value assignable to setpoint SP1. **NOTE: The two setpoints are interdependent: LS1 cannot be greater than HS1 and vice versa.**	°C/°F	LdL ... HS1	-10.0	-10.0	-30.0	-30.0
dit	Interval between the start of two consecutive defrost cycles. **0** = function disabled (**defrost NEVER run**).	hours	0 ... 250	12	9	25	25
dE1	Evaporator 1 defrost time-out; determines the maximum duration of defrost on evaporator 1.	min	1 ... 250	50	70	60	60
dS1	Defrost 1 end temperature (referred to evaporator 1) (only if **dP1 ≠ diS**).	°C/°F	-58.0 ... 302	10.0	10.0	12.0	12.0
dPH	Periodic defrost start time (only if **dCt ≠ 4**). **0 ... 23** = start hour; **24** = disabled.	hours	0 ... 24	24	24	24	24
dPn	Periodic defrost start minutes (only if **dCt = 4**).	min	0 ... 59	0	0	0	0
dPd	Interval between one defrost and next (periodic function) (only if **dCt = 4**).	days	1 ... 7	1	1	1	1
FSt	Fans block temperature; if the value read is greater than FSt, the fans are stopped (only if **FP1 ≠ diS**).	°C/°F	-58.0...302			-3.0	-3.0
Fdt	Fans activation delay after a defrost cycle.	min	0 ... 250			5	5
dt	drainage time. Coil drainage time.	min	0 ... 250			5	5
dFd	Evaporator fans operating mode during defrost. **OFF** (0) = Fans Off; **On** (1) = Fans On.	flag	OFF/On			On	On
HA1	Probe 1 maximum alarm. Temperature value (intended either as distance from setpoint or as an absolute value based on **Att**) which, if exceeded in an upward direction, triggers the activation of the alarm signal.	°C/°F	LA1...302	10.0	10.0	-15.0	-15.0
LA1	Probe 1 minimum alarm. Temperature value (intended as distance from setpoint or as an absolute value based on **Att**) which, when exceeded downwards, triggers the activation of the alarm signal.	°C/°F	-58.0...HA1	-5.0	-10.0	-40.0	-40.0
AOP	Alarm output polarity. **0** = alarm active and output disabled; **1** = alarm active and output enabled.	num	0/1	0 - (Parameter not present in vectors)			
FH0	Configuration of relative setpoint for frame heater (only if **FH ≠ diS** and **FH ≠ dc**).	°C/°F	-58.0...302				0.0
FH1	Configuration of relative offset for frame heater (only if **FH ≠ diS** and **FH ≠ dc**).	°C/°F	0.0 ... 25.0				0.0
FH2	Configuration of relative band for frame heater (only if **FH ≠ diS** and **FH ≠ dc**).	°C/°F	0.0 ... 25.0				20.0
FH3	Configuration of minimum percentage for frame heater (only if **FH≠diS** and **FH≠dc**).	%	0 ... 100				0
FH4	Configuration of maximum percentage for day Duty Cycle.	%	0 ... 100				75
FH5	Configuration of maximum percentage for night Duty Cycle.	%	0 ... 100				50
FH6	Configuration of percentage during defrosting.	%	0 ... 100				100
PS1	PAssword 1. When enabled (**PS1≠0**) this is the access key to level 1 parameters (**User**).	num	0 ... 250	0	0	0	0
CA1	Probe **Pb1** calibration (only if **H41 = Pro**). Positive or negative temperature value added to the value read by **Pb1**. This sum is used both for the temperature displayed and for regulation.	°C/°F	-30.0...30.0	0.0	0.0	0.0	0.0
CA2	Probe **Pb2** calibration (only if **H42 = Pro**). Positive or negative temperature value added to the value read by **Pb2**. This sum is used both for the temperature displayed and for regulation.	°C/°F	-30.0...30.0	0.0	0.0	0.0	0.0
CA3	Probe **Pb3** calibration (only if **H43 = Pro**). Positive or negative temperature value added to the value read by **Pb3**. This sum is used both for the temperature displayed and for regulation.	°C/°F	-30.0...30.0	0.0	0.0	0.0	0.0
CA4	Probe **Pb4** calibration (only if **H44 = Pro**). Positive or negative temperature value added to the value read by **Pb4**. This sum is used both for the temperature displayed and for regulation.	°C/°F	-30.0...30.0	0.0	0.0	0.0	0.0
CA5	Probe **Pb5** calibration (only if **H45 = Pro**). Positive or negative temperature value added to the value read by **Pb5**. This sum is used both for the temperature displayed and for regulation.	°C/°F	-30.0...30.0	0.0	0.0	0.0	0.0
ddL	Display mode during defrost. **0** = displays the temperature read by probe **1** = blocks the reading at the temperature value read by the probe when defrosting starts and until the next time the SEt is reached **2** = displays label **dEF** during defrost and until the SEt is reached (or until **Ldd** elapses)	num	0/1/2	2	2	2	2
Ldd	Timeout value for display unlock - label **dEF**.	min	0 ... 250	40	40	40	40
H60	Display of selected application. **0** = disabled; **1** = AP1; **2** = AP2; **3** = AP3; **4** = AP4; **5** = AP5; **6** = AP6; **7** = AP7; **8** = AP8.	num	0 ... 8	1 - (Parameter not present in vectors)			

NOTE: The 'USER' menu parameters also include **PA2** which permits access to the '**Installer**' menu.

DIAGNOSTICS

Alarms are always indicated by the buzzer (if present) and the alarm icon ((•)).
To silence the buzzer, press and release any key, the relative icon will continue to flash.

NOTE: If alarm exclusion times have been set (see 'AL' folder in the parameters table) the alarm will not be indicated.

'ALARMS' TABLE

Label	Fault	Cause	Effects	Remedy
E1	Probe Pb1 faulty	• Measured values are outside operating range • Probe faulty/short-circuited/open	• Label **E1** displayed • Alarm icon permanently on	• Check probe type (**H00**) • Check the probe wiring • Replace probe
E2	Probe Pb2 faulty	• Measured values are outside operating range • Probe faulty/short-circuited/open	• Label **E2** displayed • Alarm icon permanently on	• Check probe type (**H00**) • Check the probe wiring • Replace probe
E3	Probe Pb3 faulty	• Measured values are outside operating range • Probe faulty/short-circuited/open	• Label **E3** displayed • Alarm icon permanently on	• Check probe type (**H00**) • Check the probe wiring • Replace probe
E4	Probe Pb4 faulty	• Measured values are outside operating range • Probe faulty/short-circuited/open	• Label **E4** displayed • Alarm icon permanently on	• Check probe type (**H00**) • Check the probe wiring • Replace probe
E5	Probe Pb5 faulty	• Measured values are outside operating range • probe faulty/short-circuited/open	• Label **E5** displayed • Alarm icon permanently on	• Check probe type (**H00**) • Check the probe wiring • Replace probe
EL	LINK[2] probe faulty	• Measured values are outside operating range • Probe faulty/short-circuited/open	• Label **EL** displayed • Alarm icon permanently on	• Check the probe type • Check the probe wiring • Replace probe
Ei	VIRTUAL probe faulty	• Measured values are outside operating range • Probe faulty/short-circuited/open	• Label **Ei** displayed • Alarm icon permanently on	• Check the probe type • Check the probe wiring • Replace probe
AH1	HIGH temperature alarm 1	Value read by probe 1 > HA1 after time set in **tA1**. (see "MAX/MIN TEMP. ALARMS)	• Label **AH1** recorded in folder ALr • No effect on control	Wait until value read by probe selected by **rA1** returns below (**HA1-AFd**).
AL1	LOW temperature alarm 1	Value read by probe 1 > LA1 after time set in **tA1**. (see "MAX/MIN TEMPERATURE ALARMS")	• Label **AL1** recorded in folder ALr • No effect on control	Wait until value read by probe selected by **rA1** returns above (**LA1+AFd**).
AH2	HIGH temperature alarm 2	Value read by probe 2 > HA2 after time set in **tA2**. (see "MAX/MIN TEMPERATURE ALARMS")	• Label **AH2** recorded in folder ALr • No effect on control	Wait until value read by probe selected by **rA2** returns below (**HA2-AFd**).
AL2	LOW temperature alarm 2	Value read by probe 2 > LA2 after time set in **tA2**. (see "MAX/MIN TEMPERATURE ALARMS")	• Label **AL2** recorded in folder ALr • No effect on control	Wait until value read by probe selected by **rA2** returns above (**LA2+AFd**).
EA	External alarm	Digital input activated	• Label **EA** recorded in folder ALr • Alarm icon permanently on • Regulation blocked as requested by **EAL**	Check and remove external cause of alarm on D.I.
OPd	Alarm Door open	Digital input activated (for a time greater than tdO)	• Label **Opd** recorded in folder ALr • Alarm icon permanently on • Regulation blocked as requested by **dOd**	• Close the door • Alarm signal delay defined by **OAO**
Ad2	End defrost by time-out	End of defrost cycle due to timeout rather than due to defrost end temperature being read by Pb2.	• Label **Ad2** recorded in folder ALr • Alarm icon permanently on	Wait for the next defrost cycle for automatic reset.
Prr	Preheat alarm	Alarm for preheat input regulator ON	• Label **Prr** displayed. • Compressor icon blinking • Regulation locked (Compressor and Fans) **NOTE**: defrost also blocked if it's hot gas.	Preheat input regulator off
E10	Clock Alarm	• Clock (RTC) battery dead. • RTC failure.	• Label **E10** recorded in folder ALr • Functions associated with clock not available	Connect the instrument to the power supply.

Label	Fault	Cause	Effects	Remedy
HiP	HIGH voltage alarm	Voltage value read by the analog input is higher than the **SPH** value.	• Display label **HiP** • Alarm icon permanently on • Regulation locked depending on **SoU** value	• wait for the value read by the analog input returns below (**SPH-dFL**).
LoP	LOW voltage alarm	Voltage value read by the analog input is lower than the **SPL** value.	• Display label **LoP** • Alarm icon permanently on • Regulation locked depending on **SoU** value	• Wait for the value read by the analog input returns above (**SPL+dFL**).
nPA	General pressure switch alarm	Activation of pressure switch alarm by general pressure switch.	If the number of pressure switch activations is **n < PEn**: • Folder **nPA** recorded in folder ALr with the number of pressure switch activations • Regulation blocked	Check and remove the cause that triggered the alarm on the digital input (Auto Reset).
LPA	Minimum pressure switch alarm	Activation of pressure switch alarm by low pressure switch regulator.	If the number of pressure switch activations is **n < PEn**: • Folder **LPA** recorded in folder ALr with the number of pressure switch activations • Regulation blocked	Check and remove the cause that triggered the alarm on the digital input (Auto Reset).
HPA	Maximum pressure switch alarm.	Activation of pressure switch alarm by high pressure switch regulator.	If the number of pressure switch activations is **n < PEn**: • Folder **HPA** recorded in folder ALr with the number of pressure switch activations • Regulation blocked	Check and remove the cause that triggered the alarm on the digital input (Auto Reset).
PA	General pressure switch alarm	Activation of pressure switch alarm by general pressure switch.	If the number of pressure switch activations is **n = PEn**: • Label **PA** displayed • Label **PA** recorded in folder ALr • Alarm LED on • Relay activated (if configured) • Regulation blocked	• Switch the device off and back on again. • Reset alarms from functions folder, pressing the rAP function (Manual Reset)

TECHNICAL SPECIFICATIONS (EN 60730-2-9)

Classification:	Electronic automatic control (not safety) device for incorporation
Mounting:	panel mounting
Type of action:	1.B
Pollution class:	2
Material class:	IIIa
Overvoltage category:	II
Nominal pulse voltage:	2500V
Temperature:	Use: –5 … +55°C - Storage: -30 … +85°C
Power supply:	SMPS 100-240 V~ ±10% 50/60 Hz
Power consumption:	5.5W max
Fire resistance category:	D
Software class:	A
RTC battery life:	In absence of external power, the clock battery will last 3 years.

FURTHER INFORMATION

Input Characteristics

Measurement range:	**NTC**: -50.0°C ... +110°C; **PTC**: -55.0°C ... +150°C; **PT1000**: -60.0°C ... +150°C (on 3-digit display with +/- sign)
Accuracy:	±1.0° for temperatures below -30°C ±0.5° for temperatures between -30°C and +25°C ±1.0° for temperatures above +25°C
Resolution:	1 or 0.1°C
Buzzer:	NO
Analogue/Digital Inputs:	5 configurable NTC/PTC/PT1000/DI inputs 1 multi-function, voltage-free digital input (D.I.)

Output Characteristics

Digital Outputs:	**OUT1**:	1 SPST relay:	2HP	max 240V~
	OUT2:	1 SPDT relay:	1HP	max 250V~
	OUT3:	1 SPDT relay:	8(4)A	max 250V~
	OUT4:	1 SPST relay:	8(4)A	max 250V~
OC (Open Collector) Output:	**OC:**	1 multifunctional output:		12V⎓ 20mA

Mechanical Characteristics

Dimensions:	121 x 92 mm
Terminals:	faston and screw for wires with cross-section of 2.5 mm^2
Connectors:	TTL for Unicard / Device Manager connection (via DMI)
Humidity:	Usage / Storage: 10...90% RH (non-condensing)

Regulations

Electromagnetic compatibility:	The device complies with Directive 2004/108/EC
Safety:	The device complies with Directive 2006/95/EC
Food Safety:	The device complies with standard EN13485 as follows: - suitable for storage - application: air - climate range: A - measurement class 1 in the range from -25°C to 15°C (*) (***with Eliwell probes only**)

NOTE: The technical specifications stated in this document regarding measurement (range, accuracy, resolution, etc.) refer to the instrument alone and not to any accessories provided, such as the probes. This means, for example, that the error introduced by the probe must be added to the error of the instrument.

ELECTRICAL CONNECTIONS

Important! Make sure the machine is switched off before working on the electrical connections.
The instrument is equipped with faston and screw connectors to connect power cables with maximum cross-section of 2.5 mm^2 (one wire per terminal). Make sure that the power supply is of the correct voltage for the device.

Temperature probes (NTC, PTC, PT1000) have no connection polarity and can be extended using a normal bipolar cable (note that the extension of the probes influences the instrument's EMC electromagnetic compatibility: take great care with the wiring).

Probe cables, power supply cables and the RS485 serial cable should be routed separately from power cables.

DISCLAIMER

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RESPONSIBILITY AND RESIDUAL RISKS

ELIWELL CONTROLS SRL declines all liability for damage due to:
- Installation/use other than expressly specified and, in particular, in conflict with the safety prescriptions set down in regulations and/or specified in this document.
- Use on panels that do not provide adequate protection against electric shocks, water or dust in the adopted mounting conditions.
- Use on panels allowing access to dangerous parts without having to use tools.
- Tampering with and/or modification of the product.
- Installation/use on panels that do not comply with statutory laws and regulations.

CONDITIONS OF USE

Permitted use
For safety reasons, the device must be installed and used according to the instructions provided. In particular, parts carrying dangerous voltages must not be accessible in 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 suitable for use in household refrigeration appliances and/or similar equipment and has been tested for safety aspects in accordance with the harmonised European reference standards.

Improper use
Any use other than that expressly permitted is prohibited. The relays provided are of a functional type and can be subject to failure: any protection devices required by product standards, or suggested by common sense for obvious safety requirements, must be installed externally to the controller.

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