DESCRIPTION OF ST120 FAMILY

ST120 devices are controllers with 2 relay outputs, 2 temperature sensors (regulation and evaporator) and 2 digital inputs.

Der Relaisausgang 2 ermöglicht die Steuerung von:

- compressor
- evaporator fans
- temperature alarm
- defrost heating elements
- AUX output
- Standby

The second probe can be used to control the defrost cycle and the evaporator fans.

The Digital inputs (D.I.1 and D.I.2) can be used for:

- energy saving
- AUX management
- standby
- deep Cooling
- HACCP alarms
- defrost activation
- door switch
- external alarm
- pressure switch

USER INTERFACE

KEYs

UP Press and release **Scroll menu items** **Increases values** Press for at least 5 sec **Activates the Manual Defrost function**	**STANDBY (ESC)** Press and release **Returns to the previous menu level** **Confirms parameter value** Press for at least 5 sec **Activates the Standby function** (when outside the menus)
DOWN Press and release **Scroll menu items** **Decrease values** Press for at least 5 sec **Function can be configured by the user** (par.H32)	**SET (ENTER)** Press and release **Displays alarms** (if active) **Opens Machine Status menu** Press for at least 5 sec **Opens Programming menu** **Confirm commands**

LEDs

Reduced SET / Economy LED Flashing: economy Setpoint active Quick flashing: access to level2 parameters Off: otherwise	**Alarm LED** Permanently on: alarm active Flashing: alarm acknowledged Off: otherwise
Compressor LED Permanently on: compressor active Flashing: a delay, a protection or a locked start-up Off: otherwise	**Defrost LED** Permanently on: defrost active Flashing: manual or D.I. activation Off: otherwise
Fans LED Permanently on: fans active Off: otherwise	**Aux LED** Permanently on: Aux output active Flashing: manual or D.I. activation of Deep Cooling
°C LED Permanently on: °C setting (dro = 0) Off: otherwise	**°F LED** Permanently on: °F setting (dro = 1) Off: otherwise

*** To activate the LOC function:**

- enter the "Basic Commands" menu by pressing the key set.
- press keys ⏻ and ⌃ **within 2 seconds**.

If the LOC function is **Active** and you try to enter the "Programming" menu, the text LOC appears. If this happens, the parameters are still displayed but cannot be edited. To disable the keypad lock, repeat the aforementioned procedure.

* When switched on, the device performs a Lamp Test; the display and LEDs will flash for several seconds to check that they all function correctly.

LOCK SETPOINT MODIFICATION

The keypad can be locked by entering the "Basic Commands" menu using set and pressing ⏻ and ⌃ within 2 seconds, or by programming the "LOC" parameter (see "diS" folder).
If the keypad is locked, the "Basic Commands" menu can be accessed and the Setpoint displayed, but the value cannot be modified.

INSTRUMENT ON/OFF

The instrument can be switched off by pressing the key ⏻ for longer than 5 seconds.
In this condition, the adjustment algorithms and defrost cycles are disabled and the text "OFF" will appear on the display.

ACCESSING AND USING THE MENUS

Resources are organised into menus. Press and release the set key to access the "Machine Status" menu. To access the "Programming" menu, press the set key for more than 5 seconds. If no keys are pressed for over 15 seconds (Timeout), or if the ⏻ key is pressed, the last value to appear on the display is confirmed.

MANUAL DEFROST CYCLE ACTIVATION

Hold down the ⌃ key for longer than 5 seconds. It is only activates if the temperature conditions are fulfilled. Otherwise, the display will flash three times to indicate that the operation will not be performed.

PASSWORD

Password PA1: used to access **User** parameters.
The password is not enabled by default (**PS1**=0). To enable it (**PS1**≠0): press and hold set for longer than 5 seconds, scroll through the parameters using ⌃ and ⌄ until you see the label **PS1**, press set to display the value, modify it using ⌃ and ⌄, then save it by pressing set or ⏻. If enabled, it will be required in order to access the User parameters.

Password PA2: used to access **Installer** parameters.
The password is enabled by default (**PS2**=15). To modify it (**PS2**≠15): press set and hold for longer than 5 seconds, scroll through the parameters using ⌃ and ⌄ until you see the label **PA2**, press set, set the value to "15" using ⌃ and ⌄, then confirm using set. Scroll through the folders until you find the label **diS** and press set to enter. Scroll through the parameters using ⌃ and ⌄ until you see the label **PS2**, press set to display the value, modify it using ⌃ and ⌄, then save it by pressing set or ⏻.

The visibility of "PA2" is as follows:

1) **PA1** and **PA2** ≠ 0: Press and hold set for longer than 5 seconds to display "PA1" and "PA2". It will then be possible to decide whether to access the User (PA1) or the Installer (PA2) parameters.

2) **Andernfalls**: The password "PA2" is amongst the level1 parameters. If enabled, it will be required when accessing the Installer parameters; to enter it, proceed as instructed for password "PA1".

If the password entered is incorrect, the label PA1/PA2 will be displayed again and the procedure will need to be repeated.

USING THE COPY CARD

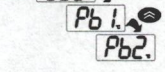
The Copy Card is connected to the serial port (TTL) and allows rapid programming of the instrument parameters. Access Installer parameters by entering "**PA2**", scroll through the folders using ⌃ and ⌄ until folder **FPr** appears. Select it using set, scroll through the parameters using ⌃ and ⌄, then 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 procedure is a success, "**y**", will appear on the display, otherwise "**n**" will appear.
- **Format** (Fr): This command is used to format the copy card, (recommended when using the card for the first time). **Important**: the **Fr** parameter deletes all data present. This operation cannot be cancelled.
- **Download**: Connect the Copy Card when the instrument is switched off. At power-on, data is downloaded from the copy card to the instrument automatically. At the end of the lamp test, the display will show "**dLy**" if the operation was successful and "**dLn**" if not.

NOTE: After downloading, the instrument works with the settings of the new map just downloaded.

MACHINE STATUS MENU

Access the Machine Status menu by pressing set and releasing the key. If no alarms are active, the "SEt" label appears. Use the keys ⌃ and ⌄ to scroll through all the folders in the menu:



- AL: alarms folder (**only visible if an alarm is active**)
- SEt: Setpoint setting folder
- Pb1: probe 1 - Pb1 folder
- Pb2: probe 1 - Pb2***** folder

*** angezeigte Registerkarte, sofern Pb2 vorhanden (H42=y)**

Setting 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, Pb2 or Pb3 are present, press the set key to view the value measured by the corresponding probe
(**NOTE**: the value cannot be modified).

PROGRAMMING MENU

To access the "Programming" menu, press the set key for more than 5 seconds.
If specified, an access PASSWORD will be requested: "PA1" for User parameters and "PA2" for Installer parameters (see "PASSWORD" paragraph).

User parameters: When accessed, the display will show the first parameter (e.g. "diF").
Press ⌃ and ⌄ to scroll through all the parameters on the current level.
Select the desired parameter by pressing set.
Press ⌃ and ⌄ to modify it and set to save the changes.

Installer parameters: When accessed, the display will show the first folder (e.g. "CP").
Press ⌃ and ⌄ to scroll through the folders on the current level.
Select the desired folder using set. Press ⌃ and ⌄ to scroll through the parameters in the current folder and select the parameter using set.
Press ⌃ and ⌄ to modify it and set to save the changes.

NOTE: Make sure you switch the instrument off and on again each time the parameter configuration is changed, in order to prevent malfunctioning in the configuration and/or timing in progress.

DISCLAIMER

TECHNICAL DATA (EN 60730-2-9)

Classification:	operation (not safety) device for incorporation
Mounting:	panel mounting with 71x29 mm (+0.2/-0.1 mm) drilling template
Type of action:	1.B
Pollution class:	2
Material class:	IIIa
Overvoltage category:	II
Rated impulse voltage:	2500 V~
Temperature:	Use: -5 … +55 °C - Storage: -30 … +85 °C
Power supply:	115 V~ (±10%) 50/60 Hz or 230 V~ (±10%) 50/60 Hz
Consumption:	4.5 W max.
Digital outputs (relay):	refer to the label on the device
Fire resistance category:	D
Software class:	A

NOTE: check the power supply specified on the instrument label; contact our Sales Office for power supply and relay ratings.

FURTHER INFORMATION

Input Characteristics

Display range: **NTC**: -50.0 °C ... 110 °C; **PTC**: -55.0 °C ... 140 °C; **PT1000**: -55.0 °C ... 150 °C } (on display with 3 digits + sign)

Accuracy: **NTC, PTC, PT1000** (-55,0 °C...70,0 °C):
- Better than 0.5% of full scale +1 digit.

PT1000 (+70,0 °C...+150 °C):
- Better than 0.6% of full scale +1 digit.

Resolution:	0,1 °C
Buzzer:	YES (depending on model)
Analogue inputs:	2 NTC (default)/PTC/PT1000 (can be selected using parameter **H00**)
Digital inputs:	2 voltage-free digital inputs

N.B.: D.I.2, if activated, should be connected to terminals 1-2 of the TTL

Output Characteristics

Digital outputs: 1 Defrost relay: NO 8(4)A - N.C. 6(3)A max. 250 V~
1 Compressor relay: UL60730 (A) 2Hp (12FLA - 72LRA) max. 240 V~

Mechanical Characteristics

Casing:	PC+ABS UL94 V-0 resin casing, polycarbonate window, thermoplastic resin keys
Dimensions:	front panel 78.6x37 mm, depth 59 mm (without terminals)
Terminals:	screw/disconnectable terminals for cables with a diameter of 2,5 mm²
Connectors:	TTL for connection of Copy Card + D.I.2
Humidity:	Use / Storage: 10…90% RH (non-condensing)

Regulations

Food Safety: The device complies with standard EN 13485 as follows:
- suitable for storage
- application: air
- climate range A
- measurement class 1 in the range from -25 °C to 15 °C (*)

(*** exclusively using Eliwell probes**)

NOTE: The technical specifications given in this document regarding measurement (range, accuracy, resolution, etc.) refer to the instrument 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 typical error of the instrument.

LIABILITY AND RESIDUAL RISKS

ELIWELL CONTROLS SRL declines any liability for damage due to:
- installation/uses different from those specified and, in particular, not complying with the safety regulations and/or instructions given in this document;
- use on panels that do not provide adequate protection against electric shocks, water or dust when assembled;
- use on panels allowing access to dangerous parts without the use of tools;
- tampering with and/or modifying the product;
- installation/use on panels not complying with current standards and regulations.

CONDITIONS OF USE

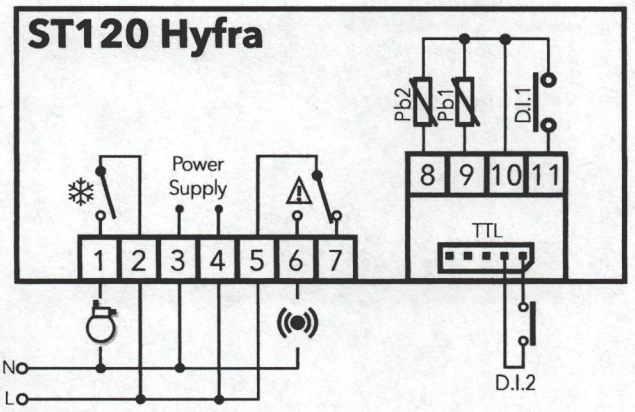
Permitted use:

For safety reasons, the instrument must be installed and used according to the instructions supplied and, in particular, parts under dangerous voltages must not be accessible in normal conditions.
The device must be adequately protected from water and dust with regard to its application, and must only be accessible using tools (except for 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 relay contacts provided are of a functional type and 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 instrument.

CONNECTIONs



TERMINALS

1-2	Compressor relay (❄)	**10-8**	probe Pb2**
3-4	115 V~ or 230 V~	**10-9**	probe Pb1
N-L	115 V~ or 230 V~ power supply	**10-11**	Digital Input 1
5-6-7	Alarms relay (((•)))	**TTL**	TTL Input or Digital Input 2**

** = disabled

Eliwell Controls s.r.l.
Via dell'Industria, 15
Z.I. Paludi
32010 Pieve d'Alpago (BL)
- ITALY -
T: +39 0437 986 111
F: +39 0437 989 066
www.eliwell.com

Technical Customer Support:
T: +39 0437 986 300
E: Techsuppeliwell@schneider-electric.com

Sales
T: +39 0437 986 100 (Italy)
T: +39 0437 986 200 (other countries)
E: saleseliwell@schneider-electric.com

MADE IN ITALY

ISO 9001

cod. 9IS54306 • ST120 Hyfra • EN • rel. 12/15

eliwell by Schneider Electric

ST120 Hyfra

EN **Electronic controllers for refrigeration units**

PARAMETERS TABLE

PAR.	DESCRIPTION	RANGE	V1-V3-V4	V2	M.U.	LEVEL
SEt	Temperature control SEtpoint.	LSE ... HSE	15	15	°C/°F	
	COMPRESSOR ("**CP**" folder)					
diF	diFferential. Compressor relay activation differential.	0.1 ... 30.0	2	2	°C/°F	1&2
HSE	Higher SEt. Maximum value that can be assigned to the Setpoint.	LSE ... 320	25	40	°C/°F	1&2
LSE	Lower SEt. Minimum value that can be assigned to the Setpoint.	-67.0 ... HSE	10	10	°C/°F	1&2
OSP	Temperature value to be added to the Setpoint if reduced set enabled (Economy function).	-30.0 ... 30.0	3	3	°C/°F	2
Hc	Control mode. **C** (0) = Cold, **H** (1) = Hot.	C/H	C	C	flag	2
Ont	Controller on time for faulty probe. If **Ont=1** and **OFt=0**, the compressor remains on; if **Ont=1** and **OFt>0**, it runs in duty cycle mode.	0 ... 250	0	0	min	2
OFt	Controller off time for faulty probe. If **OFt=1** and **Ont=0**, the compressor remains off; if **OFt=1** and **Ont>0**, it runs in duty cycle mode.	0 ... 250	1	1	min	2
dOn	Compressor relay activation delay after request.	0 ... 250	0	0	secs	2
dOF	Delay after switching off and subsequent activation.	0 ... 250	0	0	min	2
dbi	Delay between two consecutive compressor activations.	0 ... 250	0	0	min	2
OdO (!)	Delay in activating outputs after the instrument is switched on or after a power failure. **0** = not active.	0 ... 250	0	0	min	2
dCS	Deep Cooling cycle Setpoint.	-67.0 ... 320	0	0	°C/°F	2
tdc	Deep Cooling cycle duration.	0 ... 255	0	0	min*10	2
	ALARMS ("**AL**" folder)					
Att	Can be used to select absolute (**Att=0**) or relative (**Att=1**) values for HAL and LAL parameters.	0/1	1	0	flag	2
AFd	Alarm differential.	1.0 ... 50.0	1	1	°C/°F	2
HAL	Maximum temperature alarm.	LAL ... 320	9	41	°C/°F	1&2
LAL	Minimum temperature alarm.	-67.0 ... HAL	-2	7	°C/°F	1&2
PAO	Alarm exclusion time after re-activation following a power failure.	0 ... 10	0	0	hours	2
dAO	Temperature alarm exclusion time after defrost.	0 ... 999	0	0	min	2
OAO	Alarm signalling delay after disabling of digital input.	0 ... 10	0	0	hours	2
tdO	Delay in door open alarm activation.	0 ... 250	0	0	min	2
tAO	Time delay for temperature alarm indication.	0 ... 250	0	0	min	2
rLO	External alarm locks controllers. **n** (0) = does not lock; **y** (1) = locks.	n/y	n	n	flag	2
AOP	Polarity of the alarm output. **nC** (0) = normally closed; **nO** (1) = normally open.	0/1	0	0	flag	2
tP	Enable all keys to acknowledge an alarm. **n** (0) = no; **y** (1) = yes.	n/y	n	n	flag	2
	LIGHTS & DIGITAL INPUTS ("**Lit**" folder)					
dOd	Digital input for switching off utilities. **0** = disabled; **1** = disables fans; **2** = disables the compressor; **3** = disables fans and compressor.	0/1/2/3	3	3	num	2
dAd	Activation delay for digital input.	0 ... 255	1	1	min	2
dCO	Compressor deactivation delay after door opened.	0 ... 255	0	0	min	2
	PRESSURE SWITCH ("**PrE**" folder)					
PEn	Number of errors allowed per maximum/minimum pressure switch input.	0 ... 15	0	0	num	2
PEI	Minimum/maximum pressure switch error count interval.	1 ... 99	1	1	min	2
PEt	Delay in activating compressor after pressure switch deactivation.	0 ... 255	0	0	min	2
	DISPLAY ("**diS**" folder)					
LOC	Basic commands modification lock. It is still possible to enter parameter programming mode and modify them. **n** (0) = no. **y** (1) = yes.	n/y	n	n	flag	1&2
PS1	PAssword1: if **PS1≠0** is the access key to **"User"** parameters.	0 ... 250	0	0	num	1&2
PS2	PAssword2: if **PS2≠0** is the access key to **"Installer"** parameters.	0 ... 250	22	22	num	2
ndt	Display with decimal point. **n** (0) = no; **y** (1) = yes.	n/y	n	n	flag	2
CA1	Calibration 1. Temperature value to be added to the Pb1 value.	-12.0 ... 12.0	0	0	°C/°F	1&2
CA2	Calibration 2. Temperature value to be added to the Pb2 value.	-12.0 ... 12.0	0	0	°C/°F	1&2
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. Setpoint=10°C becomes 10°F).**	0/1	0	0	flag	2
ddd	Selects the type of value to display. **0** = Setpoint; **1** = probe Pb1 ; **2** = probe Pb2 ; **3** = not used.	0/1/2/3	1	1	num	2
	HACCP ("**HcP**" folder)					
SHH	Maximum HACCP alarm signals threshold.	-67.0 ... 320	0	0	°C/°F	2
SLH	Minimum HACCP alarm signals threshold.	-67.0 ... 320	0	0	°C/°F	2
drA	Minimum time spent in critical range for the event to be recorded. After this a HACCP alarm will be triggered and logged.	0 ... 99	0	0	min	2
drH	HACCP alarm reset time after last reset.	0 ... 250	0	0	hours	2
H50	Enable HACCP and alarm relay functions. **0** = HACCP alarms NOT enabled; **1** = HACCP alarms enabled and alarm relay NOT enabled; **2** = HACCP alarms enabled and alarm relay enabled.	0/1/2	0	0	num	2
H51	HACCP alarm exclusion time.	0 ... 250	0	0	min	2
	CONFIGURATION ("**CnF**" folder) ➡ **If one or more parameters present in this forder are changed, the controller MUST be powered-off and than powered-on.**					
H00 (!)	Probe type selection. **0** = PTC; **1** = NTC; **2** = PT1000.	0/1/2	1	1	num	2
H11	Configuration of digital input 1/polarity. **0** = disabled; **±1** = defrost; **±2** = economy Setpoint; **±3** = not used; **±4** = door switch; **±5** = external alarm; **±6** = Stand-by; **±7** = pressure switch; **±8** = Deep Cooling; **±9** = disable HACCP alarm logging. **NOTE**: - the "+" sign indicates that the input is active if the contact is closed; - the "–" sign indicates that the input is active if the contact is open.	-9 ... +9	-4	-4	num	2
H12	Configuration of digital input 2/polarity. Same as H11.	-9 ... +9	0	0	num	2
H21	Configurability of digital output 1 (❄). **0** = disabled; **1** = compressor; **2** = defrost; **3** = fans; **4** = alarm; **5** = AUX; **6** = Stand-by.	0 ... 6	1	1	num	2
H22	Configurability of digital output 2 (❄). Same as H21.	0 ... 6	4	4	num	2
H25	Enable/Disable buzzer. **0** = disabled; **4** = alarm; **1-2-3-5-6-7** = not used; **8** = buzzer.	0 ... 8	8	8	num	2
H31	Configurability of UP key. **0** = disabled; **1** = defrost; **2** = AUX; **3** = economy Setpoint; **4** = Stand-by; **5** = reset HACCP alarms; **6** = disable HACCP alarms; **7** = Deep Cooling.	0 ... 7	0	0	num	2
H32	Configurability of DOWN key. Same as H31.	0 ... 7	0	0	num	2
H33	Configurability of ESC key. Same as H31.	0 ... 7	0	0	num	2
H42	Evaporator probe present. **n** (0) = not present; **y** (1) = present.	n/y	n	n	flag	1&2
H60	Select parameter vector. **0** = disabled; **1** = Vector 1; **2** = Vector 2; **3** = Vector 3; **4** = Vector 4.	1 ... 4	1	1	num	2
reL	Device version. Read-only parameter.	/	/	/	/	1&2
tAb	tAble of parameters. Reserved: read-only parameter.	/	/	/	/	1&2
	COPY CARD ("**Fpr**" folder)					
UL	Programming parameter transfer from instrument to Copy Card.	/	/	/	/	/
Fr	Format Copy Card. Erase all data contained in the Copy Card. **NOTE: If parameter "Fr" is used, the data entered will be permanently lost. This operation cannot be cancelled.**	/	/	/	/	/
	FUNCTIONS ("**FnC**" folder)					
rAP	Reset pressure switch alarms.	/	/	/	/	/
rES	Reset HACCP alarms.	/	/	/	/	/

NOTE: If one or more parameters marked with (!) are modified, the controller MUST be switched off and then switched on again to ensure correct operation.

DIAGNOSTICS

Alarms are always indicated by the buzzer (if present) and the alarm icon. To switch off the buzzer, press and release any key; the corresponding icon will continue to flash.

N.B.: If alarm exclusion times have been set (see "AL" folder in Parameters Table) the alarm will not be signalled.

In the event of an alarm caused by a malfunctioning ambient probe (Pb1), the indication "**E1**" will appear on the display. For a malfunctioning evaporator probe (Pb2), the indication "**E2**" will appear.

ALARMS

Label	Fault	Cause	Effects	Remedy
E1	Probe1 faulty (Cold room)	• measured values are outside operating range • probe faulty/short-circuited/open	• display label **E1** • alarm icon permanently on • disable max/min alarm controller • compressor operation based on parameters **Ont** and **OFt**.	• check probe type (**H00**) • check probe wiring • replace probe
E2	Probe1 faulty (Defrost)	• measured values are outside operating range • probe faulty/short-circuited/open	• display label **E2** • alarm icon permanently on • the evaporator fans will be: on if the compressor is ON, or running in accordance with the **FCO** parameter if the compressor is OFF.	• check probe type (**H00**) • check probe wiring • replace probe
AH1	Alarm for HIGH Pb1 temperature	value read by Pb1 > HAL after time of **tAO**. (see "MAX/MIN TEMPERATURE ALARMS")	• recording of label **AH1** in folder AL • no effect on regulation	Wait until value read by Pb1 returns below HAL.
AL1	Alarm for LOW Pb1 temperature	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 until value read by Pb1 returns above LAL.
EA	External alarm	digital input activation (**H11** = ±5)	• recording of label **EA** in folder AL • alarm icon permanently on • regulation locked if **rLO** = y	Check and remove the external cause which triggered the alarm on the D.I.
OPd	Door open alarm	digital input activation (**H11** = ±4) (for longer than **tdO**)	• recording of label **Opd** in folder AL • alarm icon permanently on • controller locked	• close the door • delay function defined by **OAO**
Ad2	Defrost due to timeout	end of defrost cycle due to timeout rather than due to defrost end temperature being recorded by Pb2.	• recording of label **Ad2** in folder AL • alarm icon permanently on	wait for the next defrost cycle for automatic return.
nPA	General pressure switch alarm	Activation of pressure alarm by general pressure switch.	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 locked (Compressor and Fans)	check and remove the cause which triggered the alarm on the D.I. (Automatic Reset)
PAL	General pressure switch alarm	Activation of pressure alarm by general pressure switch.	If the number **N** of pressure switch activations is **N = PEn**: • display label **PAL** • recording of label **PA** in folder AL • alarm icon permanently on • regulation locked (Compressor and Fans)	• Switch the device off and back on again • Reset alarms by entering the functions folder and selecting the **rAP** function (Manual Reset)

NOTE: to delete folders "HC **n**", "tC **n**", "bC **n**" and "bt **n**" from folder AL, start function **rES** in folder **FnC**.

ELECTRICAL CONNECTIONS

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

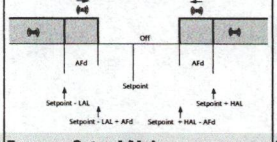
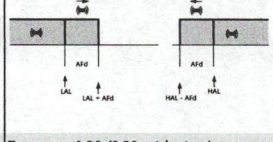
- Disconnect all power from all equipment including connected devices prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Always use a properly rated voltage sensing device to confirm the power is off where and when indicated
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

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

This equipment has been designed to operate outside of any hazardous location.
Only install this equipment in zones known to be free of hazardous atmosphere.

The instrument is equipped with screw or disconnectable terminal blocks for connecting electrical cables with a max. diameter of 2.5 mm² (one wire per terminal for power connections): for the terminal ratings, see the label on the instrument. Do not exceed the maximum permissible current; in case of higher loads, use a suitably rated contactor.
Make sure the power supply voltage complies with that required by the instrument.
Probes have no connection polarity and can be extended using a normal bipolar cable (note that the extension of the probes influences the electromagnetic compatibility - EMC - of the instrument: take great care with the wiring). Probe cables, power supply cables and the TTL serial cable should be routed separately from power cables.

MAX/MIN TEMPERATURE ALARMS

	Temperature as a value relative to Setpoint (Att=1)	Temperature as an Absolute value (Att=0)
		
Minimum alarm	Temp. ≤ **Set** + **LAL** *	Temp. ≤ **LAL** (**LAL** with sign)
Maximum alarm	Temp. ≥ **Set** + **HAL** **	Temp. ≥ **HAL** (**HAL** with sign)
Returning from minimum temperature alarm	Temp. ≥ **Set** + **LAL** + **AFd** or ≥ **Set** - |**LAL**| + **AFd** (**LAL<0**)	Temp. ≥ **LAL** + **AFd**
Returning from maximum temperature alarm	Temp. ≤ **Set** + **HAL** - **AFd** (**HAL>0****)	Temp. ≤ **HAL** - **AFd**

* If **LAL** is negative, **SEt**+**LAL** < **SEt**
** If **HAL** is negative, **SEt**+**HAL**< **SEt**

MOUNTING - DIMENSIONS

The device is designed for panel mounting. Drill a 29x71 mm hole and insert the instrument; secure it with the special brackets provided.
Do not install the instrument in damp and/or dirty places; in fact, it is suitable for use in places with ordinary or normal levels of pollution.
Keep the area around the instrument cooling slots adequately ventilated.