

## Operating Instructions

### Compact Case Controller UA 30 RC

Version 5.4



## GENERAL INSTRUCTIONS



The safety regulations, codes and notes contained in this section must definitely be observed and complied with at all times. During repairs on the entire LDS system, the accident prevention regulations and general safety instructions must be observed. Important information (safety instructions and hazard warnings) are indicated by corresponding symbols. Follow these instructions in order to prevent accidents and danger to life and limb, as well as damage to the LDS system. Before commissioning and use, please check that this is the latest version of the document. With the publication of a new version of the documentation, all previous versions lose their validity.



**Warning – hazardous electrical voltage! Danger of electric shock!** Beware of external voltage at the digital inputs and outputs! All device connections/plugs are **only** to be plugged in, unplugged and/or wired when **off load**.

- This operating instruction is an integral part of the equipment. It must be kept in the proximity of the equipment and must be stored for future use, so that it can be referred to when necessary. To avoid operating errors, the operation instructions must always be kept available for operating and maintenance staff.
- For safety reasons, the equipment must not be used for any application other than described in the operating instruction i.e. only for the intended use, see also section "Intended use".
- Before using the equipment, always check that its limits are suitable for the intended application.
- Check that the electric power supply is correct for the equipment before connecting it to power.
- Specified ambient conditions (e.g. humidity and temperature limits) must be observed and complied with in order to avoid malfunctioning (see section "Specifications").
- Check correct wiring of the connections before switching on power to the equipment.
- Never operate the equipment without its casing. Before opening the casing the equipment must be switched to zero potential.
- Note and observe maximum load on relay contacts (see Section Specifications").
- Contact the supplier in any malfunction.
- Note that all leads running to and from the controller – especially those of the Modbus – must be shielded and installed sufficiently clear of other leads carrying live power. Doing so will avoid faulty measurements and will protect the equipment from external interference via the analog inputs. Parallel connection of RC elements is recommended for applications in a critical environment.
- Instructions for integration in the E\*LDS system via the Modbus can be found in the document "Basics and general safety and connection instructions" and "UA 30 Series - Connection Instructions"



1. In stand-alone operation, or as an alternative to monitoring with the system centre / store computer, the alarm contact on the controller must be used for alarm purposes in order to implement the error message transmission via telephone network.
2. In the interests of fire prevention, allowance should be made at the time of planning the system for a suitable shutdown device designed to operate in the event of excessive temperature on the defrost heater (high-temperature cutout).
3. Work on electrical equipment may only be undertaken by authorized and duly trained personnel (as defined by DIN/VDE 0105 and IEC364) with full observance of the currently valid regulations contained in the following VDE Regulations, Local safety codes, Intended use, Five Safety Rules BGV A3 and the Operating instructions

### Disclaimer in the event of non-compliance

These operating instructions contain information on the commissioning, function, operation and maintenance of the controls and of the associated components. Observance of these operating instructions is a prerequisite for safe and trouble-free operation.

### Personnel requirements, requirements on staff

Special skills are required for project planning, programming, assembly, commissioning and maintenance work. This work may be performed by qualified and specially trained staff. The staff involved in installation, commissioning and maintenance must have received the special training needed for them to work on the unit and on the automation system. The project planning and programming staff must be familiar with the safety concepts involved in automation technology. Expertise is a requirement for any work on electrical systems. Work on electrical installations may only be performed by trained electrical specialists (or may only be performed when directed or supervised by them). The applicable regulations (e.g. DIN EN 60204, EN 50178, BGV A3, and DIN VDE 0100/0113) must be followed. The operating staff who deal with the unit/machine and the controls must be correspondingly trained and familiar with the operating instructions.

### Intended use

This control system may only be used for the purpose for which it is intended: The UA 30 RC control system has been designed for use as case controller in commercial and industrial refrigeration systems with the intended functional scope as described in these operating instructions, and it is to be used under the environmental conditions in these instructions. Follow the safety instructions, as well as the instructions on installation, commissioning, operation and maintenance. Only THEN should you start commissioning or operating the machine/system.

The safety and function of the machine/unit is only assured in the use for which it has been intended. Never use the machine/unit, its components, assemblies or parts of it for a different purpose. The installation may be only operated for the first time when the entire unit has been shown to conform to the EC Directives.

### VBG A3 – Five safety rules

The following rules must be strictly observed:

1. Disconnect electric power: Disconnect power at all connections of the entire installation on which work is to be carried out. **Warning – hazardous electrical voltage! Beware of possible external power supplies!** BEFORE and AFTER connection it must be checked that the controller is off load! All device connections/plugs are only to be plugged in, unplugged and/or wired when off load.
2. Secure against reconnection of power: Tag the disconnected equipment with the following information:
  - What has been disconnected from power
  - Why it has been disconnected
  - Name of person who disconnected power
  - Use a suitable lock-out (e.g. padlock) to prevent reconnection of power.
3. Make sure that power is off (authorized and duly trained personnel only):
  - Check with voltmeter immediately before use.
  - Check that power is off on all connections at the disconnection point.
  - Check that power is off on all connections at the place of work.
4. Ground and short circuit: Ground and then short circuit all electrical parts at the place of work.
5. Cover or bar off adjacent power-carrying parts: Any equipment carrying power adjacent to the work area must be covered by suitable means (e.g. insulating cloths or panels).

### NOTE

Additional information such as data sheets, more detailed documentation and FAQs are available for you online in E\*EDP (Eckelmann® Electronic Documentation Platform) at



[https://edp.eckelmann.de/edp/lids/\\_l6x6nQYvsu](https://edp.eckelmann.de/edp/lids/_l6x6nQYvsu)

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## UA 30 RC V5.4 with built-in RS485

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### 1. APPLICATION

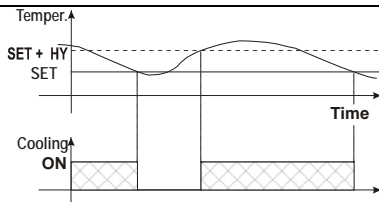
The UR 30 RC is a microprocessor based controller suitable for applications on medium or low temperature refrigerating units and is provided with four relay outputs to control cooling/ compressor, defrost - which can be either electrical or hot gas - the evaporator fans and an auxiliary output.

It also provides three L243 or NTC sensor inputs configurable by the User, one for temperature control, the other to control the defrost end temperature of the evaporator, two digital inputs (free contact, terminal 9,10) are configurable by parameter and an internal buzzer for acoustic signal.

Each instrument is fully configurable through special parameters that can be easily programmed through the keypad. This model is connectable to the system centre / store computer through the two terminals of serial port RS485.

### 2. FUNCTION

#### 2.1 THE COOLING



The regulation is performed according to the temperature measured by the thermostat sensor with a positive hysteresis from the set point: if the temperature increases and reaches set point plus hysteresis the cooling is started and then turned off when the temperature reaches the set point value again.

In case of fault in the thermostat sensor the start and stop of the cooling are timed through parameters "Con" and "CoF".

#### 2.2 FAST FREEZING

When defrost is not in progress, it can be activated over the keypad by holding the  $\blacktriangle$  key pressed for about 3s. The cooling operates in continuous mode for the time set through the "CCt" parameter. The cycle can be terminated before the end of the set time using the same activation key,  $\blacktriangle$  for about 3 s.

#### 2.3 DEFROST

Three defrost modes are available through the "tdF" parameter: defrost with electrical heater, hot gas or thermostatic defrost. The defrost interval is control by means of parameter "EdF": (EdF = in) the defrost is made every "ldF" time, (EdF = Sd) the interval "ldF" is calculated through Smart Defrost algorithm (only when the cooling is ON and the evaporator temperature is bigger than "SdF" parameter). At the end of defrost the drip time is controlled through the "Fdt" parameter.

#### 2.4 CONTROL OF EVAPORATOR FANS

The fan control mode is selected by means of the "FnC" parameter:

FnC = C-n	fans will switch ON and OFF with the cooling and not run during defrost
FnC = C-y	fans will run continuously, but not during defrost
FnC = O-n	fans will switch ON and OFF with the cooling and run during defrost
FnC = O-y	fans will run continuously also during defrost

After defrost, there is a timed fan delay allowing for drip time, set by means of the "Fnd" parameter.

An additional parameter "FS" provides the setting of temperature, detected by the evaporator sensor, above which the fans are always OFF. This can be used to make sure circulation of air only if its temperature is lower than set in "FS".

#### 2.5 DIGITAL INPUTS

The UA 30 RC can support up to 2 free contact digital inputs. One is always configured as door contact (terminal 7,8), the second (terminal 9,10) is programmable in eight different configurations by the "iZF" parameter.

#### 2.6 DOOR CONTACT INPUT

It signals the door status and the corresponding relay output status through the "odc" parameter:

no	= normal (any change);
Fan	= Fan OFF;
CPr	= Cooling OFF;
F_C	= Cooling and fan OFF.

If the door is opened, after the delay time set through parameter "doA", the alarm output is enabled and the display shows the message "dA". The alarm stops as soon as the external digital input is disabled again (if the door is closed). During this time and then for the delay "dot" after closing the door, the high and low temperature alarms are disabled.

#### 2.7 CONFIGURABLE INPUT - GENERIC ALARM (EAL)

As soon as the digital input is activated the unit will wait for "did" time delay before signalling the "EAL" alarm message. The outputs status don't change. The alarm stops just after the digital input is de-activated.

#### 2.8 CONFIGURABLE INPUT - SERIOUS ALARM MODE (BAL)

When the digital input is activated, the unit will wait for "did" delay before signalling the "BAL" alarm message. The relay outputs are switched OFF. The alarm will stop as soon as the digital input is de-activated.

#### 2.9 CONFIGURABLE INPUT - PRESSURE SWITCH (PAL)

If during the interval time set by "did" parameter, the pressure switch has reached the number of activation of the "nPS" parameter, the "PAL" pressure alarm message will be displayed. The cooling and the regulation are stopped. When the digital input is ON the cooling is always OFF.

#### 2.10 CONFIGURABLE INPUT - START DEFROST (DFR)

It executes a defrost if there are the right conditions. After the defrost is finished, the normal regulation will restart only if the digital input is disabled otherwise the instrument will wait until the "Mdf" safety time is expired.

#### 2.11 CONFIGURABLE INPUT - RELAY AUX ACTUATION (AUS)

This function allows to turn ON and OFF the auxiliary relay (AUX) by using the digital input as external switch. The function is enabled until the digital input is activated.

#### 2.12 CONFIGURABLE INPUT - ALTERNATIVE SETPOINT (ES)

The function to toggle the temperature control setpoint allows to change the set point value as the result of the SET+ HES (parameter) sum. This function is enabled until the digital input is activated.

#### 2.13 CONFIGURABLE INPUT - MANUAL SHUT-OFF (ONF)

This function allows to switch the instrument ON and OFF.

**When the instrument is manually shut-off, all the relays are under power supply.**



**Don't connect any loads to the normally closed contact of the relays.**

#### 2.14 DIGITAL INPUTS POLARITY

The digital inputs polarity depends on "I1P" and "I2P" parameters.

- CL : the digital input is activated by closing the contact.
- OP : the digital input is activated by opening the contact

#### 2.15 USE OF THE PROGRAMMING "HOT KEY"

The UA 30 RC unit can UPLOAD or DOWNLOAD the parameter list from its own E2 internal memory to the "Hot Key" and vice-versa.

#### 2.16 DOWNLOAD (FROM THE "HOT KEY" TO THE UA 30 RC)

- Turn OFF UA 30 RC by means of the ON/OFF key (see "Manual shutoff").
  - Insert the "Hot Key"
  - Turn the Controller ON.
  - The parameter list of the "Hot Key" is downloaded automatically into the Controller memory, the "DoL" message is blinking. After 10s the UA 30 RC will restart working with the new parameters.
  - Turn OFF the UA 30 RC and remove the "Hot Key".
- At the end of the data transfer phase the instrument displays the following messages:  
 "end" for right programming. The instrument starts regularly with the new programming.  
 "err" for failed programming. In this case turn the unit off and then on if you want to restart the download again.

#### 2.17 UPLOAD (FROM UA 30 RC TO THE "HOT KEY")

- Turn OFF the UA 30 RC by means of the ON/OFF key (see "Manual shutoff")
  - Turn it ON again.
  - When the Controller is ON, insert the "Hot key" and push  $\blacktriangle$  key; the "uPL" message appears.
  - Push "SET" key to start the UPLOAD: the "uPL" message is blinking.
  - Turn OFF the UA 30 RC and remove the "Hot Key" after 10 sec
- At the end of the data transfer phase the instrument displays the following messages:  
 "end" for right programming.  
 "err" for failed programming. In this case push "SET" key if you want to restart the programming again.

### 3. INSTALLATION AND STARTUP

The UA 30 RC shall be mounted on a omega DIN rail (3). The temperature range allowed for correct operation is 0..60 °C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity. The same recommendations apply to sensors. Let air circulate by the cooling holes.

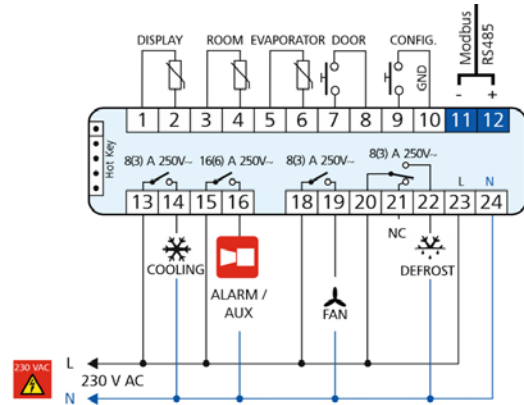
#### 3.1 ELECTRICAL CONNECTIONS

The instruments are provided with screw terminal block to connect cables with a cross section up to 2,5 mm<sup>2</sup>. Before connecting cables make sure the power supply complies with the instrument's requirements. Separate the sensor cables from the power supply cables, from the outputs and the power connections. Do not exceed the maximum current allowed on each relay, in case of heavier loads use a suitable external relay.

#### 3.2 SENSOR CONNECTION

If sensor cables are exclusively laid within the refrigerated display case to be monitored, and sources of interference (e.g. parallel power lines) are not anticipated, then it is possible to dispense with shielding. The sensors shall be mounted with the bulb upwards to prevent damages due to casual liquid infiltration. It is recommended to place the thermostat sensor away from air streams to correctly measure the average room temperature. Place the defrost termination sensor among the evaporator fins in the coldest place, where most ice is formed, far from heaters or from the warmest place during defrost, to prevent premature defrost termination.

## 4. PIN AND TERMINAL ASSIGNMENTS



## 5. OPERATION



### SET

To display target set point; in programming mode it selects a parameter or confirm an operation.  
By holding it pressed for 5s the instrument's manual shutoff is activated (if it is enable)  
By holding it pressed for 3s when max or min temperature is displayed the temperature will be erased.



To start a manual defrost.



To see the max. stored temperature; in programming mode it browses the parameter codes or increases the displayed value. By holding it pressed for 3s the fast freezing cycle is started.



To see the min stored temperature; in programming mode it browses the parameter codes or decreases the displayed value.

### AUX

**AUX** by holding the auxiliary relay is switched ON or OFF, if it is configured (Parameter oA1=AUS)

### KEY COMBINATIONS:

▼ + ▲ To lock & unlock the keyboard.

SET + ▼ To enter in programming mode.

SET + ▲ Return to the room temperature display.

### 5.1 USE OF LEDES

Each LED function is described in the following table:

LED	MODE	Function
	ON	Cooling enabled
	FLASHING	- Programming Phase - flashing with LED - Anti-short cycle delay enabled
	ON	Fan enabled
	FLASHING	Programming Phase - flashing with LED
	ON	Defrost enabled
	FLASHING	Drip time in progress
	ON	Fast freezing enabled
	ON	- ALARM signal - In "Pr2" indicates the parameter is also present in "Pr1"
AUX	ON	Auxiliary relay is ON

### 5.2 HOW TO SEE THE MIN TEMPERATURE

1. Press and release the ▼ key.
2. The "Lo" message will be displayed followed by the minimum temperature recorded.
3. By pressing the ▼ key or waiting for 5s the normal display will be restored.

### 5.3 HOW TO SEE THE MAX TEMPERATURE

1. Press and release the ▲ key.
2. The "Hi" message will be displayed followed by the maximum temperature recorded.
3. By pressing the ▲ key or waiting for 5s the normal display will be restored.

### 5.4 HOW TO RESET THE MAX AND MIN TEMPERATURE RECORDED

- To reset the stored temperature, when max or min temperature is displayed:
1. Press SET key until "rST" label starts blinking.

### 5.5 HOW TO SEE THE SET POINT

1. Push and immediately release the SET key; the display will show the Set point value;
2. Push and immediately release the SET key or wait for 5s to display the sensor value again.

### 5.6 HOW TO CHANGE THE SETPOINT

1. Push the SET key for 3s to change the Set point value;
2. The value of the set point will be displayed and the and LEDs start blinking;
3. To change the Set value push the ▲ or ▼ arrows within 10s.
4. To memorise the new set point value push the SET key again or wait 10s.

### 5.7 HOW TO START A MANUAL DEFROST

- Push the key for more than 2s and a manual defrost will start.

### 5.8 HOW TO START A FAST FREEZING

Push the ▲ key for more than 3s. See Parameter „CCT“

### 5.9 TO ENTER IN PARAMETERS LIST "Pr1"

- To enter the parameter list "Pr1" (user accessible parameters) operate as follows:
1. Enter the Programming mode by pressing the Set and DOWN key for few seconds - and start blinking.
  2. The instrument will show the first parameter present in "Pr1"

### 5.10 TO ENTER IN PARAMETERS LIST "Pr2"

- To access parameters in "Pr2" a security code is required.
1. Enter in "Pr1" level.
  2. Select "Pr2" parameter and press the "SET" key.
  3. The "PAS" flashing message is displayed, shortly followed by "0 -" with a flashing zero.
  4. Use ▲ or ▼ to input the security code in the flashing digit; confirm the figure by pressing "SET". The security code is "710".
  5. If the security code is correct the access to "Pr2" is enabled by pressing "SET" on the last digit.
- NOTE: each parameter in "Pr2" can be removed or put into "Pr1" (user level) by pressing "SET" + ▼. When a parameter is present in "Pr1" LED is on.

### 5.11 HOW TO CHANGE THE PARAMETER VALUE

- To change the parameter's value operate as follows:
1. Enter the Programming mode.
  2. Select the required parameter with ▼ or ▲.
  3. Press the "SET" key to display its value - and LED starts blinking.
  4. Use ▲ or ▼ to change its value.
  5. Press "SET" to store the new value and move to the following parameter.
- To exit: Press SET + ▲ or wait 15s without pressing a key.  
NOTE: the new programming is stored even when the procedure is exited by waiting for the time-out.

### 5.12 HOW TO LOCK THE KEYBOARD

1. Keep the ▲ and ▼ keys pressed for more than 3 s.
2. The "POF" message will be displayed and the keyboard is locked. At this point it is only possible the viewing of the set point or the MAX or MIN temperature stored.

### 5.12.1 TO UNLOCK THE KEYBOARD

Keep the ▲ and ▼ keys pressed for more than 3 s.

### 5.13 MANUAL SHUTOFF

If the Manual Shutoff function is enabled (Parameter Onf = y), by holding pressed the SET key for 5s, the instrument shows "OFF". The shut-off-function switches OFF all the relays and stops the regulation. If a system centre / store computer is connected during the manual shutoff, it does not record the instrument data and alarms.

When the instrument is manually shut-off, all the relays are under power supply.  
Don't connect any loads to the normally closed contact of the relays.

### 5.14 RS485 SERIAL COMMUNICATION

The RS485 serial communication port allows to connect the unit to the Modbus, by means of a simple 2 wires shielded cable, to the system centre / store computer.  
The UA 30 can be operated via the serial port. For more details please check the manual of the system centre / store computer or the manual of the PC-Software LDSWin.

## 6. MENU STRUCTURE

### 6.1 CONTROL

**Hy** Hysteresis: (0,2°C .. 30,0°C): Hysteresis for set point, always positive. Cooling Cut IN is Set Point Plus Hysteresis (Hy). Cooling Cut OUT is when the temperature reaches the set point.

**LS** Minimum set point limit: (-50,0°C .. SET) Sets the minimum acceptable value for the set point.

**US** Maximum set point limit: (SET .. 150°C) Set the maximum acceptable value for set point.

**Ods** Outputs activation delay at start up: (0 .. 255 min) This function is enabled at the initial start up of the instrument and inhibits any output activation for the period of time set in the parameter. (AUX and Light can work)

**AC** Minimum off time: (0 .. 30 min) interval between the stop of the cooling and the following restart.

**CCt** Fast freezing time: (0min .. 23h 50min; 0,1 = 10 minutes) allows to set the length of the continuous cycle. Can be used, for instance, when the room is filled with new products.

**Con** Cooling ON time with faulty sensor: (0 .. 255 min) time during which the cooling is active in case of faulty thermostat sensor. With **Con** = 0 cooling is always OFF.

**CoF** Cooling OFF time with faulty sensor: (0 .. 255 min) time during which the cooling is off in case of faulty thermostat sensor. With **CoF** = 0 cooling is always active. (**Con** = 0 overrides **CoF** = 0.)

The duration of one ON/OFF-cycle with a faulty sensor is **Con** + **CoF**.

### 6.2 DISPLAY

**rES** Resolution: (in = 1°C; de = 0,1°C) allows decimal point display. **de** = 0,1°C; **in** = 1 °C

**Lod** Local display : select which sensor is displayed by the instrument:  
**P1** = Room sensor (The high and low temperature alarms only effect the room air sensor as this is the only temperature monitoring source employed).  
**P2** = Evaporator sensor  
**P3** = 3<sup>rd</sup> sensor (Auxiliary sensor)  
**tr2** = Difference between P1 and P2 (P1-P2)

### 6.3 DEFROST

**ldF** Defrost type:  
**rE** = electrical heater (Cooling OFF)  
**in** = hot gas (Cooling and defrost relays ON)

**EdF** Defrost mode :  
**in** = interval mode. The defrost starts when the time "ldf" is expired.  
**Sd** = Smart Defrost mode. The time ldf (interval between defrosts) is increased only when the cooling is running (even non consecutively) and only if the evaporator temperature is less than the value in "SdF" (set point for SMARTFROST).  
**rtc** = same functionality as with "in"

**SdF** Set point for SMARTFROST: (-30 .. 30 °C) evaporator temperature which allows the ldf counting (interval between defrosts) in SMARTFROST mode.

**dtE** Defrost end temperature: (-50,0 .. 110,0°C) (Enabled only when the evaporator sensor is present) sets the temperature measured by the evaporator sensor which causes the end of defrost.

**ldF** Interval between defrosts: (1 .. 120h) Determines the time interval between the beginning of two defrost cycles.

**MdF** (Maximum) duration of defrost: (0 .. 255 min) When **P2P** = n, no evaporator sensor, it sets the defrost duration, when **P2P** = y, defrost end based on temperature, it sets the maximum length for defrost.

**dFd** Display during defrost:  
**rt** = real temperature;  
**it** = temperature reading at the defrost start;  
**Set** = set point;  
**dEF** = "dEF" label;  
**dEG** = "dEG" label;

**dAd** Defrost display time out: (0 .. 255 min) Sets the maximum time between the end of defrost and the restarting of the real room temperature display.

**Fdt** Drip time: (0 .. 60 min.) time interval between reaching defrost termination temperature and the restoring of the control's normal operation. This time allows the evaporator to eliminate water drops that might have formed due to defrost.

**dPo** First defrost after start-up:  
**y** = immediately;  
**n** = after the ldf time

**dAF** Defrost delay after fast freezing: (0min .. 23h 50min) after a Fast Freezing cycle, the first defrost will be delayed for this time.



Please note: If parameter "i2F" = HdF no defrost will occur.

### 6.4 FANS

**FnC** Fan operating mode:  
**C-n** = running with the cooling, OFF during the defrost;  
**C-y** = running with the cooling, ON during the defrost;  
**O-n** = continuous mode, OFF during the defrost;  
**O-y** = continuous mode, ON during the defrost;

**Fnd** Fan delay after defrost: (0 .. 255 min) The time interval between the defrost end and evaporator fans start.

**FSt** Fan start temperature: (-50 .. 110°C) Setting of temperature, detected by evaporator sensor, above which the fan is always OFF.

### 6.5 ALARMS

**ALC** Temperature alarm configuration  
**rE** = 0=High and Low alarms related to Set Point  
**Ab** = 1=High and low alarms in absolute temperatures.

**ALU** High temperature alarm setting (always using room sensor P1, see 7.2):  
**ALC** = rE, 0 .. 50°C  
**ALC** = Ab, ALL .. 110°C  
 when this temperature is reached and after the ALd delay time the HA alarm is enabled.

**ALL** Low temperature alarm setting (always using room sensor P1, see 7.2):  
**ALC** = rE, 0 .. 50°C  
**ALC** = Ab, - 50,0°C .. ALU  
 when this temperature is reached and after the ALd delay time, the LA alarm is enabled.

**AFH** Temperature alarm and fan hysteresis: (0,1 .. 25,5°C) Intervention hysteresis for temperature alarm set point and fan regulation set point, always positive.

**ALd** Temperature alarm delay: (0 .. 255 min) time interval between the detection of an alarm condition and the corresponding alarm signalling.

**dAo** Delay of temperature alarm at start-up: (0min .. 23h 50min) time interval between the detection of the temperature alarm condition after the instrument power on and the alarm signalling.

**EdA** Alarm delay at the end of defrost: (0 .. 255 min) Time interval between the detection of the temperature alarm condition at the end of defrost and the alarm signalling.

**dot** Delay of temperature alarm after closing the door : (0 .. 255 min) Time delay to signal the temperature alarm condition after closing the door.

**doA** Open door alarm delay:(0 .. 255 min) delay to the flashing message "dA" is displayed. The cooling and the fans remains effective after the alarm.

**tbA** Buzzer and alarm relay silencing: by pushing one of the keypad buttons.  
**n** = Only the Buzzer is silenced;  
**y** = Buzzer and relay (terminal 15,16) are silenced.

**nPS** Pressure switch number: (0 .. 15) Number of activation of the pressure switch, during the "did" interval, before signalling the alarm event (i2F = PAL).

### 6.6 SENSOR INPUTS

**ot** Thermostat sensor calibration: (-12,0..12,0°C) allows to adjust possible offset of the thermostat sensor.

**oE** Evaporator sensor calibration: (-12,0..12,0°C) allows to adjust possible offsets of the evaporator sensor.

**o3** Auxiliary sensor calibration: (-12,0..12,0°C) allows to adjust possible offsets of the evaporator sensor.

**P2P** Evaporator sensor presence:  
**n** = not present: the defrost stops only by time; **y** = present: the defrost stops by temperature and time.

**P3P** Auxiliary sensor presence: **n** = not present; **y** = present.

**Pbr** Regulation sensor selection:  
**P1** = Room sensor  
**P2** = Evaporator sensor  
**P3** = 3<sup>rd</sup> sensor (Auxiliary sensor)  
**tr2** = Difference between P1 and P2 (P1-P2)

**HES** Temperature increase for alternative setpoint (Toggle setpoint): (-30,0°C .. 30,0°C)  
 Example: SET = -20,0°C and HES = 2,0; during the toggle setpoint the setpoint is SET = -18 °C. The setpoint switching is started by activation the second digital input (terminal 9,10), if the parameter i2F = Es is adjusted.

### 6.7 DIGITAL INPUTS

**odc** Door contact (terminal 7,8) - Cooling and fan status when open door:  
**no** = normal;  
**Fan** = Fan OFF;  
**CPr** = Cooling OFF;  
**F\_C** = Cooling and fan OFF.

**i1P** Door contact input polarity (terminal 7,8):  
**CL** = the digital input is activated by closing the contact;  
**OP** = the digital input is activated by opening the contact.

**i2P** Configurable digital input polarity (terminal 9,10):  
**CL** = the digital input is activated by closing the contact;  
**OP** = the digital input is activated by opening the contact

**i2F** Digital input operating mode (terminal 9,10): configure the digital input function:  
**EAL** = generic alarm;  
**bAL** = serious alarm mode;  
**PAL** = pressure switch;  
**dFr** = start defrost;  
**AUS** = relay AUX actuation;  
**ES** = alternative setpoint;  
**onF** = manual shut-off  
**HdF** = defrost deactivated, cooling without defrost cycles.

**did** Time interval/delay for digital input alarm:(0..255 min.) Time interval to calculate the number of the pressure switch activation when i2F = PAL. If i2F = EAL or bAL (external alarms), "did" parameter defines the time delay between the detection and the successive signalling of the alarm.

### 6.8 OTHER

**oA1** Auxiliary relay (AUX, terminal 15,16) configuration:  
**CP2** = Cooling 2: the relay is activated/ deactivated with the cooling.  
**dF2** = The relay is always off.  
**OnF** = The relay is always on, it is off if the controller is manually shut off.  
**AUS** = Auxiliary relay (AUX).  
**LiG** = Light relay. Activated with the door contact.  
**Fan** = Fan 2: the relay is activated/ deactivated with the fan.  
**ALr** = Alarm relay (default).

**Adr** RS485 serial address for system centre / store computer (1 .. 50):  
 Identifies the instrument address when connected to a Modbus compatible monitoring system.

**PbC** Sensor type selection: (L243 or NTC) select the type of sensor used

**OnF** Manual shut-off:  
**0** = Manual shut-off not enabled.  
**1** = Manual shut-off enabled (under SET key control).

**Rel** Software release: (read only) Software version of the microprocessor.

**Ptb** Parameter table: (read only) it shows the original code of the parameter map.

**Prd** Sensors display: (read only) display the temperature values of the evaporator sensor Pb2 and the auxiliary sensor Pb3.

**Pr2** Access to parameter level 2 (read only).



## 6.9 DEFAULT SETTING VALUES

Label	Name	Limits	Default °C/ min/h	Level UA 30 RC
<b>REGULATION</b>				
Set	Set point	LS .. US	-5	Pr1
Hy	Hysteresis	0,1 .. 25,5 °C	2	Pr1
LS	Minimum set point	-50,0 °C .. SET	-30	Pr2
US	Maximum set point	SET .. 110 °C	20	Pr2
OdS	Outputs activation delay at start up	0 .. 255 min.	0	Pr2
AC	Minimum off time	0 .. 30 min.	1	Pr1
CCt	Cooling ON time during fast freezing	0 .. 23h 50 min.	0	Pr2
Con	Cooling ON time with faulty sensor	0 .. 255 min.	15	Pr2
CoF	Cooling OFF time with faulty sensor	0 .. 255 min.	30	Pr2
<b>DISPLAY</b>				
rES	Resolution (integer/decimal point)	in .. de	De	Pr1
Lod	Local display	P1 .. 1r2	P1	Pr2
<b>DEFROST</b>				
IdF	Defrost type	rE, in	rE	Pr1
EdF	Defrost mode	In, Sd, rtc	In	Pr2
SdF	Set point for SMART DEFROST	-30 .. +30 °C	0	Pr2
dIE	Defrost termination temperature	-50,0 .. 110 °C	8	Pr1
IdF	Interval between defrost cycles	1 .. 120h	6	Pr1
MdF	Safety time (Maximum length for defrost)	0 .. 255 min.	30	Pr1
dFd	Displaying during defrost	rt, it, SET, dEF, dEG	it	Pr2
dAd	Max display delay after defrost	0 .. 255 min.	30	Pr2
Fdt	Drip time	0 .. 60 min.	0	Pr2
dPo	First defrost after start up	n .. y	n	Pr2
dAF	Defrost delay after fast freezing	0 .. 23h 50 min.	2	Pr2
<b>FANS</b>				
FnC	Fans operating mode	C-n, C-y, O-n, O-y	O-n	Pr2
Fnd	Fans delay after defrost	0 .. 255 min.	10	Pr2
FSt	Fans stop temperature	-50,0 .. 110 °C	2	Pr2
<b>ALARMS</b>				
ALC	Temperature alarms configuration	re, Ab	rE	Pr2
ALU	high temperature alarm	-50,0 .. 110 °C	10	Pr1
ALL	low temperature alarm	-50,0 .. 110 °C	10	Pr1
AFH	Temperature alarm and fan hysteresis	0,1 .. 25,5 °C	2	Pr2
ALd	Temperature alarm delay	0 .. 255 min.	15	Pr2
dAo	Delay of temperature alarm at start up	0 .. 23h 50 min.	1,3	Pr2
EdA	Alarm delay at the end of defrost	0 .. 255 min.	30	Pr2
dot	Delay of temperature alarm after closing the door	0 .. 255 min.	15	Pr2
doA	Open door alarm delay	0 .. 255 min.	15	Pr2
tbA	Alarm relay silencing	y .. n	y	Pr2
nPS	Pressure switch activation number	0 .. 15	0	Pr2
<b>ANALOGUE INPUTS</b>				
ot	Thermostat sensor calibration	-12,0 .. 12,0 °C	0	Pr1
oE	Evaporator sensor calibration	-12,0 .. 12,0 °C	0	Pr2
o3	Auxiliary sensor calibration	-12,0 .. 12,0 °C	0	Pr2
P2P	Evaporator sensor presence	n .. y	y	Pr2
P3P	Auxiliary sensor presence	n .. y	n	Pr2
Pbr	Regulation sensor selection	P1 .. 1r2	P1	Pr2
HES	Temperature increase for alternative setpoint (Toggle Setpoint)	-30 .. 30 °C	0	Pr2
<b>DIGITAL INPUTS</b>				
odc	Open door control (terminal 7,8)	no, Fan, CPr, F_C	Fan	Pr2
i1P	Door contact polarity	CL .. OP	CL	Pr2
i2P	Configurable digital input polarity	CL .. OP	CL	Pr2
i2F	Digital input configuration	EAL, bAL, PAL, dFr, AUS, ES, OnF, HdF	EAL	Pr2
did	Digital input alarm delay	0 .. 255 min.	5	Pr2
<b>OTHER</b>				
oA1	Auxiliary output configuration (AUX)	ALr .. CP2	ALr	Pr2
Adr	Serial address	1 .. 50	1	Pr1
PbC	Sensor type selection	NTC .. 243	243	Pr2
OnF	Manual shutoff function enabled	n .. y	n	Pr2
rEL	Software version	---	5.4	Pr2
Ptb	Map code	---	---	Pr2
Prd	Sensors display	Pb1 .. Pb3	---	Pr2
Pr2	Access parameter list	---	---	Pr2

## 7. ALARMS AND MESSAGES

Message	Cause	Outputs
"P1"	Thermostat sensor failure	Alarm output ON Cooling output according to parameters "Con" and "CoF"
"P2"	Evaporator sensor failure	Alarm output ON; Other outputs unchanged
"P3"	Auxiliary sensor failure	Alarm output ON; Other outputs unchanged
"HA"	Maximum temperature alarm	Alarm output ON; Other outputs unchanged
"LA"	Minimum temperature alarm	Alarm output ON; Other outputs unchanged
"EE"	Data or memory failure	Alarm output ON; Other outputs unchanged
"dA"	Door switch alarm	Alarm output ON; Other outputs unchanged
"EAL"	External alarm	Alarm output ON; Other outputs unchanged
"BAL"	Serious external alarm	Alarm output ON; Other outputs OFF
"PAL"	Pressure switch alarm	Alarm output ON; Other outputs OFF
"noP"	Indicator sensor not activated (see parameters „P2P“ / „P3P“)	Alarm output NOT ACTIV; regulation remains active.

The alarm message is displayed until the alarm condition is gone.

All the alarm messages are showed alternating with the room temperature except for the "P1" which is flashing. To reset the "EE" alarm and restart the normal functioning press any key, the "rSt" message is displayed for about 3s. If the controller is connected to the system centre / store computer via Modbus all alarms will be set into the message list with the configured alarm priority. This applies also for the message „computer fault“.

### 7.1 SILENCING BUZZER / ALARM RELAY OUTPUT

If "tbA = y", once the alarm signal is detected the buzzer and the relay are silenced by pressing any key. If "tbA = n", only the buzzer is silenced while the alarm relay is on until the alarm condition is gone.

### 7.2 "EE" ALARM

The instruments are provided with an internal check for the data integrity. Alarm "EE" flashes when a failure in the memory data occurs. In such cases the alarm output is enabled.

### 7.3 ALARM RECOVERY

Sensor alarms : "P1" (sensor1 faulty), "P2" and "P3" automatically stop 10s after the sensor restarts normal operation. Check connections before replacing the sensor.

Temperature alarms "HA" and "LA" automatically stop as soon as the thermostat temperature returns to normal values or when the defrost starts.

Door switch alarm "dA" stops as soon as the door is closed.

External alarms "EAL", "BAL" stop as soon as the external digital input (terminal 9,10) is disabled "PAL" alarm is **only** recovered by switching OFF the instrument.

## 8. SPECIFICATIONS

Housing:	Self extinguishing ABS.
Case:	85x70x64 mm <sup>3</sup> (Height x Width x Depth)
Mounting:	DIN rail mounting in a omega (3) DIN rail
Connections:	Screw terminal block ≤ 2,5 mm <sup>2</sup> wiring.
Power supply:	230 V AC
Power absorption:	3 VA max.
Display:	3 digits, red LED, 14,2 mm high.
Inputs:	L243 or NTC configurable.
Relay outputs	- Cooling: SPST relay 8(3) A, 230 V AC *
	- Defrost: SPDT relay 8(3) A, 230 V AC *
	- Fans: SPST relay 8(3) A, 230 V AC *
	- Alarm or auxiliary: SPST relay 16(6) A, 230 V AC *
	* Ohmic load (inductive/cos phi = 0.4)

Other output:  
Serial Output:  
Data storing:  
On the non-volatile memory (EEPROM).

Kind of action:	1B.
Pollution grade:	Normal
Software class:	A.
Operating temperature:	0 .. 60 °C.
Relative humidity:	20 .. 85% (no condensing).
Storage temperature:	-30 .. 85 °C.
Measuring and regulation range	- L243: -50..50°C
	- NTC: -50 .. 110°C
Resolution:	0,1 °C or 1 °C (selectable).
Measurement accuracy (L243) at 25°C / range -40 .. 50°C:	±0,5 °C

