

EVBOX1 EEV

Control panels for single-phase cold rooms



ENGLISH

- temperature regulation with built-in control of unipolar valves (EEV) up to **260mA** (pre-set or with custom setting) and pressure reading
- power supply 115... 230 Vac
- 5 analogue inputs: 3 for PTC, NTC or Pt 1000 probes (of which 1 is configurable), 1 for PTC, NTC or Pt 1000 probes for superheating temperature; 1 for 4...20 mA pressure transducer to calculate superheating and pressure alarms
- 1 door switch digital input
- 2 multi-purpose digital inputs
- 6 electro-mechanical relay digital outputs, 2 of which are configurable and 2 of which are 30 A res. @ 250 Vac
- alarm buzzer
- magnetothermal switch (models 1 and 2)
- built-in Wi-Fi module for the EPoCA cloud system (models 2 and 4)
- TTL MODBUS slave port for one of the following optional modules (models 1 and 3):
 - EVIF25TWX (EVlinking Wi-Fi) for the EPoCA cloud system
 - EVIF25TBX (EVlinking BLE) for the EVconnect app
 - EVIF23TSX (EVlinking RS-485 with clock) for real-time functions
- RS-485 port for MODBUS RTU serial communication, in models 1 and 3 also for Ethernet connectivity using the EV3 Web or the EVD Web gateway for the EPoCA cloud system

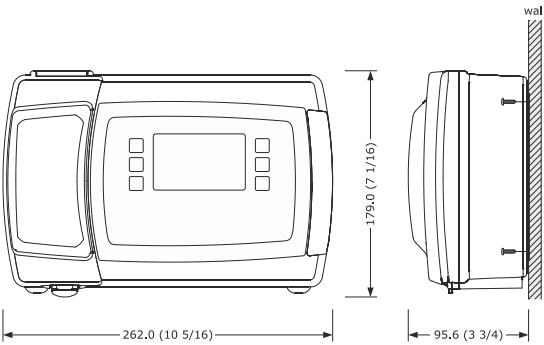
| Models available | | | |
|------------------|-----------------|-----------------------|-----------------------------------|
| No. | Purchasing code | Magnetothermal switch | Connectivity |
| 1 | EVB1246N9MFX | yes | Ethernet, Wi-Fi or optional BLE |
| 2 | EVB1246N9MWX | yes | Built-in Wi-Fi |
| 3 | EVB1246N9XFX | no | Ethernet or Wi-Fi or optional BLE |
| 4 | EVB1246N9XWX | no | Built-in Wi-Fi |

MEASUREMENTS AND INSTALLATION

Measurements are expressed in mm (inches). Wall or on-board installation with fixing screws and plugs (not provided)

CAUTION

- make sure an o-ring seal (provided) is fitted onto each fixing screw
- make sure the product used to clean the user interface is not rated as aggressive



INSTALLATION PRECAUTIONS

- ensure that the working conditions are within the limits stated in the *TECHNICAL SPECIFICATIONS* section
- do not install the device close to applications which are capable of generating hazardous atmospheres (such as applications that use flammable refrigerants) **FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN A SERIOUS RISK TO PERSONAL SAFETY**
- do not install the device close to heat sources, equipment with a strong magnetic field, in places subject to direct sunlight, rain, damp, excessive dust, mechanical vibrations or shocks
- in compliance with safety regulations, the device must be installed properly to ensure adequate protection from contact with electrical parts. All protective parts must be fixed in such a way as to need the aid of a tool to remove them.

FIRST-TIME USE

1. Carry out the installation as shown in the section *MEASUREMENTS AND INSTALLATION*.
2. Power up the device.
3. Configure the device as shown in the section *Setting configuration parameters*. Recommended configuration parameters for first-time use:

| LAB. | DEF. | PARAMETER | MIN... MAX. |
|------|------|---|------------------------|
| P9 * | -1.0 | minimum 4 mA calibration value of Pb5 input (absolute or relative) | -99.9... 99.9 bar/barg |
| P10* | 12.0 | minimum 20 mA calibration value of Pb5 input (absolute or relative) | -99.9... 99.9 bar/barg |

(*) When setting absolute or relative pressure, check the transducer data and, if necessary, add/remove 1 bar to the minimum and maximum value.

| | | | |
|-----|-----|--|---|
| h15 | | type of refrigerant | see table of parameters |
| h16 | 1 | type of valve | 0 = generic (see also h18, h19 and h20) 1 = Sanhua DPF 2 = Danfoss ETS |
| d0 | 8 | defrost interval (if d8 = 3 or 4, maximum interval) | 0... 99 h 0 = manual only |
| d1 | 0 | type of defrost | 0 = electric 1 = hot gas 2 = compressor off 3 = thermostat controlled, set by d2 threshold |
| d2 | 2.0 | evaporator temperature threshold to end defrosting (if P3=1) | -99.0... 99.0 °C/°F |
| d3 | 30 | defrost duration (if P3 = 1, maximum duration) | 0... 99 min |

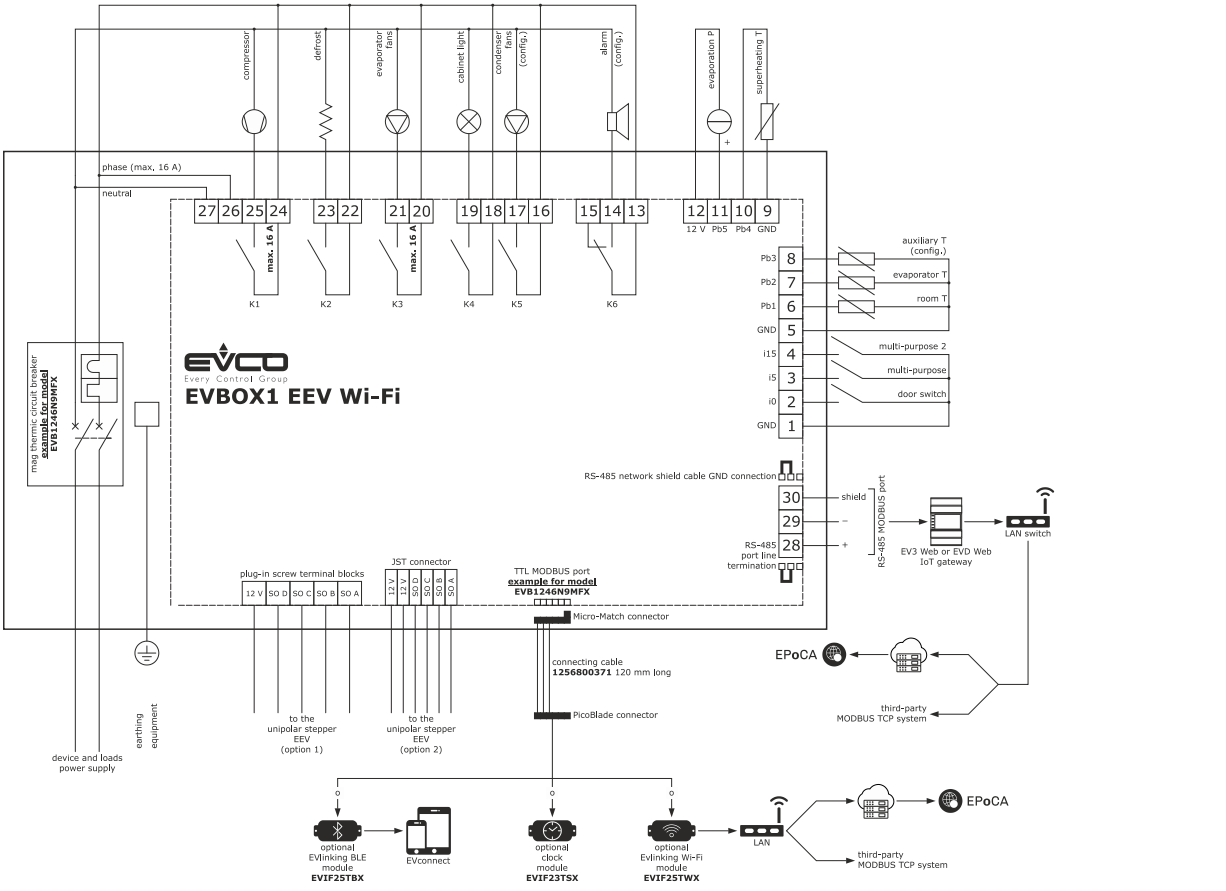
Next check that the remaining settings are appropriate: see the section *CONFIGURATION PARAMETERS*.

4. Disconnect the device from the mains.
5. Make the electrical connection as shown in the section *ELECTRICAL CONNECTION*, without powering up the device.
6. In models 1 and 3 only, connect one of the following optional accessories as required (for the EVlinking modules, also add an adapter cable 1256800371). To activate real-time functions, connect the EVlinking RS-485 EVIF23TSX clock module.

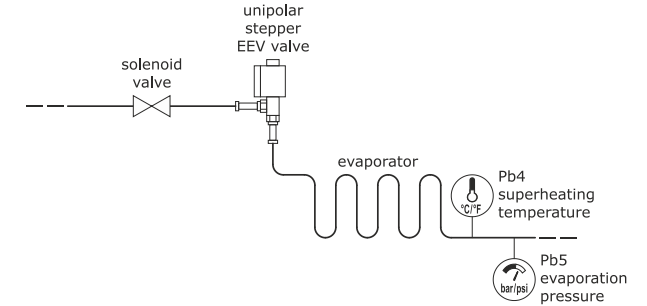
ELECTRICAL CONNECTION

N.B.

- use cables of an adequate section for the current running through them
- to reduce any electromagnetic interference, locate the power cables as far away as possible from the signal cables

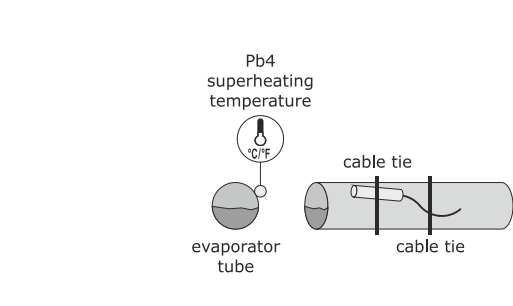


Position of sensors Pb4 and Pb5 at the evaporator outlet



Pb5: 4...20mA evaporation pressure transducer. Reading scale from parameters P9 and P10.
Pb4: superheating temperature sensor. The type of temperature sensor is defined by P0, default NTC. The P0 setting applies to both regulation and superheating.

Position of sensor Pb4 on the pipe fitting at the evaporator outlet

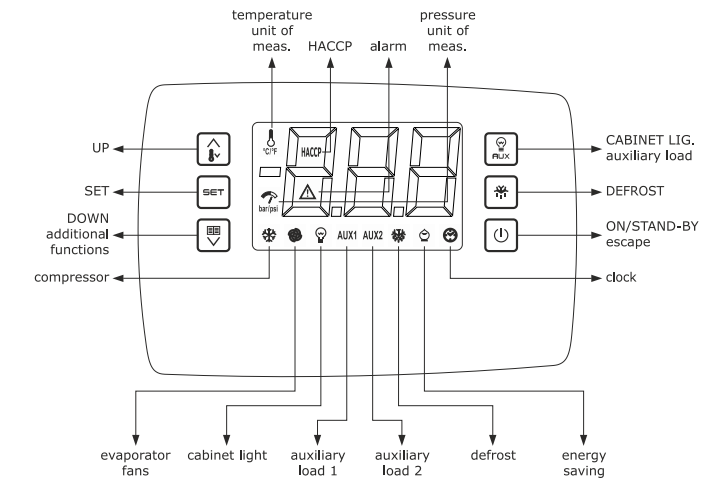


Warning icon: The speed with which the temperature is transmitted determines the accuracy of the instant superheating calculation. Apply a conductive paste and place the sensor with its tip pointing upwards slightly and the cable output pointing downwards, creating a small siphon. Secure with a cable tie and insulate to prevent it being affected by the surrounding air. For wide tubing, place the sensor where it can detect the fluid level.

PRECAUTIONS FOR ELECTRICAL CONNECTION

- If using an electrical or pneumatic screwdriver, adjust the tightening torque
- if the device is moved from a cold to a warm place, the humidity may cause condensation to form inside. Wait about an hour before switching on the power
- make sure that the supply voltage, electrical frequency and power are within the set limits. See the section *TECHNICAL SPECIFICATIONS*
- disconnect the power supply before carrying out any type of maintenance
- do not use the device as a safety device
- for repairs and further information, contact the EVCO sales network
- If the optional EVlinking modules are used for the clock (EVIF23TSX), Wi-Fi (EVIF25TWX) or Bluetooth Low Energy (EVIF25TBX) connectivity, the 1256800371 adapter cable must also be ordered.

USER INTERFACE AND FUNCTIONS




| LED | ON | OFF | FLASHING |
|-----|-----------------------|---------------------|--|
| | temperature displayed | - | overcooling active |
| | pressure displayed | - | - |
| | compressor on | compressor off | compressor protection active or setpoint being set |
| | evaporator fans on | evaporator fans off | evaporator fans off active |
| | cabinet light on | cabinet light off | cabinet light on from digital input |

| | | | |
|-------|--------------------------------------|---|---|
| AUX1 | load connected with u1 on | load connected with u1 off | compressor 1 protection active (if u1=7), evaporator fans off active (if u1=9), auxiliary load active (if u1=2) |
| AUX2 | load connected with u11 on | load connected with u11 off | compressor 2 protection active (if u11=7), evaporator fans off active (if u11=9), auxiliary load active (if u11=2) |
| | defrost or pre-drip active | defrost or pre-drip not active | hot gas defrost delay active, drip-ping or heating of refrigerant active |
| | energy saving active | energy saving not active | - |
| | - | - | date, time and day of week setting in progress, in stand-by with programmed switch on/off (flashes normally); access via EPoCA or EVconnect in progress (flashes 1 s on, 9 s off) |
| HACCP | saved HACCP alarms not yet displayed | no saved HACCP alarms or alarms already displayed | new HACCP alarm saved |
| | alarm active | alarm not active | compressor maintenance request |


| LABEL | ON | OFF | FLASHING |
|-------|--|-----|---|
| --- | function or data requested which are not available | - | - |
| Pd | - | - | pump-down in progress or pump-down alarm from digital input timed out signalled (see C14, u3 and h10) |
| dEF | defrost in progress, if d6 = 2 | - | - |

4.1 Switching the device on/off

1.





Hold down the ON/STAND-BY key for 1 s.

| | | |
|---|--|--|
|  | N.B. | |
| | - to activate a function or view a value, make sure the device is switched on, the keypad is not locked and that no other procedures are running (see additional details given for each function) - when the keypad is locked, functions other than silencing the buzzer, switching the cabinet light on/off, viewing the setpoint and unlocking the keypad are not available. When any other key is pressed, the Loc label will appear and no action can be taken. The Loc label also appears when an attempt is made to make changes to the setpoint with the settings block activated (r3 = 1) | |

4.2 Locking/unlocking the keypad

1.

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Hold down both the DOWN and ON/STAND-BY keys for 1 s: the Loc (keypad locked) or UnL (keypad unlocked) label will appear.

4.3 Switching the cabinet light on/off (if u2 = 1)

1.

 AUX


Press the AUX key: the  LED will come on/go off.

4.4 Silencing the buzzer (if u9 = 1, default)



Press any key.
If **u4 = 1** (default), silencing the buzzer will also deactivate the alarm output.

4.5 Viewing values detected by the analogue inputs


1.




Hold down the DOWN key for 1 s to view the first available label
2.

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
Press the UP or DOWN key until the desired label among those given below appears.
- | LABEL | CORRESPONDING VALUE |
|-------|--|
| Pb1 | cabinet temperature; if P4 = 4: incoming air temperature |
| Pb2 | evaporator temperature |
| Pb3 | auxiliary temperature |
| Pb4 | Ts evaporator superheating temperature |
| Pb5 | Pe superheating pressure (absolute or relative depending on parameters P9 and P10) |
3.



Press the SET key to view the value of the label displayed.
4.




Press the SET key (or take no action for 60 s) to go back to the labels.
5.






Press the ON/STAND-BY key to exit the procedure.

4.6 Setting the setpoint (enabled with r3 = 0, default)


1.




Press the SET key: the  LED will start flashing.
2.

 / 

Press the UP or DOWN key within 15 s to set the value within the limits r1 and r2 (default -50... 50)
3.





Press the SET key (or take no action for 15s): the  LED will go off.

4.7 Activating defrost

Make sure overcooling is not activated and that the evaporator temperature is below the d2 threshold.

1.





Hold down the DEFROST key for 4 s: the  LED will come on.

4.8 Activating/deactivating overcooling

Make sure defrosting, dripping or the evaporator fan stop are not in progress.


1.



Hold down the UP key for 4 s: the  LED will start flashing. Repeat to deactivate the function

4.9 Switching the demisting function on (if u1 and/or u11 = 1) and switching the auxiliary load on/off (if u1 and/or u11 = 2)



1.

 AUX

Hold down the AUX key for 2 s: the AUX1 LED (referred to the load associated with u1) and/or the AUX2 LED (referred to the load associated with u11) will come on. The heaters will come on for the time set by parameter u6 and/or the auxiliary load will be activated (and deactivated when the AUX key is held down again)

4.10 Viewing and activating the low or high relative humidity function (if F0 = 5)

- 1


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Hold down both the SET and UP keys for 4 s: the **rhL** (low relative humidity function) or **rhH** (high relative humidity function) label will appear. Repeat the operation within 10 s of the label being displayed to select the desired mode



4.11 Displaying and deleting the compressor operating hours

To view the operating hours:


1.




Hold down the DOWN key for 1 s: the display will show the first available label
2.

 / 


Press the UP or DOWN key until the desired label is displayed (**CH1** for compressor operating hours, **CH2** for compressor 2 operating hours).
3.



Press the SET key to view the hours of the selected compressor
4.




Press the SET key again to return to the labels
5.





Press the ON/STAND-BY key (or take no action for 60 s) to exit the procedure

To delete the operating hours (of both the compressors if compressor 2 is present):


1.




Hold down the DOWN key for 1 s: the display will show the first available label
2.

 / 


Press the UP or DOWN key until the **RCH** label appears
3.



Press the SET key: the value **0** will be displayed
4.




Press the UP key within 15 s to increase the value up to 149 (access password)
5.




Press the SET KEY (or take no action for 15 s): the symbol - - - will flash for 4 s, after which the device will exit the procedure.



4.12 Setting the date, time and day of the week available in models with built-in Wi-Fi (or by connecting to optional EVlinking or EV3/EVD Web gateway in models 1 and 3)

| | | |
|---|---|--|
|  | N.B. | |
| | - do not disconnect the device from the mains in the two minutes after setting the date, time and day of the week - if the device communicates with the EVconnect app or the EPoCA remote monitoring system, it is possible to force synchronisation of the date, time and day of the week with those of the smartphone/tablet/PC used | |


1.









Hold down the DOWN key for 1 s: the display will show the first available label
2.





 / 

Press the UP or DOWN key until the **rtc** label appears
3.




Press the SET key: the  LED will start flashing and the display will show the first available label. By pressing the SET key again, others will be displayed in the order given below

| LAB. | DESCRIPTION |
|---|--------------------|
| y+2  -ures | year (00...99) |
| n+2  -ures | month (01... 12) |
| d+2  -ures | day (01... 31) |
| h+2  -ures | hour (00... 23) |
| n+2  -ures | minutes (00... 59) |
| Mon | Monday |
| tuE | Tuesday |
| UEd | Wednesday |



| | | |
|----|---|--|
| | thu | Thursday |
| | Fri | Friday |
| | Sat | Saturday |
| | Sun | Sunday |
| 4. |  /  | Press the UP or DOWN key within 15 s of the desired label being displayed to set the value |
| 5. |  | Press the SET key to confirm any changes and to view the next label; press the SET key after viewing/changing the last label (day of the week) to exit the procedure |
| 6. |  | Press the ON/STAND-BY key to exit the procedure beforehand |

5 SETTINGS


5.1 Setting the configuration parameters

| | |
|---|--|
|  | N.B. Check the settings made are appropriate; see the section <i>CONFIGURATION PARAMETERS</i> . |
|---|--|


1.

 + 


Hold down both the UP and DOWN keys for 4 s: the display will show the **PA** label
2.





Press the SET key: the value **0** will be displayed
3.





Press the DOWN key within 15 s to decrease the value to -19 (access password)
4.




Press the SET key (or take no action for 15 s)
5.

 + 



Hold down both the UP and DOWN keys for 4 s: the display will show the first parameters label (SP)
6.

 / 


Press the UP or DOWN key to find the label of the parameter to be changed
7.





Press the SET key to access the value of this parameter
8.

 / 


Press the UP or DOWN key to increase/decrease the value
9.



Press the SET key (or take no action for 15 s) to confirm the set value
10.

 + 



Hold down both the UP and DOWN keys for 4 s to exit the procedure
11.




Or press the ON/STAND-BY key to exit the procedure

5.2 Restoring factory settings


1.

 + 


Hold down both the UP and DOWN keys for 4 s: the display will show the **PA** label
2.





Press the SET key: the value **0** will be displayed
3.




Press the UP key within 15 s to increase the value to **149** (access password)
4.





Press the SET key (or take no action for 15 s)
5.

 + 


Hold down both the UP and DOWN keys for 4 s: the display will show the **dEF** label
6.




Press the SET key: the value **0** will be displayed
- 7a.

 + 

Hold down both the UP and DOWN keys to exit the procedure without restoring the settings
- 7b.



Press the UP key to increase the value to **1** and restore the settings
8.



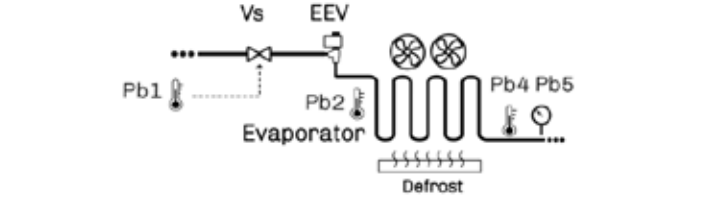
Press the SET key (or take no action for 15 s): the **dEF** label will flash for 4 s, after which the device will exit the procedure
9.

Disconnect the device from the power supply

8 CHECKING THE VALVE

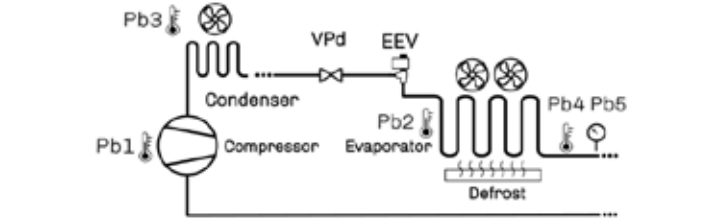
EXAMPLE WITH A REMOTE COMPRESSOR

To check the expansion valve only with a remote compressor, disable the compressor delays by setting C1, C2, C3 = 0 to ensure a prompt response to the cooling request. If pump-down is not necessary, it is disabled by setting u3 = 0; the main cooling output K1 is connected to the solenoid valve to open the supply.






EXAMPLE WITH A DIRECT COMPRESSOR

The main cooling output K1 controls the compressor, while the pump-down output manages the solenoid valve, closing it before switching off to empty the evaporator. Enable delays C1, C2, C3 to protect the compressor. It is advisable to set parameter h21>0.



PUMP-DOWN

There is a pump-down relay u1/u11 = 10 in this configuration, which is on when regulation is active and off when there is a request to switch off cooling. The compressor remains active in the modes set by parameter C14:
0= when the "u3>0" interval elapses
1= from the digital input configured as LP
2= h10 threshold from the pressure transducer
The message "Pd" will flash for the duration of the pump-down to signal it is in progress.

- 
- Before connecting the valve, set the following basic parameters

When parameters **P9** and **P10**, which determine the minimum and maximum limits of the pressure transducer, are set correctly, they reset the "**Pr5**" alarm. By following the procedure described in section 4.5, the pressure read by the transducer is given at Pb5 and can be compared with the system's pressure gauge "**Pb5** value = pressure gauge value".

"**h15**" sets the type of refrigerant used in the system;

"**h16**" determines the type of valve: 0=generic; 1= Sanhua DPF, 1=Danfoss ETS. For custom valve configuration "h16=0", the following values must also be set:

"**h18**" maximum steps

"**h19**" additional steps

"**h20**" step frequency

Once these parameters have been set, switch the device off, connect the valve then switch it back on again.

CHECKING SUPERHEATING

Enable valve: superheating is checked if the valve is enabled with "**h0**=1". If "**h0**=0", all the probe checks and errors "**Pr4** and **Pr5**" to calculate superheating are disabled.

Opening the valve during normal operation: the valve can be regulated either manually or automatically by setting "**h08**":

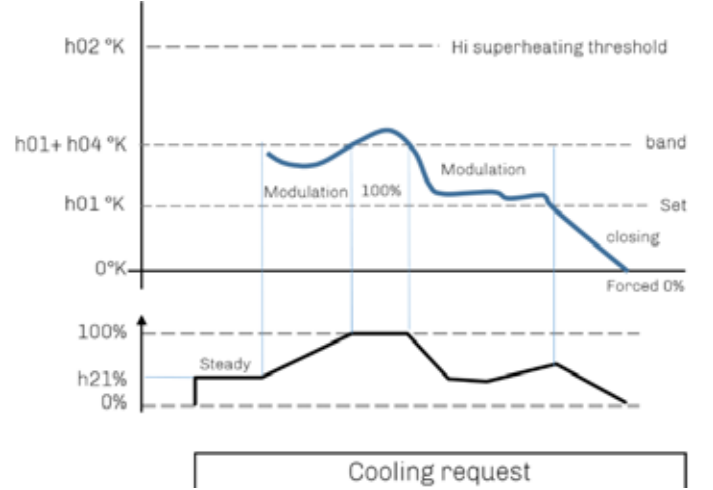
"**h08**=-1" automatic to calculate superheating

"**h08**=0%" manual with total closure (e.g. to check for leaks)

"**h08**>0%" manual with fixed opening

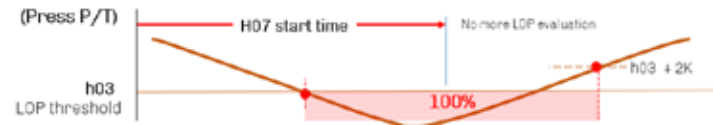
Opening the valve during hot gas defrost: the valve can be opened with the set value "**h09**".
Consent to regulation: this is given when the on-off cooling output is available and not subject to delays.

Trend of superheating check "h08=-1"



REGULATION AT START-UP


When the device is switched on and a cooling request is activated, it is necessary to wait for synchronism and any delays C1, C2, C3, followed by opening with an initial **stabilisation** stage (Steady). The percentage of the opening can be calculated using the algorithm "**h21**=0" based on the previous closing status (*), or set manually with "**h21**>0" for time "**h7**". The only exception is the resetting after a low pressure switch alarm **LP** which goes directly to regulation. During stabilisation, if the lower threshold "**h03**" (low operating pressure **LOP** in °C) is exceeded, this will force the valve to open 100% until the function is reset and no alarms are signalled.



If the pressure does not return to normal, any enabled low pressure transducer alarms **LPT** ("h12=1" enabled and "**h13** = threshold in bar" with "**h14**" delay) or low pressure switch alarms **LP** (with an initial delay "h17") will block regulation.

Checking low pressure transducer alarm Pb5 active "h12=1" with threshold **h13**



(*) : when combined with previous particular closing conditions, the calculation upon reopening may be 0% for the duration of the stabilisation


REGULATION DURING NORMAL OPERATION

When stabilisation is complete, the valve modulates between the superheating setpoint "**h01**" and the upper band threshold "**h01**+**h04**", checking the opening with the PID algorithm, where "**h05**=integral" and "**h06**=derivative". When the upper band threshold has been exceeded and any calculation times have elapsed, the valve is 100% open.



HIGH SUPERHEATING when the threshold "**h02** in °K" has been exceeded, an "**HSH**" alarm message is generated which does not affect regulation. An alarm delay "h11" (common to MOP) may be applied.


LOW SUPERHEATING when the superheating value goes below the setpoint, a control procedure automatically starts up to reduce the valve opening until total closure at 0 °K superheating. No alarms are triggered.

MAXIMUM OPERATING PRESSURE when maximum operating pressure is reached, the control sets off the "**MOP**" alarm after delay "**h11**" (the same delay for high superheating). The valve goes to its safety opening "**h17**" for 60". After this time has elapsed, if the alarm persists, the valve is forced shut until the pressure returns below the MOP threshold.

 **SUPERHEATING SENSOR ERRORS:** when the "**Pr4** or **Pr5**" alarm is set off, the control triggers the safety opening "**h17**" when regulation is requested.

6 CONFIGURATION PARAMETERS

|  | NO. | PAR. | DEF. | SETPOINT | MIN... MAX. |
|---|-----|------|-------------|---|--|
| | 1 | SP | 3.0 | setpoint | r1... r2 |
|  | NO. | PAR. | DEF. | ANALOGUE INPUTS | |
| | 2 | CA1 | 0.0 | cabinet probe offset | -25... 25 °C/°F |
| | 3 | CA2 | 0.0 | evaporator probe offset | -25... 25 °C/°F |
| | 4 | CA3 | 0.0 | auxiliary temperature probe offset | -25... 25 °C/°F |
| | 5 | CA4 | 0.0 | evaporation temperature probe offset due to superheating | -25... 25 °C/°F |
| | 6 | CA5 | 0.0 | evaporation pressure transducer offset | -25.0... 25.0 Bar/10 (10.0 = 1 Bar) |
| | 7 | P0 | 1 | type of temperature probe | 0 = PTC 1 = NTC 2 = Pt 1000 |
| | 8 | P1 | 1 | enable decimal point °C | 0 = no 1 = yes |
| | 9 | P2 | 0 | temperature measurement unit | 0 = °C 1 = °F |
| | 10 | P3 | 1 | evaporator probe configuration | 0 = disabled 1 = defrost regulation + fans 2 = fan regulation |
| | 11 | P4 | 0 | auxiliary temperature probe configuration | 0 = disabled 1 = condenser temperature 2 = auxiliary temperature 3 = evaporator 2 temperature 4 = outgoing air temperature |
| | 12 | P5 | 0 | value displayed | 0 = cabinet temperature (if P4 = 4, product temperature CPT) 1 = setpoint 2 = evaporator temperature 3 = sensor 3 temperature 4 = incoming air temperature |
| | 13 | P7 | 50 | incoming air effect to calculate product temperature (CPT) | 0... 100% CPT = [[(P7 x (incoming air)) + [(100 - P7) x (outgoing air)] : 100] |
| | 14 | P8 | 5 | display refresh time | 0... 250 s: 10 |
| | 15 | P9 | -1.0 | minimum 4 mA calibration value of Pb5 input (absolute or relative) | -99.9... 99.9 bar/barg |
| | 16 | P10 | 12.0 | minimum 20 mA calibration value of Pb5 input (absolute or relative) | -99.9... 99.9 bar/barg |

|  | NO. | PAR. | DEF. | TEMPERATURE REGULATION | MIN... MAX. |
|---|-----|------|--------------|----------------------------------|-------------------------------------|
| | 17 | r0 | 2.0 | setpoint SP differential | 0.1... 15.0 °C/°F see also r12 |
| | 18 | r1 | -50.0 | minimum setpoint | -99.0 °C/°F... r2 |
| | 19 | r2 | 50.0 | maximum setpoint | r1... 99.0 °C/°F |
| | 20 | r3 | 0 | enable setpoint lock | 0 = no 1 = yes |
| | 21 | r4 | 0.0 | setpoint offset in energy saving | 0.0... 99.0 °C/°F |
| | 22 | r5 | 0.0 | setpoint offset in overcooling | 0.0... 99.0 °C/°F |
| | 23 | r6 | 30 | overcooling duration | 0... 240 min |
| | 24 | r12 | 0 | differential position r0 | 0 = asymmetrical 1 = symmetrical |

| | NO. | PAR. | DEF. | VALVE | MIN... MAX. |
|--|-----|------|------|-------|-------------|
|--|-----|------|------|-------|-------------|

| | | | | | |
|--|----|-----|--------------|--|--|
| | 25 | h0 | 1 | enable electronic valve control (at start-up, there is a stabilisation phase with set duration h07 and automatically calculated or manual opening h21) | 0 = no (also excludes Pr4 and Pr5 probe errors) 1 = yes |
| | 26 | h01 | 6.0 | superheating setpoint SH | 3.0... 25.0 °K |
| | 27 | h02 | 20.0 | high superheating threshold HSH (delayable with h11) | 10.0... 40.0 °K |
| | 28 | h03 | -30.0 | low pressure (LOP) threshold in degrees (if active during stabilisation, it forces a fixed opening of 100% without blocking the compressor) | -70.0... 40.0 °C |
| | 29 | h04 | 50.0 | proportional band to calculate superheating | 10.0... 99.9 °K |
| | 30 | h05 | 50 | integral time to calculate superheating | 0... 999 seconds |
| | 31 | h06 | 10 | derivative time to calculate superheating | 0... 999 seconds |
| | 32 | h07 | 10 | stabilisation duration at valve start-up | 0... 250 seconds |
| | 33 | h08 | -1 | valve opening mode in normal operation -1 = automatic with SH calculation 0 = manual with total closure >0= manual with fixed opening | -1... 100 % |
| | 34 | h09 | 0 | valve opening during hot gas defrost | 0..100% |
| | 35 | h10 | 1.0 | evaporation pressure threshold for compressor off during pump-down | 0.0... 45.0 bar/barg |
| | 36 | h11 | 15 | high superheating alarm delay HSH and maximum operating pressure alarm MOP | 0... 250 seconds |
| | 37 | h12 | 0 | enable low pressure LPT alarm from transducer | 0 = no 1 = yes |
| | 38 | h13 | 0.5 | low pressure LPT alarm threshold from transducer | -0.5... 45.0 bar/barg |
| | 39 | h14 | 3 | low pressure LPT alarm delay from transducer | 0... 250 min |
| | 40 | h15 | 9 | type of refrigerant | 0 = R-22 1 = R-404A 2 = R-507A 3 = R-744 4 = R-290 5 = R-1270 6 = R-407F 7 = R-717 8 = R-449A 9 = R-448A 10= R-452A 11= R-134A 12= R-32 13= R-407C 14= R-410A 15= R-513A 16= R-1234YF 17= R-1234ZE 18= R-407A 19= R-454C 20= R455A |
| | 41 | h16 | 1 | type of valve | 0 = generic 1 = Sanhua DPF 2 = Danfoss ETS |
| | 42 | h17 | 30 | valve opening with evaporation probe errors (Pr4, Pr5) and MOP alarm | 0..100% |
| | 43 | h18 | 100 | maximum valve steps (if h16 =0) | 0... 2000 |
| | 44 | h19 | 30 | additional valve steps (if h16 =0) | 0... 490 |
| | 45 | h20 | 100 | valve step frequency (if h16 =0) | 25... 999 |
| | 46 | h21 | 70 | fixed opening during stabilisation 0 = automatically calculated >0= fixed manual value | 0... 100% |
| | 47 | h22 | 50.0 | evaporation temperature threshold due to maximum operating pressure alarm MOP after delay h11 with valve opening h17 and closing after 60 s | -99.0... 199.0 °C/°F |

| | | | | | | |
|--|--|-----|------|-------------|--|---|
| | | NO. | PAR. | DEF. | COMPRESSOR | MIN... MAX. |
| | | 48 | C0 | 0 | compressor-on delay from power-on | 0... 240 min |
| | | 49 | C1 | 5 | delay between two compressor switch-ons | 0... 240 min |
| | | 50 | C2 | 3 | minimum compressor-off time | 0... 240 min |
| | | 51 | C3 | 0 | minimum compressor-on time | 0... 240 s |
| | | 52 | C4 | 10 | compressor-off time during cabinet probe error Pr1 | 0... 240 min |
| | | 53 | C5 | 10 | compressor-on time during cabinet probe error Pr1 | 0... 240 min |
| | | 54 | C6 | 80.0 | condenser superheat COH alarm threshold | 0.0... 199.0 °C/°F |
| | | 55 | C7 | 90.0 | compressor locked CSd alarm threshold | 0.0... 199.0 °C/°F |
| | | 56 | C8 | 1 | compressor locked CSd alarm delay | 0... 15 min |
| | | 57 | C10 | 0 | compressor hours to signal maintenance (flashing LED Δ) | 0... 999 h x 10 0 = disabled |
| | | 58 | C11 | 3 | delay between 2 different compressor switch-ons | 0... 240 s If u1 or u11=7 |
| | | 59 | C12 | 2 | compressor hour value for compressor rotation algorithm | 0... 240 algorithm = {[C12 x (compressor hours)] + [C13 x (compressor switch-ons)]} if C15= 2 |
| | | 60 | C13 | 1 | compressor switch-on value for compressor rotation algorithm | 0... 10 algorithm = {[C12 x (compressor hours)] + [C13 x (compressor switch-ons)]} if C15 = 2 |
| | | 61 | C14 | 2 | type of pump-down | 0 = time-controlled 1 = from digital input 2 = due to evaporator pressure |

| | | | | | | |
|--|--|-----|------|------------|--|---|
| | | NO. | PAR. | DEF. | DEFROST | MIN... MAX. |
| | | 62 | d0 | 8 | defrost interval (if d8 = 3 or 4, maximum interval) | 0... 99 h 0 = manual only |
| | | 63 | d1 | 0 | type of defrost | 0 = electric 1 = hot gas 2 = compressor off 3 = thermostat controlled, set by d2 threshold |
| | | 64 | d2 | 2.0 | evaporator temperature threshold to end defrosting (if P3=1) | -99.0... 99.0 °C/°F |
| | | 65 | d2b | 2.0 | evaporator 2 temperature threshold to end defrosting (if P3=1 and/or P4 = 3) | -99.0... 99.0 °C/°F |
| | | 66 | d3 | 30 | defrost duration (if P3 = 1, maximum duration) | 0... 99 min |
| | | 67 | d4 | 0 | enable defrost at power-on | 0 = no 1 = yes |
| | | 68 | d5 | 0 | defrost delay from power-on | 0... 99 min |
| | | 69 | d6 | 1 | value displayed when defrosting | 0 = cabinet temperature (or product temperature CPT) 1 = limited to SP+r0 2 = dEF label |
| | | 70 | d7 | 2 | drip duration | 0... 15 min |
| | | 71 | d8 | 0 | type of defrost interval | 0 = hours (d0) device on |

| | | | | | |
|--|----|-----|------------|---|---|
| | | | | | 1 = hours (d0) compressor on 2 = hours (d0) evaporator temperature < d9 3 = adaptive 4 = timed (if real-time functions are active) |
| | 72 | d9 | 0.0 | evaporator temperature threshold for defrost interval count (if d8 = 2) | -99... 99 °C/°F |
| | 73 | d11 | 0 | enable defrost timeout alarm dFd | 0 = no 1 = yes |
| | 74 | d15 | 0 | compressor-on consecutive time for hot gas defrost (if d1 = 1) | 0... 99 min |
| | 75 | d16 | 0 | pre-drip duration for hot gas defrost with defrost relay active (if d1 = 1) | 0... 99 min |
| | 76 | d18 | 40 | interval for adaptive defrost (if d8=3) | 0... 999 min if compressor-on with evaporator T < optimal evaporator T + d22 0 = manual only |
| | 77 | d19 | 3.0 | threshold relative to optimal evaporator temperature for forced adaptive defrost (if d8=3) | 0.0... 40.0 °C/°F optimal evaporator temperature - d19 |
| | 78 | d20 | 180 | compressor-on consecutive time to force defrost during normal operation | 0... 500 min 0 = disabled |
| | 79 | d21 | 200 | compressor-on consecutive time to force defrost from power-on and from overcooling in pull-down | 0... 500 min if (cabinet T or product T CPT - SP) > 10 °C/20 °F 0 = disabled |
| | 80 | d22 | 2.0 | threshold relative to optimal evaporator temperature for adaptive defrost interval count | 0.0... 10.0 °C/°F optimal evaporator T + d22 |
| | 81 | d25 | 0 | enable outgoing air probe to control defrost with evaporator probe error Pr3 | 0= no 1= yes |
| | 82 | d26 | 6 | interval count for function d25 | 0..99 hours |

| | | | | | | |
|--|--|-----|------|--------------|---|--|
| | | NO. | PAR. | DEF. | TEMPERATURE ALARMS | MIN... MAX. |
| | | 83 | A0 | 0 | select value for low temperature alarm | 0 = cabinet temperature (or product temperature CPT if P4 = 4) 1 = evaporator temperature |
| | | 84 | A1 | -10.0 | low temperature alarm threshold | -99.0... 99.0 °C/°F |
| | | 85 | A2 | 1 | type of low temperature alarm | 0 = disabled 1 = relative to setpoint (i.e. SP + A1) 2 = absolute (i.e. A1) |
| | | 86 | A4 | 10.0 | high temperature alarm threshold | -99.0... 99.0 °C/°F |
| | | 87 | A5 | 1 | type of high temperature alarm | 0 = disabled 1 = relative to setpoint (i.e. SP + A4) 2 = absolute (i.e. A4) |
| | | 88 | A6 | 120 | high temperature alarm delay from power-on | 0... 240 min |
| | | 89 | A7 | 15 | high/low temperature alarm delay | 0... 240 min |
| | | 90 | A8 | 15 | high temperature alarm delay after defrost | 0... 240 min |
| | | 91 | A9 | 15 | high temperature alarm delay from door closure | 0... 240 min |
| | | 92 | A10 | 1 | duration of power failure for saving alarm | 0... 240 min 0 = disabled |
| | | 93 | A11 | 2.0 | high/low temperature alarm threshold differential (A1 and A4) | 0.1... 15.0 °C/°F |

| | | | | | | |
|--|--|-----|------|-------------|--|--|
| | | NO. | PAR. | DEF. | FANS | MIN... MAX. |
| | | 94 | F0 | 1 | evaporator fan mode in normal operation | 0 = off 1 = on 2 = on if compressor on 3 = thermostat controlled (with cabinet or product temperature + F1) 4 = thermostat controlled (with cabinet or product temperature + F1) if compressor on 5 = function of F6 (low or high humidity) |
| | | 95 | F1 | -1.0 | evaporator fan regulation threshold (if P3 = 1 or 2) | -99.0... 99.0 °C/°F |
| | | 96 | F2 | 0 | evaporator fan mode during defrost and dripping | 0 = off 1 = on 2 = function of F0 |
| | | 97 | F3 | 0 | maximum time evaporator fans off after dripping | 0... 15 min |
| | | 98 | F4 | 60 | time evaporator fans off in low humidity | 0... 240 s |
| | | 99 | F5 | 10 | time evaporator fans on in low humidity | 0... 240 s |
| | | 100 | F6 | 0 | high or low humidity function (if F0 = 5) | 0 = for low humidity (with fan time F4 and F5 if compressor is off, on if compressor is on) 1 = for high humidity (fans on) |
| | | 101 | F7 | 5.0 | threshold relative to setpoint (SP) for end of fan stop time | -99.0... 99.0 °C/°F SP + F7 |
| | | 102 | F8 | 2.0 | evaporator fan regulation threshold differential (F1) | 0.1... 15.0 °C/°F |
| | | 103 | F9 | 0 | evaporator fans off delay from compressor off | 0... 240 s if F0 = 2 or 5 |
| | | 104 | F11 | 15.0 | condenser fans on threshold | 0.0... 99.0 °C/°F differential = 2 °C/4 °F |
| | | 105 | F12 | 30 | condenser fans off delay from compressor off | 0... 240 s if PP1... PP4 ≠ 3 |
| | | 106 | F13 | 30 | time evaporator fans off in energy saving | 0... 240 s x 10 if F0 ≠ 5 |
| | | 107 | F14 | 30 | time evaporator fans on in energy saving | 0... 240 s x 10 if F0 ≠ 5 |

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|--|--|-----|------|-----------|---|--|
| | | NO. | PAR. | DEF. | DIGITAL INPUTS | MIN... MAX. |
| | | 108 | i0 | 3 | door switch input function | 0 = disabled 1 = compressor + evaporator fans off 2 = evaporator fans off 3 = cabinet light on 4 = compressor + evaporator fans off, cabinet light on 5 = evaporator fans off, cabinet light on |
| | | 109 | i1 | 0 | door switch input activation | 0 = with contact closed 1 = with contact open |
| | | 110 | i2 | 30 | door open alarm delay | -1... 120 min -1 = disabled |
| | | 111 | i3 | 15 | maximum compressor and evaporator fan off time with door open | -1... 120 min -1 = until closed |
| | | 112 | i5 | 7 | multi-purpose input 1 function | 0 = disabled 1 = energy saving 2 = multi-purpose input alarm (IA) 3 = high pressure switch alarm (HP event and ISd) 4 = auxiliary load on 5 = switch device on/off |

| | | | | | |
|--|-----|-----|------------|---|--|
| | | | | | 6 = low pressure switch alarm (LP) 7 = compressor thermal switch alarm (C1t) 8 = compressor 2 thermal switch alarm (C2t) 9 = man in cold room alarm (MIC) |
| | 113 | i6 | 0 | multi-purpose input 1 activation | 0 = with contact closed 1 = with contact open |
| | 114 | i7 | 0 | alarm delay iA (multi-purpose input) if i5 and/or i15 = 2 compressor on delay from alarm reset, if i5 and/or i15 = 3 or 6 | 0... 120 min 0 = disabled |
| | 115 | i8 | 0 | number of HP alarms required (multi-purpose input activation if i5 and/or i15 = 3) to block regulation after high pressure switch alarm (iSd) | 0... 15 0 = disabled |
| | 116 | i9 | 240 | consecutive time if there are no HP alarms (multi-purpose input activation if i5 and/or i15 = 3) to reset counter i8 | 1... 999 min |
| | 117 | i10 | 0 | door closed consecutive time with cabinet/product temperature < SP for energy saving | 0... 999 min 0 = disabled |
| | 118 | i13 | 180 | number of door openings for defrost | 0... 240 0 = disabled |
| | 119 | i14 | 32 | door open consecutive time for defrost | 0... 240 min 0 = disabled |
| | 120 | i15 | 9 | multi-purpose input 2 function | like i5 |
| | 121 | i16 | 0 | multi-purpose input 2 activation | like i6 |
| | 122 | i17 | 30 | low pressure switch alarm delay LP from compressor start-up | 0... 240 s |

| | | | | | | |
|--|--|-----|------|-------------|--|---|
| | | NO. | PAR. | DEF. | DIGITAL OUTPUTS | MIN... MAX. |
| | | 123 | u1 | 6 | k5 relay configuration | 0 = reserved 1 = demisting heaters 2 = auxiliary load 3 = alarm 4 = door heaters 5 = neutral zone heaters 6 = condenser fans 7 = compressor 2 8 = defrost 2 9 = evaporator fans 2 10= reserved 11= on/stand-by 12= man in cold room alarm (MIC) |
| | | 124 | u2 | 0 | enable cabinet light and auxiliary load (if u1 = 2) using stand-by key | 0 = no 1 = yes |
| | | 125 | u3 | 10 | pump-down duration (duration of valve closing included) | 0... 240 s if C14 = 1 or 2, maximum duration |
| | | 126 | u4 | 1 | enable deactivation alarm output with silencing buzzer | 0 = no 1 = yes |
| | | 127 | u5 | -1.0 | door heaters on threshold | -99.0... 99.0 °C/°F |
| | | 128 | u6 | 5 | duration demisting on | 1... 120 min |
| | | 129 | u7 | -5.0 | threshold relative to setpoint SP for heating neutral zone | -99.0... 99.0 °C/°F |
| | | 130 | u9 | 1 | enable alarm buzzer | 0 = no 1 = yes |
| | | 131 | u11 | 3 | k6 relay configuration | as u1 |

| | | | | | | |
|--|--|-----|------|----------|--|---|
| | | NO. | PAR. | DEF. | CLOCK | MIN... MAX. |
| | | 132 | Hr0 | 0 | enable clock | 0 = no 1 = yes |
| | | NO. | PAR. | DEF. | ENERGY SAVING | MIN... MAX. |
| | | 133 | HE2 | 0 | maximum duration energy saving | 0... 23 h 59 min 0 = until door opened |
| | | NO. | PAR. | DEF. | ENERGY SAVING IN REAL TIME | MIN... MAX. |
| | | 134 | H01 | 0 | start time energy saving Monday | 0... 23 h 0 = midnight |
| | | 135 | H02 | 0 | maximum duration energy saving Monday | 0... 24 h >0 function active |
| | | 136 | H03 | 0 | start time energy saving Tuesday | 0... 23 h 0 = midnight |
| | | 137 | H04 | 0 | maximum duration energy saving Tuesday | 0... 24 h >0 function active |
| | | 138 | H05 | 0 | start time energy saving Wednesday | 0... 23 h 0 = midnight |
| | | 139 | H06 | 0 | maximum duration energy saving Wednesday | 0... 24 h >0 function active |
| | | 140 | H07 | 0 | start time energy saving Thursday | 0... 23 h 0 = midnight |
| | | 141 | H08 | 0 | maximum duration energy saving Thursday | 0... 24 h >0 function active |
| | | 142 | H09 | 0 | start time energy saving Friday | 0... 23 h 0 = midnight |
| | | 143 | H10 | 0 | maximum duration energy saving Friday | 0... 24 h >0 function active |
| | | 144 | H11 | 0 | start time energy saving Saturday | 0... 23 h 0 = midnight |
| | | 145 | H12 | 0 | maximum duration energy saving Saturday | 0... 24 h >0 function active |
| | | 146 | H13 | 0 | start time energy saving Sunday | 0... 23 h 0 = midnight |
| | | 147 | H14 | 0 | maximum duration energy saving Sunday | 0... 24 h >0 function active |

| | | | | | | |
|--|--|-----|------|------------|---|---|
| | | NO. | PAR. | DEF. | REAL-TIME DEFROST | MIN... MAX. |
| | | 148 | Hd1 | h-- | 1 st daily defrost time | 0... 23 h *h--" = disabled |
| | | 149 | Hd2 | h-- | 2 nd daily defrost time | like Hd1 |
| | | 150 | Hd3 | h-- | 3 rd daily defrost time | like Hd1 |
| | | 151 | Hd4 | h-- | 4 th daily defrost time | like Hd1 |
| | | 152 | Hd5 | h-- | 5 th daily defrost time | like Hd1 |
| | | 153 | Hd6 | h-- | 6 th daily defrost time | like Hd1 |
| | | NO. | PAR. | DEF. | DATA-LOGGING | MIN... MAX. |
| | | 154 | PA1 | 426 | level 1 password to access settings from EVconnect and EPoCA | -99... 999 |
| | | 155 | PA2 | 824 | level 2 password to access settings from EVconnect and EPoCA | -99... 999 |
| | | 156 | rE0 | 60 | EVlinking Wi-Fi/EVlinking BLE/EV3 Web/EVD Web data logger sampling interval | 0... 240 min |
| | | 157 | rE1 | 1 | select temperature for sampling | 0 = none 1 = cabinet 2 = evaporator 3 = auxiliary 4 = cabinet and evaporator 5 = all |

| | | | | | | |
|--|--|-----|------|------------|---|--|
| | | NO. | PAR. | DEF. | SERIAL COMMUNICATION | MIN... MAX. |
| | | 158 | LA | 247 | MODBUS address | 1... 247 |
| | | 159 | Lb | 2 | MODBUS baud rate the parameter is relevant only if bLE = 0 | 0 = 2,400 baud 1 = 4,800 baud 2 = 9,600 baud 3 = 19,200 baud |
| | | 160 | LP | 2 | MODBUS parity the parameter is relevant only if bLE = 0 | 0 = none 1 = odd 2 = even |
| | | 161 | bLE | 1 | configuration MODBUS serial port | 0 = free for real-time functions or for MODBUS RTU communication via the RS-485 port |

| | | | | | |
|--|--|--|--|--|---|
| | | | | | 1... 99 = device address for connectivity |
| | | | | | N.B.: - for the EVconnect app via the EVlinking BLE module and for the EPoCA system and/or MODBUS TCP communication via Wi-Fi, set to 1 - for the EPoCA system and/or for MODBUS TCP communication via Ethernet, follow the procedure to set the address in the relative manuals - communication works with MODBUS baud rate 19,200 and even MODBUS parity, irrespective of the value set with parameters Lb and LP |

7 ERRORS AND ALARMS

| CODE | DESCRIPTION | RESET | TO CORRECT |
|------|--|-----------|--|
| Pr1 | cabinet probe error (if P4=4, incoming air probe alarm) | automatic | <div>- check sensor integrity</div> <div>- check electrical connection</div> <div>- check P0 (for Pr1, Pr2, Pr3 and Pr4)</div> <div>- check h0 (for Pr4 and Pr5)</div> <div>- check P9 and P10 (for Pr5)</div> |
| Pr2 | evaporator probe error | automatic | |
| Pr3 | auxiliary temperature probe error (set with P4) | automatic | |
| Pr4 | evaporation temperature probe error | automatic | |
| Pr5 | evaporation pressure transducer error | automatic | |
| rtc | clock error | manual | <div>- set date, time and day of the week</div> |
| AL | low temperature alarm | automatic | <div>- check A0, A1 and A2</div> |
| AH | high temperature alarm | automatic | <div>- check A0, A4 and A5</div> |
| id | door open alarm | automatic | <div>- check i0 and i1</div> |
| PF | power failure alarm | manual | <div>- press a key</div> <div>- check electrical connection</div> |
| iA | multi-purpose 1 and 2 input alarm | automatic | <div>- check i5, i6, i15, i16</div> |
| C1t | compressor thermal switch alarm | automatic | <div>- check i5, i6, i15, i16</div> |
| C2t | compressor 2 thermal switch alarm | automatic | <div>- check i5, i6, i15, i16</div> |
| COH | condenser superheat alarm | automatic | <div>- check C6, C7, C8</div> |
| CSd | compressor locked alarm | manual | <div>- switch the device off and on</div> <div>- check C6, C7, C8</div> |
| MiC | man in cold room alarm | automatic | signal only |
| dFd | defrost timeout alarm | manual | <div>- press a key</div> <div>- check d2, d3 and d11</div> |
| Pd | pump-down alarm from digital input timed out | manual | signal only <div>- press a key</div> <div>- check u3</div> |
| iSd | high pressure switch alarm (regulation locked for no. HP events in time i8) | manual | <div>- switch the device off and on</div> <div>- check i5, i6, i8, i9, i15, i16</div> |
| HP | high pressure switch alarm (regulation locked for single event) | automatic | <div>- check i5, i6, i15, i16</div> |
| LP | low pressure switch alarm with compressor locked | automatic | <div>- check i5, i6, i15, i16</div> |
| LPt | low pressure transducer alarm (if h12=1) with compressor locked | automatic | <div>- check h13 and h14</div> |
| HSH | high superheating alarm | automatic | signal only |
| MOP | maximum operating pressure alarm for high evaporation with compressor locked | | <div>→check threshold h23 (reset differential 5° C)</div> |

8 TECHNICAL SPECIFICATIONS

| | |
|--|--|
| Purpose of the control device: | function controller |
| Construction of the control device: | built-in electronic device |
| Housing: | grey, self-extinguishing |
| Category of heat and fire resistance: | D |
| Measurements: | 262.0 x 179.0 x 95.6 mm (10.314 x 7.047 x 3.763 in: L x H x D). |
| Mounting method for the control device: | wall or on-board with fixing screws and plugs (not provided) |
| Degree of protection provided by the casing: | IP65 |
| Connection method: | |
| - fixed screw terminal blocks pitch 6.35 mm (0.25 in) for wires up to 4 mm² (0.0062 in²): power supply and digital outputs | |
| - fixed screw terminal blocks pitch 5.0 mm (0.196 in) for wires up to 2.5 mm² (0.0038 in²): analogue inputs, digital inputs and communications ports | |
| Maximum permitted length for connection cables: | |
| power supply: 100 m (328 ft) | power supply 4... 20 mA transducers: 100 m (328 ft) |
| analogue inputs: 100 m (328 ft) | digital inputs: 100 m (328 ft) |
| digital outputs: 100 m (328 ft) | communications ports: 1,000 m (3,280 ft); see also the <i>MODBUS specifications and implementation guides</i> available at http://www.modbus.org/specs.php |

Use cables of an adequate section for the current running through them. When the device is used at its maximum operating temperature and at full load, use cables with a maximum operating temperature of 90 °C (194 °F)

| | |
|---|--|
| Operating temperature: | models with a magnetothermal switch: from 0 to 45 °C (from 32 to 113 °F). models without a magnetothermal switch: from 0 to 50 °C (from 32 to 122 °F) |
| Storage temperature: | from -25 to 70 °C (from -13 to 158 °F) |
| Operating humidity: | relative humidity without condensate from 10 to 90 % |
| Pollution status of the control device: | 2 |

| | |
|--|--|
| Compliance: | |
| RoHS 2011/65/EC | WEEE 2012/19/EU |
| REACH (EC) no. 1907/2006 | LVD 2014/35/EU |
| RED 2014/53/EU | |
| Power supply: | 115... 230 Vac (+10 % -15 %), 50... 60 Hz (±3 Hz), 35 VA maximum, supplied by a class 2 circuit. The maximum current permitted for the phase is 16 A |
| Magnetothermal switch | 230 Vac, In 16 A, Icn, 4500 A, unipolar + neutral, for wires up to 2.5 mm² (0.0387 in²); upon request |
| Earthing methods for the control device: | with earth terminal |
| Rated impulse withstand voltage: | 4 kV |

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| Overvoltage category: | | III |
| Software class and structure: | | A |
| Analogue inputs: | | 4 for PTC, NTC or Pt 1000 probes (of which 1 is configurable from parameter P4); 1 for 4...20 mA pressure transducers |
| PTC probes: | Type of sensor: | KTY 81-121 (990 W@ 25 °C, 77 °F) |
| | Measurement field: | from -50 to 150 °C (from -58 to 302 °F) |
| | Resolution: | 0.1 °C (1 °F) |
| NTC probes: | Type of sensor: | ß3435 (10 kW@ 25 °C, 77 °F) |
| | Measurement field: | from -40 to 105 °C (from -40 to 221 °F) |
| | Resolution: | 0.1 °C (1 °F) |
| Probes Pt 1000: | Type of sensor: | 1 kW@ 0 °C, 32 °F |
| | Measurement field: | from -99 to 199 °C (from -146 to 390 °F) |
| | Resolution: | 0.1 °C (1 °F) |
| 4... 20 mA transducers | Power supply | 8... 28 Vdc (±10%) |
| | Measurement field: | can be configured |
| | Protection: | none, maximum current 25mA |

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| Digital inputs: | | 3 voltage-free (door switch, multi-purpose 1 and multi-purpose 2) |
| Voltage-free: | Type of contact: | 5 Vdc, 2 mA |
| | Power supply: | none |
| | Protection: | none |

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| Digital outputs: | | 6 with electro-mechanical relays |
| K1 relay: | | SPST, 30 A res. @ 250 Vac |
| K2 relay: | | SPST, 16 A res. @ 250 Vac |
| K3 relay: | | SPST, 30 A res. @ 250 Vac |
| K4 relay: | | SPST, 16 A res. @ 250 Vac |
| K5 relay: | | SPST, 8 A res. @ 250 Vac |
| K6 relay: | | SPDT, 8 A res. @ 250 Vac |


The device guarantees reinforced insulation between the digital outputs (electro-mechanical relays) and the SELV (Safety Extra Low Voltage) circuits, as well as between the digital output groups

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| Driver for unipolar stepper electronic expansion valves: | 12 Vdc, max. 260 mA |
| Type 1 or Type 2 actions: | type 1 |
| Additional features of Type 1 or Type 2 actions: | C |

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| Displays: | custom display with 3 digits, decimal point and function icons |
| Alarm buzzer: | built-in |

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| Communications ports: | |
| 1 TTL MODBUS slave port (only in models 1 and 3, can be used with EVlinking modules for the clock, the EVconnect app, the EPoCA system or MODBUS TCP) | 1 RS-485 MODBUS slave port |

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| Built-in Wi-Fi sensor (in models 2 and 4 only) | |
| Wi-Fi output power (EIRP) | 11b: 67.5 mW and 11g: 71.1 mW, 11n (HT20) 56.5 mW |
| Wi-Fi frequency range | 2,412... 2,472 MHz |
| Safety protocols | open, WEP, WPA/WPA2 Personal or PSK |
| Encryption methods | TKIP, CCMP |
| Unsupported modes | mixed WPA/WPA2 PSK using TKIP + CCMP WPA/WPA2 Enterprise or EAP |

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|  | N.B. The device must be disposed of according to local regulations governing the collection of electrical and electronic equipment. |
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