CONTROLLERS FOR MULTIPLEXED CABINETS  
XM670K- XM679K -MANUAL FOR THE SW REL. 4.2-

1. GENERAL WARNING

1.1 PLEASE READ BEFORE USING THIS MANUAL

- The manual is part of the product and should be kept near the instrument for easy and quick reference.
- The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- Check the application limits before proceeding.
- Dixell Srl reserves the right to change the composition of its products, even without notice, ensuring the same and unchanged functionality.

1.2 SAFETY PRECAUTIONS

- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation.
- Do not expose to water or moisture: use the controller only within the operation limits.
- Fit the probe where it is not accessible by the End User. The instrument must not be opened.
- If in case of failure or faulty operation send the instrument back to the distributor or to "Dixell S.r.l." (see address) with a detailed description of the fault.
- Consider the maximum current which can be applied to each relay (see Technical Data).
- The same recommendations apply to humidity.
- In case of applications on industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.

2. BEFORE PROCEEDING

2.1 CHECK THE SW REL. OF THE XM67K

1. Look at the SW rel. of XM67K printed on the label of the controller.

2. If the SW release is 4.2 proceed with this manual otherwise contact Dixell to get the right manual.

2.2 INSTALLATION AND MOUNTING

The XM67K/XM679K are high level microprocessor based controllers for multiplexed cabinets suitable for applications on medium or low temperature. They can be inserted in a LAN up to 8 different sections which can operate, depending on the programming, as stand alone controllers or following the commands coming from the other sections. The XM670K/XM679K are provided with 6 relay outputs to control the solenoid valve, defrost - which can be either electrical or hot gas - the evaporator fans, the lights, an auxiliary output and an alarm output and with one output to drive the superheat measurement and regulation. The XM679K is provided with an output to drive the superheat measurement and regulation. Finally, the XM670K/XM679K are equipped with the HOTKEY connector that permits to be programmed in a simple way. The same and unchanged functionality.

The device can operate without any user interface but normal application is with Dixell CX660 keyboard.

The CX660 keyboard shall be mounted on vertical panel, in a 29x71 mm hole, and fixed using the special bracket supplied as shown in fig. 1a/b. Before connecting cables make sure the power supply complies with the instrument’s requirements. Separate the probe 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. N.B. Maximum current allowed for all the loads is 16A. The probes shall be mounted with the bulb upwards to prevent damages due to casual liquid infiltration. It is recommended to place the thermostat probe away from air streams to correctly measure the average room temperature. Place the defrost termination probe 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.

5.2 XM670K – ALL POWER SUPPLY

5.3 XM679K – 230AC VALVES

5.4 XM67K – 24VAC VALVES

5.5 KEYBOARD DISPLAY CX660

5.6 SYNCHRONIZED DEFROST – MAXIMUM 8 SECTIONS

Follow next steps to create a LAN connection, which is a necessary condition to perform synchronized defrost (also called master-slave functioning):

1) connect a shielded cable between terminals [38] [+] and [39] [-] for a maximum of 8 sections.
2) the Adr parameter is the number to identify each electronic board. Address duplication is not permitted, in this case the synchronized defrost and the communication with monitoring system is not guaranteed (the ADR also is the ModBUS address). For example, a correct configuration is the following:

ADR = 0
ADR = 1
ADR = 2
ADR = 3
ADR = 4
ADR = 5
ADR = 6
ADR = 7
ADR = 8
ADR = 9

If the LAN is well connected, the green LED will be ON. If the green LED blinks then the connection is wrongly configured.

The maximum distance allowed is 30m
5.7 SENSORS FOR SUPERHEAT CONTROL – ONLY FOR XM679K


Pressure transducer: Pb5 terminals:
- [21] = input of the signal
- [22] = Power Supply for 4mA20mA transducer;
- [23] = +5Vdc power supply for ratiometric pressure transducer.

Select the configuration of the transducer with parameter P5c.

5.8 HOW TO USE ONLY ONE PRESSURE TRANSDUCER ON MULTIPLEXED APPLICATIONS

A working LAN connection is required (green LED lit on all XM670/XM679K boards of the same LAN). Connect and configure a pressure transducer only on one XM670/XM679K of the network. Afterwards, the value of pressure read by the unique transducer connected will be available to each device connected to the same LAN.

By pressing UP ARROW button, the user will be able to enter a fast selection menu and read the value of the following parameters:

- dPP = measured pressure (only on master device);
- dPS = value of temperature obtained from pressure
- dP5 = pressure value read from remote location (only for slave devices).

Examples of error messages:

- dPP → Err the local transducer read a wrong value, the pressure is out of the bounds of the pressure transducer or the P6 parameter is wrong. Check all these options and eventually change the transducer;
- dPF → the remote pressure transducer is on error situation. Check the status of the onboard GREEN LED: if this LED is OFF the LAN is not working, otherwise check the remote transducer.

5.9 HOW TO CONNECT MONITORING SYSTEM

On the fast access menu:

- dPP is the value read by the pressure gauge;
- dPS is the value read by the temperature probe, temperature of the gas on the outlet section of the evaporator;
- SH is the value of the superheat. The m in Err messages mean that the superheat has no sense in that moment and its value is not available.

LAST CHECKS ABOUT SUPERHEAT

On the fast access menu:

- dPP is the value read by the pressure gauge;
- dPS is the value read by the temperature probe, temperature of the gas on the outlet section of the evaporator;
- SH is the value of the superheat. The m in Err messages mean that the superheat has no sense in that moment and its value is not available.

5.10 DIGITAL INPUTS

The Adr parameter is the number to identify each electronic board. Address duplication is not permitted, in this case the synchronized defrost and the communication with monitoring system is not guaranteed (the Adr is also the ModBUS address).

5.11 ANALOG OUTPUT

- Selectable between 4 to 20mA and 0 to 10Vdc;
- Use Cab/CUS/15 to perform the connections.

If it's located near the terminal [39] on a 2-pin connector. It's possible to use the output to control anti-sweat heaters through a tripped phase controller XRPW001 (500Watt) or family XV, D or XV, X.

5.9 HOW TO CONNECT MONITORING SYSTEM

Only one device for each LAN has to be connected to the RS485 connection.

The Adr parameter is the number to identify each electronic board. Address duplication is not permitted, in this case the synchronized defrost and the communication with monitoring system is not guaranteed (the Adr is also the ModBUS address).

5.10 DIGITAL INPUTS

The parameters to perform this configuration are H1P, H1F, H1d respectively for polarity, functioning and delay. The HP can be CL = active when closed; dP = active when opened. The H1F parameter can be: EAL = external alarm, bAL = serious lock alarm, PALL = pressure switch alarm, dOr = door switch, dEF = external defrost, AUS = auxiliary activation command, Lig = light activation, OnOff = board On/Off, FNU = don’t use this configuration, ES = daylight, HST = don’t use this configuration. There is no H1d parameter for delay of activation. For the others digital inputs there are a set of the same parameters HP, H1F, H1D, H1f, H1d.

5.11 ANALOG OUTPUT

It’s located near the terminal [39] on a 2-pin connector. It’s possible to use the output to control anti-sweat heaters through a tripped phase controller XRPW001 (500Watt) or family XV, D or XV, X.

6. QUICK REFERENCE GUIDE: HOW TO RUN THE SELF ADAPTIVE REGULATION IN 4 STEPS

1. After wiring the XM679K, set the proper gas via P5y parameter. Pre-set gas is R404A.
2. Configure the probes:
   - Regulation and evaporator probe are preset as NTC. If another kind of sensors is used, set it via P5C and P5p parameters.
   - Superheat evaporator outlet probe is pre-set as P100. If another kind of sensor is used, set it via P5a parameter.
   - P1H1 (0.5+11bar) is pre-set as pressure probe. It operates at relative pressure (Pru = dP).
   - If you’re using a ratiometric transducer, set P5c = 0.5-0.7, then use parameters PA4 and PA20 to set the range.
   NOTE: check the pressure gauge reading with the value of dPP, press the UP arrow once to enter the Fast Access Menu. If ok, proceed; otherwise solve the situation before proceeding acting on par. Pp, PA4 and PA2.
3. Set the parameters for self adaptive regulation of superheat
   NOTE: the parameters P5b (regulation band) and Int (integral time) are automatically calculated by the controller.
   - Set CIE = no, this disables the continuous regulation of the temperature. Default is CIE = no
   - Set SH5 superheating setpoint; a value between 4 and it is acceptable. Default is SH5=8
   - Set AM5 = y to start the self adaptive regulation. Default is AM5 = y
   - Set ATU = y to start the search of the lowest stable superheat. Default is ATU = y. This function reduces automatically the setpoint in order to optimize the use of the evaporator, keeping, at the same time, the self overheating regulation stable. The minimum allowed SH set point is LSH+2°C.
   - Set LBN, low superheating limit: a value between 2-4 is acceptable. Default is LSH = 3
   - Set Sub, pressure filter: Default is Sub = 10. The value can be increased up to 20 in case of too fast response of the pressure variations.
4. Set the parameters for the temperature regulation
   Set the temperature setpoint. Default is 0°C.
   - Set the differential HY: Default is 2°C.
   - If the capacity of the valve is higher than requested, it can be reduced by the par. M1F (Default is 100). A proper setting of M1F will reduce the time that the algorithm takes to reach the stability. M1F-value doesn’t affect the band with

7. USER INTERFACE

UP ARROW
Press and release: Fast access menu
Press and hold 3 sec: SEC Menu
browser parameter, increase the value

DOWN ARROW
Press and release: ON/OFF AUX relay
browes parameter, decrease the value

SET
Press and release: Show setpoint
ON/OFF
Press and hold 3 sec: device ON/OFF

7.1 ICONS

Cooling output

Light ↓
Defrost → AUX ←
Energy saving →
Generic alarm ←

DURING PROGRAMMING: blink the measurement units of temperature and pressure

7.2 KEYBOARD COMMANDS

Single commands:
- LIGHT relay
- AUX relay
- Manual defrost
- Energy Saving

Double commands:

Press and hold for about 3 sec to lock (Pen) or unlock (PoF) the keyboard.

Press together to exit from programming mode or from menu; on submenus rTC and Eev this combination allow to come back to previous level.

Press together for 3 sec allow to access to first level of programming mode.

7.3 HOW TO MODIFY THE SET POINT FOR AIR TEMPERATURE REGULATION

The thermostat set point is the value that will be used to regulate the air temperature. The regulation output is controlled by the electronic valve or by the relay.

BEGIN
Press SET button for 3 sec, the measurement units will blink together.
8. HOW TO PROGRAM THE PARAMETERS (PR1 AND PR2)
The device provides 2 programming levels: PR1 with direct access and PR2 protected with a password (intended for experts).

**ACCESS to PR1**
Press and hold for about 3 sec to have access to the first programming level (PR1).

**Select item**
Select the parameter or submenu using the arrows.

**Show value**
Press SET button.

**Modify**
Use the arrows to modify the value.

**Confirm and store**
Press SET key: the value will blink for 3 sec, and then the display will show the next parameter.

**EXIT**
Instantaneous exit from the programming mode, otherwise wait about 10 sec (without press any button).

**GENERAL STRUCTURE:** The first two item rTc and Eev are related to submenus with other parameters.

- **SET**+**UP** keys on rTc or Eev submenus allow coming back to parameter list.
- **SET**+**UP** keys on parameter list allow immediate exit.

9. FAST ACCESS MENU
This menu contains the list of probes and some values that are automatically evacuate by the board such as the superheat and the percentage of valve opening. The values: dPp or dPfP stands for probe not present or value not evacuate, Err value out of range, probe damaged not connected or incorrectly configured.

**Entering fast access menu**
By pressing and release the UP arrow. The duration of the menu in case of no activity is about 3 min. The menu will be closed after pressing the one of the parameter that will be configured.

**Use**

- **HM** Access to clock menu or reset of the RTC alarm;
- **An** Value of analog output;
- **Sh** Value of superheat, mA = not Available;
- **Pp** Percentage of valve opening;
- **P1** (Pr) Value read by probe 1;
- **P2** (Pr) Value read by probe 2;
- **P3** (Pr) Value read by probe 3;
- **P4** (Pr) Value read by probe 4;
- **P5** (Pr) Temperature read by probe 5 or value obtained from pressure transducer;
- **P6** (Pr) Value read by probe 6;
- **PP** Pressure value read by (Po) transducer;
- **Pr** Virtual probe for fan management (pPA);
- **Pf** Virtual probe for fan management (pPF);
- **Ht** Minimum room temperature;
- **Lt** Maximum room temperature;
- **Pr** Virtual probe for room temperature regulation (PrA and PrB);
- **Vp** Virtual probe for defrost management (PPA);
- **Vf** Real thermoregulation set point: the value includes the sum of SET, HES and/or the dynamic set point if the functions are enabled.

**Exit**
Press SET parameter, then press and hold for about 3 sec to have access to the first programming level (PR1).

In any case, it is possible to wait for about 10 sec to exit. In order to show the air temperature set is sufficient to evacuate, superheat and the percentage of valve opening. The values: dPp or dPfP stands for probe not present or value not evacuate, Err value out of range, probe damaged not connected or incorrectly configured.

In this way, the boards can perform simultaneous defrost from a keyboard not physically connected to the board, through the LAN functionality.

10. MENU FOR MULTIMASTER FUNCTION: SEC
The function “section” SEC is enabled when icon \( \mathbf{\text{F}} \) is lit. It allows entering in the remote programming mode, from a keyboard not physically connected to the board, through the LAN functionality.

**Action**
Press UP arrow for about 3 sec, then press the \( \mathbf{\text{F}} \) icon will be ON.

**Waiting for action**
The menu to change the section will be entered. SEC label will be displayed.

**Enter section list**
Press SET to confirm. The following list will be available to select the proper network function.

**Select proper function**
- **Ld**
- **LdP**
- **Sr**
- **SrP**
- **Ld**
- **Sr**
- **Pr**
- **SrP**
- **Ld**
- **Sr**

**Confirm**
Select and confirm an entry by pressing SET button.

**Exit menu**
Press SET and UP together or wait about 10 seconds.

**EXAMPLES**
1. To modify the same parameter values in all the devices connected to the LAN enter multi-master menu. Select and confirm ALL. Exit from multi-master menu. Enter the programming menu and change the required parameter values.
   - The new values will be changed on all devices connected to the LAN.

2. To modify a parameter value in the device with \( \text{Adr} = 35 \) and the relevant indexed section (the one linked to \( \text{Adr} = 35 \)) enter multi-master menu. Select and confirm this section from the multi-master section. Exit from multi-master menu. Enter the programming menu and change the required parameter value.
   - If the alarm need is present: enter the multi-master menu. Select and confirm the LOC section. Exit from multi-master menu.

**AT THE END OF THE PROGRAMMING PROCEDURE, SELECT THE SECTION “LOC”. IN THIS WAY THE ICON \( \mathbf{\text{LOC}} \) WILL BE SWITCHED OFF!**

10.1 Synchronization DEFROST
The synchronized defrost allow to manage multiple defrost from different boards connected through the LAN connection. In this way, the boards can perform simultaneous defrost with the possibility to end them in a synchronized way.

The Adr parameter cannot be duplicated because in this case the defrost cannot be correctly managed.

**BEGIN**
Press for 3 seconds, the rTc or other will be showed. The measurement unit blinks.

**Find Adr**
Press more than once the DOWN arrow to find the Adr parameter, the press SET.

**Modify Adr**
Set the value of Adr parameter, then press SET to confirm the parameter.

**Exit**
Press the two keys together to exit from menu or wait for about 10 seconds.

The Lsn and LAN parameter are only to show the actual settings (read only). See the following example of configuration:

<table>
<thead>
<tr>
<th>Adr</th>
<th>Unit A (RTC)</th>
<th>Unit B (RTC)</th>
<th>Unit C (RTC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adr</td>
<td>N + 1</td>
<td>N + 2</td>
<td>N + 2</td>
</tr>
<tr>
<td>EdF</td>
<td>rTc (clock)</td>
<td>rTc (clock)</td>
<td>rTc (clock)</td>
</tr>
<tr>
<td>IdF</td>
<td>9 hours safety</td>
<td>9 hours safety</td>
<td>9 hours safety</td>
</tr>
<tr>
<td>NDF</td>
<td>45 min safety</td>
<td>45 min safety</td>
<td>45 min safety</td>
</tr>
<tr>
<td>DE</td>
<td>12°C safety</td>
<td>12°C safety</td>
<td>12°C safety</td>
</tr>
<tr>
<td>Ld1</td>
<td>06:00 1°</td>
<td>06:00 1°</td>
<td>06:00 1°</td>
</tr>
<tr>
<td>Ld2</td>
<td>14:00 2°</td>
<td>14:00 2°</td>
<td>14:00 2°</td>
</tr>
<tr>
<td>Ld3</td>
<td>22:00 3°</td>
<td>22:00 3°</td>
<td>22:00 3°</td>
</tr>
</tbody>
</table>

**WARNING:** do not set \( \text{EdF} = \text{rtC} \) and \( \text{CPb} = \text{n} \).

**MULTI MASTER DEFROST:** all the probes with clock

**Table for example**

- **EdF**
- **IdF**
- **NDF**
- **DE**
- **Ld1**
- **Ld2**
- **Ld3**
11. COMMISSIONING

11.1 CLOCK SETTING AND RT Alarm RESET
If the clock is present: [UP | DOWN] enable the button from [LOC1 to LOC2].

BEGIN Display
UP arrow (press once) to access the fast access menu

NOTE: the NC clock menu is present also on the second level of parameters. Warning: if the board shows the RF alarm, the device has to be changed.

11.2 ELECTRONIC VALVE SETTINGS – ONLY FOR XM679K

Some parameters have to be checked:
[1] Superheat temperature probe: Nic, Ptc, P11000 with parameter P6C. The sensor has to be fixed at the end of the evaporator.
[2] Pressure transducer: [4 to 20mA] or ratiometric Psc = 420 or Sw with parameter P5C.
[3] Range of measurement: check the parameter of conversion P4A and P20 that are related to the transducer, 705/60/VDC [±5.0/5.0%] or [±5.0/5.0%] the correct setup is relative pressure with P4A = 0.5 and P20 = 7.0. The (0.5/12bar abs) the correct setup is relative pressure with P4A = 0.5 and P20 = 11.00.

Example of virtual pressure with unique [4 to 20mA] or [0 to 5V] transducer:

[5] Use the following parameters to setup the relief valve driving, according to the valve datasheet from the manufacturer.

12. KIND OF REGULATION FOR SUPERHEAT: SELF ADAPTIVE OR MANUAL OPERATING MODE

12.1 GENERAL CONSIDERATIONS: SELF ADAPTIVE OR MANUAL SH CONTROL
The controller is able to regulate the superheat in manual or self adaptive mode, according to the value of the parameter AMS, autocalibrating switching.

- With AMS = n: the normal SH regulation is performed
- With AMS = y: the self adaptive SH regulation is performed

12.2 MANUAL OPERATING MODE – AMS = NO
The temperature and SH regulation can be performed in 2 ways according to the value of the parameter CrE, on/off or continuous. See below in details. Standard temperature regulation

12.2.1 ON/OFF TEMPERATURE REGULATION [CrE = n]
1. Temperature regulation is ON/OFF and it depends on the SET point and HY parameter (differential). Valve is closed when the temperature reaches the set point and open when the temperature is higher than set point + differential.
2. The superheating is regulated to its closer to its set point.
3. With more pauses normally also the humidity is bigger.
4. Regulation pauses can be realized using Sti and Std parameters (during these pauses the valve is closed).

12.2.2 CONTINUOUS REGULATION OF THE TEMPERATURE [CrE = Y] (with superheat regulation):
1. The HY parameter becomes temperature band for PI control. A default good value is 6°C.
2. The regulation of injection is continuous and the cooling output is always on. The icon is always ON excluding the defrost phase.
3. The superheating is regulated by the following parameters.
4. Regulation pauses can be realized using Sti and Std parameters (during these pauses the valve is closed).
5. Increasing the Mi integral time it is possible to decrease the speed of reaction of the regulator on the variable.

12.3 SELF ADAPTIVE OPERATING MODE – AMS = YES
Auto-adaptive means to find and maintain the condition of the lowest super heating according to the load and environmental conditions present in a given time on the evaporator. The parameter AMS enables the self adaptive mode for the superheat regulation. In this function the values of Pb and nC parameter are automatically set by the controller according to the kind of applications and the response of the system.

With the AMS = YES, nC must be set at NO

The self adaptive algorithm does not affect, the functions related to the forced opening of the valve in special situation such as:
- Forced opening of the valve at start of regulation, parameter SFd (percentage) and SFd (time).
- Forced opening of the valve after defrost, parameter oPd (percentage) and Pd (time).

12.4 MINIMUM STABLE SUPERHEAT – AMS = YES, ATU = YES
With the parameter ATU, the minimum stable superheat function is enabled.

With ATU y=1 controllers start searching the minimum stable value for the SH, the minimum admitted value in any case is LSH = 2°C (4°F).
Please take it in consideration, before setting LSH value.

12.5 VALVE CAPACITY REDUCING – MnF PARAMETER

Thanks to the parameter MnF it’s possible to reduce the capacity of the valve, to freeze the valve to the evaporator.
The regulation band is not affected from the modification of the MnF parameter. See below the behaviour of the capacity of the valve, when the MnF parameter is adjusted.

NOTE: during the soft start phase (oPE, SFd), MnF parameter is not taken in consideration and the capacity of the valve is set by the parameters oPE and oPd, respectively.

12.6 PRESSURE FILTERING – Sub Parameter

For a good SH regulation, it’s important to use a filtered value of the pressure. This can be done by the parameter Sub.

Suggested values:
- From 1-5 evaporators for each racks: Sub = 20
- From 6-30 evaporators for each racks: Sub = 15
- More than 30 evaporators for each racks: Sub > +10

13. DISPLAY MESSAGES

<table>
<thead>
<tr>
<th>Param.</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addr</td>
<td>With AMS = n: the normal SH regulation is performed</td>
<td></td>
</tr>
<tr>
<td>LPP</td>
<td>With AMS = y: the self adaptive SH regulation is performed</td>
<td></td>
</tr>
<tr>
<td>P5C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P4A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13.1 ALARM RECOVERY

Alarm alarms P1, P2, P3 and P4 start some seconds after the fault in the related probe, they automatically stop some seconds after the probe restarts normal operation. Check connections before replacing the probe. Temperature alarms HA, LA and HSH and LSH automatically stop as soon as the temperature returns to normal values.

Alarms EA and CA (with IF = BAIL) recover as soon as the digital input is disabled. Alarm CA (with IF = PAL) recover only by switching off and on the instrument.

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15. CONTROLLING LOADS

15.1 THE SOLENOID VALVE

The regulation is performed according to the temperature measured by the thermostat probe that can be physical probe or virtual probe obtained by a weighted average between two probes (see parameters table description) with a positive differential from the set point. If the temperature increases and reaches the set point plus differential the solenoid valve is opened and then it is closed when the temperature reaches the set point value again.

In case of fault in the thermostat probe the opening and closing time of solenoid valve is configured by "Cn" and "Cof" parameters.

15.2 STANDARD REGULATION AND CONTINUOUS REGULATION

The regulation can be performed in two ways: the goal of the first way (standard regulation) is reaching the best superheat via a classic temperature regulation obtained using hysteresis. The second way permits to use the valve to realise an high performance temperature regulation with a good factor of superheat precision. This second possibility, it can be used only in centralized plants and it is available only with electronic expansion valve by selecting C/EY parameter.

In any case, the regulation is performed via PI regulator that gives the opening percentage to the valve a the parameters it has programmed but, at the most it can be used only in centralized plants and it is available only with electronic expansion valve by selecting C/EY parameter.

With opening percentage we mean percentage of cycle period where valve is open. For example, if CyP=0% (standard value) by saying: "The valve is opened at 50%", this means that the valve is opened for 3s during cycle period.

First kind of regulation:

In this case, the Hy parameter is the differential for standard ON/OFF regulation. In this case the int parameter is neglected. The regulation follow this diagram:

- When defrost is started via rtc, the maximum duration of defrost is obtained from Md parameter and the defrost end temperature is obtained from dE parameter (and dDs if two defrost probes are selected).
- If dPa and dPb are present and dDPry the instrument stops the defrost procedure when dPb is higher than dE temperature and dPa is higher than dDs temperature. At the end of defrost the drip time is controlled through the "Pb" parameter.

CONTROL WITH RELAY

The fan control mode is selected by means of the ‘Fnc’ parameter:
- C=n: running with the solenoid valve, OFF during the defrost;
- Cv=n: running with the solenoid valve, ON during the defrost;
- Os=n: continuous mode, OFF during the defrost;
- Ov=n: continuous mode, ON during the defrost.

An additional parameter ‘FSc’ provides the setting of temperature, detected by the evaporator probe, above which the fans are always OFF. This can be used to make sure circulation of air only if his temperature is lower than set in ‘FSc’.

CONTROL WITH ANALOG OUTPUT (if present)

The modulating output (trA=AC) works in proportion as well as the fans speed is the maximum. The regulation set point is relative to regulation set point and is indicated by dPb, the proportional band is always located above SET+ASr value and its value is PbA. The fans are at minimum speed (AMt) when the temperature read by fan probe is SET+ASr and the fan is at maximum speed (AMA) when the temperature is SET+ASr+PLA.

15.5 ANTI SWEAT HEATERS

The anti-sweat heater regulation can be performed with board relay (if OA6 = AC) or with the analog output (if present by setting trA = AC). However the regulation can be performed in two ways:

- Without real dew-point information: in this case the default value for dew-point is used (dPb parameter).
- Receiving dew-point from XWEB500D system: the dPb parameter is overwritten when valid value for dew-point is received from XWEB. In case of XWEB link is lost, dPb is the value that will be used for safety.

The best performance can be obtained using probe 4. In this case, the regulation follows the chart:

Probe 4 should be placed on the showcase glass. For each cabinet can be used only one probe 4 (P4) sending its value to the others section that are connected to the LAN.

HOW TO WORK WITH PROBE 4 THROUGH THE LAN:

<table>
<thead>
<tr>
<th>Param.</th>
<th>XM6xK_1 Without probe 4</th>
<th>XM6xK_2 Without probe 4</th>
<th>XM6xK_3 Without probe 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCP</td>
<td>LCP = n</td>
<td>LCP = n</td>
<td>LCP = n</td>
</tr>
<tr>
<td>P4C</td>
<td>LAN or not connect the probe</td>
<td>P4C = NTC, PD or PM</td>
<td>LAN or not connect the probe</td>
</tr>
<tr>
<td>trA</td>
<td>trA = AC if the device has the analog output</td>
<td>OA6 = OA6 if the device will use the AUX relay for regulation</td>
<td></td>
</tr>
<tr>
<td>nD</td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>AMt</td>
<td>% of ON</td>
<td>% of ON</td>
<td>% of ON</td>
</tr>
</tbody>
</table>

HOW TO WORK WITHOUT PROBE 4:

In this case, the regulation is performed by switching on and off the auxiliary relay on a 60 minutes time base. The ON time will be the AMt value, so that the relay will be ON for AM minutes and OFF for [60-AM] minutes.

P4C is an auxiliary output that switch ON and OFF by means of the control digital input by pressing and releasing the down arrow key.

16. PARAMETER LIST

In case of P4 error or if P4 is absent the output is at AMt value for the AM time then the output is at 0 value for the time [256 – AMt] time performing a simple PWM modulation.

16.6 AUXILIARY OUTPUT

- trA: allows the switch of the auxiliary output on. The ON time will be the AMt value, so that the relay will be ON for AMt minutes and OFF for [60-AM] minutes.

- AM: % of ON

- P4C: % of ON

16.15 TEMPERATURE REGULATION

Set Temperature set point (LST=US)
- rC: Access to CLOK menu (if present);
- EEU: Access to EEV menu (only XM670K);
- Hy: Differential: (0,1÷23,5°C; 1÷45°F); Intervention differential for set point, always positive; Solaroide valve Cut in is Set Point Plus Differential (Hy). Solaroide valve Cut OUT is the temperature reaches the set point.
- Int: Integral time for room temperature regulation (Only XM679K): (0 > 255 s) integral time for room temperature PI regulator. 0= no integral action;
CrE Continuous regulation activation (Only XM679K): (n=5) n standard regulation; Y= continuous regulation. Use it only in centralized plants;
L5 Minimum set point limit: (-55.0°C/SET.-67.0°F/SET.) Sets the minimum acceptable value for the fan probe. The minimum acceptable value for the sensor signals situation with MOP.
US Maximum set point limit: (SET+150°C/SET+302°F) Set the maximum acceptable value for set point.
DdS 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 parameter. (AUX and Light can work).
AC Auto-self adaptation delay: (0÷60 min) interval between the solenoid valve stop and the following restart.
CtC Consensual ON time during continuous cycle: (0÷24.0h; resolution 10mins) Allows to set the length of the continuous cycle; compressor stays on without interruption for the CTC time. Can be used, for instance, when the room is filled with new products.
CCS Set point for continuous cycle: (-550.0°C/-471°F) Set the set point for continuous cycle; during the continuous cycle.
Con solenoide valve ON time with faulty probe: (0÷255 min) time during which the solenoid valve is active in case of fault of the solenoid valve. When the solenoid valve is off. OFF.
CoF solenoide valve OFF time with faulty probe: (0÷255 min) time during which the solenoid valve is off in case of faulty thermostat. With COF=0 solenoid valve is always active.

ELECTRONIC EXPANSION VALVE SUBMENÚ (Only XM679K)

ELECTRONIC EXPANSION VALVE SUBMENÚ (Only XM679K)

Crystal °Celsius; *Fahrenheit. ***WARNING!!! When the measurement unit is changed the parameters with temperature values have to be checked.
PdP Pressure mode: (REL or A) defines the mode to use the pressure. ***WARNING!!! The setting of PdU is used for all the pressure parameters. If *PdU/REL* all the pressure parameters are in relative pressure unit, if *PdU/ABS* all the pressure parameters are in absolute pressure unit. (Only XM679K)
PMU Pressure measurement unit: (kPa) select the pressure measurement unit, *MPa = the value of pressure measured by kPa*10. (Only XM679K)
PdW Way of displaying pressure: (dP / PM) It shows the value measured by pressure probe. (dP = Relative pressure; PM = Pressure). (Only XM679K)
RSE Resolution for (°C) (in: 1°C; de: 0.1°C) allows decimal point display.
Lod Superheat dP setting: (0÷255 min); (0÷15°C; 0÷27°F) Selects the percentage which is displayed by the instrument. P1, P2, P3, P4, P5, PE, (dP) virtual probe for thermostat, dP (virtual pressure for defrost).
red Red alarm display; (n=1; P1, P2, P3, P4, P5, PE, dE) it selects which probe is displayed by the X-REP. P1, P2, P3, P4, P5, PE, virtual probe for thermostat, dP (virtual pressure for defrost).
Display delay: (0÷24.0 min; resolution 10s) when the temperature increases, the display is updated of 1°C/1F after this time.
PrA Regulation probe A: (n=1; P1, P2, P3, P4, P5, PE, dE) first probe used to regulate room temperature. It is used in the regulation of a single room with one probe.
PrB Regulation probe B: (n=2; P1, P2, P3, P4, P5, PE, dE) second probe used to regulate room temperature. (Only XM679K).
PrE Regulation probe virtual percentage: (0÷100 %) it defines the percentage of the PrA respect to PrB. The value used to regulate room temperature is obtained: value for room = (PA/PrE*100+PrP)/PE+100/100

DEFROST

dPA defrost Probe A: (n=1; P1, P2, P3, P4, P5) first probe used for defrost. If FPA=nP the regulation is performed with real value of dP.
dPa defrost Probe B: (n=1; P1, P2, P3, P4, P5) second probe used for defrost. If FPA=nP the regulation is performed with real value of dP.
dPa defrost virtual percentage: (0÷100 %) it defines the percentage of the dPa respect to dP. The value used to regulate room temperature is obtained: value for defrost(dP) = dP*PE/ dP+100/100
EdF Defrost mode: (t= (n) only if RTC is present) dF=defrost activation via RTC, dF= defrost via dP.
SrT Heater set point during defrost: (55.0÷150.0°C; 725÷302°F) if tF=tE and dF=tE the defrost relay perform an ON/OFF regulation with SrT setpoint.
HdF Display for heater =set point to set 25.5°C; 1°F = difference of the defrost.
 TOD Time out for heater: (0÷255 min) if the defrost probe temperature is bigger than set for all the time the defrost probe temperature is lower than LDE or dis. It permits to reduce the defrost duration.
dLF Minimum temperature difference to start defrost: (0.1°C; 0.1°F) if the difference between the two defrost probes stays lower than dLF for all the time the defrost is active.
ddP Delay before starting defrost (related to dP): (0÷60 min) delay related to dP.
ddF Defrost with two probes: (n=m) only the dP probe is used to defrost management. dF=defrost managed with dP probe and dF probe. Defrost can performed only if both the value are lower than dLF for dP probe and dis for dF probe.
ddF Defrost cancellation (temperature Probe A): (55.0÷50.0°C; 122°F÷122°F) Only when the evaporator probe is present the temperature measured by the evaporator probe dP which causes the end of defrost.
ddF Defrost cancellation (temperature Probe B): (55.0÷50.0°C; 122°F÷122°F) Only when the evaporator probe is present the temperature measured by the evaporator probe dP which causes the end of defrost.
dLF Interval between defrosts: (0÷120) determines the interval time between the beginning of two defrost cycles;
MdF Minimum duration of defrost: (0÷255 min) When dP and dLF are not present, it sets the defrost duration, otherwise it sets the minimum duration of dLF.
StD Start defrost delay: (0÷255 min) This is useful when different defrost start times are necessary for accelerating defrost (only if RTC is present).
FdD Display during defrost: h = real temperature; °F = temperature reading at the defrost start; Set = set point; dF= "DF" label;
FdD Display time out: (0÷255 min) Sets the maximum time between the end of defrost and the restarting of the real room temperature display.
DdT Drain down time: (0÷255 min) time interval between reaching defrost termination temperature and the restarting of the evaporator temperature display. This permits the evaporator to eliminate water drops that might have formed due to defrost.
DaF First defrost after start-up: y = immediately; n= after the 6th time;
DaF Defrost delay after continuous defrost: (0÷20 min) time interval between the end of the fast freezing cycle and the following defrost related to it.

FAN

PPA Fan probe A: (n=1; P1, P2, P3, P4, P5) first probe used for fan. If FPA=nP the regulation is performed with real value of PPA.
PPB Fan probe B: (n=1; P1, P2, P3, P4, P5) second probe used for defrost. If FPA=nP the regulation is performed with real value of PPA.
FE Fan virtual probe percentage: (0÷100 %) it defines the percentage of the FPA respect to FPP. The value used to regulate room temperature is obtained: value for fan = (FPA*FE/ FPA+100/100)
FnC Fan operating mode: C = running with the solenoid valve, OFF = running during the defrost; C = running with the solenoid valve. ON during the defrost; C = continuous mode, OFF during the defrost; C = 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.
FCT Temperature differential avoiding short cycles of fans (0.0°C = 50.0°C, 0°F = 90°F) If the difference of the temperature between the evaporator and the room probes is more than the value of the FCT parameter, the fans are switched on.
FSd Fan Start temperature: (SET+150°C/SET+302°F) setting of temperature, detected by evaporator probe, above which the fan is always OFF.
FdD Difficult to restart fans: (0÷255 °C; 1°F ÷ 45°F) when stopped, fans restarts when probe reaches FSd/FHd temperature.
Fad Fan activation time after defrost: (0÷255 min) It forces fan activation for indicated time;
Fdn Fan delay at start-up: (0÷15 min) it permits to force the fan activation for indicated time; (Enabled only when C.Fan boo) the fan activated in parallel with compressor. It selects the evaporator fan ON cycling time when the compressor is off. With Fon=0 and F0=0 the fan is always on; with Fon=0 and F0=1 the fan is always off; with Fon=1 and F0=0 the fan is always off; with Fon=1 and F0=1 the fan is always on.
Fnd Interval between defrosts: (0÷255 min) time interval between the end of defrost termination and the restarting of the cooling of the evaporator. This периов time used to evaporate the superheat that might be present due to defrost.

MODULATING OUTPUT (AnOut) if present

trA Kind of regulation with PWM output: (UAL – REG – AC) it selects the functioning for the PWM output. UAL-output is at PAM value; REG=output is regulated with fan algorithm described in fan section; AC=anti-sweats heater control (required the XM66500 system);
nPS Pressure switch number: (0 ÷ 15) Number of activation of the pressure switch, during the “dE” interval, before signaling the alarm event (EAL= PAL). If the nPS activation in the dE in is reached, switch off and on the instrument to restart normal regulation.
dC A compressor and fan ON/OFF, n = 0 = normal; Fan = Off OFF; Cpr = Fan OFF; Cpr = Compressor and fan OFF.
rD Outputs restart after doA alarm: no = no effects not affected by the doA alarm; y = outputs restart with the doA alarm.

RTC SUBMENU (if present)

C/dP Clock Presence (n=1): it permits to disable or enable the clock.
Hyr Current hour (0 = 23 h) 
Min Current minute (0 = 59 min)
dAY Current day (Sun = 5A) 

Hi1 First weekly holiday (Sun = Su) Set the first day of the week which follows the holiday times.
Hi2 Second weekly holiday (Sun = Su) Set the second day of the week which follows the holiday times.
Hi3 Third weekly holiday (Sun + Su) Set the third day of the week which follows the holiday times.
dE Energy Saving cycle length during workdays: (0 ÷ 24 h 00 min.) Sets the duration of the Energy Saving cycle on workdays.
dE enam Energy Saving cycle start on holidays: (0 ÷ 23h 50 min.)
dE En Energy Saving cycle length on holidays: (0 ÷ 24 h 00 min.)
hes Temperature increase during the Energy Saving cycle (-30°C / +54°F) sets the increasing value of the setpoint during the Energy Saving cycle.
L41+L65 Workday defrost start (0 ÷ 23h 50 min.) These parameters set the beginning of the 6 programmable defrost cycles during workdays. Ex. When Let2 = 12.4 the second defrost starts at 13:30 on workdays.
Sd1+Sd5+6 Holiday defrost start (0 ÷ 23h 50 min.) These parameters set the beginning of the 6 programmable defrost cycles on holidays. Ex. When Sd2 = 3.4 the second defrost starts at 13:40 on holidays.

ENERGY SAVING

E2P Energy Saving probe selection: (nP - P1 - P2 - P3 - P4 - P5 - E2E) It sets the channel of the external energy probe.
HE Temperature increase during the Energy Saving cycle (-30°C / +54°F) sets the increasing value of the setpoint during the Energy Saving cycle.

ESET Energy Saving activation when light is switched off: (n=1) n= function disabled; y= energy saving is activated when the light is switched on and vice versa.

LAN MANAGEMENT

LMD Desynchronisation y= the section send a command to start defrost to other controllers, when the brain don’t want to send a global defrost command
dEM Type of end defrost: n= the of the LAN defrost are independent; y= the end of the defrost are synchronised.

LSP L.A.N. set-point synchronisation: y= the section set-point, when modified, is updated to the same value on all the other sections; n= the set-point value is modified only in the local section

LdA L.A.N. delay synchronisation: y= the delay time of the section will act on all the other ones too; n= the delay time is sent to all the other sections; n= the delay time is modified only in the local section

LOC L.A.N. On/off synchronisation this parameter states if the On/off command of the section will act on all the other ones too; n= the Off command is sent to all the other sections; n= the On/off command acts only in the local section

LLA L.A.N. light synchronisation this parameter states if the light command of the section will act on all the other ones too; n= the light command is sent to all the other sections; y= the light command acts only in the local section

LES L.A.N. energy saving synchronisation this parameter states if the energy saving command of the section will act on all the other ones too: y= the Energy Saving command is sent to all the other sections; n= the Energy Saving command acts only in the local section

LSD Remote probe display: this parameter states if the section has to display the local probe value or the value coming from another section: y= the displayed value is the one coming from another section (which has parameter LoS = y); n= the displayed value is the local probe

LPP Remote probe pressure display value of probe pressure is read from local probe; y= the value of probe pressure is sent via LAN.

S1M Solenoid activation via LAN: n= not used; y= generic cooling requests from LAN activate the solenoid valve connected to compressor relay.

PROBE CONFIGURATION

P1c Probe 1 configuration: (nP - PtC - nuc - Pm) nP not present; PtC PtC; nuc nuc; Pm Pm1000
O1 Probe calibration: (-12.0÷12.0°C / -21÷21°F) allows to adjust possible offset of the thermostat calibration.
P2c Probe 2 configuration: (nP - PtC - nuc - Pm) nP not present; PtC PtC; nuc nuc; Pm Pm1000
O2 Probe calibration: (-12.0÷12.0°C / -21÷21°F) allows to adjust possible offsets of the evaporator probe.
P3c Probe 3 configuration: (nP - PtC - nuc - Pm) nP not present; PtC PtC; nuc nuc; Pm Pm1000
O3 Probe calibration: (-12.0÷12.0°C / -21÷21°F) allows to adjust possible offset of the probe 3.
P4c Probe 4 configuration: (nP - PtC - nuc - Pm) nP not present; PtC PtC; nuc nuc; Pm Pm1000
O5 Probe calibration: (-12.0÷12.0°C / -21÷21°F) allows to adjust possible offset of the probe 4.
P5c Probe 5 configuration: (nP - PtC - nuc - Pm) nP not present; PtC PtC; nuc nuc; Pm Pm1000
O6 Probe calibration: (-12.0÷12.0°C / -21÷21°F) allows to adjust possible offset of the probe 5.

SERVICE – READ ONLY

CLt Ceiling time percentage: it shows the effective cooling time calculated by XM6700 during regulation.
Tmd Time to next defrost: it shows the time before the next defrost if interval defrost is selected;
LnA L.N.A. section number: (1 ÷ 8) Shows the number of sections available in the L.N.A.
Lm A.N. L.N.A. serial address (1 ÷ LSN) Identifies the instrument address inside local network of multiplexed cabinet controller.

Digital inputs:
1P Digital input 1 polarity: (cl – of) cl: the digital input is actively closed by selecting the op; the digital input is actively opened by opening the contact.
1n Digital input 1 function: (EAL = bal - PAL - oor - def - aus - LG - ON / Off – Hy / EN / HS) = 150°C / 302°F; Pal = pressure switch activation; dorn / door open; defN defrost activation; ausN auxiliary activation; LGN light activation; onF switch activation; off/ the instrument; HSN / remote function; HON / heating function; 5Vr / not present.
1d1 Time interval/delay for digital input alarm: (0 ÷ 255 min) Time interval to calculate the number of the pressure switch activation when t1F/P1 = t1F/P1 or bal (external alarms). tCn parameter defines the time delay between the detection and the successional signalling of the alarm. If tFdis/or this is the delay to active door open alarm
1d2 Digital input 2 polarity: (cl – of) cl: the digital input is actively opened by closing the contact; op the digital input is actively opened by opening the contact.
1d2 Time interval/delay for digital input alarm: (0 ÷ 255 min) Time interval to calculate the number of the pressure switch activation when t1F/P1 = t1F/P1 or bal (external alarms). tCn parameter defines the time delay between the detection and the successional signalling of the alarm. If tFdis/or this is the delay to active door open alarm
1d3 Digital input 3 function: (EAL = bal - PAL - oor - def - aus - LG - ON / Off – Hy / EN / HS) xtc = 50°C / 122°F; EAL external alarm; bal = bal external alarm; Pal = pressure switch activation; dorn / door open; defN defrost activation; ausN auxiliary activation; LGN light activation; onF switch activation; off/ the instrument; HSN / remote function; HON / heating function; 5Vr / not present.
17. DIGITAL INPUTS

The AMS series can support up to 3 free of voltage contact configurable digital inputs (depending on the models). They are configurable via iParameter.

17.1 GENERIC ALARM (EAL)

As soon as the digital input 1, 2, or 3 is activated the unit will wait for "d1d" or "d2d" or "d3d" time delay before signaling the "EAL" alarm message. The outputs status doesn't change. The alarm stops just after the digital input is de-activated.

17.2 SERIOUS ALARM MODE (BAL)

When the digital input is activated, the unit will wait for "d1d" or "d2d" or "d3d" delay before signaling the "BAL" alarm message. The relay outputs are switched OFF. The alarm stop as soon as the digital input is de-activated.

17.3 PRESSURE SWITCH (PAL)

If during the interval set time by "d1d" or "d2d" or "d3d" parameter, the pressure switch has reached the number of activation of the "fSP" parameter, the "PA" pressure alarm message will be displayed. The compressor and the regulation are stopped. When the digital input ON the compressor is always OFF. If the fSP activation in the delay time is reached, switch off and on the instrument to restart normal regulation.

17.4 DOOR SWITCH INPUT (dor)

It signals the door status and the corresponding relay output status through the "dor" parameter: ne = normal (any change); Fa = Fan Off; CF = Compressor Off, C = Compressor and fan Off. Since the door is opened, after the delay time set through parameter "dor", the door alarm is enabled, the display shows the message "dor" and the regulation restarts after a time. The alarm stops as soon as the external digital input is deactivated.

17.5 START DEFROST (DER)

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 deactivated otherwise the instrument will wait until the "M$" safety time is expired.

17.6 RELAY AUX ACTUATION (AUS)

This function allows to turn ON and OFF the auxiliary relay by using the digital input as external switch.

17.7 RELAY LIGHT ACTUATION (LS)

This function allows to turn ON and OFF the light relay by using the digital input as external switch.

17.8 REMOTE ON/OFF (ONF)

This remote allows to switch ON and OFF the front instrument.

17.9 KIND OF ACTION (HTR)

This function allows to change the kind of regulation from cooling to heating and vice versa.

17.10 FHU – NOT USED

This function allows to change the kind of regulation from cooling to heating and vice-versa.

17.11 ENERGY SAVING INPUT (ES)

The Energy Saving function allows to change the set point value as the result of the SET+ HES parameter) sum. This function is enabled only if the digital input is activated.

17.12 CONFIGURABLE INPUT – HOLIDAY FUNCTION (HDY)

In Holiday function Energy saving and defrost cycles follow holiday times. (S$1...S$6)

17.13 DIGITAL INPUTS POLARITY

The digital inputs polarity depends on fSP parameters. CL: digital input is activated by closing the contact; CP: digital input is activated by opening the contact.

18. USE OF THE PROGRAMMING "HOT KEY"

The XM units can UPLOAD or DOWNLOAD the parameter list from its own E2 internal memory to the "HOT KEY" and vice-versa through a TTL connector.

18.1 DOWNLOAD FROM THE "HOT KEY" TO THE INSTRUMENT

1. Turn OFF the instrument by means of the ON/Off key. Insert the "HOT KEY" and then turn the unit ON.
2. Automatically the parameter list of the "HOT KEY" is downloaded into the controller memory, the "d1d", "d2d", "d3d" messages is lighting. After 10 seconds the instrument will restart working with the new parameters. 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 push "SET" key if you want to restart the programming again or remove the not programmed "HOT KEY" to abort the operation.

18.2 UPLOAD FROM THE INSTRUMENT TO THE "HOT KEY"

1. When the XM unit is ON, insert the "HOT KEY" and push "UP" key.
2. The UPLOAD begins. The "UP" message is blinking.
3. Remove the "HOT KEY".
4. At the end of 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 or remove the not programmed "HOT KEY".

19. TECHNICAL DATA

CA6060

Housing: self-extinguishing ABS.
Case: CA6060 facia 35x77 mm, depth 18mm
Mounting: panel mounting in a 29x71 mm panel cut-out
Protection: IP20, Frontal protection: P65
Power supply: from XM6000 power module
Display: 3 digits, red LED, 14.2 mm high
Optional output: buzzer
Power modules
Case: 6 x 12V
Connections: Screw terminal block < 1.6 mm2 heat-resistant wiring and 5.0mm Faston
Power supply: depending on the model: 24Vac - 24Vac - 110Vac ± 10% - 230Vac ± 10% or 90-230Vac with switching power supply.
Power absorption: 9W max.

20. DEFAULT SETTING VALUES

<table>
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<tr>
<th>Lab</th>
<th>Val</th>
<th>Menu</th>
<th>Description</th>
<th>Range</th>
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<td>SE</td>
<td>2.0</td>
<td>-</td>
<td>Set point</td>
<td>LS - US</td>
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<td>rC</td>
<td>-</td>
<td>Pr1</td>
<td>CLOCK and DEPRT menu access</td>
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</tr>
<tr>
<td>EEU</td>
<td>-</td>
<td>Pr1</td>
<td>Electro valve menu access</td>
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Regulation

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<td>Differential</td>
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<td>Integral time for room temperature regulation</td>
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<tr>
<td>Cr/E</td>
<td>Continuous regulation activation</td>
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<tr>
<td>LS</td>
<td>Minimum set point</td>
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<td>US</td>
<td>Maximum set point</td>
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<tr>
<td>odS</td>
<td>Outputs activation delay at start up</td>
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<td>Anti-short cycle delay</td>
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<td>CCI</td>
<td>Continuous cycle duration</td>
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<td>Continuous cycle set point</td>
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<tr>
<td>Con</td>
<td>Compressor ON time with faulty probe</td>
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<td>CoF</td>
<td>Compressor OFF time with faulty probe</td>
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<td>Measurement unit: Celsius, Fahrenheit</td>
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<td>rPb</td>
<td>Regulation probe B</td>
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<td>rPe</td>
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Electronic Expansion Valve

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<td>Auy</td>
<td>Minimum stable superheat</td>
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<td>Auy</td>
<td>Minimum superheat search</td>
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<td>Auy</td>
<td>Minimum superheat search</td>
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<td>Pb</td>
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<td>Integral time for superheat regulator</td>
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<td>PEO</td>
<td>Probe error opening percentage</td>
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<td>PE4</td>
<td>Probe error delay before stopping regulation</td>
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<td>OFE</td>
<td>Start opening percentage</td>
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### Defrost

<table>
<thead>
<tr>
<th>Parameter</th>
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<tr>
<td>dPA</td>
<td>P2</td>
<td>Defrost probe A</td>
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<td>dPb</td>
<td>nP</td>
<td>Defrost probe B</td>
</tr>
<tr>
<td>dPE</td>
<td>100</td>
<td>Virtual probe percentage (defrost temperature)</td>
</tr>
<tr>
<td>tdF</td>
<td>EL</td>
<td>Defrost type</td>
</tr>
<tr>
<td>EdF</td>
<td>in</td>
<td>Defrost mode: Clock or interval</td>
</tr>
<tr>
<td>St</td>
<td>150</td>
<td>Heater set point during defrost</td>
</tr>
<tr>
<td>Hyr</td>
<td>2.0</td>
<td>Differential for heater</td>
</tr>
<tr>
<td>tcd</td>
<td>255</td>
<td>Time out for heater</td>
</tr>
<tr>
<td>dIP</td>
<td>0.1</td>
<td>Minimum temperature difference to start defrost</td>
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<tr>
<td>dDP</td>
<td>80</td>
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<td>d2P</td>
<td>nP</td>
<td>Delay with two probes</td>
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<tr>
<td>dIE</td>
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<td>Defrost termination temperatureProbe A</td>
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<tr>
<td>dIS</td>
<td>8.0</td>
<td>Defrost termination temperature Probe B</td>
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<td>idF</td>
<td>6</td>
<td>Interval between defrosts</td>
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<tr>
<td>MiDF</td>
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<td>Defrost Maximum duration</td>
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<tr>
<td>dSD</td>
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<tr>
<td>dFD</td>
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<td>Start delay</td>
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<td>dAd</td>
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<td>Defrost display time out</td>
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<tr>
<td>Fdt</td>
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<td>Drain down time</td>
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<td>dPo</td>
<td>n</td>
<td>Defrost at start-up</td>
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<tr>
<td>dAF</td>
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### Alarm

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<tr>
<td>ALc</td>
<td>Ab</td>
<td>Temperature alarm configuration</td>
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<tr>
<td>ALU</td>
<td>10</td>
<td>High temperature alarm setting</td>
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<tr>
<td>ALL</td>
<td>-30</td>
<td>Low temperature alarm setting</td>
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<tr>
<td>Ayh</td>
<td>1.0</td>
<td>Differential for temperature alarm</td>
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<tr>
<td>ALd</td>
<td>15</td>
<td>Temperature alarm delay</td>
</tr>
<tr>
<td>dLU</td>
<td>150</td>
<td>High temperature alarm setting (defrost probe)</td>
</tr>
<tr>
<td>dLL</td>
<td>-55</td>
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<tr>
<td>dAH</td>
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<td>Temperature alarm delay (defrost probe)</td>
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<td>FLU</td>
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<td>High temperature alarm setting (fan probe)</td>
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<tr>
<td>FLL</td>
<td>-55</td>
<td>Low temperature alarm setting (fan probe)</td>
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<td>1.0</td>
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<td>FAd</td>
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<td>Delay of temperature alarm start-up</td>
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<td>P1</td>
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<tr>
<td>dot</td>
<td>15</td>
<td>Temperature alarm exclusion after door open</td>
</tr>
<tr>
<td>Sti</td>
<td>nu</td>
<td>Stop regulation interval</td>
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<tr>
<td>StP</td>
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<td>Stop duration</td>
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<tr>
<td>eAG</td>
<td>AUS</td>
<td>Sixth relay output configuration</td>
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<tr>
<td>CoM</td>
<td>Cur</td>
<td>Modulating output configuration</td>
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<tr>
<td>AOP</td>
<td>cL</td>
<td>Alarm relay polarity</td>
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<tr>
<td>iAU</td>
<td>n</td>
<td>Auxiliary output independent from ON/OFF state</td>
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### Digital Inputs

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<tr>
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<td>1If</td>
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<td>i2P</td>
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<td>LiG</td>
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<tr>
<td>i3P</td>
<td>cL</td>
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<td>ES</td>
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<td>nPS</td>
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<td>Number of pressure switch activation before lock</td>
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<td>Odc</td>
<td>F-C</td>
<td>compressor and fan status when open door</td>
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Probe Configurations

<table>
<thead>
<tr>
<th>Clock</th>
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<th>Pr2</th>
<th>P6 calibration</th>
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<tbody>
<tr>
<td>CbP y</td>
<td>Y</td>
<td>Y</td>
<td>n(0) – Y(1)</td>
</tr>
<tr>
<td>Hur y</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Current hour</td>
</tr>
<tr>
<td>Min y</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Current minutes</td>
</tr>
<tr>
<td>dAY y</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Current day</td>
</tr>
<tr>
<td>H1d nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>First weekly day</td>
</tr>
<tr>
<td>H2d nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Second weekly day</td>
</tr>
<tr>
<td>H3d nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Third weekly day</td>
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<tr>
<td>ILE 0.0</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Energy saving cycle start during weekdays 0 - 23.5(143) (hours.10min)</td>
</tr>
<tr>
<td>dLE 0.0</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Energy saving cycle length during weekdays 0 - 24.0(144) (hours.10min)</td>
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<tr>
<td>ISE 0.0</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Energy saving cycle start during holidays 0 - 23.5(143) (hours.10min)</td>
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<tr>
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<td>Pr1</td>
<td>Energy saving cycle length during holidays 0 - 24.0(144) (hours.10min)</td>
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<tr>
<td>HES 0.0</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Temperature increasing during Energy Saving cycle [-30.0°C ÷ 30.0°C] [54°F ÷ 54°F]</td>
</tr>
<tr>
<td>Ld1 nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Workdays First defrost start 0.5 - 23.5(143) - nu(144) (hours.10min)</td>
</tr>
<tr>
<td>Ld2 nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Workdays Second defrost start Ld1 - 23.5(143) - nu(144) (hours.10min)</td>
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<tr>
<td>Ld3 nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Workdays Third defrost start Ld2 - 23.5(143) - nu(144) (hours.10min)</td>
</tr>
<tr>
<td>Ld4 nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Workdays Fourth defrost start Ld3 - 23.5(143) - nu(144) (hours.10min)</td>
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<td>Ld5 nu</td>
<td>Pr1</td>
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<td>Workdays Fifth defrost start Ld4 - 23.5(143) - nu(144) (hours.10min)</td>
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<td>Ld6 nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Workdays Sixth defrost start Ld5 - 23.5(143) - nu(144) (hours.10min)</td>
</tr>
<tr>
<td>Sd1 nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Holidays First defrost start 0.5 - 23.5(143) - nu(144) (hours.10min)</td>
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<td>Sd2 nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Holidays Second defrost start Sd1 - 23.5(143) - nu(144) (hours.10min)</td>
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<td>Sd3 nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Holidays Third defrost start Sd2 - 23.5(143) - nu(144) (hours.10min)</td>
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<tr>
<td>Sd4 nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Holidays Fourth defrost start Sd3 - 23.5(143) - nu(144) (hours.10min)</td>
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<tr>
<td>Sd5 nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Holidays Fifth defrost start Sd4 - 23.5(143) - nu(144) (hours.10min)</td>
</tr>
<tr>
<td>Sd6 nu</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Holidays Sixth defrost start Sd5 - 23.5(143) - nu(144) (hours.10min)</td>
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Energy Saving

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<tr>
<th>ESP</th>
<th>P1</th>
<th>Pr1</th>
<th>Energy saving probe selection n(P3) ÷ P1(1) - P2(2) - P3(3) - P4(4) - P5(5) - P6(6)</th>
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<tbody>
<tr>
<td>HES 0.0</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Temperature increasing during Energy Saving [-30.0°C ÷ 30.0°C] [54°F ÷ 54°F]</td>
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<tr>
<td>PEL n</td>
<td>Pr1</td>
<td>Pr1</td>
<td>Energy saving activation when Light switched off n(0) – Y(1)</td>
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L.A.N. Management

<table>
<thead>
<tr>
<th>Lmd y</th>
<th>P9</th>
<th>Pr1</th>
<th>Defrost Synchronisation n(0) – Y(1)</th>
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<tr>
<td>dEM y</td>
<td>P9</td>
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<td>Defrost end Synchronisation n(0) – Y(1)</td>
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<td>LSP n</td>
<td>Pr2</td>
<td>Pr1</td>
<td>SET-POINT Synchronisation n(0) – Y(1)</td>
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<tr>
<td>Lds n</td>
<td>Pr2</td>
<td>Pr1</td>
<td>Display Synchronisation (temperature sent via LAN) n(0) – Y(1)</td>
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<tr>
<td>LOf n</td>
<td>Pr1</td>
<td>Pr2</td>
<td>ON/OFF Synchronisation n(0) – Y(1)</td>
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<tr>
<td>LLI y</td>
<td>Pr2</td>
<td>Pr2</td>
<td>Light Synchronisation n(0) – Y(1)</td>
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<td>LAU n</td>
<td>Pr2</td>
<td>Pr2</td>
<td>ALUX Synchronisation n(0) – Y(1)</td>
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<td>LES n</td>
<td>Pr2</td>
<td>Pr2</td>
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<td>LSD n</td>
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<td>Pr2</td>
<td>Remote probe displaying n(0) – Y(1)</td>
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<td>LPP n</td>
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<td>Pressure value sent in LAN n(0) – Y(1)</td>
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<tr>
<td>SIM n</td>
<td>Pr2</td>
<td>Pr2</td>
<td>Cooling request from LAN enable compressor relay n(0) – Y(1)</td>
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Probe Configurations

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<tr>
<th>P1C</th>
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<td>P4C</td>
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<td>N/C</td>
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<td>P6C</td>
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Parameter table

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<td>ON/OFF percentage (C.R.O.) (read only)</td>
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<td>tMd</td>
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<td>Pr1</td>
<td>Time remaining before next defrost activation (only for interval defrost) (read only)</td>
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<tr>
<td>LSN</td>
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<td>Pr1</td>
<td>Number of devices in LAN 1 + 8 (read only)</td>
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<td>LAN</td>
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Other

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