

# XR110C with built-in RS485

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## 1. GENERAL WARNING

### 1.1 PLEASE READ BEFORE USING THIS MANUAL

- This 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.

### 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
- Warning: disconnect all electrical connections before any kind of maintenance.
- Fit the probe where it is not accessible by the End User. The instrument must not be opened.
- 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).
- Ensure that the wires for probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.
- In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.

## 2. GENERAL DESCRIPTION

XR110C is connectable to the XJ500 monitoring system through the two terminals of serial port RS485.

Model XR110C, 32 x 74 mm format, is a single stage temperature controller suitable for applications in the field of refrigeration or heating. It's provided with a relay output and a PTC or NTC probe inputs configurable by the User.

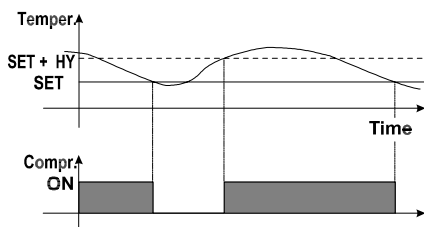
## 3. CONTROLLING LOADS

### 3.1 TYPE OF REGULATION

The regulation is performed according to the temperature measured by the probe. The instruments are provided with the CH programmable parameter which enables the user to set the regulation both for heating or cooling applications:

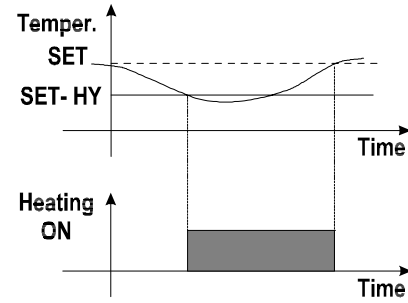
- CH = cl : cooling applications
- CH = Ht : heating applications

### 3.2 CH=CL : COOLING



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

### 3.3 CH = HT: HEATING



The Hy value is automatically set under the Set Point. If the temperature decreases and reaches set point minus differential the regulation output is activated and then turned off when the temperature reaches the set point value again.

N.B. :In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters "COOn" and "COF".

## 4. FRONT PANEL COMMANDS



### SET

:To display target set point; in programming mode it selects a parameter or confirm an operation.

By holding it pressed for 5s the instrument Stand By started( If it is enable)  
By holding it pressed for 3s when max or min temperature is displayed it will be erased.



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



:To see the min stored temperature; in programming mode it browses the parameter codes or decreases the displayed value. By holding it pressed for 3s the auxiliary relay is switched ON or OFF ( If it is configured)

### KEY COMBINATIONS:

▼ + ▲ To lock & unlock the keyboard.

SET + ▼ To enter in programming mode.

SET + ▲ To return to the room temperature display.

### 4.1 USE OF LEDS

Each LED function is described in the following table.

LED	MODE	Function
❄	ON	Compressor enabled
❄	FLASHING	- Programming Phase (flashing with LED 1) - Anti-short cycle delay enabled
LED1	FLASHING	Programming Phase (flashing with LED ❄)
⚠	ON	- ALARM signal - In "Pr2" indicates the parameter is also present in "Pr1"

### 4.2 HOW TO SEE THE MIN TEMPERATURE

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

### 4.3 HOW TO SEE THE MAX TEMPERATURE

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

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

To reset the stored temperature, when max or min temperature is displayed :

1. Press SET key until "rST" label starts blinking.

#### 4.5 HOW TO SEE THE SET POINT



1. Push and immediately release the SET key: the display will show the Set point value;



2. Push and immediately release the SET key or wait for 5 seconds to display the probe value again.

#### 4.6 HOW TO CHANGE THE SETPOINT



1. Push the SET key for 3 seconds to change the Set point value;
2. The value of the set point will be displayed; led and LED 1 start blinking;



3. To change the Set value push the or arrows within 10s.
4. To memorise the new set point value push the SET key again or wait 10s.

#### 4.7 TO ENTER IN PARAMETERS LIST "PR1"



To enter the parameter list "Pr1" (user accessible parameters) operate as follows:

1. Enter the Programming mode by pressing the Set and UP key for few seconds (LED 1 and led start blinking).



2. The instrument will show the first parameter present in "Pr1"

#### 4.8 TO ENTER IN PARAMETERS LIST "PR2"

To enter in the parameter list "Pr2" (installer level) operate as follows:



To access parameters in "Pr2" a security code is required.

1. To enter in "Pr1" level.
2. Select "Pr2" parameter and press the "SET" key.
3. The "PAS" flashing message is displayed, shortly followed by "0 - ." with a flashing zero.
4. Use or to input the security code in the flashing digit; confirm the figure by pressing "SET". The security code is "321".
5. If the security code is correct the access to "Pr2" is enabled by pressing "SET" on the last digit.

**NOTE:** each parameter in "Pr2" can be removed or put into "Pr1" (user level) by pressing "SET" + . When a parameter is present in "Pr1" LED is on.

#### 4.9 HOW TO CHANGE THE PARAMETER VALUE

To change the parameter's value operate as follows:

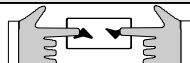


1. Enter the Programming mode.
2. Select the required parameter with or .
3. Press the "SET" key to display its value ( and LED 1 starts blinking).
4. Use or to change its value.
5. Press "SET" to store the new value and move to the following parameter.

**To exit:** Press SET + UP or wait 15s without pressing a key.

**NOTE:** the new programming is stored even when the procedure is exited by waiting the time-out.

#### 4.10 HOW TO LOCK THE KEYBOARD



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

#### 4.10.1 TO UNLOCK THE KEYBOARD

Keep pressed together for more than 3s the and keys.

#### 4.11 STAND BY FUNCTION

If the stand-by function is enabled (Onf = 1), by holding pressed the SET key for 5s., the instrument shows "OFF". The stand-by function switches OFF all the relays and stops the regulation. During the stand by if a XJ500 is connected, it does not record the instrument data and alarms.

**N.B. When the instrument is under Stand-by, all the relays are under power supply. Don't connect any loads to the normal closed contact of the relays.**

### 5. LIST OF PARAMETERS

#### REGULATION

**Hy Differential:** (0,2°C ÷ 30,0°C / 1°F÷54°F): Intervention differential for set point, always positive. Compressor Cut IN is Set Point Plus Differential (Hy). Compressor Cut OUT is when the temperature reaches the set point.

**LS Minimum set point limit:** (- 50,0°C+SET/ -58°F+SET) Sets the minimum acceptable value for the set point.

**US Maximum set point limit:** (SET+ 150°C / SET +302°F) Set the maximum acceptable value for set point.

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

**AC Anti-short cycle delay:** (0÷30 min) interval between the compressor stop and the following restart.

**CCt Thermostat override:** (0min ÷23h 50min) allows to set the length of the continuous cycle. Can be used, for instance, when the room is filled with new products.

**Con Compressor ON time with faulty probe:** (0÷255 min) time during which the compressor is active in case of faulty thermostat probe. With COn=0 compressor is always OFF.

**COF Compressor OFF time with faulty probe:** (0÷255 min) time during which the compressor is off in case of faulty thermostat probe. With COF=0 compressor is always active.

**CH Type of regulation:** cL = cooling; Ht = heating.

#### DISPLAY

**CF Temperature measurement unit:** °C = Celsius; °F = Fahrenheit . When the measurement unit is changed the SET point and the values of the regulation parameters have to be modified

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

de = 0,1°C

in = 1°C

#### ALARMS

##### ALCTemperature alarm configuration

rE = High and Low alarms related to Set Point

Ab = High and low alarms related to the absolute temperature.

##### ALUHigh temperature alarm setting:

ALC= rE, 0 ÷ 50°C or 90°F

ALC= Ab, ALL ÷ 110°C or 230°F

when this temperature is reached and after the ALd delay time the HA alarm is enabled.

##### ALL Low temperature alarm setting:

ALC = rE, 0 ÷ 50°C or 90°F

ALC = Ab, - 50°C or -58°F ÷ ALU

when this temperature is reached and after the ALd delay time, the LA alarm is enabled.

**AFHTemperature alarm and fan differential:** (0,1÷25,5°C; 1÷45°F) Intervention differential for temperature alarm set point and fan regulation set point, always positive.

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

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

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

**doA Open door alarm delay:**(0÷255 min) delay between the detection of the open door condition and its alarm signalling: the flashing message "dA" is displayed.

**nPS Pressure switch number:** (0 ÷15) Number of activation of the pressure switch, during the "did" interval, before signalling the alarm event (I2F= PAL).

#### PROBE INPUTS

**Ot Thermostat probe calibration:** (-12,0÷12,0°C / -21÷21°F) allows to adjust possible offset of the thermostat probe.

**HESTemperature increase during the Energy Saving cycle :** (-30,0°C ÷ 30,0°C / -22÷86°F) sets the increasing value of the set point during the Energy Saving cycle.

**DIGITAL INPUTS****odc Compressor and fan status when open door:**

**no** = normal;  
**Fan** = Fan OFF;  
**CPr** = Compressor OFF;  
**F\_C** = Compressor and fan OFF.

**I2P Configurable digital input polarity:**

**CL** : the digital input is activated by closing the contact;  
**OP** : the digital input is activated by opening the contact

**I2F Digital input operating mode:** configure the digital input function:

**EAL** = generic alarm;  
**bAL** = serious alarm mode;  
**PAL** = Pressure switch;  
**dFr** = Start defrost;  
**AUS** = Relay AUX actuation;  
**Es** = Energy Saving;  
**onF** = remote On/OFF.  
**dor** = door switch

**did Time interval/delay for digital input alarm:**(0÷255 min.) Time interval to calculate the number of the pressure switch activation when I2F=PAL. If I2F=EAL or bAL (external alarms), "did" parameter defines the time delay between the detection and the successive signalling of the alarm.**OTHER**

**Adr RS485 serial address** (1÷247): Identifies the instrument address when connected to a ModBUS compatible monitoring system.

**PbC Probe type selection:** (NTC or PTC) select the type of probe used

**OnF Stanb-by function:**

**0** = Stand-by function not enabled.  
**1** = Stand-by function enabled (under SET key control).

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

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

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

**Pr2 Access to the protected parameter list** (read only).

**6. DIGITAL INPUTS**

The XR110C can support up to 2 free contact digital inputs. One is always configured as door switch, the second is programmable in seven different configurations by the "I2F" parameter.

**6.1 CONFIGURABLE INPUT - GENERIC ALARM (EAL)**

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

**6.2 CONFIGURABLE INPUT - SERIOUS ALARM MODE (BAL)**

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

**6.3 CONFIGURABLE INPUT - PRESSURE SWITCH (PAL)**

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

**6.4 CONFIGURABLE INPUT - START DEFROST (DFR)**

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

**6.5 CONFIGURABLE INPUT - ENERGY SAVING (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 until the digital input is activated.

**6.6 CONFIGURABLE INPUT - REMOTE ON/OFF (ONF)**

This function allows to switch ON and OFF the instrument.

**6.7 CONFIGURABLE INPUT - DOOR SWITCH (DOR)**

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

**no** = normal (any change);  
**Fan** = Fan OFF;  
**CPr** = Compressor OFF;  
**F\_C** = Compressor and fan OFF.

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

**6.8 DIGITAL INPUTS POLARITY**

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

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

**7. INSTALLATION AND MOUNTING**

Instruments XR110C shall be mounted on panel, in a 29x71 mm hole, and fixed using the special bracket supplied. The temperature range allowed for correct operation is 0 - 60 °C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity. The same recommendations apply to probes. Let air circulate by the cooling holes.

**8. ELECTRICAL CONNECTIONS**

The instruments are provided with screw terminal block to connect cables with a cross section up to 2,5 mm<sup>2</sup>. Before connecting cables make sure the power supply complies with the instrument's requirements. Separate the 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.

**8.1 PROBE CONNECTION**

The probe 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.

**9. RS485 SERIAL COMMUNICATION**

The RS485 serial communication port allows to connect the unit, by means of a simple 2 wires shielded cable, to a network line ModBUS-RTU compatible as the **dixell** monitoring system XJ500 (Version 3.2).

**10. USE OF THE PROGRAMMING "HOT KEY"**

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

**10.1 DOWNLOAD (FROM THE "HOT KEY" TO THE INSTRUMENT)**

- Turn OFF the instrument by means of the ON/OFF key, remove the TTL serial cable if present, insert the "Hot Key" and then turn the Controller ON.
- Automatically the parameter list of the "Hot Key" is downloaded into the Controller memory, the "DoL" message is blinking. After 10 seconds the instrument will restart working with the new parameters.
- Turn OFF the instrument remove the "Hot Key", plug in the TTL serial cable, then turn it ON again.

At the end of the data transfer phase the instrument displays the following messages: "end" for right programming. The instrument starts regularly with the new programming. "err" for failed programming. In this case turn the unit off and then on if you want to restart the download again or remove the "Hot key" to abort the operation.

**10.2 UPLOAD (FROM THE INSTRUMENT TO THE "HOT KEY")**

- Turn OFF the instrument by means of the ON/OFF key and remove the TTL serial cable if present; then turn it ON again.
- When the unit is ON, insert the "Hot key" and push ^ key; the "uPL" message appears.
- Push "SET" key to start the UPLOAD; the "uPL" message is blinking.
- Turn OFF the instrument remove the "Hot Key", plug in the TTL serial cable, then turn it ON again.

At the end of the data transfer phase the instrument displays the following messages: "end" for right programming. "err" for failed programming. In this case push "SET" key if you want to restart the programming again or remove the not programmed "Hot key".

**11. ALARM SIGNALS**

Message	Cause	Outputs
"P1"	Thermostat probe failure	Alarm output ON; Compressor output according to parameters "CO" and "COF"
"HA"	Maximum temperature alarm	Alarm output ON; Other outputs unchanged
"LA"	Minimum temperature alarm	Alarm output ON; Other outputs unchanged
"EE"	Data or memory failure	Alarm output ON; Other outputs unchanged
"dA"	Door switch alarm	Alarm output ON; Other outputs unchanged
"EAL"	External alarm	Alarm output ON; Other outputs unchanged
"BAL"	Serious external alarm	Alarm output ON; Other outputs OFF
"PAL"	Pressure switch alarm	Alarm output ON; Other outputs OFF

The alarm message is displayed until the alarm condition is recovery. All the alarm messages are showed alternating with the room temperature except for the "P1" which is flashing. To reset the "EE" alarm and restart the normal functioning press any key, the "rSt" message is displayed for about 3s.

**11.1 "EE" ALARM**

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

**11.2 ALARM RECOVERY**

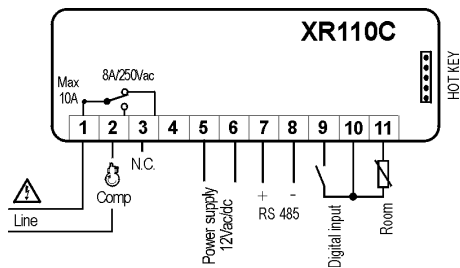
Probe alarm : "P1" (probe faulty) is automatically stop 10s after the probe restarts normal operation. Check connections before replacing the probe.  
 Temperature alarms "HA" and "LA" automatically stop as soon as the thermostat temperature returns to normal values or when the defrost starts.  
 Door switch alarm "dA" stop as soon as the door is closed.  
 External alarms "EAL", "BAL" stop as soon as the external digital input is disabled "PAL" alarm is recovered by switching OFF the instrument.

**12. TECHNICAL DATA**

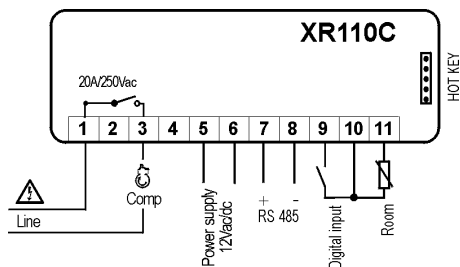
**Housing:** self extinguishing ABS.  
**Case:** frontal 32x74 mm; depth 70mm  
**Mounting:** panel mounting in a 71x29 mm panel cut-out.  
**Frontal protection:** IP65  
**Connections:** Screw terminal block  $\leq 2,5 \text{ mm}^2$  wiring.  
**Power supply:** 230Vac (opt.12Vac/dc),  $\pm 10\%$ , 50/60Hz  
**Power absorption:** 3VA max.  
**Display:** 3 digits, red LED, 14,2 mm high.  
**Inputs:** 1 PTC or NTC configurable.  
**Relay output:** SPDT relay 8(3)A, 250Vac  
**Other output:** buzzer for an acoustic signal of alarms  
**Serial Output :** RS485 serial communication port with ModBUS-RTU protocol  
**Data storing:** on the non-volatile memory (EEPROM).  
**Kind of action:** 1B.  
**Pollution grade:** normal  
**Software class:** A.  
**Operating temperature:** 0+60 °C.  
**Relative humidity:** 20+85% (not condensing)  
**Storage temperature:** -30+85 °C.  
**Measuring and regulation range:**  
 PTC: -50+150°C (-58+302°F)  
 NTC: -50+110°C (-58+230°F)  
**Resolution:** 0,1 °C or 1 °F (selectable).  
**Accuracy of the controller at 25°C:** range -40+50°C (-40+122°F);  $\pm 0,3 \text{ }^\circ\text{C} \pm 1 \text{ digit}$

**13. CONNECTIONS**

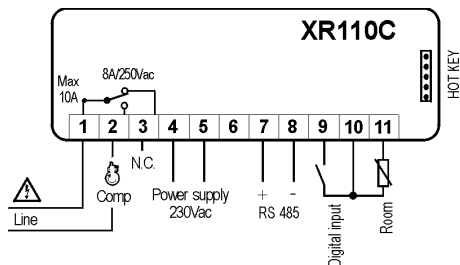
**13.1 XR110C: 12VAC/DC; COMPRESS. 8A**



**13.2 XR110C: 12VAC/DC; COMPRESS. 20A**



**13.3 XR110C: 230VAC; COMPRESS. 8A**



**14. DEFAULT SETTING VALUES**

Label	Name	Limits	Default	XR110C
<b>REGULATION</b>				
Set	Set point	LS+US	5	Pr1
Hy	Differential	0,1+25,5 °C / 1+45°F	2	Pr1
LS	Minimum set point	-50,0°C+SET / -58°F+SET	-50	Pr2
US	Maximum set point	SET + 150°C / SET + 230°F	120	Pr2
OdS	Outputs activation delay at start up	0+255 min.	0	Pr2
AC	Anti-short cycle delay	0+30 min.	1	Pr1
CCt	Compressor ON time during fast freezing	0 + 23h 50 min.	0	Pr2
COon	Compressor ON time with faulty probe	0+255 min.	15	Pr2
COF	Compressor OFF time with faulty probe	0+255 min.	30	Pr2
CH	Kind of action (cold / Hot)	cL + Ht	cL	Pr2
<b>DISPLAY</b>				
CF	Temperature measurement unit	°C + °F	°C	Pr2
rES	Resolution (integer/decimal point)	in + de	de	Pr1
<b>ALARMS</b>				
ALC	Temperature alarms configuration	rE+Ab	rE	Pr2
ALU	MAXIMUM temperature alarm	-50,0+110°C / -58+230°F	10	Pr1
ALL	minimum temperature alarm	-50,0+110°C / -58+230°F	10	Pr1
AFH	Temperature alarm and fan differential	0,1+25,5 °C / 1+45°F	2	Pr2
ALd	Temperature alarm delay	0+255 min.	15	Pr2
dAO	Delay of temperature alarm at start up	0 + 23h 50 min.	1,3	Pr2
dot	Delay of temperature alarm after closing the door	0+255 min.	15	Pr2
dOA	Open door alarm delay	0+255 min.	15	Pr2
nPS	Pressure switch activation number	0+15	0	Pr2
<b>ANALOGUE INPUTS</b>				
Ot	Thermostat probe calibration	-12,0+12,0°C / -21+21°F	0	Pr1
HES	Temperature increase during the Energy Saving cycle	-30+30°C / -22+86°F	0	Pr2
<b>DIGITAL INPUTS</b>				
Odc	Open door control	no, Fan, CPr, F_C	no	Pr2
I2P	Configurable digital input polarity	CL+OP	CL	Pr2
I2F	Digital input configuration	EAL, bAL, PAL, dFr, AuS, ES, OnF	EAL	Pr2
did	Digital input alarm delay	0+255 min.	5	Pr2
<b>OTHER</b>				
Adr	Serial address	1+247	1	Pr1
PbC	Probe type selection	NTC + PTC	NTC	Pr2
OnF	On / Off function enabled	n + y	n	Pr2
rEL	Software release	---	2.0	Pr2
Ptb	Map code	---	---	Pr2
Prd	Probes display	Pb1+Pb3	---	Pr2
Pr2	Access parameter list	---	---	Pr2

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