

# XR110C - XR120C - XR130C - XR130D

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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.
- The instrument must not be opened.
- Fit the probe where it is not accessible by the end user.
- 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

Model **XR110C**, 32 x 74 mm format, is a single stage temperature controller suitable for applications in the field of refrigeration or heating.

Model **XR120C**, format 32 x 74 mm, is a thermostat with off cycle defrost designed for refrigeration applications at normal temperature. It provides a relay output to drive the compressor and a PTC probe input. An internal timer controls defrost by stopping the compressor. The 12Vac/dc and 24Vac/dc versions are equipped with internal buzzer for alarm signalling, the 230Vac, 110Vac, have a 12Vdc/40mA alarm output. Versions **XR130C**, format 32 x 74 mm, and **XR130D**, DIN RAIL format, are provided with alarm output relay and internal buzzer for acoustic signal.

## 3. CONTROLLING LOADS

### 3.1. The regulation output

The regulation is performed according to the temperature measured by the thermostat probe.

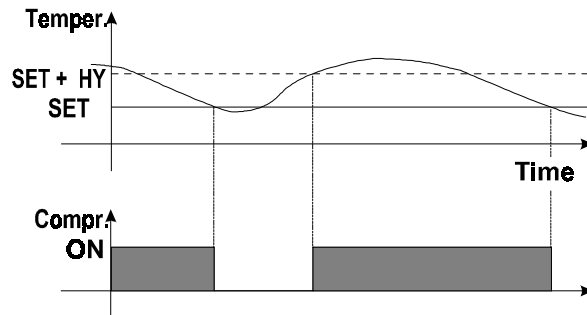
The **XR110C** instrument is provided with the **CH** programmable parameter which enables the user to set the regulation both for heating or cooling applications:

- CH = 0: cooling applications
- CH = 1: heating applications

For the XR120C, XR130C and XR130D only the cooling action is available.

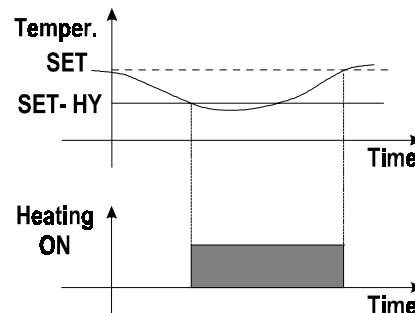
### 3.2. DIRECT ACTION: cooling applications.

The Hy value is automatically set above 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. INVERSE ACTION: heating application. (XR110C)

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.



In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters "CO<sub>n</sub>" and "CO<sub>F</sub>".

### 3.4. Fast freezing (mod. XR120C, XR130C, XR130D)

When defrost is not in progress, it can be activated the keypad by holding the "UP" key pressed for about 3 seconds. The compressor operates in continuous mode for the time set through the "Cct" parameter. The cycle can be terminated before the end of the set time using the same activation key "UP" for 3 seconds.

### 3.5. Defrost (mod. XR120C, XR130C, XR130D)

Defrost is performed through a simple stop of the compressor. Parameter "IdF" controls the interval between defrost cycles, while its length is controlled by parameter "MdF".

## 4. FRONT PANEL COMMANDS

**SET:** **TO DISPLAY TARGET SET POINT:** by pressing and releasing this key the set point is displayed for 5s.

**TO MODIFY SET POINT:** by holding the key pressed for at least 2s set point change mode is entered: the set point is displayed and the LEDs of the first and third digits blink. To change the value use the "UP" and "DOWN" keys. The new value can be stored either by pressing the "SET" key (the instrument restores temperature display) or by waiting the exit time-out to expire (15s).

**▲ (UP):** In programming mode or in "Function Menu" it browses the parameter codes or increases the value of the displayed variable. Hold pressed for a faster change.

**TO START A FAST FREEZING CYCLE:** (not on model XR110C) in normal operation, by holding it pressed for 3s the fast freezing cycle is started. Such cycle can be interrupted by holding the "UP" key pressed for 3s.

▼ (DOWN) in programming mode or in “Function Menu” it browses the parameter codes or decreases the value of the displayed variable. Hold pressed for a faster change.



**TO START A MANUAL DEFROST:** (not on model XR110C) by holding it pressed for 5s the defrost cycle is started

**KEY COMBINATIONS:**



**TO UNLOCK THE KEYBOARD:** when held pressed for 3s the keyboard is unlocked (see “LOC” function).



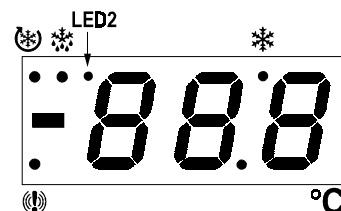
**TO ENTER ON FUNCTION MENU:** when held pressed for 3s the Function Menu is entered.



**TO RETURN TO THE ROOM TEMPERATURE DISPLAY:** programming end, return to the room temperature display.

**4.1. Use of LEDS**

A series of light points on the front panels is used to monitor the loads controlled by the instrument. Each LED function is described in the following table.



LED	MODE	FUNCTION
	ON	Compressor enabled
	FLASHING	- Programming Phase (flashing with LED2) - Anti-short cycle delay enabled
LED2	FLASHING	Programming Phase (flashing with )
	ON	Defrost enabled (No mod. XR110C)
	ON	Fast freezing enabled (No mod. XR110C)
 Alarm	ON	- ALARM signal - In “Pr2” indicates the parameter is also present in “Pr1”

**5. FUNCTION AND PARAMETERS’ PROGRAMMING MENU**

**5.1. Function Menu**


Includes all the main functions controlled by the instrument.

**Access procedure:**

- The menu is entered by holding the **SET** and **DOWN** keys pressed for three seconds. The label of the first function is displayed.
- The **UP** and **DOWN** keys are used to cycle backwards or forward in the menu.
- By pressing the **SET** key the currently displayed function is enabled.

**5.2. List of functions**

1. “dFt”: displays for 5s the time to defrost [hours]. (Not model XR110C)
2. “Pr1”: includes all user accessible parameters.

3. **“Pr2”**: includes all the instrument’s parameters (at installer level). It can be accessed through a security code. Hence it is possible to modify all parameters and add or remove parameters from “Pr1” (user level) by pressing **“SET”** + **“DOWN”**. When a parameter is enabled at user level, LED  (Alarm LED) is on.
4. **“LOC”**: keyboard lock. When enabled the “POF” flashing message is displayed for a few seconds then the keys are locked. Only the set point display is enabled.
5. **“Out”**: exits from menu.

From function “dFt” the instrument will go back to “Functions Menu” by time out. From the all other functions the instrument will display again the room temperature by time out.

### 5.3. Exit Timeout

If no key is pressed for more than 15 seconds the instrument reverts to room temperature display mode.


### 5.4. Accessing “Pr2” and SECURITY CODE input

To access parameters in “Pr2” a security code is required.

1. Enter Function Menu, select label “Pr2” and press the **“SET”** key. The “PAS” flashing message is displayed, shortly followed by “0 - -” with a flashing zero.
2. Use **“UP”** or **“DOWN”** to input the security code in the flashing digit;
3. Confirm the figure by pressing **“SET”**.
4. Repeat operations 2 and 3 for the other digits.
5. If the security code is correct the access to “Pr2” is enabled by pressing **“SET”** on the last digit, otherwise the security code input process restarts from the beginning.

If key is pressed for more than 15 seconds the instrument reverts to room temperature display mode.

**SECURITY CODE is 321**

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

### 5.5. Changing a parameter’s value

Each parameter is identified by a special alphanumeric code.

To change the parameter’s value operate as follows:

1. Enter the Function Menu and select the parameters’ list you require: **“Pr1”** or **“Pr2”**.
2. Browse the parameters’ list using **“UP”** or **“DOWN”** until the required parameter is displayed.
3. Press the **“SET”** key to display its value.
4. Use **“Up”** or **“DOWN”** to change its value.
5. Press **“SET”** to store the new value and skip to the following parameter.

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

**NOTE:** the set value is stored even when the procedure is exited by waiting the timeout to expire.

## 6. LIST OF PARAMETERS

**Hy Differential:** (0,2°C÷12,0°C/2°F ÷120°F) Intervention differential for set point.

**Cooling:** Compressor Cut IN is Set Point Plus Differential (Hy). Compressor Cut OUT is when the temperature reaches the set point.

**Heating:** (only XR1110C) Compressor Cut IN is Set Point minus Differential (Hy). Compressor Cut OUT is when the temperature reaches the set point.

**LS Minimum set point:** (- 57°C÷SET/ -57°F÷SET): Sets the minimum acceptable value for the set point.

**US Maximum set point:** (SET÷ 99°C / SET ÷196°F). Set the maximum acceptable value for set point.

- AC Anti-short cycle delay:** (0÷30 min) minimum interval between the compressor stop and the following restart.
- ALC Temperature alarms configuration:**  
(0= temperature alarms are related to SET, alarm relay and buzzer works in parallel;  
1 = temperature alarms are referred to absolute values; alarm relay and buzzer works in parallel;  
2= referred to set, alarm relay is active when the alarm is active;  
3= absolute temperature, alarm relay is active when the alarm is active)  
determines if temperature alarms are relative to setpoint or if alarms are referred to absolute temperatures.
- ALU MAXIMUM temperature alarm:** (with **ALC = 0 or 2** from 0 to 50°C/90°F above the set point; with **ALC = 1 or 3** from ALL to 99°C/ 196°F) when this temperature is reached the alarm is enabled, after the "Ald" delay time.
- ALL Minimum temperature alarm:** (with **ALC = 0 or 2** from 0 to 50°C/90°F below the set point; with **ALC = 1 or 3** from -57 °C/°F to ALU) when this temperature is reached the alarm is enabled, after the "Ald" delay time.
- Ald Temperature alarm delay:** (0÷120 min) time interval between the detection of an alarm condition and alarm signalling.
- dAO Delay of temperature alarm at startup:** (from 0 min to 720 min; res. 10min) time interval between the detection of the temperature alarm condition after instrument power on and alarm signalling.
- Ods Outputs activation delay at start up:** (0÷120min) 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.
- CCt Compressor ON time during fast freezing:** (0÷990 min; res. 10min) (Not model XR110C) allows to set the length of the fast freezing cycle. Can be used, for instance, when the room is filled with new products.
- dAF Defrost delay after fast freezing cycle:** (0÷120 min) (Not model XR110C) time interval between the end of the fast freezing cycle and the following defrost related to it.
- ldF Interval between defrost cycles:** (1÷120 hours) (Not model XR110C) Determines the time interval between the beginning of two defrost cycles.
- MdF Length for defrost:** (0÷120 min; with 0 the defrost is disabled) (Not model XR110C) It sets the defrost duration.
- dFd Temperature displayed during defrost:** (Not model XR110C)  
(0 = real temperature; 1 = temperature at defrost start; 2 = set point; 3 = "dEF" label)
- dAd MAX display delay after defrost:** (Not model XR110C) (0÷120 min). Sets the maximum time between the end of defrost and the restarting of the real room temperature display.
- dPO First defrost after startup:** (0 = Immediately; 1 = after the ldF time) (Not model XR110C)
- Ot Thermostat probe calibration:** (-12.0÷12.0°C; -120÷120°F) allows to adjust possible offset of the thermostat probe.
- CF Temperature measurement unit:** 0 = Celsius; 1 = Fahrenheit.  
WARNING: When the measurement unit is changed the SET point and the values of the parameters Hy, LS, US, ALU, ALL and Ot have to be modified)
- CH Type of action:** (Only for XR110C) 0 = cooling; 1 = heating
- COon Compressor ON time with faulty probe:** (0÷120 min) time during which the compressor is active in case of faulty thermostat probe. With COon=0 compressor is always OFF.
- COF Compressor OFF time with faulty probe:** (0÷120 min) time during which the compressor is OFF in case of faulty thermostat probe. With COF=0 compressor is always active.

## 7. INSTALLATION AND MOUNTING

Instruments **XR110C**, **XR120C** and **XR130C** shall be mounted on panel, in a 29x71 mm hole, and fixed using the special bracket supplied. **XR130D** shall be mounted on an omega DIN rail.

The ambient 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 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.

## 9. ALARM SIGNALS

Message - Mode	Cause	Outputs
"EE" Flashing	Data or memory failure	Alarm output ON; Other outputs unchanged.
"P1" Flashing	Room probe failure	Alarm output ON; Compressor output according to parameters "Con" and "COF"
"HA" Alternating with room temperature	Maximum temperature alarm	Alarm output ON; Other outputs unchanged.
"LA" Alternating with room temperature	Minimum temperature alarm	Alarm output ON; Other outputs unchanged.
"FF" Alternating with room temperature	Fast freezing interrupted by power failure	Alarm output ON; Other outputs unchanged.

### 9.1. Silencing buzzer / alarm relay output (XR130C, XR130D).

Once the alarm signal is detected the buzzer and the alarm output can be disabled by pressing any key according to the ALC par.

With ALC=0 or 1 buzzer and alarm relay are silenced by pressing any key

With ALC=2 or 3 the buzzer is silenced by pressing a key, the alarm relay remains activated as long as the alarm condition lasts.

The display signal remains as long as the alarm condition remains.

### 9.2. Alarm "EE"

The instruments in the Dixell range are provided with an internal check verifying data and memory integrity. Alarm "EE" flashes when a failure in data or in the internal memory is detected. In such case the alarm output is enabled.

#### WHAT TO DO

1. Cancel the alarm by pressing a key.
2. Check the value of all parameters and restore correct values when wrong.
3. Check the correct instrument operation and in case of further errors replace it.

### 9.3. Alarm reset through keyboard

It is referred to alarms "EE" and "FF". Reset is performed by pressing any key while the alarm is being signalled, then message "rES" is displayed for about 3s before normal operation is restored.

#### 9.4. Alarm recovery

Probe alarms "P1", start 30 seconds after the fault in the related probe; they automatically stop 30 seconds 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 and when defrost starts.

The alarm "FF", fast freezing interrupted by power fail, automatically stops after 30 minutes.

### 10. TECHNICAL DATA

**Housing:** self extinguishing ABS.

#### Case

**XR110C, XR120C, XR130C:** frontal 32x74 mm; depth 60mm;

**XR130D:** 4 DIN modules 70x85 mm; depth 61mm.

#### Mounting

**XR110C, XR120C, XR130C** panel mounting in a 71x29 mm panel cut-out

**XR130D** DIN RAIL mounted in a omega (3) din rail

#### Frontal protection

**XR110C, XR120C, XR130C:** IP65

#### Connections

Screw terminal block  $\leq 2,5 \text{ mm}^2$  wiring.

#### Power supply

**XR110C, XR120C:** 12Vac/dc, -10% +15% (optional 230, 110, 24 Vac,  $\pm 10\%$ , 50/60Hz)

**XR130C:** 12Vac/dc, -10% +15% (optional 24 Vac/dc,  $\pm 10\%$ )

**XR130D:** 110/230Vac,  $\pm 10\%$  50/60Hz (opt. 24Vac,  $\pm 10\%$  50/60Hz).

**Power absorption:** 3VA max.

**Display:** 3 digits, red LED, 14,2 mm high.

**Inputs:** 1 PTC probe

#### Relay outputs

##### compressor

SPDT relay 8(3) A, 250Vac

##### alarm

**XR130C:** SPST relay 8(3) A, 250Vac

**XR130D:** SPST relay 5(2) A, 250Vac

#### Other output

##### Alarm output 12V/40mA

**XR110C** (power supply 230Vac or 110Vac), **XR120C** (power supply 230Vac or 110Vac):

##### Buzzer for acoustical alarm

**XR110C** (power supply 12Vac/dc or 24Vac/dc), **XR120C** ((power supply 12Vac/dc or 24Vac/dc), **XR130C, XR130D**

**Data storing:** on the non-volatile memory (EEPROM).

**Operating temperature:** 0÷60 °C.

**Relative humidity:** 20÷85% (no condensing)

**Storage temperature:** -30÷85 °C.

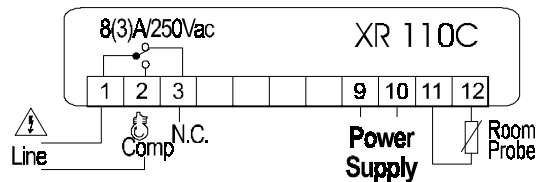
**Measuring and regulation range:** -55÷99 °C (-57÷196°F)

**Resolution:** 0,1 °C or 1 °F (selectable).

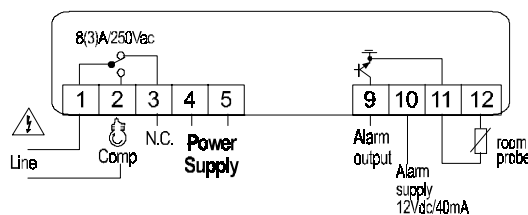
**Accuracy of the controller at 25°C:** range -40÷50°C (-40÷122°F):  $\pm 0,3 \text{ °C} \pm 1 \text{ digit}$

## 11. CONNECTIONS

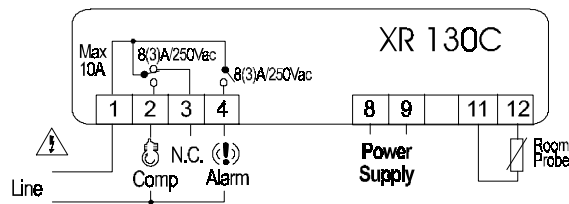
### 11.1. XR110C and XR120C (12Vac/dc or 24Vac/dc)



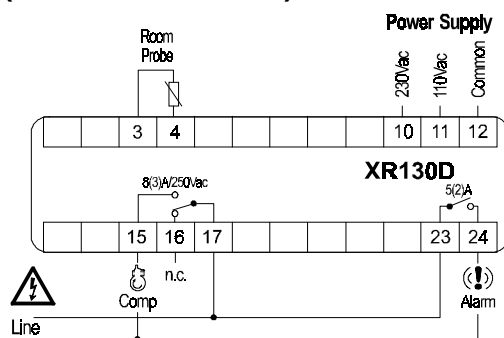
### 11.2. XR110C and XR120C (230Vac or 110Vac)



### 11.3. XR130C (12Vac/dc or 24Vac/dc)



### 11.4. XR130D (230Vac or 110Vac)



## 12. DEFAULT SETTING VALUES

### DEFAULT SETTING - XR110C STANDARD MODELS

PARAMETER	RANGE	LEVEL	COOLING °C/°F	HEATING °C/°F
Set	LS ÷ US	Pr1	5/41	5/41
HY	0.2÷12.0°C/2÷120°F	Pr1	2/4	2/4

PARAMETER	RANGE	LEVEL	COOLING °C/°F	HEATING °C/°F
LS	-57°C/°F ÷ Set	Pr2	-57/-57	-50/-57
US	Set ÷ 99°C / 196°F	Pr2	99/196	99/196
AC	0 ÷ 30m	Pr2	1	0
ALC	0=relative, 1=absolute; 2=relative, 3=absolute	Pr2	0	0
ALU	0÷50°C/90°F or ALL÷ 99°C/196°F	Pr2	10/18	15/30
ALL	0÷50°C/90°F or -57÷ALU	Pr2	10/18	15/30
ALd	0 ÷ 120m	Pr2	15	5
dAO	0 ÷ 720m	Pr2	60	30
OdS	0 ÷ 120m	Pr2	1	0
Ot	-12.0÷12.0°C/120÷120°F	Pr2	0	0.0
CF	0=°Celsius 1=°Fahrenheit	Pr2	0/1	0/1
CH	0=Cooling; 1= Heating	Pr2	0	1
CO <sub>n</sub>	0 ÷ 120m	Pr2	30	0
COF	0 ÷ 120m	Pr2	30	5

**DEFAULT SETTING - XR120C, XR130C, XR130D - STANDARD MODELS**

PARAMETER	RANGE	LEVEL	DEFAULT °C / °F
SP	LS ÷ US	Pr1	3/37
HY	0.2÷12.0°C/2÷120°F	Pr1	2/4
LS	-57°C/°F ÷ Set	Pr2	-57/-57
US	Set ÷ 99°C / 196°F	Pr2	99/196
AC	0 ÷ 30m	Pr2	1
ALC	0=relative, 1=absolute; 2=relative, 3=absolute	Pr2	0
ALU	0÷50°C/90°F or ALL÷ 99°C/196°F	Pr2	10/18
ALL	0÷50°C/90°F or -57÷ALU	Pr2	10/18
ALd	0 ÷ 120m	Pr2	15
dAO	0 ÷ 720m	Pr2	90
OdS	0 ÷ 120m	Pr2	1
CCt	0÷990m	Pr2	240
dAF	0 ÷ 120m	Pr2	120
ldF	1 ÷ 120h	Pr2	8
MdF	0 ÷ 120m	Pr2	20
dFd	0=Real, 1=Start, 2=Set, 3=dEF	Pr2	1
dAd	0 ÷ 120m	Pr2	30
dPO	0=Immediately - 1=Normal	Pr2	1
Ot	-12.0÷12.0°C/120÷120°F	Pr2	0
CF	0=°Celsius 1=°Fahrenheit	Pr2	0/1
CO <sub>n</sub>	0 ÷ 120m	Pr2	15
COF	0 ÷ 120m	Pr2	30

Dixell s.r.l. Z.I. Via dell'Industria, 27  
 32010 Pieve d'Alpago (BL) ITALY  
 tel. +39 - 0437 - 98 33 - fax +39 - 0437 - 98 93 13  
 E-mail: dixell@dixell.com - <http://www.dixell.com>