

DIGITAL CONTROLLER

XR03CH

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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.
- 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**

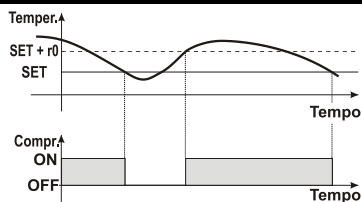
- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical 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.
- Dixell Srl reserves the right to change the composition of its products, even without notice, ensuring the same and unchanged functionality.

**2 GENERAL DESCRIPTION**

The **XR03CH**, in **32x74x50mm short format**, is microprocessor based controller suitable for applications on normal temperature refrigerating units. It provides two relay output: one for compressor and the other one for alarm signalling or as auxiliary output. It provides an NTC probe input and a digital input for alarm signalling, for switching the auxiliary output or for start defrost. The instrument is fully configurable through special parameters that can be easily programmed through the keyboard or the by HOTKEY.

**3 REGULATION**

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.



In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters **Cy** and **Cn**.

**4 AUX OUTPUT**

The function related to the second relay output can be selected by using par. **o1**:

- on = output enabled
- oFF = output disabled

**5 FRONT PANEL COMMANDS**



<b>SET</b>	To display target set point, in programming mode it selects a parameter or confirm an operation
<b>AUX</b>	To activate the auxiliary output
	In programming mode it browses the parameter codes or increases the displayed value
	In programming mode it browses the parameter codes or decreases the displayed value. Keep it pressed more than 3 sec to power ON and OFF the device.

**5.1 KEYS COMBINATION**

	To lock or unlock the keyboard
<b>SET</b> +	To enter in programming mode
<b>SET</b> +	To return to room temperature display

LED	MODO	SIGNIFICATO
	On	Compressor enabled
	Flashing	Anti-short cycle delay enabled (AC parameter)
	On	Heating relay active (if o1=on)
	on	Alarm/error
	On	Measurement unit
	Flashing	Programming mode
	On	Measurement unit
	Flashing	Programming mode

**5.2 HOW TO SEE THE SET POINT**

1. Push and immediately release the **SET** key, the set point will be showed;
2. Push and immediately release the **SET** key or wait about 5s to return to normal visualisation.

**5.3 HOW TO CHANGE THE SETPOINT**

1. Push the SET key for more than 2 sec to change the Set point value;
2. The value of the set point will be displayed and the "°C" or "°F" LED starts blinking;
3. To change the Set value push the or arrows within 10 sec.
4. To memorise the new set point value push the SET key again or wait for 10 sec.

**5.4 HOW TO CHANGE A PARAMETER VALUE**

To change any parameter's value, operate as follows:

1. Enter the Programming mode by pressing the **SET**+ keys for 3 sec ("°C" or "°F" LED starts blinking).
2. Select the required parameter. Press the "SET" key to display its value
3. Use or to change its value.
4. Press "SET" to store the new value and move to the following parameter.

**To exit:** Press **SET**+ or wait for 15 sec without pressing a key.

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

**5.5 HIDDEN MENU**

The hidden menu includes all the parameters of the instrument.

**HOW TO ENTER THE HIDDEN MENU**

1. Enter the Programming mode by pressing the **SET**+ keys for 3 sec ("°C" or "°F" LED starts blinking).
2. Released the keys, then push again the **SET**+ keys for more than 7 sec. The L2 label will be displayed immediately followed from the **Hy** parameter.

**NOW THE HIDDEN MENU IS ACTIVE**

3. Select the required parameter.
4. Press the "SET" key to display its value
5. Use or to change its value.
6. Press "SET" to store the new value and move to the following parameter.

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

**NOTE1:** if none parameter is present in L1, after 3 sec the "nP" message will be displayed. Keep the keys pressed till the L2 message is displayed.

**NOTE2:** the set value is stored even when the procedure is exited by waiting the time-out to expire.

**MOVE A PARAMETER FROM THE HIDDEN MENU TO THE FIRST LEVEL AND VICEVERSA**

Each parameter present in the HIDDEN MENU can be removed or put into "THE FIRST LEVEL" (user level) by pressing **SET**+. In HIDDEN MENU when a parameter is present in First Level the decimal point is on.

**5.6 TO LOCK THE KEYBOARD**

Keep pressed for more than 3 sec both and buttons.

The "OF" message will be displayed and the keyboard will be locked. If a key is pressed more than 3 sec the "OF" message will be displayed.

5.7 TO UNLOCK THE KEYBOARD

Keep pressed together for more than 3 sec both  $\wedge$  and  $\vee$  keys till the "on" message will be displayed.

6 PARAMETERS

REGULATION

Hy	<b>Differential:</b> (0,1 to 25°C; 1 to 45°F) Intervention differential for set point. Compressor Cut IN is SET POINT + differential (Hy). Compressor Cut OUT is when the temperature reaches the set point
LS	<b>Minimum SET POINT:</b> (-55°C to SET; -67°F to SET) Sets the minimum value for the set point
US	<b>Maximum SET POINT:</b> (SET to 99°C; SET to 99°F) Set the maximum value for set point
ot	<b>First probe calibration:</b> (-9.9 to 9.9°C; -17 to 17°F) allows to adjust possible offset of the first probe
od	<b>Outputs activation delay at start up:</b> (0 to 99min) 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
AC	<b>Anti-short cycle delay:</b> (0 to 50 min) minimum interval between the compressor stop and the following restart
Cy	<b>Compressor ON time with faulty probe:</b> (0 to 99 min) time during which the compressor is active in case of faulty thermostat probe. With Cy=0 compressor is always OFF
Cn	<b>Compressor OFF time with faulty probe:</b> (0 to 99 min) time during which the compressor is OFF in case of faulty thermostat probe. With Cn=0 compressor is always active
CH	<b>Kind of Action:</b> cL= cooling action; hL= heating action

DISPLAY

CF	<b>Measurement unit:</b> (°C to °F) °C=Celsius; °F=Fahrenheit. WARNING: When the measurement unit is changed the SET point and the values of the parameters Hy, LS, US, oE, o1, AU, AL have to be checked and modified if necessary)
rE	<b>Resolution:</b> (dE to in) dE= decimal between -9.9 and 9.9°C; in= integer
dy	<b>Display delay:</b> (0 to 15 min) when the temperature increases, the display is updated of 1 °C/1°F after this time

ALARMS

AU	<b>Maximum temperature alarm:</b> (AL to 99°C; AL to 99°F) when this temperature is reached the alarm is enabled, after the "Ad" delay time
AL	<b>Minimum temperature alarm:</b> (-55°C to AU; -67°F to AU) when this temperature is reached the alarm is enabled, after the "Ad" delay time
Ad	<b>Temperature alarm delay:</b> (0 to 99 min) time interval between the detection of an alarm condition and alarm signalling
o1	<b>Auxiliary relay configuration:</b> (on; oFF) on= enabled; oFF= disabled

DIGITAL INPUT (Only XR03CH)

iP	<b>Digital input polarity:</b> (oP; cL) oP= activated by closing the contact; cL= activated by opening the contact
iF	<b>Digital input configuration:</b> (EA; bA; do; dF; Au; Hc) EA=external alarm: "EA" message is displayed; bA=serious alarm "CA" message is displayed; do=door switch function; dF=defrost activation; Au=auxiliary relay activation; Hc=inversion of the kind of action
di	<b>Digital input delay:</b> (0 to 99 min) with iF=EA or bA delay between the detection of the external alarm condition and its signalling. With iF=do it represents the delay to activate the door open alarm
dC	<b>Compressor and fan status when open door:</b> (no; Fn; cP; Fc) no=normal; Fn=Fans OFF; cP=Compressor OFF; Fc=Compressor and fans OFF
rd	<b>Regulation with door open:</b> (n to y) n=no regulation if door is opened; Y=when di is elapsed regulation restarts even if door open alarm is present

OTHER

Pt	Parameter code table
rL	Software release

7 DIGITAL INPUTS

The free voltage digital input is programmable in different configurations by the "iF" parameter.

7.1 DOOR SWITCH (iF=DO)

It signals the door status and the corresponding relay output status through the "dC" parameter: **no** = normal (any change); **Fn** = Fan OFF; **CP** = Compressor OFF; **FC** = Compressor and fan OFF. Since the door is opened, after the delay time set through parameter "di", the door alarm is enabled, the display shows the message "dA" and the regulation restarts if **rd = y**. The alarm stops as soon as the external digital input is disabled again. With the door open, the high and low temperature alarms are disabled.

7.2 EXTERNAL ALARM (iF=EA)

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

7.3 SERIOUS ALARM (iF=BA)

When the digital input is activated, the unit will wait for "di" delay before signalling the "CA" alarm message. The relay outputs are switched OFF. The alarm will stop as soon as the digital input is deactivated.

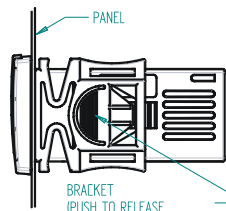
7.4 START DEFROST (iF=DF)

It starts 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 "dd" safety time is expired.

7.5 INVERSION OF THE KIND OF ACTION: HEATING - COOLING (iF=HC)

This function allows to invert the regulation of the controller: from cooling to heating and viceversa.

8 INSTALLATION AND MOUNTING



The XR03CH shall be mounted on vertical panel, in a 29x71 mm hole, and fixed using the special bracket supplied. The temperature range allowed for correct operation is from 0 to 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.

9 ELECTRICAL CONNECTIONS

The instrument is provided with screw terminal block to connect cables with a cross section up to 2.5 mm². 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.

1.1 PROBES

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.

10 HOW TO USE THE HOT KEY

1.2 HOW TO PROGRAM THE HOT KEY FROM THE INSTRUMENT (UPLOAD)

1. Program one controller with the front keypad.
2. When the controller is ON, insert the "Hot key" and push  $\wedge$  button; the "uP" message will appear followed a by flashing "Ed"
3. Push "SET" key and the "Ed" will stop flashing
4. Turn OFF the instrument remove the "Hot Key", then turn it ON again

NOTE: the "Er" message is displayed for failed programming. In this case push again a key if you want to restart the upload again or remove the "Hot key" to abort the operation.

4.1 HOW TO PROGRAM AN INSTRUMENT USING HOT KEY (DOWNLOAD)

1. Turn OFF the instrument.
2. Insert a programmed "Hot Key" into the 5-PIN connector and then turn the Controller ON
3. Automatically the parameter list of the "Hot Key" is downloaded into the Controller memory, the "do" message is blinking followed a by flashing "Ed"
4. After 10 seconds the instrument will restart working with the new parameters
5. Remove the "Hot Key"

NOTE: the "Er" message is displayed for failed programming. In this case push again a key if you want to restart the upload again or remove the "Hot key" to abort the operation.

11 ALARM SIGNALLING

Mess.	Cause	Outputs
"P1"	Room probe failure	Compressor output according to "Cy" e "Cn"
"HA"	Maximum temperature alarm	Outputs unchanged
"LA"	Minimum temperature alarm	Outputs unchanged
"EA"	External alarm	Outputs unchanged
"CA"	Serious external alarm	All outputs OFF
"dA"	Door Open	Compressor and fans restarts

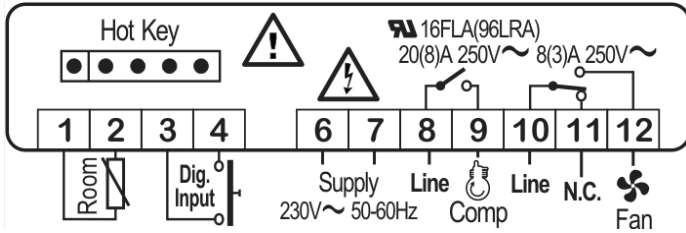
4.2 ALARM RECOVERY

Probe alarms P1" and "P2" 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" and "LA" automatically stop as soon as the temperature returns to normal values. Alarms "EA" and "CA" (with iF=bA) recover as soon as the digital input is disabled.

12 TECHNICAL DATA

**Housing:** self extinguishing ABS  
**Case:** frontal 32x74 mm; depth 50mm  
**Mounting:** panel mounting in a 71x29mm panel cut-out  
**Protection:** IP20; **Frontal protection:** IP65  
**Connections:** Screw terminal block  $\leq$  2.5 mm² wiring  
**Power supply:** according to the model 110Vac  $\pm$ 10%, 50/60Hz --- 230Vac  $\pm$ 10%, 50/60Hz  
**Power absorption:** 3.5 VA max  
**Display:** 2 digits, red LED, 14.2 mm high; **Inputs:** Up to 2 NTC probes  
**Digital input:** free voltage contact (if present)  
**Relay outputs:** compressor SPST 20(8)A 250Vac or 8(3) A 250Vac  
**Aux:** SPDT 8(3) A 250Vac  
**Data storing:** on the non-volatile memory (EEPROM)  
**Kind of action:** 1B; **Pollution degree:** 2; **Software class:** A  
**Rated impulsive voltage:** 2500V; **Overvoltage Category:** II  
**Operating temperature:** 0 to 60 °C; **Storage temperature:** -25 to 60°C  
**Relative humidity:** 20 to 85% (no condensing)  
**Measuring and regulation range:** NTC probe: -40 to 110°C  
**Resolution:** 0,1 °C or 1 °C or 1 °F (selectable); **Accuracy (ambient temp. 25°C):**  $\pm$ 0,1 °C  $\pm$ 1 digit



13 CONNECTIONS



NOTE: In model with 110Vac the power supply has to be connected to 6-7 terminals

14 DEFAULT SETTING VALUES

LABEL	DESCRIPTION	RANGE	DEFAULT
Hy	Differential	0.1 to 25°C 1 to 45°F	2.0°C
LS	Minimum Set Point	-55°C to SET -67°F to SET	-55°C
US	Maximum Set Point	SET to 99°C SET to 99°F	99°C
ot	First probe calibration	-9.9 to 9.9°C -17 to 17°F	0°C
od	Outputs activation delay at start up	0 to 99 min	0
AC	Anti-short cycle delay	0 to 50 min	1
Cy	Compressor ON time faulty probe	0 to 99 min	15
Cn	Compressor OFF time faulty probe	0 to 99 min	30
CF	Measurement units	°C; °F	°C
rE	Resolution	dE; in	dE
dy	Display delay	0 to 15 min	0
id	Interval between defrost cycles	0 ÷ 99 (hour)	6
Md	Maximum lenght for defrost	0 ÷ 99 (min.)	30
dF	Display during defrost	rt(0) - it(1) - SP(2) - dE(3)	it
FC	Fans operating mode	C_n(0) - O_n(1) - C_Y(2) - O_Y(3)	O_Y
AU	Maximum temperature alarm	ALL to 99°C ALL to 99°F	99.0°C
AL	Minimum temperature alarm	-55°C to ALU -67°F to ALU	-55.0°C
Ad	Temperature alarm delay	0 to 99 min	15
o1	Auxiliary relay configuration	on; oFF	fn
iP	Digital input polarity	cL; oP	cL
iF	Digital input configuration	EA; bA; do; dF; Au; Hc	do
di	Digital input delay	0 to 99 min	15
dC	Compressor and fan status when open door	no; Fn; cP; Fc	FC
rd	Regulation with door open	n; Y	Y
Pt	Parameter code table	Read Only	---
rL	Firmware release	Read Only	---

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