

**Digital controller with alarm management**

**XR40CX**

**1. CONTENTS 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.p.A." (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 **XR40CX**, format 32 x 74 mm, is a digital thermostat with off cycle defrost designed for refrigeration applications at normal temperature. It provides two relay outputs, one for the compressor, the other one can be used as light, for alarm signalling or as auxiliary output.. It is also provided with 2 NTC or PTC probe inputs, the first one for temperature control, the second one, optional, to connect to the HOT KEY terminals to signal the condenser temperature alarm or to display a temperature. The digital input can operate as third temperature probe.

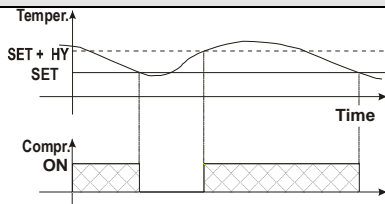
The HOT KEY output allows to connect the unit, by means of the external module XJ485-CX, to a network line **ModBUS-RTU** compatible such as the **dIXEL** monitoring units of X-WEB family. It allows to program the controller by means the HOT KEY programming keyboard.

The instrument is fully configurable through special parameters that can be easily programmed through the keyboard.

**3. CONTROLLING LOADS**

**3.1 COMPRESSOR**

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 "COn" and "COF".

**4. FRONT PANEL COMMANDS**



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

(SBR) Not used

(UP): To see the max. stored temperature; in programming mode it browses the parameter codes or increases the displayed value.

(DOWN) To see the min stored temperature; in programming mode it browses the parameter codes or decreases the displayed value.

Turn on/off the instrument if onF= OFF




**KEY COMBINATIONS:**

+ To lock & unlock the keyboard.

**SET** + To enter in programming mode.



**SET** + To return to the room temperature display. Use of LEDs

Each LED function is described in the following table.



LED	MODE	FUNCTION
	ON	Compressor enabled
	Flashing	Anti-short cycle delay enabled
	ON	An alarm is occurring
°C	ON	Measurement unit
°C	Flashing	Programming phase

**5. MAX & MIN TEMPERATURE MEMORIZATION**

**5.1 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 again or by waiting 5s the normal display will be restored.

**5.2 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 again or by waiting 5s the normal display will be restored.

**5.3 HOW TO RESET THE MAX AND MIN TEMPERATURE RECORDED**



1. Hold press the SET key for more than 3s, while the max. or min temperature is displayed. (rSt message will be displayed)
2. To confirm the operation the "rSt" message starts blinking and the normal temperature will be displayed.

**6. MAIN FUNCTIONS**

**6.1 HOW TO SEE THE SETPOINT**

- SET 
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.

**6.2 HOW TO CHANGE THE SETPOINT**

1. Push the SET key for more than 2 seconds to change the Set point value;
2. The value of the set point will be displayed and the "°C" LED starts 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.

**6.3 HOW TO CHANGE A PARAMETER VALUE**

To change the parameter's value operate as follows:

1. Enter the Programming mode by pressing the Set + DOWN keys for 3s (the "°C" LED starts blinking).
2. Select the required parameter. Press the "SET" key to display its value
3. Use "UP" or "DOWN" to change its value.
4. 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 set value is stored even when the procedure is exited by waiting the time-out to expire.

**6.4 THE HIDDEN MENU**

The hidden menu Includes all the parameters of the instrument.

**6.4.1 HOW TO ENTER THE HIDDEN MENU**

1. Enter the Programming mode by pressing the Set + DOWN keys for 3s (the "°C" LED starts blinking).
2. Released the keys, then push again the Set+DOWN keys for more than 7s. The Pr2 label will be displayed immediately followed from the HY parameter.

**NOW YOU ARE IN THE HIDDEN MENU.**

3. Select the required parameter.
4. Press the "SET" key to display its value
5. Use UP or DOWN to change its value.
6. 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.

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

**6.4.2 HOW TO 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 + n".

In HIDDEN MENU when a parameter is present in First Level the decimal point is on.

**6.5 HOW TO LOCK THE KEYBOARD**


1. Keep pressed for more than 3 s the UP + DOWN keys.
2. The "POF" message will be displayed and the keyboard will be locked. At this point it will be possible only to see the set point or the MAX o Min temperature stored
3. If a key is pressed more than 3s the "POF" message will be displayed.

**6.6 TO UNLOCK THE KEYBOARD**

Keep pressed together for more than 3s the o and n keys, till the "Pon" message will be displayed.

**6.7 ON/OFF FUNCTION**



With "onF = oFF", pushing the  key, the instrument goes in stand-by mode and it displayed "OFF". In this configuration all the output relays and regulation are disabled. To put the instrument in ON mode push the same key .

**ATTENTION: loads wired on the normally closed relays works even if the instrument is in stand-by mode.**

**7. PARAMETERS**

**REGULATION**

**Hy Differential:** (0,1 ÷ 25,5°C) 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 Minimum set point:** (- 50°C÷SET); Sets the minimum value for the set point.  
**US Maximum set point:** (SET÷110°C). Set the maximum value for set point.  
**Ot Thermostat probe calibration:** (-12,0÷12,0°C) allows to adjust possible offset of the thermostat probe.  
**Ods Outputs activation delay at start up:** (0÷255min) 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 Anti-short cycle delay:** (0÷50 min) minimum interval between the compressor stop and the following restart.  
**COOn Compressor ON time with faulty probe:** (0÷255 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÷255 min) time during which the compressor is OFF in case of faulty thermostat probe. With COF=0 compressor is always active.

**DISPLAY**

**CF Temperature measurement unit:** °C=Celsius; °F=Fahrenheit. WARNING: When the measurement unit is changed the SET point and the values of the parameters Hy, LS, US, Ot, ALU and ALL have to be checked and modified if necessary).

**rES Resolution (for °C):** (in = 1°C; dE = 0.1 °C) allows decimal point display.

**TEMPERATURE ALARMS**

**ALU MAXIMUM temperature alarm:** (SET÷110°C; SET÷230°F) when this temperature is reached the alarm is enabled, after the "ALd" delay time.  
**ALd Temperature alarm delay:** (0÷255 min) time interval between the detection of an alarm condition and alarm signalling.  
**dAO Exclusion of temperature alarm at startup:** (from 0.0 min to 23.5h) time interval between the detection of the temperature alarm condition after instrument power on and alarm signalling.

**TEMPERATURE ALARMS PROBE 2**

**AL2 Low temperature alarm of condenser:** (-55÷150°C) when this temperature is reached the LA2 alarm is signalled, possibly after the Ad2 delay : the compressor stop  
**Au2 High temperature alarm of condenser:** (-55÷150°C) when this temperature is reached the HA2 alarm is signalled, possibly after the Ad2 delay.  
**AH2 Differential for temperature condenser alarm recovery:** (0,1÷25,5°C; 1÷45°F)  
**Ad2 Condenser temperature alarm delay:** (0÷255 min) time interval between the detection of the condenser alarm condition and alarm signalling.  
**dA2 Condenser temperature alarm exclusion at start up:** (from 0.0 min to 23.5h, res. 10min)

**DIGITAL INPUT**

**i1P Digital input polarity:** oP: the digital input is activated by opening the contact; CL: the digital input is activated by closing the contact.  
**i1F Digital input configuration:** EAL = external alarm: "EA" message is displayed; bAL = serious alarm "CA" message is displayed. PAL = NOT PRESENT; dor = NOT PRESENT; dEF = NOT PRESENT; AUS =NOT PRESENT; Htr = NOT PRESENT; FAn = NOT PRESENT; ES = NOT PRESENT.  
**did:** (0÷255 min) with i1F= EAL or i1F = bAL digital input alarm delay: delay between the detection of the external alarm condition and its signalling.

**OTHER**

**Adr Serial address (1÷244):** Identifies the instrument address when connected to a ModBUS compatible monitoring system.  
**onF Enable on/off key:** nu = disabled; oFF = enable; ES = NOT PRESENT.  
**dP1 Thermostat probe display**  
**Dp2 Thermostat probe 2 display.**  
**rEL Software release** for internal use.  
**Ptb Parameter table code:** readable only.

**8. DIGITAL INPUT**

The free voltage digital input is programmable in different configurations by the "i1F" parameter.

**8.1 GENERIC ALARM (i1F = EAL)**

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

**8.2 SERIOUS ALARM MODE (i1F = bAL)**

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

**8.3 INVERSION OF THE KIND OF ACTION: HEATING-COOLING (i1F = Htr)**

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

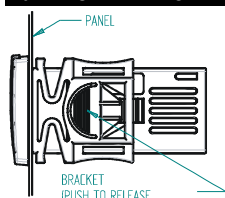
**8.4 DIGITAL INPUTS POLARITY**

The digital input polarity depends on the "i1P" parameter.  
**i1P=CL:** the input is activated by closing the contact  
**i1P=OP:** the input is activated by opening the contact

**9. TTL SERIAL LINE – FOR MONITORING SYSTEMS**

The TTL serial line, available through the HOT KEY connector, allows by means of the external TTL/RS485 converter, XJ485-CX, to connect the instrument to a monitoring system ModBUS-RTU compatible such as the X-WEB500/3000/300.

**10. INSTALLATION AND MOUNTING**



Instrument XR30CX 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 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.

**11. 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.

**11.1 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. 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.

**12. HOW TO USE THE HOT KEY**

**12.1 HOW TO PROGRAM A 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 **o** key; the "uPL" message appears followed a by flashing "End"
3. Push "SET" key and the End will stop flashing.
4. Turn OFF the instrument remove the "Hot Key", then turn it ON again.

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

**12.2 HOW TO PROGRAM AN INSTRUMENT USING A HOT KEY (DOWNLOAD)**

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

**NOTE** the message "Err" is displayed 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.

**13. ALARM SIGNALS**

Message	Cause	Outputs
"P1"	Room probe failure	Compressor output acc. to par. "Con" and "COF"
"P2"	Probe 2 failure	Outputs unchanged
"HA"	Maximum temperature alarm	Outputs unchanged.
"LA"	Minimum temperature alarm	Outputs unchanged.
"HA2"	Condenser high temperature	It depends on the "Ac2" parameter
"LA2"	Low temperature alarm probe 2	Compressor stop
"EA"	External alarm	Output unchanged.
"CA"	Serious external alarm (i1F=bAL)	All outputs OFF.

**13.1 ALARM RECOVERY**

Probe alarms "P1", "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", "LA", "HA2" and "LA2" automatically stop as soon as the temperature returns to normal values.

Alarms "EA" and "CA" (with i1F=bAL) recover as soon as the digital input is disabled.

**13.2 OTHER MESSAGES**

Pon	Keyboard unlocked.
PoF	Keyboard locked
noP	In programming mode: none parameter is present in Pr1 On the display or in dP2, dP3, dP4: the selected probe is nor enabled

**14. TECHNICAL DATA**

**Housing:** self extinguishing ABS.

**Case:** XR40CX frontal 32x74 mm; depth 60mm;

**Mounting:** XR40CX panel mounting in a 71x29mm panel cut-out

**Protection:** IP20; **Frontal protection:** XR30CX IP65

**Connections:** Screw terminal block ≤ 2,5 mm<sup>2</sup> wiring.

**Power supply:** according to the model: 12Vac/dc, ±10%; 24Vac/dc, ±10%; 230Vac ±10%, 50/60Hz, 110Vac ±10%, 50/60Hz

**Power absorption:** 3VA max

**Display:** 3 digits, red LED, 14,2 mm high; **Inputs:** Up to 4 NTC or PTC probes.

**Digital input:** free voltage contact

**Relay outputs: compressor** SPST 8(3) A, 250Vac; or 20(8)A 250Vac

**AUX:** SPDT 8(3) A, 250Vac

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

**Kind of action:** 1B; **Pollution grade:** 2; **Software class:** A.;

**Rated impulsive voltage:** 2500V; **Overvoltage Category:** II

**Operating temperature:** 0÷60 °C; **Storage temperature:** -30÷85 °C.

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

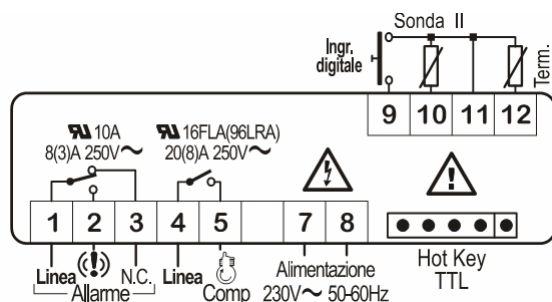
**Measuring and regulation range: NTC probe:** -40÷110°C (-40÷230°F);

**PTC probe:** -50÷150°C (-58÷302°F)

**Resolution:** 0,1 °C or 1°C or 1 °F (selectable); **Accuracy (ambient temp. 25°C):** ±0,7 °C ±1 digit

**15. CONNECTIONS**

**15.1 XR40CX – 20A COMPRESSOR**



**16. DEFAULT SETTING VALUES**

Label	Value	Menù	Parameters description	Limiti / Limits
SEt	3,5		Set point	LS - US
Hy	2,0	Pr2	Compressor regulation hysteresis	[0,1°C ÷ 25,5°C] [1°F ÷ 45°F]
LS	25,0	Pr2	Minimum set point	[-55,0°C ÷ SET] [-67°F ÷ SET]
US	45,0	Pr2	Maximum set point	[SET ÷ 150,0°C] [SET ÷ 302°F]
ot	0,0	Pr2	Probe calibration (probe 1)	[-12,0°C ÷ 12,0°C] [-21°F ÷ 21°F]
oE	0,0	Pr2	Probe calibration (probe 2)	[-12,0°C ÷ 12,0°C] [-21°F ÷ 21°F]
odS	0,0	Pr2	Time delay output relays at power on	0 ÷ 255 (min.)
AC	0,0	Pr2	Time delay for the same output realy	0 ÷ 50 (min.)
Con	30,0	Pr2	Time compressor ON with broken probe	0 ÷ 255 (min.)
CoF	30,0	Pr2	Time compressor OFF with broken probe	0 ÷ 255 (min.)
CF	°C	Pr2	Temperature unit: Celsius, Fahrenheit	°C(0) - °F(1)
rES	dE	Pr2	Resolution (for °C): decimal, not decimal	dE(0) - in(1)
ALd	10,0	Pr2	Time delay temperature alarm	0 ÷ 255 (min.)
dAo	0,1	Pr2	Time delay temperature alarm at power on probe 1	0 ÷ 24H0(144)
AL2	2,0	Pr1	Set low temperature probe 2	[-55,0°C ÷ 150,0°C] [-67°F ÷ 302°F]
AU2	55,0	Pr2	Set high temperature probe 2	[-55,0°C ÷ 150,0°C] [-67°F ÷ 302°F]
AH2	2,0	Pr2	Hysteresis temperature alarm probe 2	[0,1°C ÷ 25,5°C] [1°F ÷ 45°F]
Ad2	10,0	Pr2	Time delay temperature alarm probe 2	0 ÷ 254 (min.) , 255=nU
dA2	0,0	Pr2	Time delay temperature alarm at power on probe 2	0 ÷ 24H0(144)
i1P	cL	Pr1	Digital input polarity	OP(0) - CL(1)
i1F	EAL	Pr1	Digital input function	EAL(0) - bAL(1) - PAL(2) - dor(3) - dEF(4) - AUS(5) - Htr(6) - FAn(7) - ES(8)
did	0,0	Pr1	Time delay digital input	0 ÷ 255 (min.)
Adr	1,0	Pr2	Derial address	0 ÷ 247
OnF	nu	Pr2	Pushbotton OFF configuration	nu(0) - OFF(1) - ES(2)
dP1	-	Pr2	Probe 1 display	(probe value)
dP2	-	Pr1	Probe 2 display	(probe value)
rEL	-	Pr2	Firmare release code	Only reading
Ptb	-	Pr2	EEPROM table identification	sola lettura