



**Installing and Operating Instructions**

**Thermostat with off cycle defrost  
XR20Ce COOLING**

**CONTENTS**

1. GENERAL WARNING	1
2. GENERAL DESCRIPTION	1
3. CONTROLLING LOADS	1
4. FRONT PANEL COMMANDS	1
5. MAIN FUNCTIONS	1
6. LIST OF PARAMETERS	1
7. DIGITAL INPUT	2
8. INSTALLATION AND MOUNTING	2
9. ELECTRICAL CONNECTIONS	2
10. HOW TO USE THE HOT KEY	2
11. ALARM SIGNALS	2
12. TECHNICAL DATA	2
13. CONNECTIONS	2
14. DEFAULT SETTING VALUES	2

**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.

**1.2 SAFETY PRECAUTIONS**

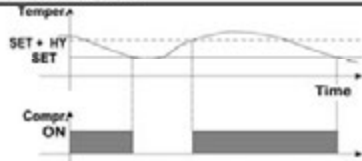
- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical 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 XR20C, format 32 x 74 mm, is thermostat with off cycle defrost designed for refrigeration applications at normal temperature. It provides a relay output to drive the compressor and a NTC probe input. A internal timer manages the off cycle defrost. 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 "CO<sub>n</sub>" and "CO<sub>F</sub>".

**3.2 DEFROST**

Defrost is performed through a simple stop of the compressor. Parameter "IdF" controls the interval between defrost cycles, while its length is controlled by parameters "MdF & dtE". MdF is used for a timed defrost end when P2P= n. When P2P= y, then dtE will end defrost by temperature.

**4. FRONT PANEL COMMANDS**



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

- DEF (DEF)** To start a manual defrost
- ▲ (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.

**KEY COMBINATIONS:**

- ▲ + ▼** To lock & unlock the keyboard.
- SET + ▼** To enter the programming mode.
- SET + ▲** To return to the room temperature display.

**4.1 MEANING OF LEDS**

Each LED function is described in the following table.

LED	MODE	FUNCTION
*	ON	Compressor enabled
*	Flashing	-Programming Phase (flashing with *) -Anti-short cycle delay enabled
*	ON	Defrost enabled
*	Flashing	- Programming Phase (flashing with *) - Drip time in progress

**5. MAIN FUNCTIONS**

**5.1 HOW TO SEE THE SETPOINT**

- Push and immediately release the SET key; the display will show the Set point value;
- Push and immediately release the SET key or wait for 5 seconds to display the probe value again.

**5.2 HOW TO CHANGE THE SETPOINT**

- Push the SET key for more than 2 seconds to change the Set point value;
- The value of the set point will be displayed and the \* LED starts blinking;
- To change the Set value push the ▲ or ▼ arrows.
- To memorise the new set point value push the SET key again or wait 15s.

**5.3 HOW TO START A MANUAL DEFROST**

- Push the DEF key for more than 2 seconds and a manual defrost will start.

**5.4 HOW TO CHANGE A PARAMETER VALUE**

- To change the parameter's value operate as follows:
  - Enter the Programming mode by pressing the Set and ▼ key for 3s (\* and \* start blinking).
  - Select the required parameter.
- Press the "SET" key to display its value. (Now only the \* LED is blinking).
- Use ▲ or ▼ to change its value.

- 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.

**5.5 THE HIDDEN MENU**

The hidden menu includes all the parameters of the instrument.

**5.5.1 HOW TO ENTER THE HIDDEN MENU**

- Enter the Programming mode by pressing the Set + ▼ key for 3s (\* and \* start blinking).
- When a parameter is displayed release and then press the Set + ▼ again for more than 7s. The Pr2 label will be displayed immediately followed from the HY parameter. NOW YOU ARE IN THE HIDDEN MENU.

- Select the required parameter.
- Press the "SET" key to display its value (Now only the \* LED is blinking).
- Use ▲ or ▼ to change its value.
- Press "SET" to store the new value and move to the following parameter.

To exit: Press SET + ▲ 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.

**5.5.2 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 + ▼". In the HIDDEN MENU when a parameter is present in First Level the decimal point is on.

**5.6 HOW TO LOCK THE KEYBOARD**

- Keep pressed for more than 3s the ▲ and ▼ keys.
- 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
- If a key is pressed more than 3s the "POF" message will be displayed.

**5.7 TO UNLOCK THE KEYBOARD**

Keep pressed together for more than 3s the ▲ and ▼ keys till the Pon message will be displayed.

**6. LIST OF PARAMETERS**

NOTE: the parameters preceded by dots are only in the Hidden Menu.

**REGULATION**

- Hy Differential:** (0,1 + 25,5°C / 1+45 °F) Intervention differential for set point. Compressor Cut IN is Set Point Plus Differential (Hy). Compressor Cut OUT is when the temperature reaches the set point.
- LS Minimum set point:** (- 50°C+SET / -58°F+SET); Sets the minimum acceptable value for the set point.
- US Maximum set point:** (SET+ 150°C / SET+302°F). Set the maximum acceptable value for set point.
- Ot Thermostat probe calibration:** (-12,0+12,0°C; - 21+21°F) allows the adjustment of possible offset of the thermostat probe.
- P2P Evaporator probe presence:** n= not present; the defrost stops by time; y= present; the defrost stops by temperature.
- OE Evaporator probe calibration:** (-12,0+12,0°C; - 120+120°F). allows to adjust possible offset of the evaporator 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.
- CO<sub>n</sub> Compressor ON time with faulty probe:** (0+255 min) time during which the compressor is active in case of faulty thermostat probe. With CO<sub>n</sub>=0 compressor is always OFF.

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- **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 and Of have to be checked and modified if necessary.

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

**DEFROST**

**dTE** Defrost termination temperature: (-50+50 °C/ -58+122°F) (Enabled only when P2P=y) sets the temperature measured by the evaporator probe, which causes the end of defrost.

**IdF** Interval between defrost cycles: (1-120h) Determines the time interval between the beginning of two defrost cycles.

**MdF** Length for defrost: (0-255min) It sets the defrost duration.

- **dFd** Temperature displayed during defrost: (rt = real temperature; it = temperature at defrost start; SET = set point; dEF = "dEF" label)

- **dAd** MAX display delay after defrost: (0-255min). Sets the maximum time between the end of defrost and the restarting of the real room temperature display.

**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.

- **did**: (0-255 min) door open signalling delay
- **odc** Compressor status when open door: no=Digital Input not used. CPPr = Compressor OFF

**OTHER**

**rEL** Software release for internal use.  
**Ptb** Parameter table index: readable only. For internal use.

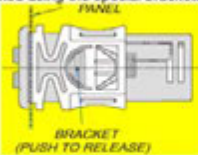
**7. DIGITAL INPUT**

**7.1 DIGITAL INPUTS POLARITY**

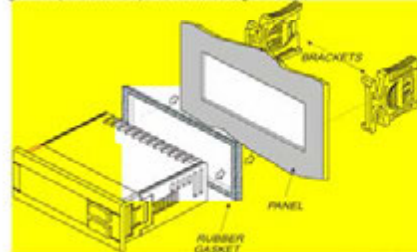
The digital input polarity depends on the "i1P" parameter. **i1P=CL**: the input is activated by closing the contact. **i1P=OP**: the input is activated by opening the contact

**8. INSTALLATION AND MOUNTING**

Instrument XR20C shall be mounted on panel, in a 29x71 mm hole, and fixed using the special brackets supplied.



To obtain an IP65 protection grade use the front panel rubber gasket (mod. RG-C) as shown in figure.



The temperature range allowed for correct operation is 0+60 °C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or moisture. The same recommendations apply to probes. Let air circulate by the cooling holes.

**9. ELECTRICAL CONNECTIONS**

The instruments are provided with screw terminal block to connect cables with a cross section up to 2,5 mm². Heat-resistant cables have to be used. 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.

**9.1 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 probe away from air streams to correctly measure the average room temperature.

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

**10.1 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  $\blacktriangle$  key; the "uPL" message appears followed a The word "End"
3. Push "SET" key and the End will stop being displayed.
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  $\blacktriangle$  key if you want to restart the upload again or remove the "Hot key" to abort the operation.

**10.2 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 "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.

**11. ALARM SIGNALS**

Message	Cause	Output
EE	Data or memory failure	
P1*	Room probe failure	Output according to par "Com" and "COF"
P2*	2nd probe failure	Output unchanged
dA*	Door open	Regulation restarts

**11.1 ALARM "EE"**

The instrument is provided with an internal check verifying memory integrity. Alarm "EE" flashes when a failure in the internal memory is detected. In such case call the service.

**11.2 ALARM RECOVERY**

Probe alarm "P1 & P2" start some seconds after the fault in the related probe; it automatically stops some seconds after the probe restarts normal operation. Check connections before replacing the probe. Alarm dA will recover as soon as the digital input is disabled.

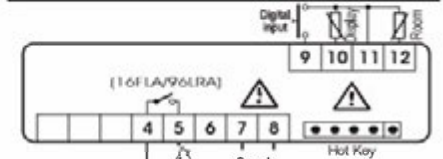
**12. TECHNICAL DATA**

Housing: self extinguishing ABS.  
Case: XR20C frontal 32x74 mm, depth 60mm;  
Mounting  
XR20C panel mounting in a 71x29mm panel cut-out  
Protection: IP20.  
Frontal protection:  
XR20C IP65 with frontal gasket RG-C (optional).  
Connections: Screw terminal block  $\leq 2,5 \text{ mm}^2$  heat-resistant wiring.  
Power supply: according to the model: 12Vac/dc,  $\pm 10\%$ ; 24Vac/dc,  $\pm 10\%$ ; 230Vac  $\pm 10\%$ , 50/60Hz, 110Vac  $\pm 10\%$ , 50/60Hz  
Power absorption: 3VA max  
Display: 3 digits, red LED, 14,2 mm high.  
Inputs: 2 NTC probes, 1 Digital input  
Relay outputs  
Compressor:  
SPST relay 16FLA/96LRA

Data storing: on the non-volatile memory (EEPROM).  
Kind of action: 1B.  
Pollution grade: normal  
Software class: A  
Operating temperature: 0+60 °C.  
Storage temperature: -25+60 °C.  
Relative humidity: 20+85% (no condensing)  
Measuring and regulation range:  
NTC probe: -40+110°C (-58-230°F)  
Resolution: 0.1 °C or 1°C or 1 °F (selectable).  
Accuracy (ambient temp. 25°C):  $\pm 0,7 \text{ °C} \pm 1 \text{ digit}$

**13. CONNECTIONS**

**13.1 XR20C: 16FLA COMPRESSOR**



120Vac supply: connect to the terminals 7 and 8.  
OPTIONAL:  
12Vac/dc supply: connect to the terminals 7 and 8.  
24Vac/dc supply: connect to the terminals 7 and 8.  
230Vac supply: connect to the terminals 7 and 8.

**14. DEFAULT SETTING VALUES**

Label	Name	Range	°C/°F
Set	Set point	LS+US	3/37
Hy	Differential	0,1+25,5°C/ 1+ 45°F	2/4
LS	Minimum set point	-50°C+SET/ -58°F+SET	-40/ - 40
US	Maximum set point	SET+150°C/ SET + 230°F	110/ 230
Of	Thermostat probe calibration	-12+ 12°C / -21+ 21°F	0/0
P2P	2nd probe presence	Y/N	Y
OE	2nd probe calibration	-12+ 12°C / 120+ 120°F	
OdS	Outputs delay at start up	0-255 min	0
AC	Anti-short cycle delay	0 + 50 min	1
GOn	Compressor ON time with faulty probe	0 - 255 min	15
COF	Compressor OFF time with faulty probe	0 + 255 min	30
CF	Temperature measurement unit	°C + °F	°C/°F
rES	Resolution	in + dE	dE/- 46
dTE	Defrost end temp	-50 + 50 °C	
IdF	Interval between defrost cycles	1 + 120 hour	8
MdF	(Maximum) length for defrost	0 + 255 min	20
dFd	Displaying during defrost	rt, it, SET, DEF	it
dAd	MAX display delay after defrost	0 + 255 min	30
i1P	Digital input polarity	oP=opening, CL=closing	oP CL
did	Digital input alarm delay	0-255min	5
odc	Compressor status with open door:	No=No Digital input used. CPPr = Compressor off	no
rEL	Software release	-	-
Ptb	Map code	-	-

Hidden parameters



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