

Digital thermostat with off cycle defrost and configurable relay

XR30C – XR30D

CONTENTS

1. GENERAL WARNING	1
2. GENERAL DESCRIPTION	1
3. CONTROLLING LOADS	1
4. FRONT PANEL COMMANDS	1
5. PARAMETERS	2
6. INSTALLATION AND MOUNTING	2
7. ELECTRICAL CONNECTIONS	2
8. ALARM SIGNALLING	2
9. TECHNICAL DATA	2
10. CONNECTIONS	3
11. DEFAULT SETTING VALUES	3

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

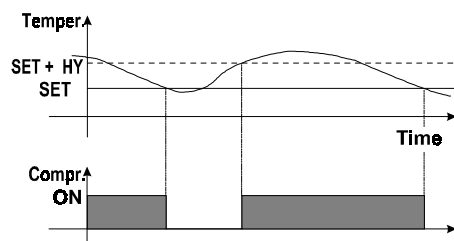
- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical 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 XR30C, format 32 x 74 mm, and XR30D, DIN rail format, are thermostats with off cycle defrost designed for refrigeration applications at normal temperature. They provide two relay outputs, one for the compressor, the other one can be used for alarm signalling or as auxiliary output. The probe input can be selected between PTC or NTC. The instruments have a digital input also, for alarm signalling, for switching the auxiliary output or for start a defrost cycle.

3. CONTROLLING LOADS

3.1 THE COMPRESSOR



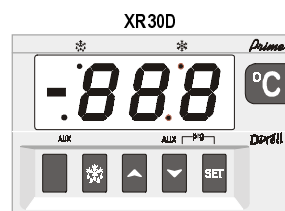
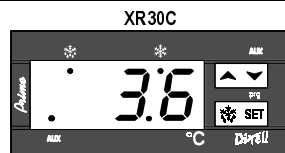
The Hy value is automatically set above the Set Point. If the temperature increases and reaches set point plus differential the compressor is started and then turned off when the temperature reaches the set point value again.

In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters "COn" and "COF".

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 parameter "MdF".

4. FRONT PANEL COMMANDS



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

❄️ (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; hold pressed it switches the auxiliary output; 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
AUX	ON	Second relay ON

4.2 HOW TO SEE THE MIN TEMPERATURE

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

4.3 HOW TO SEE THE MAX TEMPERATURE

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

4.4 HOW TO RESET THE MAX AND MIN TEMPERATURE RECORDED

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

Note: at the first installation reset the max&min recorded temperatures.

4.5 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.

4.6 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.

4.7 HOW TO START A MANUAL DEFROST

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



4.8 HOW TO SWITCH ON OR OFF THE SECOND RELAY (OAC= AUS)

Hold pressed the ▼ key for some seconds, till the AUX LED is turned ON or OFF



4.9 HOW TO CHANGE A PARAMETER VALUE

To change the parameter's value operate as follows:

- Enter the Programming mode by pressing the Set and ▼ keys 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 + ▲ 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.

4.10 THE HIDDEN MENU

The hidden menu includes all the parameters of the instrument.

4.10.1 HOW TO ENTER THE HIDDEN MENU

Enter the Programming mode by pressing the Set + ▼ key for 3s (❄️ and ❄️ start blinking).

1. When a parameter is displayed keep pressed the Set+▼ 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).

4. 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.

4.10.2 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.

4.11 HOW TO LOCK THE KEYBOARD



1. Keep pressed for more than 3 s the ▲ and ▼ 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.

4.12 TO UNLOCK THE KEYBOARD

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

4.13 THE CONTINUOUS CYCLE



When defrost is not in progress, it can be activated by holding the "▲" 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 "▲" for 3 seconds.

5. PARAMETERS

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

REGULATION

Hy Differential: (0.1 ÷ 25.5°C / 1÷255 °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; -120÷120°F) allows the adjustment of 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.

- **CCt Compressor ON time during continuous cycle:** (0.0÷24.0h; res. 10min) Allows to set the length of the continuous cycle: compressor stays on without interruption for the CCt time. Can be used, for instance, when the room is filled with new products.
- **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.

CH Type of action: CL = cooling; Ht = heating.

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 the decimal point displaying.

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.

ALARMS

- **ALC Temperature alarms configuration:** (Ab; rE)
Ab= absolute temperature: alarm temperature is given by the ALL or ALU values. rE = temperature alarms are referred to the set point. Temperature alarm is enabled when the temperature exceeds the "SET+ALU" or "SET-ALL" values.

ALU MAXIMUM temperature alarm (With ALC=Ab: ALL+150°C; ALL+302°F; with ALC=rE 0÷50°C, 0÷90°F) when this temperature is reached the alarm is enabled, after the "ALd" delay time.

ALL Minimum temperature alarm: (With ALC=Ab -50.0°C÷ALU; -58°F÷ALU; with ALC=rE 0÷50°C, 0÷90°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.

SECOND RELAY AND DIGITAL INPUT

- **tba Alarm relay silencing (with oAC=ALr):** (n= silencing disabled: alarm relay stays on till alarm condition lasts, y = silencing enabled: alarm relay is switched OFF by pressing a key during an alarm).

OAC Second relay configuration: ALr: alarm; AUS: auxiliary; dEF: do not select it!

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 and the regulation output is turned off, dEF = activation of a defrost cycle; AUS =with OAC=AUS the second relay is switched ON.

did Digital input alarm delay: (0÷255 min) delay between the detection of the external alarm condition (i1F= EAL or i1F = bAL) and its signalling.

OTHER

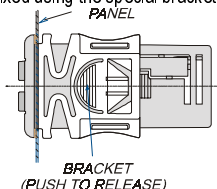
PbC Type of probe: (Ptc=PTC probe; ntc=NTC probe). It allows the selection of the kind of probe.

Ptb Parameter table code: readable only.

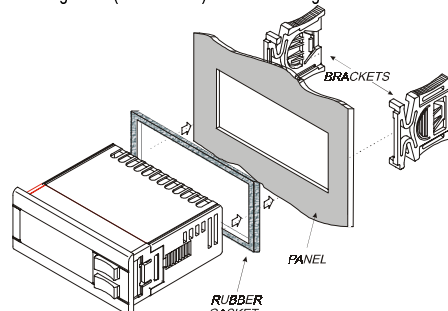
rEL Software release for internal use.

6. INSTALLATION AND MOUNTING

Instrument XR30C shall be mounted on panel, in a 29x71 mm hole, and fixed using the special bracket supplied.



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



Instrument XR30D shall be mounted on an omega DIN rail. 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.

7. 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.

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

8. ALARM SIGNALLING

Message	Cause	Outputs
"EE"	Data or memory failure	
"P1"	Room probe failure	Output according to par. "Con" and "COF"
"HA"	Maximum temp. alarm	Output unchanged.
"LA"	Minimum temp. alarm	Output unchanged.
"EA"	External alarm	Output unchanged.
"CA"	Serious external alarm	Compressor output OFF. If OAC=AL 2 nd relay ON. If OAC=AUS 2 nd relay unchanged.

8.1 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.

8.2 ALARM RECOVERY

Probe alarm "P1" 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.

Temperature alarms "HA" and "LA" automatically stop as soon as the thermostat temperature returns to normal values and when defrost starts.

Alarms "CA" and "EA" recover as soon as the digital input is disabled.

9. TECHNICAL DATA

Housing: self extinguishing ABS.

Case: XR30C frontal 32x74 mm; depth 60mm;

XR30D 4 DIN modules 70x85 mm; depth 61mm

Mounting

XR30C panel mounting in a 71x29mm panel cut-out

XR30D DIN RAIL mounted in a omega (3) din rail

Protection: IP20.

Frontal protection:

XR30C IP65 with frontal gasket RG-C (optional).

Connections: Screw terminal block ≤ 2.5 mm² heat-resistant 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: 1 PTC or NTC probes.

Relay outputs

compressor

SPST relay 8(3) A, 250Vac or

SPST relay 20(8)A, 250Vac

2nd relay: SPDT relay 8(3) A, 250Vac

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:

PTC probe: -50÷150°C (-58÷302°F)

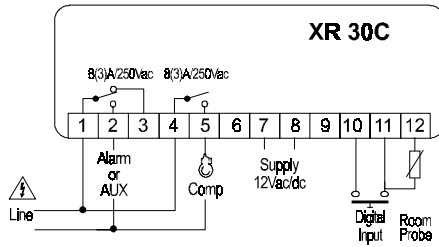
NTC probe: -40÷110°C (-58÷230°F)

Resolution: 0.1 °C or 1°C or 1 °F (selectable).

Accuracy (ambient temp. 25°C): ±0.7 °C ±1 digit

10. CONNECTIONS

10.1.1 XR30C: COMPRESSOR 8A



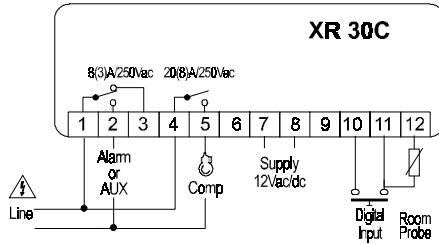
NOTE: digital input is an option

24Vac/dc: supply the instrument to the terminals 7 - 8.

120Vac: supply the instrument to the terminals 7 - 8.

230Vac: supply the instrument to the terminals 7 - 8.

10.1.2 XR30C: COMPRESSOR 20A



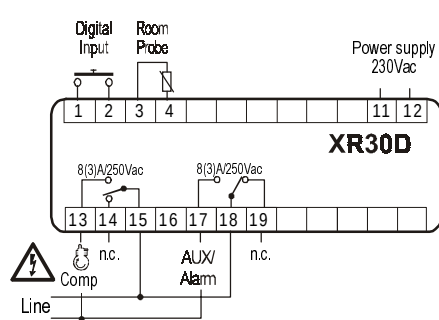
NOTE: digital input is an option

24Vac/dc: supply the instrument to the terminals 7 - 8.

120Vac: supply the instrument to the terminals 7 - 8.

230Vac: supply the instrument to the terminals 7 - 8.

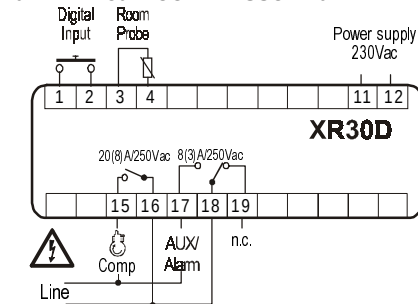
10.1.3 XR30D: COMPRESSOR 8A



24Vac: supply the instrument to the terminals 11 - 12.

120Vac: supply the instrument to the terminals 11 - 12.

10.1.4 XR30D: COMPRESSOR 20A



24Vac: supply the instrument to the terminals 11 - 12.

120Vac: supply the instrument to the terminals 11 - 12.

11. DEFAULT SETTING VALUES

Label	Name	Range	°C/°F
Set	Set point	LS+US	3/37
Hy	Differential	0,1+25,5°C/ 1+255°F	2/4
LS	Minimum set point	-50°C+SET/ -58°F+SET	-50/-58
US	Maximum set point	SET+150°C/ SET+302°F	150/302
Ot	Thermostat probe calibration	-12÷12°C / -120÷120°F	0
OdS	Outputs delay at start up	0+255 min	0
AC	Anti-short cycle delay	0+50 min	1
CcT	Continuous cycle duration	0,0+24,0h	0,0
Con	Compressor ON time with faulty probe	0+255 min	15
COF	Compressor OFF time with faulty probe	0+255 min	30
CH	Type of action (cooling, heating)	CL, Ht	CL
CF	Temperature measurement unit	°C ÷ °F	°C/°F
rES	Resolution	in ÷ dE	dE/-
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
ALc	Temperat. alarms configuration	rE; Ab	Ab
ALU	MAXIMUM temperature alarm	ALL+150,0°C ALL+302°F	150/302
ALL	Minimum temperature alarm	-50,0°C+ALU/ -58°F+ALU	-50/-58
ALd	Temperature alarm delay	0+255 min	15
dAO	Delay of temperat. alarm at start up	0+23h e 50'	1,3
tbA	Alarm relay silencing	n=no; y=yes	y
OAC	2 nd relay configuration	ALr=alarm; dEF=no select it; AUS=auxiliary	AUS
iIP	Digital input polarity	oP=opening; CL=closing	CL
iIF	Digital input configuration	EAL=external ALr bAL=lock regulat dEF=defrost AUS=aux. activat.	AUS
did	Digital input alarm delay	0+255min	5
PbC	Probe selection	Ptc ÷ ntc	Ptc/ntc
rEL	Software release	--	-
Ptb	Map code	--	--

Hidden parameters

