

Multifunction controller XR40C – XR40D

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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.
- 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.

2. GENERAL DESCRIPTION

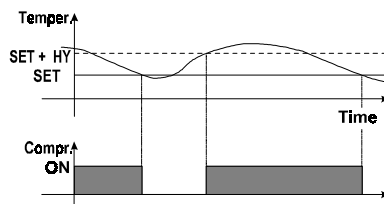
Model **XR40C**, 32x74 mm format and **XR40D**, DIN rail format, are microprocessor based controllers, suitable for applications on medium or low temperature refrigerating units. They are provided with two relay outputs to control compressor and defrost, which can be either electrical or reverse cycle (hot gas). They are also provided with two probe inputs, PTC or NTC selectable, one for temperature control, the other, to be located onto the evaporator, to control the defrost termination temperature. The instruments are fully configurable through special parameters that can be easily programmed through the keyboard.

3. CONTROLLING LOADS

3.1 THE 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.

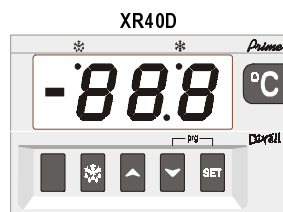
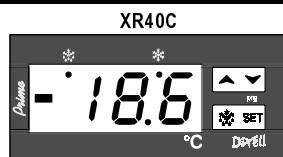
In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters "COn" and "COF".



3.2 DEFROST

Two defrost modes are available through the "tdF" parameter: defrost through electrical heater (tdF = EL) and hot gas defrost (tdF = in). Other parameters are used to control the interval between defrost cycles (ldF), its maximum length (MdF) and two defrost modes: timed or controlled by the evaporator's probe (P2P).

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 USE 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

4.2 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.

4.3 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.

4.4 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.

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

4.5 HOW TO SEE THE SETPOINT

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.

4.6 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 ✱ LED starts blinking;
3. To change the Set value push the **▲** or **▼** arrows within 15s.
4. 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 CHANGE A PARAMETER VALUE

To change the parameter's value operate as follows:



1. Enter the Programming mode by pressing the Set and **▼** key for 3s (✱ and ✱ start blinking).
2. Select the required parameter.
3. Press the **"SET"** key to display its value (now only the ✱ LED is blinking).

4. Use **▲** or **▼** to change its value.

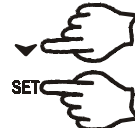
5. Press **"SET"** to store the new value and move to the following parameter.

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.

4.9 THE HIDDEN MENU

The hidden menu includes all the parameters of the instrument.



4.9.1 HOW TO ENTER THE HIDDEN MENU

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

2. 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.**

3. Select the required parameter.

4. Press the **"SET"** key to display its value (Now only the ✱ LED is blinking).

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 15s without pressing a key.

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

4.9.2 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.

4.10 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.

4.11 TO UNLOCK THE KEYBOARD

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

4.12 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 to adjust 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.

- **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.

- **COn Compressor ON time with faulty probe:** (0÷255 min) time during which the compressor is active in case of faulty thermostat probe. With COn=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.

- **Lod Default display (P1; P2):** select the probe to be displayed P1= thermostat probe; P2=evaporator probe.

- **Prd Evaporator probe read out:** it shows the temperature of the evaporator probe.

DEFROST

tdF Defrost type: EL = electrical heater; in = hot gas

dtE Defrost termination temperature: (-50÷50 °C/ -58÷122°F) (Enabled only when EdF=Pb) sets the temperature measured by the evaporator probe, which causes the end of defrost.

ldF Interval between defrost cycles: (0÷120h) Determines the time interval between the beginning of two defrost cycles.

MdF (Maximum) length for defrost: (0÷255min) When P2P = n, (not evaporator probe: timed defrost) it sets the defrost duration, when P2P = y (defrost end based on temperature) it sets the maximum length for defrost.

- **dSd Start defrost delay:**(0÷59min) This is useful when different defrost start times are necessary to avoid overloading the plant.

- **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.

- **Fdt Drip time:** (0÷120 min) time interval between reaching defrost termination temperature and the restoring of the control's normal operation. This time allows the evaporator to eliminate water drops that might have formed due to defrost.

- **dPo First defrost after start-up:** (y = immediately; n = after the ldF time)

- **dAF Defrost delay after continuous cycle:** (0÷23,5h) time interval between the end of the fast freezing cycle and the following defrost related to it.

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.

OTHER

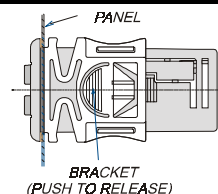
Pbc Type of probe: (Ptc=PTC probe; ntc=NTC probe). It allows to select the kind of probe.

Ptb Parameter table code: readable only.

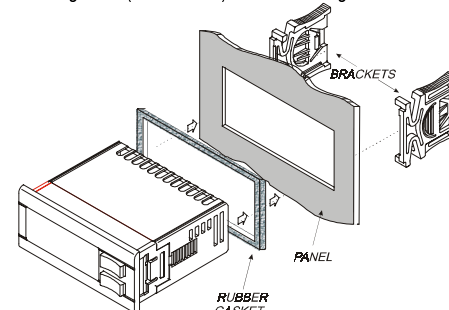
rEL Software release for internal use.

6. INSTALLATION AND MOUNTING

Instrument XR40C 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.



Instrument XR40D 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 blocks 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 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.

8. ALARM SIGNALS

Message	Cause	Outputs
"EE"	Data or memory failure	
"P1"	Room probe failure	Compressor output according to par. "Con" and "COF"
"P2"	Evaporator probe failure	Defrost end is timed
"HA"	Maximum temperature alarm	Outputs unchanged.
"LA"	Minimum temperature alarm	Outputs 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 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 thermostat temperature returns to normal values and when defrost starts.

9. TECHNICAL DATA

Housing: self extinguishing ABS.

Case: XR40C frontal 32x74 mm; depth 60mm;

XR40D 4 DIN modules 70x85 mm; depth 61mm

Mounting

XR40C panel mounting in a 71x29mm panel cut-out

XR40D DIN RAIL mounted in a omega (3) din rail

Protection: IP20.

Frontal protection:

XR40C 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 PTC or NTC probes.

Relay outputs

compressor

SPST relay 8(3) A, 250Vac or

SPST relay 20(8)A; 250Vac

defrost: 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: $0 \div 60^\circ\text{C}$.

Storage temperature: $-25 \div 60^\circ\text{C}$.

Relative humidity: $20 \div 85\%$ (no condensing)

Measuring and regulation range:

PTC probe: $-50 \div 150^\circ\text{C}$ ($-58 \div 302^\circ\text{F}$)

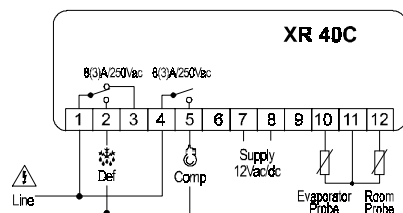
NTC probe: $-40 \div 110^\circ\text{C}$ ($-58 \div 230^\circ\text{F}$)

Resolution: $0,1^\circ\text{C}$ or 1°C or 1°F (selectable).

Accuracy (ambient temp. 25°C): $\pm 0,7^\circ\text{C} \pm 1 \text{ digit}$

10. CONNECTIONS

10.1.1 XR40C: COMPRESSOR 8A

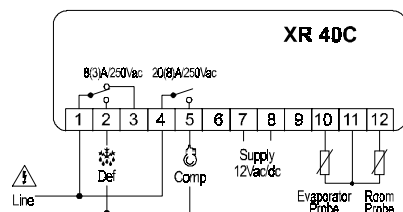


24Vac/dc: supply the instrument to the terminals 7 -8.

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

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

10.1.2 XR40C: COMPRESSOR 20A

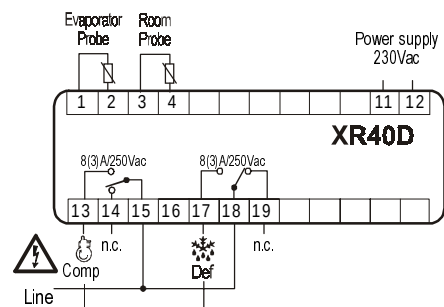


24Vac/dc: supply the instrument to the terminals 7 -8.

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

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

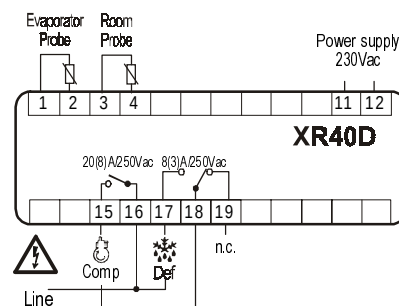
10.1.3 XR40D: COMPRESSOR 8A



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

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

10.1.4 XR40D: 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	$^\circ\text{C}/^\circ\text{F}$
Set	Set point	LS+US	-5/0
Hy	Differential	$0,1 \div 25,5^\circ\text{C}/1 \div 255^\circ\text{F}$	2/4
LS	Minimum set point	$-50^\circ\text{C} + \text{SET} / -58^\circ\text{F} + \text{SET}$	-50/-58
US	Maximum set point	$\text{SET} + 150^\circ\text{C} / \text{SET} + 302^\circ\text{F}$	150/302
Ot	Thermostat probe calibration	$-12 \div 12^\circ\text{C} / -120 \div 120^\circ\text{F}$	0
P2P	Evaporator probe presence	n=not present; y=present	y
OE	Evaporator probe calibration	$-12 \div 12^\circ\text{C} / -120 \div 120^\circ\text{F}$	0
OdS	Outputs delay at start up	$0 \div 255 \text{ min}$	0
AC	Anti-short cycle delay	$0 \div 50 \text{ min}$	1
CCt	Continuous cycle duration	$0,0 \div 24,0 \text{ h}$	0,0
COu	Compressor ON time with faulty probe	$0 \div 255 \text{ min}$	15
COF	Compressor OFF time with faulty probe	$0 \div 255 \text{ min}$	30
CF	Temperature measurement unit	$^\circ\text{C} \div ^\circ\text{F}$	$^\circ\text{C}/^\circ\text{F}$
rES	Resolution	in=integer; dE=dec.point	dE/-
Lod	Probe displayed	P1; P2	P1
Prd	Second probe read out	--	--
tdF	Defrost type	EL=electric heater in=hot gas	EL
dtE	Defrost termination temperature	$-50 \div 50^\circ\text{C}$	8/46
IdF	Interval between defrost cycles	$1 \div 120 \text{ ore}$	6
MdF	(Maximum) length for defrost	$0 \div 255 \text{ min}$	30
dSd	Start defrost delay	$0 \div 59 \text{ min}$	0
dFd	Displaying during defrost	rt, it, SET, DEF	it
dAd	MAX display delay after defrost	$0 \div 255 \text{ min}$	30
Fdt	Draining time	$0 \div 120 \text{ min}$	0
dPo	First defrost after startup	n= after IdF; y = immediately	n
dAF	Defrost delay after fast freezing	$0 \div 23 \text{ h e } 50'$	0,0
ALc	Temperat. alarms configuration	rE= related to set; Ab = absolute	Ab
ALU	MAXIMUM temperature alarm	$\text{Set} + 150,0^\circ\text{C} / \text{Set} + 302^\circ\text{F}$	150/302
ALL	Minimum temperature alarm	$-50,0^\circ\text{C} + \text{Set} / -58^\circ\text{F} + \text{Set}$	-50/-58
ALd	Temperature alarm delay	$0 \div 255 \text{ min}$	15
dAO	Delay of temperature alarm at start up	$0 \div 23 \text{ h e } 50'$	1,30
PbC	Probe selection	Ptc + ntc	Ptc/ntc
rEL	Software release	--	-
Ptb	Map code	--	-

Hidden parameters

