

ERC 2 – Electronic Refrigeration Control



The **ERC 2 Electronic Refrigeration Control** is a microprocessor-based electronic controller designed to control both the temperature and the defrost functions of a commercial refrigeration unit. It can be powered by 120, 208 or 240 VAC (50 or 60Hz). The control comes with four relay outputs: compressor, defrost, evaporator fan and alarm.

The ERC 2 includes a digital display module that provides readout of the temperature, time and built-in diagnostics. The display module can be mounted locally or remotely from the unit and it contains a touch keypad for simple programming. For defrost control, it uses a real time clock.

This control is NSF certified and it can be applied to many different commercial refrigeration applications like reach-ins, walk-ins, refrigerated cases or other different products where accurate control of refrigerated space and defrost cycles are required.

Features / Benefits

Multi-function Unit Integrates defrost timer, temperature control, defrost tent switch, fan delay switch and digital thermometer	
Display Module for Temperature	Easy to read display that can be mounted with the unit or
Readout	remotely. Temperature can be displayed in °F or °C
Two Temperature Sensors	For zone temperature and evaporator temperature
Choice of Defrost Methods	Off cycle, hot gas or electric heater with up to 8 defrosts per day
	and duration up to 4 hours
Four Relay Outputs	Compressor, defrost, evaporator fan and alarm
Adjustable Short Cycle Protection	Extra protection for the equipment
Non-volatile memory	The programmed parameters will remain in the memory
Capacitor Carry Over for the Clock	It maintains the correct time-of-day for up to 100 hours
Microprocessor-Based Electronics	High reliability and repeatability

FCC Compliance*

This device complies with CFR 47, Part 15, Class A FCC Requirements. Operation is subject to the following two conditions (1) This device may not cause harmful interference and (2) This device must accept any interference received, including interference that may cause undesired operation.

Canadian Compliance*

This digital apparatus meets all of the Industry Canada, ICES-003, Class A requirements (Canadian Interference-Causing Equipment Regulations).

* **Note:** these compliance apply to NEMA 1 enclosed models only. All modular units are the responsibility of the purchaser to obtain the compliance.

Operation and Functions

The ERC 2 features a simple way to program and operate. Four buttons on the display module allow the user to scroll through the functions and set the desired parameters. A manual defrost button is used to initiate the defrost cycle at any time.

There are two different levels of security to access the programming features. The first one will allow the change on the time-of-day and the setpoint temperature (cut-out). The other level will allow access to the other parameters.

The programmable parameters are:

Clock

Clock: allows time-of-day programming and choice of display format (12 / 24 hours)

General

- Display: the display can show time-of-day, zone temperature, evaporator temperature and it can also cycle between zone temperature and time-of-day
- Temperature format: the control can use temperatures in °F or °C
- Fan enable during defrost: to control the fan operation during defrost (on or off)
- Minimum compressor off time: for short cycle protection, between 0 and 15 min
- Minimum compressor on time: between 0 and 15 min
- Alarm delay: a time delay can be configured for the alarm to operate (between 0 and 59 min)

Defrost

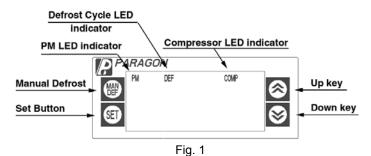
- Defrost type: it can programmed for hot gas or electric heater defrost. An off cycle defrost type can be configured by selecting the electric defrost option and not connecting any device to the defrost relay
- Number of defrosts per day: between 1 and 8. There is also an option for 1 defrost every 48 hours
- Defrost cycle: a choice among defrost start time (real time clock), accumulated compressor run time or temperature initiation defrost
- Fan delay: amount of time that the fan will remain off after defrost is terminated (0 to 15 min)
- Pump down: amount of time the compressor remains on after defrost initiates (0 to 59 min)
- Drip time: amount of time the compressor remains off after defrost is terminated (0 to 59 min)
- Defrost duration time: amount of time for the defrost duration. It also functions as a back-up for temperature termination.
- Defrost termination temperature: temperature that will cause the defrost to terminate (if reached before defrost duration time)
- Fan start temperature: temperature that will cause the fan to re-start after defrost

Setpoint

- Setpoint temperature (cut-out): a setpoint temperature can be programmed to control the compressor operation. The range is -40 to 60 °F
- Cut-in differential: differential between the cut-out (setpoint) and the cut-in temperature. The range is 1 to 25 °F
- High and low temperature alarm setpoint: high and low alarms for the temperature can be set. The ranges are -40 to 60 °F for each of the alarms (high and low)

Graphic Description / Dimensions

Display Layout



Relay Board Layout

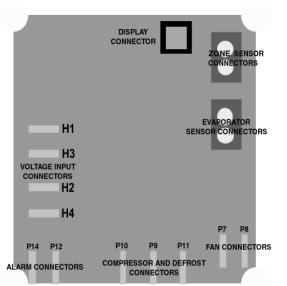
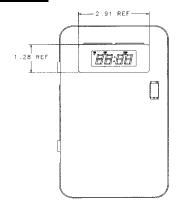
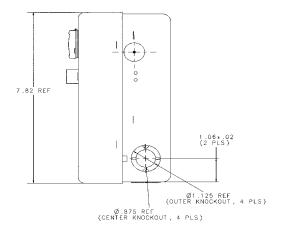


Fig. 2

Overall Dimensions - Models ERC2 - 111xxx and 211xxx (Metal Case / Integrated Display Module)





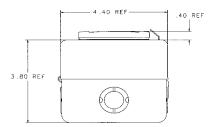


Fig. 3

Models ERC 2 – 121xxx and 221xxx (Metal Case / Remote Display Module)

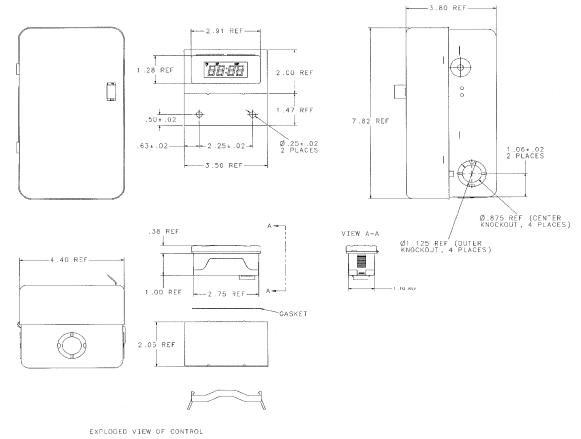
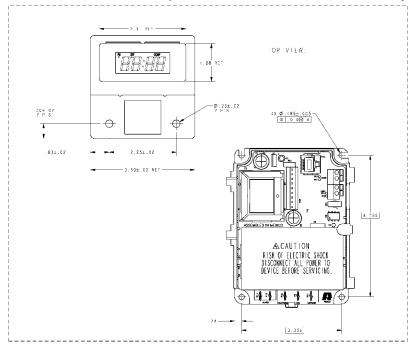


Fig. 4

Model ERC2 – 131xxx, 151xxx, and 351xxx (Control Mechanism / Remote Display Module)



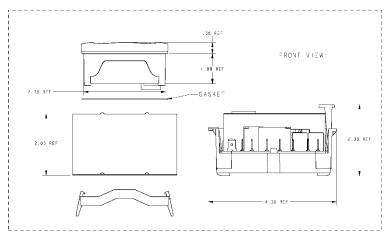


Fig. 5

Installation Instructions

IMPORTANT

- All ERC series controls are designed as operating controls only. If an operating control failure could result in personal injury or loss of property, a separate safety control and/or alarm should be installed
- The schematic drawings and other information included in this specification sheet are for the purpose of illustration and general reference only
- These instructions do not expand, reduce, modify or alter the Ranco Terms in any way; and no warranty
 or remedy in favor of the customer or any person arises out of these instructions
- The ERC 2 control has been certified by Underwriters Laboratories Inc. The certification does not extend
 to their use for any other purpose. Ranco assumes no responsibility for any unconventional application
 of its control unless such application has been approved in writing by Ranco.
- It is the responsibility of the installer and the user to assure that his or its application and use of Ranco products are in compliance with all federal, state and local requirements, including, without limitation, all requirements imposed under the National Electric Code and any applicable building codes.

CAUTION

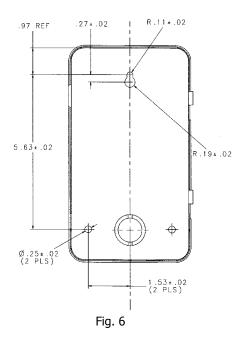
To prevent possible electric shock or equipment damage, disconnect electrical power to the unit before and during installation. DO NOT restore electrical power to the unit until the control is properly installed and the case or panel door is closed. DO NOT locate the control in an explosive atmosphere as a safety hazard can result due to possible spark generation in the control. Use of control in such environments may result in injury or damage of the persons or property (or both) and are likely to shorten control life.

Ranco assumes no responsibility for any such use.

Mount the ERC 2 to a wall or any flat surface using the three holes in the metal case (models ERC 2 - x11xxx and x21xxx) or the 4 holes in the plastic support for the ERC 2 - 131xxx, 151xxx, and 351xxx models. The control's components are not position sensitive, but should be mounted so they can be easily wired and adjusted. The models that do not come in a metal case must be mounted inside an enclosure (Nema 1 type or better).

Avoid excessive conditions of moisture, dirt, dust and any corrosive atmosphere.

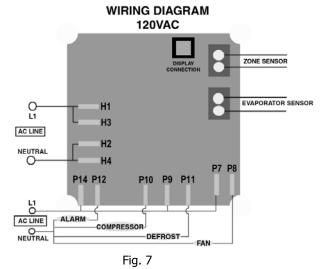
Mounting Dimensions – Metal Case



Control Wiring

- All wiring should conform to the National Electric Code and local regulations.
- Use copper conductors only.
- Electrical leads should not be taut; allow slack for temperature change and vibration.

The wiring diagrams for the ERC 2 are shown below:



208/240VAC

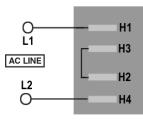


Fig. 8

For **208-240 VAC**, change the jumpers on the connectors located on the left side (from jumpers H1 to H3 and H2 to H4 for 120 VAC to a jumper from H3 to H2 for 208-240 VAC), just like this diagram shows.

Neutral becomes L2 in 208-240 VAC

Wiring Installation Procedure

- 1. Accessing the terminals
- Open the metal case to access the control connectors. The cable can be disconnected from the display module while the control is being wired. Reconnect the cable before using the unit.

2. Connecting the sensors

- Connect the evaporator sensor to the lower terminal block in the upper right corner.
- Connect the zone sensor to the upper terminal block in the upper right corner.

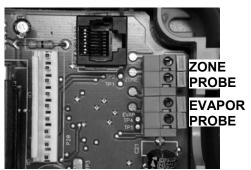


Fig. 9 - Sensor Connectors

3. Connecting the refrigeration / defrost equipment

- Connect the wires from the compressor (including the thermostat) to the correspondent terminal on the bottom side of the control (Fig. 10 for quick connect version or Fig. 11 for terminal block version).
- Connect the defrost device (heater or hot gas solenoid) to the terminal in the control (Figs. 10 and 11).
- Connect the wire from L1 120 VAC or 208-240 VAC line to the terminal marked as "COM".
- Connect also the fan wires to the terminals marked as "FAN".
- Use the alarm connections to connect an alarm to the control, as shown in Figs. 10 and 11.

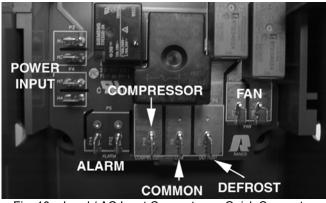


Fig. 10 – Load / AC Input Connectors – Quick Connects



Fig. 11 - Load / AC Input Connectors- Terminal Blocks

4. Supplying Power to the Unit

The power input must be connected to the terminals on the left side of the control (Figs. 10 and 11). Connect the 120 VAC L1 wire (or 208-240 VAC L1 wire) to the uppermost terminal and the 120 VAC neutral (or 208-240 VAC L2 wire) to the lowermost terminal.

The terminals in the middle are used to change the voltage of the unit. Refer to the <u>wiring diagram</u> (Figs. 7 and 8) to see how to connect the jumpers for 120 VAC or 208-240 VAC

For the models supplied with a metal case, connect the ground wire to the grounding lug on the bottom of the case.

5. Reconnecting the Display Module

Reconnect the display module cable to the control.



Fig. 12 - Display Module Cable

Programming

The ERC 2 control initially powers up displaying 12:00 AM otherwise it will show the last configured selection (time or temperature). If a power outage occurs during normal operation, the control will maintain the correct time-of-day using a capacitor (batteries are not required). The time will be maintained for up to 100 hours when the capacitor is fully charged.

To initiate a **Manual Defrost**, press and hold the MAN DEF key for 3 seconds.

There are two levels of programming in the ERC 2. The first level of security will enable the user to set two parameters: Time-of-day (CLoC) and Setpoint temperature (SEt). The other level allows access to the other parameters.

Three buttons are used for the programming: SET, UP and DOWN

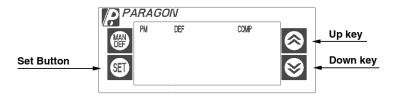


Fig. 13 - Display Lay-out

To change <u>time-of-day</u> and <u>setpoint</u> temperature (First Level) follow these steps:

Step 1	SEI	Press and hold set for 5 seconds. The display will show CLoC
Step 2	(E)	Press SET again to change the time-of-day
Step 3	⊗ or ⊗	Press UP or DOWN until the correct time-of-day is displayed
Step 4	(E)	Press SET to accept the new time
Step 5	8	Press DOWN to go to the next parameter – Setpoint Temperature - SEt (cut out)
Step 6	SED	Press SET to change the setpoint temperature
Step 7		Press UP or DOWN to go to the desired setpoint. The range is – 40 to 60°F or –40 to 16°C
Step 8	SED	Press SET to accept the change
Step 9	⊗	Press DOWN to exit the first level of programming

<u>Note 1:</u> During programming, if no button is pushed during 30 seconds, the control will go back to the normal operating mode. This is valid for both programming levels.

Note 2: When changing the time, press and hold the MAN DEF button for 3 seconds to change the AM/PM mode.

To change the other parameters (Second Level) follow these steps:

Step 1	sand 😂	Press and hold SET and DOWN for 10 seconds. The display will show dSPL
Step 2	S	Press SET to change the parameter
Step 3	or or	Press UP or DOWN to change the options, time or temperature for the current parameter
Step 4	(E)	Press SET to accept the new value
Step 5	8	Press DOWN to go to the next parameter, then go back to Step 2. After the last parameter is displayed (ALHi), the display will go back to the normal operating condition

Note: to scroll down the parameters without changing them, press the DOWN button.

List of Parameters

Here is a list of the parameters that can be changed in the Second Level of programming, as well as their options and ranges.

Parameter	Display Symbol	Description	Range / Options	
Display Status	dSPL	Information shown on the display during operation conditions	tdAy – time-of-day rSP° – zone temperature (refrigerated space) CyCL – cycle between time and zone temperature Epr° – evaporator coil temperature	
Clock Format	CLHr	Format of the time (12 or 24 hours mode)	12Hr – AM/PM format 24Hr – 24 hour format	
Temperature Format	°dSP	Temperature degrees	°F – degrees Fahrenheit °C – degrees Celsius	
Defrost Type	dFtP	Type of defrost used in the application	ELEC – electric heater defrost / off cycle HgAS – hot gas	
Fan Status During Defrost	EFAN	Enable or not the fan during defrost	no – fan is turned off during defrost yES – fan remains on during defrost	
Fan Status During Normal Mode	CFAN	Enable or not the fan during normal compressor on/off mode	on – fan is always on during normal mode CyCP – fan cycles with compressor	
Defrost Interval	dFin	Type of defrost interval	TdAy – time-of-day setpoint CPrn – compressor run time tdEF – temperature initiated defrost	
Minimum Compressor Off Time	CoFF	Minimum time that the compressor will remain turned off	Range: from 0 to 15 min	
Minimum Compressor On Time	Con	Minimum time that the compressor will remain turned on	Range: from 0 to 15 min	
Alarm Delay	ALrd	Time delay before the alarm goes off after the temperature fall off the two alarm setpoints	Range: from 0 to 59 min	
Compressor Run Time	CPrn	Time the compressor will run between defrosts		
Number of Defrosts	nodF	Number of defrosts per day	from 0 to 8 (0 means 1 defrost every 48 hours)	

Defrost Start	dEF1-8	Start time of each defrost	
Time			
Defrost	dEFd	Defrost duration time (back-up for	Range: from 0 min to 4 hours
Duration		defrost termination temperature)	
Fan Delay	FAnd	Delay time for the fan after defrost	Range: from 0 to 15 min
		(back-up for fan cut-in temperature)	
Pump Down	Pudn	Pump down duration	Range: from 0 to 59 min
Drip Time	driP	Drip time duration	Range: from 0 to 59 min
Setpoint	diF°	Cut-in temperature differential	Range: from 1 to 25°
Differential		Note: cut-in is cut-out plus	
		differential	
Temperature	tdEF	Temperature that will initiate a defrost	Range: from – 40 to 40°F or – 40 to 4°C
Initiated Defrost		cycle	
Defrost	dEF°	Temperature in the evaporator that will	Range: from 0 to 75°F or –18 to 24°C
Termination		terminate the defrost cycle	
Temperature			
Fan Cut-In	FAn°	Temperature in the evaporator that will	Range: from – 40 to 60°F or – 40 to 16°C
Temperature		turn the fan on after defrost	
Low	ALLo	Low temperature setpoint that will	Range: from – 40 to 83°F or – 40 to 28°C
Temperature		make the alarm go off and the error	
Alarm		message appear on the display	
High	ALHi	High temperature setpoint that will	Range: from – 40 to 83°F or –40 to 28°C
Temperature		make the alarm go off and the error	
Alarm		message appear on the display	

Important Note: To change from degrees **C** to **F** or vice-versa, the user must reprogram all the parameters that are related to the temperature. The unit does not convert the parameters automatically from degrees **F** to **C** or vice-versa.

Example 1 - To adjust the time-of-day

- Press and hold SET for 5 seconds
- Press SET again
- Press UP or DOWN until the correct time appears on the display
- Press SET to accept the new time
- Press DOWN twice to exit the programming mode

Example 2 - To set one defrost a day, at 11:59 PM

- Press and hold SET and DOWN for 10 seconds
- Press DOWN six times to go to the Defrost Interval (dFIn)
- Press SET to change the parameter
- Press DOWN until tdAy appears on the display
- Press SET to accept the option
- Press DOWN eight times to go to the Number of Defrosts (noDF)
- Press SET to change it
- Press UP or DOWN until 1 appears on the display
- Press SET to accept the change
- Press DOWN to go to Defrost Start Time (dEF1)
- Press SET to change the time
- Press UP or DOWN until the 11:59 PM appears on the display
- Press SET
- Press DOWN ten times to exit the programming level

Error Codes

Display	Control Status
Er 1	ERC Fault – software or hardware failure
Er 2	ERC Communication Fault – indicates that there is a problem with the display module cable
Er 3	Zone Sensor Fault – indicates an open or shorted temperature sensor
Er 4	Evaporator Sensor Fault – indicates an open or shorted evaporator sensor
Er 5	ERC Fault – software or hardware failure
Er 6	Low Temperature Alarm – indicates that the temperature has dropped below the low alarm setpoint
Er 7	High Temperature Alarm – indicates that the temperature has gone above the high alarm setpoint
Er 8	Relay and display modules are incompatible.

For Error Codes 1, 2, 5 and 8 cut the power to the unit and correct the problem to reset the display. For Codes 3 and 4, press the UP or DOWN button on the display to reset the error message. If the display still shows the message, the sensor must be replaced.

The Error Codes 6 and 7 will be automatically reset once the temperature is back within the two setpoints.

Technical Specifications

Input Power: 120 / 208-240 VAC 50/60 Hz (+10,-15%)

Power Consumption: 5VA @ 120/240VAC

Zone and Evaporator Coil Temperature Sensors: NTC thermistor. Range – 40 to 199°F

Ambient Operating Conditions: – 40 to 122°F; 0 to 95% RH (non-condensing)

Display Module Dimensions: 2.75"W x 1.10"H x 1.38"D

Case Dimensions: 4.40"W x 7.82"H x 3.80"D

Shipping Weight: 3.0 lbs.

Agency Approvals: c-UR-us Recognized Component – Models ERC2-1xxxxx & ERC2-3xxxxx

c-UL-us Listed Product – Models ERC2-2xxxxxx

NSF International Certified

Output Relay Ratings:

Compressor: SPST NO

	120 VAC	208 VAC	240 VAC
Horsepower Rating (hp)	1	1.5	2
FLA / LRA	16 / 96	12 / 72	12 / 72
Pilot Duty	470	470	470

Defrost: SPST NC

	120 VAC	208 VAC	240 VAC
Resistive Amps	16	16	16
Horsepower Rating (hp)	1/2	3/4	1
Pilot Duty (VA)	470	470	470

Evaporator fan: SPST NC

	120 VAC	208 VAC	240 VAC
Resistive Amps	16	16	16
Horsepower Rating (hp)	1/2	3/4	1
FLA / LRA	10 / 59	8 / 48	8 / 48
Pilot Duty (VA)	470	470	470

Alarm: SPST NO

	120 VAC	208 VAC	240 VAC
Resistive Amps	5	5	5
Pilot Duty (VA)	240	240	240



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