

Refrigeration Controller (RC²) Installation Instructions

Regulatory Compliance

Safety

This device has been tested and found to be in compliance with the requirements set forth in UL 873, Energy Management Equipment, and is listed by Underwriters Laboratories, Inc., for installations in the United States.

This device has been tested and found to be in compliance with the requirements set forth in C22.2, No. 205-M1983, Signal Equipment, and is Certified by Underwriters Laboratories, Inc., for installations in Canada.

Electromagnetic Compatibility (EMC)

Federal Communications Commission (FCC)

This device complies with Part 15 of the FCC Rules. 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.

NOTE! This device has been tested and found to comply with the limits established for Class A digital devices. It is intended to be used in a commercial environment. Operation of this equipment in residential environments may cause harmful interference, in which case the user may be required to correct the interference at his own expense.

CAUTION! Any changes or modifications not expressly approved by Novar Controls Corporation could void your authority to operate this equipment.

Industry Canada

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the interference-causing equipment standard entitled *Digital Apparatus*, ICES-003, of Industry Canada.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouiller: *Appareils Numériques*, NMB-003, édictée par l'Industrie Canada.

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Description

The Refrigeration Controller (RC²) controls, monitors, and logs the operations of Novar Controls' Spectrum[®] Advanced Refrigeration Control modules. It processes input/output activity, manages network communications, and provides important operating information.

This document provides instructions for mounting and wiring the RC² baseplate and installing the RC² electronics assembly. Unless otherwise specified, the term "RC²" refers to the combined baseplate and electronics assembly.

Specifications

Agency Approvals

Recognized component: U.S. and Canada CUL/UL E134292
Standards used: UL 873 & CSA C22.2, No. 24, Temperature-Indicating and Temperature-Regulating Equipment

Power Requirements

Voltage: 24 VAC, 50/60 Hertz, Class 2
Consumption: 40 VA maximum

Internal Power Supply

CIM/2 Power Source: 30 VDC nominal, 480 mA maximum

Input/Output Ratings

Digital Input (1): 5 VDC open, 20 mA closed, Class 2, Contact closure only
Contact Closure
(Output X & Y): 24 VAC or VDC, 2 amp, Class 2 (externally derived)

Operating Environment

RC² Electronics Assembly with Touchscreen:

Operating temperature: 41° to 122°F (5° to 50°C)
0–80% RH, noncondensing
Storage: –4 to 158 F (–20 to 60 C)
0–90% RH, noncondensing

RC² Electronics Assembly without Touchscreen and RC² Baseplate:

Operating temperature: 32° to 140°F (0° to 60°C)
0–80% RH, noncondensing
Storage: –40 to 158 F (–40 to 70 C)
0–90% RH, noncondensing

Physical Dimensions (RC² Electronics Assembly and RC² Baseplate)

Width: 13.3 inches
Height: 15.75 inches
Depth: 2.5 inches
Shipping weight: 11.0 lb (All aluminum enclosure)

Precautions

Take the following precautions during installation:

- Observe national and local electrical codes.
- Connect 24-VAC power wiring to the terminals marked as 24 VAC only.
- To reduce the risk of electrical shock or fire, do not interconnect the output of different Class 2 circuits.

Pour reduire le risque de choc electrique ou d'incendie, ne pas relier les sorties de circuits Classe 2 distincts.

- This device is not intended to be used as a final safety device.

Ce dispositif ne constitue pas un dispositif de securite final.

- Make sure that the 24-VAC power wiring is connected to a dedicated Class 2, 40 VA transformer. No other devices should be powered by the transformer connected to the RC².
 - Do *not* ground Terminals 23 or 24.
 - Make sure that the RC² has continuous power for proper operation.
-

Mounting the RC²

The following items are needed to mount the RC²:

- The appropriate baseplate (RC or RC²)
- The RC² electronics assembly
- The hex wrench (included with the baseplate)
- Four screws (appropriate for mounting surface; not provided)

NOTE! The baseplate should be mounted in an accessible location so that the touchscreen on the electronics assembly can be viewed easily (once the electronics assembly has been installed) by those who will be using it. The mounting surface should be flat and smooth to prevent the baseplate from being bent. When the baseplate is mounted to paneling or drywall, hollow-wall anchors should be used to insure that the assembly remains secure.

Mounting the RC² Baseplate

Use the following procedure and refer to Figure 1, as necessary, to mount the RC² baseplate.

Step	Procedure
1	Turn off all power before installation.
2	Remove the baseplate's cover. <ul style="list-style-type: none"> ■ Use the hex wrench included with the baseplate to loosen the two screws at the bottom of the baseplate. ■ Lift off the cover.
3	Position the baseplate against the mounting surface.
4	Mark the mounting surface to show the locations of the four slotted mounting holes in the corners of the baseplate.
5	Drill holes in the places marked on the mounting surface.
6	Install the enclosure with appropriate fasteners.
7	Turn appropriate screws until approximately one-quarter inch remains between the mounting surface and the head of the screws.
8	Position the baseplate over the screws and slide it down until the screws slide into the slots.
9	Tighten the screws to secure the baseplate.

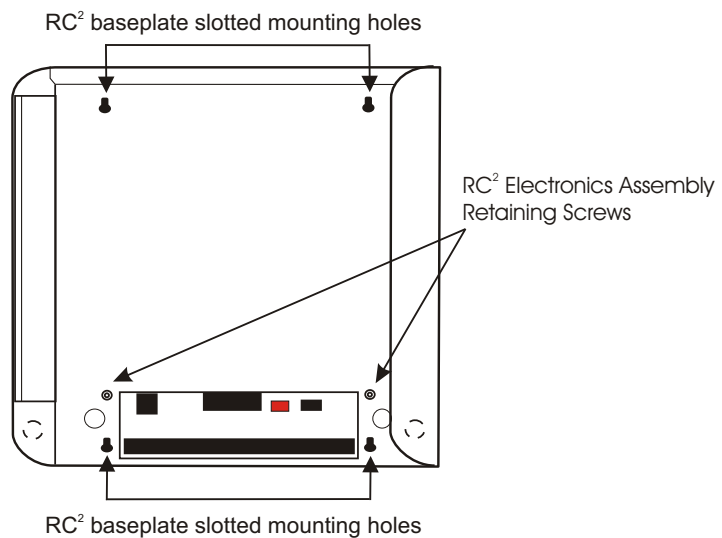


Figure 1. RC² baseplate mounting holes

Refrigeration Controller (RC²) Installation Instructions

Wiring the RC² Baseplate

NOTE! The following wiring instructions apply to applications where an RC² electronics assembly will be mounted on an RC² baseplate. If the RC² electronics assembly will be mounted on an RC baseplate, refer to the “Verifying Wiring Connections on Retrofit Applications Using an RC Baseplate” section of this document.

Refer to Figure 2, as necessary, when wiring the RC² baseplate.

Power Connections

Use the following procedure to connect power to the RC² baseplate.

Step	Procedure
1	Install a 24-VAC, Class 2, 40 VA transformer in close proximity to the RC ² baseplate.
2	Connect the secondary side of the transformer to Terminals 23 and 24 on the RC ² baseplate. <ul style="list-style-type: none"> Do not ground Terminals 23 or 24.
3	Connect the enclosure securely to earth ground.

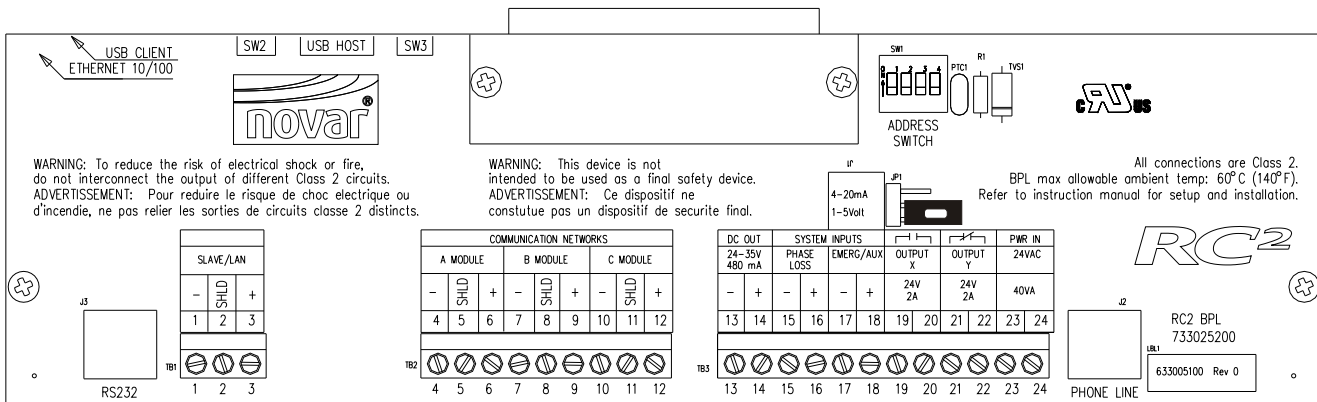


Figure 2. RC² baseplate

Module Communication Port Connections

The RC² has three module communication ports identified on the RC² baseplate (see Figure 2) as:

- A Module
- B Module
- C Module

NOTE! Terminals 13 and 14 (DC Out) can provide power for up to 16 CIM/2s. If more than 16 are connected to the RC², a separate 24-volt power supply must be used to power them.

Modules must be connected to the Communications ports so that they match the configuration specified in ESS32. A two-conductor shielded cable (Novar Controls WIR-1010, Belden #8761, or equivalent) should be used to make the connections. The colors referenced here refer to the colors of Novar Controls two-conductor shielded cable (WIR-1010) or Belden 8761.

Step	Procedure
1	Connect the black wire to the negative (–) terminal.
2	Connect the shield/drain wire to the shield (SHLD) terminal.
3	Connect the white wire to the positive (+) terminal.

Phase Loss Input Connections

The normally open dry contact output of an electrical phase loss monitor should be connected to the System Inputs terminals labeled Phase Loss Input as follows:

- Terminal 15: –
- Terminal 16: +

Emergency/Auxiliary Connections

Emergency/auxiliary connections should be made as indicated in the following procedure.

Step	Procedure
1	Connect the normally open dry contact output of an emergency monitoring system to the terminals labeled Emerg/Aux: <ul style="list-style-type: none"> ■ Terminal 17: – ■ Terminal 18: +
2	Verify that JP1 is in the 1–5 volt (default) position. <hr style="width: 50%; margin: 10px auto;"/> <p style="text-align: center;">NOTE! The auxiliary input configured for 4–20 mA is for future use.</p> <hr style="width: 50%; margin: 10px auto;"/>

Refrigeration Controller (RC²) Installation Instructions

Contact Closures (Output X and Y) Connections

The Output X terminals (19 and 20) and Output Y terminals (21 and 22) are used for local activation of an annunciator device. The contact ratings are 24V at 2 amp. The voltage is externally derived. The two outputs function independently of each other. With the power off:

- OUTPUT X is normally open and closes during an alarm condition.
 - OUTPUT Y is normally closed and opens during an alarm condition.
-

Slave/LAN Connections

The slave cable from a multiple RC² (or other executive modules) communications network should be connected to the terminals labeled Slave/LAN.

Step	Procedure
1	Connect the black wire to Terminal 1 (negative [-]).
2	Connect the shield/drain wire to Terminal 2 (SHLD).
3	Connect the white wire to Terminal 3 (positive [+]).

RS-232 Port

A special communication cable (Novar Controls Part No. 600540010) is required for the RS-232 connection and must be ordered separately. Instructions for making the connection are provided with the cable.

NOTE! Do not connect the RS-232 cable to the “Phone Line” connector. Doing so could damage the equipment.

Telephone Network Connections

If the application requires connection to the telephone network, an RJ-11 jack should be located as near as possible to the RC².

The following procedure should be used to make the connection.

Step	Procedure
1	Thread appropriate telephone cable from the telephone interface jack through the side of the baseplate.
2	Insert the cable into the modular RJ-11 telephone line connection (marked “Phone Line”) located in the lower right section of the RC ² baseplate. <hr/> <p>NOTE! Do not connect the telephone cable to the “RS-232” connector. Doing so could damage the equipment.</p> <hr/>

Ethernet[®] Network Connections

The Ethernet connection is located on the bottom edge of the RC² electronics assembly, on the left side. The connection can be made when the RC² electronics assembly is installed (refer to the “Installing the RC² Electronics Assembly” section of this document).

Verifying Wiring Connections on Retrofit Applications Using an RC Baseplate

NOTE! The following instructions apply to applications where an RC² electronics assembly will be mounted on an existing RC baseplate.

If an RC² electronics assembly will be mounted on an RC baseplate, the following instructions should be used to verify the wiring connections and make sure they are secure. Figure 3 shows the location of the terminals on the RC baseplate.

Power Connections

- Make sure that a 24-VAC, Class 2, 40-VA transformer is located in close proximity to the RC.
- Make sure that the secondary side of the transformer is connected to Terminals 23 and 24.
- Make sure that Terminals 23 and 24 are *not* grounded.

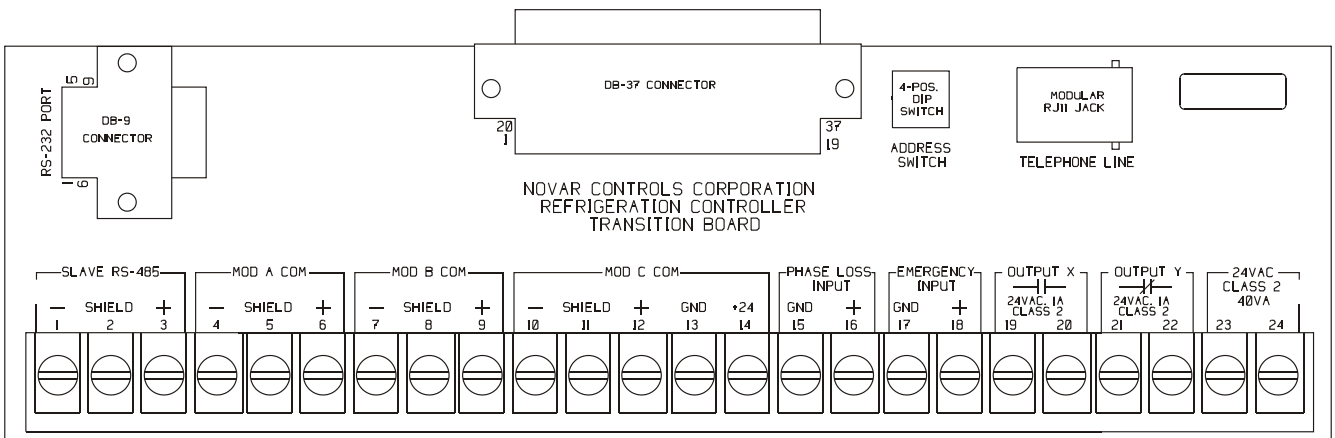


Figure 3. RC baseplate

Refrigeration Controller (RC²) Installation Instructions

Module Communication Port Connections

The RC has three module communication ports identified on the RC baseplate as:

- MOD A COM
- MOD B COM
- MOD C COM

The MOD C COM port contains both communication connections and 24-VDC terminals to provide power for up to 16 Case Input Modules (CIM/2s).

NOTE! If more than 16 CIM/2s are connected to the RC, a separate 24-volt power supply must be used to power them.

- Make sure that all modules are connected to the Communication Ports so that they match the configuration set up in ESS32.
- Make sure that each module's wiring connections are accurate and secure:
 - The black wire should be connected to the negative (–) terminal.
 - The shield/drain wire should be connected to the shield (SHLD) terminal.
 - The white wire should be connected to the positive (+) terminal.

Phase Loss Input Connections

- Make sure that the normally open dry contact output of an electrical phase loss monitor is connected to the System Inputs terminals labeled Phase Loss Input:
 - Terminal 15: GND
 - Terminal 16: +

Emergency Input Connections

- Make sure that the normally open dry contact output of an emergency monitoring system is connected to the terminals labeled Emergency Input:
 - Terminal 17: GND
 - Terminal 18: +

Contact Closures (Output X and Y) Connections

The Output X terminals (19 and 20) and Output Y terminals (21 and 22) are used for local activation of an annunciator device. The contact ratings are 24V at 2 amp. (Disregard the 1-amp indication on the RC baseplate.) The voltage is externally derived.

The two outputs function independently of each other. With the power off:

- OUTPUT X is normally open and closes during an alarm condition.
 - OUTPUT Y is normally closed and opens during an alarm condition.
-

Slave/RS-485 Connections

- Make sure that the slave cable from a multiple RC² (or other executive modules) communications network is connected to the terminals labeled Slave/RS-485.
 - The black wire should be connected to Terminal 1 (negative [-]).
 - The shield/drain wire should be connected to Terminal 2 (SHLD).
 - The white wire should be connected to Terminal 3 (positive [+]).
-

RS-232 Port

Make sure that Novar Controls' communication cable (Part No. 600540000 or 600540010) has been used to connect a personal computer to the RS-232 port in the upper left corner of the baseplate.

NOTE! Do not connect the RS-232 cable to the "Telephone Line" connector. Doing so could damage the equipment.

Telephone Network Connections

If the application requires connection to the telephone network:

- Make sure that one end of a telephone cable is connected to an RJ-11 telephone interface jack.
- Make sure the other end of the telephone cable is connected to the "Telephone Line" connection located in the upper right section of the baseplate.

NOTE! Do not connect the telephone cable to the "RS-232" connector. Doing so could damage the equipment.

Ethernet[®] Network Connections

The Ethernet connection is located on the bottom edge of the RC² electronics assembly, on the left side. The connection can be made when the RC² electronics assembly is installed (refer to the "Installing the RC² Electronics Assembly" section of this document).

Refrigeration Controller (RC²) Installation Instructions

Installing the RC² Electronics Assembly

The following procedure should be used to install the RC² electronic assembly on the baseplate.

Step	Procedure
1	Make sure that the baseplate's cover has been removed before attempting to install the RC ² electronics assembly: <ul style="list-style-type: none"> ■ Use the hex wrench supplied in the hardware kit to loosen the two screws at the bottom of the baseplate. ■ Lift off the cover.
2	Slide the RC ² electronics assembly down from the top of the baseplate assembly and over the mounting posts.
3	Guide the connector on the RC ² electronics assembly over the corresponding connector on the baseplate.
4	Tighten the two retaining screws (see Figure 1) with the hex wrench to secure the electronics assembly to the baseplate.
5	<i>(If applicable)</i> Connect the Ethernet cable to the Ethernet connection on the lower left edge of the electronics assembly.
6	Check all wiring connections and reattach the baseplate's cover. <hr/> <p style="text-align: center;">NOTE! When reattaching the baseplate cover, make sure that none of the wires will be pinched.</p> <hr/>

Setting the Address

In a multiple-unit configuration using any of the four local-area network (LAN) configurations (NovarNet, MOD2, master/slave, or Ethernet), a maximum of 16 unique addresses can be assigned using the address switches located at the top, to the right of the center of the baseplate (see Figure 2). Refer to Figure 4 when setting the addresses.

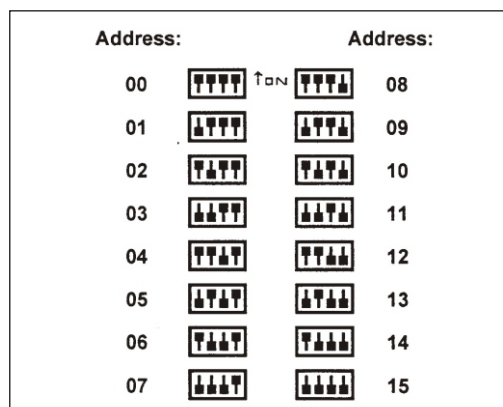


Figure 4. Setting the RC² address switches

Checking Operation

NOTE! The system program must be downloaded to the RC² *before* the installation can be checked.

Once the system program has been downloaded, the installation can be checked locally or remotely.

If the system program is to be downloaded via CompactFlash[®] module, refer to Novar Controls' *CompactFlash[®] Disk Archiving/Downloading Procedures*.

Locally

To check the installation locally, use the optional touchscreen (if the system is equipped with one) or a laptop or PC running iScope[®], ESS32 software, or Web browser.

The laptop or PC connects to RC² via any *one* of the following methods:

- The Ethernet port located at the bottom left side of the RC² electronics assembly (using the proper Ethernet components and cables).
 - The Slave/LAN connection on the RC² baseplate, provided the PC is equipped with a NovarNet[®] Interface Module (NIM).
 - The RS-232 port on the baseplate.
-

Remotely

An RC² can be accessed and checked remotely via *either* of the following two methods:

- *If the modem option is present*, the dial-up telephone network connected to a phone line as previously described under “Telephone Network Connections”
 - The Ethernet port of the RC² electronics assembly (using the proper Ethernet components and cables)
-

Refrigeration Controller (RC²) Installation Instructions

Model and Part Numbers

The part numbers shown in Table 1 should be used to order the necessary Novar Controls parts.

PRODUCT	MODEL NO.	PART NO.
Refrigeration Controller (RC ²) Baseplate	RC2-BPL	733025200
RC ² Electronics Assembly (no options)	—	733025000
<i>Options:</i>		
RC ² with Modem	—	733025010
RC ² with Integral Touchscreen	—	733025100
RC ² with Integral Touchscreen & Modem	—	733025110
24-VAC, 40 VA, Class 2, Transformer Kit	24V-XFR	730090000
Two-conductor, shielded cable (Belden 8761 equivalent)	WIR-1010	709001000
Ethernet Direct-Connect Crossover Cable	—	770077000
RS-232 Cable Kit	—	600540010
