

Case Input Module (CIM/2) Installation Instructions

Regulatory Compliance

Safety

This device has been tested and found to be in compliance with the requirements set forth in UL 916, 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 Case Input Module (CIM/2) is a unique input device that provides case temperature and defrost information to a Refrigeration Controller as part of Novar Controls' Logic One[®] system or Novar Controls' Spectrum[®] Refrigeration Control System.

Each CIM/2 has eight inputs for refrigeration case temperature sensors and a ninth input for a switch closure from a dual temperature case. A light-emitting diode (LED) displays the temperature and status of each input.

The metal enclosure protects the electronics from some environmental conditions, but it is not waterproof. It can be mounted on the exterior of a refrigerated case or on a control panel if the location is dry and not refrigerated.

This document provides instructions for mounting the module, wiring it, setting its address, and checking its operation.

Specifications

Agency Approvals

Listed device:	CUL/UL E90949
Standards used:	UL 916, Energy Management Equipment CSA C22.2, No. 205-M1983, Signal Equipment

Power Requirements

Voltage:	Class 2, 24 VDC, 30 mA, or 24 VAC, 2VA
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NOTE! The Refrigeration Controller can be used as a 24-VDC power source (see "Wiring Connections, Power Connection" in this document).

Operating Environment

Temperature:	32° to 158°F (0° to 70°C)
Humidity:	0 to 95% Relative, noncondensing

Physical Dimensions

Length:	17.25 inches
Width:	2.85 inches
Depth:	1.1 inches
Weight:	1 lb 5 oz

Precautions

Take the following precautions during installation:

- Observe all national and local electrical codes.
 - Do *not* use the module as a final safety device.
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Mounting the Module

The CIM/2 can be mounted on a wall, on the exterior of a refrigerated case, or in a control panel.

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

Step	Procedure
1	Select a dry, nonrefrigerated location for the module.
2	Position the metal case against the mounting surface and mark the surface to show the location of the two mounting holes.
3	Drill holes in the locations marked.
4	Place the module against the mounting surface and insert and tighten the appropriate type of screws to secure the module.

Wiring Connections

Use the following procedure to prepare the module for wiring.

Step	Procedure
1	Remove the two screws located in opposite corners of the cover (see Figure 1) and remove the cover.
2	Remove the screw holding the foam rubber clamp at the right end of the circuit board (see Figure 1). NOTE! The clamp and its screw must be returned to their original positions when the wiring connections have been completed.

The CIM/2 connections are shown in Figure 2.

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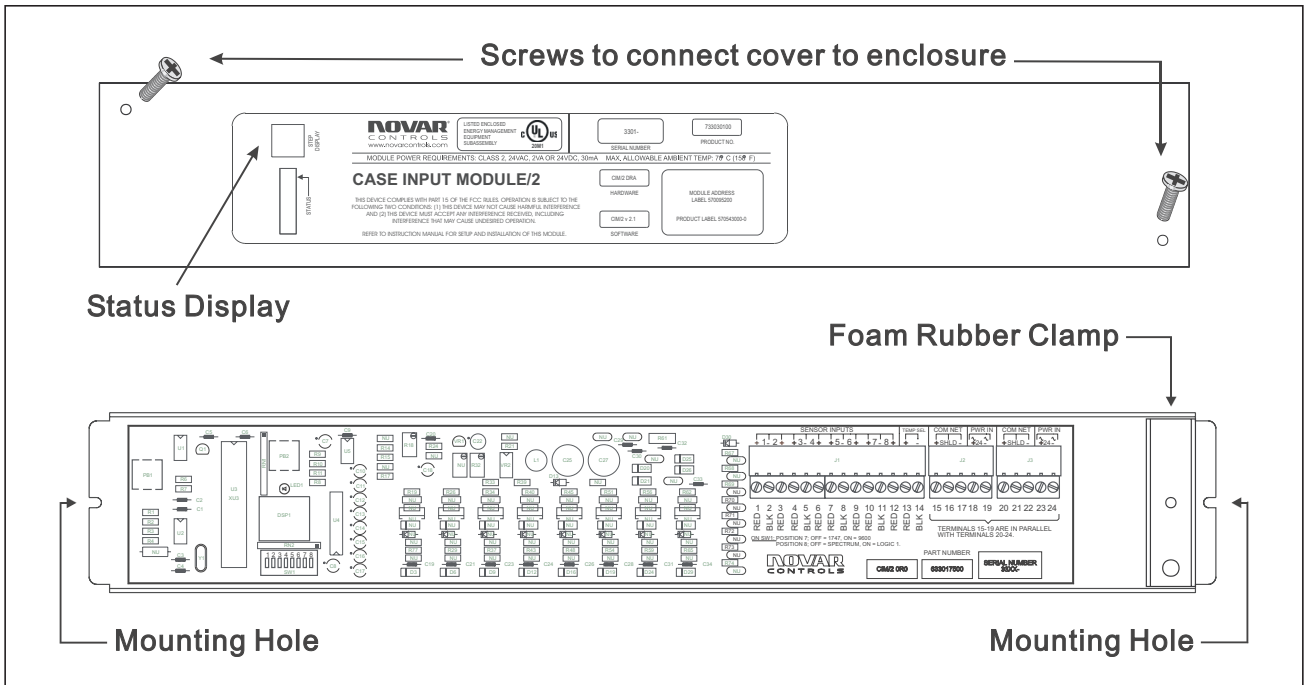


Figure 1. Mounting the CIM/2

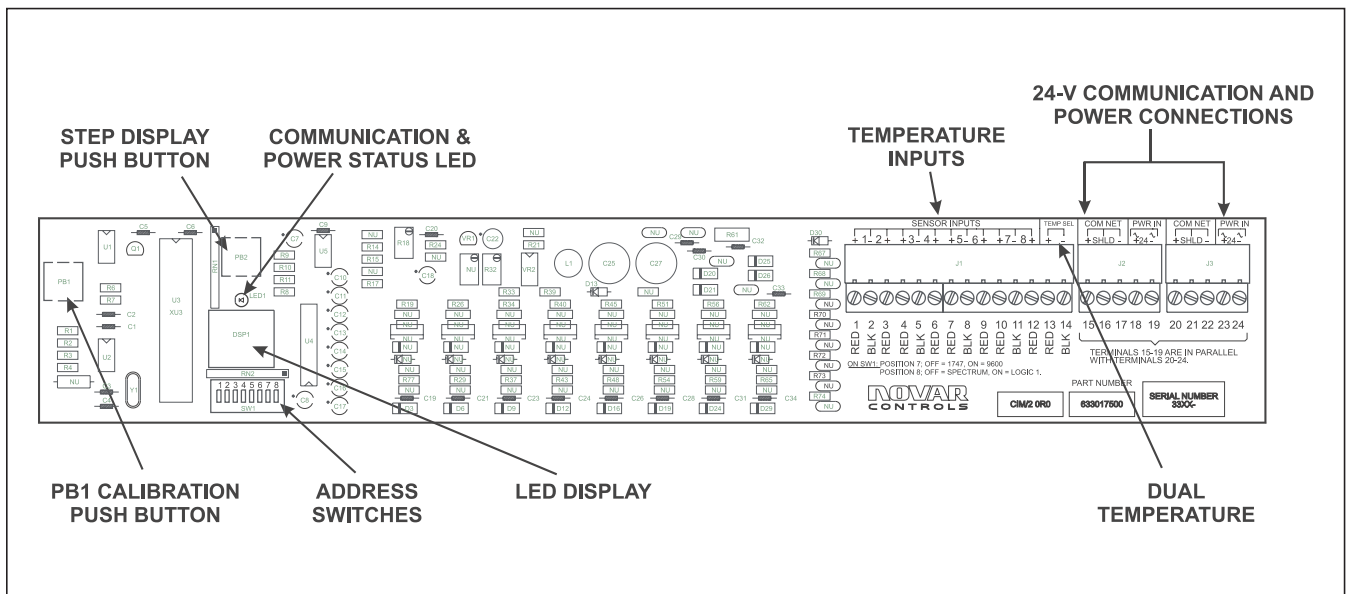


Figure 2. CIM/2 wiring connections

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Sensor Inputs

This module is designed to be used with Novar Controls' Low-Range Temperature Sensor (Part. No. 733000000).

Use the following procedure to connect the sensors.

Step	Procedure
1	Connect the red wire of the temperature sensors to the software-designated numbered input terminals.
2	Connect the black wire of the temperature sensors to any of the negative terminals (Terminals 2, 5, 8, or 11).
3	<p>(Spectrum Systems only)</p> <p>Connect one side of a dry contact closure from a dual-temperature refrigeration case to the Case Input Module's Temp Select (+) terminal and the other side of the dry contact closure to the negative (-) terminal.</p> <ul style="list-style-type: none">■ This digital input allows the system to control the dual-temperature case to an alternate setpoint when the switch is closed.

Module Communication Network

Logic One System Connections

A two-conductor shielded cable (Belden 8761, Novar Controls WIR-1010, or equivalent) should be used to make the communication connections between the CIM/2 and one of the Logic One system executive modules.

Use the following procedure to connect the communications cable.

Step	Procedure
1	Connect the CIM/2 communication cable to the Module Communications port of the executive module.
2	<p>Connect the communication cable to the CIM/2's COM Net terminals (Terminals 15, 16, and 17 or 20, 21, and 22), located next to the power connection.</p> <ul style="list-style-type: none">■ Maintain polarity when making the wiring connections.

Spectrum Connections

- A maximum of 16 CIM/2s can be powered by each Refrigeration Controller.
- A maximum of 38 CIM/2s can be configured for each Refrigeration Controller.

A four-conductor shielded cable (Belden #9155, Novar Controls WIR-1020, or equivalent) should be used to make the communication connections between the CIM/2 and the Refrigeration Controller.

Use the following procedure to connect the communications cable.

Step	Procedure
1	Connect the CIM/2 communication cable to the Mod C COM port of the Refrigeration Controller module.
2	Connect the communication cable to the CIM/2's COM Net terminals (Terminals 15, 16, and 17 or 20, 21, and 22), located next to the power connection. <ul style="list-style-type: none">■ Maintain polarity when making the wiring connections.

Power Connections

Power (24-VDC) can be supplied to the CIM/2 by the Refrigeration Controller or by a separate 24-VDC power supply or a Class 2, 24-VAC transformer.

The CIM/2's terminal strip contains double connections for 24-volt power and module communications. Internal to the module, these double connections are in parallel and are provided for wiring convenience.

- One set of the terminals can be used for incoming power and communications.
- The other set can be used to daisy chain the power and communications to the next CIM/2.

Use the following procedure to supply power to the CIM/2 from the Refrigeration Controller.

Step	Procedure
1	Connect two conductors of a four-conductor shielded cable (Belden #9155, Novar Controls WIR-1020, or equivalent) to Terminals 13 and 14 on the Refrigeration Controller.
2	Connect the same two conductors to the CIM/2 at Terminals 18 and 19 or 23 and 24, making sure that polarity is maintained.

The Refrigeration Controller can provide power for up to 16 CIM/2s. If more than 16 modules or sensors are connected to the controller, another 24-volt power supply must be used.

Address Settings

The address switches are located on the left side of the circuit board (see Figure 1 or 2). For each network, each module must have a unique address for its controller to recognize it. The address can be 0 through 63. Address switches 1–6 should be set as shown in Figure 3.

ADDRESS	SWITCH SETTINGS	ADDRESS	SWITCH SETTINGS	ADDRESS	SWITCH SETTINGS	ADDRESS	SWITCH SETTINGS
00	ON ↑ 1 2 3 4 5 6 7 8	16	ON ↑ 1 2 3 4 5 6 7 8	32	ON ↑ 1 2 3 4 5 6 7 8	48	ON ↑ 1 2 3 4 5 6 7 8
01	↓ 1 2 3 4 5 6 7 8	17	↓ 1 2 3 4 5 6 7 8	33	↓ 1 2 3 4 5 6 7 8	49	↓ 1 2 3 4 5 6 7 8
02	↓ 1 2 3 4 5 6 7 8	18	↓ 1 2 3 4 5 6 7 8	34	↓ 1 2 3 4 5 6 7 8	50	↓ 1 2 3 4 5 6 7 8
03	↓ 1 2 3 4 5 6 7 8	19	↓ 1 2 3 4 5 6 7 8	35	↓ 1 2 3 4 5 6 7 8	51	↓ 1 2 3 4 5 6 7 8
04	↓ 1 2 3 4 5 6 7 8	20	↓ 1 2 3 4 5 6 7 8	36	↓ 1 2 3 4 5 6 7 8	52	↓ 1 2 3 4 5 6 7 8
05	↓ 1 2 3 4 5 6 7 8	21	↓ 1 2 3 4 5 6 7 8	37	↓ 1 2 3 4 5 6 7 8	53	↓ 1 2 3 4 5 6 7 8
06	↓ 1 2 3 4 5 6 7 8	22	↓ 1 2 3 4 5 6 7 8	38	↓ 1 2 3 4 5 6 7 8	54	↓ 1 2 3 4 5 6 7 8
07	↓ 1 2 3 4 5 6 7 8	23	↓ 1 2 3 4 5 6 7 8	39	↓ 1 2 3 4 5 6 7 8	55	↓ 1 2 3 4 5 6 7 8
08	↓ 1 2 3 4 5 6 7 8	24	↓ 1 2 3 4 5 6 7 8	40	↓ 1 2 3 4 5 6 7 8	56	↓ 1 2 3 4 5 6 7 8
09	↓ 1 2 3 4 5 6 7 8	25	↓ 1 2 3 4 5 6 7 8	41	↓ 1 2 3 4 5 6 7 8	57	↓ 1 2 3 4 5 6 7 8
10	↓ 1 2 3 4 5 6 7 8	26	↓ 1 2 3 4 5 6 7 8	42	↓ 1 2 3 4 5 6 7 8	58	↓ 1 2 3 4 5 6 7 8
11	↓ 1 2 3 4 5 6 7 8	27	↓ 1 2 3 4 5 6 7 8	43	↓ 1 2 3 4 5 6 7 8	59	↓ 1 2 3 4 5 6 7 8
12	↓ 1 2 3 4 5 6 7 8	28	↓ 1 2 3 4 5 6 7 8	44	↓ 1 2 3 4 5 6 7 8	60	↓ 1 2 3 4 5 6 7 8
13	↓ 1 2 3 4 5 6 7 8	29	↓ 1 2 3 4 5 6 7 8	45	↓ 1 2 3 4 5 6 7 8	61	↓ 1 2 3 4 5 6 7 8
14	↓ 1 2 3 4 5 6 7 8	30	↓ 1 2 3 4 5 6 7 8	46	↓ 1 2 3 4 5 6 7 8	62	↓ 1 2 3 4 5 6 7 8
15	OFF ↓ 1 2 3 4 5 6 7 8	31	OFF ↓ 1 2 3 4 5 6 7 8	47	OFF ↓ 1 2 3 4 5 6 7 8	63	OFF ↓ 1 2 3 4 5 6 7 8

Figure 3. CIM/2 address settings

Dip Switch No. 7

Dip Switch 7 is used to set the CIM/2's communications baud rate to match the control system. It must be set correctly:

- Baud rate 1747: Dip Switch No. 7 off
- Baud rate 9600: Dip Switch No. 7 on

Dip Switch No. 8

Dip Switch No. 8 must be set according to the control system:

- Logic One: Switch #8 should be on
- Spectrum: Switch #8 should be off

Checking Operation

When the installation has been completed, check the following items to ensure proper operation.

- Double check all wiring before turning on the power.
- Supply power and check the communication LED located next to the LED status display on the CIM/2. It should blink intermittently when power is turned on and proper communication is occurring. If the LED does not blink, there is a loss of communication and/or power.
- Check the LED status display. The CIM/2 contains an alphanumeric LED display that indicates the status of the sensors wired to the module. This display can be seen through the label on the top of the metal enclosure.

NOTE! When power is initially applied and the display shows “ERR,” the input sensor’s field calibration in nonvolatile storage is corrupt. In this case, the factory default calibration is applied.

To operate the display, press the Step Display push button. The LEDs will display the input number and the sensor value in consecutive order. If the sensor value is below zero, a minus (–) sign will also be displayed. All temperature readings are in Fahrenheit. The maximum displayable range of an analog sensor is –39° to 88°F. Any temperature less than –39°F shows as –39°F. Any temperature greater than 88°F shows as 88°F.

- Check the LEDs to determine the status of the ninth input (the digital sensor from a dual-temperature case). The LEDs will display “OPN” if the sensor is open and “CLS” if the sensor is closed.
- Monitor the executive module. If any faults or malfunctions still exist, they will be announced by alarm messages. Use the executive module’s keypad to change the control settings and monitor the display to make sure the equipment responds properly.

Calibrating Temperature Sensors

Calibration is based on a 32°F input reference. The sensor input for the channel undergoing calibration is placed into the temperature reference (usually a water and ice bath mixture) and allowed to stabilize.

- After stabilization, the input is sampled and an error is calculated. If the error is within tolerance, a calibration constant is applied to subsequent input readings for this channel to zero out the error.
- If the error is outside of tolerance, subsequent input readings for this channel are not changed.

The calibration constant is saved in nonvolatile memory. Therefore, cycling power to the module does not cause loss of calibration constants.

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Calibrating an Input Channel

Use the following procedure to calibrate an input channel.

Step	Procedure
1	Place the temperature sensor for the input channel undergoing calibration into a known 32°F reference.
2	Allow adequate time for the temperature to stabilize.
3	Use the Display Step switch to display the desired input channel. <ul style="list-style-type: none">■ The display should show the channel number and a two-digit input temperature reading.
4	Press and hold the PB1 calibration button, located on the circuit board (under the cover). <ul style="list-style-type: none">■ The display should show the channel number and “CAL.”

After approximately 5 seconds, if the calibration is successful, the display should flash the channel number and the adjusted input reading for about 5 seconds.

If the calibration fails, the display should show the channel number and “ERR” for approximately 5 seconds.

NOTE! The maximum calibration adjustment is ± 4 degrees.
Calibration and recalibration is based on factory default input readings.

Erasing a Previous Calibration and Restoring Factory Default

Use the following procedure to erase a previous calibration and restore the factory default setting.

Step	Procedure
1	Use the Step Display push button to display the input channel whose calibration needs to be erased and restored to the factory default.
2	Make sure that the correct input channel is displayed.
3	Press the Step Display push button and the PB1 calibration button. <ul style="list-style-type: none">■ The display should show the channel number and “ERS.”

After approximately 5 seconds, if the restoration is successful, the display should flash the channel number and the unadjusted input reading for approximately 5 seconds.

Model and Part Numbers

Use the part numbers provided in Table 1 to order the necessary Novar Controls parts.

Table 1. Novar Controls Part Numbers		
PRODUCT	MODEL NO.	PART NO.
Case Input Module (CIM/2)	CIM/2	733030100
Low-Range Temperature Sensor	—	733000000
Two-Conductor Shielded Cable (Belden 8761 equivalent)	WIR-1010	709001000
Four-Conductor Shielded Cable (Belden 9155 equivalent)	WIR-1020	709002000

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