

Condenser Control Module Installation Instructions

Description

The Condenser Control Module is one of the components of Novar's Spectrum[®] Refrigeration Control System. It controls up to ten condenser programmable outputs. The operation of this module is based on programmable settings and system information that is processed through the Refrigeration Controller and communicated to the Condenser Control Module. The Condenser Control Module also has two inputs for compressor discharge pressure and outside air temperature.

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

Specifications

Agency Approvals

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

Power Requirements

Voltage:	24 VAC
Consumption:	20 VA

NOTE! The Condenser Control Module does not require a dedicated transformer. The transformer can be shared with other Novar Refrigeration Control modules.

Operating Environment

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

Physical Dimensions

Width:	14 inches
Height:	4 inches
Depth:	1.5 inches
Weight:	1 lb 5 oz

Relay Output Rating

250 VAC, 3 Amps Maximum; Form C

Fuse Rating

2 Amps



Precautions

Take the following precautions during installation:

- Observe all national and local electrical codes.
 - Do not mix the line voltage (Class 1) and low voltage (Class 2) wiring.
 - Do *not* ground the transformer for this module to the secondary side.
 - Turn off the power before installing this module.
 - Do *not* use this module as a final safety device.
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Mounting the Module

The following procedure should be used to mount the module.

Step	Procedure
1	Turn off all power before installation.
2	Select a suitable location for the module.
3	Position the plastic snap track against the mounting surface, mark the surface to show the location of the two mounting holes, and drill holes at the marked locations.
4	Position the module against the mounting surface and insert and tighten screws to secure the module.

Wiring Connections

All line voltage connections should be made *before* the low voltage connections are wired. Refer to Figure 1, as necessary, when wiring the Condenser Control Module.

Control Outputs

Each output can be wired to the normally open or normally closed terminal, depending on system requirements.

NOTE! Because the outputs are software-definable, the wiring scheme must match the software configuration.

Output status light-emitting diodes (LEDs) are located to the left of the relays on the module. The status of an LED reflects the status of the corresponding relay coil.

- If the relay coil is energized, the LED is on.
- If the relay coil is not energized, the LED is off.

The corresponding status of the load depends on how the connection is wired.

The Condenser Control Module has one output override switch. When it is switched to override, all outputs return to their de-energized state.

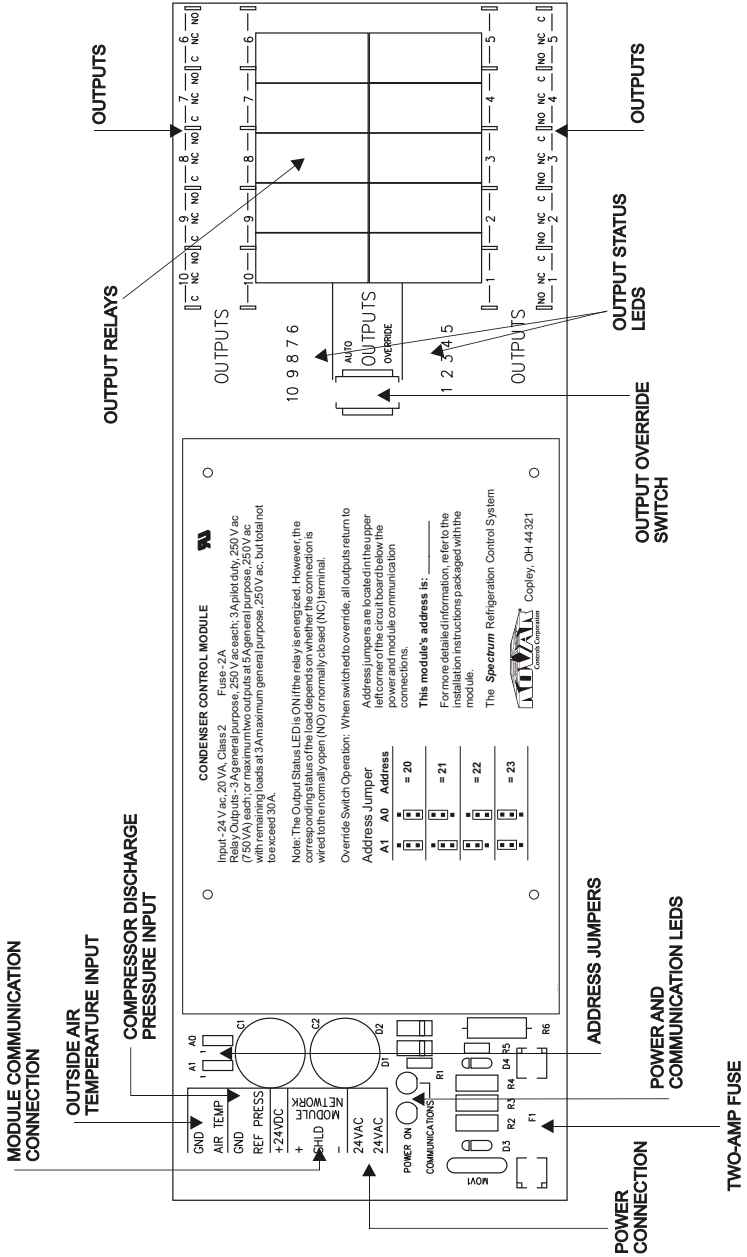


Figure 1. Condenser Control Module

Control Inputs

Use of the outside air temperature input is optional. If a separate sensor is wired to each Condenser Control Module, Novar's Low Temperature Refrigeration Sensor should be used. The input should be wired to the terminals on the left side of the circuit board labeled Air Temp and GND.

The discharge pressure input is designed to be used with Novar's Discharge Pressure Sensor. Use the following procedure to wire this sensor.

Step	Procedure
1	Connect the black wire to the GND terminal.
2	Connect the red wire to the terminal marked +24 VDC.
3	Connect the white wire to the terminal labeled Ref Press.

Module Communication

A two-conductor, shielded cable (Belden #8761, Novar WIR-1010, or equivalent) should be used to make the communication connection between this module and the Refrigeration Controller.

The module communication connection is located in the upper left corner of the circuit board, next to the power connection. There is a communication LED located below the module communication connection that should blink on intermittently when the power is turned on and proper communication is occurring. If the LED does not blink on, there is a loss of communication.

On the Refrigeration Controller, the connection should be made to the Module B Communication (MOD B COM) port.

Default Control

Condenser Control Modules that contain Firmware Version 1.10 or higher feature the following default control methods.

■ **Pressure Transducer Failure**

The pressure transducer is a 1–5 volt sensor. If the signal falls below 0.9 volts, a default method of control is initiated where it will perform stand-alone control looking at the outside air temperature input. It will perform the following actions.

OUTSIDE AIR TEMP	ACTION	RESULT
Always	Relays 1 and 2 turn off	Fans 1 and 2 turn on
Below 30 F	Relays 9 and 10 turn on	Split valves energize
Above 35 F	Relays 9 and 10 turn off	Split valves de-energize
Below 50 F	Relays 4, 6, and 8 turn on	Fans 4, 6, and 8 turn off
Above 53 F	Relays 4, 6, and 8 turn off	Fans 4, 6, and 8 turn on
Below 55 F	Relays 3, 5, and 7 turn on	Fans 3, 5, and 7 turn off
Above 58 F	Relays 3, 5, and 7 turn off	Fans 3, 5, and 7 turn on

If the condenser module is in communication loss *and* the pressure sensor is in fault, the module will control to the outside air temperature input according to the scenario above.

NOTE! To use the Condenser Control Module as an output device with no sensors connected to it, bypass the default operation by placing a jumper wire between the Discharge Pressure input and the Outdoor Temp input. This will allow the outputs to be controlled via software rather than reverting to the default control.

■ Communication Failure Loss (Module Comm Loss)

When the module has been in communication loss for 4 minutes, it will check the voltage of the pressure transducer. The typical application uses a 1–5 volt sensor that has a range of 0–400 psi; therefore, 2 volts = 100 psi, 2.5 volts = 150 psi, 3 volts = 200 psi, etc.

PRESSURE SENSOR VOLTS	ACTION	RESULT
Greater than 3.1 volts	Relays 7 and 8 off	Fans 7 and 8 turn on
Less than 2.9 volts	Relays 7 and 8 on	Fans 7 and 8 turn off
Greater than 2.9 volts	Relays 5 and 6 off	Fans 5 and 6 turn on
Less than 2.7 volts	Relays 5 and 6 on	Fans 5 and 6 turn off
Greater than 2.7 volts	Relays 3 and 4 off	Fans 3 and 4 turn on
Less than 2.5 volts	Relays 3 and 4 on	Fans 3 and 4 turn off
Greater than 2.5 volts	Relays 1 and 2 off	Fans 1 and 2 turn on
Less than 2.3 volts	Relays 1 and 2 on	Fans 1 and 2 turn off

OUTSIDE AIR TEMP	ACTION	RESULT
Below 30 F	Relays 9 and 10 turn on	Split valves energize
Above 35 F	Relays 9 and 10 turn off	Split valves de-energize

NOTE! If both sensors fail, all output relays will turn off, the fans will turn on, and the split valves will turn off.

Power Connection

The 24-VAC power connection is located in the upper left corner of the circuit board, next to the module communication connection. The power LED located below the power connection should be on when the system power is turned on.

A two-amp fuse is provided on the Condenser Control Module circuit board to protect the module electronics. The fuse can be removed to turn off the power to the module.

Setting the Module Address

Up to four Condenser Control Modules can be connected to one Refrigeration Controller. Each of the modules must have a unique address so the Refrigeration Controller can identify it.

The address jumpers are located next to the air temperature and compressor discharge connections on the circuit board. Both the A1 and A0 jumpers have three pins and can be set as shown in Figure 2.









A1	A0	Address
		= 20
		= 21
		= 22
		= 23

Figure 2. Setting the module address

Checking Operation

When the module has been mounted and all wiring connections have been completed, the following items should be checked to ensure proper operation.

- Double check all wiring before turning on the power.
 - Make sure the Refrigeration Controller is connected and the system power is on. Make sure that the communication LED is blinking intermittently to verify proper communication.
 - Check the Refrigeration Controller for alarm messages. If any faults or malfunctions still exist, they will be picked up and announced by the Refrigeration Controller.
 - Use the Refrigeration Controller keypad and display to change the control settings. Check the equipment for proper response.
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Model and Part Numbers

Table 1 indicates the part numbers that should be used for ordering purposes.

Table 1. Novar Part Numbers		
PRODUCT	MODEL NO.	PART NO.
Condenser Control Module	—	733013000
Two-conductor, shielded cable (Belden #8761 equivalent)	WIR-1010	709001000
Pressure sensor 0–400 psig	—	733093500
Low-Range Temperature Sensor	—	733000000

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 brouilleur: *Appareils Numériques*, NMB-003, édictée par l'Industrie Canada.

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