

# eti<sup>®</sup> SNOW SWITCH<sup>®</sup> MODEL EUR-5A<sup>™</sup>

AUTOMATIC SNOW/ICE MELTING SYSTEM CONTROL PANEL



## TABLE OF CONTENTS

Product Overview .....	2
Operation .....	3
Installation .....	5
Troubleshooting .....	9
Ordering Information, Warranty and Service .....	10
Terminal Connections .....	11
Specifications .....	12



Make sure that your installation and all electrical connections conform to the NEC (ANSI/NFPA 70) in the United States of American, to the Canadian Electrical Code in Canada, and to all applicable local electrical codes and laws. The EUR-5A, RCU-3, and ETI environmental sensor are all rated as NEC Class 2 devices.

## ITEMS INCLUDED

Qty.	P/N	Description
1	21496	EUR-5A Snow and Ice Melting Control
1	25076	High Temperature Limit Sensor
1	14257	Power Transformer, 50 VA, 120 V to 24 V
1	21357	RCU-3 Remote Control
1	21184	Fuse Kit
1	21776	EUR-5A Installation and Operation Manual

## PRODUCT OVERVIEW

The EUR-5A snow and ice melting control provides automatic control of a snow and ice melting system. It includes an interface for environmental sensors, heater contactors, and a building Energy Management Computer. A remote control is included to supplement the front panel controls.

Figure 1 shows a typical snow melting system using the EUR-5A. It is compatible with all ETI snow and ice sensors including the CIT-1 aerial sensor, GIT-1 gutter sensor, and the SIT-6E pavement sensor. The EUR-5A also includes a High Temperature Limit Sensor for maximum energy efficiency.

Using at least two environmental sensors improves system performance through superior coverage. A single environmental sensor can miss tracked or blowing and drifting snow. When multiple sensors are connected, any one of them detecting snow or ice conditions will signal for the heating process to start.

When snow or ice is no longer detected by the environmental sensors, the heater hold-on time begins. During hold-on time, heater operation continues for a user-adjustable time interval from 0 to 10 hours. The hold-on time continues heating for this set amount of time to ensure complete melting and sufficient drying to prevent re-freezing.

The EUR-5A includes an adjustable high temperature limit function. This function has two benefits. The high temperature limit can save energy by turning the heat off when the temperature is high enough for natural melting to occur. The high temperature limit is also useful in systems using MI heat cable and other constant wattage heat cable to prevent unnecessarily high temperatures and excessive energy use. This feature can be overridden when using self-limiting heaters. The high temperature sensor can be mounted in a place where it can accurately sense the pavement temperature or ambient air temperature.

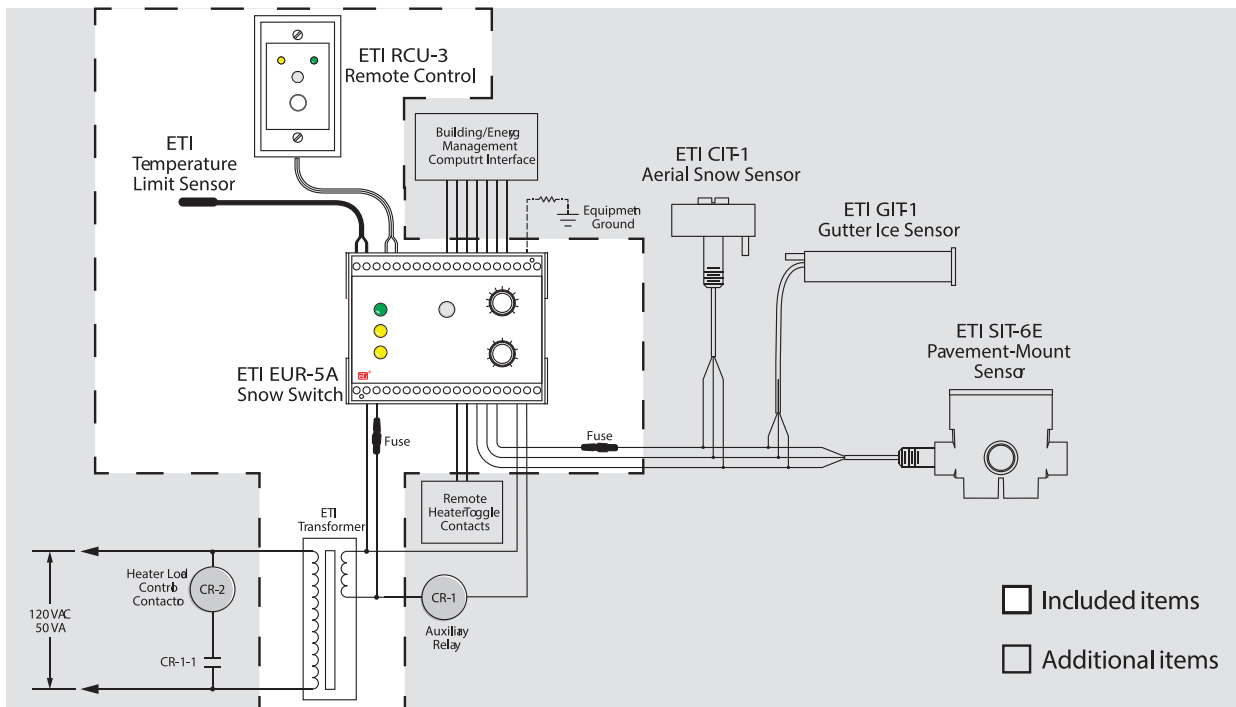


FIGURE 1. Typical EUR-5A installation

Due to the location of the EUR-5A, typically mounted in an electrical enclosure, an additional control location may be necessary. The EUR-5A comes with an RCU-3 remote control unit that can be mounted in a convenient place where an operator can monitor conditions and adjust the system operation accordingly.

The EUR-5A provides an interface that can communicate with a building's Energy Management Computer (EMC) system. The EMC interface provides dry switch contacts for communicating system status and inputs to allow the EMC to override the EUR-5A.

The EUR-5A operates from a 24 VAC NEC Class 2 power source. A 120 VAC to 24 VAC control transformer is included for use in installations with 120 VAC power. Since the EUR-5A is an NEC Class 2 device, a customer supplied auxiliary relay is required for operating the heater control contactors when using electric heat cable.

## OPERATION

The snow and ice melting system normally will operate automatically. When any sensor detects snow or ice, the heater output will turn on. When snow or ice is no longer present at any of the sensors, then the hold-on time starts. When the hold-on time is complete the heater output will turn off. If snow or ice is detected during the hold-on period, then hold-on is canceled while the heat remains on.

The Hold-On Time control sets the amount of time that the heater remains on after snow or ice is no longer present. This is to ensure that the melting process is complete. An initial setting of 5 hours may be a good starting point, and observation of the results a few hours after a snow event can allow this to be adjusted optimally. It's important that the area becomes dry enough to avoid re-freezing of melt water.

The Heater Cycle pushbutton will turn on the heat even if no snow or ice is detected. The heat will then remain on for the set hold-on time. If the Heater Cycle pushbutton is

pressed again, then the heat will be turned off (the hold-on time is canceled).

If heat is already on due to snow or ice being sensed, then the Heater Cycle pushbutton will have no effect. If heat is already on due to hold time, then the Heater Cycle pushbutton will cancel the hold time and turn the heat off. Pressing the Heater Cycle pushbutton again will reinstate the full hold-on time.

The calibrated 40°F to 90°F (4°C to 32°C) high temperature limit prevents excessive temperatures when using constant wattage and MI heat cable saving energy and preventing potential damage. It also permits safe testing at outdoor temperatures too high for continuous heater operation. The temperature limit sensor is included and must be connected to the system for proper operation. If, for any reason, you need to operate the system without the high temperature limit sensor you can temporarily replace the sensor with a 470K resistor.

The RCU-3 remote control panel allows user control from a different location. The panel indicators show the presence of system power and whether the heat is on. The Heater Cycle pushbutton allows control of the heater Cycle Time. When the Cycle Time time is active, it can be interrupted or reinstated by pressing the button. The remote Cycle Time control allows adjustment from 2 to 8 hours. This remote Cycle Time applies only when the remote Heater Cycle pushbutton is used; during automatic operation, the setting at the EUR-5A will be used.

A separate Remote Heater Toggle, a user option, can be connected to function identically to Heater Cycle pushbutton on the EUR-5A. This allows Heater Cycle operation with the hold time set on the EUR-5A.

The Energy Management Computer connected to the EUR-5A can monitor the system status. Signaling is provided to the EMC for power supply present, snow present, and heater on/off status. In addition, inputs on the EUR-5A allow the EMC to override the EUR-5A automatic operation by either holding the heaters on or holding the heaters off at any time.

## EUR-5A FRONT PANEL

The EUR-5A front panel provides the following controls and indicators:

- **SUPPLY** indicator - This green LED indicates that the EUR-5A is receiving 24 VAC power.
- **HEAT** indicator - This yellow LED indicates when the heaters are on. Also it will flash if the high temperature limit sensor is disconnected.
- **SNOW** indicator - This yellow LED Indicates when any of the sensors reports the presence of ice or snow.
- **HEATER CYCLE** pushbutton - initiates or terminates heater hold-on time.
- **HOLD-ON TIME** adjustment control - sets the amount of hold-on time from 0 to 10 hours.
- **HIGH TEMPERATURE LIMIT** - sets maximum temperature from 40°F to 90°F (4°C to 32°C). When that temperature is reached, the heat will always be turned off.

## RCU-3 REMOTE CONTROL UNIT

The RCU-3 panel provides the following controls and indicators:

- **HEAT** indicator - This yellow LED indicates when the heaters are on.
- **HEATER CYCLE** pushbutton - initiates or terminates Heater Cycle time.
- **CYCLE TIME** adjustment control - sets the amount of hold-on time from 2 to 8 hours. This hold-on time is used only when the remote Heater Cycle pushbutton on the RCU-3 is used. Otherwise, the hold-on time setting at the EUR-5A panel is used.

## REMOTE HEATER TOGGLE

A separate momentary Remote Heater Toggle switch (not included) can be mounted at a convenient accessible location and connected with the EUR-5A to provide external Heater Cycle control.

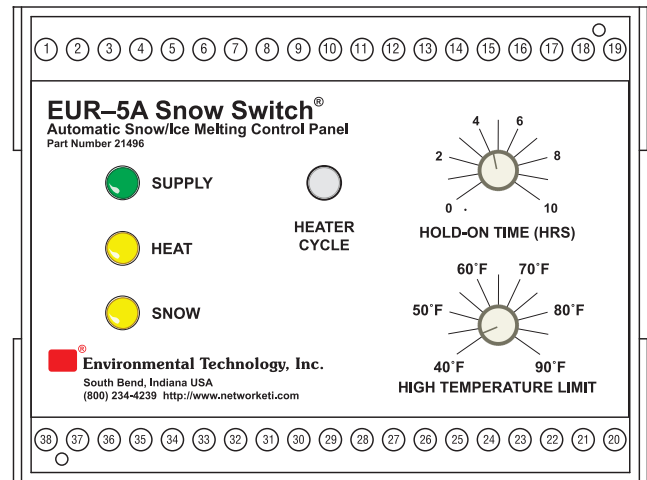


FIGURE 2. EUR-5A front panel layout

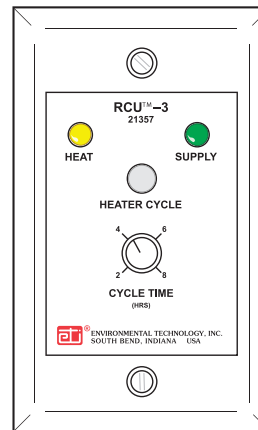


FIGURE 3. RCU-3 remote control for EUR-5A

This switch will initiate heater operation for the hold-on time set by the EUR-5A. If it is operated during the hold-on time, then heater operation is terminated.

## ENERGY MANAGEMENT COMPUTER INTERFACE

The EUR-5A provides three contact-closure outputs to the EMC to indicate operational status with indications of Supply Present, Snow Present, and Heat On.

The EUR-5A automatically controls the snow melting heaters based upon environmental conditions; this is the default operation of the system. Meanwhile the EMC can also control the EUR-5A by overriding its automatic operation. The heat can be held on or held off.

## INSTALLATION

The system installation with the EUR-5A snow and ice melting control should be performed by a qualified, licensed electrician. The installation and all electrical connections should conform to the NEC (ANSI/NFPA 70) in the United States of American, to the Canadian Electrical Code in Canada, and to all applicable local electrical codes and laws.

The EUR-5A and ETI sensors are Class 2 devices and utilize Class 2 wiring. The EUR-5A should be housed in a protected location that meets local electrical code.

The EUR-5A can be mounted in the same panel as the heater contactors, as long as no unrelated circuits are present and the required internal spacings and barriers are implemented. If the EUR-5A needs to be located in an area where it might be exposed to environmental hazards the EUR-5A should be housed in a NEMA enclosure suited for the local environment.

Figure 4 shows the dimensions of the EUR-5A. The EUR-5A can either be mounted to a 35 mm DIN rail, or mounted directly to the panel using the DIN rail latch, detached and reversed, as a mounting block.

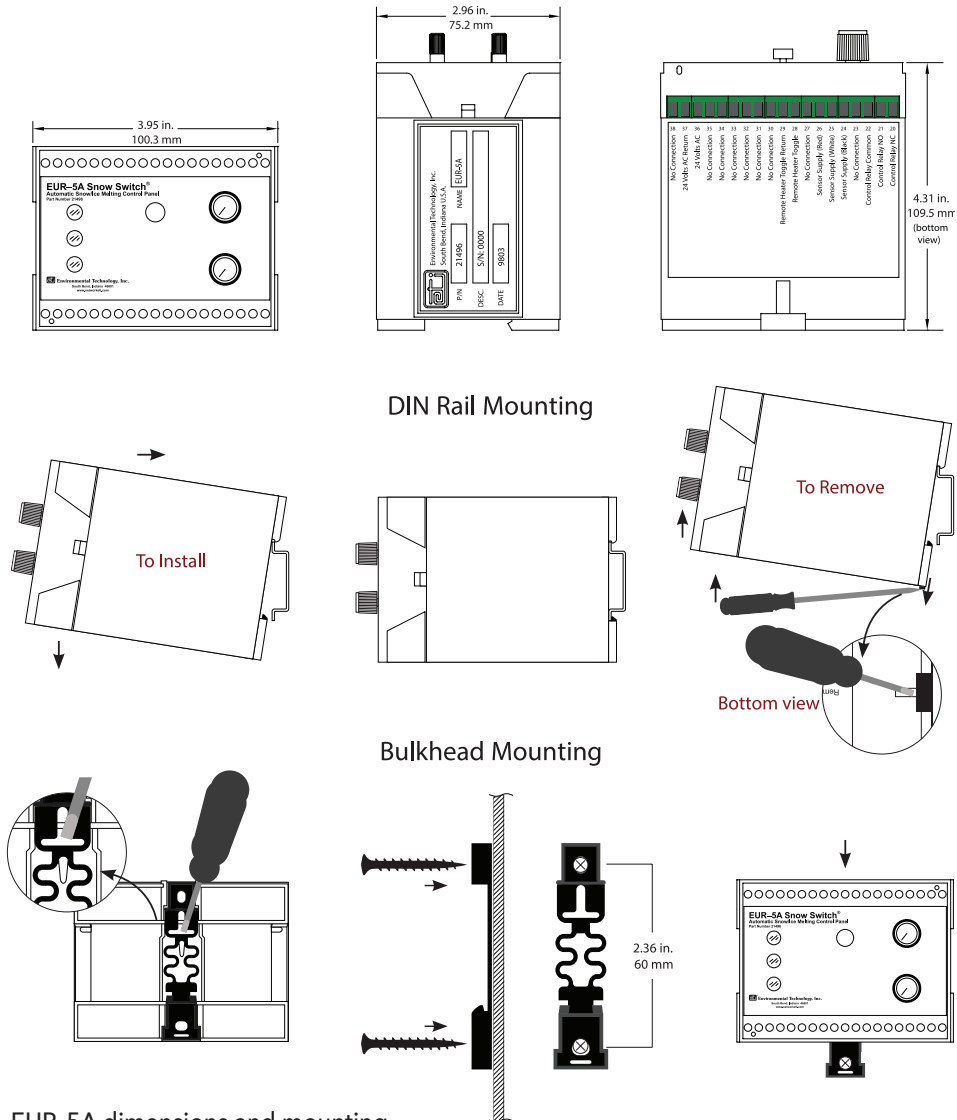


FIGURE 4. EUR-5A dimensions and mounting

## POWER SOURCE AND CONTACTOR CONNECTIONS

The EUR-5A operates from a 24 VAC NEC Class 2 power source. The optional 120 to 24 volt control transformer is included for use in installations using 120 VAC power.

Figure 5 shows power and contactor connections for a typical installation. Since the EUR-5A is an NEC Class 2 device, it usually requires a customer-supplied auxiliary relay for operating the heater control contactors to separate the Class 2 circuit from the power circuits. In case your installation is different and the necessary connections to the EUR-5A are unclear, Customer Service is available for assistance.

## INLINE FUSE CONNECTIONS

The supplied inline fuses, rated at 1.5 amps, are used to protect the EUR-5A and its connected devices.

Figure 6 shows how these are connected. One of them is in series with the 24-volt supply to the EUR-5A. The other is in series with the 24-volt supply connection to

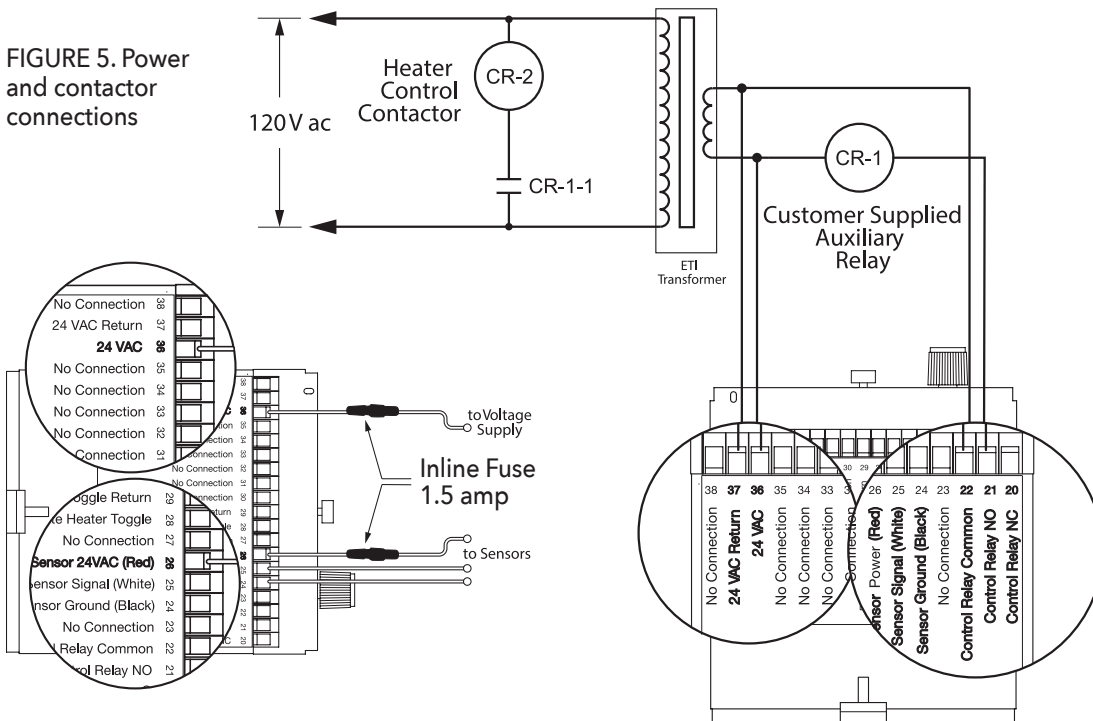


FIGURE 6. Inline Fuse connections

the environmental sensors that use power (this power source is full-wave rectified). These fuses are necessary to protect the EUR-5A from an overload or short in the sensor or its wiring.

The 24 VAC Return is not ground; a floating ac power source, such as the transformer secondary, is used here.

## GROUNDING

The EUR-5A sensor circuits and the EMC inputs are referenced to a common circuit ground. In most situations this part of the system can be left floating from the building panel ground (not connected to it). In some cases, noise or transient immunity may be improved if the EUR-5A (with its sensors) is actually grounded to the building ground. But this can create a voltage difference on the sensors because of the difference in the electrical potential of the building ground and the outdoor building structures contacting the sensors creating a ground loop. To avoid this potential ground loop install a resistor, such as 100 ohms, between the EUR-5A ground terminal (18 or 19) and the building panel ground.

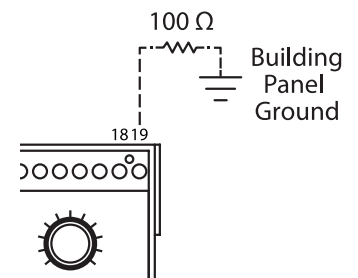


FIGURE 7. EUR-5A unit ground to Building Panel Ground with 100 ohm resistor

## DETERMINING THE AMOUNT OF SENSORS YOU CAN USE

The EUR-5A has 46 watts of power available for use between the sensors and contactor. The power requirement of your contactor will determine the amount watts left available for your sensors.

After determining your contactor's power requirement, subtract that from the 46 available watts, the result will be your available power for your sensors. You can then take your available power and use that to determine the number of sensors you can use.

- Each CIT-1 aerial sensor (at least one is required) uses 2.4 watts of power
- Each GIT-1 gutter sensor uses 6 watts of power
- Each SIT-6E pavement sensor uses 6 watts of power

At least one CIT-1 Aerial sensor is required for an effective for a snow/ice melt system. Make sure your combined sensor and contactor's power use does not exceed 46 watts.

## ENVIRONMENTAL SENSORS

The use of sufficient appropriately-placed environmental sensors is important for effective and efficient system operation. An aerial snow sensor can give the system a head start in protecting against snow or ice buildup, yielding more consistent protection.

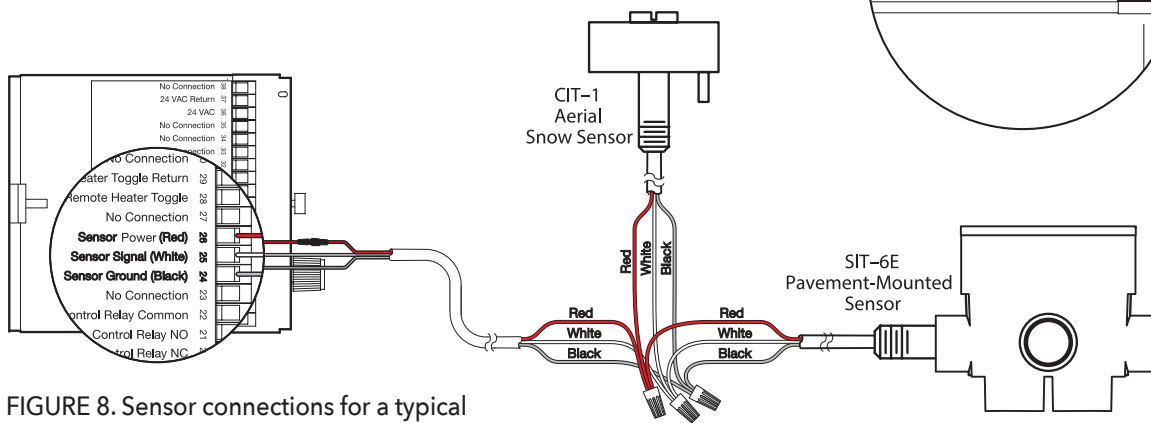


FIGURE 8. Sensor connections for a typical pavement snow melting application

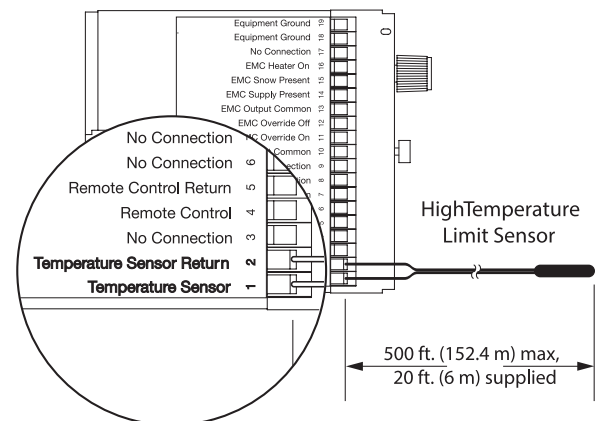
Figure 8 shows connections for a typical pavement snow melting application using both a CIT-1 Aerial Snow Sensor and a SIT-6E Pavement Sensor. These sensors are all connected in parallel. Use #18 AWG extension wire for distances up to 1000 ft. (304.8m) and #12 for up to 2000 ft. (609.6m). Running sensor wiring and power line voltage wiring in the same conduit is not recommended.

## HIGH TEMPERATURE LIMIT SENSOR

The high temperature limit sensor is connected across terminals 1 and 2. There is no polarity requirement. See Figure 9.

If the high temperature limit sensor is not used, then a 470k ohm resistor must be connected in its place, across terminals 1 and 2 of the EUR-5A. This is necessary to allow the EUR-5A to operate without the sensor. If the circuit is left open, the Heat indicator on the EUR-5A panel will flash.

FIGURE 9. Temperature limit sensor connection





## RCU-3 INSTALLATION

The RCU-3 remote control unit mounts in a single gang switch box. It can be located up to 500 feet (152.4 m) from the EUR-5A at a location convenient for observing snow melting system operation.

The RCU-3 connects to the EUR-5A at terminals 4 and 5. There is no polarity requirement. See Figure 10.

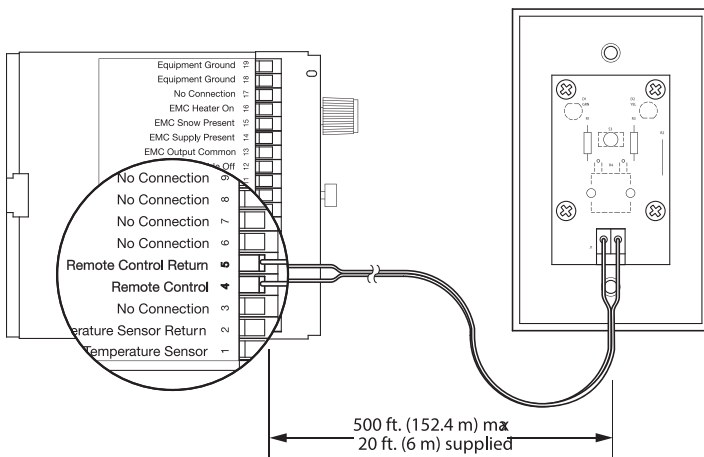


FIGURE 10. RCU-3 remote control connection to EUR-5A

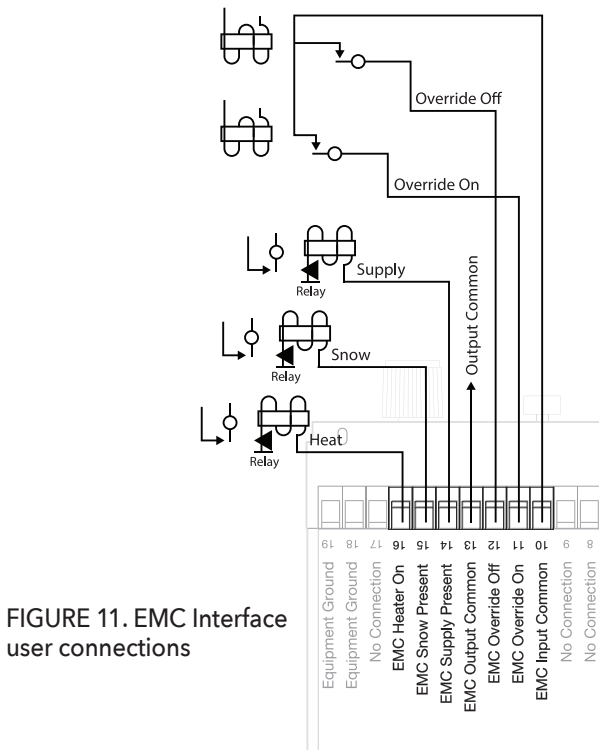


FIGURE 11. EMC Interface user connections

## ENERGY MANAGEMENT COMPUTER INTERFACE

The EUR-5A provides three contact-closure outputs to the EMC to indicate operational status with indications of Supply Present, Snow Present, and Heat On. See Figure 11.

These floating relay contacts share a common connection (terminal 13).

- The **SUPPLY PRESENT** terminal (14) connects to the common terminal (13) when the EUR-5A is receiving 24-volt power.
- The **SNOW PRESENT** terminal (15) connects to the common terminal (13) when the sensors report the presence of ice or snow.
- The **HEATER ON** terminal (16) connects to the common terminal (13) while the heaters are on.

When connecting to ECM connect as follows:

- **OVERRIDE ON:** when the ECM connects terminals 10 and 11 this forces the heaters to be on.
- **OVERRIDE OFF:** when the ECM connects terminals 10 and 12 this forces the heaters to be off.

These functions are independent of weather conditions and the status of the hold-on timer. If both are engaged, OVERRIDE OFF prevails.

## REMOTE HEATER TOGGLE CONNECTIONS

This is for a user-supplied panel-mounted momentary pushbutton switch for Heater Cycle control. It can be mounted at a location that may be more convenient than the EUR-5A panel. The connections are simply shorted together when the pushbutton is pressed. There is no polarity requirement. See Figure 12.

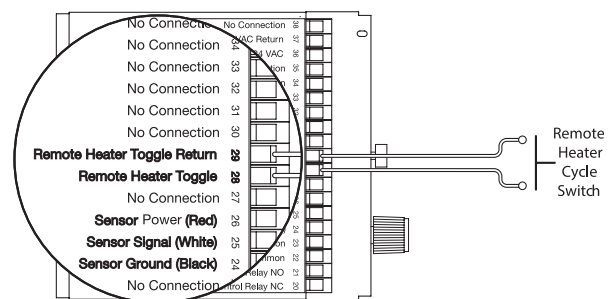


FIGURE 12. Heater cycle switch connection



## TROUBLESHOOTING

If there are any problems with system operation, the cause can be located and repaired as follows:

First, verify that all of the wiring connections are secure, and check fuses. Make certain that all EUR-5A terminal block screws are snugly tightened. Do not overtighten! If this is a new installation, check for wiring errors.

If none of the LED's on the EUR-5A front panel operate, check for 24 to 28 VAC between terminal block terminals 36 and 37. If the voltage is present, but the Supply light is not on, then the EUR-5A is defective.

If the "HEAT" LED is flashing it indicates that the High Temperature Sensor is not properly connected or the wiring is open. Check the sensor connection and replace the sensor if necessary. If the sensor is not used, verify that a 470k resistor is connected from terminal 1 to terminal 2, and the High Temperature Limit control is set to 90 °F.

The next tests determine whether a sensor or the EUR-5A is defective.

Remove EUR-5A power. Turn temperature limit dial to 90°F. If the ambient temperature is above 85°F (29.4°C), install a 470k resistor in place of temperature limit thermistor. Remove the wire connected to terminal block terminal 25 which is the sensor signal connection. Re-apply EUR-5A power. If the Heat LED turns on at this point, then the EUR-5A is defective.

Connect a short jumper wire between terminal block terminals 25 (sensor signal) and 24 (sensor ground). Now the Heat LED should turn on within 10 seconds and the control relay should close. If the Heat LED does not turn on with terminals 24 and 25 connected, then the EUR-5A is defective, if the Heat LED does turn on there is a problem with your sensors or sensor wiring.

To test the sensors connect only one sensor to the EUR-5A unit and attempt to activate it by cooling the temperature probe to 38° or colder by using ice water or freeze spray

and applying water to the sensor face. With the sensor registering both cold (38° or colder) and moisture the unit should switch on (this may take longer if using ice water instead of freeze spray to simulate cold conditions). Repeat this process for all sensors one at a time.

To test sensor wiring attach a DVM to the ground and signal wire of the sensor at the EUR-5A unit (black and white wires on CIT-1 and GIT-1 sensors, black and blue wires on the SIT-6E sensor). With the sensor in a dry condition the connection should read between 22 VDC and 26 VDC. With the sensor in a cold (38° or colder), wet condition the connection should read between 0 and 2 VDC. If your results are different there is probably a problem with the wiring.

The EUR-5A does not have user-serviceable parts inside. Hence component-level troubleshooting in the field is not practical. Checking the basic external functions and components is the correct approach. Contact Customer Service if this does not identify the problem.

## CONTACTING CUSTOMER SERVICE

For assistance, contact Customer Service. Office hours are from 8:00 AM until 5:00 PM ET.

**Email:** [info@networketi.com](mailto:info@networketi.com)

**Web:** [networketi.com](http://networketi.com)

**Mail:** ETI  
1850 North Sheridan Street  
South Bend, IN 46628

## ORDERING INFORMATION

PART NUMBERS	DESCRIPTION
21496	EUR-5A Snow and Ice Melting Control
<b>Accessories</b>	
14257	Power Transformer, 50 VA, 120 V to 24 V
21357	RCU-3 Remote Control
21184	Fuse Kit
<b>Sensors (Not Included)</b>	
10001	CIT-1 Aerial Snow Sensor
11351	GIT-1 Gutter Ice Sensor
20756	SIT-6E Pavement Mounted Snow/Ice Sensor
23832	Pavement Sensor Housing (Required for SIT-6E)

## RETURNS AND REPLACEMENT PART PURCHASES

Equipment cannot be returned for credit once it has been installed. ETI will repair or replace faulty equipment under warranty. Prior to removal of equipment for warranty return, please contact ETI Technical Support at 800.234.4239 for troubleshooting assistance.

Before returning a unit to ETI, obtain a Return Merchandise Authorization from our Customer Service Department, available between 8:00 a.m. and 5:00 p.m. Eastern Time at 574.233.1202 or 800.234.4239. If possible, use the original container and packing materials when packing the unit for shipment. It is important to mark the Return Merchandise Authorization clearly on the outside of the shipping container so that it may be correctly processed upon receipt at ETI. For more information about replacement parts or for a replacement Data Sheet or Manual, please visit [www.networketi.com](http://www.networketi.com).

## LIMITED WARRANTY

ETI's two year limited warranty covering defects in workmanship and materials applies. Contact Customer Service for complete warranty information.

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## EUR-5A TERMINAL CONNECTIONS

TERMINAL#	LABEL	DESCRIPTION
1	Temperature Sensor	High Temperature Limit Sensor (included)
2	Temperature Sensor Return	High Temperature Limit Sensor (included)
3	No Connection	
4	Remote Control	RCU-3 (included)
5	Remote Control Return	RCU-3 (included)
6	No Connection	
7	No Connection	
8	No Connection	
9	No Connection	
10	EMC Input Common	Remote Control (page 9)
11	EMC Override ON	Remote Control (page 9)
12	EMC Override OFF	Remote Control (page 9)
13	EMC Output Common	Reports this condition to EMC
14	EMC Supply Present	Reports this condition to EMC
15	EMC Snow Present	Reports this condition to EMC
16	EMC Heater ON	Reports this condition to EMC
17	No Connection	
18	Equipment Ground	Either terminal works: tied together internally
19	Equipment Ground	Either terminal works: tied together internally
20	Control Relay NC	Normally Closed
21	Control Relay NO	Normally Open. With terminal 21 to terminal 22
22	Control Relay	Common output to heater controller contactor
23	No Connection	
24	Sensor Ground	Parallel: only one (1) connection required
25	Sensor Signal	Parallel: only one (1) connection required
26	Sensor Power	Parallel: only one (1) connection required
27	No Connection	
28	Remote Heater	Toggle External HEAT CYCLE switch
29	Remote Heater	Toggle Return External HEAT CYCLE switch
30	No Connection	
31	No Connection	
32	No Connection	
33	No Connection	
34	No Connection	
35	No Connection	
36	24 VAC	input power from 24 VAC
37	24 VAC	Return input power from 24 VAC
38	No Connection	

TOP

BOTTOM

## SPECIFICATIONS

ITEM	DESCRIPTION
<b>Controls</b>	
Heater Cycle	Pushbutton Initiates Heat and Hold On Time
Hold-On	Time Sets Hold-On Time from 0 to 10 hours
High-Temperature Limit	Sets maximum temperature from 40°F to 90°F (4°C to 32°C) with 1°F (0.6°C) hysteresis.
<b>Indicators</b>	
Supply Green	LED indicates when 24 V control power is present.
Heat Yellow	LED indicates heater output is on.
Snow Yellow	LED indicates sensors detect snow or ice.
<b>Inputs</b>	
Environmental Sensors	3-terminal connection supplies power to and accepts input signals from ETI sensors including CIT-1, GIT-1, and SIT-6E.
Temperature Limit Sensor	For ETI High Temperature Limit Sensor (ETI 25076, included). Can be bypassed with 470k resistor.
Remote Control Unit	For ETI RCU-3 Remote Control Unit (ETI 21357, included)
Remote Heat Cycle	Allows connection of external pushbutton for Heat Cycle control.
EMC Override On	Connection to EMC Common will force Heat On.
EMC Override Off	Connection to EMC Common will force Heat Off.
<b>Outputs</b>	
Heater Control Relay	Form C Relay Contact Resistive Load: 1 A 30 Vdc or 0.5 A 125 Vac Max. switching power: 30 W or 62 VA
EMC Supply	Contact closure to common; Max. 0.5 A, 200 Vdc, 10 W
EMC Snow	Contact closure to common; Max. 0.5 A, 200 Vdc, 10 W
EMC Heat	Contact closure to common; Max. 0.5 A, 200 Vdc, 10 W
<b>Power Supply</b>	
Power Supply Voltage	24 V +/- 20%; NEC Class 2 power source
Power Consumption	2 W/80 mA (EUR-5A; excluding sensors)
Power Transformer (supplied)	120 V to 24 V, 48 VA max.
Protection Fuse Ratings	1.5 amps for control unit, sensors, and aux. relay (if used) 1.5 amps for separate protection of sensor power
<b>Temperature Range</b>	
Operating Temperature	-40°F (-40°C) to +140°F (+60°C)
Storage Temperature	-67°F (-55°C) to +167°F (+75°C)
<b>Mechanical</b>	
Enclosure Type	DIN mountable
Mounting 35 mm	DIN rail or bulkhead
Dimensions	3.95 in. W x 4.31 in. D x 2.96 in. H (100.3mm x 109.5mm x 75.2mm)

## RCU-3 SPECIFICATIONS

ITEM	DESCRIPTION
<b>Controls</b>	
Heater Cycle	Pushbutton Initiates Heat and Hold Time
Hold-On	Time Sets Hold-On Time from 2 to 8 hours
<b>Indicators</b>	
Supply Green	LED indicates when 24 V control power is present.
Heat Yellow	LED indicates heater output is on.
Snow Yellow	LED indicates detection of snow or ice.