summit
ICE MELT SYSTEMS

The Patented HotSlot®
Roof Ice Melt System
Installation and Operation Guide

Version 2.0.1

From This . . .

To This . . .

Thermodynamics analyzed. Applied.™

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HotSlot Roof Ice Melt System Installation and Operation Guide

This step-by-step Installation and Operation Guide provides the tools necessary to install the Summit Ice Melt Systems' HotSlot roof de-icing system.

For other applications or for design assistance, and to ensure you have the most up-to-date information, contact your Summit Ice Melt Systems representative or phone Summit Ice Melt Systems at (530) 583-8888. Also visit our web site at www.summiticemelt.com.

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Introduction

HotSlot is a roof edge ice melt system that minimizes ice formations on the following applications:

- Existing composition shingle roofs. Special applications with standard roofing materials, including shakes, shingles, rubber, hot tar, wood, metal, and plastic have been accomplished with custom specifications beyond the scope of this Guide.
- Gutters and downspouts made from standard materials, including metal and plastic.

The guide does not cover applications in which any of the following conditions exist:

- Preventing snow movement on roofs — HotSlot will not keep snow or ice from falling off the roof. It is designed to minimize ice formations and safely remove melt water from roof eaves. Snow fences or snow guards should be used to eliminate snow movement.
- Melting snow off a roof and/or reduction of snow load. HotSlot is designed to melt ice, not accumulated snow.
- HotSlot is intended for lighter ice and snow conditions on certain metal and composition shingle roofs. If conditions warrant, consider the more robust, patented PRO® or LT™ ice melt systems.
- Snow retention is an important component with roof ice and snow management. For the names of manufacturers of snow guards or snow fences, contact your Summit Ice Melt Systems' representative, or contact Summit Ice Melt Systems' directly at (530) 583-8888.

If your application conditions are different, or if you have any questions, contact your Summit Ice Melt Systems' representative, or contact Summit Ice Melt Systems directly at (530) 583-8888.

How To Use This Guide

This installation guide presents Summit Ice Melt Systems' recommendations for installing the HotSlot roof edge ice melt system. It provides design and performance data, heating cable layout installations, electrical hookup and testing. Following these recommendations will result in a reliable, energy-efficient system. Read and understand this entire guide before installation.

Other Required Documents

This guide is not intended to provide comprehensive installation instructions. For complete HotSlot de-icing system installation instructions, please refer to the following additional required documents:

• System Layout, additional installation instructions that are included with the heating cable power connection kits, thermostats, controllers, and accessories.

If you do not have these documents, you can obtain them from the Summit Ice Melt Systems web site at www.summiticemelt.com.

Ensure you are using the most current edition of the Installation and Operation Guide by contacting info@summiticemelt.com.

For products and applications not covered by this design guide, please contact your Summit Ice Melt Systems' representative, or contact Summit Ice Melt Systems directly at (530) 583-8888.

IMPORTANT NOTICE:

• Area laws differ concerning the handling and installation of heating cables, building materials, electrical connections, etc.
• Please check and comply with your local laws.
• Summit Ice Melt Systems, Inc. will not be held responsible for those who do not comply with their local or national laws while installing its products.

Safety Guidelines and Document Conventions

This symbol identifies important instructions or information.

As with any electrical equipment, the safety and reliability of any system depends on the manner in which they are installed and maintained. Incorrect design, handling, installation, or maintenance of any of the system components could damage the system and may result in inadequate performance, overheating, electric shock, or fire. To minimize these risks and to ensure that the system performs reliably, read and carefully follow the information, warnings, and instructions in this guide.

This symbol identifies particularly important safety warnings that must be followed.

WARNING: To minimize the danger of fire from sustained electrical arcing if the heating cable is damaged or improperly installed, and to comply with the requirements of Summit Ice Melt Systems, agency certifications, and national electrical codes, ground-fault equipment protection must be used on each heating cable branch circuit. Arcing may not be stopped by conventional circuit protection.

Please exercise all safety precautions necessary when using ladders, scaffolding, tools.

System Overview

Summit Ice Melt Systems' HotSlot system can minimize ice dams and icicles by maintaining a continuous path for melt water to drain from the roof. HotSlot system uses a sophisticated self-regulating heating cable which reduces heat output automatically as the heating cable warms to above freezing, resulting in lower energy use while eliminating the possibility of overheating. A typical Summit Ice Melt system includes the HotSlot Panels, Valley Channel® Base and Cover Panels, S1 or S2 self-regulating heating cables, heating cable connection and splice kits, control system and power distribution.

HotSlot is suitable for slopes down to 2/12.

System Components

A typical system may include the following:

- HotSlot Panels
- Valley Channel Base Panels
- Valley Channel Cover Panels
- Waterproof Screws
- S1 (110Vac) or S2 (208-277Vac) self regulating heating cable
- Heating cable connection and splice kits and accessories
- Controller system
- Power distribution

WARNING: The HotSlot ice melt system **MUST** be protected with a ground fault protection device per local codes and the NEC (National Electric Code) and CSA (Canadian Standards Association).

General Procedures

1. Review the following:

   A. Packing List and materials provided. Familiarize yourself with and confirm proper color, cable voltage, etc., before installing any components.

   B. System Layout drawings (may be sent separately) with panels identified, junction box and controller locations noted, sensor location

   C. Access Equipment (ladders, scaffolding, safety harnesses, etc.)

   D. On some systems, each cover and base panel is numbered. If so, position each base piece on the roof as designated in the System Layout Drawings.

   E. If the system includes the Low-slope ice melt system, consult the separate instructions enclosed.

Tools Required

- Chop saw, Skilsaw or portable bandsaw with aluminum / copper cutting blade
- Megohmeter Tester: 500 and 1000Vdc (2500 Vdc recommended)
- Multimeter
- Tape Measure
- Tin Snips
- Wire cutter
- Wire stripper
- Straight edge knife
- Drill
- Driver for screws
- 3/8" metal bit
- Deburring tool
- Caulk and caulking gun

Additional Materials Needed

- Cleaning solvent (i.e., denatured alcohol) and rags for valley areas
- Adhesive
- Masking Tape
- Touch Up Paint
- Electrical Tape
- Roofing Adhesive, DuraLink by Chemlink, or equal
- Roofing Sealant, DuraSil by Chemlink, or equal

Installation

Roof Preparation

The proper preparation of the roof is needed to ensure optimal energy efficiency, performance, and to prevent leaks.

HotSlot is suitable for slopes down to 2/12.

1. Existing Composition Shingle: Ensure 3/4" overhang or less along eave edge and that it is straight, flat, and sound, otherwise trim shingle completely off at the fascia plane. Carefully pry up second course of shingles with a broad paint scraper or similar tool. Install HotSlot along eave on first shingle course and tuck under second course of shingles.
2. New Composition Shingle: Install starter and first course of shingles. Install HotSlot along eave on first shingle course. Continue installing shingles with standard exposure.
3. On other conditions such as existing shakes, slate, tile and standing seam roofing, inquire as to the special conditions required. Also, consider using the patented PRO® or LT™ ice melt systems.

HotSlot Panel Installation

1. Determine the layout of the system. Place full-sized HotSlot panels flush to each end of the roof. Tuck top edge under second course of shingles.

2. The remaining panels shall be installed between the end panels, and have a minimum 0.25" gap between them.

3. Miter cut HotSlot Panel at valleys, leaving clearance for Valley/Channel system. De-burr all cuts.

Figure A: HotSlot Layout

For the best installation on existing shingle roofs, apply a heavy bead of caulking on the bottom side of the panel around each attachment hole and along the top flange edge.

HotSlot Panel Installation, (Cont'd.)

4. Using waterproof screws, attach the panels through the factory pre-drilled holes (five fasteners for 8' panel). If panels are less than full length, ensure a fastener is within 3" of each end, and spacing no greater than 24" O.C. Keep fasteners 5" away from center of valley.

5. Center the screw in the hole before securing; set the screw so the neoprene gasket bubbles out slightly from under the metal dome head. Do not over-drive.

   Ensure that the full shank thickness of the screw penetrates a minimum 1" into the roof wood substrate, or penetrates the full shank diameter (excludes the tapered point) through the wood, whichever is less. Some conditions do not allow adequate penetration of Summit's fasteners. **It is up to the installer to determine and procure suitable fasteners as needed**. Summit recommends the fasteners be installed through the wood deck and into the supporting wood members.

Where specified, the roof eave panels must extend to the edges of the roof eave (i.e., to the gable ends and rake ends). Contact your Summit Ice Melt Systems' representative or phone Summit if actual field dimensions are significantly different from design dimensions and System Layout Drawings. Failure to do this may cause melted snow to re-freeze at the unheated areas and form icicles and ice dams.

Valley Channel Installation

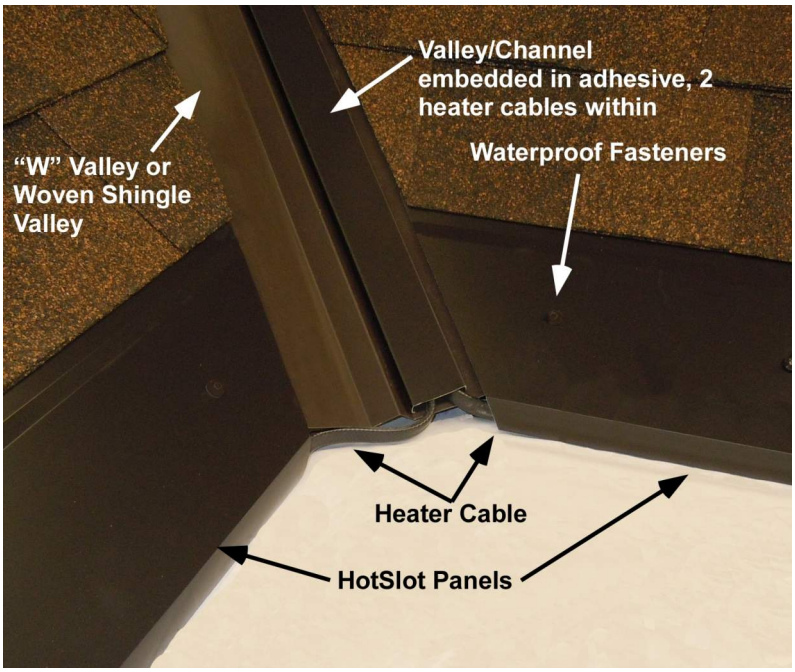

Figure B: HotSlot and Valley Channel Layout

1. If the valley uses a metal "W" valley flashing, the Valley Channel Base Panel is placed on one side of the "W". Installing the Valley Channel Base Panel on the side of the valley with less 'watershed' is preferred.

2. For shingle roofs with "woven" valleys, i.e., when no metal flashing is used, the Valley Channel Base Panels may be installed directly onto the shingles.

3. If required, trim the edge of the roofing materials on the side where the Valley Channel Base is to be installed.

4. Prepare valley metal by cleaning away debris and cleaning the metal surface with a solvent such as isopropyl alcohol.

5. Apply a continuous bead of approved adhesive to bottom side of the Valley Channel Base; allow 1/2" spaces between the Valley Channel Bases. Use masking tape or some form of securement to temporarily hold valley base until adhesive cures. A 2" length of heater cable can temporarily be inserted between two Valley Channel Base Panels for alignment.

Warning: The Valley Channel Base Panels should extend all the way down to the roof eave (the lower edge of the valley flashing). Failure to do so may cause melted snow to re-freeze at the unheated areas and form icicles and ice dams.

Heating Cable Installation

Prior to starting installation:

- Test the heating cable insulation resistance to confirm that the heating cable has not been damaged during shipping (see Electrical Testing, Pages 15-16). All cable has been factory tested prior to shipment.
- Visually check the components for damage.
- Make sure that all material is included as indicated on the Packing Slip.
- Make sure that you will be using a ground-fault equipment protection device (GFEPDs) with a 30mA trip level to power the circuit. Nuisance tripping can occur if you use 5mA trip level ground fault interrupters (GFIs) even with undamaged heating cable.
- Protect the heating cable ends from moisture and mechanical damage if they will be left exposed before connection.
- Compare the heating cable received with the design voltage required to ensure the heating cable is right for your installation. The voltage is clearly marked on the heating cable.
- Compare the design circuit lengths with the heating cable lengths received in order to minimize the need for splicing.
- Ensure that the heating cable required does not exceed the maximum circuit length for the voltage and circuit breaker rating to be used (see page 29).

WARNING: Take special care to protect the heating cable and outer jacket from damage when routing through the HotSlot Base and Valley Channel Base Panels and adjacent roofing and flashings. To optimize energy efficiency, heating cable clearances within slots are very tight. Pre-bending the heating cable by hand is recommended prior to installation and will enable an easier, safer installation. Damaged heating cable must be replaced or properly repaired prior to installing.

Heating Cable Installation (Cont'd.)

1. Once the HotSlot and Valley Channel Base Panels have been installed and adhesives cured, if applicable, the heating cable is ready for installation.

2. Follow the heating cable Power Connection Kit instructions, and install the End Seal as directed. The End Seal will protrude beyond the HotSlot Panel. End Seal may be better concealed if folded down under the Panel and affixed to the fascia.

WARNING: Taping heating cable ends is NOT acceptable for terminations.

3. Start with the heating cable end terminated with the End Seal. Leave the End Seal beyond the edge of the roof and work your way back to the other end of the system per the System Layout Drawings. Press the heater cable into the slot behind the drip edge. Ensure cable is seated completely into the slot. See Figure C.

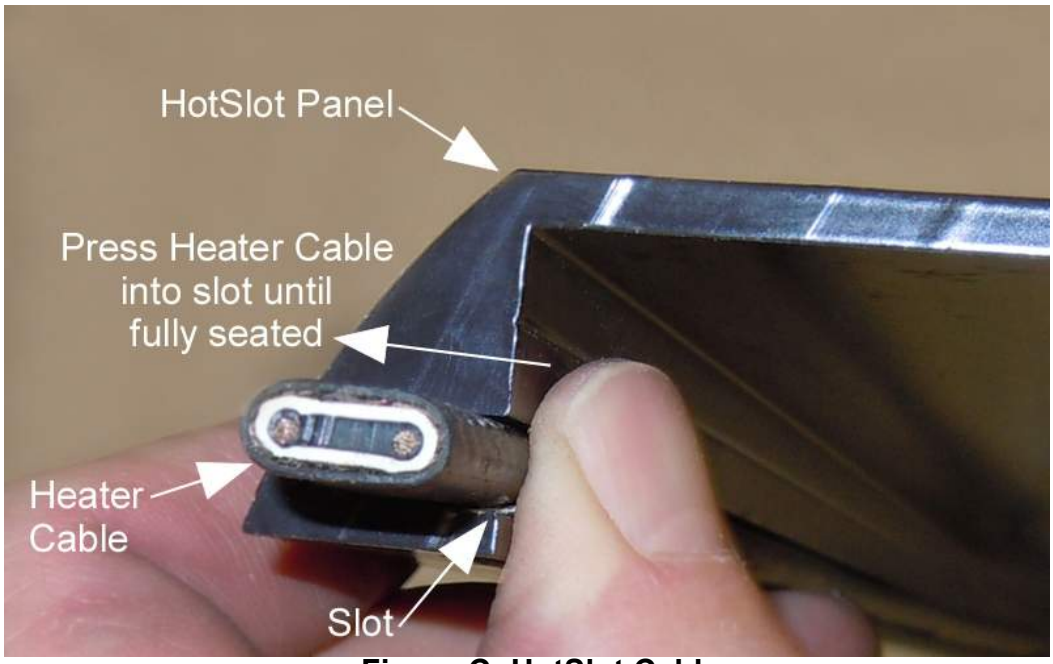

Figure C: HotSlot Cable

When installing the heating cable:

- Do not pull it over sharp edges.
- Do not use excessive pulling force.
- Do not kink or the crush heating cable.
- Do not walk on the heating cable.
- Protect heating cable from sharp edges, such as sheet metal covers, with electrical tape.
- If precipitation (frost, rain, or snow) will occur before completing end seal terminations, use electrical tape to temporarily prevent water intrusion and shorting of the cable.

4. If applicable, continue tracing up one side of Valley Base Panel and return down other side of base. It maybe helpful to temporarily remove the adjacent mitered HotSlot Panel to insert and twist the Heater Cable. Re-install.

5. Be sure to leave a drip loop at components so that water will not track down the heating cable into the component. Install the heating cable using the System Layout Drawings provided.

6. Be sure to leave enough heating cable to connect to the junction box.

7. Be sure to leave drip loops where appropriate.

8. Be sure to loop and secure the heating cable at the bottom of downspouts so that the heating cable is not exposed to mechanical damage. Use protective downspout brackets for heating cable.

9. Use UV resistant heating cable ties whenever two heaters are intended to stay together.

10. Visually inspect the heating cable for mechanical damage and test the entire circuit for insulation resistance prior to applying power. (See Electrical Hookup, page 15-16).

WARNING: Shock and fire hazard. Damaged heating cable or components can cause electrical shock, arcing, and fire. Do not attempt to energize damaged heating cable or components. Replace them immediately using a new length of heating cable and the appropriate accessory.

Electrical Testing

Megohmeter Test

IMPORTANT: The insulation resistance test is critical to ensure the safety and reliability of the heating cable system. This test should be performed at four stages: 1) when cable is received, 2) after cables are installed in system, 3) prior to initial startup, 4) as part of the regular system inspection.

WARNING: Shock or fire hazard. Disconnect power to all circuits prior to testing.

NOTE: Prior to electrical hookup, test the electrical insulation resistance of the heating cable. Every foot of heater cable provided by Summit Ice Melt Systems has been tested and approved in the factory for insulation integrity.

Use a megohmeter, test insulation with 500 and 1000Vdc voltages. IEEE 515.1 recommends testing be done at 2500 Vdc, as some problems may not be detected at lower voltages.

First, measure the resistance between the heating cable bus wires and the grounding braid; then measure the insulation resistance between the braid and the metal Eave Panel Cover, metal roofing, and gutter.

Testing Procedure

1. Disconnect all power to the heating cable, thermostat, and contactor.
2. Set test voltage 0 volts Vdc.
3. Connect the negative lead (-) to the heating cable metallic braid.
4. Connect the positive lead (+) to both heating cable bus wires.
5. Turn on Megohmeter and set the voltage to 500 Vdc; apply the voltage for 1 minute. Record the resistance in the Installation Log, Page 23.
6. Repeat Step #5 for 1000Vdc (and the recommended 2500 Vdc).
7. Turn off the Megohmeter.
8. If the megohmeter does not self-discharge, discharge phase connection to ground with a suitable grounding rod. Disconnect the megohmeter.
9. Re-connect the thermostat or contactor and re-energize the system.

Electrical Testing: Megohmeter Test (Cont'd.)

Insulation Resistance Criteria

A clean, dry, properly installed circuit should measure thousands of megohms, regardless of the heating cable length or measuring voltage (0-2500 Vdc). The following criteria are provided to assist in determining the acceptability of an installation where optimum conditions may not apply:

- **All three insulation resistance values should be greater than 20 megohms.**
- Insulation resistance values for any particular circuit should not vary more than 25% as a function of measuring voltage.
- Reading must be steady at measuring voltage.
- If any of these conditions are not met, consult the "Troubleshooting" instructions on Pages 24-25.

Continuity Test

This continuity test is useful in determining if the heating cable is damaged or was not connected correctly. This test can also be performed as part of the troubleshooting procedure. Note: some of the heating cable components, such as the End Seal kit and heater cable power connection, and splice/tee kits which utilize heat-shrink tubings, may not re-enterable and will have to be replaced after this test is done.

WARNING: Shock or fire hazard. Disconnect power to all circuits prior to testing.

1. Disconnect all power to heating cable, thermostat, and contactor.
2. Twist the two bus wires together at one end.
3. Take a resistance reading from bus wire to bus wire at the other end. The reading should be 3 ohms or less. High readings (above 1000 ohms) generally indicate bus wire damage or misconnected components.
4. If there are any tees on the circuit, each leg of the tee must be tested separately.
5. Be sure to untwist the bus wires and install new components on the circuit prior to re-energizing the circuit.
6. Re-connect the contactor or thermostat and re-energize the circuit.

Electrical Hookup

1. It is recommended that a qualified electrician, licensed in the jurisdiction of the installation, to conduct the hookup and testing of the work.

WARNING: Do NOT penetrate the heating cable protective jacket with staples, nails, etc. or route the heating cable over sharp edges that could abrade the jacket over time.

2. Route the heating cable from the Panel system to the electrical junction box. Be sure to include a drip loop at the box.

3. To complete the power connection, refer to the heating cable Power Connection Kit instructions.

WARNING: DO NOT use 5mA GFCI breakers, as they will likely cause nuisance tripping and cause the heating system to malfunction.

4. For heating systems which a complete control system has not been provided, Summit Ice Melt Systems requires a 30 milliamp ground fault circuit breaker sized for your ice melt system.

5. Complete and return ***Installation Log*** within 30 days of completion (See Page 23).

Multi-Circuit CDC Controllers

Summit offers a variety of control systems for its ice melt systems. They range from 4-, 8, and 12- circuit CDC controllers to the Ultra-HECS and APOGEE High Efficiency Controllers. The CDC controllers are discussed here. Contact Summit for information on the APOGEE and Ultra-HECS. Consult the appropriate installation guide accompanying the controller for further information regarding operation, installation and sensor placement.

If there are problems with the system not activating, refer to “Troubleshooting” on pages 25-26.

Figure G: Summit Ice Melt Systems 4CDC Digital Ambient Temperature Sensing Controller

Overview

Summit optional Multi-Circuit Digital Controllers provides On/Off operation of its S1 and S2 (120Vac to 277Vac) self-regulating heater cables by energizing up to four individual branch circuits via adjustable control values as set on the temperature controller.

The Multi-Circuit controllers provides a set point for on/off operation as well as a low-temp cutout of the circuits. The low-temp cutout shuts the system off when temperatures are so cold that no snow and ice melting occurs. Both temperatures are easily field adjustable to suit local conditions. Factory temperature settings: On at 36°, Low-Temp Cutout -20°.

Multi-Circuit CDC Controllers (Cont'd.)

Operation

The Multi-Circuit controllers use a thermistor to sense ambient temperatures. When the temperature drops below the Heater-On set-point, the system is energized. When the temperature rises above the Heater-On set-point, the system is de-energized.

If the temperature drops below the low-temp cutoff, the system is de-energized. When the temperature rises above the low-temp cutoff, the system is energized.

The 3-position rocker switch allows the operator to set the system in Automatic, Manual (system is energized no matter what ambient conditions are), or Off mode (center position).

Installation

The Multi-Circuit controllers have NEMA 4/12 rated enclosures so they may be mounted indoors or outdoors, typically near the circuit breaker panel. Each branch circuit must be protected by a ground fault protection device per the NEC. A 120Vac protected circuit is required to energize the controller.

The ambient sensor is mounted outdoors in a shaded location representative of minimum ambient conditions (typically on the north side of a building), and away from any heat source, such as direct sunlight or a utility room exhaust vent, so that the temperature sensor gives an accurate reading of the air temperature reflective of actual ambient conditions. The ambient sensor comes with a standard 10 ft lead, but its range can be extended up to hundreds of feet using ordinary stranded copper wire. *(See schematic diagram).*

Pre-Season Testing

The heater circuits may be energized and tested for proper functionality prior to the cold weather season by simply setting the 3-position rocker switch to Manual. Amperage readings may then be taken on each branch circuit. Amperage will depend on ambient temperature and time. Follow heater manufacturer test procedures.

Multi-Circuit CDC Controllers (Cont'd.)

Changing Set-Point Values

To change the Heater-On and Low-temperature Cutout set-point values, follow the steps below with the controller powered and the rocker switch set to AUTO (see Figure H: Control Module on next page):

1) Press the SET button once to display the current Heater-On set-point value (displays temperature in tenths of degrees). A red indicator light under "out1" will appear.
2) Press the UP or DOWN arrow button to adjust the value. Hold button to scroll.
3) Press the SET button again to display the current Low-Temp Cutout set-point value. A red indicator light under "out2" will appear.
4) Press the UP or DOWN arrow button to adjust the value. Hold button to scroll.
5) Press the SET button again to return to the normal operating mode (will display the current sensed temperature with no decimal point.)

NOTE: Low-Temp Cutout can effectively be avoided by setting its value below the lowest expected ambient temperature (for example: -50.0.)

Alarm Buzzer and Error Messages

If the alarm buzzer sounds, it can be silenced by simultaneously pressing the SET and Down buttons. The alarm message will continue until condition is corrected.

Common Error Messages

1) "ErP" = Error of the probe not shown on display
2) "ooo" = Open sensor (one or both sensor leads are not connected).
3) "- - -" = Shorted Sensor (direct short between sensor leads).

Multi-Circuit CDC Controllers (Cont'd.)

Control Module

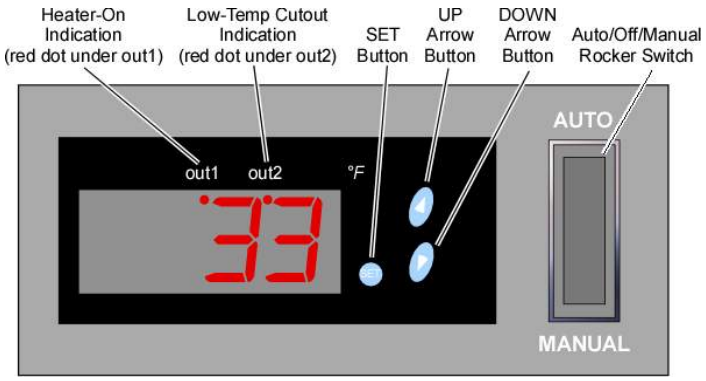

Figure H: Multi-Circuit Control Module

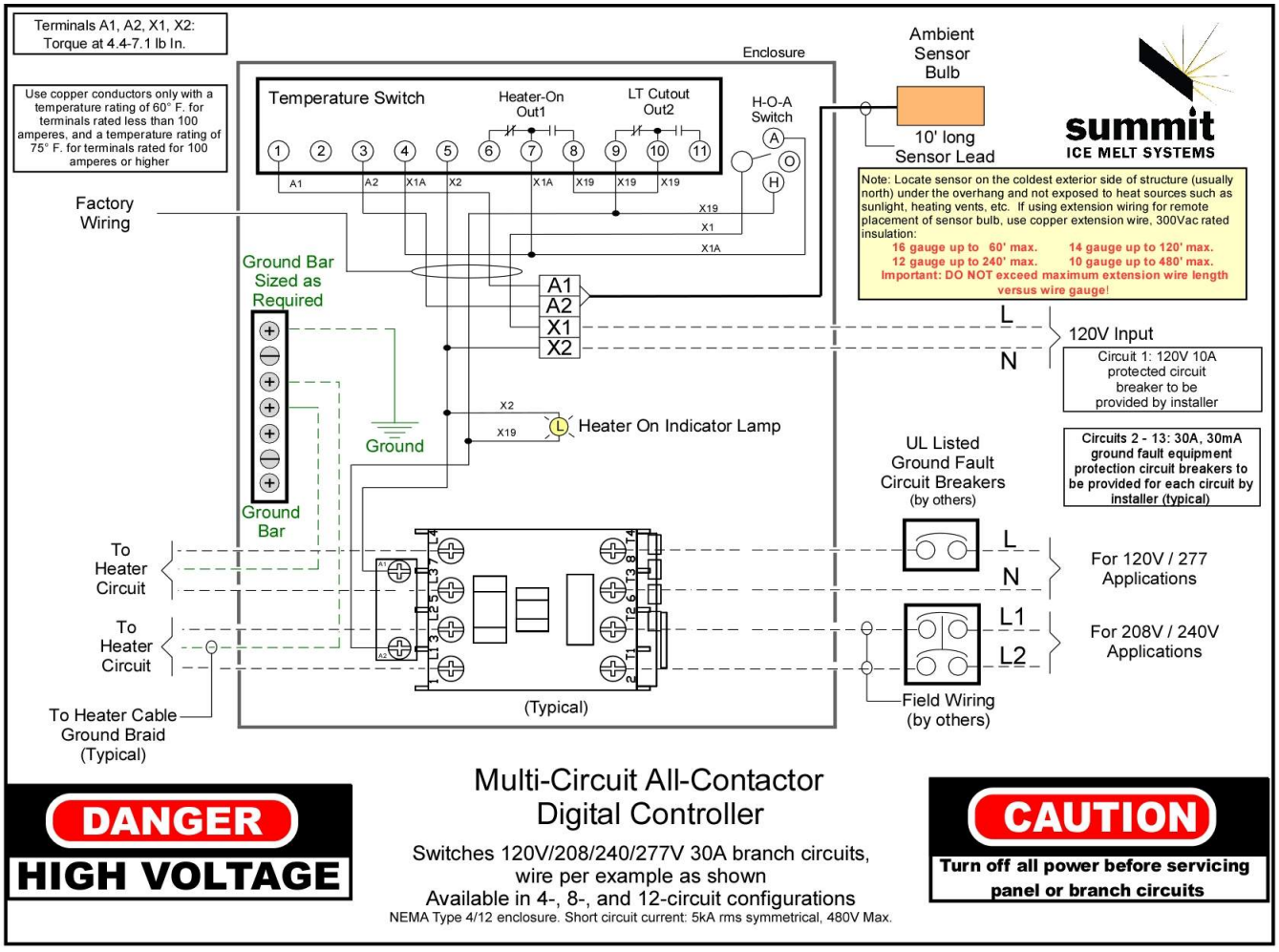

Fig I: Multi-Circuit All-Contactor Schematic Diagram

Roof Ice Melt System Operation Procedures

General Description

The roof ice melt system is designed to minimize ice dams at eaves and in valleys and to prevent icicle formation at the eaves. This system accomplishes this by providing heated eave panels that keep melted snow from re-freezing as it drains off the eave, and by providing heated valley panels that ensure a continuous water drain path down the roof. It is important to have the system energized prior to the start of a storm, as is is much easier to prevent ice formations than it is to melt them.

Fall Testing

At some point in time prior to the winter season, test each circuit by turning on each circuit breaker, one at a time, and leave them on for 10-15 minutes. Should any of the circuit breakers trip, reset the circuit breaker for a second test. If the circuit breaker trips again, check with your electrician.

If the heaters are controlled by a separate controller, consult the installation and operation guide specific to that controller.

Winter Startup

At the onset of snow accumulation on the roof surface, energize the roof ice melt system by turning on the circuit breakers (typically November/December) and controller, if applicable.

Spring Shutdown

In the spring when the snow has melted off the roof surface, the owner should de-energize the system (turn off the circuit breakers) for the summer. Certain sections may be turned off sooner than others depending on the exposure and snow pack.

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summit ICE MELT SYSTEMS

Date: ____/_____/202_____

Summit Project # _____

Customer PO # _____

Installation/Testing Log

End User Information:

Name: _____

Job Name: _____

Address: _____

Phone: _____ Mobile: _____

Email: _____

Visual Inspection:

- ❑ Check for any signs of improper installation, check for cuts in outer jacket
- ❑ Check that only Summit Ice Melt Systems products have been used
- ❑ Verify Summit Ice Melt Systems Installation Instructions were reviewed and followed
- ❑ Verify the heater cable does not lay unprotected over sharp edges
- ❑ Verify heating cable attachment points are secure

Ice Melt System: [ ] **PRO** [ ] **LT** [ ] **HotSlot** [ ] **LowSlope** [ ] **Valley** [ ] **Standing Seam**
Heating Cable Model # _____ Number of Circuits: ___ Megohmeter Mfgr: _____
Model # _____ Voltage Setting: _____ Date of last Megohmeter Calibration: _____

Visual Inspections, Multimeter and Megohmeter test performed by

Name: _____ Company: _____ Date: ___/____/202__

Installer Information	***Installation Log Sheet***
Company:	[ ] Test #1: Upon shipment [ ] Test #2: Upon Cable Installation prior to cover [ ] Test #3: Prior to startup (at terminal blocks) [ ] Insulation resistance test at 500, 1000, and 2500 Vdc. [ ] Installation log sheet completed and attached
Address:	
City, State, Zip:	
Contact:	Heating Cable Information
Phone: ( ) Mobile: ( )	Project Application:
Fax: ( )	Heating Cable Length: Type:
Email:	Reel Numbers:

(Make copies as needed)

							Test #1: Receipt of Material			**Test #2: Before Covering**			**Test #3: Before Commissioning**		
	Zone	Cable Type	Length	Breaker Number	Starting Meter Number	Ending Meter Number	Insulation Resistance (MΩ) @500	Insulation Resistance (MΩ) @1000	Insulation Resistance (MΩ) @2500	Insulation Resistance (MΩ) @500	Insulation Resistance (MΩ) @1000	Insulation Resistance (MΩ) @2500	Insulation Resistance (MΩ) @500	Insulation Resistance (MΩ) @1000	Insulation Resistance (MΩ) @2500
Cable #1															
Cable #2															
Cable #3															
Cable #4															
Cable #5															
Cable #6															

Perform insulation resistance test at 500 and 1000Vac. The National Electrical Code recommends test at 2500 Vdc (Bypass controller if applicable)

Warning: Disconnect all power before performing insulation resistance and continuity tests.

Important: In order to validate and qualify for the warranty, the above tests must be conducted on the installed heating cable and these completed results recorded and returned within 30 days via email, mail or fax to Summit Ice Melt Systems. Upon receipt of this completed registration form and the Installation Log, SIMS will send the 10-Year Limited Warranty Extension acknowledgment to End User contact.

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Troubleshooting Guide

Symptom	Probable Causes	Corrective Action
A. Circuit breaker trips.	Circuit breaker under-sized Circuit length too long Start-up temperature below design temperature	Re-size the circuit breaker and feed wiring according to instructions. Turn on/re-set.
	Defective circuit breaker	Replace the circuit breaker
	Connections or splices may be shorting out. Physical damage to the heating cable.	To confirm that heating cable is damaged, test the insulation resistance according to the procedure in "Electrical Testing" on Page 15-16. Locate and repair incorrect connections or splices. Locate and remove damaged sections of heating cable. To locate shorting problems, follow these steps: 1. Visually inspect the power connection, splices, and End Seals for proper installation. 2. Check for visual indications of damage to the heating cable. 3. Look for damage at entrances to downspouts, around eaves and valley areas. 4. If at this point you have not located the problem, you will need to begin isolating sections of the heating cable to find the general area of damage. For example, cut the circuit in half and, using a megohmeter, test both halves of the circuit to find the damaged section. Then remove the damaged section of the heating cable.
	Bus wires in contact with each other.	Cut off the End Seal. Re-cut the heating cable end and install a new End Seal.
	Excess moisture in connection boxes or splices.	Dry out and re-seal connections and splices. Test with a megohmeter per "Electrical Testing."
	Nick or cut in heating cable or power feed wire with moisture present.	Locate and replace damaged power feed wire.
	Using a 5-mA ground-fault protection device.	Replace circuit breaker with 30-mA ground-fault protection device.
	Controller not wired correctly.	Check controller's wiring instructions.
B. Power output is at zero or appears low.	Low or no input voltage.	Check voltage and correct.
	Circuit is shorter than design shows because splices or tees are not connected, or the heating cable has been severed.	Check length of heating cable installed. Check all heating cable splices and tees. Check at End Seals for continuity.
	Improper connection causes a high-resistance connection.	Check and fix heating cable splices and tees.
	The control thermostat is wired incorrectly.	Check and re-wire controller.

Summit Ice Melt Systems

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Ph: 530-583-8888

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Troubleshooting Guide (Cont'd.)

Symptom	Probable Causes	Corrective Action
C. Heating cables fail insulation resistance testing.	Heating cable connections or splices may be shorting out Physical damage to the heating cable.	To confirm that heating cable is damaged or components are shorting, test the insulation resistance according to the procedure described in "Electrical Testing" on pages 15-16. Locate and repair incorrect heating cable connections or splices. Locate and replace damaged sections of heating cable. To locate shorting problems, follow these steps: 1. Visually inspect the heating cable power connections, splices, and End Seals for proper installation. 2. Check for visual indications of damage to the heating cable, especially in areas such as valleys and transitions. 3. Look for damage at entrances to downspouts, around eaves, and at transitions between the system and gutters. 4. If at this point you have not located the problem, you will need to begin isolating the sections of the heating cable to find the general area of damage. For example, cut the circuit in half and, using a megohmeter, test both halves of the circuit to find the damaged section. Then remove the damaged section of the heating cable.
	Excessive moisture in heating cable connection boxes or splices.	Dry out and re-seal connections and splices. Test with a megohmeter per "Electrical Testing."
	Nick or cut in heating cable or power feed wire with moisture present.	Locate and replace damaged power feed wire.
D, Snow is not melting around the ice melt system.	Circuit breaker tripped. Controller not on or not working. Ambient temperature too cold.	See Symptom A "Circuit Breaker Trips." Check controller.
E. Downspouts are blocked by ice.	Circuit breaker tripped. Controller not on or not working. Ambient temperature too cold.	See Symptom A "Circuit Breaker Trips." Check controller.
F. The circuit does not draw sufficient power of approximately 12 w/ft at 32° F in snow or ice (5 w/ft at 32° in air).	Circuit breaker tripped. Controller not on or not working. All sections not connected.	See Symptom A "Circuit Breaker Trips." Check controller. Repeat continuity test.

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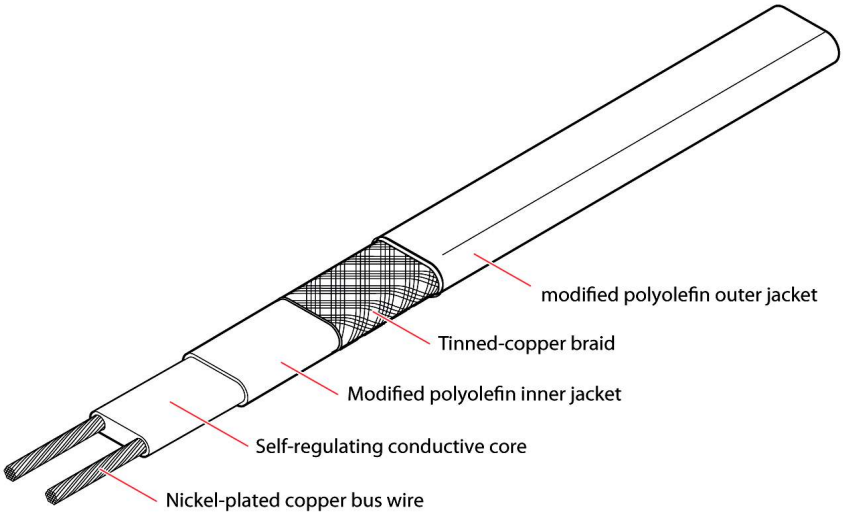
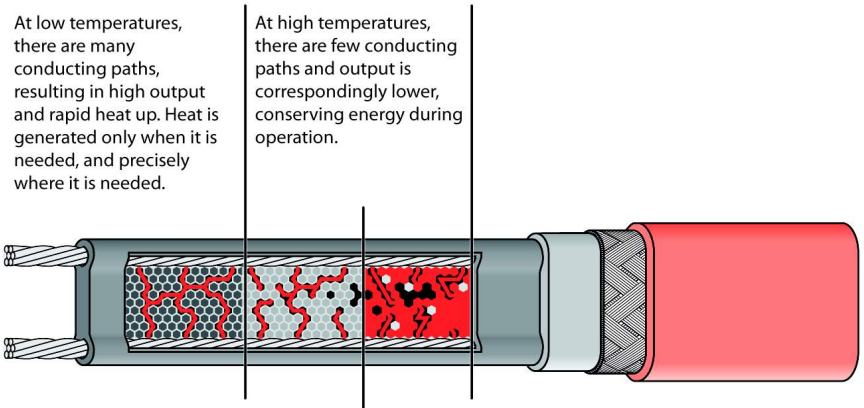
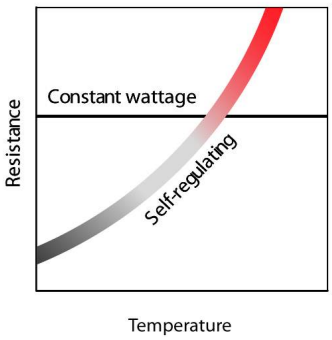
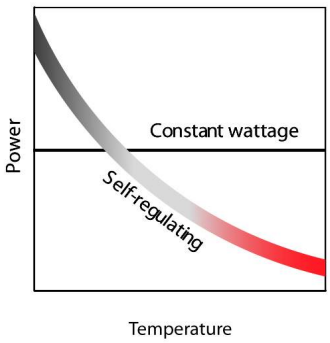
Self-regulating heater cable construction and technology





The following graphs illustrate the response of self-regulating heating cables to changes in temperature. As the temperature rises, electrical resistance increases, and the heating cables reduce their power output.





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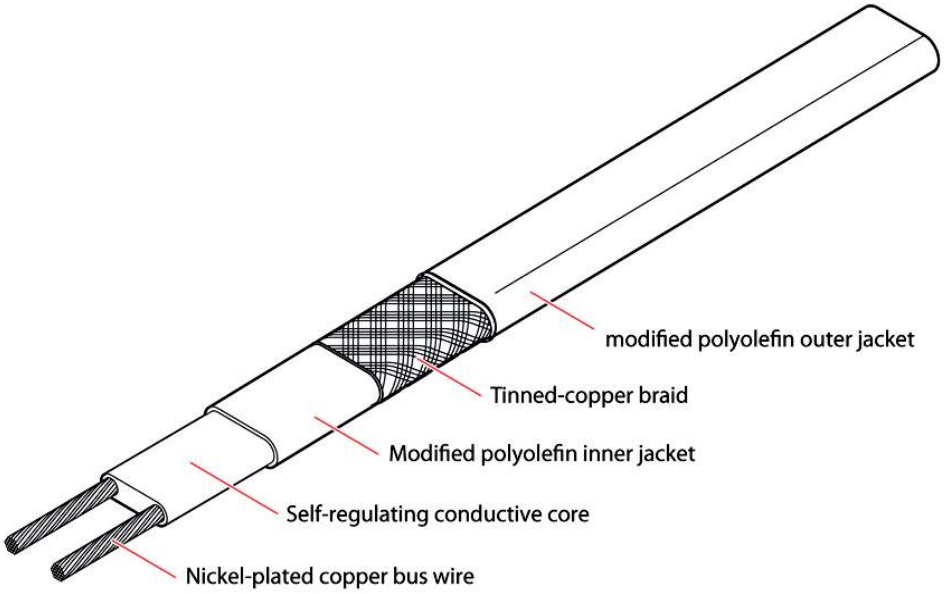
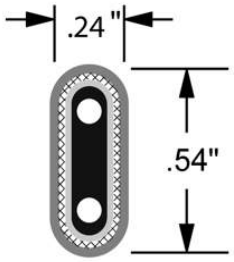
S1 and S2 Self-Regulating Heating Cable Specifications





Heating Cable Specifications

Bus Wires	16 AWG , Nickel Plated copper
Heating Core	Radiation Cross-linked Polyolefin
Primary Dielectric Insulation	Radiation Cross-linked Polyolefin
Metallic Braid	16 AWG (equivalent size) tinned copper
Outer Jacket	Polyolefin (with UV inhibitor)
Minimum Bend Radius	1.25"
Supply Voltage	120 or 208-277 Vac

Heating Cables Meet or Exceed the Following Tests

Abrasion Resistance	UL 1588 (8.3); IEEE 515.1 (4.3.4)
Cold Bend	IEEE 515.1 (4.2.10)
Deformation	IEEE 515.1 (4.2.8)
Dielectric Withstand	IEEE 515.1 (4.2.1)
Resistance to Impact	UL 1588 (8.2)
Resistance to Cutting	IEEE 515.1 (4.3.3)
Resistance to Crushing	UL 1588 (8.1)
Temperature	UL 1588 (9.1-9.3)
UV and Condensation	IEEE 515.1 (4.3.2)
Vertical Flame	UL 1588 (8.5)

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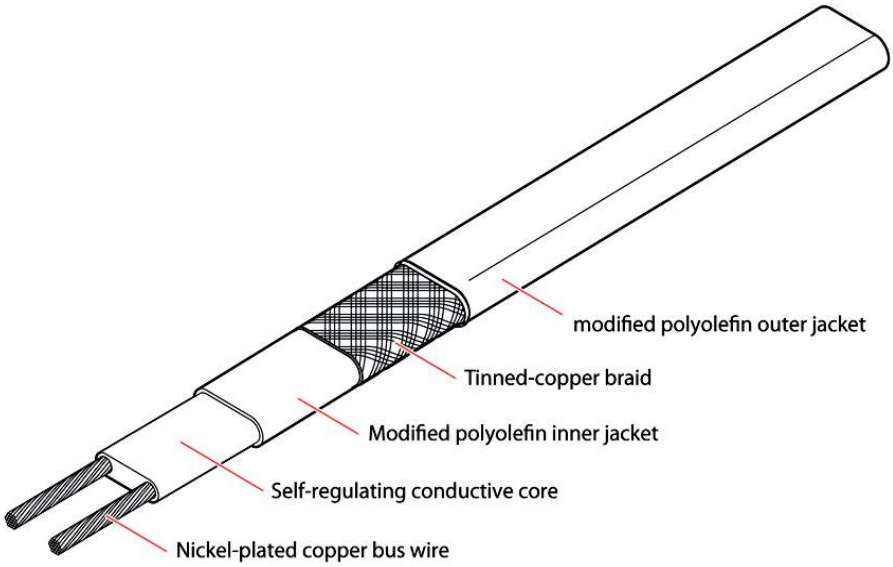
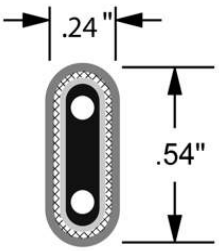
S1 and S2 Self-regulating Heating Cable Description





The heating element in Summit's S1 and S2 heating cables consist of a continuous core of conductive polymer extruded between two copper bus wires. As current flows through the core, the heating cables regulate their own heat output in response to ambient temperatures.

This self-regulating feature eliminates hot spots and results in better temperature control to protect roof, gutter, and your roof edge ice melt systems.

Their parallel circuitry allows them to be cut to the exact length required, with no wasted heating cable.

Approvals

UL LISTED De-Icing and Snow-Melting Equipment (KOBQ)

CSA Certified Specifically for snow melting under Section 2B

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S1 and S2 Self-regulating Heating Cable Maximum Circuit Lengths in Feet

Model Number	Operating Voltage	Design Load (Amps/foot) @0°	Start-up Temp	Circuit Breaker Size			
				15A	20A	30A	40A
S1	120 Vac		20° F.	100	135	175	175
		0.155	0° F.	80	105	155	175
S2	208 Vac		20° F.	185	245	350	350
		0.083	0° F.	145	190	290	350
S2	240 Vac		20° F.	190	250	350	350
		0.080	0° F.	150	200	295	350
S2	277 Vac		20° F.	195	255	350	350
		0.077	0° F.	155	205	310	350

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WARNING: The HotSlot ice melt system **MUST** be protected with a ground fault protection device per local codes and the NEC (National Electric Code) and CSA (Canadian Standards Association).

Notes:

summit
ICE MELT SYSTEMS

Thermodynamics analyzed. Applied.

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