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

Version 2.0.1

From This . . .

To This . . .

Thermodynamics analyzed. Applied.

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LT Roof Ice Melt System Installation and Operation Guide

This step-by-step Installation and Operation Guide provides the tools necessary to install the patented Summit Ice Melt Systems' LT 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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Table of Contents

Introduction

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

- Roofs made from standard roofing materials, including shakes, shingles, rubber, hot tar, wood, metal, and plastic.

- Gutters and downspouts made from standard materials, including metal and plastic.

- Roofs with light to moderate snow accumulations and annual snowfall. See Snowfall Class Map and Criteria at summiticemelt.com. It is up to designer/contractor/installer to determine if this product is suitable for installation in heavier snow climates. If conditions warrant, consider the more robust, patented PRO® ice melt system.

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

- Preventing snow movement on roofs — LT 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. LT is designed to melt ice, not accumulated snow.

- 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.

How To Use This Guide

This installation guide presents Summit Ice Melt Systems' recommendations for installing the LT 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 LT 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

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 important instructions or information.

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' LT ice melt system can minimize ice dams and icicles by maintaining a continuous path for melt water to drain from the roof. The LT system uses sophisticated self-regulating heating cables which reduce 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 LT Base Panels and Cover Panels, Valley Channel® Base and Cover Panels, self-regulating heating cables, heating cable connection and splice kits, control system and power distribution.

LT is suitable for slopes down to 2/12.

System Components

A typical system includes the following:

- LT Base Panels (or Low-Slope panels)
- LT Cover Panels
- LT Splice Covers
- Valley Channel Base Panels
- Valley Channel Cover Panels
- Attachment 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 LT 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. LT 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, 1000, (2500 Vdc recommended)
- Multimeter
- Tape Measure
- Tin Snips
- Wire cutter
- Wire stripper
- Straight edge knife
- Drill
- Deburring tool
- Caulk and caulking gun

Additional Materials Needed

- Base Panel Fasteners (see Page 10)
- Roofing nails (or equiv.) to attach covers and end brackets
- Cleaning solvent (i.e., denatured alcohol) and rags for valley areas
- Adhesive
- Electrical Tape
- Masking 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.

LT is suitable for slopes down to 2/12.

1. Existing metal roofs (except standing seam): Trim back metal 5-1/2" from eave prior to installing LT Base Panel.

2. Existing Shake, Slate, or Tile Roofs: When installing LT on these types of roofs, remove the lower course of shakes, slates, or tiles prior to installing the LT Base Panel. An additional counterflashing may be required.

3. Existing Standing Seam Metal Roofing: Verify top or bottom attachment method and expansion joint mechanism with roofer. Trim back 5-1/2" from the eave prior to installing LT Base Panel and re-attach after installing the LT Cover Panel.

4. 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. Install LT Base Panel along eave and position cover under second course of shingles.

5. New Roofs, Including Composition Roofing: Install LT system over waterproof membrane, ‘strip in’ (counterflash) top edge of panel cover with membrane, start new roofing 5-1/2" up from eave edge.

Eave Base Installation (Retrofit application, new roof application is similar)

1. Determine the layout of the system as follows. Place full-sized LT Base Panels ½" in from each end of the roof, and the remaining panels shall have ½" gaps between them (See Figure A).

2.

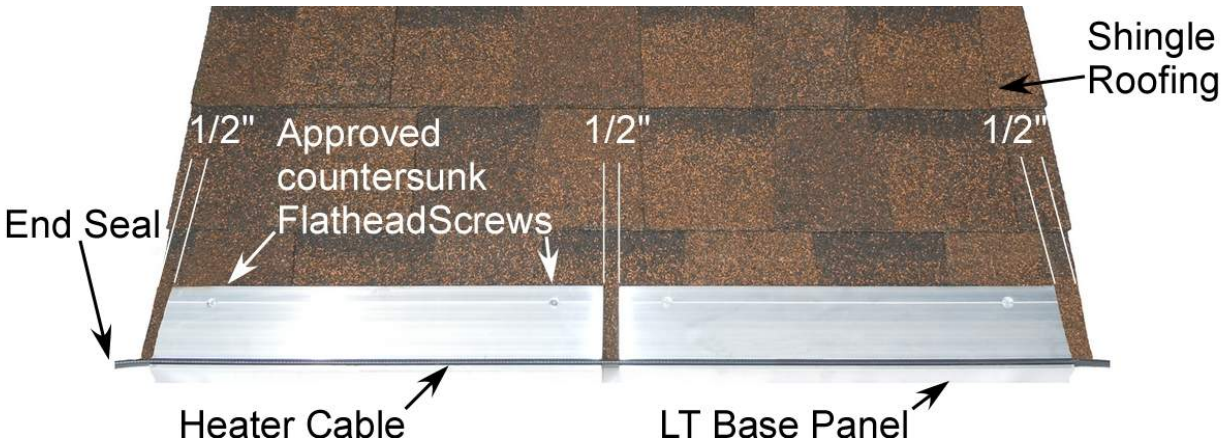


Figure A: LT Layout

A. If the actual eave length is shorter than the panel design length, trim and deburr an intermediate LT Base and the cover panel as needed.

If the actual eave dimensions exceed the ½" spacing between LT Base Panels, leave space for another base panel, and order both a new LT Base Panel and a custom Splice Cover from Summit.

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.

3. On the roof eave, place the right LT Base Panel 1" in from the right edge, and install the left LT Base Panel 1" in from the left edge, lining up the lip on the bottom of the LT Base Panel. Then install the intermediate base panels evenly between the two end panels.

Eave Base Installation, (Cont'd.)

4. Use approved #12 flat head countersunk sheet metal screws or wood screws with fully threaded shank (not included) to attach the LT Base Panels. Stainless steel screws are recommended. Ensure fasteners are installed within 23" on center and within 3" from each end (minimum 4 screws per 5' panel). Additional countersunk pilot holes may needed if installing less than a full 5' pre-drilled LT Base Panel. Screw head may not be raised above plane of LT Base Panel's top surface. Do not over-drive. (See Figure B)

IMPORTANT: Always install screws perpendicular to the roof plane. Failure to do so will cause the screw head interfere with the contact and heat conductivity between the Base Panel and Panel Cover.

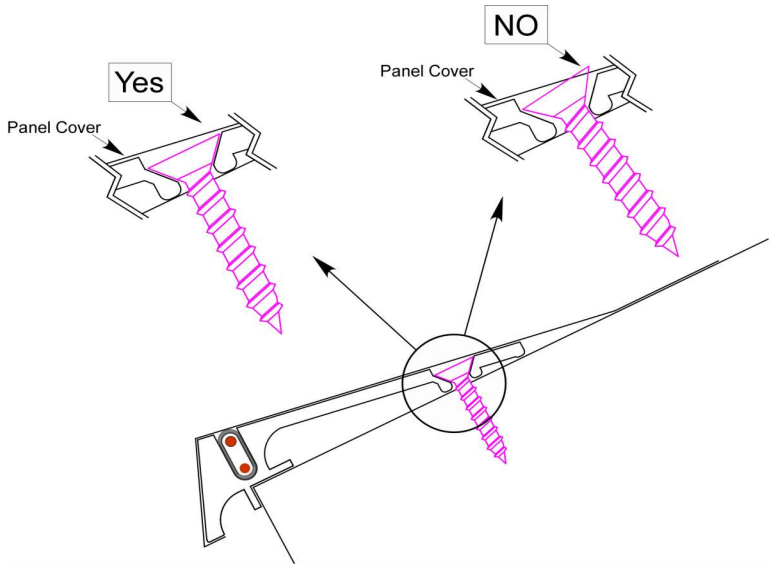


Figure B: Fastener Placement

5. Ensure that the full shank thickness of the screw penetrates a minimum 1" into the roof wood substrate or penetrates the full shank diameter through the wood, whichever is less. Some conditions do not allow adequate penetration of fasteners (multiple layers of roofing, etc.); in these cases **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.

Valley Channel Installation

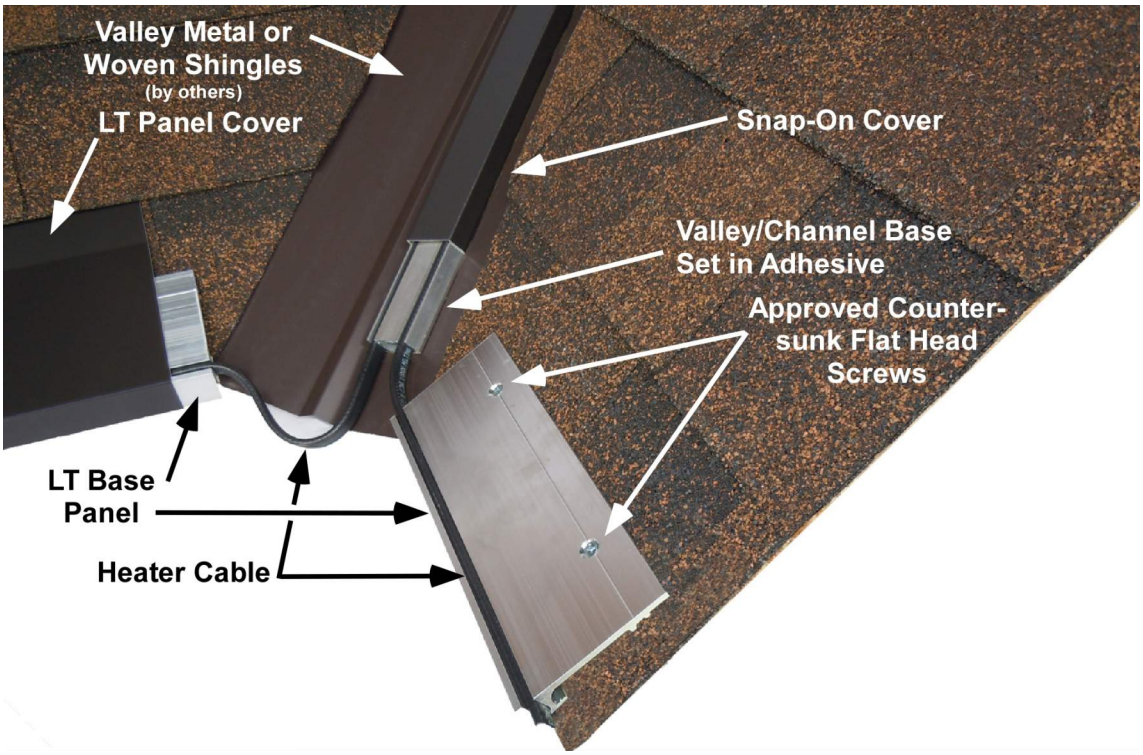


Figure C: LT and Valley Channel

1. The Valley Channel Base Panel is placed on one side of the “W” valley flashing. Installing the Base Panel on the side of the valley with less ‘watershed’ is preferred.(See Figure C)

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

2. If required, trim the edge of the roofing materials on the side where the valley base is to be installed.

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

Valley Channel Installation (Cont'd.)

4. Apply a continuous bead of approved adhesive to bottom side of the Valley Channel Base; allow 1/2" spaces between the Valley Channel Base Panels. 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.

NOTE: Position Valley Channel Base Panel approximately 1/8" from center of valley flashing to enable snap-on Valley Cover to be installed.

Low-Slope Installation

Refer to separate drawings, locations, and installation instructions.

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 19-20). 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 33).

WARNING: Take special care to protect the heating cable and outer jacket from damage when routing through the LT 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 LT Cover Panel.

Heating Cable Installation (Cont'd.)

1. Once the Eave 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.

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

3. Start with the heating cable end terminated with the End Seal and work your way back to the other end of the system per the System Layout Drawings. 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.

When installing the heating cable:

- Be sure to press cable all the way into the slot. Cable that's not deep in the slot will interfere with the heat conducting contact between the Base and Cover Panels.
- 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. Carefully insert the heating cable into the slot in the LT Base Panel.

5. There is one run of heating cable in the LT Eave Base and two runs in the Valley Channel Base, and one run through the gutter to the downspout. See site specific System Layout Drawings provided for details.

Heating Cable Installation (Cont'd.)

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 21).

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.

Install Cover Panels and Splice Covers

IMPORTANT: Before installing Cover Panels, the inspector or supervisor should confirm the correct heating cable routing.

1. Position Valley Channel Cover Panels over Valley Base. Valley Channel Covers are designed to butt together. Do not overlap Valley Channel Covers.
2. Snap Valley Channel Cover onto Valley Channel Base, adjust as required to cover all heating cable.
3. Box-in gable ends of LT Cover Panel to close in ends by notching and folding panel as shown in Figure D. If heating cable extends through boxed end, protect it from the sharp edges with electrical tape.

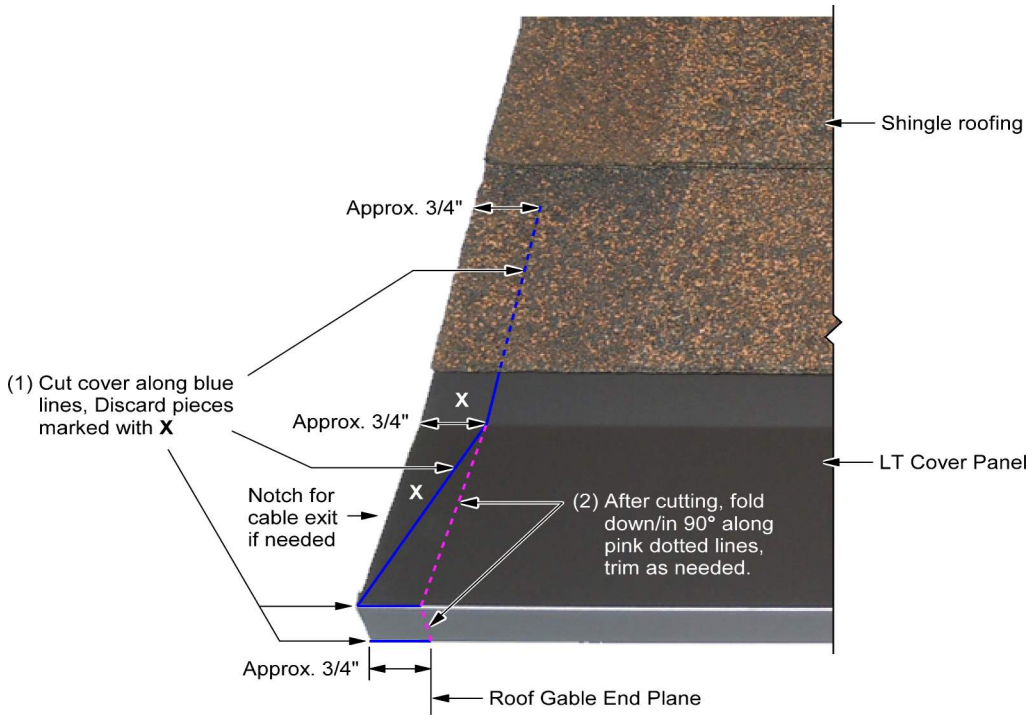


Figure D: Boxing in End of LT Cover Panel

4. Slide the LT Cover Panels into position on the LT Base Panels, with the upper edge of the cover sliding up under roofing materials. Note: at 90° inside valley corners, an extended Cover Panel may have been provided to allow a field miter cut to fit over valley intersection.

Install Cover Panels and Splice Covers (Cont'd.)

IMPORTANT!! Be sure to engage the LT Cover Panel drip edge tightly up and onto the LT Base Panel. Leave 1/2" spacing between the side edges of the LT Cover panels (to be covered with Splice Covers); DO NOT overlap LT Cover Panels.

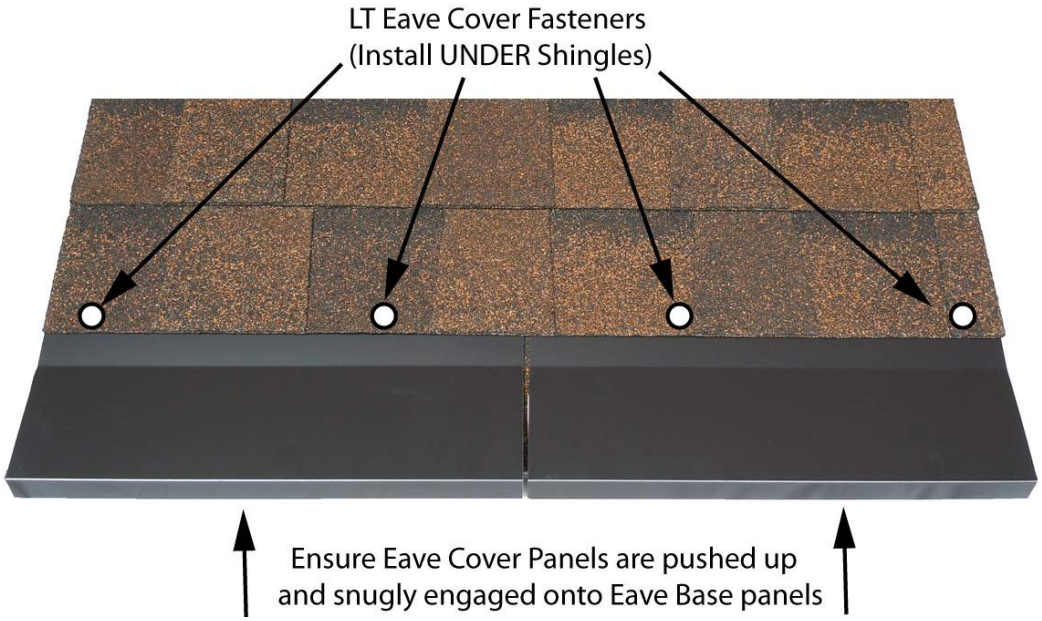


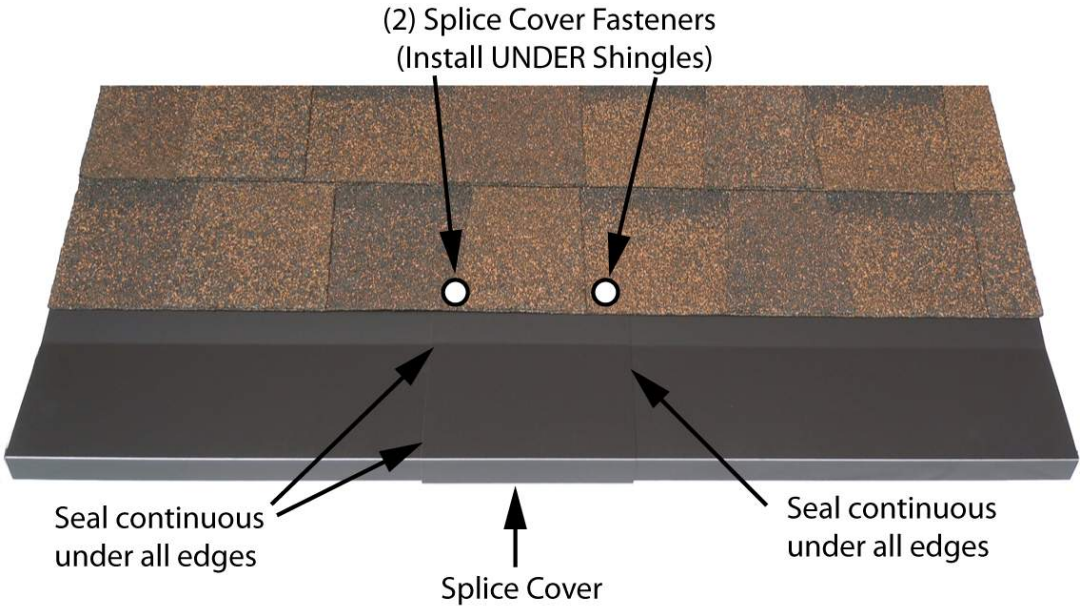
Figure E: LT Cover Panel Layout

5. While holding the LT Eave Cover Panel tightly up to and against the LT Base Panel's drip edge, attach the cover to the roof with fasteners (not included) at maximum 16" on center and within 3" of the ends. Ensure the adjacent roofing will cover the fasteners. (See Figure E)

IMPORTANT: DO NOT attach the LT Cover Panels to the LT Base Panel.

Install Cover Panels and Splice Covers (Cont'd.)

Once the covers are secured, double check that the LT Cover Panel is engaged tightly with the LT Base Panel at the drip edge.



LT Figure F

6. Splice Cover Installation: Apply a bead of sealant to the underside along each edge of the Splice Cover, then install over the open joint in the LT Cover Panel. Attach with two fasteners (not included) along the top edge of the splice over. DO NOT attach Splice Cover to the LT Base Panel. Ensure the adjacent roofing will cover the fasteners. When completed, seal across the top edge of the Panel and Splice covers with a waterproof sealant that's compatible with the roofing material. (See Figure F)

IMPORTANT: Painted aluminum Cover Panels and Splice Covers: remove poly film from panted surface at installation. Do not allow prolonged exposure to the sun.

For the best installation, apply a heavy bead of caulking along the top edge of the Cover Panel and Splice Cover.

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.

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 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 27.
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 28-29.

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 LT 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 the LT ice melt system.

5. Complete and return **Installation Log** within 30 days of completion. (See Page 27)

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 28-29.

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.)

NOTE: Factory Heater-On temperature is set to 36°.

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

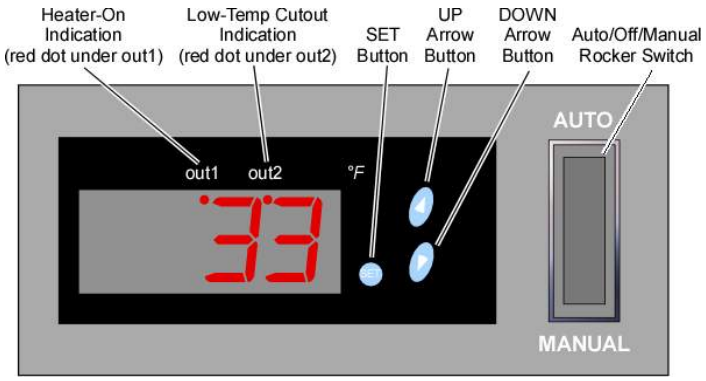


Figure H: Multi-Circuit Control Module

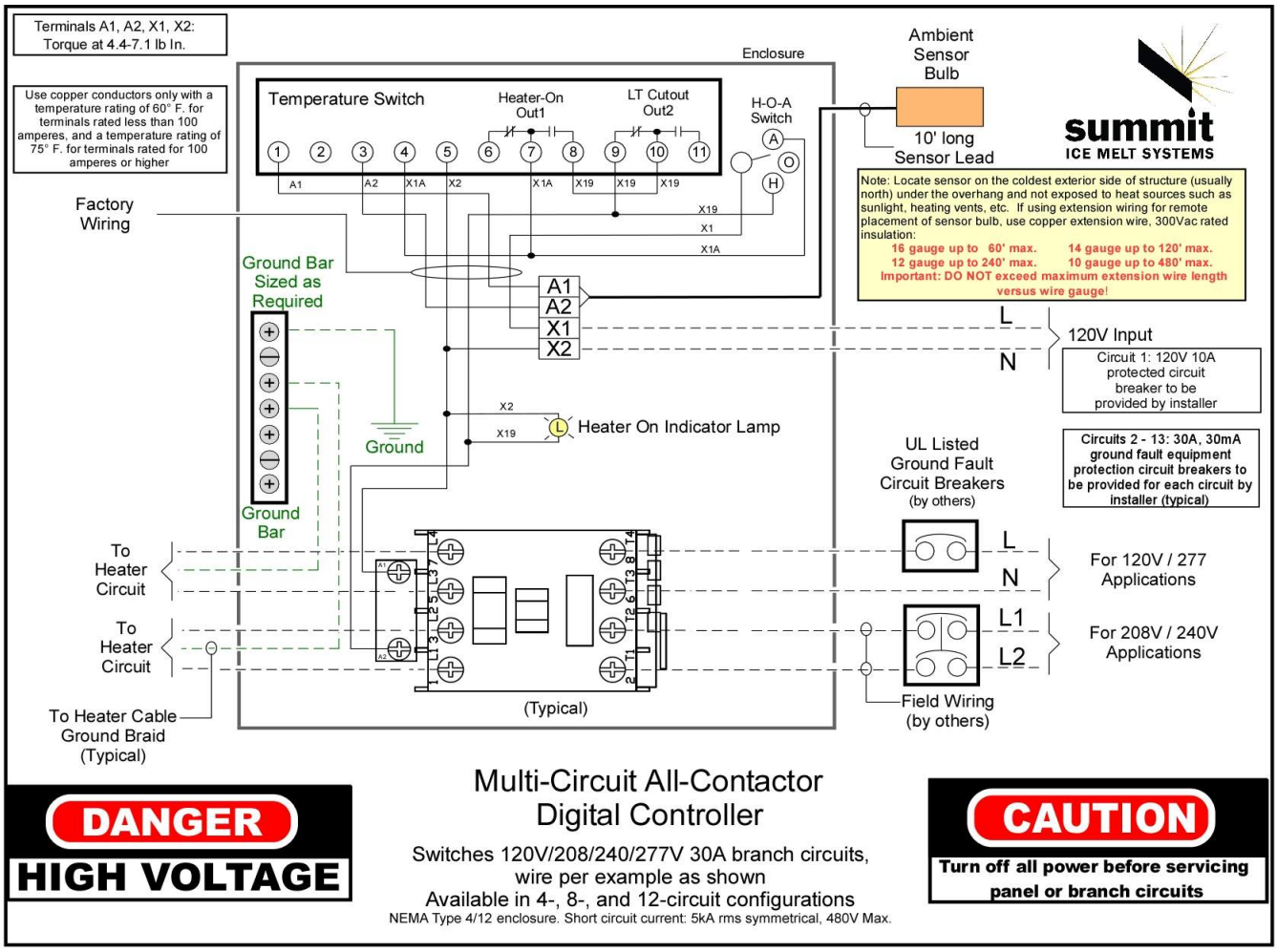


Fig I: Multi-Circuit All-Contactor Schematic Diagram

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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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Installation/Testing Log

Date: ____/_____/202_____

Summit Project # _____

Customer PO # _____

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
Address:	[ ] Test #2: Upon Cable Installation prior to cover
City, State, Zip:	[ ] Test #3: Prior to startup (at terminal blocks)
	[ ] Insulation resistance test at 500, 1000, and 2500 Vdc.
	[ ] Installation log sheet completed and attached
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 Pages 19-20. 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.

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 19-20.** **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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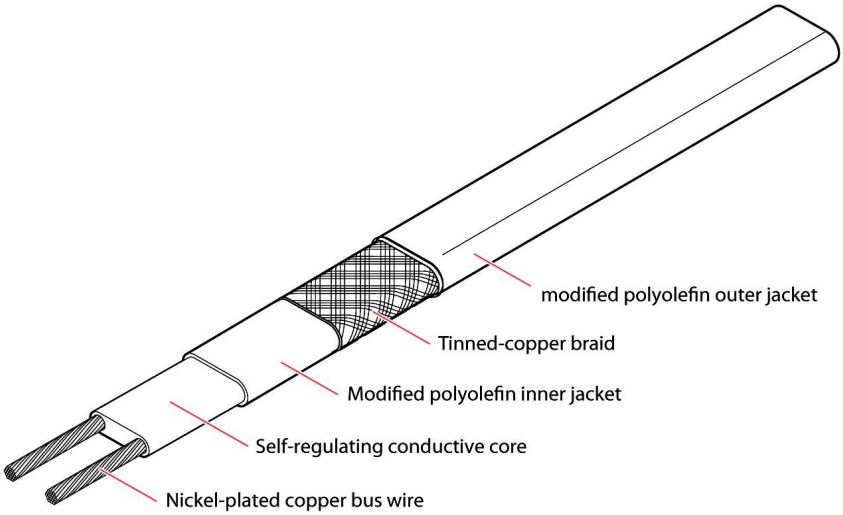
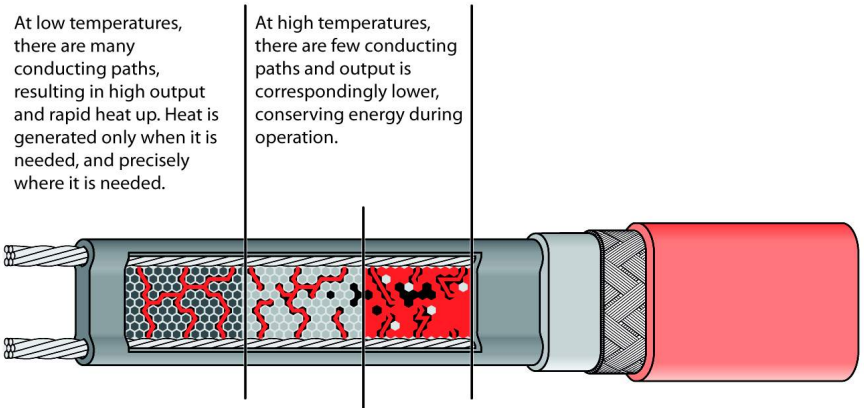
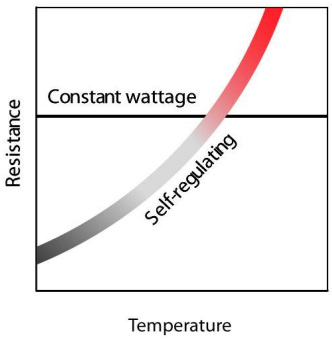
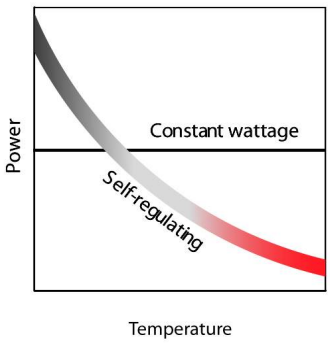
Self-regulating heater cable construction and technology





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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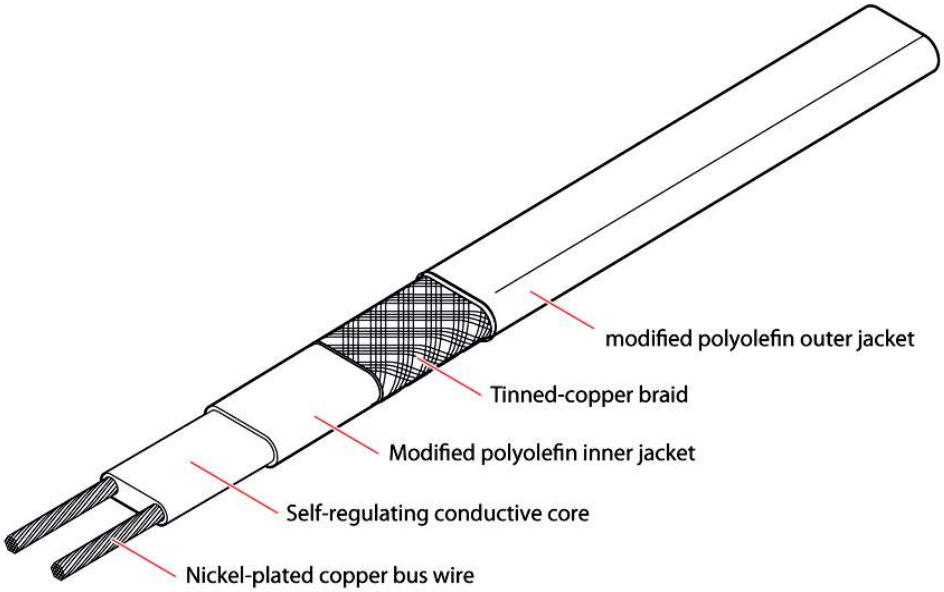
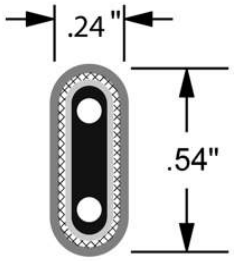
S1 and S2 Self-Regulating Heating Cable Specifications





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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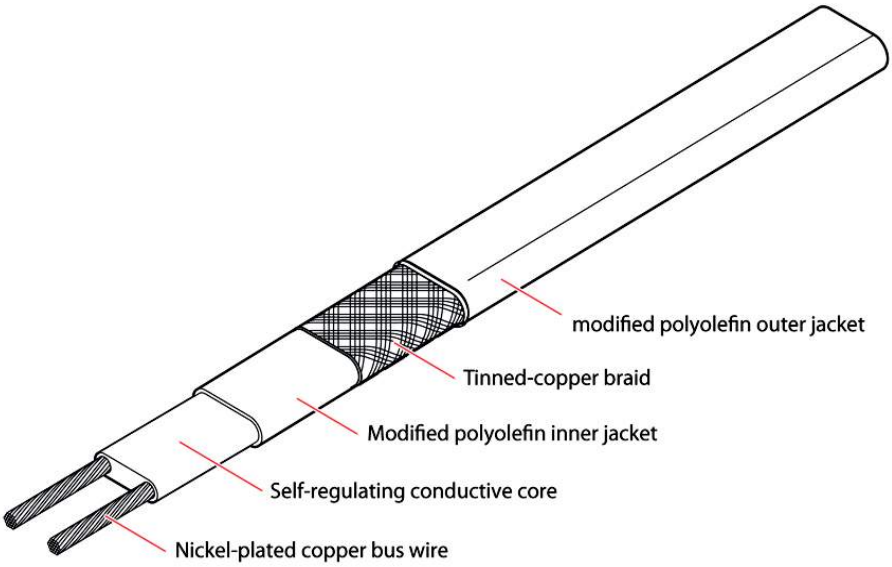
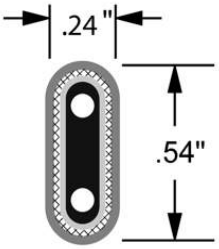
S1 and S2 Self-regulating Heating Cable Description





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

Approvals

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

CSA Certified Specifically for snow melting under Section 2B

WARNING: The LTice 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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