



SELF-REGULATING ROOF HEAT CABLE

Installation Guide



GENERAL INFORMATION

The following instructions are designed to assist in installing and operating an electric radiant heat roof deicing and gutter melt system using self-regulating heat cable.



PLEASE READ THIS MANUAL BEFORE INSTALLING THE SELF-REGULATING HEAT CABLE.

INSTALLATION PERSONNEL

Electricians and installers should thoroughly review this manual prior to installing and operating the radiant heat system. Other system equipment such as aerial-mount snow sensors and control unit will include additional instructions from their respective manufacturers.

Please read this manual in its entirety to ensure that you are familiar with the recommended installation methods for this product. The manufacturer's warranty does not cover failures resulting from improper installation.

IMPORTANT:

Please coordinate and disseminate the information in this installation manual with all individuals who will be involved in the preparation and installation of this system.

It is important that this equipment is installed only by a licensed and qualified electrician and in accordance with local laws, codes, regulations, and NEC guidelines.

TERMS CONCERNING SAFETY

The terms WARNING, CAUTION and NOTE are used in these instructions to highlight particular dangers and/or to provide additional information on aspects that may not be readily apparent.

NOTE: Provides additional technical information on topics/methods that may not be very obvious, even to qualified personnel.

CAUTION: Indicates that property damage can occur if proper pre-cautions are not taken.

WARNING: Indicates that severe personal injury, death, and/or substantial property damage can occur if proper precautions are not taken.

To avoid possible injury to personnel or damage to the heat cable or other snowmelt system equipment, WARNING and CAUTION notes must be strictly followed. Modifying this product, substituting non-factory parts or using installation procedures other than outlined could drastically affect performance and be hazardous to personnel and equipment and may void existing warranties.

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Design and Install Information for Roof and Gutter Deicing

Electrical Codes

Article 427 of the National Electrical Code and Section 62 of CAN/CSA-C22.1, Canadian Electrical Code govern the installation of self-regulating heating cable for pipe freeze protection.

IMPORTANT NOTE: *For the warranty to be valid, the installer must comply with all requirements outlined in these guidelines.*

All design information provided here is based upon a “standard” installation with self-regulating heat cable.

Heating Cable Design

Self-regulating heating cables are suitable for use with power connection kit for roof and gutter deicing applications. The heating cables are safe to use in wet areas.



Calculating the Heat Cable Length Required

To determine the total heating cable length:

Roof edge length × zig zag factor + gutter length + (2 × downspout length) + 1-foot for each power connection = **total required heating cable length**

Table I: Typical Spacing and Layout Measurements

Roof Overhang	Tracing Width	Tracing Height	Zig Zag Factor
18 inches	2 feet	24 inches	2.42 feet
24 inches	2 feet	30 inches	2.875 feet
36 inches	2 feet	42 inches	3.69 feet

Example:

- Roof edge: 100 feet
- Roof overhang: 1.5 feet
- Roof gutter: 100 feet
- Downspout: 60 feet
- Connection: 2 each
- Voltage available: 240 V
- Turn-on temperature 32°F

Heating cable required:

- Roof gutter = 100 ft.
- Roof zig zag = 100 ft. × 2.42 ft. (zig zag factor from Table I) = 242 ft.
- Downspout double traced = 60 ft. × 2 = 120 ft.
- Power connection kits required = 1 ft. × 2 ea. = 2 ft.
- Total heating cable required:
= 100 ft. + 242 ft. + 120 ft. + 2 ft. = 464 ft.

Reference xxSRL-6-2 cable in Table III (page 16). The max length for 32°F is 540 feet; so 464 feet will require one 20-amp circuit.

Design Notes

- In-line splices should be avoided when possible.
- Heating cable in downspouts should be double-traced (20 feet of heat cable per 10 feet of downspout) and extend below the frost line if tied into a drainage system.
- Field-assembled end terminations should not be located in an area where they could become immersed in water. End terminations should not be located at the lowest point of downspouts.
- The circuit length for a given over-current protection device shall not exceed the maximum length specified by the manufacturer.
- The maximum exposure temperature of all roof, gutter, and downspout materials shall be verified, and a heater shall be selected that will not exceed their temperature ratings.
- For dome drains on roof, trace the roof around the dome drain in a 5-pointed star pattern about 18 inches out from the center of the dome, then enter the drain about 2 feet and come back out of the drain.
- For roof drains leading into a heated area, a loop of heating cable is installed to a typical depth of 2 feet. Trace entire overflow drains.

NOTE: *In all locations, route and secure cable to avoid possible mechanical damage from equipment such as ladders, shovels, etc.*

- If the outside jacket of the cable becomes compromised in any way, it must be sealed using heat shrink as soon as possible.

Illustration of Self-Regulating Heat Cable on Roof

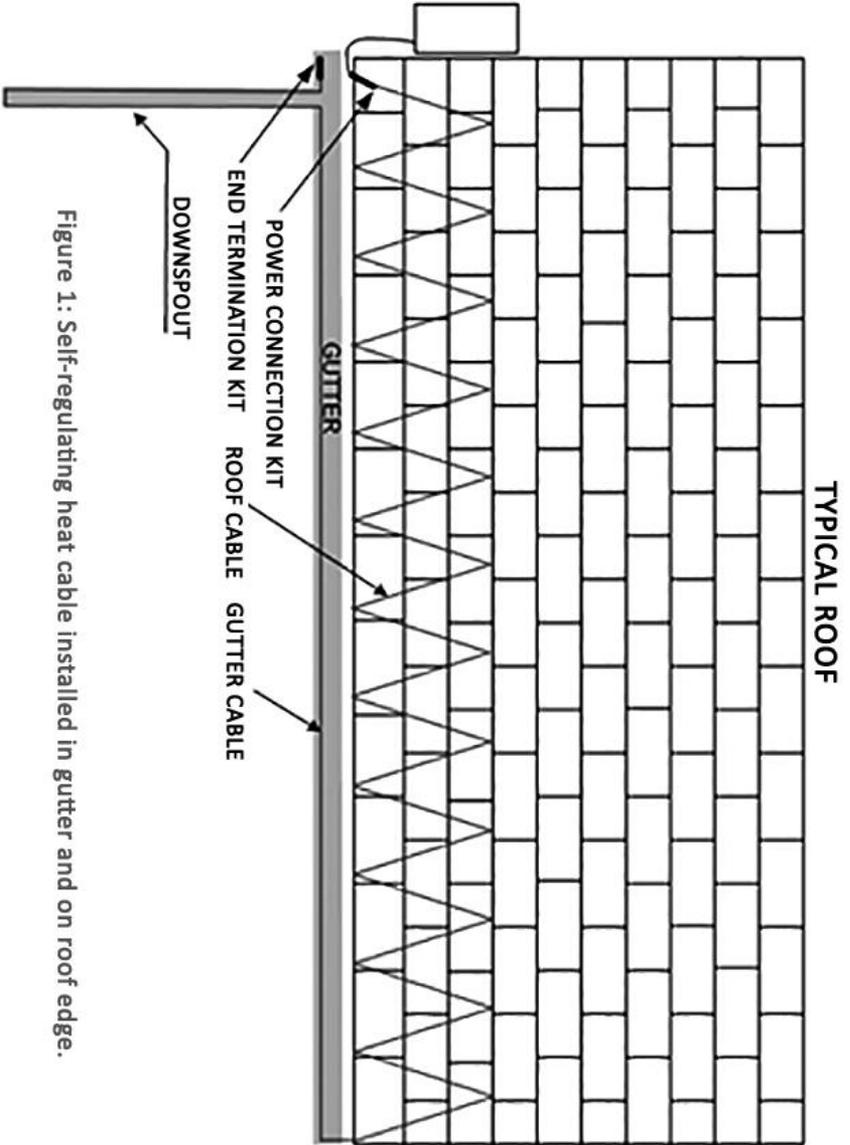


Figure 1: Self-regulating heat cable installed in gutter and on roof edge.

Heating Cable Installation

1. Prepare for Installation

- Store the heating cable in a clean, dry place; secured in accordance with Article 426 of the NEC.

Use only the following accessories to satisfy code and agency requirements:

- xSR08 plug-in power connection kit (with end seal) or xSR00 power connection kit (with end seal)
- xSR10 splice and tee kit (if splicing or teeing)
- xSR15 downspout hangers
- xSR13/xSR14 roof clips
 - Carefully plan the routing of the heating cable for roof and gutter deicing.
 - Make certain gutters and downspouts are free of leaves and other debris.
 - Inspect the mounting surface for sharp edges where the heating cable will be located and remove as necessary.
 - A listed weatherproof junction box should be located and mounted in a sheltered area to provide a power connection to the heating cable.

2. Cut the Heating Cable to Length

- Cut the heating cable to length required. This can be done before or after it is installed. Leave a minimum of 1 foot extra heating cable for connection to power. For splice and tee connections leave a minimum of 1 foot for each section of heating cable (3 feet for downspout splices). Self-regulating heating cable can be cut to length without affecting its heat output per foot.
- Protect the heating cable ends from moisture and mechanical damage until power connections and end seals are made.

3. Position and Attach the Heating Cable on Roofs

- Loop the heating cable on the overhang area of the roof. This is the part that extends past the heated building wall.
- Use roof clips to attach heating cable to the roof surface.

- Extend the bottom of each heating cable loop over the roof edge. Make sure the heating cable is attached firmly using roof clips.
- The cable running in the gutter should be firmly attached to the gutter bottom, using roof clips.
- Extend the top of each heating cable loop beyond where the heated wall joins the roof. A 2-inch peak-to-peak spacing is recommended.
- See Table I for spacing and layout information.

NOTE: *For flat roofs, the heating cable can be spaced as needed to create runoff paths for melted snow and ice. If the roof uses a rubber or EPDM material, glue strips of the material down to secure the heat cable.*

- Roof clips may be attached to a shake or shingle roof with nails or screws. Reseal the nail or screw holes if necessary before installing heating cable in the clips. Roof clips may be attached to a metal roof using adhesive.
- All penetration made on the surface of any style of roof should be moisture proofed by using a suitable sealant or sealing type fasteners.
- The mounting hardware should be made of corrosion resistant material and should not have sharp edges or burrs that could damage the heating cable.

4. Position and Attach the Heating Cable in Gutter and Downspouts

- Run heating cable along gutters and into downspouts, ending below the frost line. Permanent attachment of the cable to the gutter bottom is necessary.
- “Double trace” the downspouts whenever possible. (Run the heating cable down the spout and back up to the top.) Only use the xSR10 “T” splice when the circuit lengths would add excessive cost to a project. (Splices cost more than cable.)
- Use downspout hangers to protect the heating cable from fraying and from damage from sharp edges and to provide strain relief. Refer to downspout kit instructions for installation details.

- Use roof clips to route heating cable into and out of the gutter in such a way as to prevent abrasion to the cable. Protect all cable that protrudes past the lower opening of the downspout.

5. Install Heating Cable End Seals, Splices, Tees, and Power Connection

- Install all end seals, splices, tee, and power connection prior to powering the cable.
- Follow the xSR08 or xSR00 kit installation instructions.
- Use only listed weatherproof junction boxes approved for wet location when installing self-regulating heating cables with the xSR08 or xSR00 power connection kit for roof and gutter applications.
- Use only listed watertight construction or enclosure Type 3R, 4, 4X, 6, or 6P junction box when installing.
- When possible, all power connection boxes should be located in a protected area (such as under eaves) and entry should be at the bottom of the box. In all cases, a drip loop should be installed to prevent water from traveling down the wire into the junction box.

6. Mark the Installation

- Packed with this unit are two copies of a caution notice indicating the presence of electric deicing and snow melting equipment on the premises. One notice must be posted at the fuse or circuit-breaker panel and the other on or next to the on/off control for the cable unit. Both notices must be clearly visible.

7. Check the Installation

- Prior to powering, check to be sure the heating cable is free of mechanical damage (cuts, kinks, etc.).
- Visually check all power connections, end seals, splices, and tees for proper installation.
- Using a megohmmeter, test each circuit according to the instructions in the *Heating Cable Testing and Maintenance* section on page 14.
- Junction boxes should be inspected for water or evidence of previous water ingress. If moisture is present, the box should be

restored to dry condition and the cause of ingress should be eliminated.

- Functionality of over-current and ground fault protection devices should be checked.

Important Installation Tips

- The cable must be installed 10-inches away from combustible surfaces, such as wood.
- The minimum bending radius of each flexible heating device is 2-inches.
- In all locations, route and secure cable to avoid possible mechanical damage equipment such as ladders, etc.
- All actual lengths installed should be recorded. The installer should provide “as built” drawings and data.
- The minimum installation temperature for the heating cable is 0°F (-18°C).
- The heating cable shall be connected to power in a weatherproof junction box.

Electrical Protection

Circuit Lengths

For the maximum heating cable circuit length permitted for a given circuit breaker rating, refer to Table II. Limit your circuit length based on your lowest anticipated start-up temperature.

Ground fault protection

National electrical codes require ground-fault equipment protection on each heating cable branch circuit to reduce the risk of fire caused by damage or improper installation.

Warning

Conditions of maintenance and supervision ensure that only qualified persons service the installed systems. Continued circuit operation is necessary for safe operation of equipment or process.

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

Heating Cable Testing and Maintenance

Most zoning authorities require the following test.

1. Check the insulation resistance between the bus wires and the heater grounding braid during the installation using a 1000 V dc megohmmeter (500 V dc minimum). The minimum reading should be ≥ 30 megohms, regardless of length.
2. Record the original values for each circuit.
3. Take additional readings during regularly scheduled maintenance and compare to the original value. If the readings fall below 30 megohms, inspect cables and insulation for signs of damage.
4. If physical damage is found, the entire damaged section must be removed and a new section of heating cable installed using only approved power kits. Do not attempt to repair the damaged heating section.

5. If there is a “trip” problem, or “low” or “no current” problem, yet no physical damage is apparent, the section of heating cable should be removed and replaced with new self-regulating heat cable.

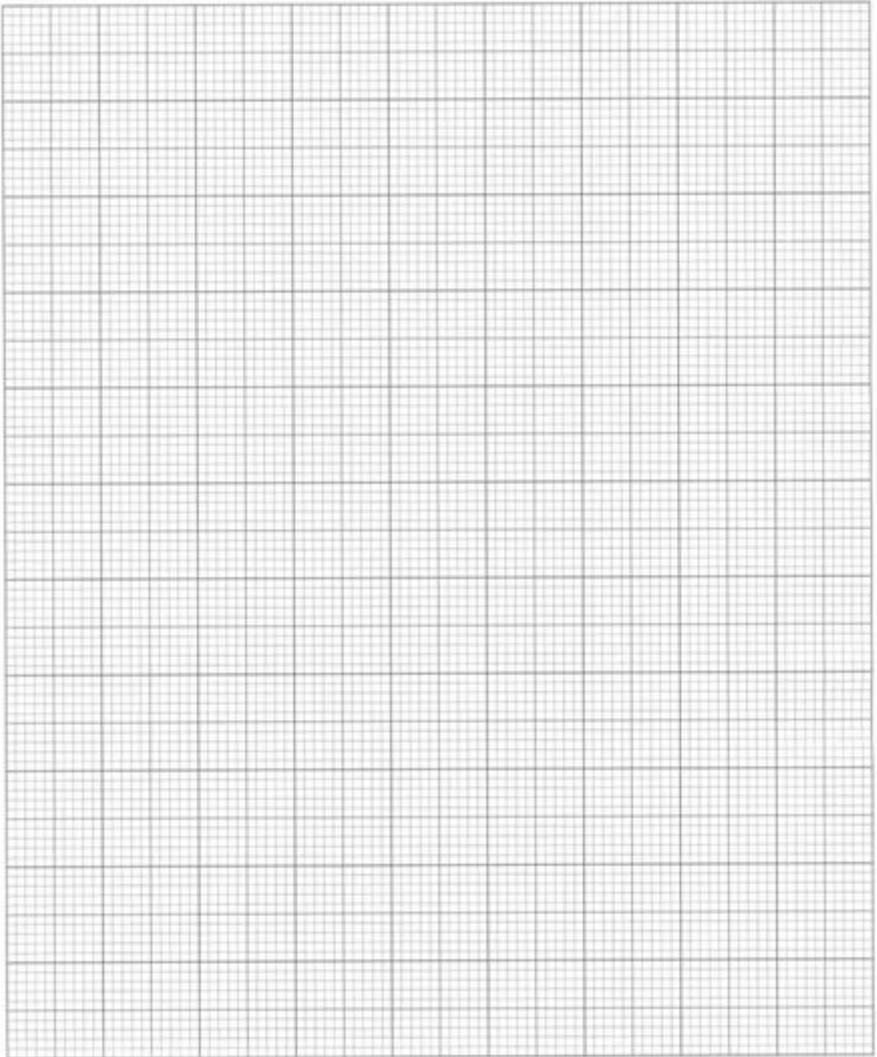
Table II: Maximum SRR Cable Length vs Circuit Breaker Size

Cable	Start-up Temperature	120 V				240 V			
		15A	20A	30A	40A	15A	20A	30A	40A
Breaker Size									
xxSRR-6-1 and xxSRR-6-2	50°F (+10°C)	230	270	270	270	460	540	540	540
	32°F (0°C)	230	270	270	270	460	540	540	540
	14°F (-10°C)	180	210	270	270	360	420	540	540
	0°F (-18°C)	140	190	270	270	285	380	540	540
	-20°F (-29°C)	125	165	250	270	250	330	500	540
	-40°F (-40°C)	110	145	220	270	220	295	440	540
xxSRR-8-1 and xxSRR-8-2	50°F (+10°C)	150	200	210	210	300	400	420	420
	32°F (0°C)	150	200	210	210	300	400	420	420
	14°F (-10°C)	140	150	205	210	280	300	410	420
	0°F (-18°C)	100	130	200	210	200	265	400	420
	-20°F (-29°C)	85	115	175	210	175	235	350	420
	-40°F (-40°C)	80	105	160	180	155	210	315	420
xxSRR-10-1 and xxSRR-10-2	50°F (+10°C)	120	160	180	180	240	315	360	360
	32°F (0°C)	105	140	170	180	210	280	340	360
	14°F (-10°C)	95	125	165	180	190	250	330	360
	0°F (-18°C)	80	110	160	180	160	215	320	360
	-20°F (-29°C)	70	95	145	180	145	190	285	360
	-40°F (-40°C)	60	85	125	170	125	170	255	340
xxSRR-12-1 and xxSRR-12-2	50°F (+10°C)	80	140	150	150	160	270	310	310
	32°F (0°C)	75	130	145	150	150	260	290	310
	14°F (-10°C)	70	115	142	150	140	230	285	310
	0°F (-18°C)	60	80	140	150	120	160	280	310
	-20°F (-29°C)	50	65	110	150	105	140	225	310
	-40°F (-40°C)	45	60	90	140	90	125	190	280

Table III: Maximum SRL Cable Length vs Circuit Breaker Size

Cable	Start-up Temperature	120 V				240 V			
		15A	20A	30A	40A	15A	20A	30A	40A
Breaker Size									
xxSRL-6-1 and xxSRL-6-2	50°F (+10°C)	230	270	270	270	460	540	540	540
	32°F (0°C)	230	270	270	270	460	540	540	540
	14°F (-10°C)	180	210	270	270	360	420	540	540
	0°F (-18°C)	140	190	270	270	285	380	540	540
	-20°F (-29°C)	125	165	250	270	250	330	500	540
	-40°F (-40°C)	110	145	220	270	220	295	440	540
xxSRL-8-1 and xxSRL-8-2	50°F (+10°C)	150	200	210	210	300	400	420	420
	32°F (0°C)	150	200	210	210	300	400	420	420
	14°F (-10°C)	140	150	205	210	280	300	410	420
	0°F (-18°C)	100	130	200	210	200	265	400	420
	-20°F (-29°C)	85	115	175	210	175	235	350	420
	-40°F (-40°C)	80	105	155	210	155	210	315	420
xxSRL-10-1 and xxSRL-10-2	50°F (+10°C)	120	160	180	180	240	315	360	360
	32°F (0°C)	105	140	170	180	210	280	340	360
	14°F (-10°C)	95	125	165	180	190	250	330	360
	0°F (-18°C)	80	110	160	180	160	215	325	360
	-20°F (-29°C)	70	95	140	180	145	190	285	360
	-40°F (-40°C)	60	85	125	170	125	170	255	340

Worksheet



WARRANTY CARD

Name:			
Address:			
Zip/Postal Code:	State / Province:		
Phone:		Order number:	

PLEASE OBSERVE:

To qualify for the manufacturer warranty, the following fields must be filled in and the warranty card submitted within 14 days of installation. (Please submit a warranty card for each circuit.)

Name of Installer:	Telephone Number:	Date of Install:
Name of Electrician:	Telephone Number:	Date:

PRODUCT INFO

Your Circuit Number:	Length of wire:	Resistance value between buswire 1 and 2:
Date of Purchase:	Length of cable per circuit:	Megg value @ 1000V - conductor 1 to cable ground braid:
Watts / ft. (See label on cable; E.g. 8w.ft.):	Circuit breaker type and amperage:	Megg value @ 1000V - conductor 2 to cable ground braid:
Cable Tag Voltage:	Applied voltage:	Control (select 1):
		Ambient Temp. <input type="checkbox"/> Moisture / Temp. Sensor <input type="checkbox"/>
		Roof type / Gutter downspout:
		<input type="checkbox"/> EPDM roof <input type="checkbox"/> Asphalt Roof
		<input type="checkbox"/> Standing seam <input type="checkbox"/> Gutter and Downspout

Record the cable resistance values in the "Product Info" section of the Warranty Card.

PRODUCT INFO

Your Circuit Number:	Length of wire:	Resistance value between buswire 1 and 2:
Date of Purchase:	Length of cable per circuit:	Megg value @ 1000V - conductor 1 to cable ground braid:
Watts / ft. (See label on cable; E.g. 8w.ft.):	Circuit breaker type and amperage:	Megg value @ 1000V - conductor 2 to cable ground braid:
Cable Tag Voltage:	Applied voltage:	Control (select 1):
		Ambient Temp. <input type="checkbox"/> Moisture / Temp. Sensor <input type="checkbox"/>
		Roof type / Gutter downspout:
		<input type="checkbox"/> EPDM roof <input type="checkbox"/> Asphalt Roof
		<input type="checkbox"/> Standing seam <input type="checkbox"/> Gutter and Downspout

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Watts / ft. (See label on cable; E.g. 8w.ft.):	Circuit breaker type and amperage:	Megg value @ 1000V - conductor 2 to cable ground braid:
Cable Tag Voltage:	Applied voltage:	Control (select 1):
		Ambient Temp. <input type="checkbox"/> Moisture / Temp. Sensor <input type="checkbox"/>
		Roof type / Gutter downspout:
		<input type="checkbox"/> EPDM roof <input type="checkbox"/> Asphalt Roof
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Watts / ft. (See label on cable; E.g. 8w.ft.):	Circuit breaker type and amperage:	Megg value @ 1000V - conductor 2 to cable ground braid:
Cable Tag Voltage:	Applied voltage:	Control (select 1):
		Ambient Temp. <input type="checkbox"/> Moisture / Temp. Sensor <input type="checkbox"/>
		Roof type / Gutter downspout:
		<input type="checkbox"/> EPDM roof <input type="checkbox"/> Asphalt Roof
		<input type="checkbox"/> Standing seam <input type="checkbox"/> Gutter and Downspout

Manufacturer's Limited Warranty

For a period of one (1) year from the original date of purchase, (*10 years with appropriate documentation), Manufacturer warrants to the original purchaser that the electric Self-Regulating Heating Cables ("Product") are free from defects in materials and workmanship under normal use and maintenance, provided the Product is installed in accordance with the accompanying installation manual, any special written design or installation guidelines for a particular project, the National Electrical Code (NEC) or the Canadian Electrical Code (CED), and all applicable local building and electrical codes. The limited warranty is valid only if the warranty certificate has been properly completed and mailed. Warranty is for Product only and does not cover thermostats, controls or any other equipment.

Under this Limited Warranty if the Product is determined by Manufacturer to be defective in materials and workmanship, has not been damaged as a result of abuse, misapplication, misuse, modification, neglect, alteration or improper installation, operation, maintenance, repair or testing, the Manufacturer will repair Product or supply replacement Product or refund the purchase price of the Product on Product covered by this Limited Warranty whichever Manufacturer may elect at its sole discretion.

In order to receive the remedy set forth above, you must return the product during the warranty period and include sufficient details relating to the nature of the defect, the installation, the history of operation, and any repairs that may have been made, including:

1. Provide proof that Product was installed in accordance with the installation manual, any special written design or installation guidelines, the National Electrical Code (NEC) or the Canadian Electrical Code (CED), and all applicable local building and electrical codes.
2. Provide dated proof of purchase.

This Limited Warranty does not cover and Manufacturer shall in no event be liable for:

1. Any direct, indirect, incidental or consequential damages, including inconvenience, loss of time, loss of or damage to or loss of use of facilities or other property, loss of revenue, loss of anticipated profits or loss of income.
2. Any labor or materials required to repair or replace the Product.
3. Any labor or materials required to remove, repair or replace construction materials.
4. Any freight or delivery costs related to the Product, or any related building or electrical products.

Manufacturer assumes no responsibility under this warranty for any damage to the Product caused by any persons; including any trades people or owners or visitors to the job site or damage caused as a result of pre or post-installation work.

MANUFACTURER DISCLAIMS ANY WARRANTY NOT PROVIDED HEREIN, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. MANUFACTURER FURTHER DISCLAIMS ANY RESPONSIBILITY FOR SPECIAL, INDIRECT, SECONDARY, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING FROM OWNERSHIP OR USE OF THIS PRODUCT, INCLUDING INCONVENIENCE OR LOSS OF USE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE FACE OF THIS DOCUMENT. NO AGENT OR REPRESENTATIVE OF MANUFACTURER HAS ANY AUTHORITY TO EXTEND OR MODIFY THIS WARRANTY UNLESS SUCH EXTENSION OR MODIFICATION IS MADE IN WRITING BY A CORPORATE OFFICER.

OWING TO DIFFERENCES IN SURFACES, APPLICATIONS, ENVIRONMENT, CLIMATE AND INSTALLATION PRACTICES, MANUFACTURER MAKES NO REPRESENTATION THAT THE PRODUCT WILL ACHIEVE ANY PARTICULAR TEMPERATURE, OR TEMPERATURE RISE. AND AS SUCH, USERS MAY OR MAY NOT BE SATISFIED WITH THE WARMTH THAT IS PRODUCED. MANUFACTURER DOES WARRANT THAT PRODUCTS WILL PRODUCE THE RATED WATT OUTPUT LISTED ON THE PRODUCT TAG WITHIN +/- TEN PERCENT, WHEN OPERATED AT THE RATED VOLTAGE.

Some states do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights, which vary from state to state.

Incoming materials should be inventoried and a resistance reading taken immediately for completeness and for possible shipping damage. Any visible damages or shortages must be noted prior to accepting the material. Any discrepancy concerning type or quantity of material shipped or Ohms measurements, must be brought to the attention of Manufacturer or Manufacturer authorized agent within 15 days of the shipping date entered on the packing slip for the order.

An additional ten (10) year Extended Limited Warranty (standard one (1) year + nine (9) years), is available on R model cables, provided that an annual report is submitted in writing to Manufacturer providing Megger® and resistance readings of the cable. This Extended Limited Warranty remains subject to the terms, limitations, conditions, and exclusions of the Manufacturer's Limited Warranty.

An additional two (2) year Extended Limited Warranty (standard one (1) year + one (1) year), is available on L model cables, provided that an annual report is submitted in writing to Manufacturer providing Megger® and resistance readings of the cable. This Extended Limited Warranty remains subject to the terms, limitations, conditions, and exclusions of the Manufacturer's Limited Warranty.

How to Claim this Warranty

In order to receive the remedy set forth above, you must contact the manufacturer or manufacturer's authorized representative during the warranty period and include sufficient details relating to the nature of the defect, the installation, the history of operation, and any repairs that may have been made, including:

1. Provide resistance readings taken by installer.
2. Provide proof that Product was installed in accordance with the installation manual, any special written design or installation guidelines, the National Electrical Code (NEC) or the Canadian Electrical Code (CED), and all applicable local building and electrical codes.
3. Provide dated proof of purchase.

Warranty Registration

Mail: PO Box 1268
Riverton, UT 84065
Phone: 801.948.7566