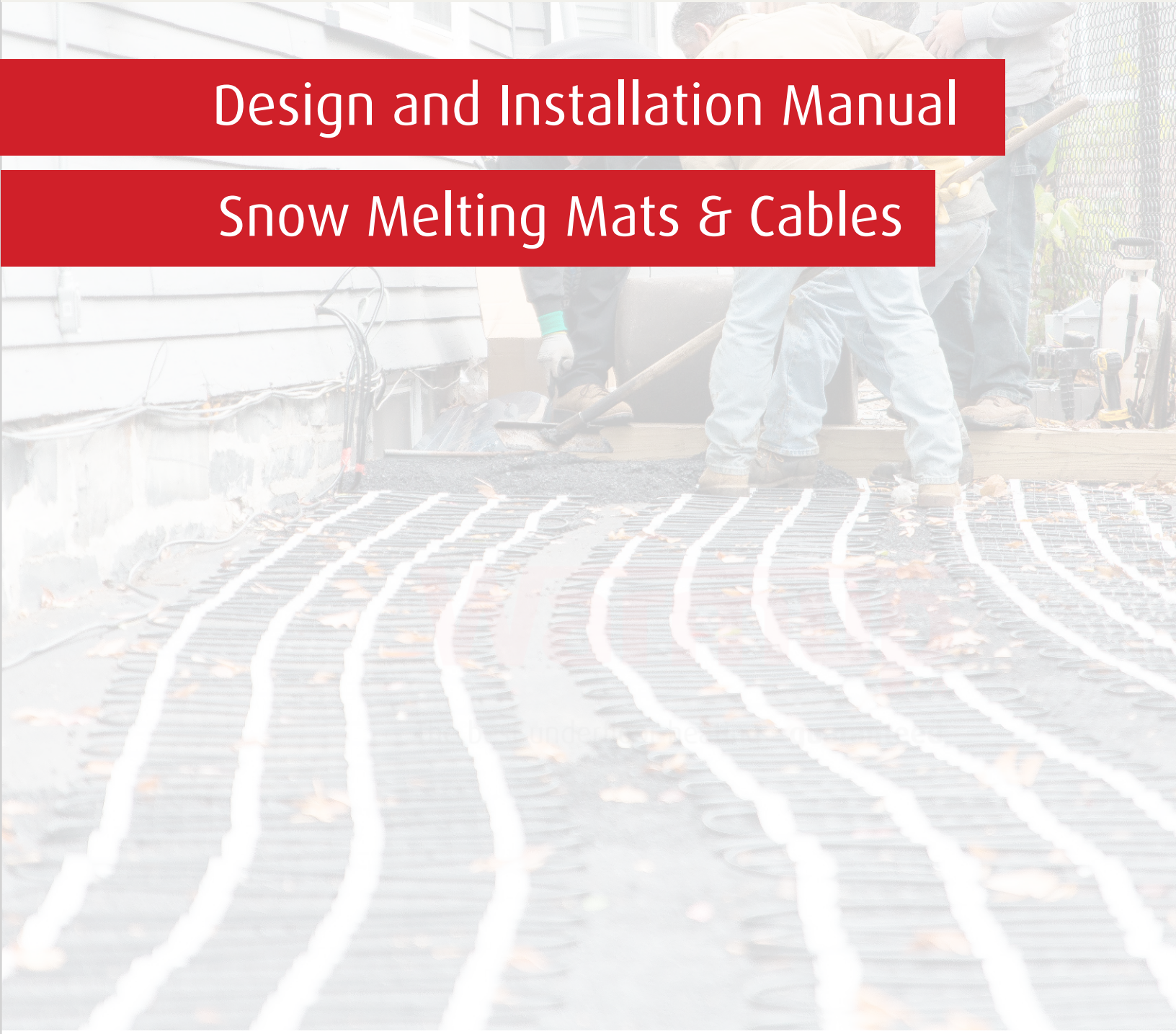


Warmup[®]

The world's **best-selling** electric floor heating brand™

Design and Installation Manual

Snow Melting Mats & Cables

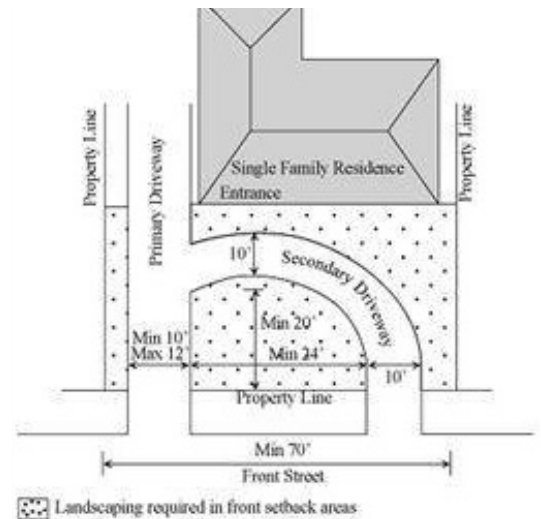


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Planning your Installation

Before any product decisions are made, the first step is to draw a plan of the area. Snow melt products can be installed in walkways, driveways and on steps. Commercially, it extends to ramps, docks, access areas and parking lots. Whether you have blueprints or a quick sketch, ensure you have received a detailed layout and panel schedule from Warmup in order to reference during and after installation.

Mark dimensions, electrical access points, any steps and expansion joints.



Product Selection

The first choice is between mats and cables. Mats are typically better suited for larger straight areas or for patterns like tire-tracks. Cables are a better fit for curved areas, custom patterns and steps. You may need to combine both in your design.

The default voltage is 240V. Residentially, that is the most common choice, but commercially, 3-phase supply or even 480 volts may be available. The higher the voltage, the lower the amperage and the larger the area that can be fit on one controller.

Efficiency of the system is the same regardless of voltage. Only wattage affects cost of operation and the system output is the same between mats and cables of any voltage.

Do note however that cables are typically recommended at 4" spacing on re-mesh while mats are pre-spaced at 3". So the output of mats would be higher unless cables are spaced at 3".

When powering a system at 208V, the mats and cables would be "de-rated" from 240V down to 208V. This means that a WSMM mat with a 50w/sqft output would now have a 37.5w/sqft output. Do not design a system at less than 35w/sqft.

Controlling your System

Warmup strongly advises to use one of its selection of automatic controllers. While a system can technically operate from a breaker or timer, automatic controllers allow for cost-effective operation. From our testing, activating a system before snow fall makes it at least twice as effective at preventing accumulation.

WIFI systems that anticipate snow will allow you to design a system at lower wattage density (i.e. lower cost of operation) as it will have more time to "pre-heat" before it snows.

Important Considerations

Measure and plan the area to be heated with the snow melt mats/cables, allowing for obstructions such as lights, poles, columns, handrails or drains.

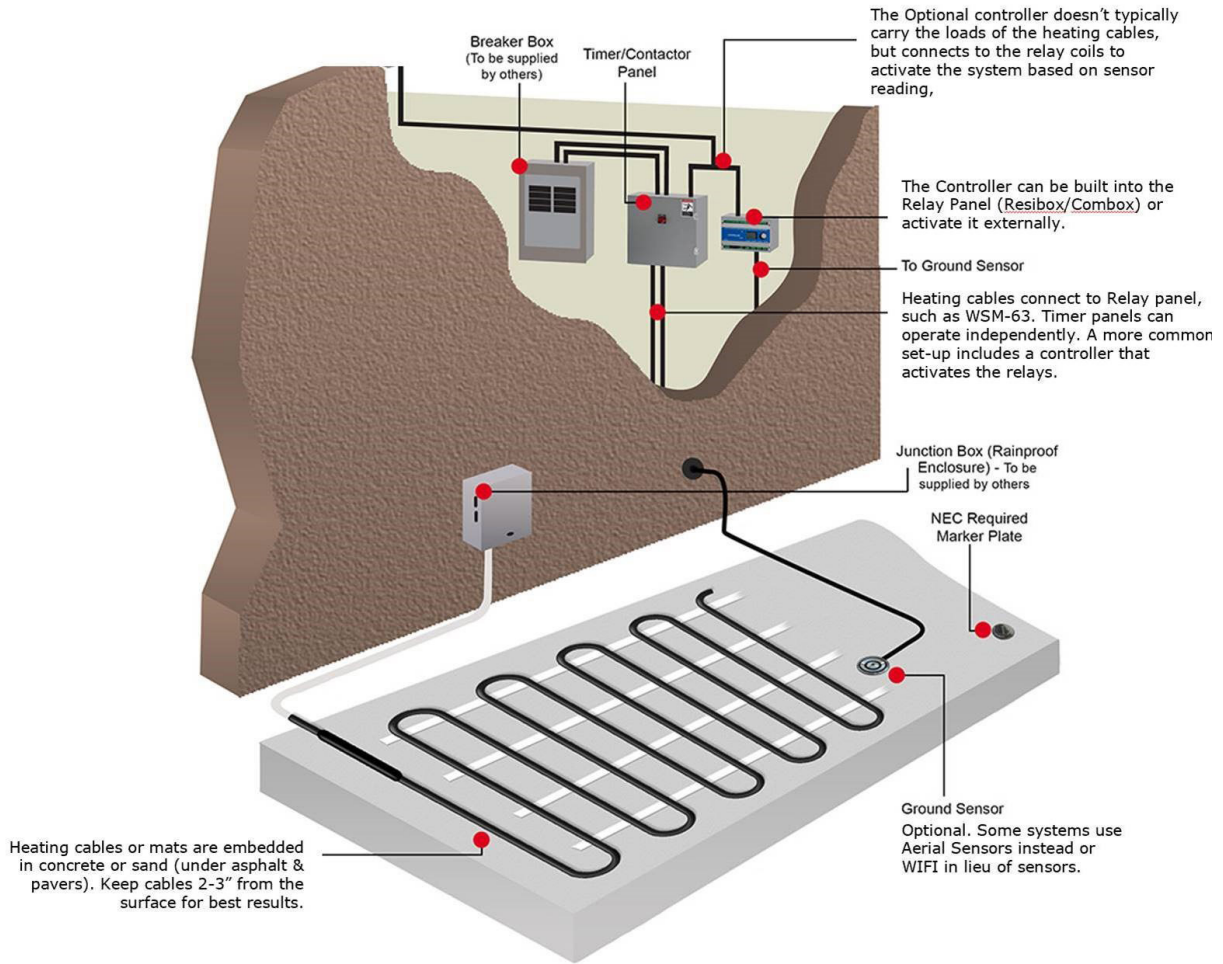
1. The heating cable should not cross or overlap itself at any point. This could cause the cable to overheat, requiring replacement.
2. The heating cable should not be cut, shortened or lengthened.
3. Take precautions to avoid damage to the heating cable during installation. Do NOT drop sharp objects or drive directly on the cable. Take care when pouring concrete or asphalt onto the cable.
4. Installation of the snow melt mats and cables should not be undertaken if ambient temperature is below 5°F/-15°C.
5. Minimum bending radius of the heating cable while laying shall not be less than approximately 3 inches (75mm).
6. The cold lead, normally 16'4" long (5m), can be cut/extended to suit the location of the electrical power connection box.
7. Snow/Moisture detection sensor location shall be in the open area, away from trees or bushes, so that it can sense moisture in the air/snowfall and initiate the energization of the heating cable.
8. Check the voltage and wattage of the heating cable to ensure you have the right products for your installation. Details are marked on the product box. A qualified electrician should connect the heating system.
9. Check the continuity and resistance of the snow melting mat before and after installing. Resistance value should match the value shown in the Sizing Guide in this manual (pages 6 and 7) or your product Specifications Sheet (WSC0726 and WSC0729). A tolerance of up to 10% is allowed.
10. Testing the system with a Megger (ACC-MEGG) for insulation resistance is highly recommended. The insulation resistance should be no less than 10MΩ.
11. Keep high voltage power wires in a separate conduit from the low voltage wire.
12. Snow Melting Mats/Cable should be connected to a GFEP protected breaker in the panel. Consult a qualified electrician for local code requirements. Some controllers have built-in GFEP protection and can accept standard breakers.
13. Allow sufficient drying or curing period of the concrete/asphalt/sand after installing the snow melting mat / cable and before energizing the heating cable.
14. Always keep a copy of the cable or mat layout for future reference. Ideally, snap some pictures of the installation before pour and store with other product documentation.
15. All outdoor embedded installations must include the application of a nameplate provided by the manufacturer under NEC 426-13.

NOTE: The installation shall be in accordance with all enclosed instructions and in compliance with local and national electrical codes, namely part 426 of ANSI/NFPA, the NEC and CEC (Canadian Electrical Code), part 1 (re: GFCI, GFEP and RDC's).

NEVER power up the heating cable prior to being buried in concrete, asphalt or in sand (even for testing purposes).

ALL ELECTRICAL WORK MUST BE COMPLETED BY A LICENSED AND QUALIFIED ELECTRICIAN AND IN ACCORDANCE

System Components



Product Specifications

Snow Melting Mats/Cables are uniquely designed for snow melting in parking lots, driveways, pavements, stairs, bridges, roofs, etc. with total safety. Snow melting systems are heating cables taped to a sturdy mesh for fast, easy installation.

Snow Melting Mats consist of a twin conductor heating cable taped onto the Polypropylene mat. The heating cable is laid in a winding fashion so that they are equally spaced (3" apart) and evenly distributed on the mat.

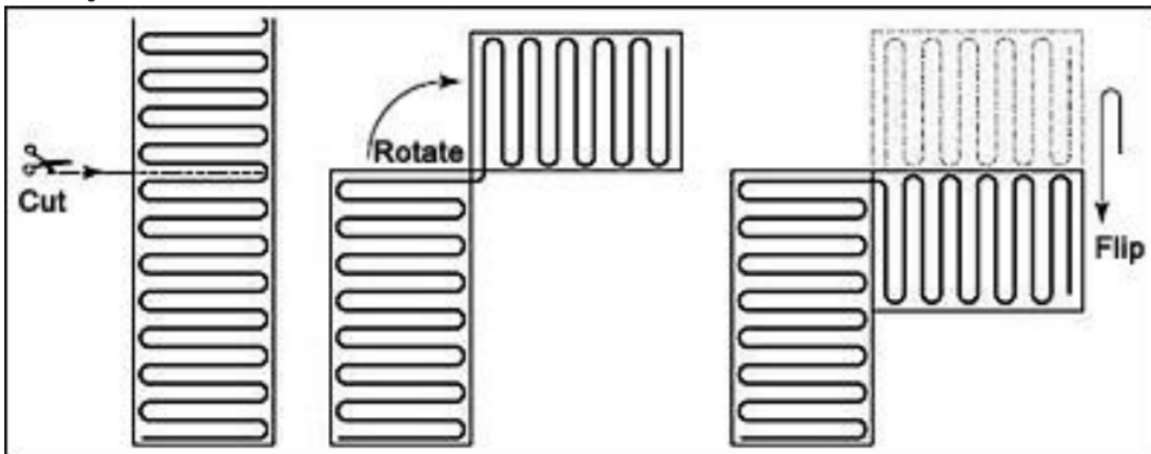
Type	Twin Conductor
Voltage Rating	240V, 480V or 600V
Output	50W/sq ft (540W/sq m) at 3"
Lead	16' 4"
Bending Radius	Minimum 1-1/2"
Cable Diameter	1/4"
Wire Insulation	Fluoropolymer
Casing	Zero Halogen Polyolefin
Max Temperature	454 F / 240 C
Min Installation Temp	14 F / -10 C

Designing Your System: Choosing Mats, Cables and Output

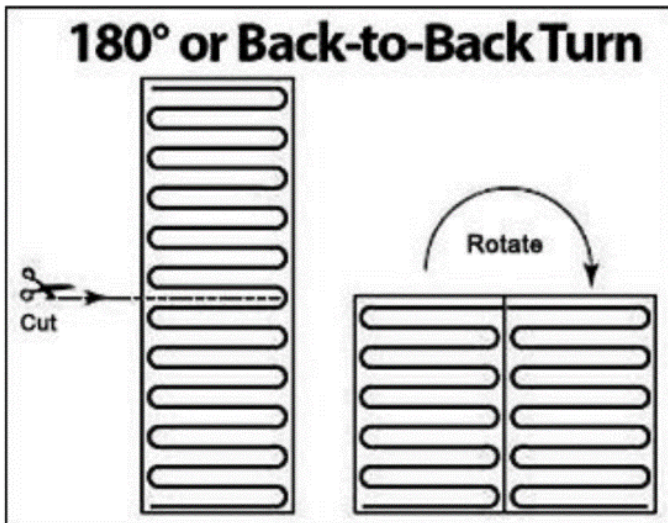
The Heating Cable on the Snow Melting systems consists of a resistance-heating element insulated with Fluoropolymer. A metallic sheath is provided to give additional mechanical strength and a ground path. A final outer jacket of Zero Halogen Polyolefin based compound is given to make it sturdier and provide corrosion protection.

Applications with Mats

Flip Turn



180° or Back-to-Back Turn



WSMM Mats

Voltage	Area (sqft)	Code	Mat Length (ft)	Wattage	Amps	Resistance (Ω)
240V**	10	WSMM-240/500	5	500	2.1	115.20
	20	WSMM-240/1000	10	1000	4.2	57.60
	30	WSMM-240/1500	15	1500	6.3	38.40
	40	WSMM-240/2000	20	2000	8.33	28.80
	50	WSMM-240/2500	25	2500	10.43	23.00
	60	WSMM-240/3000	30	3000	12.5	19.20
	70	WSMM-240/3500	35	3500	14.6	16.46
	80	WSMM-240/4000	40	4000	16.7	14.40
	90	WSMM-240/4500	45	4500	18.8	12.80
	100	WSMM-240/5000	50	5000	20.86	11.50
	120	WSMM-240/6000	60	6000	25.0	9.60

Voltage	Area (sqft)	Code	Mat Length (ft)	Wattage	Amps	Resistance (Ω)
240V**	30	WSMM-240/3x10	10	1500	6.3	38.4
	60	WSMM-240/3x20	20	3000	12.5	19.2
	75	WSMM-240/3x25	25	3750	15.6	15.6
	90	WSMM-240/3x30	30	4500	18.8	12.8
	120	WSMM-240/3x40	40	6000	25.0	9.6

*all mats can be connected to 208V and 240V, single phase or 3 phase power. Please check our Technical Data Sheets for variations to Wattage output and Amperage Load under different Voltages.

Voltage	Area (sqft)	Code	Mat Length (ft)	Wattage	Amps	Resistance (Ω)
480V	30	WSMM-480/1500	15	1500	3.12	153.84
	40	WSMM-480/2000	20	2000	4.16	115.38
	60	WSMM-480/3000	30	3000	6.25	76.8
	80	WSMM-480/4000	40	4000	8.33	57.62
	120	WSMM-480/6000	60	6000	12.50	38.40

WSMM Cables

Voltage	Length (ft)	Code	3" 4" 5"			Wattage	Amps	Resistance (Ω)
			3"	4"	5"			
240V**	84	WSM-240/1000	20	27	34	1000	4.2	57.1
	168	WSM-240/2000	43	57	72	2000	8.3	28.9
	209	WSM-240/2500	51	67	84	2500	10.4	23.1
	251	WSM-240/3000	62	84	104	3000	12.5	19.2
	330	WSM-240/4000	85	110	135	4000	16.90	14.2
	420	WSM-240/5000	100	140	170	5000	20.86	11.5
	500	WSM-240/6000	122	181	200	6000	25.0	9.6

*all mats can be connected to 208V and 240V, single phase and 3 phase power. Please check our Technical Data Sheets for variations to Wattage output and Amperage Load under different Voltages.

Voltage	Length (ft)	Code	Wattage	Amps	Resistance (Ω)
480V	84	WSM-480/1000	1000	2.08	230.77
	209	WSM-480/2500	2500	5.20	92.30
	342	WSM-480/4000	4000	8.33	57.62
	500	WSM-480/6000	6000	12.50	38.4

Voltage	Length (ft)	Code	Wattage	Amps	Resistance (Ω)
600V	84	WSM-600/1000	1000	1.7	360
	209	WSM-600/2500	2500	4.2	144
	342	WSM-600/4000	4000	6.7	90
	500	WSM-600/6000	6000	10	60

While a 240 Volt system is the default choice, sites with alternative power supply can consider alternatives. See our heat output and spacing guide on the following page.



Spacing and Heat Output

When using the pre-assembled Warmup Snow Melting mats, the standard cable spacing is approximately 3" and provides 50 watts of output per square foot.

While 50w/sqft is common in the industry, it is more than the necessary output for most installations. Outside of installations in northern Canada or in ski resorts experiencing high levels of accumulation, 40w/sqft is plenty to melt snow.

It has been demonstrated through testing that it is not necessarily the output that drives melting, it is the ability for the system to activate and heat up BEFORE the snow fall in order to prevent accumulation, rather than fight it.

This is why Warmup recommends its WSM-63 Timer panel, WSM-252W with WIFI option and automatic sensor controllers.

Spacing and Heat Output

	Power	208V	240V
Standard 240V Mats & Cables			
WSMM Mats	3" Spacing	37.5	50
WSM Cables	3" Spacing	37.5	50
	4" Spacing	28.2	37.5
	5" Spacing	22.5	30

Cable De-Rating

It is possible and allowed to "de-rate" the power of a cable. In order to maintain the mats spaced as provided (3" spacing with 50w/sqft output), you can supply the 240V-rated mats with 208V power.

De-rating the mats from 240V to 208V will bring a 50w output down to about 40w/sqft. This technique is used to obtain more coverage with less amperage load.

Refer to the WSM and WSMM technical spec sheets for an exact wattage output and amperage draw based on voltage variations. When in doubt, contact a Warmup representative at 888-927-6333 US or 888-592-7687 in Canada.

De-Rated Power Capacity

System / Power	208V	240V	277V	347V	480V	600V
240 volts	75%	100%	N/A	N/A	N/A	N/A
480 volts	N/A	N/A	33%	52%	100%	N/A
600 volts	N/A	N/A	N/A	N/A	64%	100%

3-Phase Wiring

In the instance when the power supply is available in 3-phases, check with an electrician to determine the best design for your system. It is important to note that the efficiency and cost-effectiveness of the system is NOT impacted by voltage. Electrical bills are paid in WATTS (KiloWatts) and the resulting output/wattage of a system is usually identical regardless of VOLTAGE. This is not always true in the case of de-rating, so check the section above for resulting output.

The main benefit of higher voltages or 3-phase wiring is the reduction in Amperage draw. The equivalent mat or cable at 480V will draw half the amperage than the 240V size. This mainly affects the ability to connect more cables and more square footage on a given amount of amperage. It also utilizes less room on the electrical panel.

There are 3 common 3-phase configurations: 208, 277 and 480V.

Please contact Warmup for 3-phase wiring compatibility and control panel selection.

Controlling your Snow Melting System

Your Warmup Snow Melting system should be controlled by the approved and supported Warmup control devices. Choosing the right controller is a matter of usage and required specifications by the contractor or engineer. What to look for in a controller?

- Do you want simple operation for a smaller residential system?
Check out the section on ODC-ASE-DS2C/5C controllers.
- Are you looking for a larger installation or WIFI Connectivity?
Check out our WSM-63 Timer panel and the WSM-252W Wifi controller.
- Do you need integrated sensors, in-ground or on roof?
Consider the ET02.
- Do you need all the above and GFEP protection?
Check out the ODC-Resibox and COMMBOX-600 panels.

In many instances, a simple ASE-DS5 outdoor-mounted controller will suffice to automatically activate the system during snow fall. Your selection above will also be determined by the amount of amperage you need to switch.

	Amperage	Voltage
ODC-ASE-DS2C	30	100-240
ODC-ASE-DS5C	2 X 30	100-240
ODC-RESIBOX	4 X 30	100-600
COMMBOX-600	4 X 50	100-600
WSM-63	4 X 63	100-600
WSM-252W	4 X 63	100-600



Scan for more technical information

Connecting to ODC-ASE-DS2C or ODC-ASE-DS5C

Several controllers are “all-in-one” and include the sensor. This is the case for the ASE-DS2 or 5 where the sensor is built-in. Even the load switching is built-in, so you only need the heaters and the controller. The DS-2 switches up to 30 amps and the DS-5 up to 2 x 30 amps.



Connecting to WSM-63 and WSM-252W

But these systems are limited in their functionality and total amperage capacity. For that reason, in larger installation, a WSM-63 or WSM-252W will be recommended. These systems can be activated by a ASE-DS2 sensor, or operate manually as a Timer Panel (WSM-63). The WSM-252W is WIFI enabled and is triggered by the weather forecast data captured on the WSM app for Android and iOS.



Connecting to ET02

Multi-zone systems are available as well, though Warmup cautions about excessive zoning. Once the snow builds up in an area, it is very difficult for any system to catch up and melt it. The ET02 system allows for dual zone operation. It requires a contactor panel (WSM-63 or as provided by installer) as well as external sensors.

ETOG sensors are placed in-ground and ETOR sensors are placed on roof or in gutters.



Connecting to ODC-RESIBOX or COMMBOX-600

The Warmup Resibox-120 and Commbbox-600 provide multi-zone operation and have built-in GFEP protection. The Resibox can switch 4x30A and the Commbbox switches up to 4 x 50A. The latter can also be used up to 600V and with 3-phase power supply.

These controllers will require a wall-mounted sensor (AIR-SENSE) to activate.



Mounting Your Controller

Refer to the installation instructions specific to each controller. Depending on specifications, some are mounted indoors and some outdoors. "All-in-one" controllers also require caution so that they are mounted in an exposed area where they can capture falling snow.

Outside of these, it is always recommended to mount controllers indoors to ensure the proper functioning and long-life of the electronic components.

Be mindful of public access to controllers and prevent unauthorized access to the devices.

Selecting a Sensor

There are three types of sensor available in the Warmup range

1. Built-in
2. In-ground
3. Aerial mounted

The built-in sensors are limited to the ASE-DS2 and 5 devices. These are simple but easy to use and easy to install devices for installations under 300 sqft. Because the sensors are built-in, they do not require any rough-in prep.

In-ground sensors like the SIT-6E or the ETOG are used when slab sensing is recommended due to drifting snow or when creating multiple zones.

The recommended choice is Aerial Sensors, like the Warmup AIR-SENSE. The latter is compatible with the RESIBOX-120 and the COMMBOX-600. Aerial mounted sensors are very accurate and do not get damaged by traffic and debris over time.



AIR-SENSE

No-Sensor Operation

It is technically possible to operate a system without a sensor at all. Timer panels can be very effective for people with installations that can easily be triggered manually. The WSM-63 panel has a variable timer built-in where the user can set it (for example) at 8 hours and activate it a few hours ahead of a scheduled precipitation.

The advanced version of that is the WSM-252W panel where the system will regularly check the local weather forecasts and automatically activate the system based on the snow fall probability. An app for smart devices is available to control, activate and shut-down the system remotely.

Placement of Sensors

While a single sensor suffices for successful operation, some designs locate one sensor where the snow and ice will manifest first, and another where the snow is going to disappear last. This will guarantee complete clearing of snow and ice. For example, on a sloped down driveway to an underground garage, place a sensor at the top and at the bottom of the driveway. Remember a combination of sensors can be ground-ground or ground-roof.

When using only one sensor, you will have to choose between fast detection or the lasting melting period (place it where the snow will disappear last). A single-sensor set-up is by far the most common, and controllers have "Over-run" or "Delay" cycles that allow them to continue to operate for a limited time AFTER snow and ice has been cleared. This is in order to ensure no melted snow re-freezes in place or to handle snow drifts.

Conduits

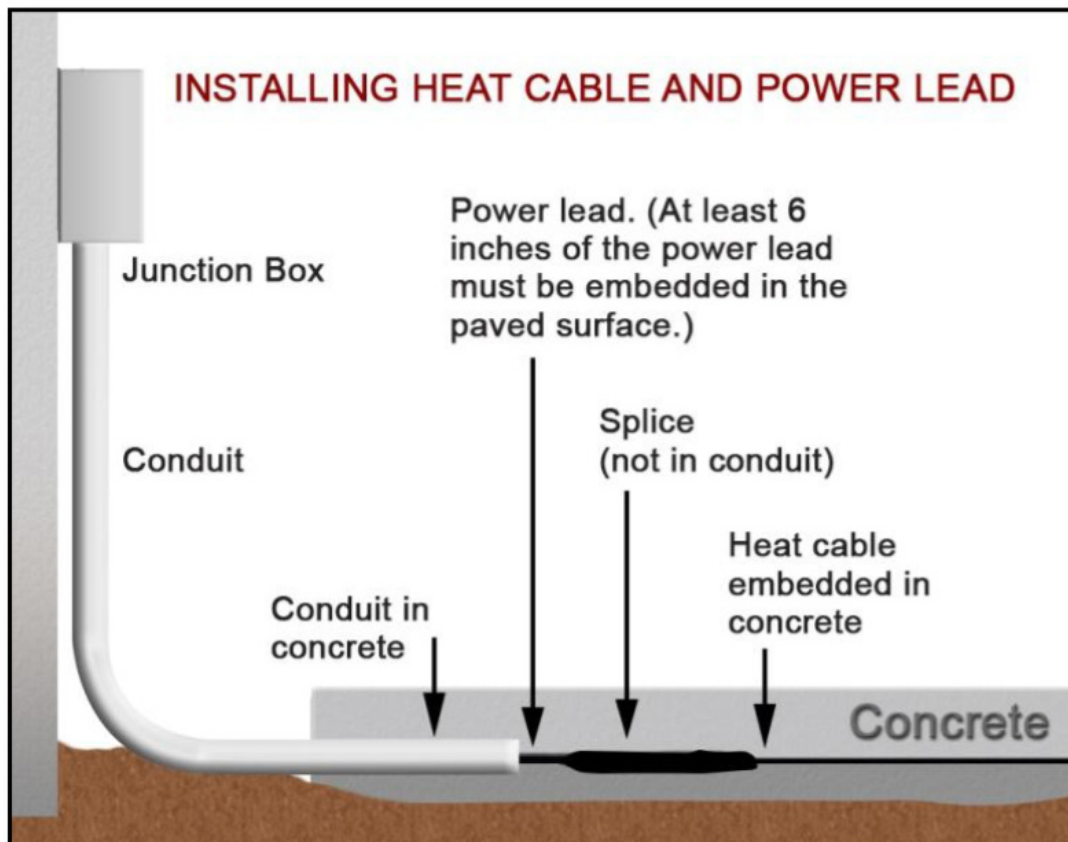
Sensors:

After choosing the location of the sensors, you must install PVC or METAL (based on local code) in order to wire the sensor from its outside location to the control panel. Refer to specific instructions for:

CIT-1
SIT6-E
GIT-1
ETOG
ETOR
AIR-SENSE

Always ensure the conduits are secured to the base (rebar, drained gravel base, blocks) so that they do not move during the pour.

Heating Cables: Heating cables have 16ft leads and can in many cases directly reach the relay or control panel. In instances where that is not possible, the installer must plan for junction boxes to gather the leads and "home-run" the loads to the relay or control panel.



Electrical Supply

All electrical connections should be performed by a licensed electrician and be in compliance with the appropriate local and national codes.

Based on the amount of mats or cables purchased from Warmup, provide enough amperage supply to the relay contactors. Electrical code typically requires 120% capacity on breakers. So when supplying a 16 amps load (cables/mats) a 20 amp breaker should be supplied.

Make sure to supply the appropriate power to the controller or relay panels in order to operate the mats and cables. Make sure you understand the proper wiring if a 3-phase connection is necessary or recommended by your general contractor as your amperage load requirements will change.

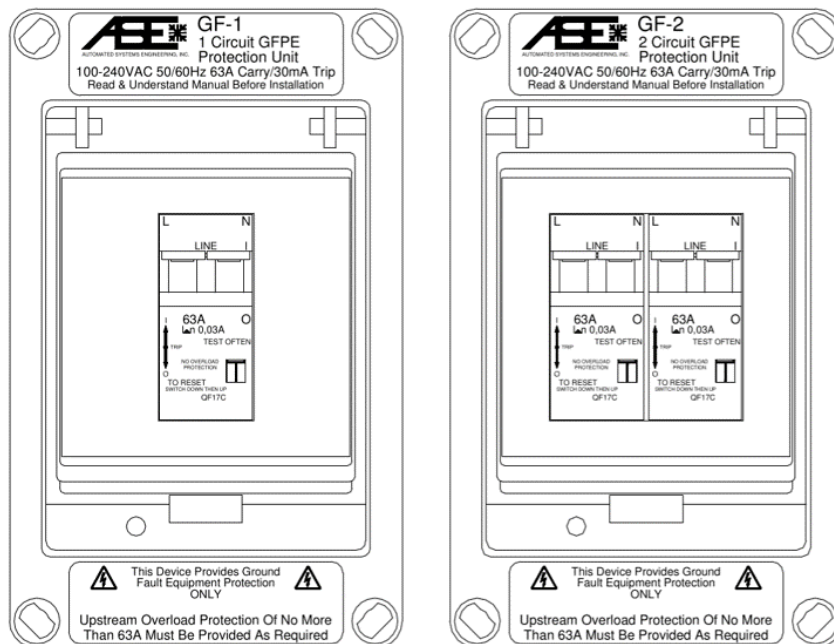
Note that the sensor wires can often be low voltage wires and should therefore ALWAYS be placed in their own, separate conduits. By the same token, while you may place multiple heating cable LEADS inside a single conduit, you should NEVER run the heating portion of the cable inside a PVC or METAL conduit.

All lead wires may be lengthened or shortened as necessary, but NEVER cut the HEATING CABLE. When extending the lead wires, we recommend the use of a wall-mounted or in-ground weather-proof junction box.

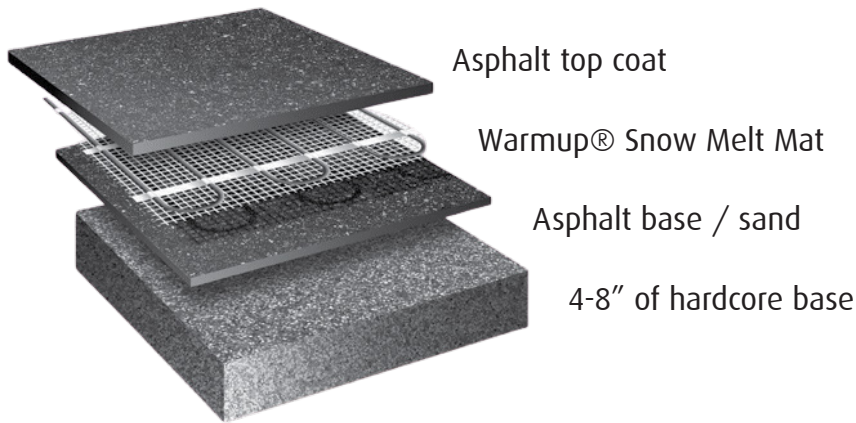
GFCI/GFEP Protection

All circuits provided may require to be GFEP protected, however, some panels have a built-in GFEP protection. Check with your Warmup representative or refer to the specification sheet of the controllers purchased.

You can use a GFEP protection on the breaker or obtain a GF-1 or GF-2 from Warmup which serve as in-line GFEP protections. They respectively protect up to 63A 'carry' or 2 x 63A at 30mA trip levels.



Installation Instructions - Under Asphalt



When using the snow melt mats/cables under asphalt, consider embedding them in sand or concrete first.

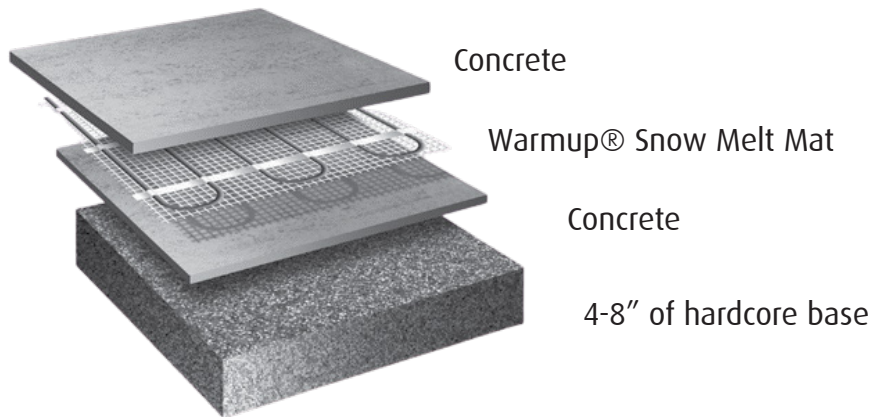
Note: Using a megohmmeter and multi-meter, an electrician should measure the cable resistance and insulation resistance: (1) before commencing installation, (2) before applying asphalt and (3) after the asphalt is applied. Record the readings in this manual. If there is damage STOP and call Warmup.

1. Ensure the contractor has a firm base of 4"-8" drained base tamped down and ready to receive the asphalt.
2. Warmup highly recommends laying 1" of sand over the base to encase the cables or mats. It is important to keep heavy equipment, machinery, vehicles, shovels and rakes away from the cable to prevent damage during exposure.
3. Unroll the mat or place the cable on the sand layer according to your layout plan and apply another layer of sand before a coat of bituminous binder.
4. As needed, secured the mats or cables with landscape staples or by zip-tying the cable onto a re-mesh wire grid.
5. Once the mats/cables are in place, route the cold lead(s) provided through a rigid metal conduit to return to an accessible weatherproof junction box(es). The electrician may supply "in-ground" junction boxes which can be accessed from above so the rest of the box is buried to avoid damage by vehicles. [Note: ensure none of the heated section of the cable enters the conduit(s)]. Seal the ends of the conduit.
6. Sensors can be placed within the asphalted area. Refer to earlier sections under Placement of Sensors.
7. When the mat/cable is embedded in sand or mortar, the asphalt should not exceed a thickness of more than 2" for optimal results. When pouring asphalt DIRECTLY on the mat/cable, let it cool to 230F or below. Use a maximum of 2" of asphalt for optimal results.
8. After the asphalt hardens, test and record results to verify that there is no damage and to ensure it is ready for activation once the asphalt has cured.
9. Warmup highly recommends hand-rolling the asphalt. However, provided the cables are embedded in sand, a small 1-ton roller can be used.
10. For easy reference, attach a label at the power distribution board, indicating the location of the heating cables.



Maximum roller weight is 1 ton.

Installation Instructions - Under Concrete



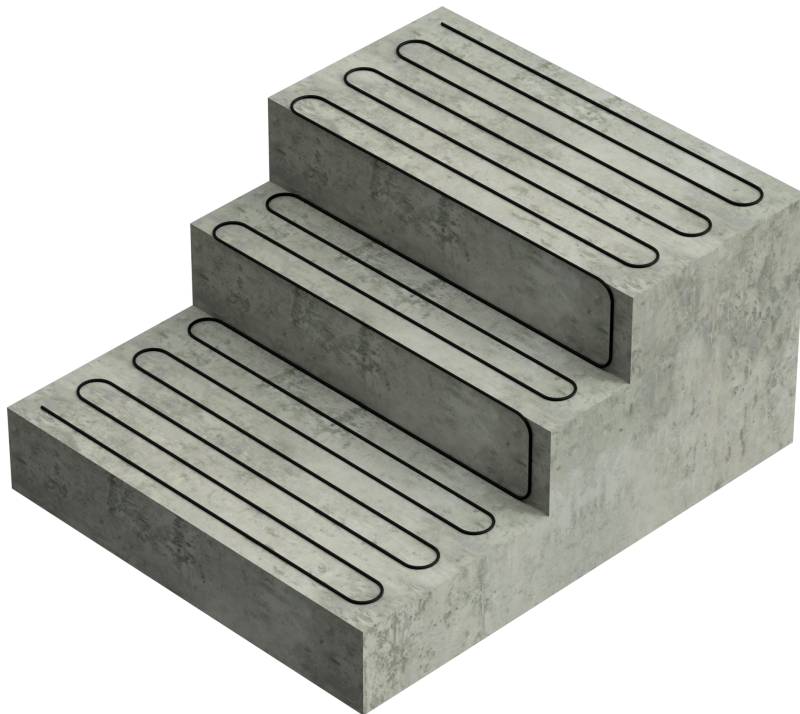
Note: Using a multi-meter, an electrician should measure the cable resistance and insulation resistance: (1) before commencing installation, (2) before pouring concrete and (3) after the concrete is poured. Record the readings. If there is damage STOP and ring 1-888-927-6333.

1. Ensure the paving contractor has a solid base of 4"-8" (102-203mm) of crushed rock aggregate tamped down and ready to receive the pour.
2. Clean the area below the heating mat/cable so that it is free from sharp objects. It is important to keep heavy equipment, machinery, vehicles, shovels and rake edges away from the cable to prevent damage.
3. For locations that require handrails, it is strongly recommended that the concrete installer pre-sleeves the posts to avoid any and all drilling of the concrete. The mat/cable must be routed around these sleeves/posts to avoid any direct contact with them. See "How To Modify the Mat" if you need to alter the mats.
4. Identify the location of Expansion Joints with spray paint. Avoid crossing over expansion joints and design your system such that each section is covered by separate heating mats. This does not apply to "stress-cuts" in the concrete.
As an alternative, mark the location of the expansion joints on the sub-base with chalk or spray-paint and use the following technique: Apply a 2" x 2" downward bend or loop in the cable. This will cause for that section of cable to be deeper, thereby avoiding the blades, as well as provide for some level of flexibility when the slab expands and contracts during the various seasons.
5. Place the mat or cable down on top of a "re-mesh" type lightweight wire mesh. This will facilitate the even spacing of loose cable or prevent mats from moving around during pour. Use Warmup-provided zip-ties to secure the mats or cables to the mesh.
6. Depending on the depth of the pour, plan on elevating the mesh holding the cable so that it sits 2" to 3" from the surface. You can also leave the mesh at the bottom of a 4" pour, but expect longer heat times.
7. Route the cold lead(s) through rigid PVC or metal conduit(s) to an accessible weatherproof junction box(es). Ensure that none of the factory splice or heated section of the cable enters any conduit. Do not use excess force to pull the cold leads otherwise it may damage the hot-cold splice. Seal the conduit ends.
8. Make the necessary provisions to plan for an in-ground sensor if applicable. Ensure you set it up such that the sensor will sit flush with the top coat of the concrete. A separate conduit should be used to protect the low voltage sensor wire and must NOT be shared with any high voltage cold lead from the mats/cables.
9. See various provisions regarding j-boxes and expansion joints. Provided all is set, you can pour the concrete through the lightweight mesh. Take the necessary precautions to avoid damaging the cable with spades/rakes during the pour.
10. An electrician MUST complete the final test and record results of all the mats/cables readings with a multi-meter and megohmmeter and verify that each mat/cable is in good working order and is ready for energizing once the sand has cured.
11. For easy reference, easy reference, tape your plan to a power distribution board, indicating the location of the heating cables.

Installation Instructions - Loose Cables on Steps

The WARMUP Loose Cables are specifically designed to be applied on steps and landings. Here's how we recommend to proceed, using all the above-mentioned cautions and techniques.

1. We highly recommend the use of the WARMUP CLIP system (part number USM-FB1). Cut the strips to about 10" or the depth of the steps and apply every 2 or 3ft in width to maintain consistent spacing of the cables.
2. On a 10" deep step, use 3 runs of the loose cable, ensuring that one of the runs is at the outer-most edge of the step. This is to guarantee that the heating will perform even when stones are laid with an overhang on the step. For any unusual layouts or masonry work, please contact Warmup®.
3. Start your work closest to the 1" conduit provided to route the lead wire. This can be at the top of the landing or at the bottom of the steps. Work your way up or down from there.
4. When transitioning to the next step, follow the bending diagram below, taking care not to bend the cable tighter than a radius of 1.5". Do not over-bend the cable. Going up or down to the next step, use a slightly diagonal route to reduce the bending radius to a minimum and when possible, lightly chisel the sharp edges of a concrete stair base.
5. Note whether the drawings will call for the installation of railings. If so, and because railings are drilled after the masonry or concrete work, leave a minimum of 6" on the edges of the steps.
6. Even when making use of the WARMUP CLIP system, we recommend the punctual application of hot glue with a hot glue gun to secure some of the manual bending and laying of the cable and clips.



Installation Instructions - Under Pavers



1. Ensure the paving contractor has a solid base of 4"-8" (102-203mm) of crushed rock aggregate tamped down and ready to receive the mortar pour or sand/gravel base.
2. Take extreme care to ensure the paver installer does NOT use any heavy equipment, machinery or vehicles over the exposed heating cables. We highly recommend the cable resistance be checked with a multimeter during the paving process. This will ensure detection of any unlikely faults as early as possible.
3. For installation on stairs and ramps that will include hand rails, it is strongly recommended that the paver installer pre-sleeves the posts to avoid any and all drilling of the mortar. The heating mat/cable must be routed around these sleeves or posts to avoid any direct contact with them. When preparing for railings, expansion joints and related, please ensure the contractor has clearly marked and informed the paving/concrete contractor of the cable location.
4. Start by spreading a 1" layer of sand over the drained rock base. This will smoothen the base on which the mats/cables will be laid. Use landscape staples if permitted to secured your cables and mats in place. Where not suitable, use a lightweight mesh (type "re-mesh") to secured cable evenly spaced. Warmup recommends the used of WSMM Mats under pavers.
5. Route the cold lead(s) through metal or PVC conduit(s) to an accessible weatherproof junction box(es). The electrician must ensure that none of the heated section enters any conduit. For this type of application, we recommend the use of the built-in or aerial sensors to avoid cuts in pavers and stone. When using in-ground sensors, please make sure to plan ahead for correct placement of sensors within the stone. (Note: test the mats/cables to ensure they have not been damaged and record the readings.)
6. Do NOT walk on the hot-cold factory splice and avoid damaging the mats/cables with shovels or rakes. As with all installations, ensure the factory splice is embedded in sand or mortar, and not sleeved into a conduit.
7. The electrician needs to complete the final testing of all the snow melting mats/cables with a multi-meter to verify and record that each heating cable is still operational after the pour of mortar and cured. Record these values at the back of this manual.

Testing the Snow Melt Mat / Cable

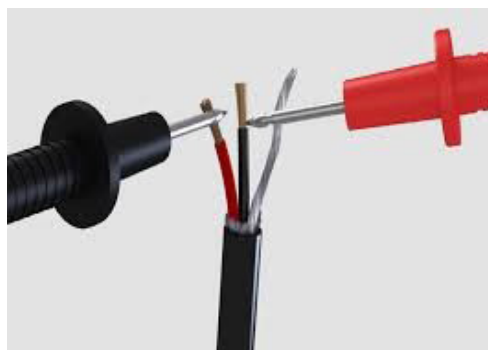
A. Insulation Resistance (megohmmeter required)

1. Connect one meter clamp to the cold lead inner conductor and the other meter clamp to the metal cable braided sheath (ground) of the heating cable.
2. Test in accordance with the meter manufacturer's instructions (recommended meter is a 500 VDC megohmmeter).
3. Megohmmeter reading should read greater than 10 megohms.
4. Ensure you test and record readings BEFORE, DURING and AFTER installation.



B. Total Cable Resistance (Multi-meter required)

1. Connect one meter clamp to one cold lead inner conductor and the other meter clamp to the other cold lead inner conductor.
2. Test in accordance with the meter manufacturer's instructions and record this Ohm value.
3. Total nominal cable resistance information can be found on the product tag. Actual readings should be within 10% of the cable resistance.
4. Perform this test and record measured values on the Warranty Card BEFORE, DURING and AFTER installation.



Accessories

Code	Accessories
WSM-NMP	Branded Name Plate for use with Warmup Snow Melt Heater installations (NEC426-13).
ACC-DGMTR	The Alligator Tester - Digital Multimeter.
ACC-MEGG	Warmup's Digital Mega-Ohmmeter is used to track Insulation Resistance for installation Accuracy and Warranty Purposes.
SR-ZT-100	Bag of 100 Heavy Duty Zip Ties. 7" long. For use with WSM, WODH and NAMS cable series. 50lbs load bearing capacity.
USM-FB1	Metal fixing strips to fix the heating cable - 83 ft long.

Warranty - Snow Melting Mats and Cables



Warmup provides a 10-Year Warranty (from date of purchase) for the Snow Melting Mats and Cables for the material and workmanship under normal operating conditions.

In case of defective material, Warmup's obligation will be limited to the repair or supply of new material, free of charge to the customer.

The Warranty does NOT cover installations made by unqualified personal or faults caused by incorrect design by others; misuse; damage caused by others; damage in transit; incorrect installation and any other subsequent damage that may occur. Cost related to repair/replacement will be fully chargeable to the customer if the damage is due to any of the above reasons.

Warmup is under no circumstances liable for consequential damages or losses including without limitations the loss or profit arising from any cause whatsoever. The guarantee is a material warranty only and does NOT cover field labor. A qualified electrician MUST connect the heating system.

The Warranty is void if there is any payment default and if data is not filled in correctly.

EXCLUSIONS

Warmup, Inc. shall in no event be liable for incidental or consequential damages, including but not limited to extra utility expenses or damages to property. This Warranty is null and void if:

- 1) The covering over the heater(s) is damaged, lifted, replaced, drilled into or repaired.
- 2) The heater fails due to damage caused during installation, unless damage is caused directly by an employee of Warmup. It is therefore essential to check that the heater is working (as specified in the installation manual) prior and during installation.
- 3) Damage as a result of floods, fires, winds, lightning, accidents, corrosive atmosphere or other conditions beyond the control of Warmup, Inc.

- 4) Use of components or accessories is not compatible with Warmup heaters.
- 5) Warmup products are installed outside the United States.
- 6) Parts not supplied or designated by Warmup, Inc.
- 7) Damage or repair required as a result of any improper use, maintenance, operation or servicing.
- 8) Failure to start due to interruption and/or inadequate electrical service.
- 9) Any damage caused by frozen or broken pipes in the event of equipment failure.
- 10) Changes in the appearance of the product that does not affect its performance.
- 11) The owner, or his/her designated representative, attempts to repair the product without receiving prior authorization from Warmup. Upon notification of a repair problem, Warmup, Inc. will issue an Authorization to Proceed under the terms of this Warranty. If Warmup is required to inspect or repair any defects caused by any exclusions referenced above, all work will be fully chargeable at Warmup's inspection and repair rates then in effect.

WARMUP, INC. DISCLAIMS ANY WARRANTY NOT PROVIDED HEREIN, INCLUDED ANY IMPLIED WARRANTY OF THE MERCHANTABILITY OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. WARMUP, INC. 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 THAT EXTEND BEYOND THE FACE OF THIS DOCUMENT. NO AGENT OR REPRESENTATIVE OF WARMUP, INC. HAS ANY AUTHORITY TO EXTEND OR MODIFY THIS WARRANTY UNLESS SUCH EXTENSION OR MODIFICATION IS MADE IN WRITING BY A CORPORATE OFFICER.

DUE TO DIFFERENCES IN BUILDING AND FLOOR INSULATION, CLIMATE AND FLOOR COVERINGS, WARMUP, INC. MAKES NO REPRESENTATION THAT THE FLOOR TEMPERATURE WILL ACHIEVE ANY PARTICULAR TEMPERATURE OR TEMPERATURE RISE. UL STANDARD LISTING REQUIREMENTS LIMIT THE HEAT OUTPUT OF WARMUP UNDERTILE HEATING, AS SUCH, USERS MAY OR MAY NOT BE SATISFIED WITH THE FLOOR WARMTH THAT IS PRODUCED. WARMUP DOES WARRANT THAT ALL HEATERS WILL PRODUCE THE RATED WATT OUTPUT LISTED ON THE HEATER NAMEPLATE, WHEN OPERATED AT THE RATED VOLTAGE.

TERMS AND CONDITIONS

Shipping Discrepancies: Incoming materials should be inventoried 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, must be brought to the attention of your Warmup® reseller within 15 days of the shipping date entered on the packing slip for the order.

Miscellaneous: The terms of this Limited Warranty are exclusive and supersede any other warranty or terms and conditions relating to the subject matter whether included in a purchase order for this product or in any other document or statement.

Register your Warmup warranty at www.warmup.com or www.warmup.ca

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