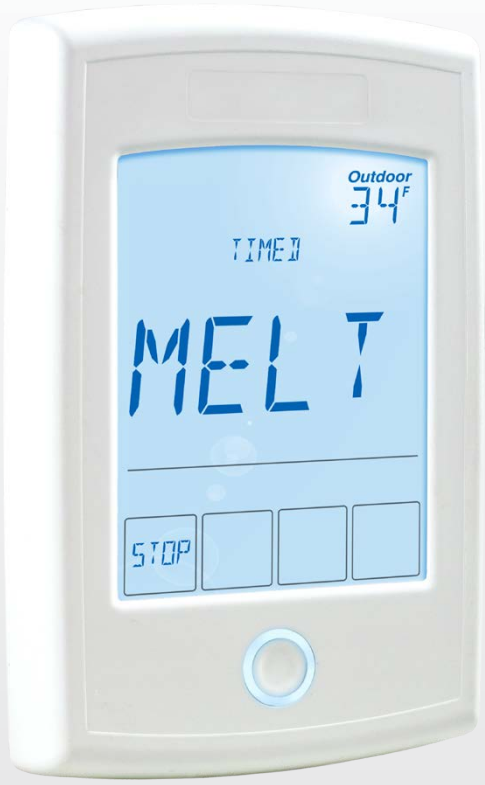
SunTouch®
electric floor heating & snow melting

Snow Melting Control PM-653

Installation Manual



The Snow Melting Control PM-653 is designed to operate electric heating cables to melt snow or ice from any surface including driveways, walkways, patios, business entrances, parking ramps, loading docks, hospital entrances, helipads or car wash bays. The surface temperature for snow melting is controlled automatically to reduce operating energy costs. The PM-653 has an automatic start and stop function when used with the Snow/Ice Sensor PM-090. Automatic start with a timed stop is available when used with the Snow Sensor PM-095.

Features

- Automatic Snow / Ice Detection
- Connect to In-Slab, Surface or Pole-Mount Sensors
- Manual Start With Timer
- Warm Weather Shut Down
- Cold Weather Cut Out
- Manual Override
- Away Key

⚠ WARNING

Installation must be performed by qualified persons, in accordance with local codes, ANSI/NFPA 70 (NEC Article 426) and CEC Part 1 Section 62 where applicable. Prior to installation, please consult the local codes in order to understand what is acceptable. To the extent this information is not consistent with local codes, the local codes should be followed. However, electrical wiring is required from a circuit breaker or other electrical circuit to the control. It is recommended that an electrician perform these installation steps. Please be aware local codes may require this product and/or the control to be installed by an electrician.

Table of Contents

⚠ WARNING

Read this Manual BEFORE using this equipment.

Failure to read and follow all safety and use information can result in death, serious personal injury, property damage, or damage to the equipment.

Keep this Manual for future reference. Replacement Manuals are available at SunTouch.com

Important Safety Information

This is a safety-alert symbol. The safety alert symbol is shown alone or used with a signal word (DANGER, WARNING, or CAUTION), a pictorial and/or a safety message to identify hazards.

When you see this symbol alone or with a signal word on your equipment or in this Manual, be alert to the potential for death or serious personal injury.

This pictorial alerts you to electricity, electrocution, and shock hazards.

⚠ WARNING This symbol identifies hazards which, if not avoided, could result in death or serious injury.

⚠ CAUTION This symbol identifies hazards which, if not avoided, could result in minor or moderate injury.

NOTICE This symbol identifies practices, actions, or failure to act which could result in property damage or damage to the equipment.

Radio Frequency Interference

The installer must ensure that this control and its wiring are isolated and/or shielded from strong sources of electromagnetic noise. Conversely, this Class B digital apparatus complies with Part 15 of the FCC Rules and meets all requirements of the Canadian Interference-Causing Equipment Regulations. However, if this control does cause harmful interference to radio or television reception, which is determined by turning the control off and on, the user is encouraged to try to correct the interference by re-orientating or relocating the receiving antenna, relocating the receiver with respect to this control, and/or connecting the control to a different circuit from that to which the receiver is connected.

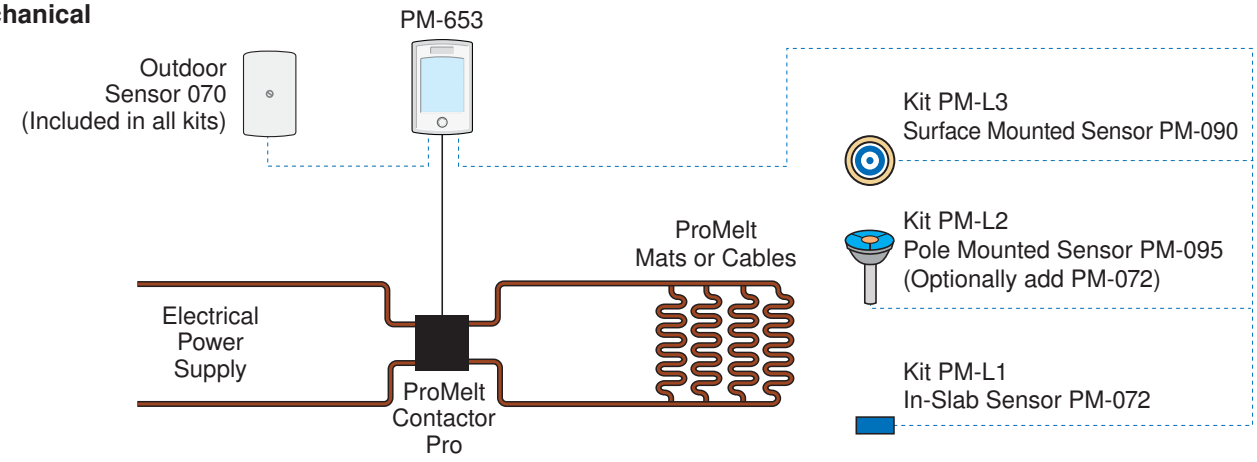
Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Single Zone Electric Snow Melting Application PM-653

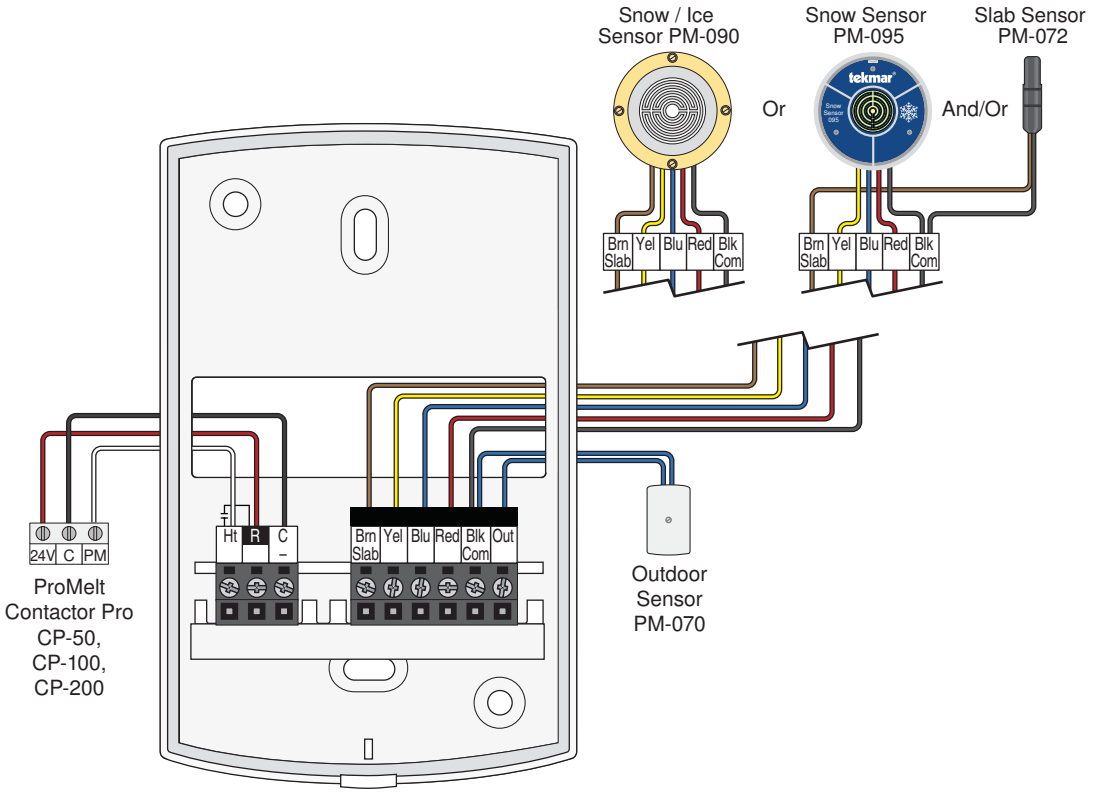
There are 3 levels of operation available depending on which kit is used.

Kit PM-L1	Snow melting system is manually started at the control or using a remote enable. Snow melting operates for a timed duration or until manually shut off. The melting surface is operated using the lowest effective melting temperature to reduce operating costs.
Kit PM-L2	Snow melting system is operated as soon as snow is detected and continues for a pre-set duration. If snow remains on the sensor after the run time has expired, another melting cycle begins. For reset slab temperature control, the optional PM-072 in-slab sensor is required.
Kit PM-L3	Snow melting system is operated as soon as snow is detected and automatically shuts off when the sensor surface is free of snow or ice. The melting surface is operated using the lowest effective melting temperature to reduce operating costs.

Mechanical



Electrical



⚠ WARNING

All electrical work must be done by a qualified licensed electrician in accordance with local building and electrical codes, and the National Electrical Code (NEC), especially Article 426 of the NEC, ANSI/NFPA70 and Section 62 of CEC Part 1.

Installation

Preparation

Tools Required

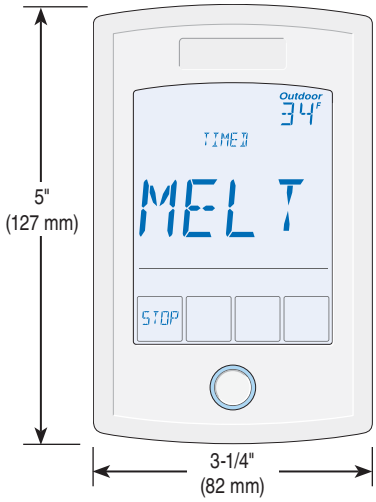
- Jeweler screwdriver
- Phillips head screwdriver
- Needle-nose Pliers
- Wire Stripper

Materials Required

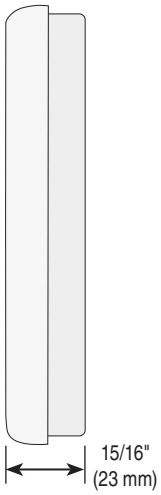
- 18 AWG LVT Solid Wire (Low Voltage Connections)

Physical Dimensions

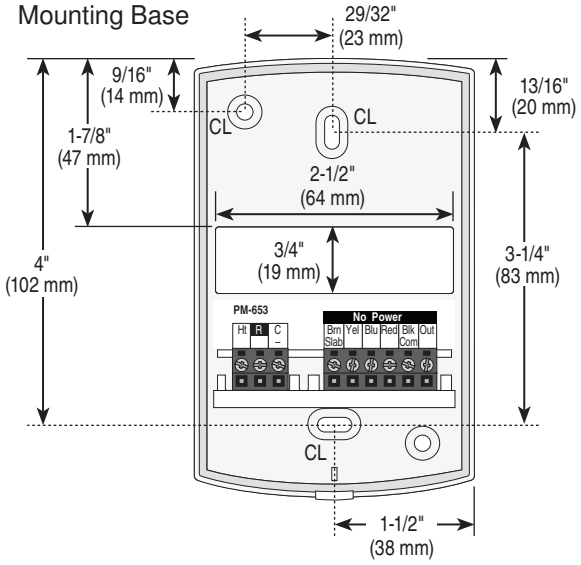
Front View



Side View



Mounting Base



Installation Location

When choosing the location for the control, consider the following:

- Interior Wall.
- Keep dry. Avoid potential leakage onto the control.
- Relative Humidity less than 90%. Non-condensing environment.
- No exposure to extreme temperatures beyond -4 to 122°F (-20 to 50°C).
- No draft, direct sun, or other cause for inaccurate temperature readings.
- Away from equipment, appliances, or other sources of electrical interference.
- Easy access for wiring, viewing, and adjusting the display screen.
- Approximately 5 feet (1.5 m) off the finished floor.
- The maximum length of wire is 500 feet (150 m).
- Strip wire to 3/8" (10 mm) for all terminal connections.
- Use standard 8 conductor, 18 AWG wire.

Control and Snow Sensor Wiring

Each cable must be pulled from the equipment to the control's plastic enclosure. All low voltage wiring connections enter the enclosure through the square knockout on the rear. It is recommended to label each cable for easy identification. All low voltage wires are to be stripped to a length of 3/8" (9 mm) to ensure proper connection to the control.

Pull two conductor 18 AWG LVT cable, up to 500 feet (150 m) for the following equipment:

- Outdoor Temperature Sensor PM-070
- Slab Sensor PM-072

Pull three conductor 18 AWG LVT cable, up to 500 feet (150 m) for the following equipment:

- ProMelt Contactor Pro CP-50, CP-100 or CP-200

Pull four conductor 18 AWG LVT cable, up to 500 feet (150 m) for the following equipment:

- Snow Sensor PM-095

Pull five conductor 18 AWG LVT cable, up to 500 feet (150 m) for the following equipment:

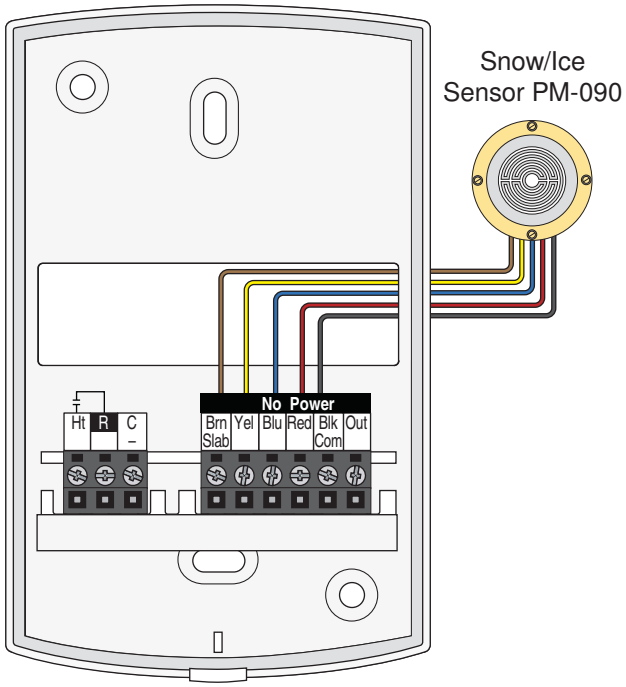
- Snow / Ice Sensor PM-090

⚠ WARNING

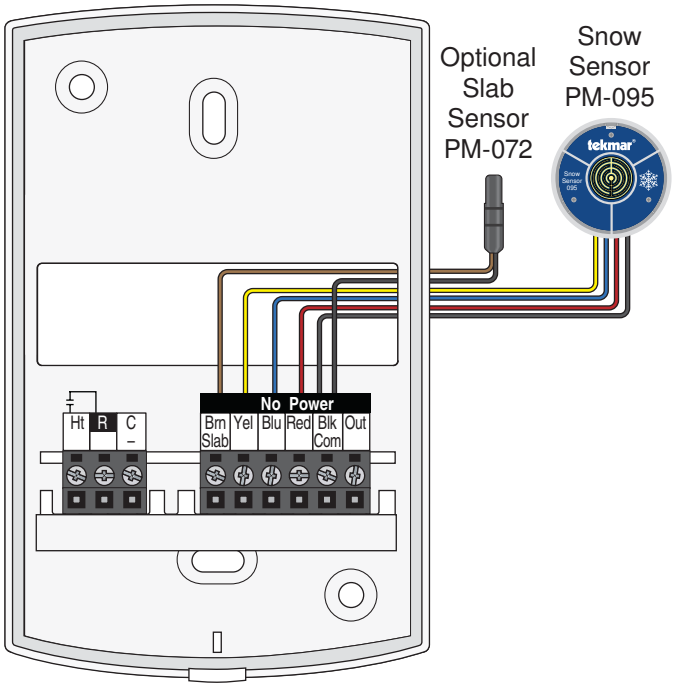
It is the installers responsibility to ensure that this control is safely installed according to all applicable codes and standards. SunTouch is not responsible for damages resulting from improper installation and/or maintenance.

- Read Manual and all product labels BEFORE using the equipment. Do not use unless you know the safe and proper operation of this equipment.
- Disconnect all power before opening the control.
- This electronic control is not intended for use as a primary limit control. Other controls that are intended and certified as safety limits must be placed into the control circuit.
- Do not attempt to service the control. There are no user serviceable parts inside the control. Attempting to do so voids warranty.

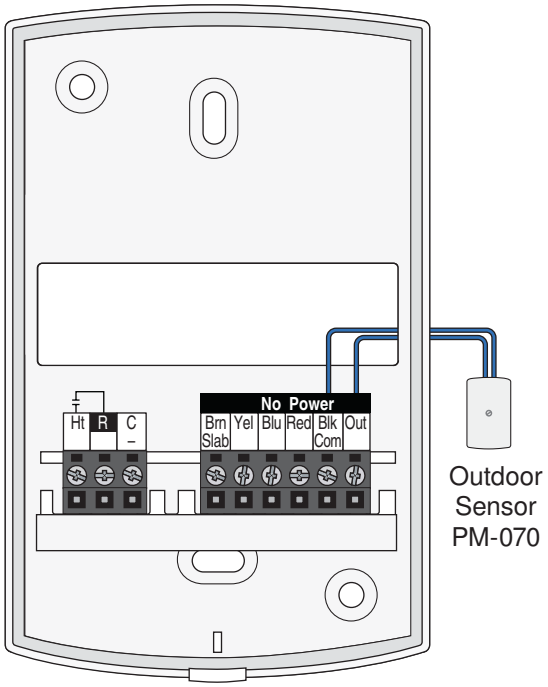
Snow / Ice Sensor



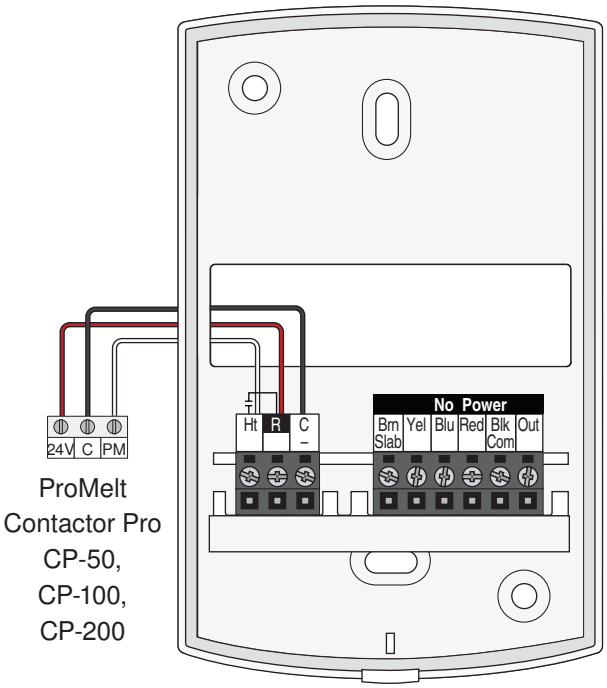
Snow and Slab Sensor



Outdoor Sensor



Electrical Contactor

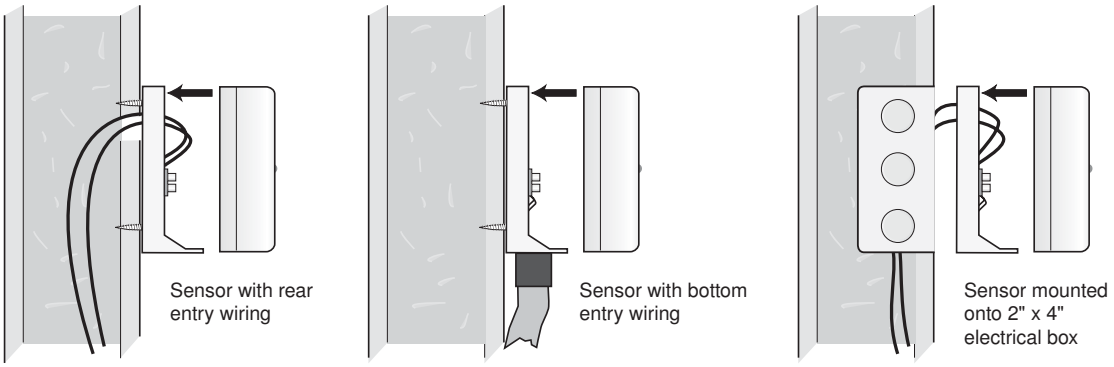


Outdoor Sensor Wiring

Mounting the Outdoor Sensor

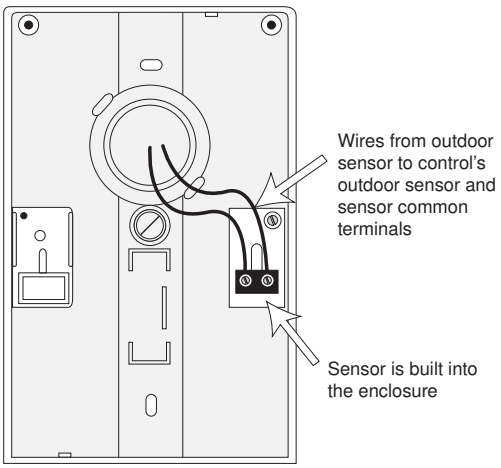
The temperature sensor (thermistor) is built into the sensor enclosure.

- Remove the screw and pull the front cover off the sensor enclosure.
- The outdoor sensor can either be mounted directly onto a wall or a 2" x 4" electrical box. When the outdoor sensor is wall mounted, the wiring should enter through the back or bottom of the enclosure. Do not mount the outdoor sensor with the conduit knockout facing upwards as rain could enter the enclosure and damage the sensor.
- In order to prevent heat transmitted through the wall from affecting the sensor reading, it may be necessary to install an insulating barrier behind the enclosure.
- The outdoor sensor should be mounted on a wall which best represents the heat load on the building (a northern wall for most buildings and a southern facing wall for buildings with large south facing glass areas). The outdoor sensor should not be exposed to heat sources such as ventilation or window openings.
- The outdoor sensor should be installed at an elevation above the ground that will prevent accidental damage or tampering.



Wiring the Outdoor Sensor

- Connect 18 AWG or similar wire to the two terminals provided in the enclosure and run the wires from the outdoor sensor to the control. Do not run the wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference (EMI), shielded cable or twisted pair should be used or the wires can be run in a grounded metal conduit. If using shielded cable, the shield wire should be connected to the Com terminal on the control and not to earth ground.
- Follow the sensor testing instructions in this brochure and connect the wires to the control.
- Replace the front cover of the sensor enclosure.



Testing the Sensor Wiring

A good quality test meter capable of measuring up to 5,000 kΩ (1 kΩ = 1000 Ω) is required to measure the sensor resistance. In addition to this, the actual temperature must be measured with either a good quality digital thermometer, or if a thermometer is not available, a second sensor can be placed alongside the one to be tested and the readings compared.

First measure the temperature using the thermometer and then measure the resistance of the sensor at the control. The wires from the sensor must not be connected to the control while the test is performed. Using the temperature versus resistance table, estimate the temperature measured by the sensor. The sensor and thermometer readings should be close. If the test meter reads a very high resistance, there may be a broken wire, a poor wiring connection or a defective sensor. If the resistance is very low, the wiring may be shorted, there may be moisture in the sensor or the sensor may be defective. To test for a defective sensor, measure the resistance directly at the sensor location.

NOTICE

Do not apply voltage to a sensor at any time as damage to the sensor may result.

Temperature versus Resistance Table

Temperature		Resistance	Temperature		Resistance	Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω	°F	°C	Ω	°F	°C	Ω
-50	-46	490,813	20	-7	46,218	90	32	7,334	160	71	1,689
-45	-43	405,710	25	-4	39,913	95	35	6,532	165	74	1,538
-40	-40	336,606	30	-1	34,558	100	38	5,828	170	77	1,403
-35	-37	280,279	35	2	29,996	105	41	5,210	175	79	1,281
-30	-34	234,196	40	4	26,099	110	43	4,665	180	82	1,172
-25	-32	196,358	45	7	22,763	115	46	4,184	185	85	1,073
-20	-29	165,180	50	10	19,900	120	49	3,760	190	88	983
-15	-26	139,403	55	13	17,436	125	52	3,383	195	91	903
-10	-23	118,018	60	16	15,311	130	54	3,050	200	93	829
-5	-21	100,221	65	18	13,474	135	57	2,754	205	96	763
0	-18	85,362	70	21	11,883	140	60	2,490	210	99	703
5	-15	72,918	75	24	10,501	145	63	2,255	215	102	648
10	-12	62,465	80	27	9,299	150	66	2,045	220	104	598
15	-9	53,658	85	29	8,250	155	68	1,857	225	107	553

Testing the Control Wiring

Testing the Power

1. Remove the front cover from the control.
2. Use an electrical test meter to measure (ac) voltage between the R and C terminals. The reading should be 24 V (ac) +/– 10%.
3. Install the front cover.

Manual Override - Test

The control includes a Test operation where the electrical heating cables can be energized for 10 minutes after which the control resumes normal operation. This allows testing of the electric snow melting system during warm weather.

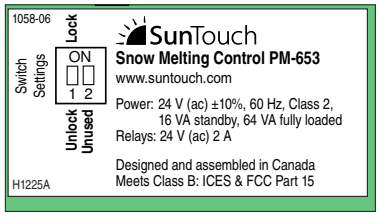
Step 1: Press and hold the Home button for 3 seconds.
Step 2: Press NEXT to navigate to the Override menu.
Step 3: Press ENTER to enter the Override menu.
Step 4: Select Manual Override to Test.
Step 5: Exit the Manual Override by selecting Auto.

Manual Override - Off

The snow melting system can be manually turned off and the control remains off until manually changed back to Auto. This allows the installer or end user to permanently disable the snow melting system without removing power from the control.

Step 1: Press and hold the Home button for 3 seconds.
Step 2: Press NEXT to navigate to the Override menu.
Step 3: Press ENTER to enter the Override menu.
Step 4: Select Manual Override to Off.
Step 5: Exit the Manual Override by selecting Auto.

Switch Settings

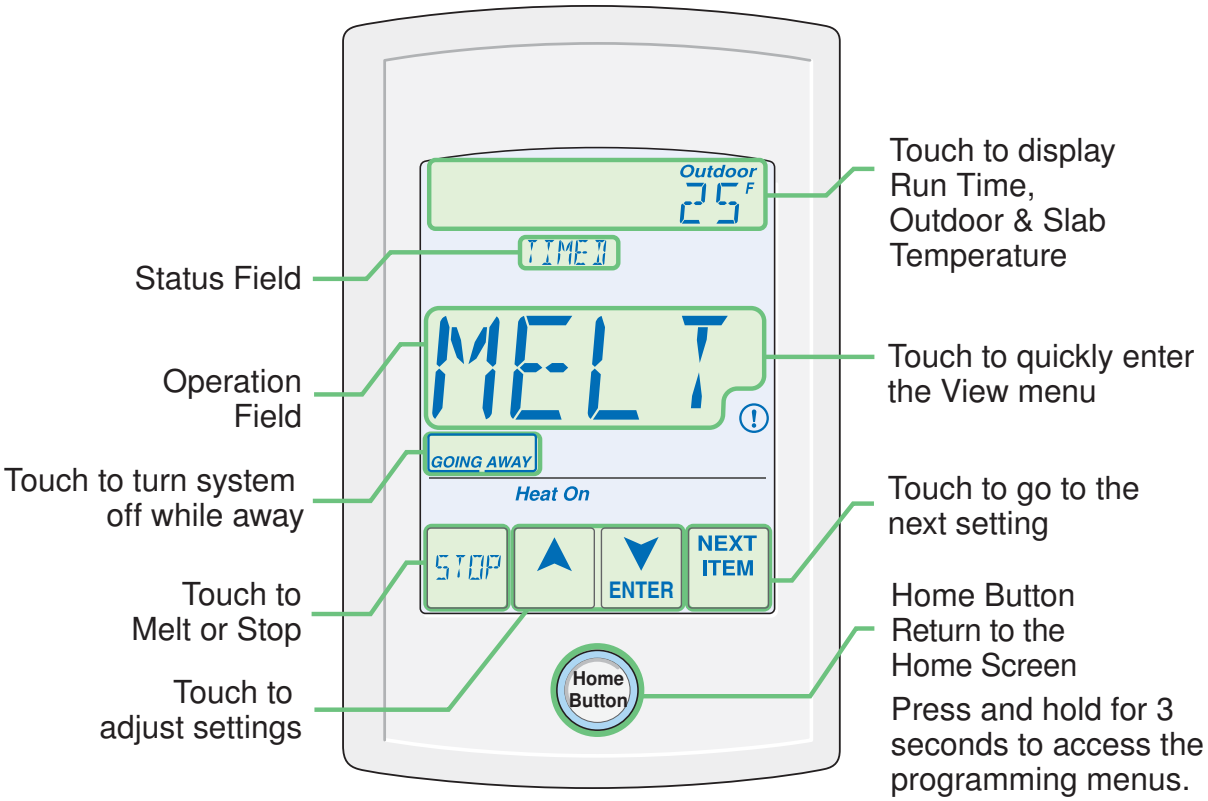


Back of Control

Switch	Position	Action
1	ON	**LOCK ACCESS LEVEL** The control is locked and the access level cannot be changed. Set to Lock when installation has been completed.
	OFF	**UNLOCK ACCESS LEVEL** The control is unlocked and the access level may be changed. Go to the Toolbox menu to change the access level. Set to Unlock during the installation process.
2	ON	Not used
	OFF	Not used

User Interface

Display



Operation Field

MELT	System is melting snow or ice.	OFF	System is off.

Status Field

WWSD	Warm Weather Shut Down. The slab is naturally warm enough to melt snow or ice.	WARM	Slab is warming up to the melting temperature.
CWCO	Cold Weather Cut Out. Too cold to melt.	AWAY	Away scene. No melting until the away scene is exited.
TIMED	Timed melting operation. System operates until time has elapsed.	PEND	Pending. The system has detected water but it is too cold to operate.

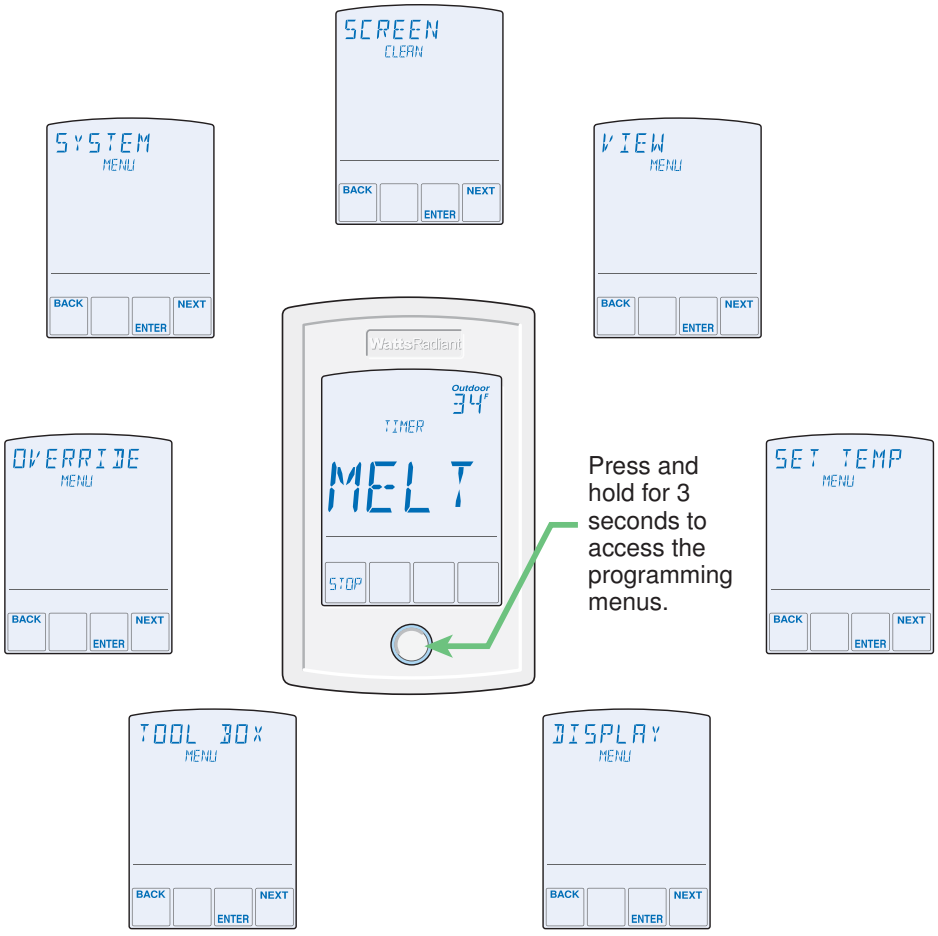
Symbols

Heat On	**HEAT ON** Heat is turned on.
▲▼	**ARROWS** Adjust the displayed setting.
ⓘ	**WARNING SYMBOL** Indicates an error is present.

Programmable Settings

Programming Menus

Press and hold the Home button for 3 seconds to enter the programming menus. The control returns to the last programming menu previously used.



Select a Programming Menu

- Touch “NEXT” to advance (clockwise in above illustration) to the next menu.
- Touch “BACK” to go backwards (counterclockwise in above illustration) through the menus.
- Touch “ENTER” to enter a menu.

Setting Items

- Touch ▲ or ▼ arrow to adjust the setting if required.
- Touch “NEXT ITEM” to advance to the next item within the menu.
- Touch “BACK ITEM” to go backwards to the previous item within the menu.
- To return to the parent menu after changing a setting, press and release the Home button.
- To return to the Home screen, press and release the Home button twice or wait 30 seconds to automatically return to the Home screen.

Access Levels and Access Level Lock

The control is shipped pre-programmed with common settings. The control has an “Installer” access level that allows full access to all settings and a “User” access level that restricts the number of menus and settings available. The control defaults to the “User” access level after 12 hours of operation.

View Menu

The View menu items display the current operating temperatures and status information of the system.

Item Field	Range	Access	Description
OUTDOOR	– – –, -76 to 149°F (-60 to 65°C)	User Installer	**OUTDOOR** Current outdoor air temperature as measured by the outdoor sensor.
SLAB TARG	– – –, -76 to 149°F (-60 to 65°C)	Installer	**SLAB TARGET** The calculated slab target of the snow melting system. "– – –" is displayed when the snow melt control is off. Conditions: A snow/ice sensor or slab sensor is installed.
SLAB	-76 to 149°F (-60 to 65°C)	User Installer	**SLAB** Current slab temperature as measured by the control. Conditions: A snow/ice sensor or slab sensor is installed.
SENSOR WATER	DRY or WET	User Installer	**WATER SENSOR** Current status of the water detection sensor. Conditions: A snow/ice sensor or snow sensor is installed.
HEAT HOURS	0 to 9999 hours	User Installer	**HEAT HOURS** Records the number of running hours since the item was last reset. Touch the number and then the ENTER key to reset to zero.
MAN MELT HOURS	00:00 to 24:00 hours	User Installer	**MANUAL MELT TIME** When manually started, the display shows the remaining run time before shutting off.
ADD MELT HOURS	00:00 to 6:00 hours	User Installer	**ADDITIONAL MELT TIME** When automatically started by a Snow/Ice Sensor 090, the display shows the remaining run time before shutting off. Conditions: A snow/ice sensor is installed.

Set Temp Menu

The Set Temp menu items select the operating temperatures of the snow melt system.

Item Field	Range	Access	Description	Set to
MELTING	32 to 95°F (0.0 to 35.0°C) Default = 36°F (2.0°C)	User Installer	**MELTING** Select the desired surface temperature of the snow melt surface when melting.	
MAN MELT HOURS	0:30 to 24:00 hours Default = 4:00 hours	User Installer	**MANUAL MELT RUN TIME** Select the amount of running time when manually starting the system.	
ADD MELT HOURS	0:00 to 6:00 hours Default = 0:00 hours	Installer	**ADDITIONAL MELT TIME** Select the amount of additional melting time after the Snow / Ice Sensor 090 is dry. This allows low spots on the slab to fully dry before the snow melting system is shut off. Conditions: A Snow / Ice Sensor is installed.	
SENSITVTY WATER	AUTO, MIN, -2, -1, MID, +1, +2, MAX Default = AUTO	Installer	**WATER SENSITIVITY** Select how sensitive the Snow / Ice Sensor 090 or the Snow Sensor 095 is to water detection. Conditions: Snow / Ice Sensor is set to 090 or 095.	
WWSD	AUTO, 32 to 95°F (0.0 to 35.0°C) Default = AUTO	Installer	**WARM WEATHER SHUT DOWN** Select the temperature at which to shut down the snow melting system during warm weather. This allows the snow or ice to melt off the slab naturally.	
CWCO	OFF, -30 to 50°F (-34.5 to 10.0°C) Default = 10°F (-12.0°C)	Installer	**COLD WEATHER CUT OUT** Select the temperature at which to shut down the snow melting system during extremely cold weather. Below this temperature, the heat loss of the slab exceeds the capacity of the boiler or heating appliance.	

Display Menu

The Display menu items select the temperature units and backlight options.

Item Field	Range	Access	Description	Set to
UNITS IN	°F or °C Default = °F	User Installer	**UNITS** Select Fahrenheit or Celsius as the temperature units.	
BACKLIGHT	ON, ON MELT, OFF Default = ON MELT	User Installer	**BACKLIGHT** Select how the display backlight operates. ON = Always on. ON MELT = On when melting, off when not melting. This provides a visual indicator to occupants that the snow melting system is currently melting. OFF = Always off.	
AWAY KEY	OFF or ON Default = OFF	User Installer	**AWAY KEY** Enable or disable the away touch key on the home screen.	

Toolbox Menu

The Toolbox Menu is a location for system information. If any errors are present on the system, they will be located at the beginning of this menu.

Item Field	Range	Access	Description
ACCESS LEVEL	Installer (INST) User (USER) Default = INST	User Installer	**ACCESS LEVEL** Select the access level of the control, which determines which menus and items are available. Conditions: Adjustable only when control switch setting set to UNLOCK.
SW J1227A TYPE	Software J1227A Type 653	User Installer	**SOFTWARE VERSION AND TYPE NUMBER** Displays the software version and the product type number.
DEFAULTS LOAD?	Not applicable	Installer	**FACTORY DEFAULTS** Loads the factory default settings. Press ENTER to load defaults.
HISTORY- 1 --------	See Troubleshooting Guide	Installer	**HISTORY - 1 THROUGH 5** Displays a history of any past errors that have occurred on the system. Will clear after 30 days, or press the Cancel key to manually clear. The last 5 history items will display if present.

Override Menu

The Override Menu allows an operator to manually start the system.

Item Field	Range	Access	Description
OVERRIDE MANUAL	AUTO, TEST, OFF Default = AUTO	Installer	**MANUAL OVERRIDE** Manually override the normal automatic operation of the control to test the equipment. AUTO = Normal operation TEST = Operate electric system for 10 minutes OFF = Control is disabled and will not melt

System Menu

The System Menu provides settings on how to configure the sensors.

Item Field	Range	Access	Description	Set to
SNOW/ICE SENSOR	NONE, 090, 095 Default = 090	Installer	**SNOW / ICE SENSOR** Select if a Snow / Ice Sensor PM-090 or Snow Sensor PM-095 is installed.	
SLAB SENSOR	OFF or ON Default = ON	Installer	**SLAB SENSOR** Select if a Slab Sensor PM-072 is installed to measure the slab temperature. Conditions: Snow / Ice Sensor is set to None or 095.	
MAX MELT DAYS	0.5 to 7.0 days, OFF Default = 3.0 days	Installer	**MAXIMUM MELT TIME** Select to limit the amount of melting run time after snow is automatically detected by a Snow / Ice Sensor PM-090 or a Snow Sensor PM-095.	

Sequence of Operation

Snow Melting Overview

A snow melting system can offer a safe, convenient, and cost effective way of removing snow and ice from the snow melting slab and similar surfaces. Safety is increased by activating the snow melting system as soon as the snow falls rather than waiting for mechanical snow removal after snow has accumulated. This eliminates slip hazards and reduces the risk of injury by mechanized snow melting equipment, thereby reducing potential liability costs. The elimination of snow plow equipment and corrosive salts also reduces damage to the slab surface and to the environment. Snow melting systems when controlled correctly can be cost competitive compared to mechanical snow removal.

The snow melting control has two operations:

Melt Heats the slab to melt snow or ice

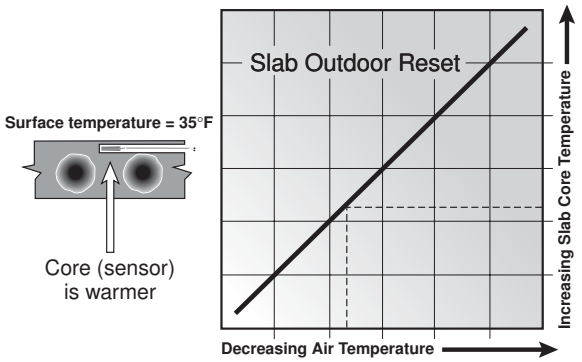
Off Snow melting system is off

The control display shows the control operation in the home screen.

Slab Temperature Control

Controlling the slab temperature is critical to minimizing the cost of snow melting. This requires that either a Snow / Ice Sensor PM-090 or a Slab Sensor PM-072 is installed. The Snow / Ice Sensor contains a built-in slab temperature sensor. While the control will continue to operate without a slab sensor installed, operating costs will be much higher.

The slab is operated using slab outdoor reset. As the outdoor temperature gets colder, the heat loss of the slab increases. In order to keep the slab surface at a constant temperature while operating, the inner core of the slab must be heated above the melt temperature setting. The amount that the slab inner core temperature is above the melt setting is proportional to the outdoor temperature. Since the slab sensor is installed below the surface of the slab, it is not measuring the true slab surface temperature but rather the inner core temperature. The control automatically compensates for this temperature difference. However, the Slab item in the View menu displays the actual measured temperature, so it is normal to view slab temperatures that exceed the melt temperature setting.



Slab Surface Temperature is Constant

Melt Operation

The snow melting system operates the heating equipment to heat the slab from a cold start to reach the melt temperature setting to melt snow or ice. Melt operation can be triggered automatically using a snow / ice sensor, a snow sensor, or by manually pressing the melt key.

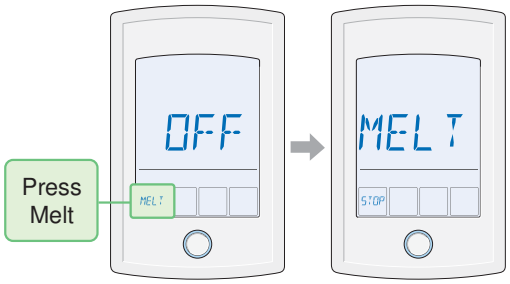
The control operates the heat relay on a 20 minute pulse width modulation cycle. The heat relay in turn activates an electrical contactor to energize the electrical cable heater installed in the slab. The heat relay on time is determined by the calculated slab target and by the measured slab temperature reading. As the slab temperature reaches the slab target, the on time per cycle of the heat relay is reduced to prevent the slab temperature from overshooting. If no slab sensor is installed the heat relay remains on 100% of the time until the Melt operation has completed.

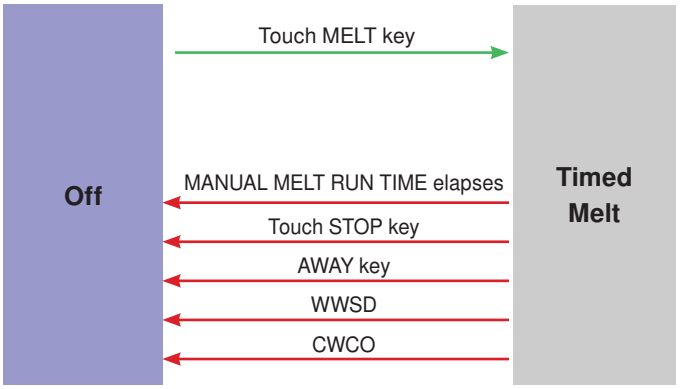
Melt - Manual Start and Timed Stop

The snow melting system can be started manually by touching the Melt key on the control display.

Once manually started, the snow melting system continues to operate until the time set by the Manual Melt Run Time setting in the Set Temp menu elapses.

If a manual start has been provided and a PM-090 or PM-095 detects water, the control changes from manual melt to automatic operation.



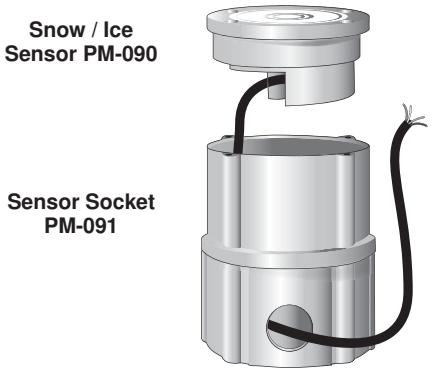


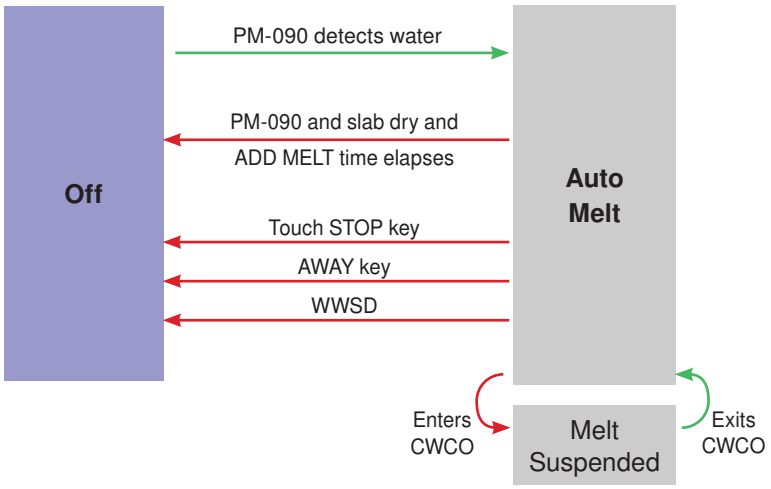
Melt - Automatic Start and Stop

Automatic start and stop operation requires the installation of a Snow / Ice Sensor PM-090. The control continually monitors the sensor for the presence of moisture and slab temperature conditions in which snow or ice may be present. When moisture is detected, the control will show “Sensor Water Wet” in the View menu. When the sensor is dry the control will show “Sensor Water Dry”. The control includes a Sensitivity setting in the Set Temp menu that allows the installer to adjust the amount of moisture required to start and stop the melting operation. In areas with low amounts of dust and / or air pollution, the sensitivity may need to be increased. The Sensitivity setting default is Auto, and the control will automatically determine the best suitable sensitivity setting for the installation.

When moisture is detected and the slab and outdoor temperatures are at the melting setting, the control will automatically start the snow melting system. As the snow or ice melts and the slab dries off, the sensor also dries off at the same time. When the sensor is dry, the snow melt system automatically shuts off. If there are low spots on the slab surface that dry off slower than the sensor, additional melting run time can be included by adjusting the Additional Melt Time setting in the Set Temp menu.

If the snow melting system is manually stopped, the Snow / Ice Sensor must fully dry before it is able to detect a new snow fall and automatically start the snow melting system.



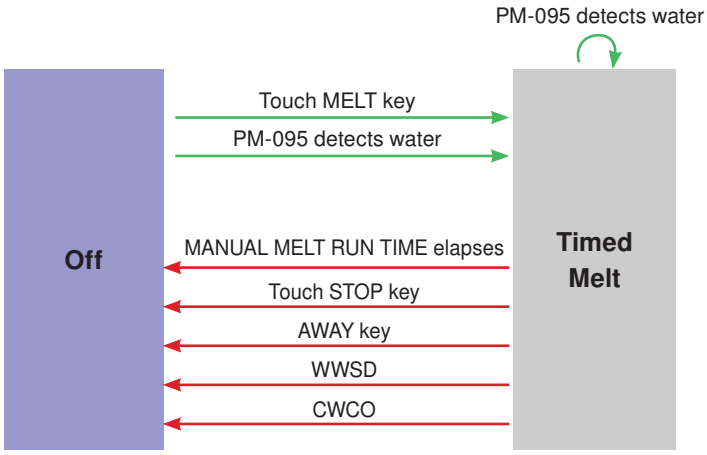


Melt - Automatic Start and Timed Stop

Automatic start with a timed stop operation requires the installation of a Snow Sensor PM-095. It is also highly recommended to install a Slab Sensor PM-072 in order to regulate the slab temperature and operate the snow melting system at the highest possible efficiency. The control continually monitors the sensor for the presence of moisture and slab temperature conditions in which snow or ice may be present. When moisture is detected, the control will show “Sensor Water Wet” in the View menu. When the sensor is dry the control will show “Sensor Water Dry”. The control includes a Sensitivity setting in the Set Temp menu that allows the installer to adjust the amount of moisture required to start and stop the melting operation. In areas with low amounts of dust and / or air pollution, the sensitivity may need to be increased. The factory default is for the Sensitivity setting is Auto. The control automatically determines the best suitable sensitivity setting for the installation.

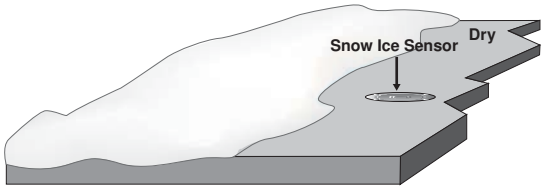
When moisture is detected and both the slab and outdoor temperatures are below the Melting setting, the control automatically starts the snow melting system. The snow melting system operates to heat the slab to the slab target temperature and continues to operate until the time set by the Manual Melt Run Time in the Set Temp menu elapses.

Snow Sensor PM-095



Additional Melting Time

A Snow / Ice Sensor PM-090 automatically shuts off the snow melting system when the water sensor is dry. Due to the construction of the slab and the layout of the electrical cable, there may be areas that do not melt completely. The Additional Melt Time setting in the Set Temp menu allows the installer to set addition melting time after the sensor is dry.



Warm Weather Shut Down

During warm weather, the slab is warm enough to naturally melt snow or ice. The control has a Warm Weather Shut Down (WWSD) setting in the Set Temp menu that prevents the control from entering Melt operation in order to conserve energy. The control shows WWSD on the display when WWSD is in effect.

Automatic (Auto)

The control enters WWSD when both the slab temperature and the outdoor temperature exceed the Melt temperature setting by more than 2°F (1°C).

Manual WWSD

The control enters WWSD when the outdoor air temperature exceeds the WWSD setting by 1°F (0.5°C) and when the slab temperature exceeds 34°F (1°C). The control exits WWSD when the outdoor air temperature falls 1°F (0.5°C) below the WWSD setting or if the slab temperature falls below 34°F (1°C). This allows the Melt temperature setting to be set higher than the WWSD. This is useful when high slab temperatures are required to melt the snow or ice. An example of this are installations using paving bricks on top of sand and concrete layers.

Cold Weather Cut Out

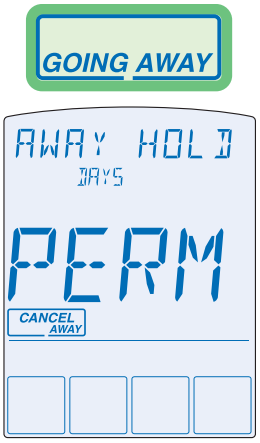
Maintaining the melting temperature during extremely cold temperatures is not only expensive but may be impossible if the heat loss of the slab exceeds the input capacity of the heating plant or electric cable. The control turns the snow melting system off when the outdoor air temperature drops below the Cold Weather Cut Out (CWCO) temperature and the slab is below freezing. This is a safety and energy saving measure. The control shows CWCO on the display when CWCO is in effect. When the temperature reaches the CWCO setting in an actively melting system with an 090, melting is suspended until the outdoor temperature rises above the CWCO setting. If an 090 is not installed, melting is permanently stopped when CWCO is in effect. Melting does not resume when the temperature rises above the CWCO setting.

Away Key

The Away key provide an easy way to disable the snow melting system and save energy while away on vacation. To turn on the Away Key, go to the Display menu.

To activate the Away scene, touch “Going Away” on the screen.

- Press the home button to accept the setting or leave the screen untouched for several seconds.
- “Scene Away” is displayed on the home screen until the number of days expires.
- Touch “Cancel Away” to cancel at any time.

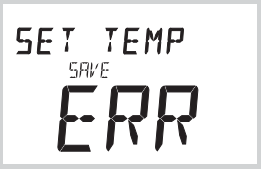
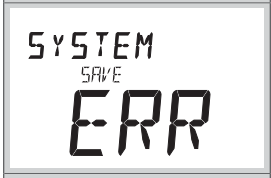
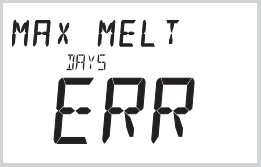
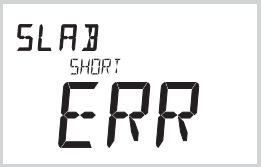
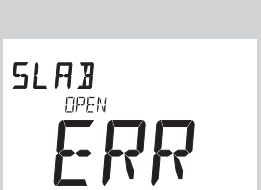


Troubleshooting

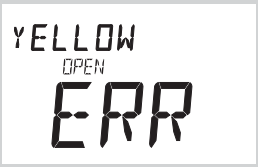
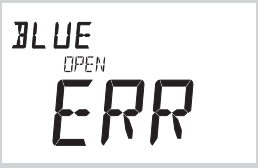
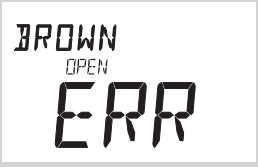
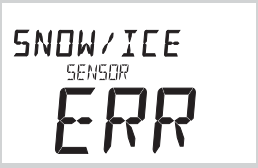
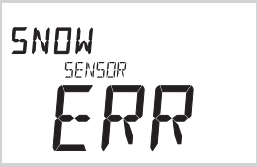
It is recommended to complete all wiring to ensure trouble free operation. Should an error occur, simply follow these steps:

1. **Find:** If the control flashes ⓘ on the screen, it is indicating a problem on the system.
2. **Identify:** Hold the Home button for 3 seconds, touch the NEXT key to locate the Toolbox Menu, then touch the ENTER key. The error code should appear as the first item.
3. **Solve:** Use the chart below to match the error code to the one on the control. Use the description to solve the problem.

Error Messages (1 of 2)

Error Message	Description
	**SET TEMP MENU SAVE ERROR** The control failed to read the Set Temp menu settings from memory and has reloaded the factory default settings. The control stops operation until all settings in the Set Temp menu are checked. To clear the error, set the access level to Installer and check all settings in the Set Temp menu.
	**SYSTEM MENU SAVE ERROR** The control failed to read the System menu settings from memory and has reloaded the factory default settings. The control stops operation until all settings in the System menu are checked. To clear the error, set the access level to Installer and check all settings in the System menu.
	**MAXIMUM MELT TIME ERROR** The control has operated in melting for the time set by Maximum Melt Days setting located in the System menu. This error is usually created when there is an electrical system failure resulting in the snow melt slab not heating correctly. Clear the error message by touching the Cancel key while viewing the error message. Use the Manual Override menu to test that the electrical system is operating correctly. If necessary, change the Maximum Melt Days setting to a longer time period or to Off.
	**OUTDOOR SENSOR SHORT CIRCUIT ERROR** Due to a short circuit, the control is unable to read the Outdoor Sensor 070. The control continues to operate and assumes an outdoor temperature of 32°F (0°C). Energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Out (CWCO) are disabled. Check the outdoor sensor wire for short circuits according to the sensor installation manual. It may be necessary to replace the outdoor sensor. Once the error has been corrected, the error message automatically clears.
	**OUTDOOR SENSOR OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the Outdoor Sensor 070. The control continues to operate and assumes an outdoor temperature of 32°F (0°C). Energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Out (CWCO) are disabled. Check the outdoor sensor wire for open circuits according to the sensor installation manual. It may be necessary to replace the outdoor sensor. Once the error has been corrected, the error message automatically clears.
	**SLAB SENSOR SHORT CIRCUIT ERROR** Due to a short circuit, the control is unable to read the Slab Sensor 072. Energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Out (CWCO) operate using the outdoor temperature only. Check the slab sensor wire for short circuits according to the sensor installation manual. It may be necessary to replace the slab sensor. Once the error has been corrected, the error message automatically clears.
	**SLAB SENSOR OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the Slab Sensor 072. Energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Out (CWCO) operate using the outdoor temperature only. Check the slab sensor wire for open circuits according to the sensor installation manual. It may be necessary to replace the slab sensor. Once the error has been corrected, the error message automatically clears. If the slab sensor has been intentionally removed, set the slab sensor setting in the System menu to Off.

Error Messages (2 of 2)

Error Message	Description
	**YELLOW WIRE OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the yellow wire connected to the Snow / Ice Sensor PM-090, or the Snow Sensor PM-095. The control can no longer automatically detect snow or ice but manual start of the snow melting system is still available. Check the Snow / Ice Sensor or Snow Sensor yellow and black wires and any wire splices for open circuits according to the sensor installation manual. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.
	**BLUE WIRE SHORT CIRCUIT ERROR** Due to a short circuit, the control is unable to read the blue wire connected to the Snow / Ice Sensor PM-090, or the Snow Sensor PM-095. The control can no longer automatically detect snow or ice but manual start of the snow melting system is still available. First check the Snow / Ice Sensor or Snow Sensor for dirt or debris. The ring structure of the sensor may need cleaning with hot soapy water and a nylon brush. Rinse with water. Secondly, check the Snow / Ice Sensor or Snow Sensor blue and black wires and any wire splices for short circuits according to the sensor installation manual. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.
	**BLUE WIRE OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the blue wire connected to the Snow / Ice Sensor PM-090, or the Snow Sensor PM-095. The control can no longer automatically detect snow or ice but manual start of the snow melting system is still available. Check the Snow / Ice Sensor or Snow Sensor blue and black wires and any wire splices for open circuits according to the sensor installation manual. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.
	**BROWN WIRE SENSOR OPEN CIRCUIT ERROR** Due to an open circuit, the control is unable to read the brown wire connected to the Snow / Ice Sensor PM-090. Energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Out (CWCO) operate using the outdoor temperature only. Check the Snow / Ice Sensor brown and black wires for open circuits according to the sensor installation manual. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.
	**SNOW / ICE SENSOR ERROR** The control is unable to properly detect the Snow / Ice Sensor PM-090. The control can no longer automatically detect snow or ice but manual start of the snow melting system is still available. Check the Snow / Ice Sensor brown, yellow, red and black wires according to the sensor installation manual. It is important to check any cable splices for loose wiring connections. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.
	**SNOW SENSOR ERROR** The control is unable to properly detect the Snow Sensor 095. The control can no longer automatically detect snow but manual start of the snow melting system is still available. Check the Snow Sensor yellow, red and black wires according to the sensor installation manual. It may be necessary to replace the sensor. Once the error has been corrected, the error message automatically clears.

Frequently Asked Questions

Symptom	Look For...	Corrective Action
LCD display is off	**Power to control**	Use electrical meter to measure 24 V (ac) voltage on input power R and C terminals.
Blue short	**Dirt or salt on snow/ ice sensor**	The snow/ice sensor requires regular cleaning. Avoid using road salt on the snow melting slab.
Slab is above melt temperature	**Slab Target**	The slab is heated to the slab target.
System running with no snow	**Melt**	During cold weather cut out (CWCO), the system is shut off. If shut off during a melt cycle, the system resumes melting once the outdoor temperature is above CWCO if using a Snow / Ice Sensor PM-090.
Snow on slab but system did not start	**Off**	System has been manually Stopped and the automatic snow / ice sensor never dried, thereby preventing the system to automatically start.

Job Record

Set Temp Menu Settings

Item	Setting
MELTING	
MANUAL MELT RUN TIME	
ADDITIONAL MELT TIME	

Item	Setting
WATER SENSITIVITY	
WARM WEATHER SHUT DOWN	
COLD WEATHER CUT OUT	

System Menu Settings

Item	Setting
SNOW / ICE SENSOR	
SLAB SENSOR	

Item	Setting
MAXIMUM MELT TIME	

System Menu Settings

Item	Setting
UNITS	
BACKLIGHT	

Item	Setting
AWAY KEY	

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. For more information: www.watts.com/prop65

Technical Data

Snow Melting Control PM-653	
Literature	IOM-ST-PM653, ES-ST-PM653, IS-ST-PM653
Control	Microprocessor control. This is not a safety (limit) control
Packaged weight	1.3 lb. (590 g)
Dimensions	5" H x 3-1/4" W x 15/16" D (127 x 82 x 23 mm)
Enclosure	White PVC plastic, NEMA type 1
Ambient conditions	-4 to 122°F (-20 to 50°C), < 90% RH non-condensing, outdoor use permitted when installed inside a NEMA 3 enclosure
Power supply	24 V (ac) ±10%, 60 Hz, Class 2, 16 VA standby, 64 VA fully loaded
Relay capacity	24 V (ac) 2 A
Sensors	NTC thermistor, 10k Ω @ 77°F (25°C ± 0.2°C) ß=3892
- Included	Outdoor Sensor PM-070
- Optional or in kit	PM-072, PM-090, PM-095
Warranty	Limited 3 Year

Limited Warranty: SunTouch (the "Company") warrants each product to be free from defects in material and workmanship under normal usage for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge.

THE WARRANTY SET FORTH HEREIN IS GIVEN EXPRESSLY AND IS THE ONLY WARRANTY GIVEN BY THE COMPANY WITH RESPECT TO THE PRODUCT. THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED. THE COMPANY HEREBY SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The remedy described in the first paragraph of this warranty shall constitute the sole and exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental, special or consequential damages, including without limitation, lost profits or the cost of repairing or replacing other property which is damaged if this product does not work properly, other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemical, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication, improper installation or improper maintenance or alteration of the product.

Some States do not allow limitations on how long an implied warranty lasts, and some States do not allow the exclusion or limitation of incidental or consequential damages. Therefore the above limitations may not apply to you. This Limited Warranty gives you specific legal rights, and you may have other rights that vary from State to State. You should consult applicable state laws to determine your rights. SO FAR AS IS CONSISTENT WITH APPLICABLE STATE LAW, ANY IMPLIED WARRANTIES THAT MAY NOT BE DISCLAIMED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL SHIPMENT.

SunTouch®
electric floor heating & snow melting

A Watts Water Technologies Company

USA: Tel: (888) 432-8932 • Fax: (417) 831-4067
Canada: Tel: (888) 208-8927 • Fax: (905) 332-7068
Latin America: Tel: (52) 81-1001-8600 • Fax: (52) 81-8000-7091