tekmar® - Data Brochure

Snow Melting Control 650

D 650

06/94

The tekmar Snow Melting Control 650 is a microprocessor-based control that uses a Slab Sensor 072 and an Outdoor Sensor 070 (both supplied with the control) to maintain a snow melt slab at a set surface temperature during snow melting. When melting is not required, the melting system is either shut down or the slab is maintained at an idling temperature for faster response and improved safety. The melting mode is initiated manually by a button on the control or by an optional remote switch. Built in energy saving features include warm and cold weather cut offs that automatically shut the melting system down in warm weather or extremely cold conditions. The timer included in the control can be programmed to operate the snow melt system for a set time period. Viewing and programming the operating parameters in either °C or °F is accomplished through a digital LCD. The display indicates an error message whenever a sensor or its wiring develops a fault.

Sequence of Operation

Powering up the Control

After the Snow Melting Control 650 is powered-up, the LCD screen segments are turned on for 3 seconds. The control then monitors and displays the outdoor temperature.

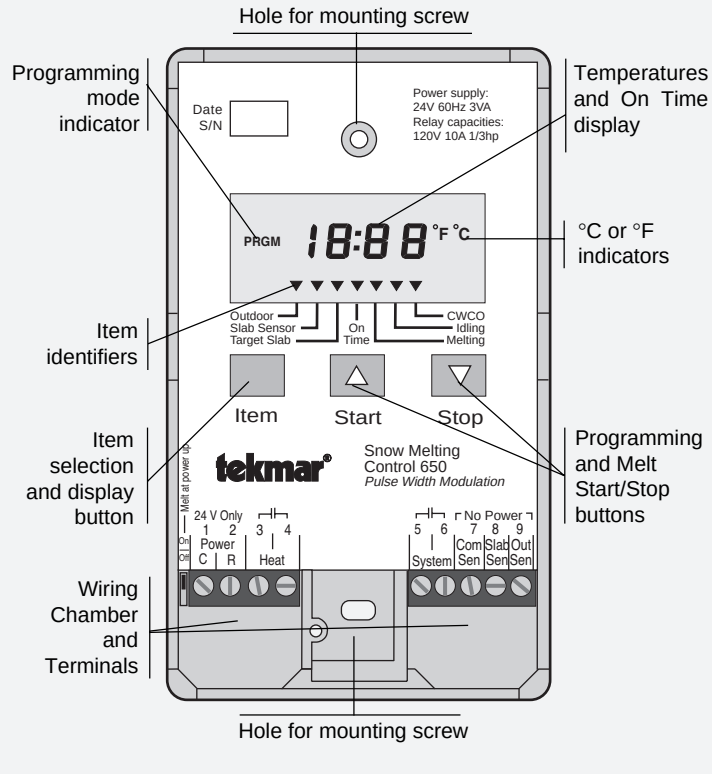
Melting Mode

The Snow Melting Control 650 is a manual control; in order to start the melting system with the control powered up, the "Start" button is pushed. The melt system can also be started by setting the "Melt at power up" DIP switch to "On" and powering up the control. When the control is in melting mode, the melting pointer flashes slowly and the system relay is turned on. The heat relay is cycled on and off to maintain the slab at the "Melting" temperature. The method used to cycle the heat relay is called Pulse Width Modulation (PWM). For more information on PWM, see Essay 000. Once the slab has reached the "Melting" temperature, a timer starts. The control remains in melting mode until the timer "On Time" reaches zero, the "Stop" button is pushed, or the remote switch is turned off.

Note: If the remote switch is turned off and on again to restart the system, the switch must be kept off for at least 1 second for the control to fully power down.

Idling Mode

When the snow melting system starts from a cold temperature, the time required for the slab to reach "Melting" temperature can be excessive. To decrease this start up time, the slab can be maintained at an "Idling" temperature. The Idle feature is also useful for preventing frost and light ice formation. When the control is in idling mode, the idling pointer flashes slowly and the system relay is turned on. The heat relay is cycled on and off to maintain the slab at the "Idling" temperature.



Warm Weather Cut Off (WWCO)

If the control is in melting or idling mode and the "Slab" and "Outdoor" temperatures rise above the "Melting" temperature, the control shuts down the melting system and enters Warm Weather Cut Off mode. During WWCO, the WWCO pointer flashes slowly. The timer continues to run and normal operation is resumed when the "Outdoor" temperature drops below the "Melting" temperature.

Cold Weather Cut Off (CWCO)

Maintaining the slab at a "Melting" or "Idling" temperature in extremely cold conditions can be expensive and may even be impossible. When it does snow at these colder temperatures, the snow is usually dry, light and less slippery. The control therefore turns the melting system off when the "Outdoor" temperature drops below the "CWCO" setting. While the control is in CWCO, the CWCO pointer flashes slowly. The timer continues to run until the slab temperature drops below the "Target Slab" temperature. When the outdoor temperature rises above the "CWCO" temperature, the control exits CWCO and continues with normal operation.

On Time

The control has a built in timer which is used to set the length of time the control operates the system in melting mode. The timer begins counting down when the snow melt system is turned on **and** the slab has reached the "Melting" temperature.

Installation

Caution

Improper installation and operation of this control could result in damage to the equipment and possibly even personal injury. It is your responsibility to ensure that this control is safely installed according to all applicable codes and standards. 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.

Step One — Getting ready

Check the contents of this package. If any of the contents listed are missing or damaged, please refer to the Limited Warranty and Product Return Procedure on the back of this brochure and contact your wholesaler or tekmar sales agent for assistance.

Type 650 includes: • One Snow Melting Control 650 • One Slab Sensor 072 • One Outdoor Sensor 070
• One Data Brochure D 650 • One Data Brochure D 001 • Application Brochures A 650

Other information available: • Essay E 000, Essay E 600

Note: *Carefully read the Sequence of Operation section in this brochure to ensure that you have chosen the proper control and understand its functions within the operational requirements of your system.*

Step Two — Mounting

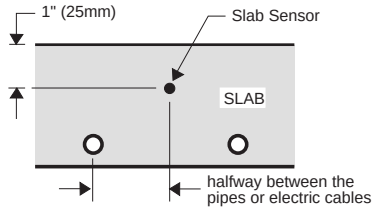
The control is mounted in accordance with the instructions in the Data Brochure D 001.

Step Three — Rough-in wiring

All electrical wiring terminates in the two wiring chambers at the bottom front of the control. If the control is to be mounted on an electrical box, the wiring can be roughed-in at the electrical box prior to installation of the control (see Brochure D 001). Standard 18 AWG solid wire is recommended for all low voltage wiring to this control.

Power should not be applied to any of the wires during the rough-in wiring stage.

- Install the Outdoor Sensor 070 according to the instructions in Data Brochure D 001 and run the wiring back to the control. Do not connect the wires to the terminals yet.
- Install the Slab Sensor 072 in the slab halfway between the heating pipes or electric cables and within 1 inch of the slab surface (see adjacent diagram). The sensor should be placed approximately 3 feet (1m) from the edge of the slab. Run the wiring back to the control but do not connect the wires to the terminals yet.
- Install a 24 V ac Class II transformer with a minimum 5VA rating and run the wiring from the transformer to the control. *A Class II transformer must be used.* **Do not connect** either of the transformer secondary wires to ground.
- Run wiring from the heating device and system circuits to the control.



Step Four — Testing and connecting the wiring

Caution

These tests are to be performed using standard testing practices and procedures and should only be carried out by properly trained and experienced persons. A good quality electrical test meter, capable of reading from at least 0 — 200 Volts ac, and at least 0 — 2,000,000 Ohms, is essential to properly test this control. At no time should voltages in excess of 28 V ac be measured at any of the wires connected to the control.

Test the sensors

- This test must be performed *before* power is applied to the control and *before* the sensors are connected to the terminal strip. Test the sensors according to the instructions printed in the enclosed Data Brochure D 001.

Test the power supply

- Ensure exposed wires are not grounded or in contact with other wires. Turn on the 24 V ac power supply and, using an AC voltmeter, you should measure between 20 and 28 volts at the secondary side of the transformer.
- Turn off the power and complete the electrical connections to the terminal strip of the control.

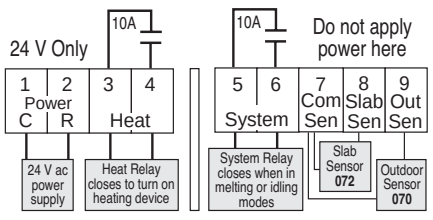
Power and output connections

The installer should test to confirm that no voltage is present at any of the wires.

- Connect the power supply to terminals *Power C — R* (1 and 2).
- Connect the heating device circuit to terminals *Heat* (3 and 4).
- Connect the system circuit to terminals *System* (5 and 6).

Sensor connections — ***Caution, voltage is never applied to these terminals***

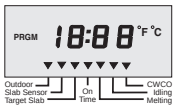
- Connect the Slab Sensor 072 to terminals *Com Sen and Slab Sen* (7 and 8).
- Connect the Outdoor Sensor 070 to terminals *Com Sen and Out Sen* (7 and 9).



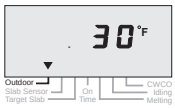
Settings

POWER ON

When the control is powered-up, all display elements are turned on.

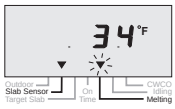


After approximately three seconds, the "Outdoor" temperature is displayed.

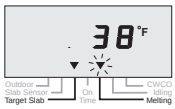


VIEWING

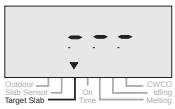
Press and Release the "Item" button to change the display from the "Outdoor" temperature to the "Slab Sensor" temperature.



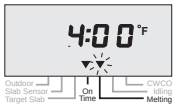
Press and Release the "Item" button to change the display to the "Target Slab" temperature.



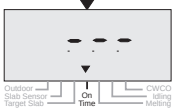
If the control is **not in melting or idling mode,** no "Target Slab" temperature is displayed.



Press and Release the "Item" button to change the display to the "On Time" remaining.

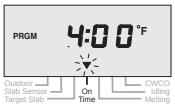


If the control is **not in melting mode** no "On Time" is displayed.



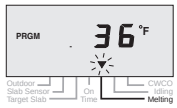
PROGRAMMING

Continue to ***Press and Release*** the "Item" button. The word "PRGM" is displayed and the "On Time" pointer flashes.



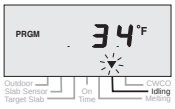
Use the arrow keys to program the "On Time" in hours and minutes.

Press and Release the "Item" button to change the display to the "Melting" temperature.



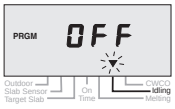
Use the arrow keys to program the "Melting" temperature.

Press and Release the "Item" button to change the display to the "Idling" temperature.

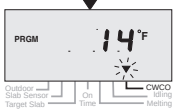


Use the arrow keys to program the "Idling" temperature.

When no Idling function is desired, set Idling to "OFF".

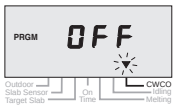


Press and Release the "Item" button to change the display to the "CWCO" temperature.

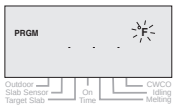


Use the arrow keys to set the "CWCO" temperature.

When no CWCO is desired, set CWCO to "OFF".



Press and Release the "Item" button to change the display to "°F" or "°C".



Use the arrow keys to switch between "°F" and "°C".

INITIATING OPERATING MODE

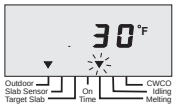
When the control is not in CWCO or WWCO, the melt system is turned on as follows:

If the DIP switch is set to "Melt at power up", the control switches into "Melting" mode when it is powered up.

OR

If the control is already powered up and you are not programming, **Press and Release** the "Start" button.

When the control is in melting mode the melting pointer flashes.



Note: The control automatically exits out of programming when the buttons are left alone for 20 seconds

Outdoor temperature - the temperature measured by the Outdoor Sensor.

Slab Sensor temperature - the temperature measured by the Slab Sensor. This sensor should be 1" below the slab surface.

Target Slab temperature - the control calculates a "Target Slab" temperature to maintain the slab surface at the "Melting" or "Idling" setting when the Slab Sensor is placed 1" below the slab surface and halfway between the pipes or electric cables (See Step Three of this brochure). The "Target Slab" temperature is calculated from the "Melting" or "Idling" setting and the measured "Outdoor" temperature. As the "Outdoor" temperature drops or the "Melting" or "Idling" setting is raised, the "Target Slab" temperature increases.

On Time - when the control is in melting mode, the On Time display indicates the time left until the control exits melting mode. When programming, the On Time can be set from 30 minutes to 19 hours 50 minutes or it can be set to "Inf" (Infinite). When the On Time is set to "Inf", the control remains in melting mode indefinitely until the "STOP" button is pressed.

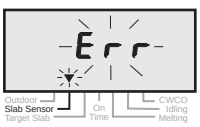
Melting temperature - the "Melting" temperature is the desired slab surface temperature when the control is in melting mode and is also used as the Warm Weather Cut Off temperature. The slab "Melting" temperature is usually set based on the local weather conditions. In some areas, heavy snowfall can load a slab at temperatures well above freezing; in these areas, the "Melting" temperature is set higher. In general if the melting system response is sluggish, increasing the "Melting" temperature causes the system to melt faster. It is important to remember that increasing this setting increases the snow melt system energy consumption.

Idling temperature - the "Idling" temperature is set based on the requirements of the user. To minimize the time required for the slab to reach "Melting" temperature, "Idling" is set slightly below freezing (<32°F). To prevent black ice or frost formation, "Idling" is set slightly above freezing (>32°F). It is important to remember that idling increases energy consumption. Idling can also be set to "Off".

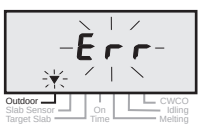
Cold Weather Cut Off (CWCO) - the "CWCO" temperature is the lowest outdoor temperature at which the melt system operates. This setting is based on the economics of melting in extreme conditions and the melting capabilities of the snow melt system.

Step Five — Troubleshooting

First observe the system operating parameters. The source of the problem can often be identified by noting a temperature or time reading which seems unreasonable. Observing what the control is doing, and understanding the sequence of operation greatly aids in troubleshooting. If there is a sensor fault, the control displays an error message. Use the error message table provided below to determine which circuit has the fault and then refer to Step Four for testing of the wiring and sensors.



Slab Sensor Open/Short Circuit
The display flashes "Err" and the "Slab Sensor" pointer. The control shuts down the melting system with this error.



Outdoor Sensor Open/Short Circuit
The display flashes "Err" and the "Outdoor" pointer. The control continues operation assuming an outdoor temperature of 20°F (-7°C).

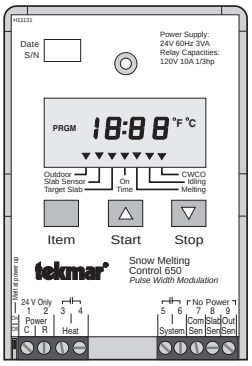
Step Six — Before you leave

- Install the wiring cover over the wiring chamber and secure it to the base with the screw provided. Place the front cover over the control and snap it into place.
- Place this brochure, and all other brochures relating to the installation, in the protective plastic bag supplied with the control. Place the bag in a conspicuous location near the control for future reference.
- It is important to explain the operation of the control and melting system to all users who may be operating it.

Technical Data

Snow Melting Control 650

Literature	—	D 650, A 650, D 001, E 000, E 600
Control	—	Microprocessor PI control; This is **not a safety (limit) control**.
Packaged weight	—	1.3 lb. (600 g), Enclosure C, PVC plastic
Dimensions	—	4-3/4" H x 2-7/8" W x 7/8" D (120 x 74 x 22 mm)
Approvals	—	Meets DOC regulations for EMI/RFI.
Ambient conditions	—	Indoor use only, -20 to 120°F (-30 to 50°C), < 90% RH non-condensing.
Power supply	—	Class 2, 24 V ac ±10% 50/60 Hz 3 VA
Relays	—	120 V ac 10 A 1/3 hp, pilot duty 240 VA 2 A
Sensors included:	—	NTC thermistor, 10 kΩ @ 25°C ±0.2°C ß=3892 Outdoor Sensor 070 and Slab Sensor 072.
Control accuracy	—	±0.5°F (±0.25°C) with up to 1000 feet (300m) of 18 AWG wire to sensors.
On Time	—	0:30 to 19:50 hours to 'Infinite'
Melting	—	34 to 45°F (1 to 7°C)
Idling	—	Off, 23 to 34°F (-5 to 1°C)
CWCO	—	Off, -22 to 23°F (-30 to -5°C)



The installer must ensure that this control and its wiring are isolated and/or shielded from strong sources of electromagnetic noise. Conversely, this control does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the Radio Interference Regulations of the Canadian Department of Communications. If this equipment does cause interference, the user is encouraged to try and correct the interference by reorienting the receiving antenna and/or relocating the receiver with respect to this equipment.
Le présent numérique n'émete pas de bruits radioeléctriques dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le réglement sur le brouillace radioeléctrique édicté par le Ministére des Communications du Canada.

Limited Warranty and Product Return Procedure

Limited Warranty: tekmar warrants to the original purchaser each tekmar product against defects in workmanship and materials when the product is installed and used in compliance with tekmar's instructions. This limited warranty covers the cost of parts and labour provided by tekmar to correct defects in materials and/or workmanship. Returned products that are fully operational are not considered a warranty case. tekmar also does not cover parts or labour to remove, transport or reinstall a defective product. tekmar will not be liable for any damage other than repair or replacement of the defective part or parts and such repair or replacement shall be deemed to be the sole remedy from tekmar. This warranty shall not apply to any defects caused or repairs required as a result of unreasonable or negligent use, neglect, accident, improper installation, or unauthorized repair or alterations. In case of defect, malfunction or failure to conform to warranty, tekmar will, for a warranty period of 24 months from the date of invoice to the original purchaser or 12 months from the date of installation of the product, whichever occurs first, repair, exchange or give credit for the defective product. Any express or implied warranty which the purchaser may have, including merchantability and fitness for a particular purpose, shall not extend beyond 24 months from the date of invoice or 12 months from the date of installation of the product, whichever occurs first.

Replacements: tekmar can send replacement products if requested. All replacements are invoiced. Any possible credit for the replacement will only be issued once the replaced product has been returned to tekmar.

Product Return Procedure: Products that are believed to have failed must be returned to tekmar Control Systems Ltd. 4611-23rd Street, Vernon B.C. Canada V1T 4K7 when agreed to by tekmar. The installer or other qualified service person must, at the owner's expense, determine which component has failed. The product must be returned complete with all of its components (sensors, base, etc.). Products must be returned together with the proof of purchase to the original purchaser who then returns the product to tekmar after receiving a Return Goods Authorization (RGA) number from tekmar.

Please include the following information with the product. The full address of the original purchaser, the RGA number and a description of the problem.

From the U.S.A., in order to avoid customs charges, products must be returned via US Post with the package clearly marked with the RGA number, product type and the statement "Canadian Product returned for repair". For shipping purposes the product can be valued at one half list price.

1) If returned during the warranty period and the product is defective, tekmar will issue full credit for the returned product less cost of missing parts.
2) If returned during the warranty period and the product is fully operational, tekmar will return the product to the original purchaser for a testing cost of $30.00 plus postage.
3) If returned during the warranty period and the product is not damaged and is fully operational, tekmar can take back the product for a return charge of 40% of the product's net value. This request has to be specified otherwise the product will be returned with a testing cost of $30.00 plus postage.
4) If returned after the warranty period and the product needs repair, tekmar will repair and return the product. Repair and postage costs will be invoiced. tekmar's repair costs are calculated at $30.00 / hour plus the cost of parts. If the repair costs will be more than $60.00 a repair estimate will be sent to the original purchaser.

In North America: tekmar Control Systems Ltd., Canada
tekmar Control Systems, Inc., U.S.A.
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