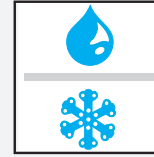


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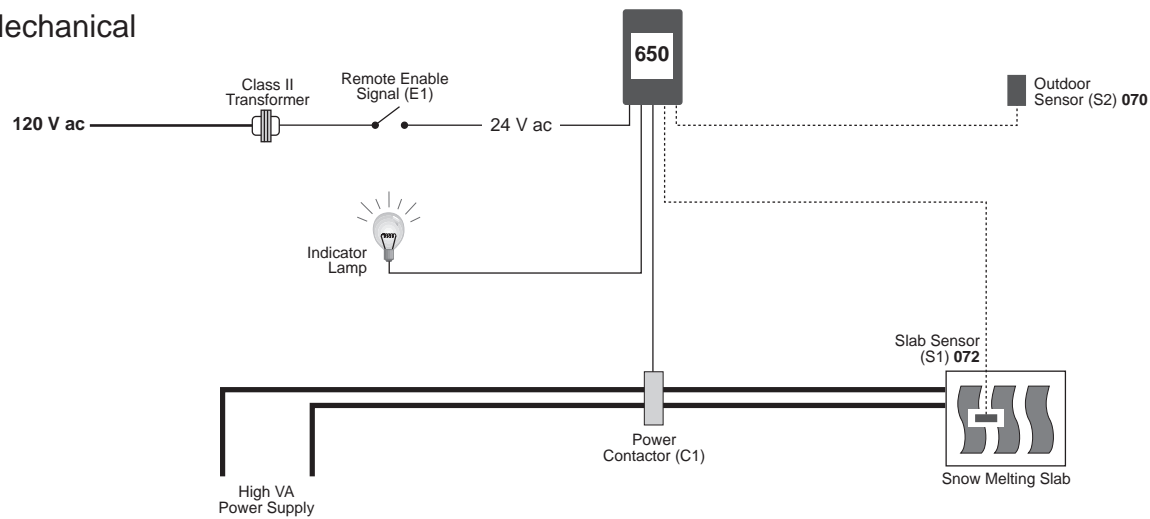
Snow Melting Control 650



A 650-1

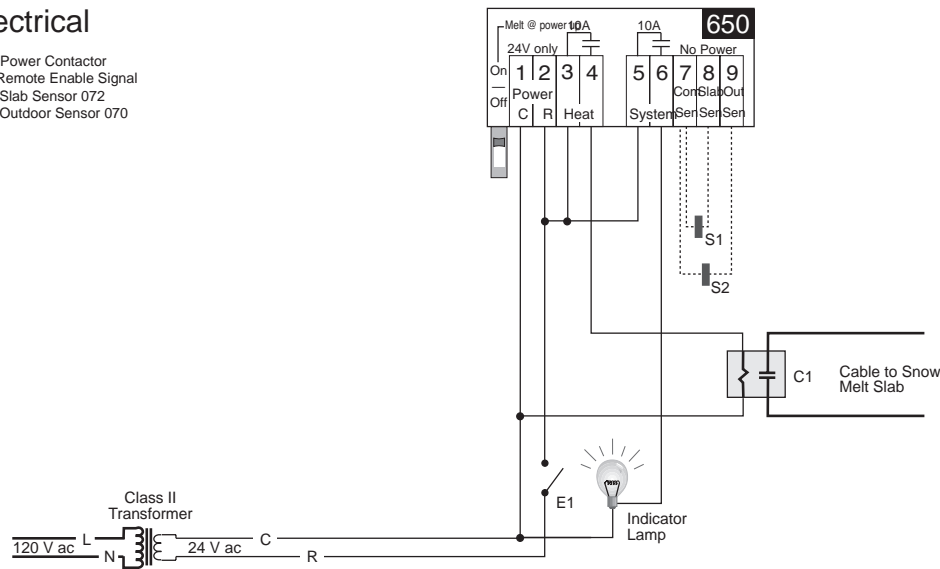
06/94

Mechanical



Electrical

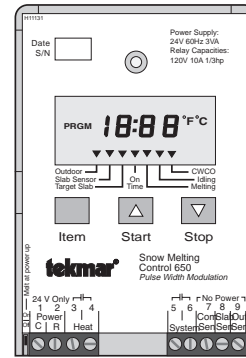
C1 = Power Contactor
 E1 = Remote Enable Signal
 S1 = Slab Sensor 072
 S2 = Outdoor Sensor 070



Note: This is only a concept drawing. The designer must determine whether this application will work in his system and must ensure compliance with code requirements. Necessary auxiliary equipment, isolation relays (for loads greater than the specified tekmar internal relay ratings), and other safety and limit devices must be added.

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 β=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)



System Operation & Specifications

The tekmar Snow Melting Control 650 utilizes feedback from a Slab Sensor 072 and an Outdoor Sensor 070 to control the heat applied to a snow melting system through electric cables buried in the slab. The melting system is manually started and runs for a user selectable On Time. The control also automatically shuts down the snow melt system if the weather becomes too cold or too warm. An indicator lamp provides visual feedback as to when the control is operating the melting system.

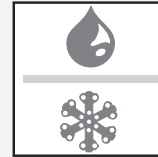
The control shall meet the technical specifications given above and shall provide the following functions.

- The control shall adjust the heat output to a slab based on sensor measurement of the slab and outdoor temperatures.
- The control shall vary the operating time (pulse width modulation, PWM) of the electric cables to maintain the slab at the required temperature.
- A timer shall be incorporated in the control to allow a user to adjust the snow melting system On Time.
- The control shall shut down the melting system when the outdoor temperature is below a user selected Cold Weather Cut Off (CWCO) temperature.
- The control shall shut down the melting system when the slab and outdoor temperatures rise above a user selected slab Melting temperature.
- The control shall have an optional idling mode to allow the slab to be maintained at a user selected Idling temperature when the control is not in melting mode.
- The control shall have a "melt at power up" switch which will allow remote starting of the melting system.
- The control shall display the outdoor, slab and target slab temperatures in °F or °C.
- The control shall continuously monitor its sensors and provide an LCD error message if a sensor is short or open circuit.
- The installer must ensure that the control and its wiring are isolated and/or shielded from strong sources of electromagnetic noise.
- **Order the following tekmar products for this application:** one Snow Melting Control 650.

In North America:	tekmar Control Systems Ltd., Canada tekmar Control Systems, Inc., U.S.A. Head Office: 4611 - 23rd Street Vernon, B.C. Canada V1T 4K7 Tel. (604) 545-7749 Fax. (604) 545-0650
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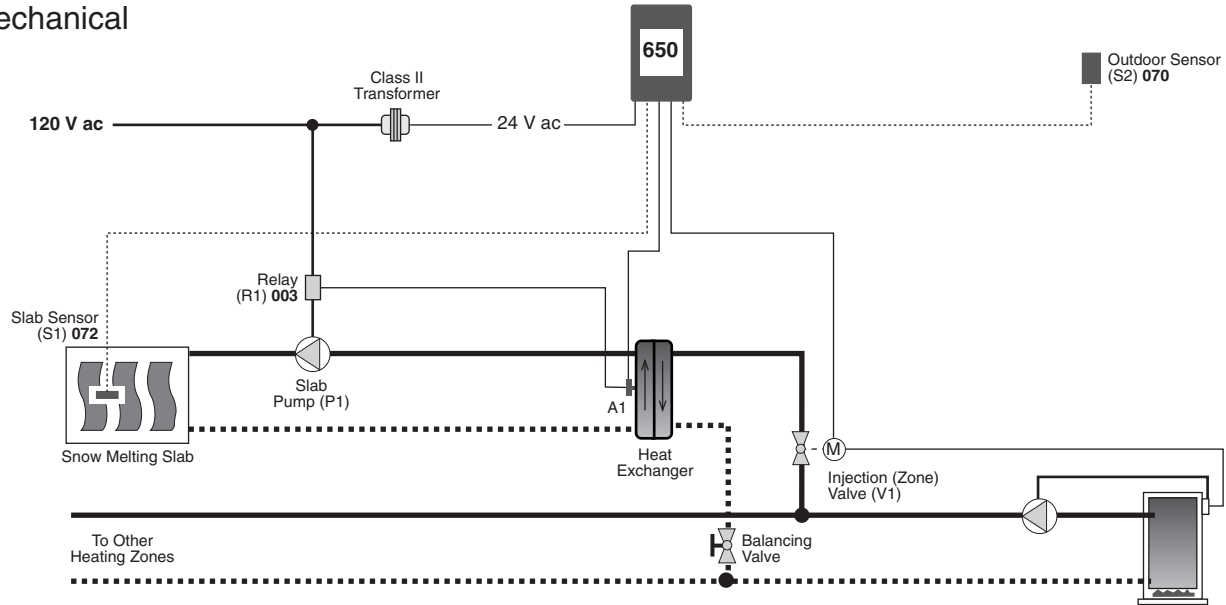
Snow Melting Control 650



A 650-2

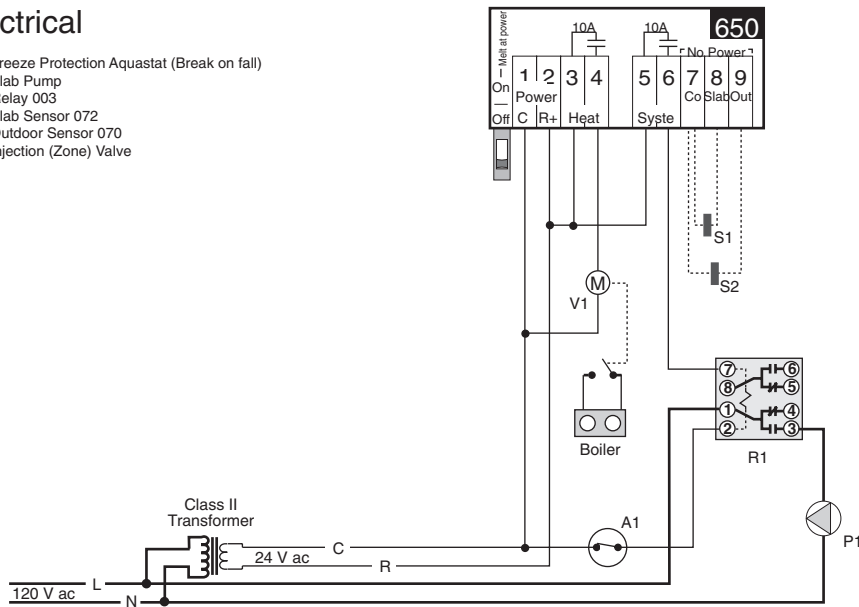
07/99

Mechanical



Electrical

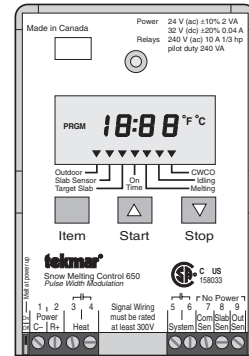
- A1 = Freeze Protection Aquastat (Break on fall)
- P1 = Slab Pump
- R1 = Relay 003
- S1 = Slab Sensor 072
- S2 = Outdoor Sensor 070
- V1 = Injection (Zone) Valve



Note: This is only a concept drawing. The designer must determine whether this application will work in his system and must ensure compliance with code requirements. Necessary auxiliary equipment, isolation relays (for loads greater than the specified tekmar internal relay ratings), and other safety and limit devices must be added.

Snow Melting Control 650 Pulse Width Modulation

- Literature — D 650, A 650's, D 001, D 070.
- Control — Microprocessor PI control; This is **not a safety (limit) control**.
- Packaged weight — 1.3 lb. (600 g), Enclosure C, white PVC plastic
- Dimensions — 4-3/4" H x 2-7/8" W x 7/8" D (120 x 74 x 22 mm)
- Approvals — CSA NRTL/C, meets ICES & FCC 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 2 VA or 32 V (dc) ± 20% 0.04 A
- Relays — 240 V (ac) 10 A 1/3 hp, pilot duty 240 VA 2 A
- Sensors included — NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) β=3892
Outdoor Sensor 070 and Slab Sensor 072.
- 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 (Off, -5 to 1°C)
- CWCO — Off, -22 to 23°F (Off, -30 to -5°C)
- Temperature display — Fahrenheit / Celsius



System Operation & Specifications

The tekmar Snow Melting Control 650 utilizes feedback from a Slab Sensor 072 and an Outdoor Sensor 070 to control the heat applied to a snow melting system through an injection (zone) valve. The melting system is manually started and runs for a user selected On Time. The control also automatically shuts down the snow melt system if the outdoor temperature becomes too cold or too warm.

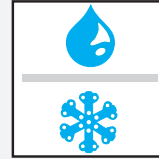
The control shall meet the technical specifications given above and shall provide the following functions.

- The control shall adjust the heat output to a slab based on sensor measurements of the slab and outdoor temperatures.
- The control shall vary the operating time (PWM) of an injection (zone) valve to maintain the slab at the required temperature.
- The end switch of the injection valve may be used to fire the boiler.
- The control shall turn on the slab pump whenever the melt system is operating.
- The heat exchanger shall have an aquastat to prevent freeze up if the slab return water temperature becomes too cold.
- A timer shall be incorporated in the control to allow a user to adjust the snow melting system On Time.
- The control shall shut down the melting system when the outdoor temperature is below a user selected Cold Weather Cut Off (CWCO) temperature.
- The control shall shut down the melting system when the slab and outdoor temperatures rise above a user selected Melting temperature.
- The control shall have an optional idling mode to allow the slab to be maintained at a user selected Idling temperature when the control is not in melting mode.
- The control shall display the outdoor, slab and target slab temperatures in °F or °C.
- The control shall continuously monitor its sensors and provide an LCD error message if a sensor is short or open circuit.
- The installer must ensure that the control and its wiring are isolated and/or shielded from strong sources of electromagnetic noise.
- **Order the following tekmar products for this application:** one Snow Melting Control 650 and one of Relay 003.

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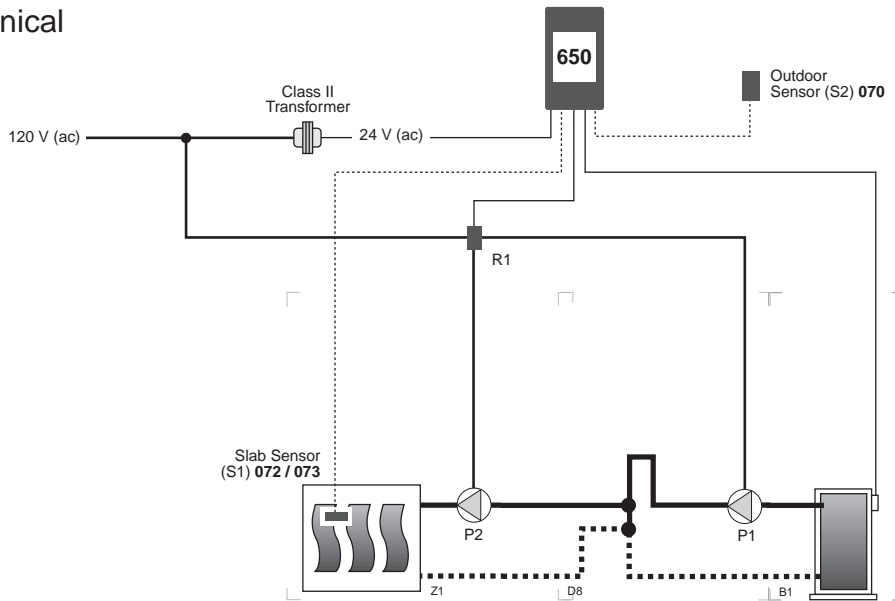
Snow Melting Control 650



A 650-4

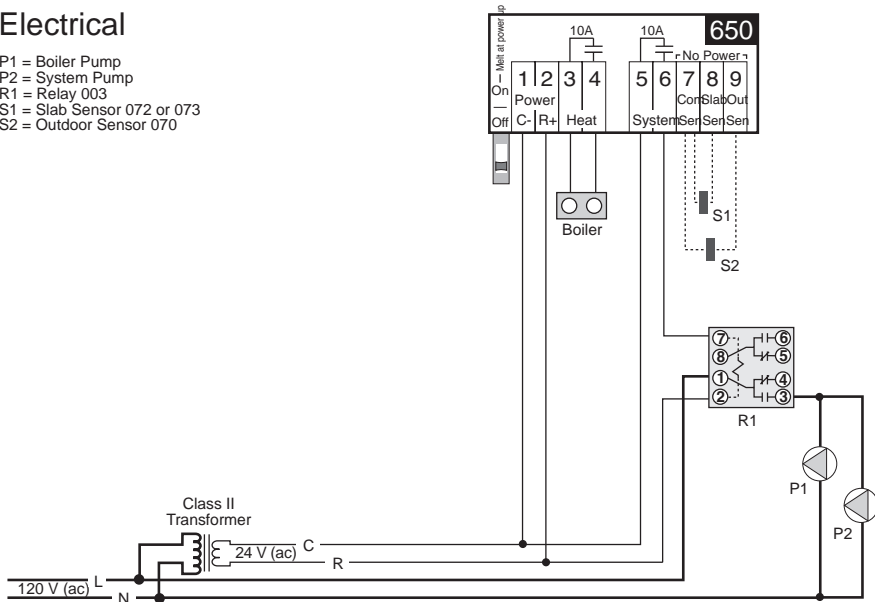
12/96

Mechanical



Electrical

- P1 = Boiler Pump
- P2 = System Pump
- R1 = Relay 003
- S1 = Slab Sensor 072 or 073
- S2 = Outdoor Sensor 070

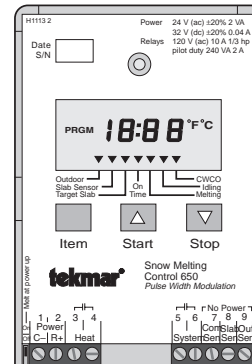


Note: This is only a concept drawing. The designer must determine whether this application will work in his system and must ensure compliance with code requirements. Necessary auxiliary equipment, isolation relays (for loads greater than the specified tekmar internal relay ratings), and other safety and limit devices must be added.

Technical Data

Snow Melting Control 650 Pulse Width Modulation

- Literature — A 000, A 650's, D 650, D 001, D070,
- 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 ICES & FCC 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 ±10% 50/60 Hz 2 VA or 30 V (dc) ± 20% 0.04 A
- Relays — 120 V (ac) 10 A 1/3 hp, pilot duty 240 VA 2 A
- Sensors — NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) β=3892
included: Outdoor Sensor 070 and Slab Sensor 072.
- 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 (Off, -5 to 1°C)
- CWCO — Off, -22 to 23°F (Off, -30 to -5°C)
- Temperature display — Fahrenheit / Celsius



System Operation & Specifications

The Snow Melting Control 650 controls the slab temperature for a single zone snow melting system.

Piping and Heat Source Details The system consists of a single dedicated condensing boiler piped in a primary-secondary arrangement providing heat to a single snow melting zone.

Snow Melting Operation When the *Start* button is pressed on the 650, the control closes its *System* contact and enables both the system pump (P2) and the boiler pump (P1). As the slab requires heat, the 650 cycles the boiler on and off through the use of its *Heat* contact using a Pulse Width Modulation Output.

Warm Weather Cut Off (WWCO) As the outdoor temperature rises, it becomes unnecessary to snow melt. When the outdoor temperature and the slab temperature rise above the *Melting* Temperature of the 650, the snow melting is disabled.

Cold Weather Cut Off (CWCO) As the outdoor temperature drops, it becomes impractical or impossible to snow melt because of the amount of heat the slab requires. When the outdoor temperature drops below the *CWCO* setting, snow melting cannot be started.

Additional Functions Additional functions are listed in the table in the Snow Melting Controls section of the Product Catalog I 000 and the Application Catalog A 000.

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