

SNOW SENSING SYSTEMS

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MR-MANUFACTURER

For over a quarter of a century, Delta-Therm Corporation has been successfully designing, manufacturing, and selling high quality heat-transfer components. Established in 1969, our company initially supplied mineral insulated cable assemblies for snow melting and pipe tracing applications. Since that time, we have dramatically expanded our line of products and accessories -- without sacrificing any of the quality our customers have come to expect. For more information or for a binder which lists all of our products, please call 1-800-526-7887.

Our engineering staff can help you design and order a heating system using the most efficient and cost effective products for your specific application. Fax your dimensions, a layout of the area to be heated, and the available voltage, and we will return a design proposal and a preliminary quote -- normally within 24 hours.

We provide comprehensive, easy-to-understand installation instructions written specifically for electricians and installation crews.

Delta-Therm is UL listed as an industrial control panels designer and manufacturer.

PP-PRODUCT PRESENTATION

SMC - 120A Snow Sensing System

SMC - 120A is designed to automatically sense snow or ice and activate a melting system. This system features a solid state controller with a 10 amp relay output contact, two moisture sensors, one slab sensor, and one ambient thermostat. Using four sensors ensures that the system is activated and deactivated only when specific atmospheric and surface conditions have been met. Once installed and initially adjusted, the system is fully automatic. This system can also be specified with a single moisture sensor and slab sensor (SMC - 90). Both SMC - 120A and SMC - 90 can be used in conjunction with mineral insulated cable, self regulating cable, constant watt cable, mats, or hydronics. SMC - 120A has also been adapted for roof and gutter applications (SMC - 120G), which can be used in conjunction with mineral insulated cable, self regulating cable, or constant watt cable.

The following product description pertains to Delta-Therm's SMC - 120A model.

System Cycle

The cycle starts by sensing moisture at slab level, at or below an air

temperature of 35°F and a slab temperature of 40°F. When these conditions exist, the heating system activates. The system deactivates at a slab temperature of 60°F, when all snow has melted and all water has evaporated.

System Components

The system consists of a solid state controller with a 10 amp relay output contact, two moisture sensors, one slab thermostat and one ambient thermostat.

The primary moisture sensor is cast epoxy, 3-1/2" long, 2" wide, 1-1/2" deep and houses the sensing unit, solid state switch and heater. The small size of the moisture sensor allows it to be placed into a standard FD two-gang box. The slab thermostat is mounted in a standard "C" type unilet box. This is the high-limit sensor which deactivates the system at 60°F and activates it at 40°F. Five interconnecting (non-shielded) leads between the moisture sensors, thermostats and the control unit are required for field operation. Input power to the control unit is 120 VAC, 60Hz.

Placement of Components

The two moisture sensors and the slab thermostat are placed in the area to be heated. The slab thermostat is placed 2" to 4" below the finished surface. The moisture sensors are placed 3 to 4 feet apart at the finished surface. The ambient thermostat control is located inside a rainproof (NEMA 3) box with a 10-foot capillary. This means that the box can be mounted either inside or outside. The bulb for this thermostat must be placed outdoors. The thermostat is field set to 35°F.

Safety Features

The secondary moisture sensor, set 3 or 4 feet from the primary moisture sensor, helps prevent improper start-up from accidental moisture such as wet shoes or tires.

The ambient thermostat prevents the system from activating at an air temperature above 35°F.

The slab thermostat prevents the heaters from operating once the slab has attained a temperature of 60°F.

Operation Sequence

Closing the "Control On/Off" switch will illuminate the control on/off light, indicating power to the internal transformer. If the air thermostat and slab sensor are closed, indicating air temperature below 35°F and slab temperature below 40°F, the control provides 12 VAC and 12 VDC to the remote moisture sensing unit. Momentary activation of the moisture sensor triggers the solid state switch and energizes the relay. This closes the output contacts, allowing snow removal equipment on the slab to operate, and turns on the front panel "Heater On" light.

Note: The control unit's output relay is rated at 10 amps.

When the system senses snow and the output relay energizes, the system remains energized until the protected area is heated to approximately 60°F, ensuring complete removal of ice or snow. This feature prevents the power contactors from short cycling or chattering. The slab sensing thermostat detects the temperature of the protected area. When the temperature of the protected area drops below 40°F, the sensor resets for another detection cycle.

Moisture Sensing

Operation relies in part on the electrical resistance difference between a dry surface and a relatively wet one. This difference may be sensed by closely spaced mutually insulated electrical conductors. When low electrical potential is applied to the conductors and the surface is dry, no leakage current will flow between the conductors. When wet, a leakage current may be detected and used to signal the presence of moisture. The leakage current between the sensing units of the moisture sensor is AC, and is limited to 300 microamps maximum with an open circuit voltage of 14 VRMS. The low AC current-voltage levels minimize galvanic action and eliminate any shock hazard. This sensing method will perform adequately as long as the moisture bridging the conductors is in the liquid state. Ice and snow, under some atmospheric circumstances, have an electrical resistance similar to dry air and so cannot be sensed reliably by a resistive response sensing element. Therefore, a heater is located near the surface of the moisture sensor. When the temperature sensors place the system in a "ready" state, an electrical potential is applied to the heater, so it will melt any snow or ice that has collected on the sensor causing a leakage current. Approximately 6 watts of heater power is sufficient heat to achieve moisture sensing. Installation of the moisture sensors in the heated areas allows system heat to ultimately dry the sensing unit.

To provide a useful signal (i.e. operate a relay), the leakage current from the sensing unit triggers the solid state device in the moisture sensor. With the solid state device in the moisture sensor instead of in the control box, the lead length between the moisture sensor and the control box is not critical. This virtually eliminates cross line coupling while maintaining maximum sensitivity. The distance between the moisture sensor and the control box is only limited by the voltage drop of the line. Voltage drop should not exceed 1.5 VDC per lead.

USES, APPLICATIONS

SMC - 120A is used for slab snow melting and de-icing. SMC-90 is used for slab snow melting and de-icing. SMC - 120G is used for roof & gutter snow melting and de-icing.

MF-MATERIALS, FINISHES

The moisture sensors are cast epoxy. The slab thermostat body is made of cast *Feraloy* iron alloy, finished with zinc electroplate with aluminum acrylic paint. The ambient thermostat is a cast enclosure with a baked-on enamel

finish. The solid state controller has a gray enamel finish.

TS-TECHNICAL SUPPORT

For additional technical information, please call our engineering staff at 1-800-526-7887.

CC-CODES, CERTIFICATION

SMC-120A, SMC-120G, and SMC-90 are UL listed.