

CSI SPECIFICATION: *SMC (Snow Melt Control)*

SECTION: 230913 Instrumentation and Control devices for HVAC

PART 1 GENERAL

1.1 Summary

- A. Section Includes:
 - 1. Snow melt control for under slab Hydronic heating systems.
- B. Related Sections:
 - 1. Conforms to applicable building code requirements of all authorities having jurisdiction.

1.2 References

- A. **International Organization for Standardization (ISO)**
 - 1. Manufacturer shall be ISO 9001:2008 Quality Management Systems Certified.
- B. **Underwriters Laboratories, Inc. (UL):**
 - 1. The control shall be tested and certified per standard 916 "Energy Management Equipment".

1.3 Quality Assurance

- A. Manufacturer's Quality System:
 - 1. Registered to ISO 9001:2008 Quality Standard, including in-house engineering for product design activities.
 - 2. The control must be UL tested and certified per standard 916, "Energy Management Equipment".

1.4 Control Operation

- A. **Description:** The control shall operate on 120VAC, with a maximum power of 48 watts. The control shall be pre-engineered and programmed exclusively for the operation of under slab Hydronic snow and ice melting systems. It shall incorporate the following integrated functions: Warm-Weather-Cutoff, Cold-Weather Cutoff, Idle Set Point, Maximum Delta T, Maximum Slab Supply temperature, and Minimum Boiler Return temperature.
- B. **Snow Melting Operating Concept:** Using a temperature and moisture detection slab sensor, the control monitors the slab temperature to prevent the slab temperature from dropping below freezing. In addition, the control monitors the presence of moisture. If moisture is detected, the heating system is activated to melt and evaporate the moisture.
- C. **Sequence of Operation:** Prior to precipitation, a drop in slab temperature below the Warm-Weather Cutoff set point shall start the "Idle Mode". In this mode the control shall maintain the slab temperature above freezing. It shall do that by pulsing the slab pump every few minutes. If the slab temperature continues dropping, the control shall energize the heating source, modulate the motorized valve open, and run the slab pump continuously to maintain the slab above freezing. If moisture is detected, the control shall start the "Melting Mode". In this mode the control shall regulate the heat source and modulate the motorized valve to maintain the slab temperature at the Warm-Weather Cutoff set point. It shall remain in this mode until no moisture is present or the minimum runtime has elapsed, whichever is longer. If the system is unable to heat the slab supply temperature within one hour, or achieve the Warm-Weather Cutoff set point within 24 hours the control shall energize the remote alarm output. During operation, should the slab temperature drop to the Cold-Weather Cutoff set point, the control shall shut the heating system down to conserve energy and pulse the slab pump to protect the glycol solution from freezing under extreme weather conditions.

D. Features:

1. **Warm-Weather Cutoff Set point:** The control shall incorporate an adjustable Warm-Weather Cut Off Set Point. This setting shall be the slab temperature, below which the idle mode is activated and is maintained during the "melt" mode.
2. **Cold-Weather Cutoff Set Point:** The control shall incorporate an adjustable Cold-Weather Cutoff set point. This setting shall be the slab temperature, below which deactivates the system to conserve energy.
3. **Idle Set Point:** The control shall incorporate an adjustable Idle Set Point. This setting shall be the above freezing slab temperature, which is maintained during the "idle" mode.
4. **Maximum Delta "T":** The control shall provide an adjustable Maximum Delta "T" set point. This setting shall limit the differential between the slab supply and slab return water temperatures to help protect the slab from thermal stresses.
5. **Minimum Run Time:** The control shall provide an adjustable Minimum Run Time period. This setting shall determine the minimum operating time of the Melt Cycle to insure adequate melting and drying.
6. **Maximum Supply Set Point:** The control shall provide an adjustable Maximum Supply Temperature set point. The setting shall establish the maximum water temperature supplied to the system to protect the tubing and slab.
7. **Minimum Boiler Return Set Point:** The control shall provide an adjustable Minimum Boiler Return set point. The setting shall establish the minimum water temperature that can enter the boiler to protect the boiler from thermal stresses and condensation. If the boiler return temperature drops below this setting, the control shall throttle the valve closed to increase the boiler return temperature above this setting.
8. **Season:** A summer/winter menu selection shall be provided for summer shutdown. In the summer mode the control shall not activate the heating source.
9. **Memory:** The control shall store all configuration and settings on EE-Prom. In case of power failure the control should be able to retrieve all of its latest settings.
10. **Display:** The control shall have a graphical display capable of displaying a minimum of five lines by twenty-one characters. The display shall be visible with no ambient light. All control operation information shall be available for display. In the default mode the control shall display the slab temperature, the slab supply and return temperatures, and any additional messages pertaining to the control's current operation.

E. Inputs:

1. **Slab Sensor:** The control shall be capable of accepting a temperature and moisture slab sensor to be used to read the current slab temperature and detect precipitation. It shall be installed level with the slab. It shall include 100 feet of cable to connect the sensor to the control. It shall facilitate easy replacement without the need for slab repair.
2. **Slab Supply and Slab Return Temperatures:** The control shall be capable of accepting two thermistor-type temperature sensors to be used to read the current slab supply water temperature and slab return water temperature.
3. **External Shutdown (Opened for normal operation):** The control shall be capable of accepting a dry-contact shutdown input. This shall prevent any heat call from activating the boiler or modulating the motorized valve open.
4. **Enable Input (Closed for normal operation):** The control shall be capable of accepting a dry-contact enable input. This shall enable a heat call to activate the slab heating.
5. **Prove Input:** The control shall be capable of accepting a dry-contact prove input to check on system components before activating the heat source. This shall prevent a boiler from energizing or a valve from opening until this input is closed/shorted.
6. **Boiler Return Temperature (Optional):** The control shall be capable of accepting a thermistor-type temperature sensor to read the current boiler return water temperature.

F. **Outputs:**

1. System Pump or Valve output relay (double throw relay)
2. Burner output relay
3. Slab Pump output relay
4. Alarm output relay
5. Floating Motorized Valve Outputs (Open and close) relays
6. Modulating output (0-10V)
7. Modulating output (4-20mA)

G. **Optional Add-Ons:**

- a. **2-Way Motorized Valves:** for low-pressure steam systems (sizes from 1-1/2" to 10") with electric actuator.
- b. **3-Way Motorized Valves:** for Hydronic systems (sizes from 1-1/2" to 8") with electric actuator.
- c. **Boiler Return Temperature Sensor:** to be used in Hydronic motorized valve applications.

1.5 Regulatory Approvals

A. Underwriters Laboratories, Inc. (UL):

1. The control shall be tested per standard 916 "Energy Management Equipment".

1.6 Included Items

- A. **Slab Sensor:** The sensor shall have a brass housing and a brass sensor enclosure to withstand heavy vehicle traffic. It shall be capable of accurately measuring the slab temperature and shall be capable of detecting traces of precipitation. Its temperature component shall be of the Thermistor type capable of measuring between -30°F to 250°F.
- B. **Slab Supply and Slab Return Temperature Sensors:** Both the supply and return temperature sensors shall be of the thermistor type capable of measuring from -30°F to 250°F. They shall be inserted in the provided wells.
- C. **Slab Supply and Slab Return Sensor Wells:** Each of the supply and return temperature sensors shall be inserted into these NPT threaded wells for accurate slab supply and return temperature readings.

1.7 Security

A. **Control Local Security:**

No changes to control settings shall take place except after the program/run switch has been toggled to allow for changes. The switch shall be located in a secure location on the control where it can be locked from unauthorized users.