SMP-680 Series Snow Melt Panels

Installation, Operation, and Maintenance Manual

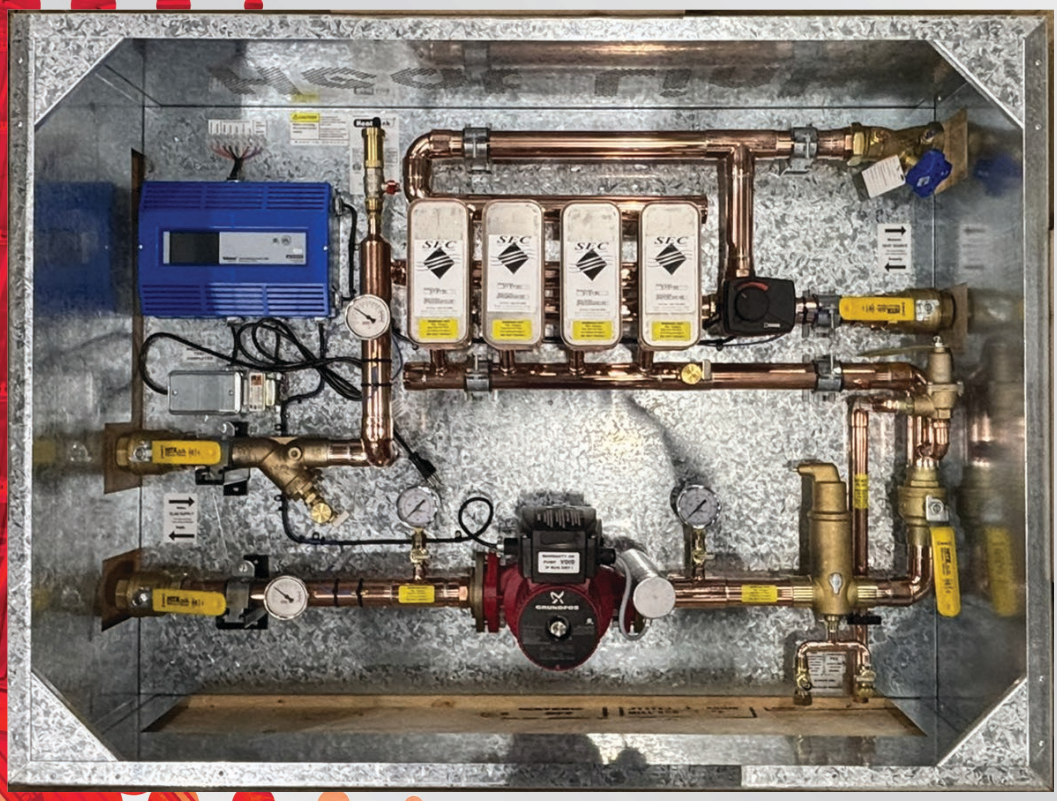


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Product Safety Information

Warnings

The zone control panel is for indoor use only and must be installed by a qualified installer/service technician. This product must be installed and operated in strict accordance with the terms set out in this manual and in accordance with the relevant requirements of the Local Authority Having Jurisdiction. Failure to comply will result in a void of warranty, and may also result in property damage, serious injury, or death.

Servicing

Prior to commencing installation of this panel it is necessary to read and understand all sections of this manual. The symbols below are used throughout this document to ensure proper operation of the panel, and your safety. Please pay attention to these symbols.



Warning
Possible Hazard



Warning
Live Power



Warning
Hot Pipes



Warning
Treated Water



In order to avoid injury or death, switch off the power to the panel prior to inspecting or making connections to the terminal strip.

Function

This zone control panel can provide mixing, distribution, and zoning for a wide variety of hydronic heating applications.
The effectiveness of the system is dependant on the system being designed and installed correctly. Proper consideration of factors such as BTU loads, outdoor design temperature, indoor design temperature, room set-point temperature(s), differential fluid temperatures, head loss, flow rates, and transfer capacities of the heat emitters is critical.
Once these factors have been considered and the system requirements determined, these can then be evaluated and compared to the panel capabilities.

Unpacking

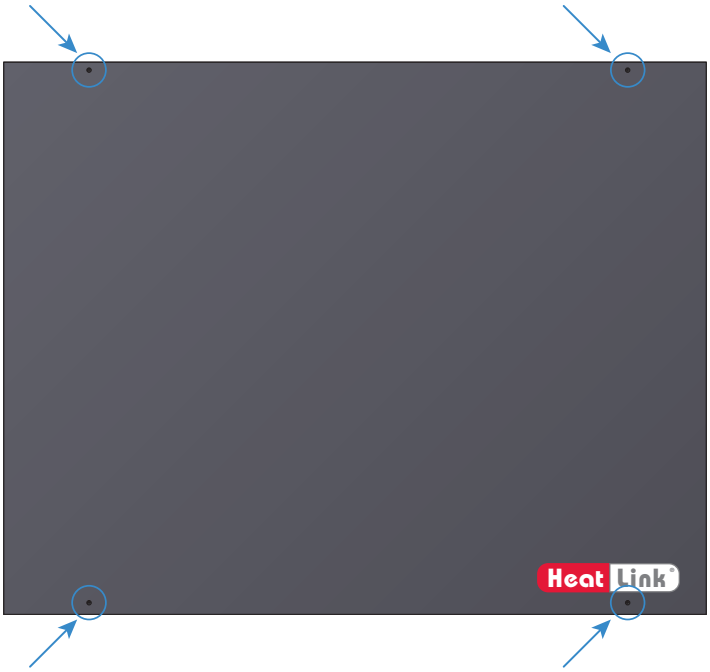
Step 1 Examine carton for any damage that may have occurred during shipping. If damage is visible notify your courier and supplier immediately.

Step 2 Open the carton by removing the staples.

Step 3 Remove the cardboard spacers from the carton, then remove the panel from the carton. Lift the panel by the base, not the enclosure.

Step 4 There are 4 screws holding the cover in place. They are located at the top left & right, and the bottom left & right of the cover. Remove and **keep** these 4 screws - they will be needed after installation is complete to re-secure the cover.

Step 5 Remove the cover and place to one side.

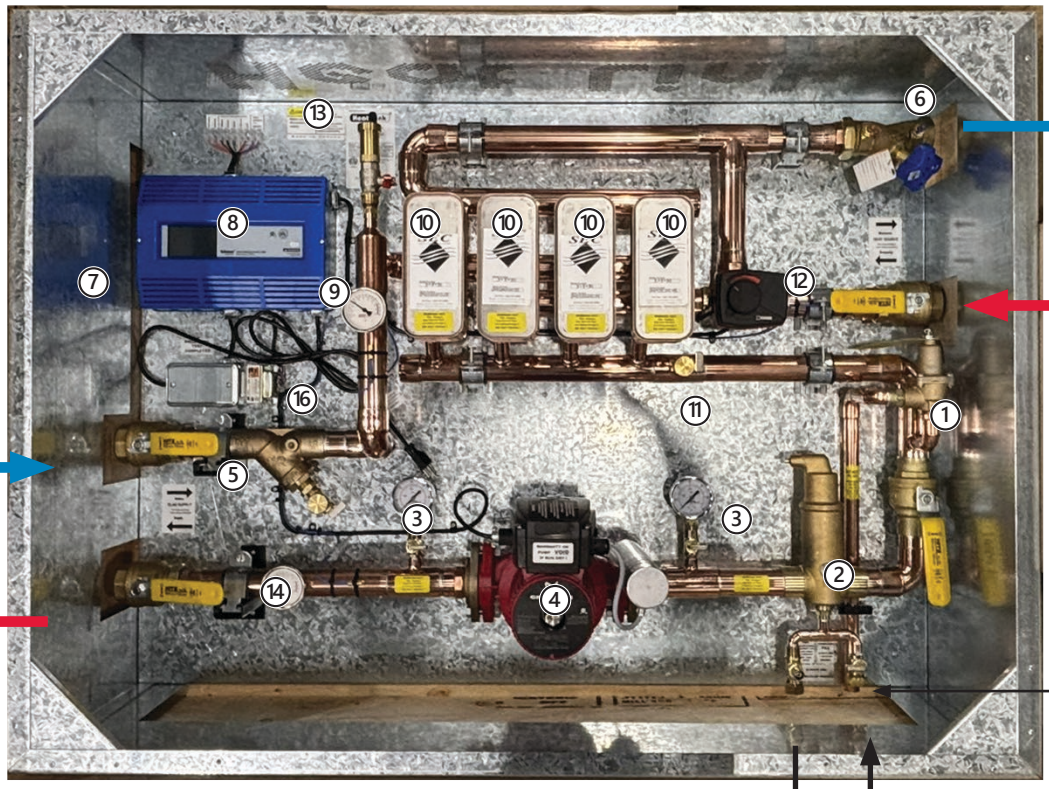


Installation Tools Needed

- Level
- Screwdriver or power drill
- Flat head bit of Robertson Square Drive #2
- Phillips head bit # 2
- 2 adjustable wrenches (or 2 × 40mm wrenches)

Panel Components

Note: When making piping hookups always be sure to use a backup wrench.



Return to Heat Source

Supply from heat source

Return from Slab

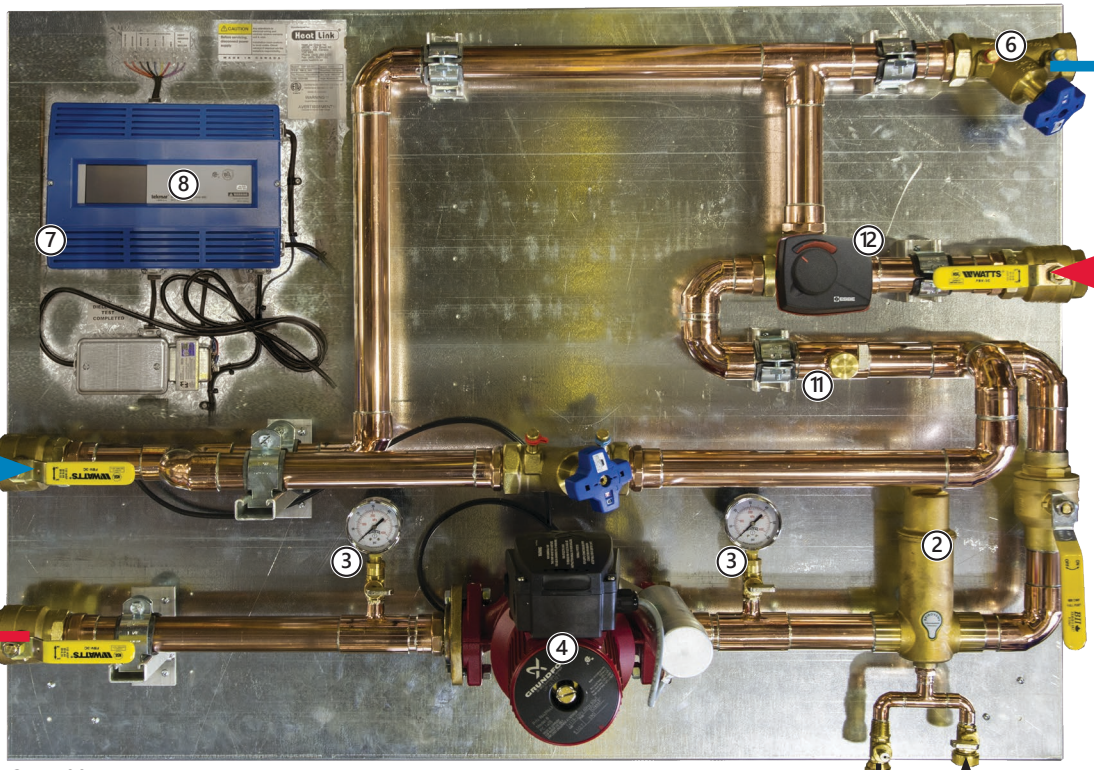
Supply to Slab

Pressure Relief Pipe - Extend to within 6 inches of the floor

SMP335

Expansion Tank Hookup

Valve Connection for Fill



Return to Heat Source

Supply from heat source

Return from Slab

Supply to Slab

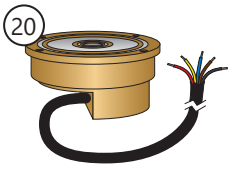
SMP400D

Expansion Tank Hookup

Valve Connection for Fill

#	Components	Part Number SMP335	SMP425	SM400D
1	Pressure relief valve	-	-	-
2	Air eliminator	-	-	-
3	Pressure gauge	PG14NPT25160	PG14NPT25160	PG14NPT25160
4	Pump	UP 43-110	UP 43-110	UP 43-110
5	Strainer/Drain valve	-	-	-
6	Balancing Valve	-	-	-
7	115V power plug	-	-	-
8	System Controller		31680	
9	Temperature gauge		76940	
10	Heat exchanger	HTEX3820	HTEX3820	n/a
11	Drain Valve	-	-	-
12	3-way valve	63539	63539	63539
13	Motorized actuator	58132	58132	58132
14	Air vent w/cap	79932	79932	79932
15	Supply sensor		30070	
16	Return sensor		30070	
17	Panel Enclosure & Cover	-	-	-
18	Outdoor Sensor		30070	
19	Boiler Sensor (optional)		30071	
20	Snow Sensor (sold separately)		30090	
21	Aerial mount snow sensor (optional, sold separately)		30095	
22	Slab sensor (optional, sold separately)		30072 / 30073	

20



30090 Snow/ice sensor sold separately

21



30095 Snow/ice sensor sold separately

22



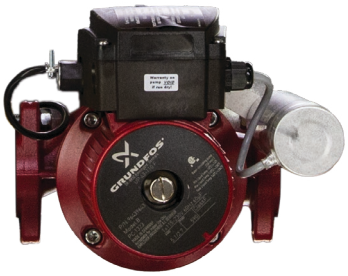
30072/30073 Slab sensor sold separately

SMP Panel Specifications

Headings	SMP335-680	SMP425-680	SMP400D-680
Listing	cETLus		
Conforms to	CAN/CSA-C22 No.14, UL508		
Dimensions	36"H × 48"W ×16"D		
Weight	500lbs		480lbs
Nominal panel output			400,000 BTU/hr
Nominal flow	*See conditions in table below*		32 US gpm @ 25°F ΔT
Nominal pressure drop outside of panel			25 ft
Max ambient temperature	120°F		
Max water temperature	200°F		
Max allowable operating pressure on secondary side	100 psi		
Power supply	15 Amp, 120V, 60Hz, single phase		
Pump	Grundfos UP43-110		
Temperature control method	1½" 3-way diverting valve and motorized actuator, controlled by snowmelt control		
Mixing valve Cv	18.6		
Heat Exchanger Size	4× 3×8-20	4× 3×8-30	n/a
Auxiliary terminal	Yes, max 16A		
Piping	1½" Copper		
Piping connections	1½" FNPT		
Expansion tank fitting	½" FNPT		
Cold water fill	¾" Hose bib		
Backplate and side	Galvanized steel		
Cover	Powder coated steel		

Panel Output Conditions	SMP335-654		SMP425-654	
	Primary	Secondary	Primary	Secondary
Fluid type	Water	50% glycol	Water	50% glycol
Entering fluid temp (°F)	180	100	180	100
Exiting fluid temp (°F)	150	130	140	130
Flow rate (US gpm)	17	22	21	28
Headloss	14.3	–	16.8	–
Pressure drop (ft head)	–	22	–	21

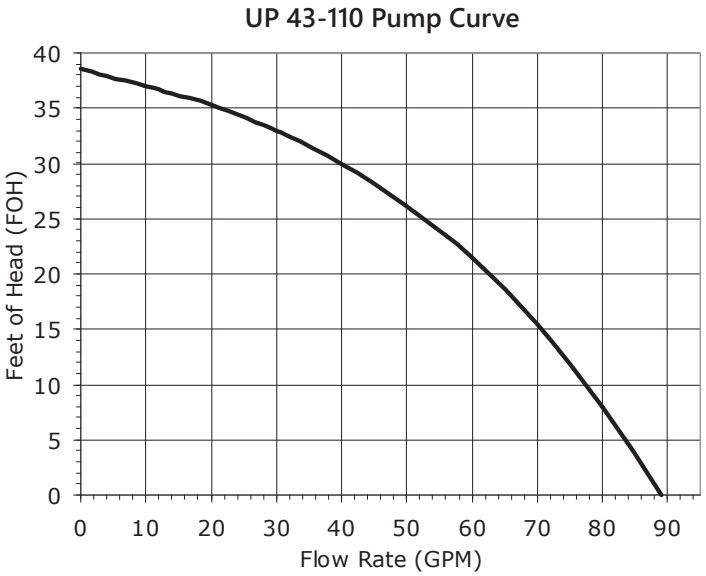
Panel Component Specifications



Circulator

The circulator moves the heated fluid through the system when there is a call for heat from the system controller.

The addition of glycol to the system will result in higher demand from the circulator due to the change in viscosity of the fluid.



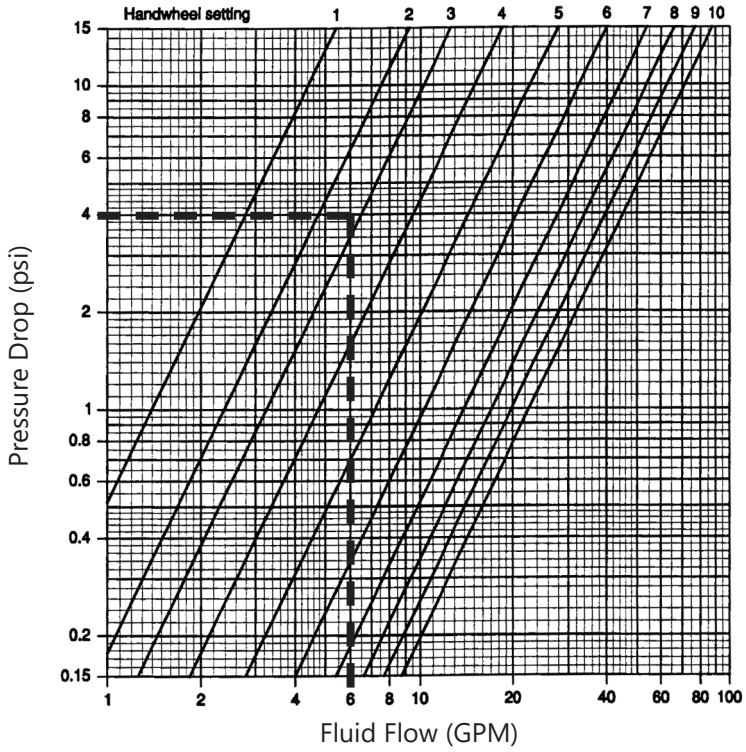


Balancing Valve

Located on the primary return (and secondary supply for SMP400D) is 1-½" balancing valve that provides flow regulation based on load requirements.

Setting of Return Balancing Valve

Certain system information is required to properly set the balancing valve:



Note: Diagram above based upon 100% water.

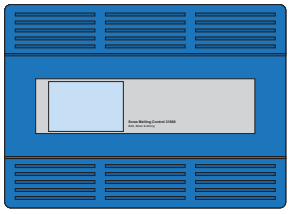
1) Total pressure drop across the supply and return for both the primary and secondary systems.
2) Flow requirements for both the primary and secondary sides of the system.

Taking this information and the graph to the left, the appropriate valve setting would then be set and read on the valve handle.

For example:
Pressure drop across the panel is 4 psi and the flow requirement is 6 GPM.
Following the dashed lines, seen on the graph to the left, the valve setting would be approximately 2.8. The blue knob would be turned clockwise until digits 2.8 appear (8 being red).

Available on the valve are two test ports. Appropriate test equipment can be utilized for verification of the required load requirements.

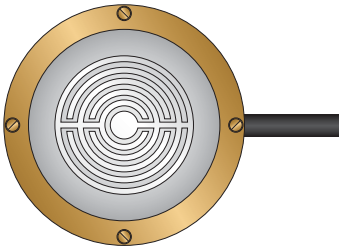
Panel Component Specifications



31680 System Controller

Based upon the feedback from the sensors for the system the controller will regulate the necessary supply fluid temperature that is required for the snow melt system by adjusting the control valve via motor actuator.

Refer to page 20 for instructions.



#30090 Snow/Ice Sensor (sold separately)

The SMP panel uses a snow/ice sensor in conjunction with the 330654, which activates and controls a snow melting system based on moisture (snow/ice) and slab temperature. The sensor measures the slab temperature, sensor surface temperature, and sensor surface moisture level. This control is not designed as a simple detection device and will not operate properly in an unheated slab.

Sensor Ambient Temp.:.....-30 to 170°F (34 to 77°C)
Sensor Material:.....Silicon brass
Sensor:.....NTC thermistor, 10kΩ @ 77°F (25°C ± 0.2°C), β =3892
Cable Material:.....5 conductor stranded wire with polyethylene jacket
Cable Length:.....65' (20 m)
Load Rating:.....15,000 lb (66,723 N) distributed load, non-impact, installed in concrete according to the manual



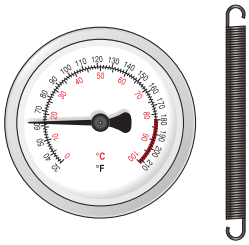
#30071 Universal Sensor

One sensor is installed on the panel as a supply sensor.

An optional boiler return sensor (sold separately) can be used instead of an outdoor sensor. If used, the mixing valve will provide boiler return protection to the boiler inlet by closing the valve when the boiler return temperature falls below the Boiler Minimum setting. Boiler return protection requires the installation of the boiler return sensor on the inlet to the boiler and the Outdoor/Boiler Return Sensor setting must be set to Boiler Return.

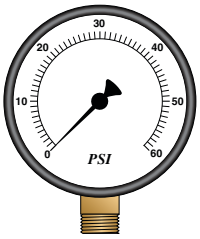
Operating Temperature:..... -58°F to 140°F (-50°C to 60°C)
Sensor:.....NTC thermistor, 10 k @ 77°F (25°C±0.2°C), B=3892

Panel Component Specifications



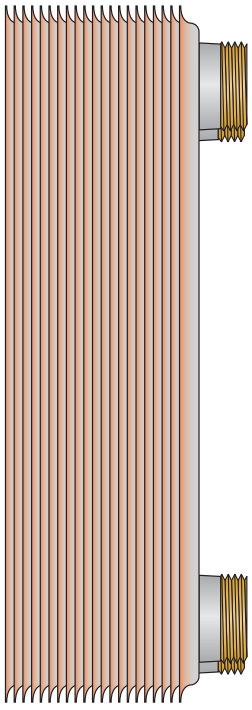
Thermometer (76940)
The pipe mounted thermometer reads the supply fluid temperature.

Specifications:
• Temperature range of 32-210°F (0-100°C).



Pressure Gauge
The two pressure gauges are mounted on the inlet and outlet ports of the circulator providing a reading of the system pressure drop.

Specifications:
• Pressure range, 0-60psi

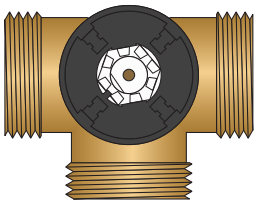


Heat Exchanger (SMP175-HEX, SMP300SS-HEX and SMP300SS-HEX-H only)
The brazed plate heat exchanger allows the transfer of heat from fluid on one side to fluid on the other side of the heat exchanger. This component also provides a separation between the two fluids so mixing does not occur.

Specification:
• Stainless steel plates copper brazed together
• Single-wall brazed plate

Fluid pH should be maintained within a range of 6.8-8.0

Panel Component Specifications



Control Valve
3-way brass mixing valve regulates the temperature in the hydronic system with the help of the electric motor actuator and system controller. May not be exactly as shown.

Specifications:
• Cv=11.6



Motorized Actuator
The motor actuator is mounted to the control valve and moves the valve appropriately to allow the heated fluid to enter. This actuator works in conjunction with the system controller.
Specifications:
• 0-10V/0-20mA, 45-120s
• 24Vac/dc, 6Nm

Manual Operation of Motorized Actuator
NOTE: Motorized actuator should not be placed in manual mode for an extended period of time.
• Pull knob out on motorized actuator.
• Rotate knob clockwise or counter-clockwise.
• To return to automatic mode, push the knob in.



Air Eliminator
The air eliminator removes entrapped air from the hydronic system by screening the fluid as it flows through the valve. The air is then released out of the system via the incorporated air vent.
Specifications:
• Stainless steel lattice
• Removable internal air vent assembly for ease of maintenance

Panel Mounting

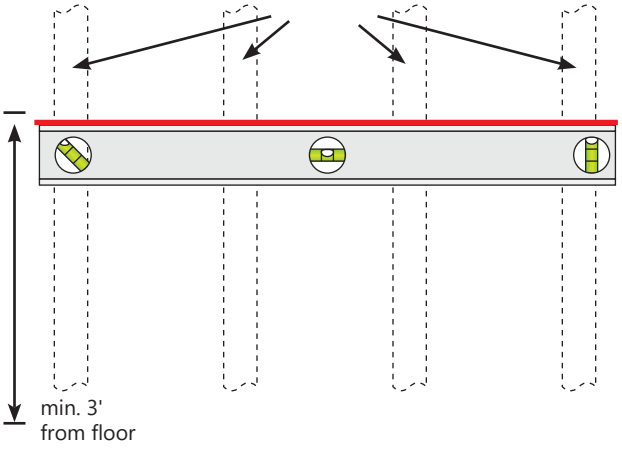
Prior to mounting the panel, ensure the wall is capable of supporting the weight of the panel, and that a 115V receptacle is within reach of the 6 foot cord and plug.
The bottom of the panel should be a minimum of 3 feet from the floor to allow for piping hookup.

Step 1 Determine the locations and distance of the studs within the walls.

Step 2 Recommended: Use a 2×4 secured to the wall to rest the panel on during installation.

Step 3 With a level draw a straight line on the wall at least 3 feet from the floor.

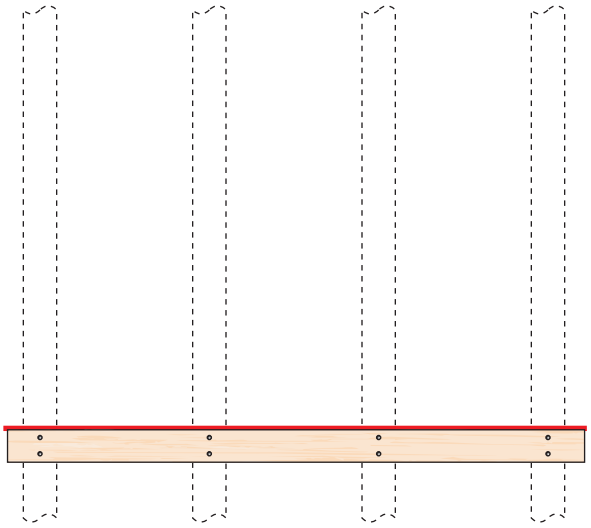
Step 4 Align the 2×4 to the line and secure it to the wall studs.





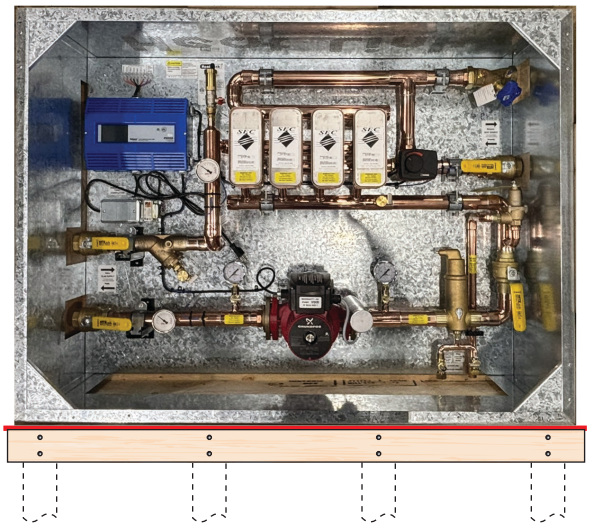
This panel is heavy; 2-3 person lift is required.

Step 5 Lift and place the panel onto the 2×4 and using the mounting screws secure the panel to the wall studs.
To ensure the panel is properly secured it may be necessary to screw through the backplate.



Step 6 Refer to pages 12-14 to connect the piping and wiring to the panel.

Step 7 Replace the cover.



Fill & Purge

The following steps are recommended in order to fill the system side of the snow-melting panel prior to commissioning of the panel.

Note: *Additional purging steps may be required for the rest of the hydronic system.*

The discharged system fluid from the fill and purge process is not for consumption or washing.

Step 1 Ensure the panel is not plugged in.

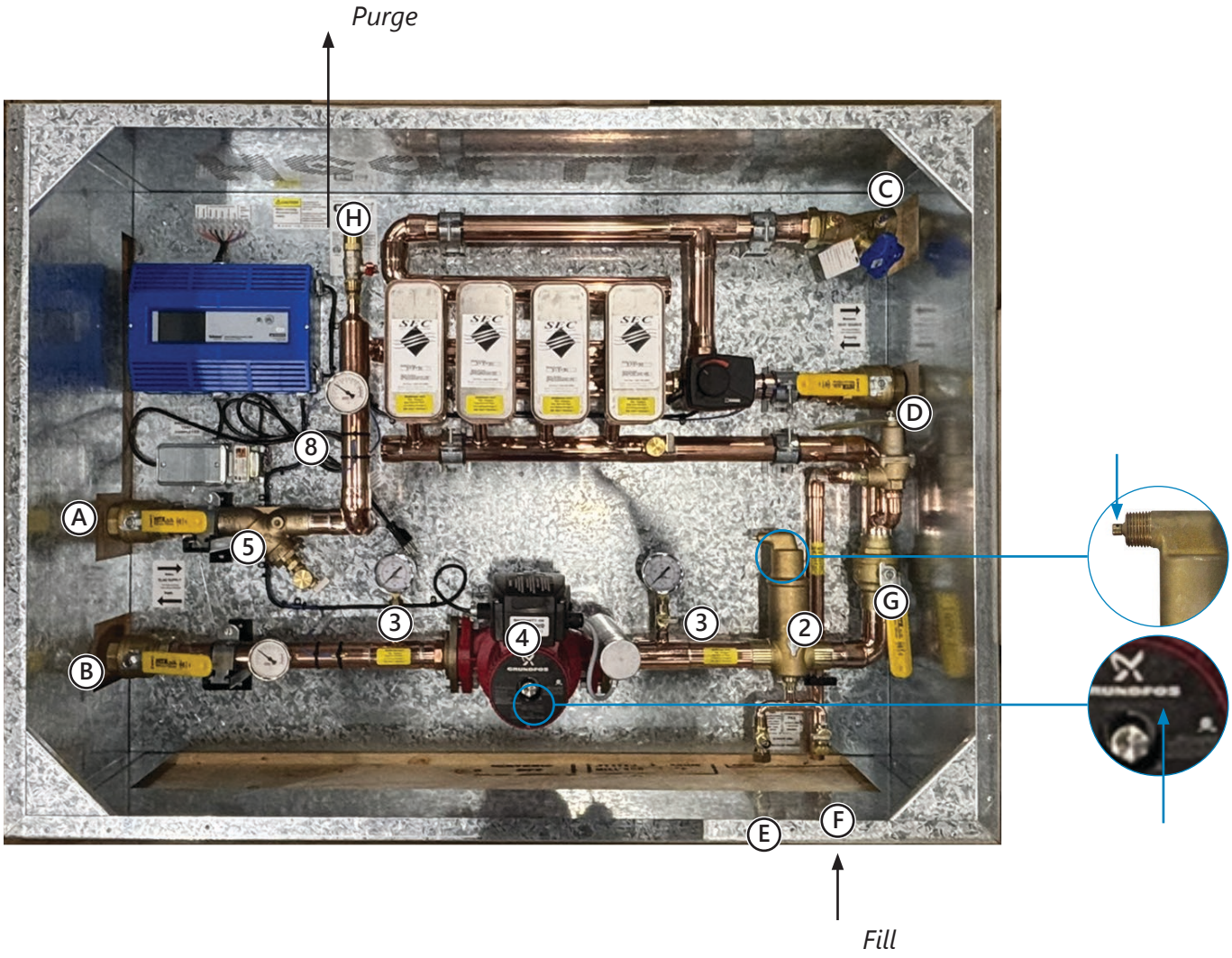
Step 2 Fully close valves Ⓐ, Ⓑ, Ⓕ, Ⓖ, ⑤, and ③.

Step 3 Remove air vent assembly from Ⓗ and attach the purge hose to the valve.

Step 4 With an appropriate expansion tank connected fully open Ⓔ.

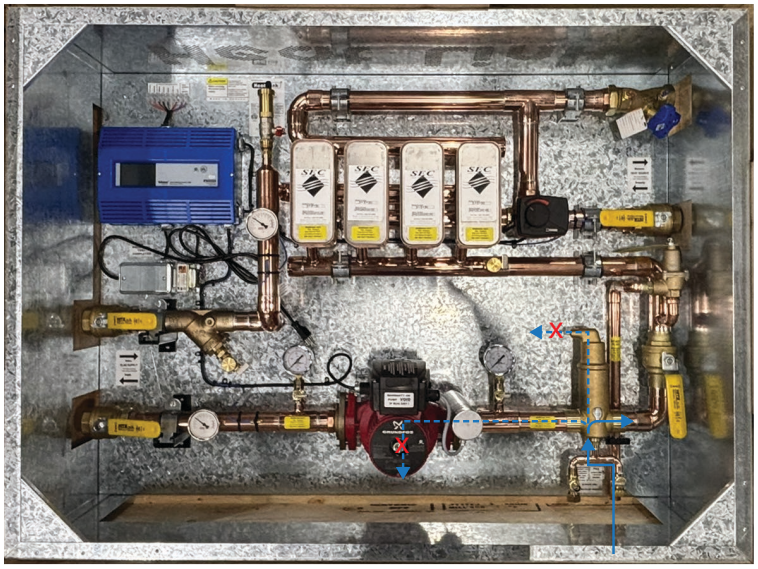
Step 5 Loosen the pump ④ vent screw with a large flat head screwdriver.

Step 6 Loosen the air vent knob on the air eliminator ②.



Step 7 Connect the antifreeze solution charger to Ⓕ and slowly open the valve. Reduce the flow if the solution sprays out from ②.

Step 8 After a minute, or when the fluid comes out of the circulator, tighten the screw.



Fill and purge part 1 water flow direction

Reduce flow if solution exits the vent head of the air eliminator

Close the vent screw on the pump once the solution exits the pump vent.

Step 9 Tighten the air vent on the air eliminator.

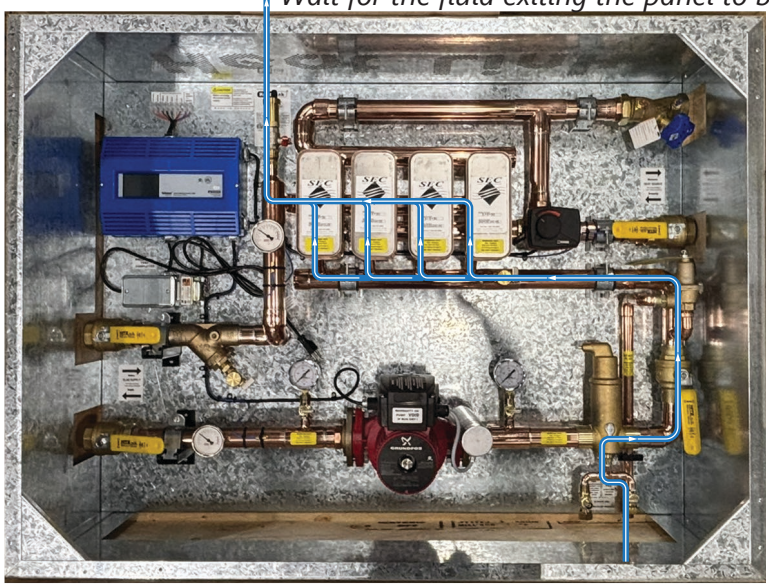
Step 10 Fully open valve Ⓖ and allow the water to fill through the heat exchangers and purge through Ⓗ.

Step 11 When the water exiting from Ⓗ is free of bubbles close valves Ⓗ and Ⓕ.

Step 12 Remove the purge hose from valve H and reattach the air vent assembly. Loosen the air vent knob on ②.

Step 13 Prior to fully opening valves Ⓐ and Ⓑ the rest of the snow melt system should be properly filled and purged.

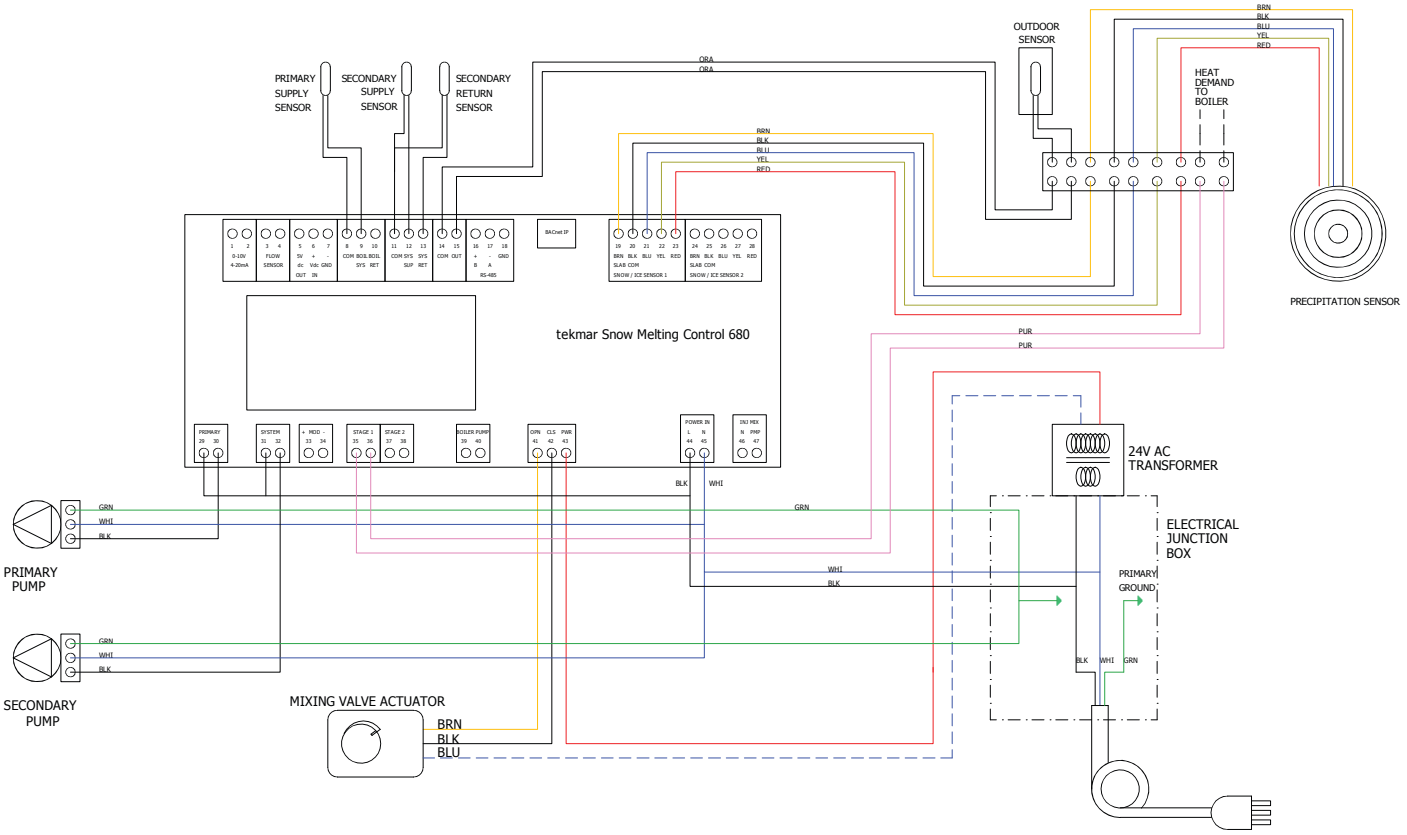
Wait for the fluid exiting the panel to be free of bubbles.



Tighten the air vent on the air eliminator.

Wiring Diagram

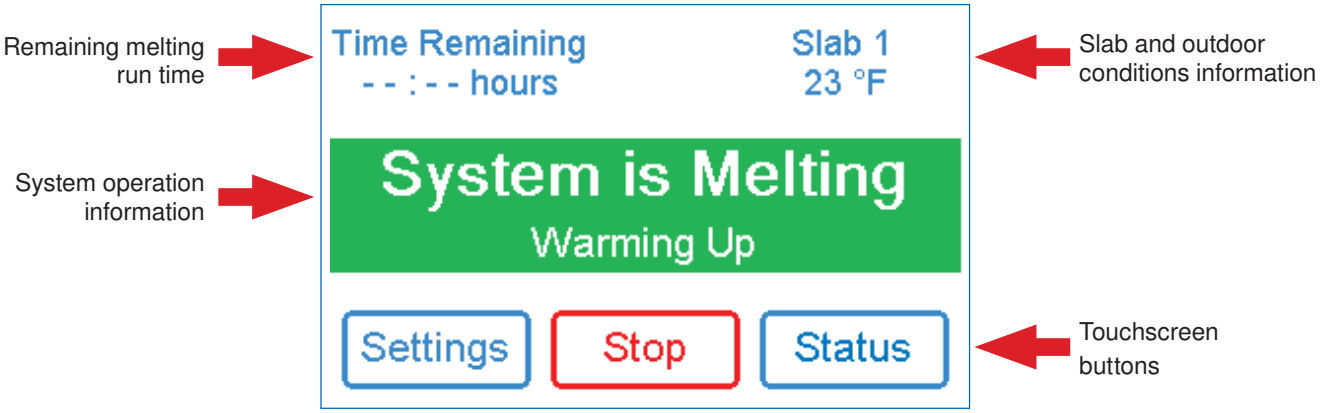
- Wiring should be done by a qualified electrician and should meet local codes and jurisdictions.



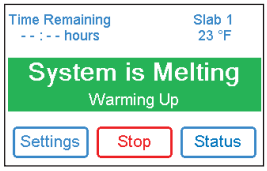
Control Overview

User Interface

Home Screen



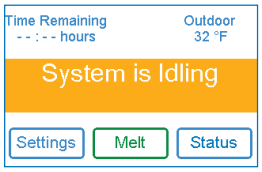
System Operation



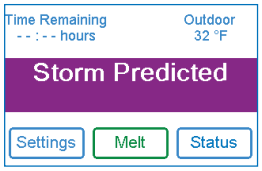
SYSTEM IS MELTING	
• Warming Up	The slab has not yet reached the slab target temperature.



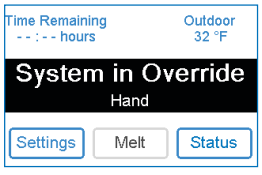
SYSTEM IS OFF	
• Warm Weather Shut Down	The slab and outdoor temperature have exceeded the WWSD setting.
• Cold Weather Cut Off	The outdoor temperature has fallen below the CWCO setting.
• Melt Pending	System will resume melting once outdoor temperature increases above the CWCO setting.



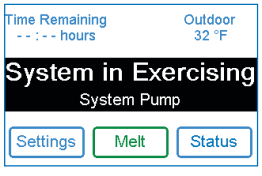
SYSTEM IS IDLING



STORM PREDICTED



SYSTEM IN OVERRIDE	
• Hand	The control is in hand manual override.
• Max Heat	The control is operating at Max Heat for hydronic systems.
• Purge	The control is purging air from the hydronic system.
• Test	The electric heating cable is in manual override.
• Off	The system is permanently off.



SYSTEM IN EXERCISING	
• Opening Mixing	Mixing valve is opening.
• Closing Mixing	Mixing valve is closing.
• System Pump	System pump is exercising.
• Primary Pump	Primary pump is exercising.
• Boiler Pump	Boiler pump is exercising.
• Injection Pump	Injection pump is exercising.

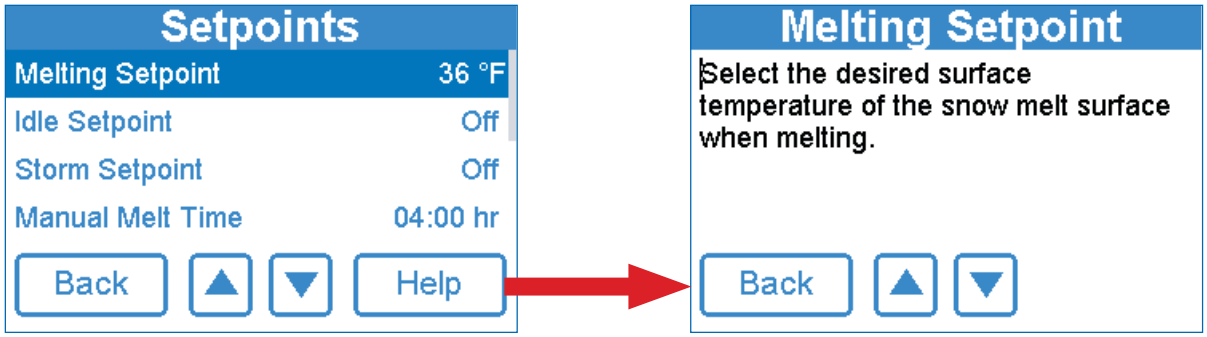
Symbols

Symbols

WARNING SYMBOL
The control has a error message. Press the warning symbol to determine the error code and information on how to take corrective action. Refer to the Troubleshooting section for a list of error codes.

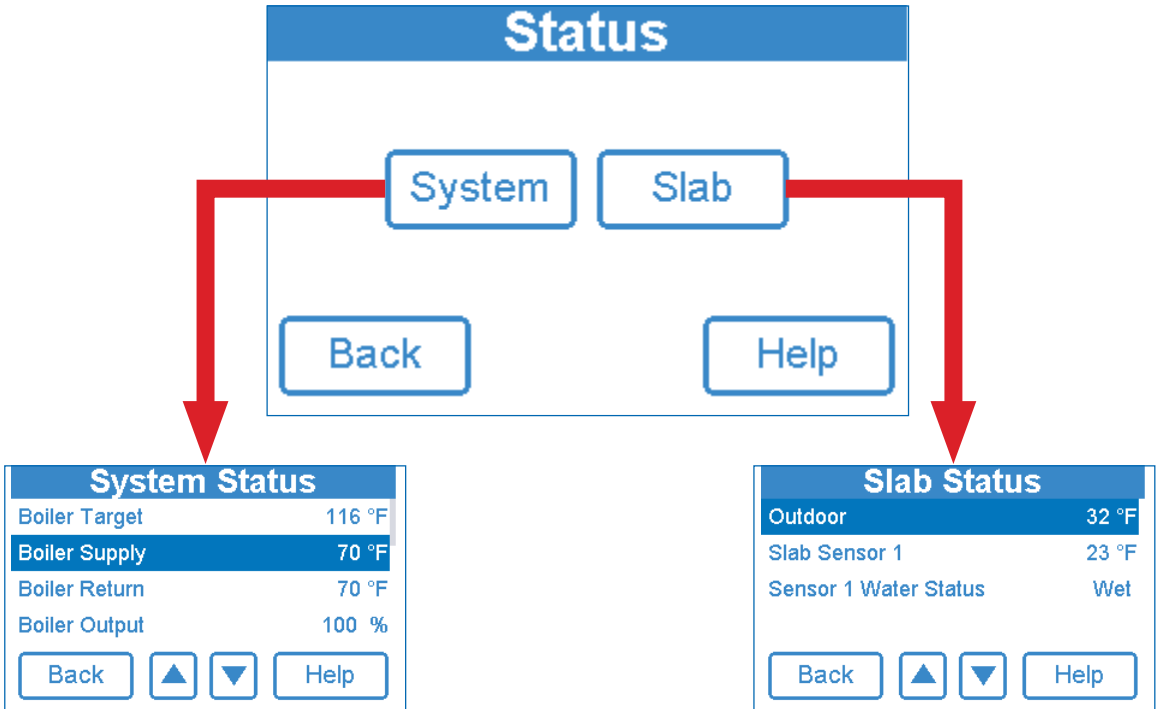
Help Screen

The display includes a Help screen for each setting. The Help screen provides a description of the setting that is identical to the description found in the Installation and Operation Manual.



Status Menu Navigation

Step 1: Press the Status button on the Home Screen.
Step 2: Press either the System or Slab button.
Step 3: Press up or down buttons to scroll through the list.



Slab Status Screen

Description	Range	Access
OUTDOOR Current outdoor air temperature as measured by the outdoor sensor or provided by the BAS system. "– – –" is displayed when no outdoor sensor is available. Conditions: Always available.	– – –, -67 to 149°F (-55.0 to 65.0°C)	User Installer
SLAB TARGET The slab target calculated by the control based on outdoor temperature and the melting, idling, or storm setpoints. "- - -" is displayed when no heat is required. Conditions: Always available.	– – –, -76 to 149°F (-60.0 to 65.0°C)	Installer
SLAB SENSOR 1 Current slab sensor 1 temperature. Conditions: Snow/ice sensor 1 set to In-slab or Slab sensor 1 is set to On.	-58 to 167°F (-50.0 to 75.0°C)	User Installer
SENSOR 1 WATER STATUS Current status of snow/ice sensor 1 moisture detector. Conditions: Snow/ice sensor 1 is set to In-slab or Aerial.	DRY or WET	User Installer
SLAB SENSOR 2 Current slab sensor 2 temperature. Conditions: Snow/ice sensor 2 is set to In-slab or Snow sensor 2 is set to On.	-58 to 167°F (-50.0 to 75.0°C)	User Installer
SENSOR 2 WATER STATUS Current status of snow/ice sensor 2 moisture detector. Conditions: Snow/ice sensor 2 is set to In-slab or Aerial.	DRY or WET	User Installer
COLDEST SLAB The coldest temperature between the two slab sensors. Conditions: 1) Snow/ice sensor 1 is set to In-slab or slab sensor 1 is set to On, and 2) snow/ice sensor 2 is set to In-slab or slab sensor 2 is set to On.	-58 to 167°F (-50.0 to 75.0°C)	User Installer
COMBINED WATER STATUS Combined status of both snow/ice sensor 1 and 2 moisture detectors. If either sensor is wet then the status is "Wet". Conditions: Snow/ice sensor 1 and 2 are both set to In-slab or Aerial.	DRY or WET	User Installer

System Status Menu

Description	Range	Access
BOILER TARGET The boiler target calculated by the control based on outdoor temperature, slab temperature and the melting, idling, or storm setpoints. "- - -" is displayed when no heat is required. Conditions: Application mode is set to Boiler or Boiler+Mix.	– – –, 50 to 230°F (10.0 to 110.0°C)	User Installer
BOILER SUPPLY Current boiler supply water temperature. Conditions: Application mode is set to Boiler or Boiler+Mix.	-31 to 266°F (-35.0 to 130.0°C)	Installer
BOILER RETURN Current boiler return water temperature. Conditions: Application mode is set to Boiler or Boiler+Mix.	-31 to 266°F (-35.0 to 130.0°C)	User Installer
BOILER OUTPUT Current boiler plant percent output. Conditions: Application mode is set to Boiler or Boiler+Mix.	0 to 100%	User Installer
STAGE 1 Current status of the stage 1 relay. Conditions: Application mode is set to PWM Zone, Mixing, Boiler, or Boiler+Mix.	On or Off	User Installer
STAGE 2 Current status of the stage 2 relay. Conditions: Boiler type is set to Stage 2.	On or Off	User Installer
PRIMARY PUMP Current status of the primary loop pump. Conditions: Application mode is set to PWM Zone, Boiler or Boiler+Mix.	On or Off	User Installer
BOILER PUMP Current status of the boiler loop pump. Conditions: Application mode is set to PWM Mode, Boiler or Boiler+Mix and the Boiler type is not set to Off.	On or Off	User Installer
MIX SYSTEM TARGET The mix system target calculated by the control based on outdoor temperature, slab temperature and one of either the melting, idling, or storm setpoints. "- - -" is displayed when no heat is required. Conditions: Application mode is set to Mixing or Boiler+Mix.	– – –, 70 to 200°F (21.0 to 93.5°C)	User Installer
SYSTEM SUPPLY Current system supply water temperature. Conditions: Application mode is not set to Electric.	-31 to 266°F (-35.0 to 130.0°C)	User Installer
SYSTEM RETURN Current system return water temperature. Conditions: 1) Application mode is set to PWM Zone, Mixing or Boiler+Mix and 2) a system return sensor is installed.	-31 to 266°F (-35.0 to 130.0°C)	User Installer
MIX SYSTEM OUTPUT Current position of the mixing valve or output of the variable speed injection pump. Conditions: Application mode is set to Mixing or Boiler+Mix.	0 to 100%	User Installer

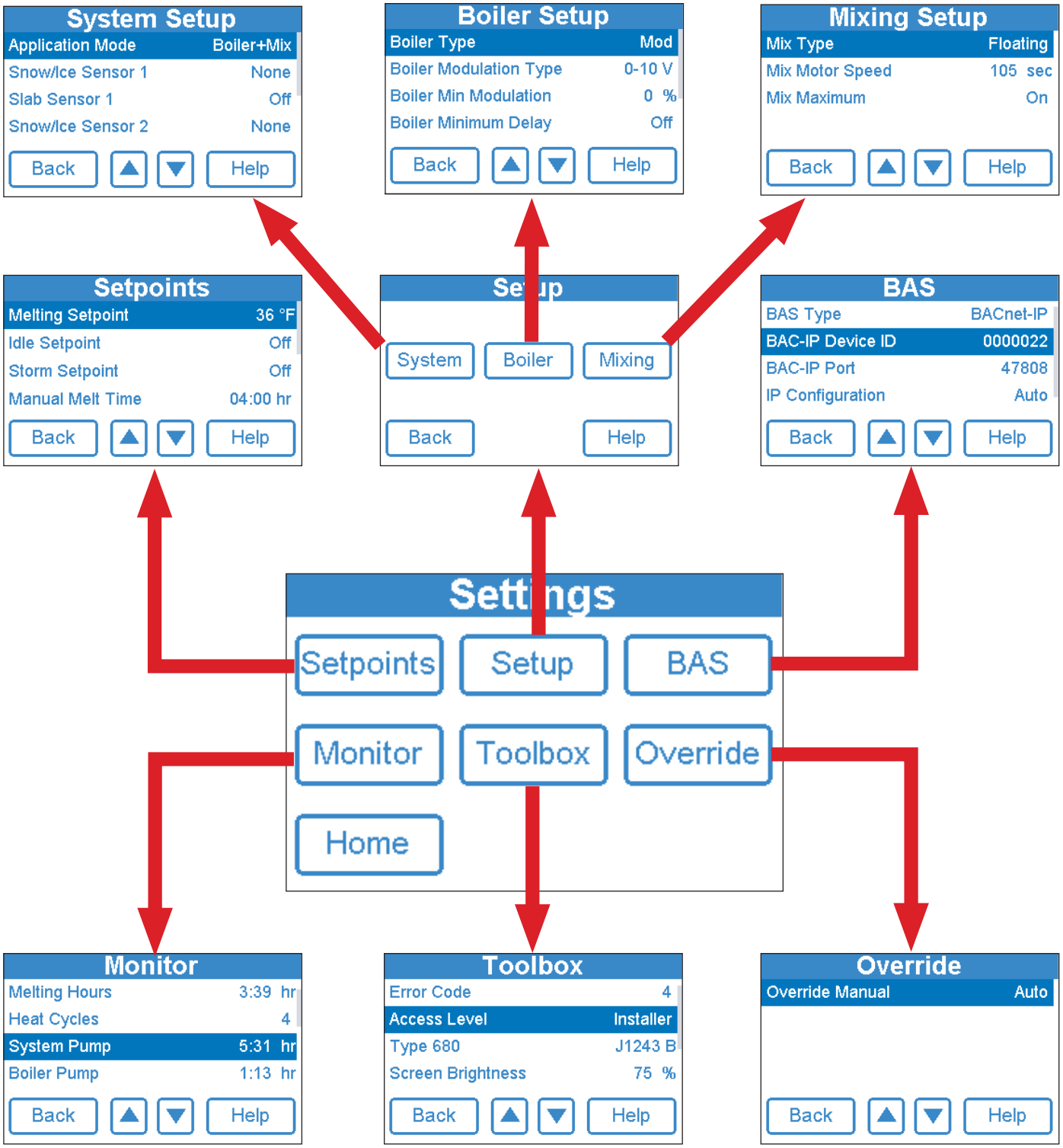
System Status Menu (cont'd)

Description	Range	Access
SYSTEM PUMP Current status of the system loop pump. Conditions: Application mode is set to PWM Zone, Mixing or Boiler+Mix.	On or Off	User Installer
SYSTEM FLOW RATE The system flow rate measured by the flow meter. Conditions: 1) Application mode is set to PWM Zone, Boiler, Mixing or Boiler+Mix and 2) Flow sensor is set to On.	0 to 1000 GPM (0 to 227 m^3/h)	User Installer
SYSTEM PRESSURE The system pressure measured by the pressure sensor. Conditions: Application mode is set to PWM Zone, Boiler, Mixing or Boiler+Mix, and 2) a Pressure Sensor is installed.	0 to 300 psi (0 to 2069 kPa)	User Installer
ELECTRIC ENABLE RELAY Current status of the electric snow melt enable relay. Conditions: Application mode is set to Electric.	On or Off	User Installer

Settings Menu Navigation

Step 1: Press the Settings button on the Home Screen.
Step 2: Press one of the six buttons.
Step 3: Press up or down buttons to scroll through the list.
Step 4: Press the highlighted setting name to change the setting value.

In the BAS menu, settings using a number keypad require touching the number field and then pressing the "Clear" button before entering the number.



Setpoints Menu

Description	Range	Access
MELTING SETPOINT Select the desired temperature of the snow melt surface when melting. Conditions: Always available.	32 to 95°F (0.0 to 35.0°C) Default = 36°F (2.0°C)	User Installer
IDLING SETPOINT Select the desired temperature of the snow melt surface when idling. Idling pre-heats the slab when the slab is dry but cold and allows faster reaction time to reach the melting temperature when snow is detected. Recommended for commercial use only. Conditions: Always available.	OFF, 20 to 95°F (-6.5 to 35.0°C) Default = Off	User Installer
STORM SETPOINT Select the desired temperature of the snow melt surface while operating in the storm operation. Storm operation temporarily pre-heats the slab to allow faster reaction time to reach the melting temperature when snow is detected. Storm operation is activated through a BACnet or Modbus command. Conditions: Always available.	OFF, 20 to 95°F (-6.5 to 35.0°C) Default = Off	User Installer
MANUAL MELT TIME Select the amount of running time when manually starting the system. Conditions: Always available.	0:30 to 24:00 hours Default = 4:00 hours	User Installer
ADD MELT TIME Select the amount of additional melting time after the Snow/Ice Sensors are dry. This allows low spots on the slab to fully dry before the snow melting system is shut off. Conditions: 1) Snow/ice sensor 1 is set to In-slab or Aerial, or 2) Snow/ice sensor 2 is set to In-slab or Aerial.	0:00 to 6:00 hours Default = 0:00 hours	Installer
STORM RUN TIME Select the amount of storm run time to pre-heat the slab when advised of a winter storm warning. Conditions: Storm setpoint is set to a temperature.	0:30 to 24:00 hours Default = 8:00 hours	Installer
SENSITIVITY 1 Select how sensitive Snow/Ice Sensor 1 is to water detection. Conditions: Snow/ice sensor 1 is set to In-slab or Aerial.	Auto, Min, -2, -1, Mid, +1, +2, Max Default = Auto	Installer
SENSITIVITY 2 Select how sensitive Snow/Ice Sensor 2 is to water detection. Conditions: Snow/ice sensor 2 is set to In-slab or Aerial.	Auto, Min, -2, -1, Mid, +1, +2, Max Default = Auto	Installer
WWSD Select the temperature above which the snow melting system is shut off during warm weather. This allows the snow or ice to melt off the slab naturally. Conditions: Always available.	Auto, 32 to 95°F (0.0 to 35.0°C) Default = Auto	Installer
CWCO Select the temperature below which the snow melting system is shut off during extremely cold weather. Below this temperature, the heat loss of the slab exceeds the capacity of the boiler or heating appliance. Conditions: Always available.	Off, -30 to 50°F (-34.5 to 10.0°C) Default = 10°F (-12.0°C)	Installer

Setup

Setup – System Setup Menu (1 of 2)		
Description	**Range**	**Access**
APPLICATION MODE The Application Mode selects the operation of the mechanical equipment. Application Mode "PWM Zone" operates a pump or zone valve to provide heat to the snow melting system. Application Mode "Mixing" operates a mixing valve or a variable speed injection mixing pump to heat the snow melting system. The heat source is enabled. Application Mode "Boiler" operates a modulating, 1-stage or 2-stage boiler to heat the snow melting system. Application Mode "Boiler+Mix" operates a mixing valve or a variable speed injection mixing pump and controls the boiler temperature to heat the snow melting system. Application Mode "Electric" uses electric cables to heat the snow melting system. Conditions: Always available.	PWM Zone Mixing Boiler Boiler+Mix Electric Default = Boiler+Mix	Installer
SNOW/ICE SENSOR 1 Select if a Snow/Ice Sensor 090 or 094 (In-slab), or a Snow Sensor 095 (Aerial) is installed on the Snow/Ice Sensor 1 input. Conditions: Always available.	None, In-slab, Aerial Default = In-slab	Installer
SLAB SENSOR 1 Select if a Slab Sensor 072 or 073 is installed on the Slab Sensor 1 input. Conditions: Available when snow/ice sensor 1 is set to None or Aerial.	Off or On Default = Off	Installer
SNOW/ICE SENSOR 2 Select if a Snow/Ice Sensor 090 or 094 (In-slab), or a Snow Sensor 095 (Aerial) is installed on the Snow/Ice Sensor 2 input. Conditions: Always available.	None, In-slab, Aerial Default = None	Installer
SLAB SENSOR 2 Select if a Slab Sensor 072 or 073 is installed on the Slab Sensor 2 input. Conditions: Available when snow/ice sensor 2 is set to None or Aerial.	Off or On Default = Off	Installer
SLAB PROTECTION Select if a concrete slab should be protected from large temperature differentials to avoid cracking the concrete due to high tensile stress. This limits the heat-up rate of the concrete slab. Slab protection is not required for installations with brick pavers, asphalt or other non-concrete materials. Conditions: Available when 1) Application mode is set to Mixing, Boiler or Boiler+Mix, 2) Snow/ice sensor 1 or 2 is set to 090 or Slab sensor 1 or 2 is set to On.	Off or On Default = On	Installer
ECONOMELT EconoMelt allows the user to mechanically remove snow then manually start the system to melt the remaining thin snow layer or ice. Conditions: Available when snow/ice sensor 1 or 2 is set to In-slab.	Off or On Default = Off	Installer
MAX MELT DAYS Limit the amount of melting run time after snow is automatically detected by a Snow/Ice Sensor 090 or 094, or a Snow Sensor 095. Conditions: Always available.	Off, 0.5 to 7 days Default = 3 days	Installer
OUTDOOR SENSOR Select if the outdoor air temperature is measured by the control or if the BAS system communicates the outdoor air temperature. Conditions: Always available.	Control or BAS Default = Control	Installer

Setup – System Setup Menu (2 of 2)

Description	Range	Access
PRESSURE SENSOR Select if a pressure sensor is installed. Conditions: Available when the Application Mode is not set to Electric.	Off or On Default = Off	Installer
PRESSURE RANGE Select the maximum pressure rating of the installed pressure sensor. Conditions: Available when 1) The Application Mode is not set to Electric, and 2) Pressure Sensor is set to On.	50, 100, 150, 200, 250, 300 (345, 690, 1034, 1379, 1724, 2069 kPa) Default = 50 psi (345 kPa)	Installer
LOW PRESSURE WARNING Select the low pressure limit below which a warning message is generated. Conditions: Available when 1) The Application Mode is not set to Electric, and 2) Pressure Sensor is set to On.	Off, 5 to 25 psi (35 to 173 kPa) Default = Off	Installer
FLOW SENSOR Select whether a flow sensor is installed. Conditions: Available when the Application Mode is not set to Electric.	Off or On Default = Off	Installer
FLOW @ 4 mA Select the flow rate when the meter's signal is 4 mA. Conditions: Available when 1) The Application Mode is not set to Electric, and 2) Flow Sensor is set to On.	1 to 100 GPM (0 to 27 m^3/h) Default = 1 GPM (0 m^3/h)	Installer
FLOW @ 20 mA Select the flow rate when the meter's signal is 20 mA. Conditions: Available when 1) The Application Mode is not set to Electric, and 2) Flow Sensor is set to On.	1 to 1000 GPM (0 to 272 m^3/h) Default = 50 GPM (11.36 m^3/h)	Installer
GLYCOL TYPE Select the type of glycol solution in the snow melt system. The type of glycol solution affects the energy meter calculation. Conditions: Available when 1) The Application Mode is not set to Electric, and 2) Flow Sensor is set to On.	Ethylene or Propylene Default = Ethylene	Installer
PERCENT GLYCOL Select the percent mixture of the glycol solution. The percent glycol solution affects the energy meter calculation. Conditions: Available when 1) The Application Mode is not set to Electric, and 2) Flow Sensor is set to On.	10 to 70% Default = 40%	Installer
ELECTRIC LOAD Set the size of the electric heating load in kilowatts for this zone. Conditions: Application mode is set to Electric.	0 to 200 kW Default = 35kW	Installer

Setup – Boiler Setup Menu (1 of 2)

Description	Range	Access
BOILER TYPE Select the type of boiler operated by the control. Mod = Modulating boiler with an adjustable firing rate using a 0-10V (dc) or 4-20 mA signal. 1 Stage = Single one-stage on/off boiler. 2 Stage = Single two-stage on/off boiler. EMS = Modulating boiler with an adjustable target temperature using a 0-10V (dc) or 4-20 mA signal. Conditions: Application Mode is set to Boiler or Boiler+Mix.	Mod, 1 Stage, 2 Stage, EMS Default = Mod	Installer
BOILER MODULATION TYPE Select between a 0-10 V (dc) or 4-20 mA signal to control the modulating boiler. Conditions: Available when 1) Application Mode is set to Boiler or Boiler+Mix, and 2) Boiler Type is set to Mod or EMS.	0-10 V or 4-20 mA Default: 0-10 V	Installer
BOILER MIN MODULATION Set the boiler minimum modulation of the boiler burner. Conditions: Available when 1) Application Mode is set to Boiler or Boiler+Mix, and 2) Boiler Type is set to Mod or EMS.	0 to 50% Default = 0%	Installer
BOILER MODULATION DELAY Set the time the boiler operates at the minimum firing rate before allowing the firing rate to change. This allows the boiler ignition system to establish a flame. Conditions: Available when 1) Application Mode is set to Boiler or Boiler+Mix, and 2) Boiler Type is set to Mod or EMS.	Off, 10 to 180 seconds Default = Off	Installer
BOILER MOTOR SPEED Set the time required for the modulating burner actuating motor to fully open the gas valve or ramp the burner fan speed from off to full speed. Set to 30 seconds unless otherwise recommended by the boiler manufacturer. Conditions: Available when 1) Application Mode is set to Boiler or Boiler+Mix, and 2) Boiler Type is set to Mod.	30 to 230 seconds Default = 30	Installer
BOILER DIFFERENTIAL The temperature differential that the control uses to cycle the boiler on and off. The differential is split evenly half above and half below of the boiler target. Conditions: Available when Application Mode is set to Boiler or Boiler+Mix.	Auto, 2 to 42°F (1.0 to 23.5°C) Deafult = Auto	Installer
BOILER MINIMUM The boiler return minimum protects both condensing and non-condensing boilers from cold return water temperatures. The mixing valve is closed or the variable speed injection mixing is reduced when the boiler return temperature falls below this setting. Conditions: Available when Application Mode is set to Mixing or Boiler+Mix. The minimum allowed boiler target temperature. Check the boiler manufacturer's manual for recommended return water temperatures. Conditions: Available when Application Mode is set to Boiler.	Off, 50 to 180°F (10.0 to 82.0°C) Default = Off	Installer
EMS SIGNAL MINIMUM The starting voltage for the EMS modulating boiler signal. This voltage corresponds to the EMS Low Temperature setting. Check the boiler manufacturer's manual for the starting voltage for the EMS signal range. Conditions: Available when 1) Boiler Type is set to EMS, and 2) Boiler Modulation Type is set to 0-10 V.	0.5 to 10 Vdc Default = 0.5 Vdc	Installer
EMS LOW TEMPERATURE The EMS modulating boiler target temperature that corresponds to the EMS Signal Minimum voltage or 4 mA. Check the boiler manufacturer's manual for the minimum EMS target temperature. Conditions: Available when Boiler Type is set to EMS.	50 to 210°F (10 to 99.0°C) Default = 50°F (10.0°C)	Installer

Setup – Boiler Setup Menu (2 of 2)

Description	Range	Access
EMS HIGH TEMPERATURE The EMS modulating boiler target temperature that corresponds to 10 V (dc) or 20 mA. Check the boiler manufacturer's manual for the maximum EMS target temperature. Conditions: Available when Boiler Type is set to EMS.	50 to 210°F (10.0 to 99.0°C) Default = 210°F (99.0°C)	Installer

Setup – Mixing Setup Menu

Description	Range	Access
MIXING TYPE Select the mixing output type. Floating = Floating action mixing output to operate a mixing valve. Injection = Injection mixing output to operate a wet-rotor, impedance protected pump with a current less than 2.4 A. 0-10 V = Analog mixing output provides a 0-10 V (dc) signal. 4-20 mA = Analog mixing output provides a 4-20 mA signal. Conditions: Available when Application Mode is set to Mixing or Boiler+Mix.	Floating, Injection, 0-10 V, or 4-20 mA Default = Floating	Installer
MIX MOTOR SPEED Set the time that the mixing actuating motor requires to operate from fully closed to fully open. Check the mixing actuator motor instruction manual for the motor speed time. Conditions: Available when 1) Application Mode is set to Mixing or Boiler+Mix, and 2) Mixing Type is set to Floating, 0-10 V, or 4-20 mA.	30 to 230 seconds Default = 105 seconds	Installer
MIX MAXIMUM Set the maximum operating temperature of the system supply water temperature. Conditions: Available when Application Mode is set to Mixing or Boiler+Mix.	80 to 180°F, Off (26.5 to 82.5°C) Default = 140°F (60.0°C)	Installer

Toolbox Menu

Description	Range	Access
ERROR CODE The current error code is displayed. Conditions: Always available.	See Error Code Section	User Installer
ACCESS LEVEL Select the access level of the control. This determines which menus and items are available through the user interface. Conditions: Available when the DIP switch is set to Unlocked.	User or Installer Default = Installer	User Installer
TYPE 680 Product information. Product 680 tektra #: 107001 SW: J1243B SVN: 1054 Conditions: Always available.	J1243B Last letter indicates software version	User Installer
SCREEN BRIGHTNESS Select the screen brightness. Conditions: Always available.	0 to 100% Default = 75%	User Installer
TEMPERATURE UNITS Select Fahrenheit or Celsius temperature units. Conditions: Always available.	°F or °C Default = °F	User Installer
FLOW UNITS Select the units for measuring flow rates. Options include US gallons per minute (GPM), cubic meters per hour (m^3/h) and liters per minute (LPM). Conditions: Available when Application Mode is not set to Electric.	GPM, m^3/h, LPM Default = GPM	User Installer
ENERGY UNITS Select the units for measuring energy. Options include therms (thm), gigajoules (GJ), mega british thermal units (MBtu) and kilowatt-hours (kWh). Conditions: Available when Application Mode is not set to Electric.	thm, GJ, MBtu, or kWh Default = thm	User Installer
PRESSURE UNITS Select the units for measuring pressure. Options include pounds per square Inch (psi) or kilopascals (kPa). Conditions: Available when Application Mode is not set to Electric.	psi or kPa Default = psi	User Installer
LOAD DEFAULTS Select “Yes” to reload the factory defaults on the control. Conditions: Always available.	No or Yes	User Installer

Override Menu

Description	Range	Access
MANUAL OVERRIDE Manually override the normal automatic operation of the control to test the equipment or operate the system at the maximum temperature limits. Auto = Normal operation. Hand = Manual override of each relay output. Max Heat = Operate hydronic system at maximum heat. Test = Operate electric system for 10 minutes. Purge = Hydronic system purge operates pumps to help bleed air from the system. Conditions: Always available.	Auto, Hand, Max Heat, Test, Purge, Off	User Installer
SYSTEM PUMP Manually turn on the system pump during the HAND Manual Override. Conditions: Available when 1) Application Mode is set to PWM Zone, Boiler, Mixing or Boiler+Mix, and 2) Manual Override is set to Hand.	Off or On Default = Off	Installer
PRIMARY PUMP Manually turn on the primary pump during the HAND Manual Override. Conditions: Available when 1) Application Mode is set to PWM Zone, Boiler, Mixing or Boiler+Mix, and 2) Manual Override is set to Hand.	Off or On Default = Off	Installer
BOILER PUMP Manually turn on the boiler pump during the HAND Manual Override. Conditions: Available when 1) Application Mode is set to PWM Mode, Boiler or Boiler+Mix, and 2) Manual Override is set to Hand.	Off or On Default = Off	Installer
BOILER MODULATION Manually set the modulating boiler firing rate during the HAND Manual Override. Conditions: Available when 1) Application Mode is set to Boiler or Boiler+Mix, 2) Manual Override is set to Hand, and 3) Boiler Type is set to Mod.	0 to 100% Default = 0%	Installer
BOILER STAGE 1 Manually turn on the boiler stage 1 during the HAND Manual Override. Conditions: Available when Manual Override is set to Hand.	Off or On Default = Off	Installer
BOILER STAGE 2 Manually turn on the boiler stage 2 during the HAND Manual Override. Conditions: Available when 1) Application Mode is set to Boiler or Boiler+Mix, 2) Manual Override is set to Hand, and 3) Boiler Type is set to Stage 2.	Off or On Default = Off	Installer
BOILER EMS Manually set the modulating boiler firing rate during the HAND Manual Override. Conditions: Available when 1) Application Mode is set to Boiler or Boiler+Mix, 2) Manual Override is set to Hand, and 3) Boiler Type is set to EMS.	Off, 50 to 210°F (10 to 99.0°C) Default = Off	Installer
MIX SYSTEM OUTPUT Manually set the mixing valve or injection mixing pump output during the HAND Manual Override. Conditions: Available when 1) Application Mode is set to Mixing or Boiler+Mix, and 2) Manual Override is set to Hand.	0 to 100% Default = 0%	Installer
HAND DURATION Select the amount of time that the HAND Override is in effect before returning to Automatic operation. Conditions: Available when 1) Application Mode is set to PWM Zone, Boiler, Mixing or Boiler+Mix, and 2) Manual Override is set to Hand.	0:10 to 72:00 hours Default = 0:10 hour	Installer
MAX HEAT DURATION Select the amount of time that Max Heat is in effect before returning to Automatic operation. Conditions: Available when 1) Application Mode is set to PWM Zone, Boiler, Mixing or Boiler+Mix, and 2) Manual Override is set to Max Heat.	0:10 to 72:00 hours Default = 24:00 hour	Installer
PURGE DURATION Select the amount of time that the Purge is in effect before returning to Automatic operation. Conditions: Available when 1) Application Mode is set to PWM Zone, Boiler, Mixing or Boiler+Mix, and 2) Manual Override is set to Purge.	0:10 to 72:00 hours Default = 24:00 hour	Installer

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 shows the Warning Symbol ⓘ on the screen, it is indicating a problem on the system.
2. **Identify:** Press the Warning Symbol to view the error code.
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 4)

Description
SETPOINTS MENU SAVE ERROR The control failed to read the Setpoints menu settings from memory and has reloaded the factory default settings. The control stops operation until all settings in the Setpoints menu are checked. To clear the error, set the access level to Installer and check all settings in the Setpoints menu.
SYSTEM SETUP MENU SAVE ERROR The control failed to read the System Setup menu settings from memory and has reloaded the factory default settings. The control stops operation until all settings in the System Setup menu are checked. To clear the error, set the access level to Installer and check all settings in the System Setup menu.
BOILER SETUP MENU SAVE ERROR The control failed to read the Boiler Setup menu settings from memory and has reloaded the factory default settings. The control stops operation until all settings in the Boiler Setup menu are checked. To clear the error, set the access level to Installer and check all settings in the Boiler Setup menu.
MIXING SETUP MENU SAVE ERROR The control failed to read the Mixing Setup menu settings from memory and has reloaded the factory default settings. The control stops operation until all settings in the Mixing Setup menu are checked. To clear the error, set the access level to Installer and check all settings in the Mixing Setup menu.
BAS MENU SAVE ERROR The control failed to read the BAS menu settings from memory and has reloaded the factory default settings. The control stops operation until all settings in the BAS menu are checked. To clear the error, set the access level to Installer and check all settings in the BAS menu.
LOW PRESSURE ALERT The system pressure has dropped below the Low Pressure Warning setting. This could indicate that the snow melting system has a leak. Fix any leaks and ensure that the glycol solution has not been diluted with water. To clear the error, press the Cancel button while viewing the warning message.
MAX MELT DAYS ERROR The control has operated in melting for the time set by Maximum Melt Days setting located in the System Setup menu. This error is usually created when there is a mechanical system failure resulting in the snow melt slab not heating correctly. Clear the error message by touching the Cancel button while viewing the error message. Use the Manual Override menu to manually check that each component of the mechanical system is operating correctly. If necessary, change the Maximum Melt Days setting to a longer time period or to Off.
OUTDOOR SENSOR OPEN CIRCUIT ERROR Due to an open circuit, the control is unable to read the Outdoor Sensor 070 on terminals 14 and 15. This error also occurs when the BAS system has failed to communicate the outdoor temperature parameter. 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 Off (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.
OUTDOOR SENSOR SHORT CIRCUIT ERROR Due to a short circuit, the control is unable to read the Outdoor Sensor 070 on terminals 14 and 15. 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 Off (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.

Error Messages (2 of 4)

Description
SYSTEM SUPPLY SENSOR OPEN CIRCUIT ERROR Due to an open circuit, the control is unable to read the System Supply Sensor 082 on terminals 11 and 12. The control stops operation and does not provide any heat. Check the system supply sensor wire for open circuits according to the sensor installation manual. It may be necessary to replace the system supply sensor. Once the error has been corrected, the error message automatically clears.
SYSTEM SUPPLY SENSOR SHORT CIRCUIT ERROR Due to a short circuit, the control is unable to read the System Supply Sensor 082 on terminals 11 and 12. The control stops operation and does not provide any heat. Check the system supply sensor wire for short circuits according to the sensor installation manual. It may be necessary to replace the system supply sensor. Once the error has been corrected, the error message automatically clears.
SYSTEM RETURN SENSOR OPEN CIRCUIT ERROR Due to an open circuit, the control is unable to read the System Return Sensor 082 on terminals 11 and 13. The control continues normal operation but does not accumulate any energy usage. Check the system return sensor wire for open circuits according to the sensor installation manual. It may be necessary to replace the system return sensor. Once the error has been corrected, the error message automatically clears.
SYSTEM RETURN SENSOR SHORT CIRCUIT ERROR Due to a short circuit, the control is unable to read the System Return Sensor 082 on terminals 11 and 13. The control continues normal operation but does not accumulate any energy usage. Check the system return sensor wire for short circuits according to the sensor installation manual. It may be necessary to replace the system return sensor. Once the error has been corrected, the error message automatically clears.
BOILER SUPPLY SENSOR OPEN CIRCUIT ERROR Due to an open circuit, the control is unable to read the Boiler Supply Sensor 082 on terminals 8 and 9. When application mode is set to boiler or boiler+mix the control stops operation. In all other application modes, the control continues to heat the snow melting system but does not control the boiler operating temperature. Check the boiler supply sensor wire for open circuits according to the sensor installation manual. It may be necessary to replace the boiler supply sensor. Once the error has been corrected, the error message automatically clears.
BOILER SUPPLY SENSOR SHORT CIRCUIT ERROR Due to a short circuit, the control is unable to read the Boiler Supply Sensor 082 on terminals 8 and 9. When application mode is set to boiler or boiler+mix the control stops operation. In all other application modes, the control continues to heat the snow melting system but does not control the boiler operating temperature. Check the boiler supply sensor wire for short circuits according to the sensor installation manual. It may be necessary to replace the boiler supply sensor. Once the error has been corrected, the error message automatically clears.
BOILER RETURN SENSOR OPEN CIRCUIT ERROR Due to an open circuit, the control is unable to read the Boiler Return Sensor 082 on terminals 8 and 10. The control continues to heat the snow melting system but does not provide boiler protection. Check the boiler return sensor wire for open circuits according to the sensor installation manual. It may be necessary to replace the boiler return sensor. Once the error has been corrected, the error message automatically clears.
BOILER RETURN SENSOR SHORT CIRCUIT ERROR Due to a short circuit, the control is unable to read the Boiler Return Sensor 082 on terminals 8 and 10. The control continues to heat the snow melting system but does not provide boiler protection. Check the boiler return sensor wire for short circuits according to the sensor installation manual. It may be necessary to replace the boiler return sensor. Once the error has been corrected, the error message automatically clears.
SLAB 1 SENSOR OPEN CIRCUIT ERROR Due to an open circuit, the control is unable to read the Slab Sensor 072 or 073 on terminals 19 and 20. The control continues normal operation if slab sensor 2 is installed; otherwise, Idling and Storm are disabled and energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Off (CWCO) are operated using the outdoor temperature only. Check the slab sensor 1 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 1 has been intentionally removed, set the slab sensor 1 setting in the System Setup menu to Off.
SLAB 1 SENSOR SHORT CIRCUIT ERROR Due to a short circuit, the control is unable to read the Slab Sensor 072 or 073 on terminals 19 and 20. The control continues normal operation if slab sensor 2 is installed; otherwise, Idling and Storm are disabled and energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Off (CWCO) are operated using the outdoor temperature only. Check the slab sensor 1 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.

Error Messages (3 of 4)

Description
SNOW SENSOR 1 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 090 or 094, or the Snow Sensor 095 on terminals 20 and 22. The control continues normal operation if snow/ice sensor 2 is installed; otherwise, 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.
SNOW SENSOR 1 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 090 or 094, or the Snow Sensor 095 on terminals 20 and 21. The control continues normal operation if snow/ice sensor 2 is installed; otherwise, 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 1 or snow sensor 1 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.
SNOW SENSOR 1 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 090 or 094, or the Snow Sensor 095 on terminals 20 and 21. The control continues normal operation if snow/ice sensor 2 is installed; otherwise, 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 1 or snow sensor 1 for dirt or debris. The ring structure of the sensor may need cleaning with hot soapy water and a nylon brush. Rinse with water. Second, check the snow/ice sensor 1 or snow sensor 1 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.
SNOW SENSOR 1 BROWN WIRE OPEN CIRCUIT ERROR Due to an open circuit, the control is unable to read the brown wire connected to the Snow/Ice Sensor 090 or 094 on terminals 19 and 20. The control continues normal operation if snow/ice sensor 2 is installed; otherwise, Idling and Storm is disabled and energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Off (CWCO) are operated using the outdoor temperature only. Check the snow/ice sensor 1 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 SENSOR 1 BROWN WIRE SHORT CIRCUIT ERROR Due to a short circuit, the control is unable to read the brown wire connected to the Snow/Ice Sensor 090 or 094 on terminals 19 and 20. The control continues normal operation if snow/ice sensor 2 is installed; otherwise, Idling and Storm is disabled and energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Off (CWCO) are operated using the outdoor temperature only. Check the snow/ice sensor 1 brown and black wires 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.
SNOW/ICE SENSOR 1 ERROR The control is unable to properly detect the Snow/Ice Sensor 090 or 094 on terminals 19, 20, 21, 22 and 23. The control continues normal operation if snow/ice sensor 2 is installed; otherwise, 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 1 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 1 ERROR The control is unable to properly detect the Snow Sensor 095 on terminals 20, 21, 22 and 23. The control continues normal operation if snow sensor 2 is installed; otherwise, the control can no longer automatically detect snow but manual start of the snow melting system is still available. Check the snow sensor 1 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.
SLAB SENSOR 2 OPEN CIRCUIT ERROR Due to an open circuit, the control is unable to read the Slab Sensor 072 or 073 on terminals 24 and 25. The control continues normal operation if slab sensor 1 is installed; otherwise, Idling and Storm are disabled and energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Off (CWCO) are operated using the outdoor temperature only. Check the slab sensor 2 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 2 has been intentionally removed, set the slab sensor 2 setting in the System Setup menu to Off.

Error Messages (4 of 4)

Description
SLAB SENSOR 2 SHORT CIRCUIT ERROR Due to a short circuit, the control is unable to read the Slab Sensor 072 or 073 on terminals 24 and 25. The control continues normal operation if slab sensor 1 is installed; otherwise, Idling and Storm are disabled and energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Off (CWCO) are operated using the outdoor temperature only. Check the slab sensor 2 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.
SNOW SENSOR 2 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 090 or 094 or the Snow Sensor 095 on terminals 25 and 27. The control continues normal operation if snow/ice sensor 1 is installed; otherwise, 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 2 or snow sensor 2 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.
SNOW SENSOR 2 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 090 or 094 or the Snow Sensor 095 on terminals 25 and 26. The control continues normal operation if snow/ice sensor 1 is installed; otherwise, 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 2 or snow sensor 2 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.
SNOW SENSOR 2 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 090 or 094 or the Snow Sensor 095 on terminals 25 and 26. The control continues normal operation if snow/ice sensor 1 is installed; otherwise, 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 2 or snow sensor 2 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 2 or snow sensor 2 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.
SNOW SENSOR 2 BROWN WIRE OPEN CIRCUIT ERROR Due to an open circuit, the control is unable to read the brown wire connected to the Snow/Ice Sensor 090 or 094 on terminals 24 and 25. The control continues normal operation if snow/ice sensor 1 is installed; otherwise, Idling and Storm is disabled and energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Off (CWCO) are operated using the outdoor temperature only. Check the snow/ice sensor 2 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 SENSOR 2 BROWN WIRE SHORT CIRCUIT ERROR Due to a short circuit, the control is unable to read the brown wire connected to the Snow/Ice Sensor 090 or 094 on terminals 24 and 25. The control continues normal operation if snow/ice sensor 1 is installed; otherwise, Idling and Storm is disabled and energy saving features such as Warm Weather Shut Down (WWSD) and Cold Weather Cut Off (CWCO) are operated using the outdoor temperature only. Check the snow/ice sensor 2 brown and black wires 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.
SNOW/ICE SENSOR 2 ERROR The control is unable to properly detect the Snow/Ice Sensor 090 or 094 on terminals 24, 25, 26, 27 and 28. The control continues normal operation if snow/ice sensor 1 is installed; otherwise, 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 2 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 2 ERROR The control is unable to properly detect the Snow Sensor 095 on terminals 25, 26, 27 and 28. The control continues normal operation if snow sensor 1 is installed; otherwise, the control can no longer automatically detect snow, but manual start of the snow melting system is still available. Check the snow sensor 2 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.

Troubleshooting

Problem	Check / Verify	Possible Cause
LCD Display is Off	Control has power	Use electrical meter to measure 24V (ac)voltage on input power R and C terminals.
System pump is always on	Display shows idle	Idle operation requires that the system pump operate continuously while below the melting temperature setting.
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 temperature	The slab is heated to the slab target temperature.
	Heat On not shown	Check wiring of the system pump. The system pump operates continuously during melt, idle or storm operation. The heat source must be wired to operate together with the heat relay.
System running with no snow	Idle	Idling heats the slab when the temperature falls below the Idle temperature.
	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.
	Timed Melt	System manually started.
	Scheduled Melt	System started on a programmable schedule.
Snow on slab but system did not start	Off	System has a programmable schedule and is in event 2 or 4 (unoccupied).
	Off	System has been manually stopped and the automatic snow/ice sensor never dried, thereby preventing the system from automatically starting.

Testing the Sensors

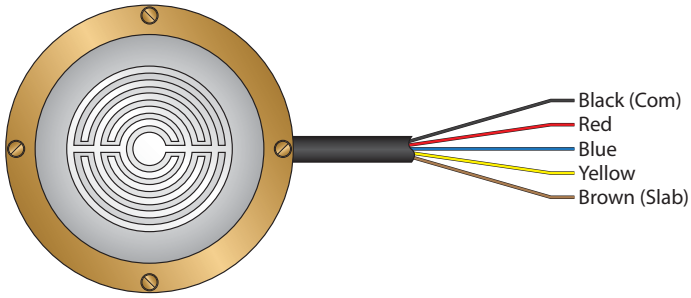
30090 Snow/Ice Sensor

Measure resistance between the Snow/Ice Sensor wires.

Note: Ensure wires are disconnected from the control before testing.

Measure resistance between

- the yellow and black sensor wires (sensor temperature), and
- the brown and black sensor wires (slab temperature)



Use the table below to measure against the expected resistance values.

Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω
-50	-46	490,813	30	-1	34,558
-45	-43	405,710	35	2	29,996
-40	-40	336,606	40	4	26,099
-35	-37	280,279	45	7	22,763
-30	-34	234,196	50	10	19,900
-25	-32	196,358	55	13	17,436
-20	-29	165,180	60	16	15,311
-15	-26	139,402	65	18	13,474
-10	-23	118,018	70	21	11,883
-5	-21	100,221	75	24	10,501
0	-18	85,362	80	27	9,299
5	-15	72,918	85	29	8,250
10	-12	62,465	90	32	7,334
15	-9	53,658	95	35	6,532
20	-7	46,218	100	38	5,828
25	-4	39,913	105	41	5,210



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