

# Installation, Operation and Maintenance

## BACnet Snow/Ice Sensor Interface 681



### ⚠ WARNING



**THINK  
SAFETY  
FIRST**

Please read carefully before proceeding with installation. Your failure to follow any attached instructions or operating parameters may lead to the product's failure.  
Keep this Manual for future reference.

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## Getting Started

Congratulations on the purchase of your new BACnet Snow/Ice Sensor Interface 681!  
This manual covers the complete installation, programming and sequence of operation for this BACnet Sensor Interface. You will also find instruction on testing, commissioning, and troubleshooting the interface.

## Important Safety Information

It is your responsibility to ensure that this control is safely installed according to all applicable codes and standards.  
Watts is not responsible for damages resulting from improper installation and/or maintenance.



This is a safety-alert symbol. The safety alert symbol is shown alone or used with a signal word (DANGER, WARNING, or CAUTION), a pictorial and/or a safety message to identify hazards. When you see this symbol alone or with a signal word on your equipment or in this manual, be alert to the potential for death or serious personal injury.



This pictorial alerts you to electricity, electrocution, and shock hazards.

### ⚠ WARNING

This symbol identifies hazards which, if not avoided, could result in death or serious injury.

### ⚠ CAUTION

This symbol identifies hazards which, if not avoided, could result in minor or moderate injury.

### NOTICE

This symbol identifies practices, actions, or failure to act which could result in property damage or damage to the equipment.

### ⚠ WARNING



**THINK  
SAFETY  
FIRST**

Read manual and all product labels BEFORE using the equipment. Do not use unless you know the safe and proper operation of this equipment. Keep this manual available for easy access by all users. Replacement manuals are available at [tekmarControls.com](http://tekmarControls.com)

### ⚠ WARNING

- It is the installer's responsibility to ensure that this control is safely installed according to all applicable codes and standards.
- Improper installation and operation of this control could result in damage to the equipment and possibly even personal injury or death.
- This control is not intended for use as a primary limit control. Other controls that are intended and certified as safety limits must be placed into the control circuit.

### NOTICE

Do not attempt to service the control. There are no user serviceable parts inside the control. Attempting to service the control voids the warranty.

## Radio Frequency Interference

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case users will be required to correct the interference at their own expense.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

# Installation

## Tools Required

- tekmar® or jeweler flathead screwdriver
- Needle-nose pliers
- Screwdriver for mounting hardware
- Wire stripper

## Materials Required

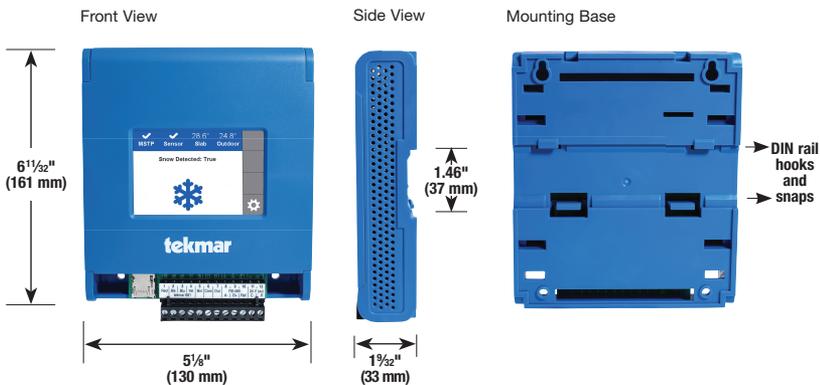
- 18 AWG, stranded solid cable (low-voltage connections)
- Four #6 or #8 screws

## Packaging Contents

The following are included in the product packaging:

- BACnet Snow/Ice Sensor Interface 681
- tekmar flathead screwdriver
- 1 Installation and Operation Manual IOM-T-681
- 1 BAS Integration Manual IS-T-681

## Physical Dimensions



## Installation Location

Choose the placement of the 681 early in the construction process to enable proper wiring during rough-in.

### NOTICE

- Keep the 681 dry. Avoid potential leakage onto the 681.
- Maintain relative humidity less than 90% in a non-condensing environment.
- Avoid exposure to extreme temperatures beyond -4 to 122°F (20-50°C).
- Install away from equipment, appliances, or other sources of electrical interference.
- Install to allow easy access for wiring, viewing, and adjusting the display screen.
- Install approximately 5 feet (1.5 m) off the finished floor.

# Installing the Enclosure

## Installation Using Mount Holes and Screws

### Mounting Screw



Depress the two snaps on the bottom of the enclosure to release the front cover.



Secure enclosure using four #6 or #8 wood screws.



Install the front cover by hooking the top catches and pivoting the cover into place.

### DIN Rail Mounting



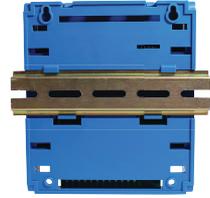
Snap the enclosure onto 35mm DIN rail using the hooks and snaps on the back of the enclosure.



Location of DIN rail hooks and snaps on the back of the enclosure.



Latch top hooks of enclosure onto DIN rail. Then rotate enclosure down engaging bottom snaps.



Enclosure mounted on DIN rail (back view).

## Rough-In Wiring

### ⚠ WARNING



To prevent the risk of personal injury and/or death, make sure power is not applied to the interface until it is fully installed and ready for final testing. All work must be done with power to the circuit being worked on turned off.

Please be aware local codes may require this interface to be installed or connected by an electrician.

## Low-Voltage Wiring

**Pull two conductor 18 AWG cable, up to 500 feet (150 m) long, for the following equipment:**

- Outdoor temperature sensor (Optional)

**Pull four solid conductor 18 AWG cable, up to 500 feet (150 m) long, for the following equipment:**

- Snow Sensor 095

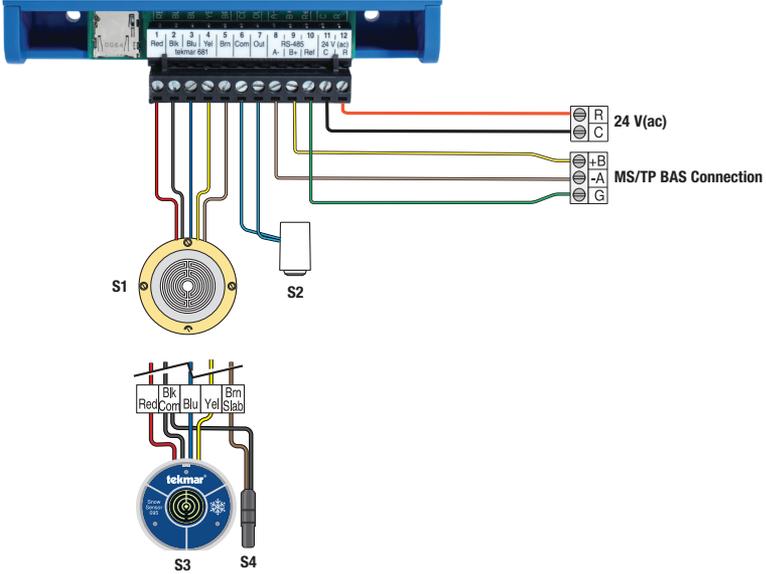
**Pull five solid conductor 18 AWG cable, up to 435 feet (132 m) long, for the following equipment:**

- Snow / Ice Sensor 090

# 681 Electrical Schematic

## Legend

- S1 = tekmar Snow/Ice Sensor 090
- S2 = tekmar Outdoor Sensor 070 (Optional)
- S3 = tekmar Snow Sensor 095
- S4 = tekmar Slab Sensor 072
- A, +B, G: BACnet MS/TP Communication
- SD Card: FAT 32, 32GB
- 24 V (ac) ±10%, 50 and 60 Hz, 17 VA Class 2



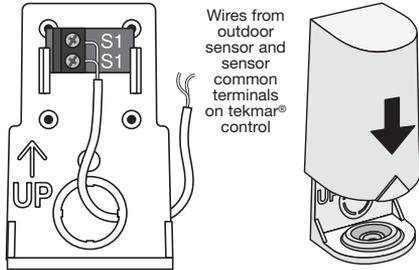
## Sensor Wiring for Outdoor Sensor

- Replace the front cover of the sensor enclosure.

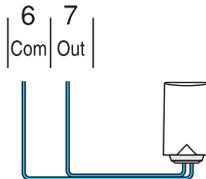
At the Interface:

- Connect the outdoor sensor to terminals 6 and 7.

The 681 requires the outdoor air temperature sensor if the BAS is not providing an outdoor air sensor. Connect the Outdoor Sensor 070 (sold separately) to terminals 6 and 7. If the BAS has an outdoor air sensor, this data can be shared with the 681 through BACnet.



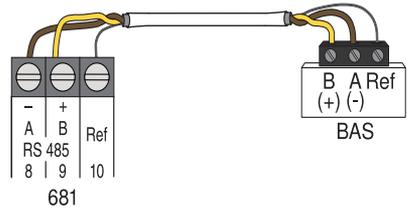
Wires from outdoor sensor and sensor common terminals on tekmar® control



## Communication Wiring

The 681 can be connected to a Building Automation System to automatically operate a snow melting System. The BAS is the system master and the 681 the system slave. BACnet MS/TP communications uses a RS-485 connection. Use 18 AWG shielded twisted pair cable. The maximum cable length is dependent on the baud rate and whether terminating resistors are installed. Refer to the BAS Integration Manual IS-T-681 for details on the maximum recommended cable length.

- Connect the A (-) terminal on the BAS network to the RS-485 A (-) terminal 8.
- Connect the B (+) terminal on the BAS network to the RS-485 B (+) terminal 9.
- Connect the ground (G) on the BAS network to the RS-485 Ref. terminal 10.



## Access Levels

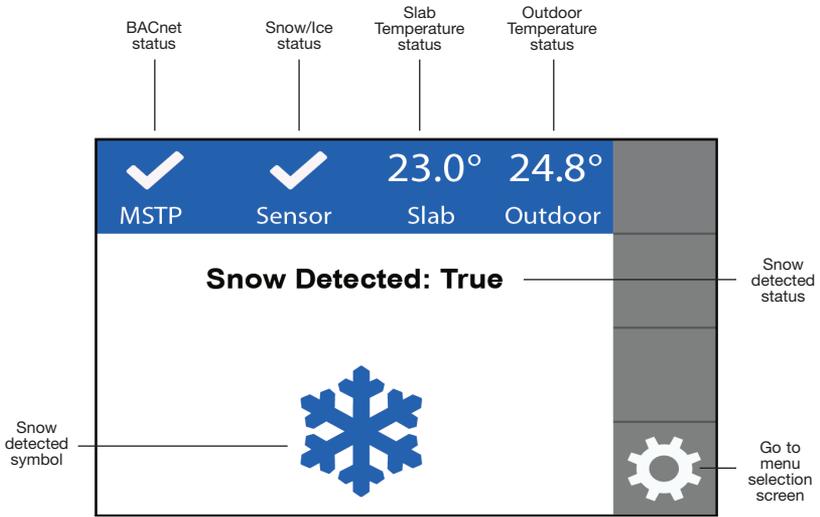
The 681 is shipped pre-programmed with common settings. The 681 has an "Installer" access level that allows full access to all settings and a "User" access level that restricts the number of settings available. The 681 defaults is the "User" access.

To change to the "Installer" access level:

- Step 1:** Press the gear button.
- Step 2:** Press the Toolbox menu.
- Step 3:** Press Access Level menu.
- Step 4:** Select Installer and press save and back button.

# User Interface

## Home Screen



## 681 Operation

✓	✓	23.0°	24.8°	
MSTP	Sensor	Slab	Outdoor	
<b>Snow Detected: True</b>				
				
				

### SNOW DETECTED: TRUE

- The Snow/Ice Sensor 090 or Snow Sensor 095 has automatically detected snow or ice.
- The 681 communicates to the BAS to signal snow or ice has been detected.

✓	✓	31.0°	32.0°	
MSTP	Sensor	Slab	Outdoor	
<b>Snow Detected: False</b>				
				

### SNOW DETECTED: FALSE

- The Snow/Ice Sensor 090 or Snow Sensor 095 has not detected snow or ice.
- The 681 communicates to the BAS to signal snow or ice is not detected.

✓	✓	10.4°	17.6°	
MSTP	Sensor	Slab	Outdoor	
<b>Snow Detected: False</b> Cold Weather Cut Off				
				
				

### COLD WEATHER CUT OFF

- CWCO is shown when the outdoor temperature is below the CWCO temperature setpoint.
- The 681 communicates to the BAS to signal snow or ice is not detected due to cold temperature.

✓	✓	41.0°	37.4°	
MSTP	Sensor	Slab	Outdoor	
<b>Snow Detected: False</b> Warm Weather Shut Down				
				
				

### WARM WEATHER SHUT DOWN

- WWSD is shown when the outdoor and slab temperature are above the WWSD temperature setpoint. During WWSD, the snow will melt naturally due to warm temperatures.
- The 681 communicates to the BAS to signal snow or ice is not detected due to warm temperature.

✓ MSTP	✓ Sensor	10.4° Slab	17.6° Outdoor	
<b>Snow Detected: False</b> Cold Weather Cut Off Melt Pending 				

## MELT PENDING

- Melt Pending is shown when the CWCO is present and the Snow/Ice Sensor 090 or Snow Sensor 095 detects moisture.

✓ MSTP	✓ Sensor	0.6° Slab	1.5° Outdoor	
<b>Snow Detected: False</b> 				

## WATER DETECTED

- The Snow/Ice Sensor 090 or Snow Sensor 095 has detected moisture but this condition does not warrant snow melting to turn on.

✓ MSTP	✓ Sensor	0.6° Slab	1.5° Outdoor	
<b>Snow Detected: False</b> 				

## SENSOR OVERHEATED

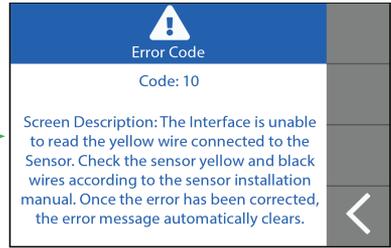
- The Snow/Ice Sensor 090 temperature is above 120°F (49°C) while the snow sensor heater is able to operate.

## Error Screen



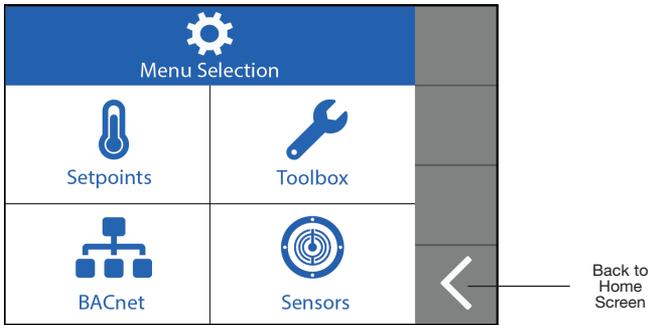
### WARNING SYMBOL

The 681 has an 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.

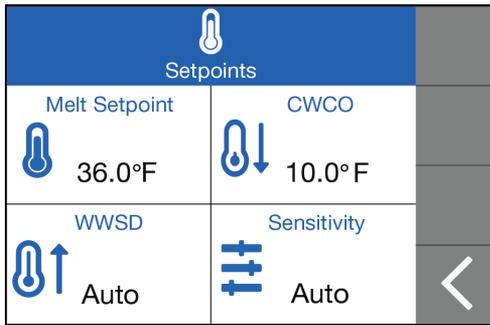


# Menu Selection

The 681 has four settings menu: Setpoints, Toolbox, BACnet, and Sensors

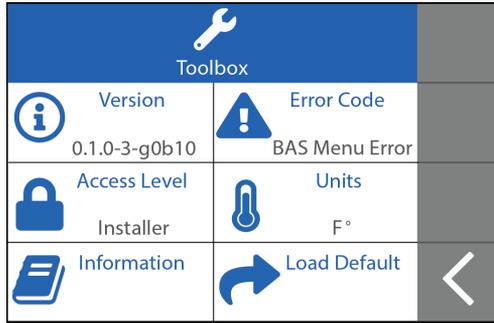


# Setpoints Menu



Description	Range	Default	Access
<p><b>MELT SETPOINT</b></p> <p>Select the desired temperature of the snow melt surface when melting.</p>	32 to 95°F (0.0 to 35.0°C)	36°F (2°C)	User Installer
<p><b>COLD WEATHER CUT OFF (CWCO)</b></p> <p>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.</p>	-30 to 50°F, Off (-34.0 to 10.0°C)	10°F (-12°C)	Installer
<p><b>WARM WEATHER SHUT DOWN (WWSD)</b></p> <p>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.</p>	Auto, 32 to 95°F (0.0 to 35.0°C)	Auto	Installer
<p><b>SENSITIVITY</b></p> <p>Select how sensitive Snow/Ice Sensor is to water detection.</p>	Auto, Min, -2, -1, Mid, +1, +2, Max	Auto	Installer

## Toolbox Menu



Description	Range	Default	Access
<b>VERSION</b> Product: 681 Software J1297 Version: XXX.	-	-	User Installer
<b>ERROR CODE</b> The current error code is displayed.	See Error Code Section	-	User Installer
<b>ACCESS LEVEL</b> Select the access level. This determines which menus and items are available through the user interface.	User, Installer	User	User Installer
<b>UNITS</b> Select if temperature is displayed in °F or °C.	°F, °C	°F	User Installer
<b>INFORMATION</b> Product information.	°F, °C	SD Card, Uptime, BAS Outdoor Time, Slab Target, Slab Temperature, Snow Detect Pending, Snow Detect in Reset	Installer
<b>LOAD FACTORY DEFAULT</b> Select "Yes" to reload the factory defaults.	No, Yes	-	Installer

## BACnet Menu

Menu Selection	
 <b>Device ID</b> 1	 <b>Address</b> 1
 <b>Baud Rate</b> 38400	
	

Description	Range	Default	Access
<b>DEVICE ID</b> Select the BACnet device number identification.	0 to 4194302	1	Installer
<b>ADDRESS</b> Set the BACnet MS/TP MAC address.	0 to 127	60	Installer
<b>BAUD RATE</b> Select the BACnet-MSTP data communication rate. Higher data rates may restrict cable length and may require terminating resistors at the end of the RS-485 data bus.	2400, 9600, 19k2, 38k4, 57k6, 76k8, 115k	76800	Installer

## Sensors Menu

Sensors	
 <b>Snow/Ice</b> In-Slab	 <b>Slab</b> On
 <b>Outdoor</b> Local	
	

Description	Range	Default	Access
<b>SNOW/ICE</b> Select if a Snow/Ice Sensor 090 "In-slab" or a Snow Sensor 095 "Aerial" is installed.	In-Slab Aerial	In-Slab	Installer
<b>OUTDOOR</b> Current outdoor air temperature. Select if the outdoor air temperature is measured by the outdoor local sensor or provided by the BAS.	Local BAS	BAS	Installer
<b>SLAB</b> Current slab sensor temperature. The slab sensor is only available when the Aerial Snow Sensor 095 is installed.	On, Off	On	Installer

# Sequence of Operation

## Snow Melting Overview

A snow melting system can offer a safe, convenient, and cost effective way of removing snow and ice from the snow melting slab and similar surfaces. Safety is increased by activating the snow melting system as soon as the snow falls rather than waiting for mechanical snow removal after snow has accumulated. This eliminates slip hazards and reduces the risk of injury by mechanized snow melting equipment, thereby reducing potential liability costs. The elimination of snow plow equipment and corrosive salts also reduces damage to the slab surface and to the environment. When controlled correctly, snow melting systems can be cost competitive compared to mechanical snow removal.

The Interface 681 can operate in one of four different ways:

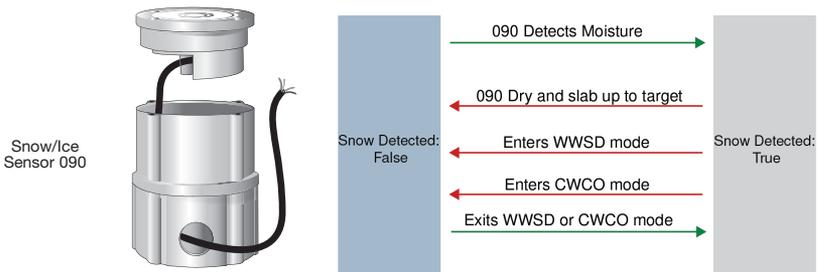
- Snow Detected: True** The 681 communicates to the BAS to signal snow or ice is detected.
- Snow Detected: False** The 681 communicates to the BAS to signal snow or ice is not detected.
- CWCO** The 681 communicates to the BAS to signal snow or ice is not detected due to cold temperature.
- WWSD** The 681 communicates to the BAS to signal snow or ice is not detected due to warm temperature.

## Snow Detected: True/False Operation with the Snow/Ice Sensor 090

Automatic snow and ice detection requires the installation of a Snow/Ice Sensor 090. The sensor is installed in-slab, level with the melting surface. The 681 continually monitors the sensor for the presence of moisture and slab temperature conditions in which snow or ice may be present. When moisture is detected, the 681 shows "Snow Detected: True" in the Home Screen. When the sensor is dry and the slab is up to target temperature the 681 will transition to "Snow Detected: False".

When snow has been detected and the 681 enters a WWSD or CWCO condition, the 681 will switch to "Snow Detected: False".

The 681 includes a Sensitivity setting in the Setpoints menu that allows the installer to adjust the amount of moisture required to set Snow Detected as True or False. In areas with dust and/or air pollution, the sensitivity may need to be increased. The default sensitivity setting is Auto. This setting allows the 681 to automatically determine the best suitable sensitivity setting for the installation.



## Snow Detected: True/False Operation with the Snow Sensor 095

With the Snow Sensor 095 automatic snow/ice detection occurs. The sensor is aerial mounted on a pole near the melting surface.

The 681 continually monitors the sensor 095 for the presence of moisture and slab temperature conditions in which snow or ice may be present. When snow or ice is detected, the 681 will show "Snow Detected: True" on the Home screen. When the sensor is dry, the 681 will show "Snow Detected: False".

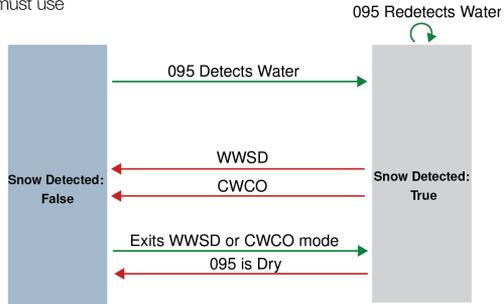
The 681 will report Snow Detected: False as soon as the 095 sensor is dry. The BAS system must use

a timer to ensure all snow and ice has melted from the slab.

The 681 includes a Sensitivity setting in the Setpoints menu that allows the installer to adjust the amount of moisture required to set Snow Detected as True or False. In areas with dust and/or air pollution, the sensitivity may need to be increased. The default sensitivity setting is Auto. This setting allows the control to automatically determine the best suit-able sensitivity setting for the installation.



Snow Sensor 095



## Snow Detected: True/False Operation with the Snow Sensor 095 and Slab Sensor 072

A Slab Sensor 072 is highly recommended with the Sensor 095 in order to measure the slab temperature. This allows the BAS to regulate the snow melting system at the highest possible efficiency.

When a Slab Sensor 072 is installed, both conditions of the slab must reach the slab target

and the Snow Sensor 095 being dry must be met before the state changes to Snow Detected: False.

When a Slab Sensor 072 is not installed, the interface assumes that the slab reaches the slab target, and the state changes to Snow Detected: False as soon as the Snow Sensor 095 is dry.



Snow Sensor 095



Slab Sensor 072

## Slab Sensor

The 681 supports the BAS to control the slab temperature which is critical to reduce the cost of snow melting. This requires that either a Snow/Ice Sensor 090 or a Slab Sensor 072 is installed. The Snow/Ice Sensor contains a built-in slab temperature sensor while the Aerial Snow Sensor

095 requires the Slab Sensor 072. The 681 continually monitors the sensors for the slab temperature conditions. This value is communicated to the BAS through BACnet MS/TP to cycle the heat source and the mixing device to control the slab temperature setpoint.

## Outdoor Sensor

An outdoor air temperature is mandatory for proper operation. The 681 either has the option to measure the outdoor temperature directly with

the Outdoor Sensor 070 or receive the information from the BAS. These options are selected by the Outdoor settings in the Sensor Menu.

## Snow Melting System with Multiple Zones

Dividing a snow melting system into a number of snow melting zones reduces the size requirements of the hydronic heating plant or the amperage of the electrical service panel. This results in lower initial capital cost of the snow melting system. In applications where a BAS operates a snow melting system with multiple

zones, each zone requires a 681 with a Snow/Ice Sensor to detect snow or ice. Each 681 continuously monitors one Snow/Ice Sensor 090 or one Snow Sensor 095. Zones that require additional sensors due to the size of the melting area, multiple 681 can be installed to cover the entire area.

## Warm Weather Shut Down

During warm weather, the slab is warm enough to naturally melt snow or ice. The 681 has a Warm Weather Shut Down (WWSD) setting in the Setpoints menu that prevents the Interface from entering "Snow Detected: True" in order to conserve energy. The 681 shows, "Snow Detected: False – Warm Weather Shut Down" on the display when WWSD is in effect, and communicates to the BAS to turn off the snow melting system.

### Automatic (Auto)

The 681 enters WWSD when both the slab temperature and the outdoor temperature exceed the Melting Setpoint temperature setting by more than 2°F (1°C).

### WWSD setpoint

The 681 enters WWSD when the outdoor air temperature exceeds the WWSD setting by 1°F (0.5°C) and when the slab temperature exceeds 34°F (1°C).

The 681 exits WWSD when the outdoor air temperature falls 1°F (0.5°C) below the WWSD setting or if the slab temperature falls below 34°F (1°C). This allows the Melting Setpoint setting to be set higher than the WWSD. This is useful when high slab temperatures are required to melt the snow or ice.

## Cold Weather Cut Off

Maintaining the snow melting system running during extremely cold temperatures is not only expensive but may be impossible if the heat loss of the slab exceeds the input capacity of the heating plant or electric cable. The 681 has a Cold Weather Cut Off (CWCO) setting in the Setpoints menu that prevents the Interface from entering "Snow Detected: True" in order to conserve energy.

The 681 shows "Snow Detected: False" - Cold Weather Cut Off on the display when CWCO is in

effect, and communicates with the BAS to turn or maintain the snow melting system off.

The 681 enters in CWCO when the outdoor air temperature drops below the CWCO temperature setpoint. This is a safety and energy saving measure.

The 681 exits the CWCO when the outdoor air temperature rises above the CWCO temperature setpoint at which time melting may be resumed.

## Slab Target

The slab target is calculated based on the outdoor temperature and the melting setting. The slab temperature must reach the slab target and the sensor must be dry for the 681 displays "Snow Detected False".

# 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 681 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 2)

Description
<p><b>SETPOINTS MENU SAVE ERROR</b></p> <p>The interface failed to read the Setpoints menu settings from memory and has reloaded the factory default settings. The interface stops operation until all settings in the Setpoints menu are checked. To clear the error, check all settings in the Setpoints menu.</p>
<p><b>SENSORS MENU SAVE ERROR</b></p> <p>The interface failed to read the Sensors menu settings from memory and has reloaded the factory default settings. The interface stops operation until all settings in the Sensors menu are checked. To clear the error, check all settings in the Sensors menu.</p>
<p><b>BAS MENU SAVE ERROR</b></p> <p>The interface failed to read the BAS menu settings from memory and has reloaded the factory default settings. The Interface stops operation until all settings in the BAS menu are checked. To clear the error, check all settings in the BAS menu.</p>
<p><b>OUTDOOR SENSOR ERROR</b></p> <p>The Interface is unable to read the Outdoor Sensor 070. This error also occurs when the BAS system has failed to communicate the outdoor temperature for more than 30 minutes. The Interface assumes an outdoor temperature of 32°F (0°C). Check the outdoor sensor wire 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.</p>
<p><b>SLAB SENSOR ERROR</b></p> <p>The Interface is unable to read the Slab Sensor 072. Check the slab sensor wire according to the sensor installation manual. Once the error has been corrected, the error message automatically clears. If the slab sensor 072 has been intentionally removed, set the slab sensor setting in the Sensors Menu to Off.</p>
<p><b>SNOW SENSOR YELLOW WIRE ERROR</b></p> <p>The Interface is unable to read the yellow wire connected to the Sensor. Check the sensor yellow and black wires according to the sensor installation manual. Once the error has been corrected, the error message automatically clears.</p>
<p><b>SNOW SENSOR BLUE WIRE ERROR</b></p> <p>The Interface is unable to read the blue wire connected to the sensor. Check the sensor blue and black wires according to the sensor installation manual. Check the sensors for dirt or debris. The ring structure of the sensor may need cleaning with hot soapy water and a nylon brush. Once the error has been corrected, the error message automatically clears.</p>

## Error Messages (2 of 2) *continued*

Description
<p><b>SNOW SENSOR BROWN WIRE ERROR</b></p> <p>The Interface is unable to read the brown wire connected to sensor. Check the sensor brown and black wires according to the sensor installation manual. Once the error has been corrected, the error message automatically clears.</p>
<p><b>SNOW/ICE SENSOR ERROR</b></p> <p>The Interface is unable to properly detect the sensor. Check the sensor brown, yellow, red and black wires according to the sensor installation manual. It is important to check any cable splices for loose wiring connections. Once the error has been corrected, the error message automatically clears.</p>
<p><b>SNOW SENSOR ERROR</b></p> <p>The Interface is unable to properly detect the snow sensor. Check the snow sensor yellow, red and black wires according to the sensor installation manual. Once the error has been corrected, the error message automatically clears.</p>

## Technical Data

BACNET SNOW/ICE SENSOR INTERFACE 681	
Literature	IOM-T-681, IS-T-681, F-T-681, ES-T-681
Control	Microprocessor control. This is not a safety (limit) control.
Packaged weight	4.3 lb. (1960 g)
Dimensions	6.35" H x 5.13" W x 1.30" D (161 x 130 x 33 mm)
Display	3.5", color touchscreen
Enclosure	Blue PVC plastic, NEMA type 1
Approvals	BTL Certified & CAN ICES-003 (A) / NMB-003 (A) & FCC Part 15B (A)
Ambient conditions	-4 to 122°F (-20 to 50°C), < 90% RH non-condensing, outdoor use permitted when used in NEMA 3 enclosure
Power supply	24 V (ac) ±10%, 50 and 60 Hz, 17 VA Class 2
Communications	BACnet MS/TP
Sensors	NTC thermistor, 10 kΩ @ 77°F (25°C ±0.2°C) β=3892
– Required	Snow/Ice Sensor 090 and Snow / Ice Sensor Socket 091 or Snow Sensor 095 & Slab Sensor 072 (depends on the bundle configuration)
– Optional	tekmar type: 070

## Limited Warranty and Product Return Procedure

**Limited Warranty** *The liability of tekmar under this warranty is limited. The Purchaser, by taking receipt of any tekmar product ("Product"), acknowledges the terms of the Limited Warranty in effect at the time of such Product sale and acknowledges that it has read and understands same.*

The tekmar Limited Warranty to the Purchaser on the Products sold hereunder is a manufacturer's pass-through warranty which the Purchaser is authorized to pass through to its customers. Under the Limited Warranty, each tekmar Product is warranted against defects in workmanship and materials if the Product is installed and used in compliance with tekmar's instructions, ordinary wear and tear excepted. The pass-through warranty period is for a period of twenty-four (24) months from the production date if the Product is not installed during that period, or twelve (12) months from the documented date of installation if installed within twenty-four (24) months from the production date.

The liability of tekmar under the Limited Warranty shall be limited to, at tekmar's sole discretion: the cost of parts and labor provided by tekmar to repair defects in materials and / or workmanship of the defective product; or to the exchange of the defective product for a warranty replacement product; or to the granting of credit limited to the original cost of the defective product, and such repair, exchange or credit shall be the sole remedy available from tekmar, and, without limiting the foregoing in any way, tekmar is not responsible, in contract, tort or strict product liability, for any other losses, costs, expenses, inconveniences, or damages, whether direct, indirect, special, secondary, incidental or consequential, arising from ownership or use of the product, or from defects in workmanship or materials, including any liability for fundamental breach of contract.

The pass-through Limited Warranty applies only to those defective Products returned to tekmar during the warranty period. This Limited Warranty does not cover the cost of the parts or labor to remove or transport the defective Product, or to reinstall the repaired or replacement Product, all such costs and expenses being subject to Purchaser's agreement and warranty with its customers.

Any representations or warranties about the Products made by Purchaser to its customers which are different from or in excess of the tekmar Limited Warranty are the Purchaser's sole responsibility and obligation. Purchaser shall indemnify and hold tekmar harmless from and against any and all claims, liabilities and damages of any kind or nature which arise out of or are related to any such representations or warranties by Purchaser to its customers.

The pass-through Limited Warranty does not apply if the returned Product has been damaged by negligence by persons other than tekmar, accident, fire, Act of God, abuse or misuse; or has been damaged by modifications, alterations or attachments made subsequent to purchase which have not been authorized by tekmar; or if the Product was not installed in compliance with tekmar's instructions and / or the local codes and ordinances; or if due to defective installation of the Product; or if the Product was not used in compliance with tekmar's instructions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHICH THE GOVERNING LAW ALLOWS PARTIES TO CONTRACTUALLY EXCLUDE, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, DURABILITY OR DESCRIPTION OF THE PRODUCT, ITS NON-INFRINGEMENT OF ANY RELEVANT PATENTS OR TRADEMARKS, AND ITS COMPLIANCE WITH OR NON-VIOLATION OF ANY APPLICABLE ENVIRONMENTAL, HEALTH OR SAFETY LEGISLATION; THE TERM OF ANY OTHER WARRANTY NOT HEREBY CONTRACTUALLY EXCLUDED IS LIMITED SUCH THAT IT SHALL NOT EXTEND BEYOND TWENTY-FOUR (24) MONTHS FROM THE PRODUCTION DATE, TO THE EXTENT THAT SUCH LIMITATION IS ALLOWED BY THE GOVERNING LAW.

**Product Warranty Return Procedure** All Products that are believed to have defects in workmanship or materials must be returned, together with a written description of the defect, to the tekmar Representative assigned to the territory in which such Product is located. If tekmar receives an inquiry from someone other than a tekmar Representative, including an inquiry from Purchaser (if not a tekmar Representative) or Purchaser's customers, regarding a potential warranty claim, tekmar's sole obligation shall be to provide the address and other contact information regarding the appropriate Representative.

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