



Frio Snow Sensor Installation Guide

AER-1 Aerial Sensor

GUT-1 Gutter Sensor

SM-JB-1 Junction Box and Power Supply



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Overview

Frio snow sensors are installed outdoors and detect temperature and the presence of moisture. This provides an indication to the Frio controller that there is snow or ice present. The sensors are compatible with the Frio S1-A controller and communicate to the controller using Modbus. The sensors are connected to a junction box (SM-JB1) with a 30 feet (10 m.), 24V 4 wires cable. The SM-JB-1 junction box includes a 24VAC power supply to provide power to the sensors. From the junction box, the Modbus communication cables are connected to the Frio S1-A controller.

The AER-1 is an aerial Snow and Ice sensor. The plastic "igloo" shape design helps to assure reliable Snow/Ice detection as it prevents the snow to accumulate around the sensing area. The 4 holes around the sensor hold the Anti Nesting spikes, keeping birds away from the sensor. The sensor cap helps to keep the sensing area clean from dust and dirt during summer time and when the snow melting system is not used. The AER-1 can be mounted on a vertical piece of conduit or by using the optional wall mount bracket (AER-WM).

The GUT-1 is a snow and Ice sensor for roof and gutter installations. The non-rusting metallic cylinder shape design helps to assure reliable Snow/Ice detection as it prevents the snow to accumulate around the sensing area.

The Frio S1-A system can work with any combination of up to 6 total GUT-1 or AER-1 Snow Sensors. Additional Frio S1-A controllers can be configured as satellite contactors to mirror the control pattern of the primary controller. This allows multi circuit systems to run on a single snow sensor. For example, a 6-circuit system could be set up with a single GUT-1 sensor connected to the primary S1-A controller. Five more S1-A controllers would then be connected to the primary S1-A controller as satellite contactors. In this configuration, all six controllers would turn on when the GUT-1 senses snow or ice.

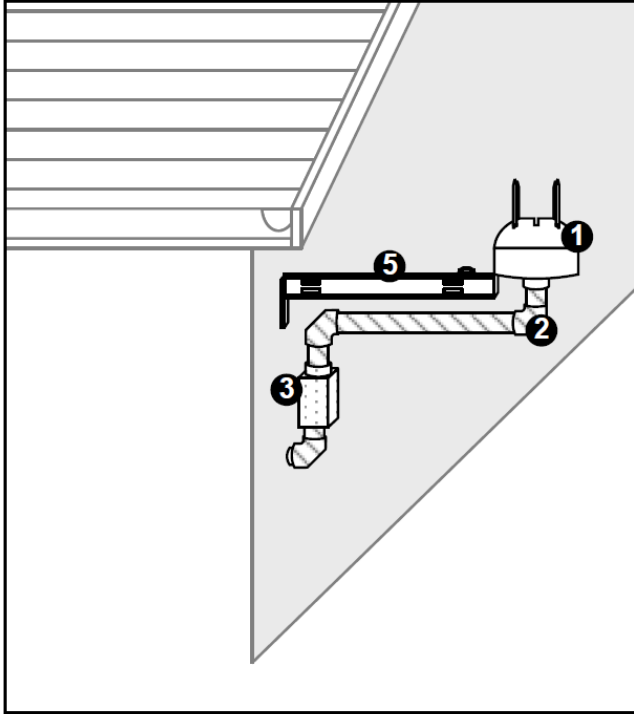
Prior to installing the S1-A controller please read the Frio S1 Installation Instructions which can be found at www.frio.co/resources.

For project specific questions or controller inquiries please contact Frio Controls at info@frio.co.

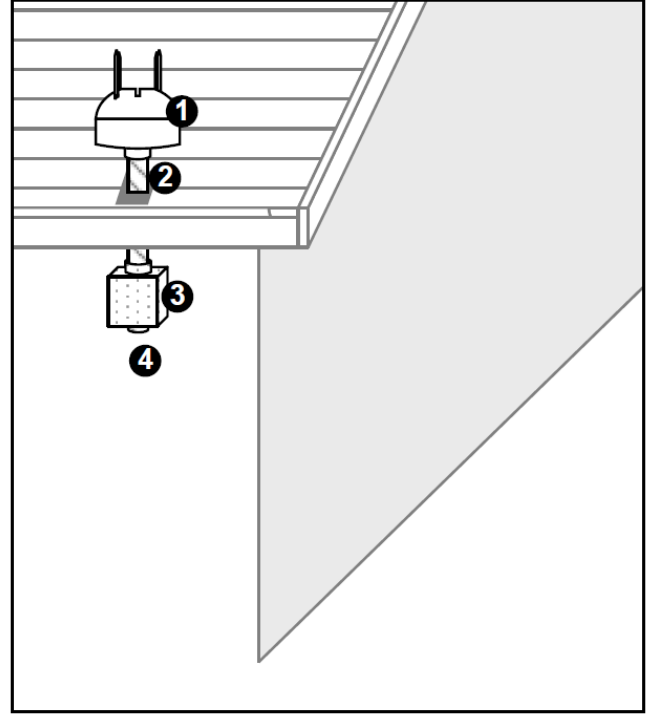


NOTE: THE FRIO S1 CONTROLLER AND SM-JB-1 MUST BE INSTALLED BY A LICENSED ELECTRICIAN OR QUALIFIED PROFESSIONAL IN ACCORDANCE WITH LOCAL AND NATIONAL ELECTRICAL CODES. THE CONTROLLER AND POWER SUPPLY MUST BE CONNECTED TO A CERTIFIED CIRCUIT BREAKER RATED FOR 30 A OR LESS. NO OTHER TYPES OF DEVICES MAY BE PLACED ON THE CIRCUIT BREAKER. REVIEW OPERATIONS MANUAL BEFORE INSTALLATION.

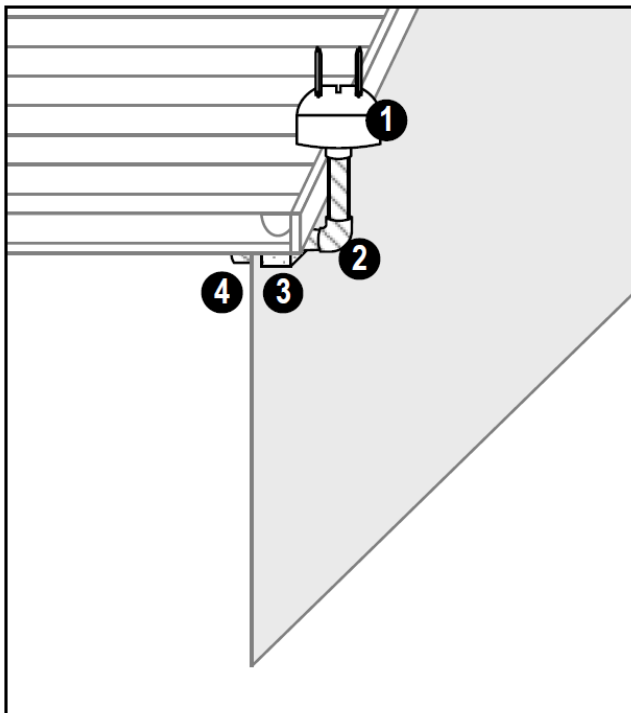
AER-1 Aerial Sensor Installation



Wall Mount Installation



Roof Installation

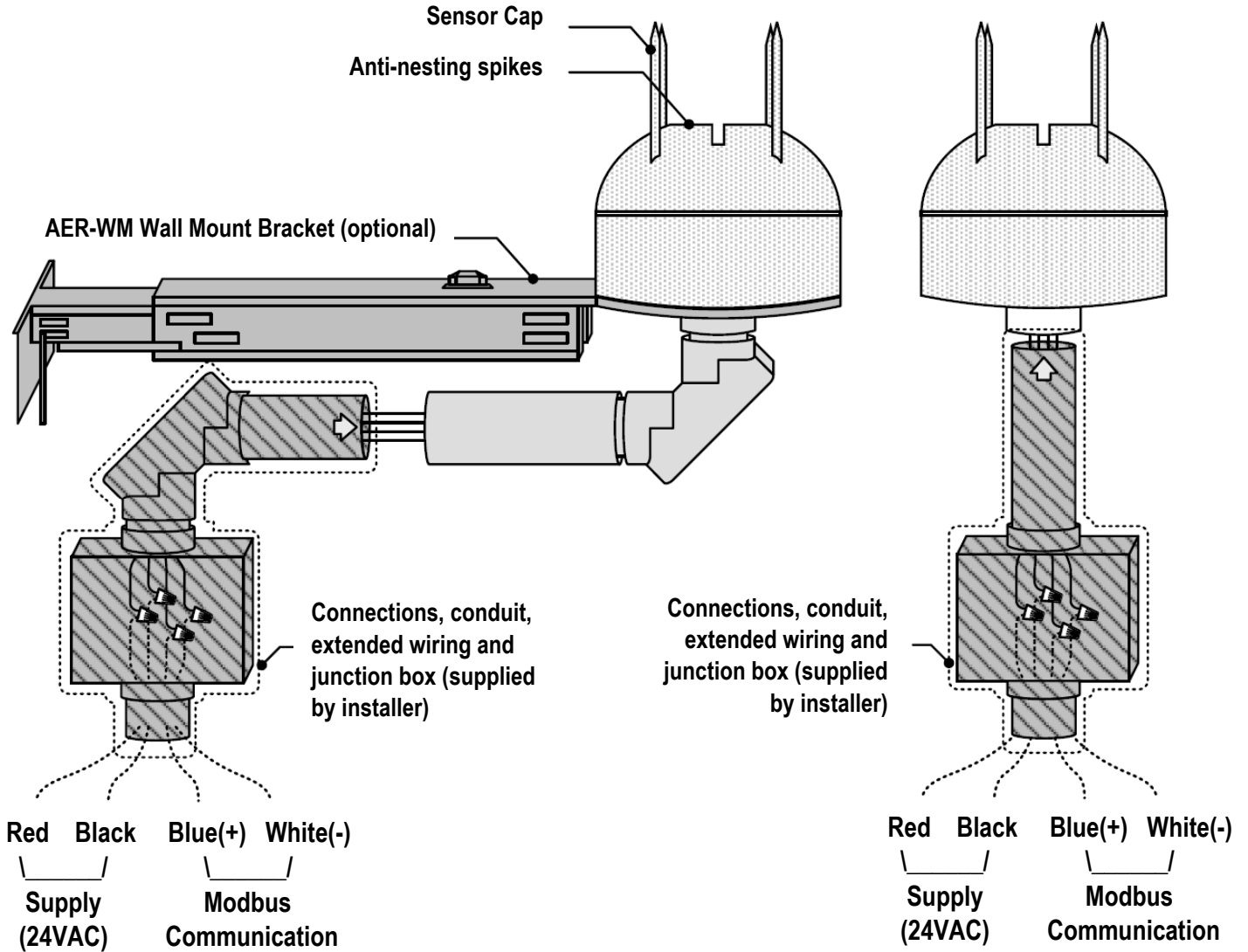


Roof Side Installation

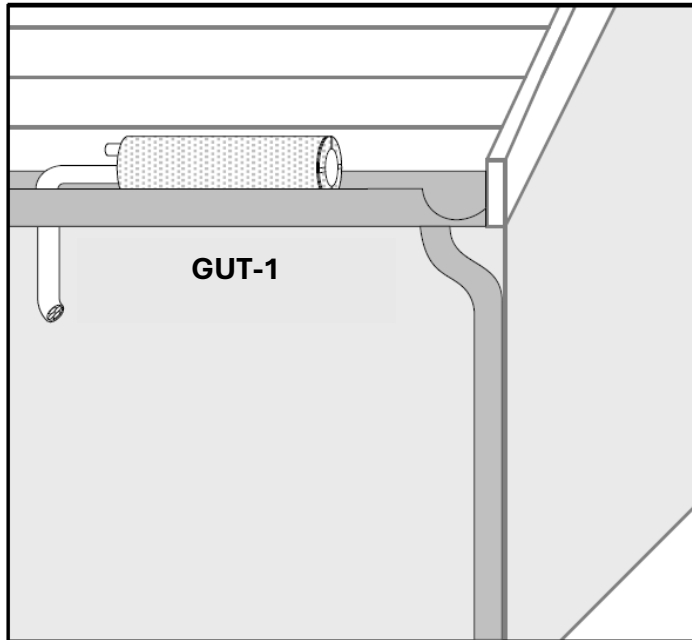
- 1 AER-1 Aerial Sensor
- 2 Waterproof conduit (supplied by installer). Use non-metallic, UL listed flexible conduit 3/4". Maximum length between AER-1 and junction box should not exceed 24".
- 3 Junction Box (supplied by installer)
- 4 Wiring (2 x 24VAC supply, 2 x Modbus Communication)
- 5 AER-WM Mounting Bracket (optional)

Mount the AER-1 Aerial sensor vertically and in a clear area so that falling snow will land on the sensor.

AER-1 Aerial Sensor Wiring Connections



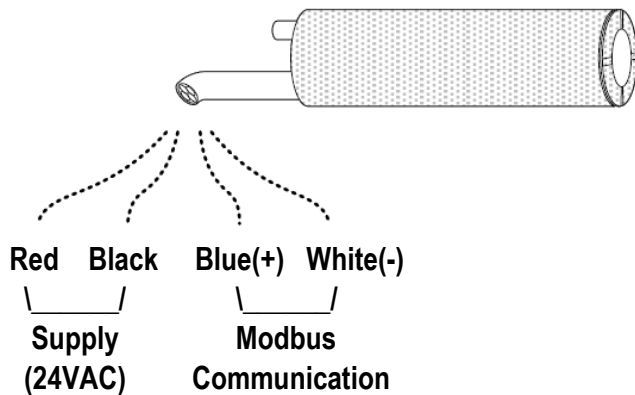
GUT-1 Gutter Sensor Installation



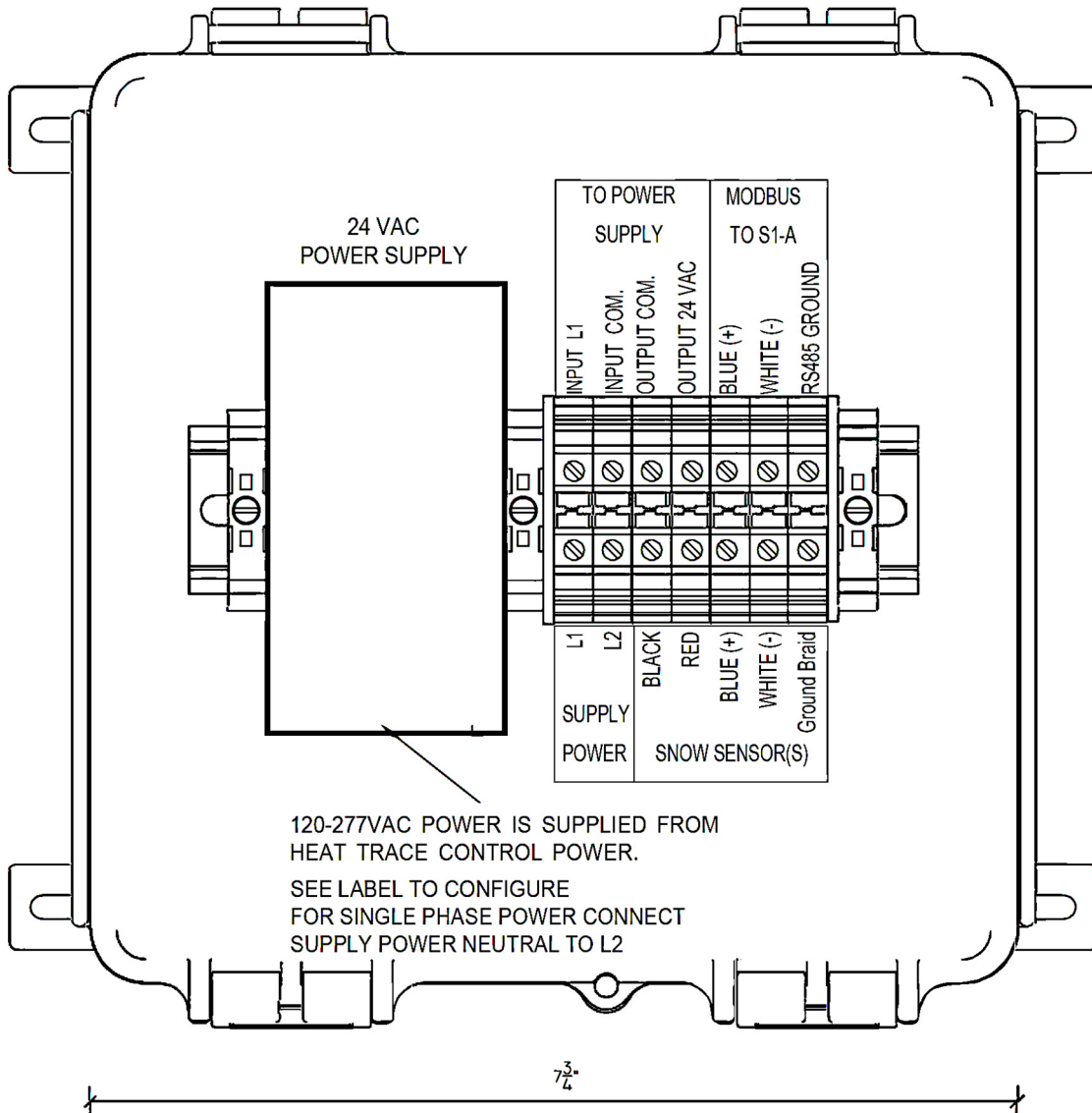
Gutter Installation

Mount the GUT-1 gutter sensor horizontally in the bottom of the gutter so that snow, ice, and melt water will contact the sensor face. Take care to protect the sensor wires from damage. Cut or damaged wires can lead to sensor failure.

GUT-1 Gutter Sensor Wiring Connections



SM-JB-1 Junction Box and Power Supply



The SM-JB-1 is a junction box with a 24VAC power supply. The JB-SM-1 has terminal blocks to combine multiple snow sensors onto a single RS485 circuit to connect back to the S1-A. You may power the JB-SM-1 using 120VAC, 208VAC, 240VAC, or 277VAC. If you are using single phase power, ensure the neutral is connected to L2. You may power the JB-SM-1 from the same circuit that feeds the S1-A controller.

1. Connect all the snow sensors that will be connected to the S1-A controller (up to 6 per controller) to the terminal blocks.
2. Connect the MODBUS to S1-A wires to the RS485 connection on the S1-A.
3. Read the label on the power supply and connect the correct colored wire to INPUT L1. Make sure to safe off the unused power supply wires.
4. Connect the Supply Power wires to L1 and L2 (Confirm that if you are using a neutral it is connected to L2).



Programming the S1-A Controller

NOTE: Frio snow sensors are only compatible with S1-A controllers operating on firmware version 3.2.0 or later. To find the FW version of your controller, press any button to enter the MAIN MENU and navigate to DEVICE INFO. If you have any questions about using your S1-A controller with snow sensors or require a firmware update, please contact Frio Controls at info@frio.co and provide the device serial number.

Prior to programming the S1-A Controller:

1. Install the snow sensors in a suitable location.
2. Install the SM-JB-1 and make all wiring connections.
 - a. Connect all snow sensors to the SM-JB-1.
 - b. Make the 3-wire Modbus RS485 connection between the SM-JB-1 and the S1-A.
 - c. Connect supply power to the SM-JB-1.
3. Install the S1-A (Read the Frio S1 installation Instructions which can be found at www.frio.co/resources).
 - a. Connect supply power to the S1-A.
 - b. [Optional] Connect the Thermistor or RTD if you plan to use a temperature sensor as the primary fallback option. Ensure the sensor is located outdoors where it will read the ambient temperature.
 - c. [Optional] Connect the dry-contact alarm output to your Building Management System (BMS).

Programming the Primary S1-A Controller

1. Turn on the supply power to the SM-JB-1.
2. Turn on the supply power to the S1-A and wait for the device to boot up.
3. Press any button to enter the MAIN MENU. Use the UP and DOWN buttons to navigate to SNOW SENSORS and press ENTER.
 - a. Select SCAN NOW and press ENTER.
 - b. Select YES to start the sensor scan. The device will scan for any connected sensors for ~10 seconds.
 - c. If sensors are detected they will be displayed on the screen along with the sensor type and address.
 - d. If no sensors are found, the screen will display "(0) sensors detected".
4. Navigate back to the MAIN MENU and select SETTINGS.
 - a. From the SETTINGS MENU set the control mode to "Local Snow Melt".
5. There are two available fallback modes if the snow sensor connection is lost.
 - a. [Optional] To set up the device with an ambient temperature sensor as the fallback mode, connect either a Thermistor or RTD and set the TEMP SENSOR to "Thermistor" or "RTD". Set the SETPOINT to a temperature between 35F - 40F. If the connection to all configured snow sensors is lost, the system will turn on the heater when the temperature sensor reads below the SETPOINT.
 - b. If you do not connect a temperature sensor, the system will fall back into the FAILURE STATE if the connection to the snow sensor is lost. If you connected a temperature sensor in the step above, the device would go into the FAILURE STATE if both the snow sensor and the temperature sensor are lost. Set the FAILURE STATE to ON or OFF.
6. To configure HIGH/LOW CURRENT alarms, go to the ADVANCED SETTINGS menu from the SETTINGS MENU and select ALARMS.



Configuring S1-A Satellite Contactors

NOTE: The Frio S1-A controller (primary controller) can drive up to 20 S1-A controllers set up as satellite contactors. The primary S1-A controller must be operating on firmware version 3.2.0 or later. To find the FW version of your controller, press any button to enter the MAIN MENU and navigate to DEVICE INFO. If you have any questions about using your S1-A controller with satellite contactors or require a firmware update, please contact Frio Controls at info@frio.co and provide the device serial number.

Prior to programming S1-A Controllers as satellite contactors:

1. Install the Primary S1-A controller and snow sensors as detailed on the previous page.
2. Install the S1-A satellite contactors. (Read the Frio S1 installation Instructions which can be found at www.frio.co/resources).
3. Make the 3-wire Modbus RS485 connection between the Primary S1-A controller and the S1-A satellite contactors.

Programming the S1-A Controllers as satellite contactor

1. Turn on the supply power to all S1-A satellite contactors.
2. Press any button to enter the MAIN MENU. Use the UP and DOWN buttons to navigate to the SETTINGS MENU, and then to the ADVANCED SETTINGS MENU. Select MODBUS and press ENTER to enter the MODBUS MENU. Program the Modbus settings as follows:
 - a. MODE: "Server"
 - b. DEVICE ADDRESS: Assign the device a unique Modbus address in the range of 1-20, inclusive
 - c. BAUD RATE: "38400"
 - d. PARITY: "None"
 - e. STOP BITS: "1"
3. Navigate back to the MAIN MENU and select SETTINGS.
 - a. From the SETTINGS MENU set the control mode to "Always ON".
4. Repeat these steps for each S1-A satellite contactor.



NOTE: Ensure all satellite contactors that are connected to a single S1-A have a unique Device Address.

Programming the Primary S1-A Controller

1. Turn on the supply power to the Primary S1-A Controller. Configure snow sensors prior to the next step.
2. Press any button to enter the MAIN MENU. Use the UP and DOWN buttons to navigate to the SETTINGS MENU and then to the ADVANCED SETTINGS MENU. Select SATELLITE CONTACTORS and press ENTER.
3. Select AUTO-DETECT S1's and press ENTER. The device will scan for all available satellite contactors. The scan take approximately 20 seconds.
 - a. If S1s are detected, the screen will display the number of S1s detected. A list of S1s and device addresses will be visible on the Satellite Contactors menu
 - b. If no S1s are detected, the screen will display "zero (0) S1s detected"
4. To test the system, select FORCE SYSTEM ON from the MAIN MENU and select "5 MIN" to override the heaters on. Confirm that the satellite contactors turn on.