Frio S1-A – Smart Heat Trace Controller

The only smart heat trace controller with Spot Check capability allowing users to automatically generate commissioning and diagnostics reports

Heat Trace Applications

- Ambient Freeze Protection
- Pipe Sensing Freeze Protection
- Process Temperature Maintenance
- Hot Water Maintenance (HWM)
- Snow Melting
- Roof & Gutter Protection
- Grease Waste Lines

The Frio S1-A is a fully featured single-circuit heat trace controller with integrated Ground Fault Equipment Protection (GFEP). The Frio S1-A can be used for a variety of applications including freeze protection, process temperature maintenance, hot water maintenance (HWM), snow melting, roof & gutter protection, and grease waste lines.

The Frio S1 can drive up to a 30A resistive load to control heat trace systems operating between 120 VAC and 277 VAC and comes in an outdoor NEMA 4X rated enclosure. The Frio S1-A is UL rated for both UL 1053 and UL 60730. The Frio S1-A includes Modbus communications and is capable of connecting to BACnet systems using the Frio gateway.

Frio's unique Spot Check feature is available on all S1 models and works by running a test cycle on the heating system, collecting data on key parameters, and generating a PDF report with the test result that is emailed to the user. Test readings outside of an acceptable range are flagged and troubleshooting tips are provided to aid installers. Key parameters such as steady state heater current can be compared to the system design to ensure proper installation. Each Spot Check is time-stamped and stored on the Frio cloud platform, allowing for a verifiable and traceable record of system performance making the reports an ideal tool to create a robust and easy commissioning process.

A Spot Check can be generated in a matter of minutes by connecting the Frio S1 to a smart phone, eliminating the need for a local internet network. Users can quickly connect a Frio S1 device by downloading the Frio Controls mobile application on their Apple or Android mobile device.

Additionally, WiFi & Ethernet capability allow the S1 to permanently connect to a local internet network. When connected to the internet, the Frio S1 will upload system status and receive operational commands from the Frio Cloud platform, enabling smart, cloud-based control and monitoring. Multiple S1 devices can be joined together in the Frio Cloud platform for centralized control of muti-circuit heating systems.

Users can access their S1 device remotely via the Frio Cloud platform to check status, activate the system or run a diagnostic test, eliminating the need to physically check the heater control system. The Frio Cloud platform offers customizable SMS and email notifications so that the user can be alerted immediately if there are any issues with the system.

Control Modes

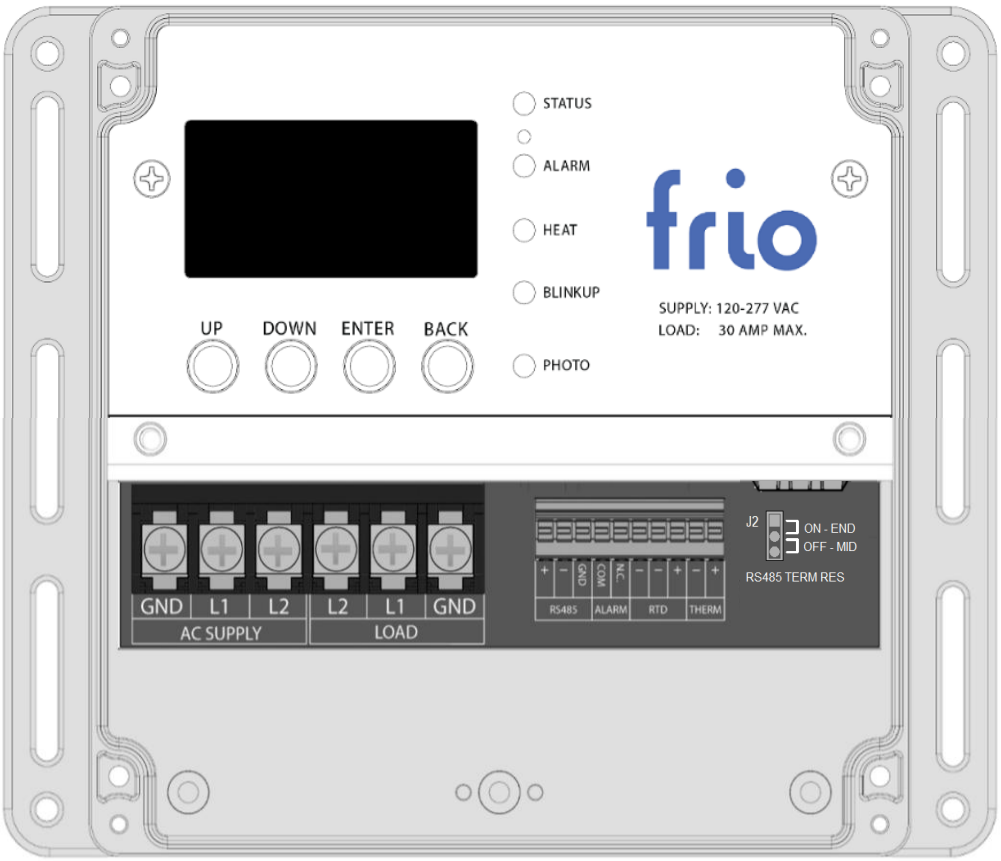
- Pipe Temperature Thermostat – Uses a thermistor or RTD to maintain system temperature (for use on freeze protection and temperature maintenance systems).
- Ambient Thermostat – Uses an ambient temperature signal (local sensor or cloud-based temperature) to activate the device (for freeze protection systems).
- Snow Melting & Gutter Protection - Uses either local sensors or weather data to activate the heating system. The S1-A-0002 controller works with up to 6 Frio moisture sensors.
- Hybrid Freeze Protection – Uses weather forecast data in combination with the local sensor to control freeze protection systems more efficiently.
- Scheduler Mode – Cloud configurable heating schedule for Hot Water Maintenance (HWM) and Grease Waste systems.
- Manual Control: Allows the user to manually activate their device for a set period of time.

Installation

- Please refer to the Frio S1 Installation Guide for more information on how to install the system. The Frio S1 must be installed by a trained professional and used only for its intended purpose. Frio advises users to avoid locating a device in direct sun or where it will be exposed to dripping water.
- **THE CONTROLLER MUST BE CONNECTED TO A CERTIFIED CIRCUIT BREAKER RATED FOR 30 A OR LESS**
- Drill all wiring holes on the bottom side of the controller

Power Ratings

- Supply Voltage: 120 to 277 Nominal VAC 50/60 Hz.
- Note: Double-pole relay is safe for 208 - 240 VAC with two hot legs
- Maximum Load: 30 A resistive
- Wire size: 10-18 AWG



GFEP

- Programable from 30 mA to 300 mA (default 30 mA)
- Manual and automatic test

Temperature Sensor Inputs

- Frio Thermistor: 2-Wire shielded pair 24 AWG leads, 10k NTC thermistor with ± 1% accuracy, operating range of -40°C to 105°C, leads and thermistor tip are black TPE, IP68, and RoHS)
- RTD: Compatible with 3-Wire pt100 RTD lead size 14-24 AWG

Low Voltage Outputs

- Dry Contact Alarm: Normally Closed, Open on Alarm (rated for 1 A max at 120 VAC or 24 VDC, 14-24 AWG)

Connectivity

- WIFI 802.11 Dual Band 2.4 GHz & 5 GHz and Ethernet (RJ45, Cat 5 or 6) See user manual for firewall information
- TIA/EIA 485 (RS-485): Frio Modbus (Isolated 3-wire 2 x Signal w/ GND, 14-24 AWG) (AVAILIBLE ON S1-A-0002 ONLY)
- BACnet IP & MS/TP: Via pre-configured Frio Gateway

Enclosure/Environment

- Enclosure rated to IP67 & NEMA 4X
- Operating Temperature -30 °C to 60 °C
- Dimensions with mounting feet: H: 6.29 in. D: 3.625 in. W: 7.55 in.
- Optional Stainless-Steel housing available upon request

Snow Sensor Compatibility (S1-A-0002 Only)

- Frio S1-A-0002 devices operating on FW version 3.2.0 or greater can connect to up to (6) Frio snow sensors using the Frio junction box and power supply (SM-JB-1).
- Frio S1-A-0002 devices operating on FW version 3.2.0 or greater can connect to up to (20) additional Frio S1-A-0002 devices which can be configured as satellite contactors allowing for multiple circuits to be controlled by one primary controller.
- Frio Snow and Ice Sensors
    - Gutter Moisture Sensor (GUT-1)
    - Aerial Snow Sensor (AER-1)
    - Pavement Moisture Sensor (PVT-1)
- For more information visit www.frio.co/resources

Agency Ratings

- UL Standard 1053 (CSA Standard C22.2 No. 14) for Ground-Fault Sensing and Relaying Equipment.
- UL Standard 60730 for Automatic Electrical Controls
- Devices comply with FCC Part 15 Subpart B.

User Interface

- 2.42 in. OLED display 128 x 64 pixels
- Four button interface
- Four LEDs with one phototransistor used for BlinkUp process during installation
- Menus are in English only
- Imperial or Metric units