frio

S1 – "Smart" IoT Heat Trace Controller

The first IoT heat trace controller designed for snowmelt, freeze protection, and temperature maintenance applications

The S1 is a single-circuit IoT heat trace controller for use in snow melting, freeze protection and temperature maintenance applications. The device can drive up to a 30A resistive load to control electric heat trace systems operating between 120 VAC and 277 VAC. The S1 comes in an outdoor-rated enclosure tested to IP67 & NEMA 4X standards.

WiFi & Ethernet capability allow the S1 to connect to the Frio Cloud platform via the internet, enabling smart, cloud-based control. When connected to the cloud, the S1 will upload system status and receive operational commands. Multiple S1 devices can be joined together in the Frio Cloud platform, allowing centralized control of multiple heat tracing systems.

The cloud connection enables advanced monitoring and notification of your heating system. Frio's unique Spot Check feature runs your heating system and evaluates how it performs across several different criteria and provides a PDF report with the results. Each criteria has an acceptable range of values, and readings outside of this range are flagged and recommendations are provided. The Spot Check also includes an expected range to

indicate how your system may perform under a range of typical operating conditions. Each Spot Check is timestamped and stored on the Frio cloud platform, allowing for a verifiable and traceable record of system performance.

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.

If an internet connection is not available, the S1 can operate in an offline configuration using a temperature sensor, via BMS commands, or manually from the HMI.

To install the S1 device and connect it to the internet, simply download the Frio app and follow the step-by-step instructions. The system configuration and notification preferences can be changed anytime via the Frio Cloud Platform or by using the device HMI.

Control Modes

- Temperature Sensor – Connects to a thermistor or RTD to maintain system temperature (For use on freeze protection and process temperature maintenance systems)
- Ambient Temperature: Uses an ambient temperature signal (local sensor or cloud-based temperature) to activate the device (For freeze protection systems)
- Smart Snow Melting: - Uses weather data to activate the heating system (For use on snow melting and gutter systems)
- 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. Do not locate 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
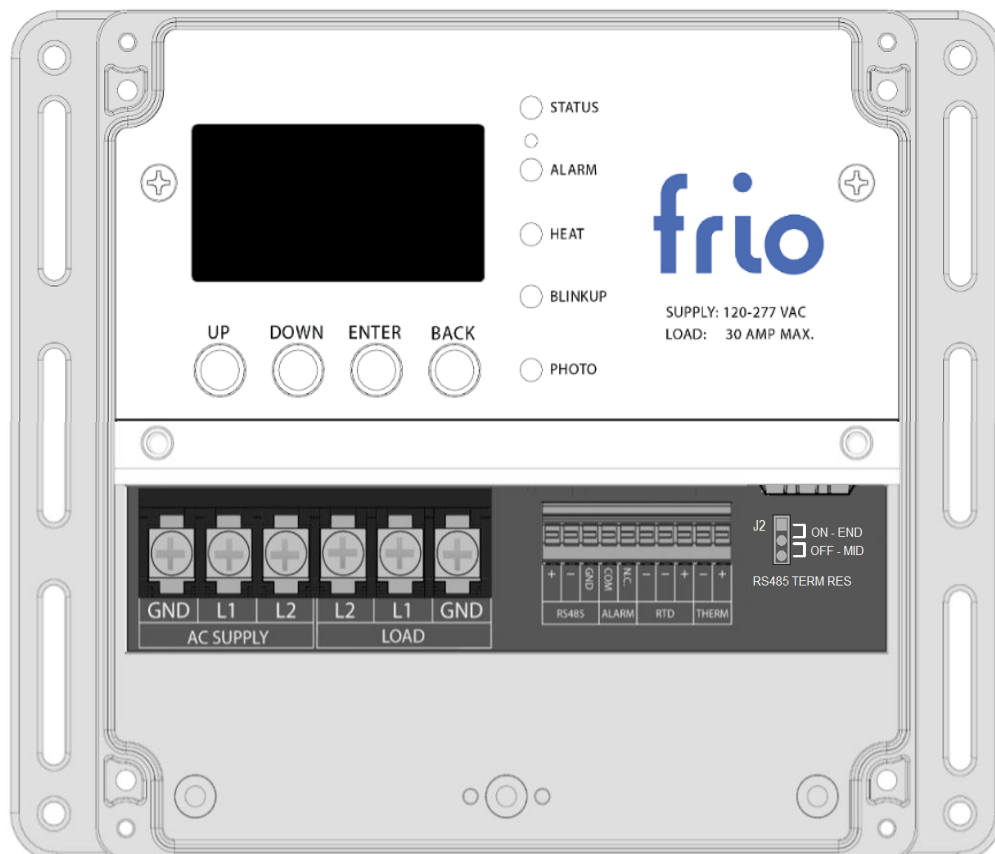
GFEP

- Programable from 30 mA to 300 mA (default 30 mA)
- Manual and automatic test
- Fire protection mode allows user to disable GFEP

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 (NOT AVAILIBLE ON S1-A-2001 OR S1-B-2002)

Low Voltage Outputs

- Dry Contact Alarm: Normally Closed, Open on Alarm (contacts 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) (NOT AVAILIBLE ON S1-A-2001 OR S1-B-2002)
- BACnet IP & MS/TP: Via pre-configured SMC Gateway (NOT AVAILIBLE ON S1-A-2001 OR S1-B-2002)

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

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
- Controllers comply with FCC Part 15 Subpart B. 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.

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

S1 Models

Model Number	Modbus/BACnet	RTD Compatible	Certifications
S1-A-0001	YES	YES	UL 1053
S1-A-0002	YES	YES	UL 1053 & UL 60730
S1-A-2001	NO	NO	UL 1053
S1-B-2002	NO	NO	UL 1053 & UL 60730