

FREEZER FLOOR HEAT MONITOR AND CONTROL

MODEL #FFCH-XXXXXX-JX



The model FFCH is designed specifically to Monitor and control self-regulating Heat Cable to maintain freezer floor temperature at ultimate design conditions.

Basic Freezer Floor designs up to 15,000 Square Feet use Self-regulating heat cable to prevent “Frost Heave”. “Frost Heave” is the process where moisture in the ground below the freezer, freezes and expands causing the floor and or the entire building foundation to rise. Floors, depending on the amount of moisture in the floor, can rise as much as several feet causing structural damage to the building. The cost of replacing the floor is extremely expensive. The Floor must be removed and all of the frozen ground below replaced or thawed.

In the pasts Self-regulating cable was monitored using techniques specifically designed to control the older technology of Constant wattage heat cable by monitoring current. But with the advent of Self-regulating designed freezer floors as the main heating source for freezers, current changes with the temperature of cable and could no longer provide a true indication of cable operation.

Our FFCH System, monitors end of run relays to ensure cable is always on, and functioning. We also Monitor other relevant failure indicators and annunciate a 90 dB Alarm, when and if failure occurs. This alarm will re-sound every 7 days until the problem has been solved and the system is back in working condition.

The FFCH system is designed to monitor and control up to 5 circuits and up to 15 separate runs of Cable. Each fault is data logged to provide help with troubleshooting. Not only are the faults shown but the time the floor has been in default is recorded. Full troubleshooting guides are easily accessible at the touch screen interface and provide detailed instructions for checking components.

This system monitors:

- Temperature of the ground below the freezer.
- Ground fault circuit breaker for short circuit conditions
- Aux Contacts on the Contactor
- End of Run Relay to monitor cable operation.

This System Indicates:

- Ground Temperature
- Heater output
- Contactor Closure
- GFI Circuit breaker Fault
- End of Run Relays
- Number of Faults each conditions
- Fault Time

We provide with our Systems, with detailed conduit layout details, Wiring details, and include amperage and power requirements, control panel wiring drawings and back up technical support and phone guided troubleshooting assistance.

Freezer Floor Freeze Protection Design

Heat Cable Design:

Application

Freezers and other refrigerated storage areas are maintained at temperatures below freezing. Therefore, moisture in the soil under the floor could also freeze. Expansion of the soil caused by the freezing temperatures can result in damage to the above surface. Some floors depending on size and temperature of the freezer have been observed to raise 12", 24" or more. In many cases this causes the floor to crack, costing thousands of dollars in removal and replacement cost. Heat cable installed under the floor and in the substrate will prevent the soil from freezing.

Standards

IEEE Std. 515.1 Recommended Practice for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Commercial Applications

Code Considerations

National Electric Code (NEC) Article 426

National Electric Code (NEC) Article 427

National Fire Protection Association (NFPA)

Local Codes

Design Considerations

- A typical substrate design includes the concrete slab, a layer of rigid foam insulation and a heater cable imbedded in sand or concrete. The heater cable is generally installed on 2 to 4 foot (.6 to 1.2 meters) centers.
- The heat load requirement is calculated based on the amount of insulation between the concrete floor and the heated substrate and the refrigerated area temperature. For elevated applications, insulation around the perimeter should be considered.
- The heater load requirements are based on insulation thickness, cable spacing and freezer temperature. Using a Low temperature self-regulating cables with a copper braid and over jacket.
- Although not required, it is recommended that polymer based heaters be installed in conduit for ease of access and / or replacement. If non-metallic conduit is being used however, care should be taken that the cables sheath temperature does not damage the pipe. This can occur if high temperature self-regulating cable or constant wattage / zone heaters are being used. Self-regulating cable also requires de-rating when installed in conduit. (De-rate Low temperature Self-regulating products by 40% when installed in metallic conduit
- Power connection kits and end seals should be mounted in an accessible junction box. Branch breakers feeding the cables shall be 30mA GFEFD.
- Thermostatic control is recommended for this application. The sensor should be located in conduit halfway between two runs of heater cable toward the center of the heated area.

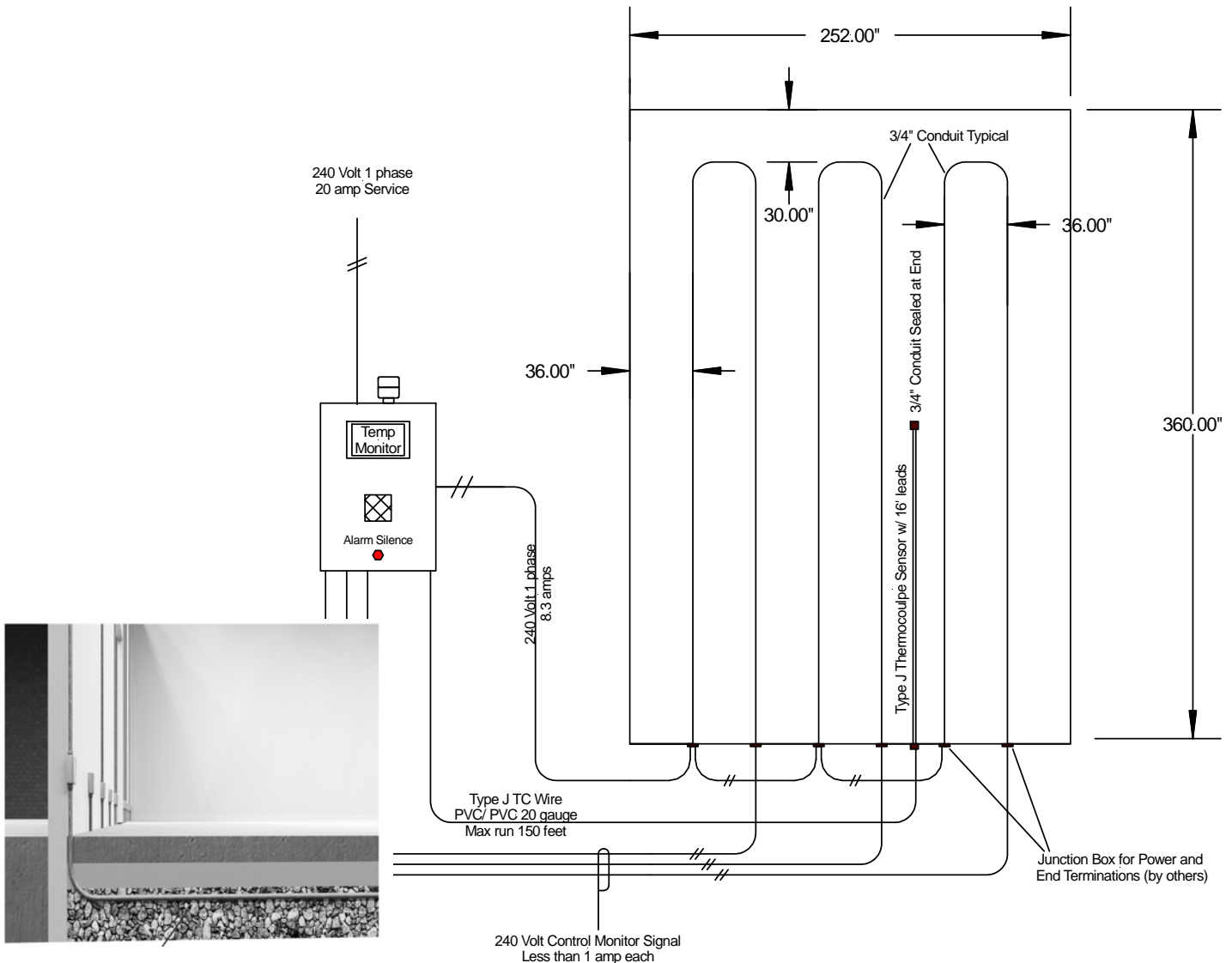
Freezer Floor Freeze Protection LAYOUT

Heater Cable Conduit Shall be mounted in the sand or Concrete base and run no closer to the outside wall that 1'6". Each conduit shall be located at "A" Centers and be a minimum of 1/2", 3/4" where allowed. A Weather proof junction box shall be mounted at each end of the Heater Cable Conduit. The junction box shall be located for easy access to both the Power Termination End and End Run connection.

The Junction box will include molded Silicone End Seal and Power Termination kit with Silicone Adhesive.

Temperature Sensor mounted in a separate conduit centered between two Heater Cable Conduit runs. Sensor shall be Type J with weather proof 30' leads. Sensor wire to Control cabinet shall be made with Type J PVC insulated Thermocouple wire and connections made with minimum 90% Silver solder. Wire nuts are not permissible

Typical Layout



Sample Specification

Description:

Self-Regulating Heat Trace Cable,

- Semi-conductive Polymer core heating matrix
- Continuous maintenance temperature: 150F (66C)
- Intermittent exposure temperature: 185F (85C)
- Supply voltages: 110 - 120VAC or 208 - 277VAC
- Moisture, chemical, and flame resistant
- 16AWG bus wires
- Tinned copper over-braid w/ Thermoplastic Elastomer Overjacket.

Sensor:

Type J thermocouple, leads lengths equal to ½ floor width, designed for direct Submersion with SS Overbraid and moisture resistant overjacket.

Freezer Floor Temperature Control System

Model FFCH-XXXXX-ALRET

Monitor and Control system shall be designed to monitor and control self-regulating heat cable using a 3.5" touchscreen.

System shall monitor and indicate alarms for :

- Continuity on each run of cable
- GFI Fault
- Low Temperature
- Floor temperature
- Contactor operation
- History of alarm operations and time spent in temperature alarm conditions.

Panel includes:

- Square D PLC with 3.5" Color Touch screen.
- Square D GFI Circuit Breakers with Aux Contact
- End of Run Relays (1) each Run of cable
- Main lugs only
- Square D 40 amp Resistive Controlling Contactor
- Alarm horn with reset Push button, minimum of 80db
- Dry Output contact for remote alarm monitoring system

All control and power equipment shall be mounted and pre-wired in NEMA 4X Fiberglass gasketed enclosure. 18" x 16"

Moisture resistant Power Connection kits / end termination kits shall be provide for each termination point.

Equipment shall be provided from one source with application experience in both monitoring and controlling sub-Freezing floor applications. As manufactured by Thermal Equipment Sales Inc. Contact: Richard Jordan (901) 452-4516