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Model GPT–3

Freeze Protection Thermostat

Part Number 19425

Installation and Operation Manual

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Safety

Make all electrical connections in compliance with the National Electric Code (NFPA 70) and local electrical code. If you have questions concerning the installation or application, contact Customer Service.

Contacting Environmental Technology

For assistance, contact Customer Service. Office hours are 8:00 AM until 5:00 PM EST (UTC minus five hours).

Voice: (800) 234.4239 (USA and Canada) or (574) 233.1202 (elsewhere)

Fax: (888) 234.4238 (USA and Canada) or (574) 233.2152 (elsewhere)

E-mail: helpdesk@networketi.com

Mail: Environmental Technology, Inc.

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General

Introduction

The GPT–3 Freeze Protection Thermostat has a calibrated adjustment range of 41° to 77°F (5° to 25°C) with a control band of 2°F (1°C). Heaters operate at ambient temperatures below the set temperature.

The GPT–3 combines temperature control using either constant wattage or self-limiting heaters with GFEP (ground fault equipment protection) and advanced monitoring features. For example, although the GFEP is factory set to trip at 30 mA, this threshhold can be set to 60, 90 or 120 mA to cure nuisance tripping problems. Keeping wet fire sprinklers from freezing is considered to be a higher priority than interrupting heater power in the event of a ground fault condition. The GPT–3 accommodates this requirement by allowing the GFEP to be set only to alarm while the ground fault persists.

Other features include continuous heater monitoring with separate modes for constant wattage and self-limiting heaters. A trickle current verifies heater continuity of both heater types when there is no call for heat. The current flow through constant wattage heaters verifies continuity during operation. Self-limiting heaters employ an independent temperature monitor sensor (included) to measure the hot-end temperature. Depending upon how long it takes the cable to reach its operating temperature such that the monitor sensor is less than 5°F (3°C) below

the control sensor temperature, the GPT–3 may momentarily declare a cold heater.

The GPT–3 automatically executes a self-test every 24 hours. First, heaters are de-energized. Then, the GFEP verifies its own operation. Finally, it checks the heaters for ground fault under operating conditions. This entire process takes about two seconds.

Other features include verifying the integrity of both the control and monitor temperature sensors and checking the contactor for open or shorted contacts. A control temperature sensor failure also inhibits contactor operation in addition to asserting an alarm condition.

The GPT–3 automatically accommodates 120, 208, 240 and 277 supply voltages. Since the heaters and the GPT–3 operate from the same supply voltage, the safety hazard created by multiple points of disconnect is eliminated. The heater control contactor is rated for up to 30 amps.

The GPT–3 provides a reverse acting isolated Class 2 alarm relay contact SPDT rated at one amp. Reverse action makes absence of supply voltage an alarmed condition.

Although the GPT–3 housing is NEMA 3R rated for indoor or outdoor service, a protected location is recommended. The operating temperature range is −40° to 136° F (−40° to 58°C). Padlocking the transparent front cover can prevent tampering without interfering with the view of the status indicators.

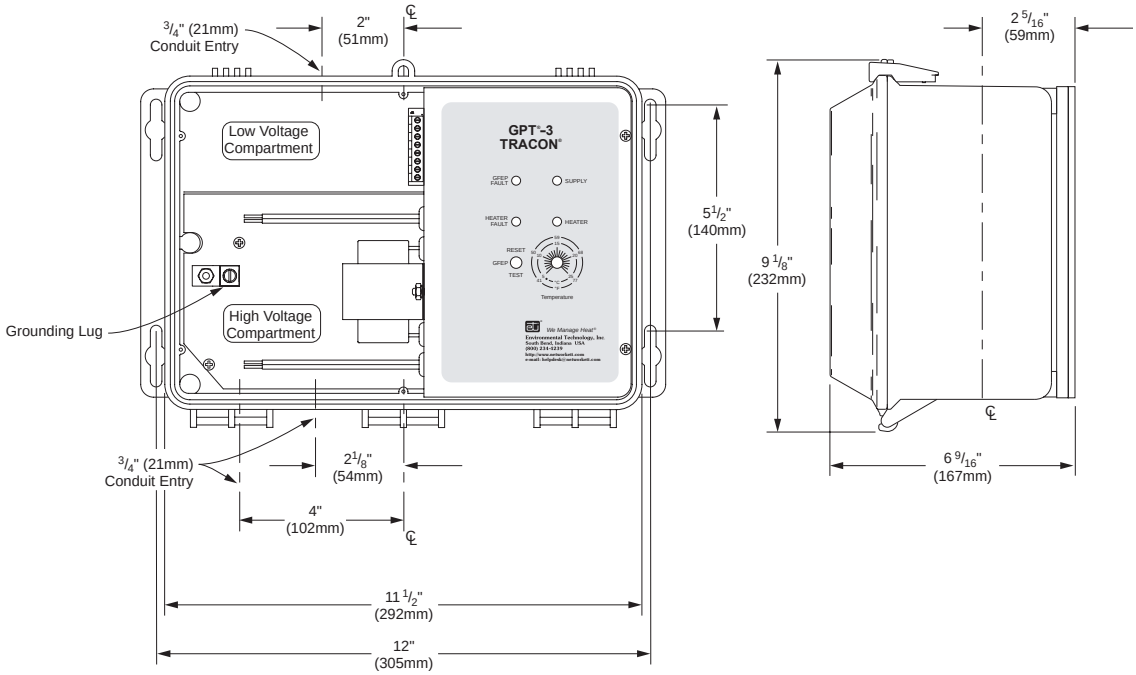


Figure 1. GPT–3 dimensional drawing

Specifications

Control

Range:	41° to 77°F (5° to 25°C)
Dead band:	2°F (1°C)

Electrical

Supply:	120, 208, 240 or 277 volts auto-selected
Heater load:	30 amps maximum
Alarm relay:	Isolated SPDT 1 amp Class 2 contact

Indicators

Supply (red)	Power applied
Heater (yellow)	Call for heat
GFEP (red)	Ground fault occurring or has occurred
FAULT (red)	Contactor failure
	Temperature sensor failure
	Power-on self-check failure

GFEP

Settings:	30 mA default, 60, 90, 120 mA selectable
Reset:	Manual default, automatic selectable
Auto-test:	Every 24 hours

Heater monitoring

Choices:	Self-limiting default, constant wattage selectable
Alarm relay:	No power
	Heater failure
	Contactor failure
	Ground fault or GFEP circuit failure
	Temperature sensor failure

Temperature limits

Operating:	−40° to 136° F (−40° to 58° C)
Storage:	−67° to 167° F (−55° to 75° C)

Operation

Normal

The GPT–3 requires little or no attention after installation. Although changing the temperature setting can improve heating system performance, this is seldom necessary. Minimum energy use occurs when the the temperature is set to the minimum value providing the desired heating performance.

Normal operation occurs when neither the Fault nor the GFEP indicators operate and the Alarm relay is off. Otherwise, operation is abnormal.

Abnormal

With one exception, operation of either the Alarm relay or Fault indicator or both means that a failure has occurred that requires a qualified electrician to correct. The exception is momentary indication of a self-limiting heater failure as is shown by blinking the Heater indicator when the GPT–3 is used with self-limiting cable. The GPT–3 detects a self-limiting heater failure by measuring its temperature at the far end of the cable. Depending upon how long it takes the cable to reach its operating temperature such that the monitor sensor is less than 5°F (3°C) below the control sensor temperature, the GPT–3 may momentarily declare a cold heater.

Many indicators display additional information concerning equipment failures through flashing. Check the Troubleshooting section for additional information since service by qualified personnel is required.

Installation

First

Inspect the package and its contents for damage. In the event of damage, immediately contact Environmental Technology, Inc. Customer Service.

Next

Check the contents of the package against the pro forma Packing List shown below. If discrepancies are found, contact ETI Customer Service before starting the installation.

Pro Forma Packing List

Order Number	Quantity	Description
19425	1	GPT–3 Freeze Protection Thermostat
19272	2	Temperature Sensor
20656	1	GPT–3 Installation and Operation Manual
18703	4	Wire Nuts, Red

Location

The GPT–3 is suitable for indoor or outdoor mounting on a vertical surface. Although the NEMA 3R rated housing is strong and durable, choose a protected location for an extra safety margin. Always consider the possibilities of tampering and vandalism when choosing a location.

Keep the GPT–3 and the heat cable as close together as is practical to minimize installation costs. There is a 2,000' (610m) limit on temperature sensor extension wiring.

Figure 1 shows mechanical dimensions of the GPT–3. Note the location of the compartment provided for low voltage Class 2 connections.

Supply and Heater Connections

The GPT–3 operates from 120, 208, 240 or 277 volts which it automatically selects. The heaters and GPT–3 operate from the same supply voltage.

The definite purpose DPST heater control contactor is rated for up to 30 AMP loads at 277 volts or less.

Make the supply voltage and heater connections in the compartment provided for this purpose. See Figure 1.

Use only copper wire for supply, heater and safety ground connections. Select a minimum

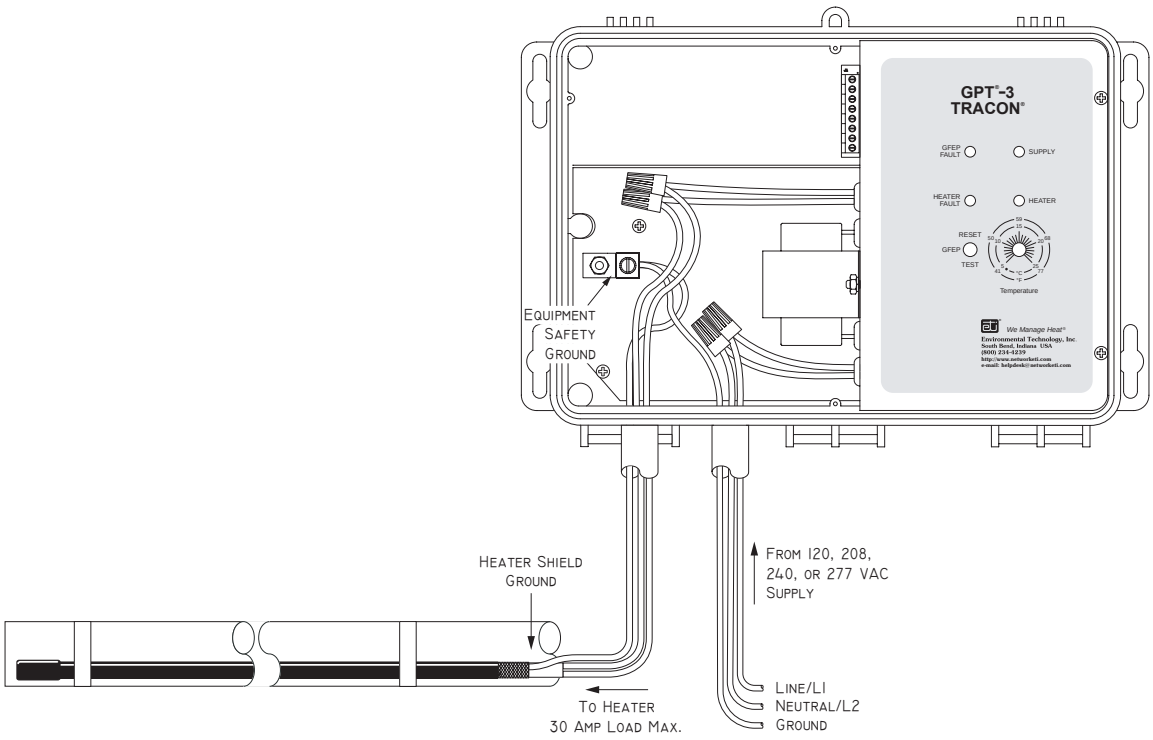


Figure 2. GPT–3 wiring diagram

wire size of 10 AWG with, minimum, 300 volt insulation rated for at least 75ºC.

Figure 2 shows a pictorial wiring diagram of the heater and supply voltage connections. Use appropriately rated wire nuts or bomb splices for all heater and supply connections. Connect the equipment safety ground and heater shield ground to the lug provided for this purpose.

Sensor and Alarm Relay Connections

General

The two temperature sensors are connected to the terminal block in the low voltage compartment along with the connections to the reverse acting isolated SPDT alarm relay. Use #18 AWG copper wire with insulation rated for 300 volt service for all Class 2 connections unless otherwise noted. Using jacketed extension wiring, although convenient, is not necessary.

Using metallic conduit for extension wires is recommended. Never route Class 2 circuits in the conduit used for supply and heater voltage circuits.

Temperature Sensors

Two identical temperature sensors are supplied with the GPT–3. Each is supplied with 20' (6m) of extension wire. For distances of up to 500' (152m), use #18 AWG copper wire and #12AWG for up to 2,000' (610m). Temperature sensor connections are non-polar.

Systems using self-limiting heaters require two temperature sensors. Figure 3 shows

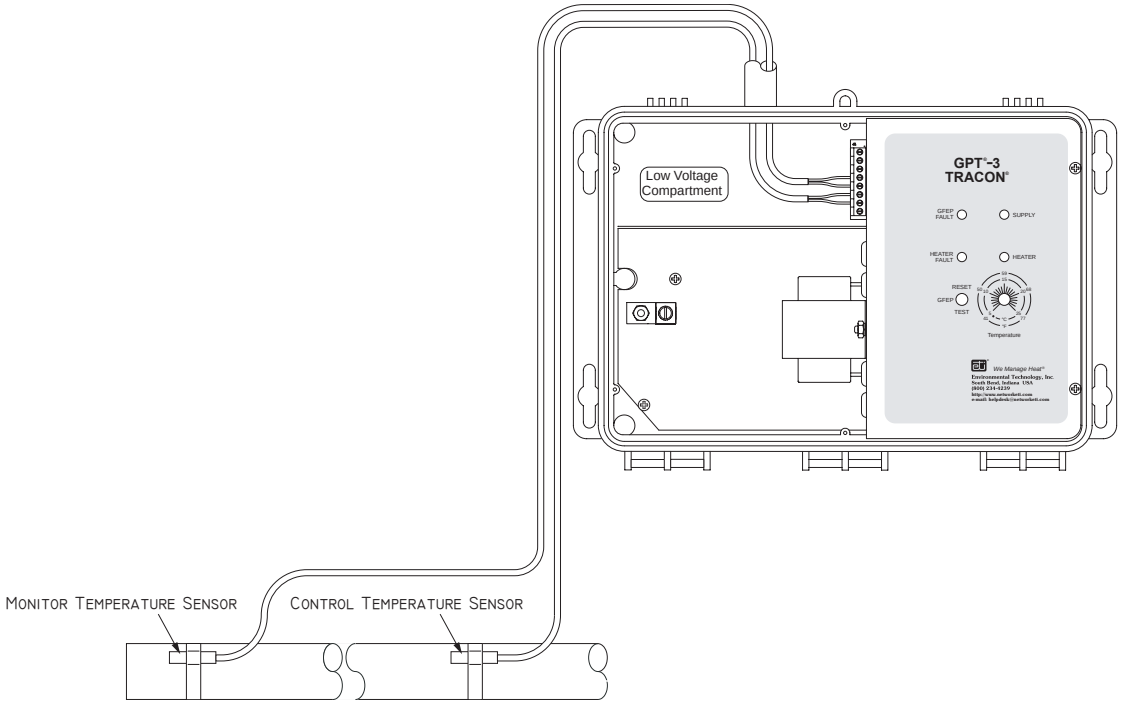


Figure 3. Control and monitor sensor connections for self-limiting heaters

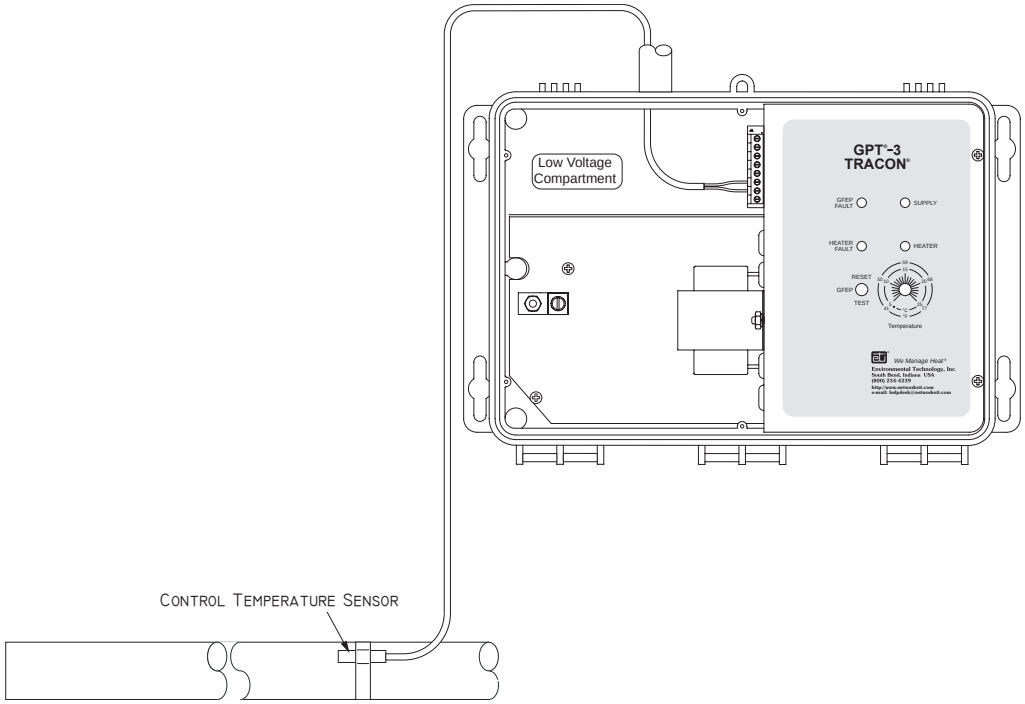


Figure 4. Control sensor connection for constant wattage heaters

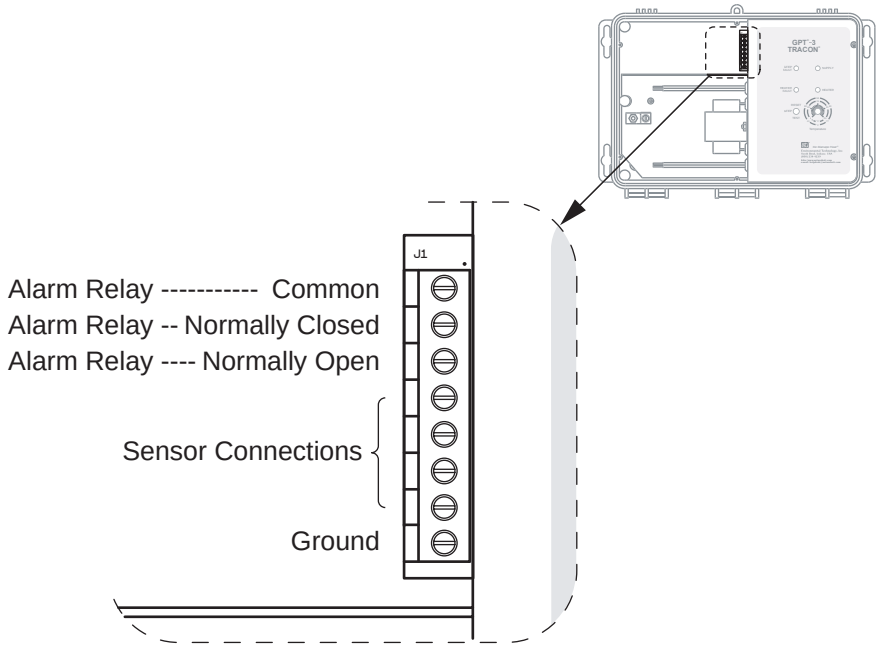


Figure 5. Alarm relay connections

connection of the two sensors. The GPT–3 comes factory set for self-limiting cable.

Systems using constant-wattage heaters require only one sensor as is shown in Figure 4. Upon completion of the installation, dispose of the unused sensor.

Alarm Relay Contacts

Figure 5 shows the alarm relay connections. The relay contacts are rated for one amp in NEC Class 2 service. Contact Customer Service if higher voltage operation is required.

Setup

Factory Settings

The GPT–3 comes set for the most common systems. This includes:

- Self-limiting cable
- GFEP set at 30 mA
- GFEP set for manual reset

The factory DIP switch settings follow:

FACTORY SETTINGS						
Pole	1	2	3	4	5	6
Setting	Off	Off	Off	Off	---	---

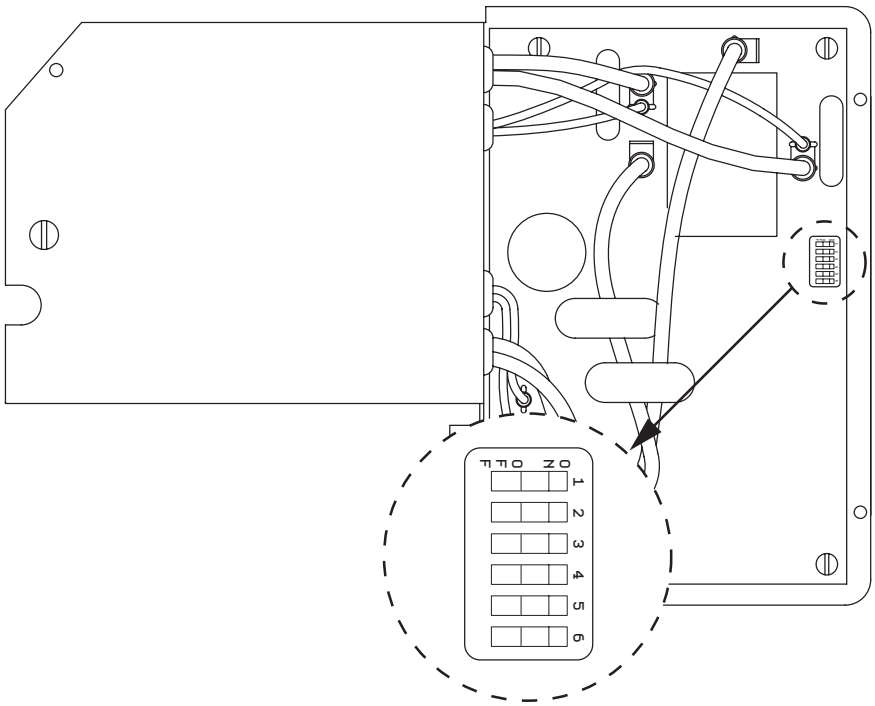


Figure 6. DIP switch detail

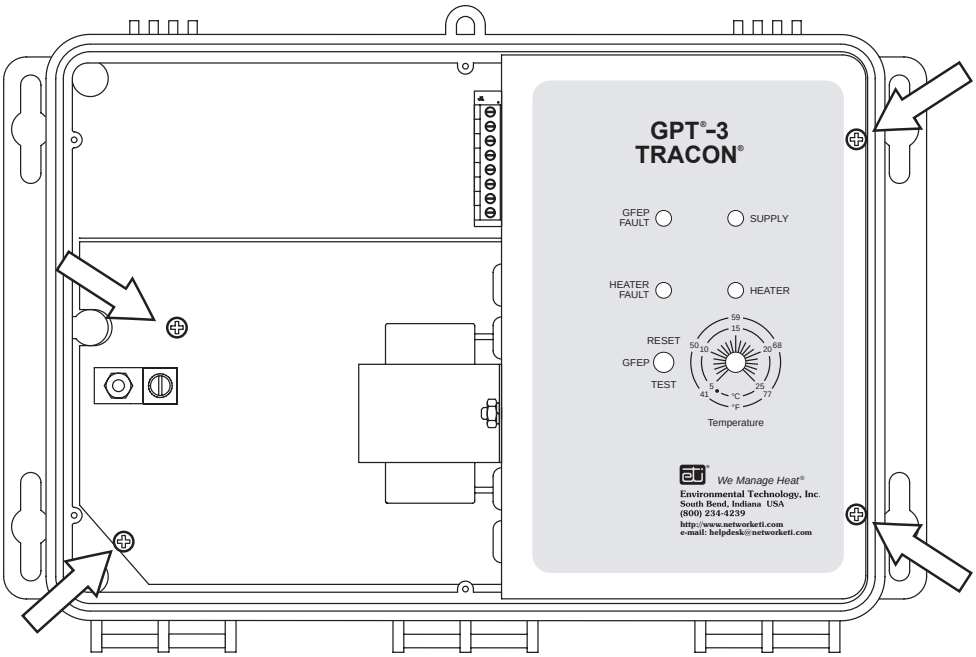


Figure 7. Removing electronic assembly from housing

Custom Settings

General

The performance of the GPT–3 can be adjusted to match the needs of the application using the DIP switch as shown in Figure 6. Accessing this switch usually requires removing the electronic assembly from its housing. Figure 7 shows the screws that need to be removed to access the DIP switch.

Make any DIP switch changes before making the supply voltage and heater connections. Otherwise, it will probably be necessary to break and re-make these connections.

DIP switch poles that do not require change are labeled ‘NC’. Spare switch poles are labeled ‘---’.

GFEP

Mode

Fire protection sprinkler and certain other critical applications consider GFEP secondary in importance to freeze protection. The GPT–3 accommodates these applications by warning of a ground fault condition while it exists. Heaters operate independent of the ground fault condition.

Automatic GFEP Reset Setting						
Pole	1	2	3	4	5	6
Setting	On	NC	NC	NC	---	----

Current

The GFEP current setting can be increased from its factory set 30 mA value to 120 mA in 30 mA steps. The higher current settings serve the special purpose of eliminating spurious GFEP tripping. Accessing this function was made intentionally difficult to prevent its casual use. The DIP switch settings follow:

60 mA GFEP Setting						
Pole	1	2	3	4	5	6
Setting	NC	NC	On	Off	---	---

90 mA GFEP Setting						
Pole	1	2	3	4	5	6
Setting	NC	NC	Off	On	---	---

120 mA GFEP Setting						
Pole	1	2	3	4	5	6
Setting	NC	NC	On	On	---	---

Constant Wattage Heater Mode

The GPT–3 provides a special operating mode for checking the continuity of constant wattage heaters. The DIP switch setting is shown below:

Constant Wattage Heater Setting						
Pole	1	2	3	4	5	6
Setting	NC	On	NC	NC	---	---

Maintenance

General

The GPT–3 does not require routine maintenance. It contains no field replaceable components.

Troubleshooting

The GPT–3 provides extensive fault diagnosis capability for the purpose of quickly identifying and correcting system problems. Front panel indicators perform multiple functions so as to provide the greatest amount of information. With one exception one, or more, indicators flashing in repetitive patterns mean that a fault requiring a qualified technician for correction has occurred.

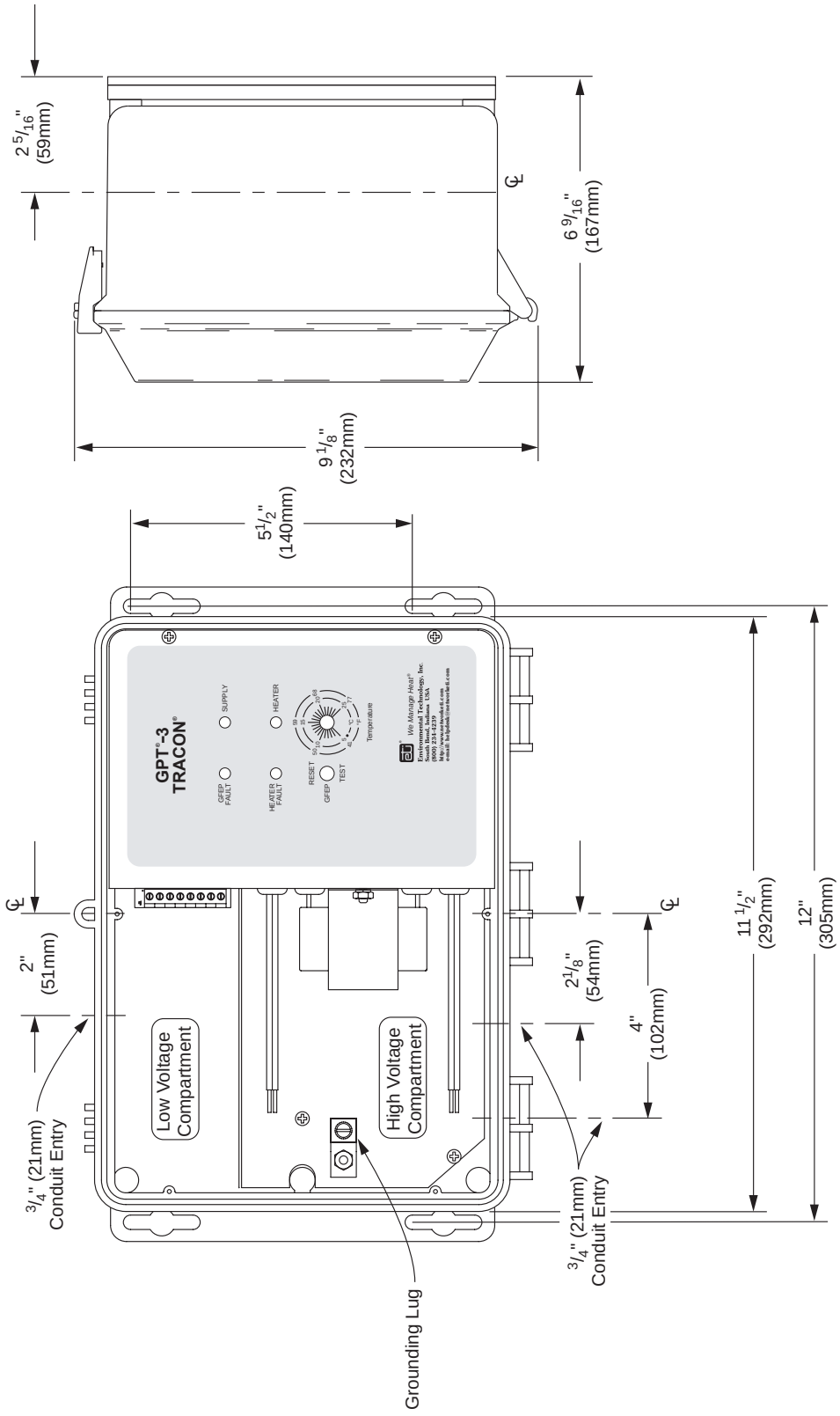
The exception is operation of the HEATER FAULT indicator in a 50% on, 50% off pattern when using self-limiting cable. This can occur when heaters first operate due to the time delay between the application of power and attaining thermal equilibrium.

Detailed troubleshooting instruction can be obtained from either Customer Service or the Environmental Technology, Inc. web site at http://www.networketi.com.

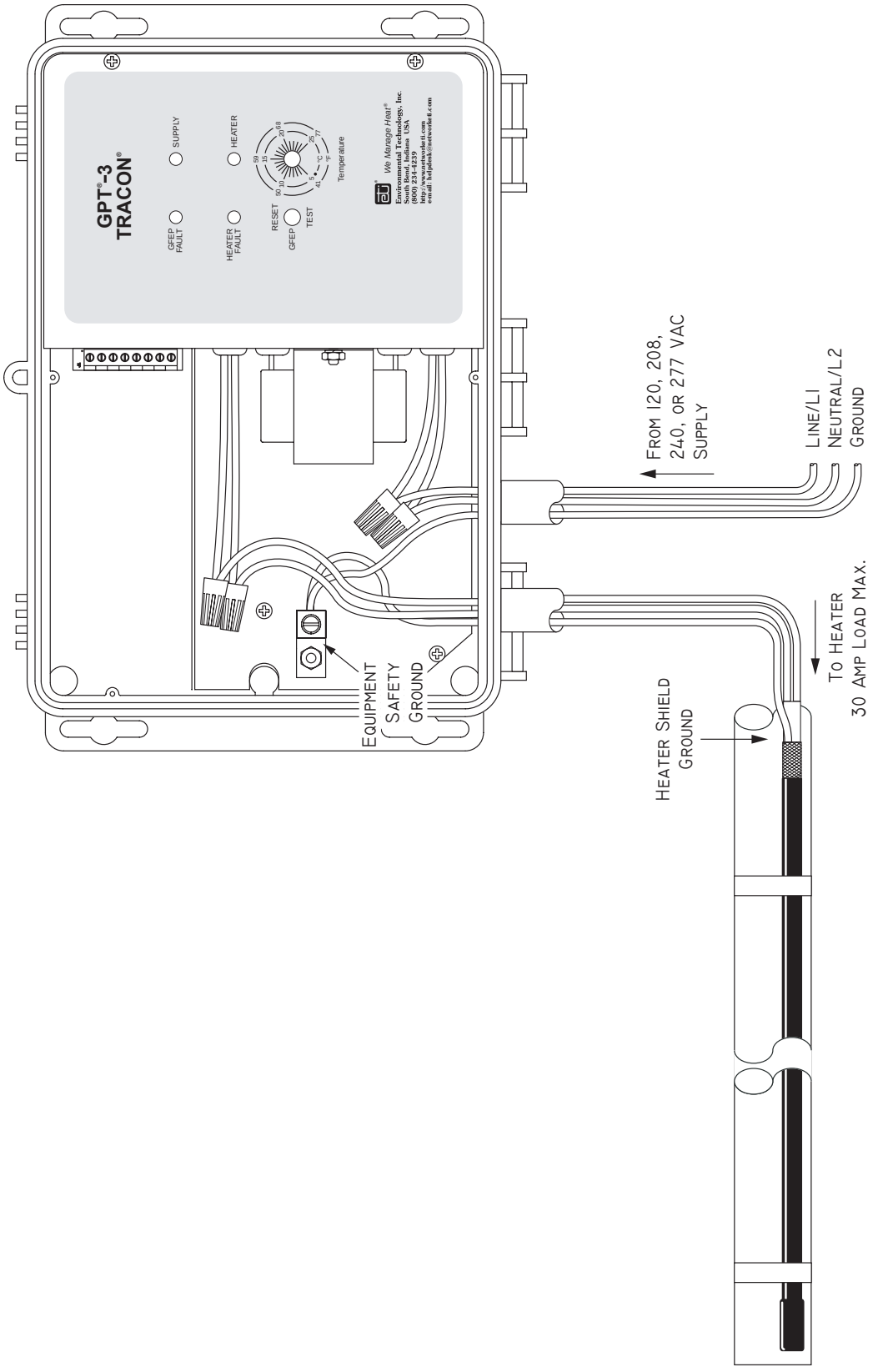
Returns

Contact Customer Service to obtain a Return Authorization before shipping anything to Environmental Technology, Inc. Otherwise, the shipment may be refused.

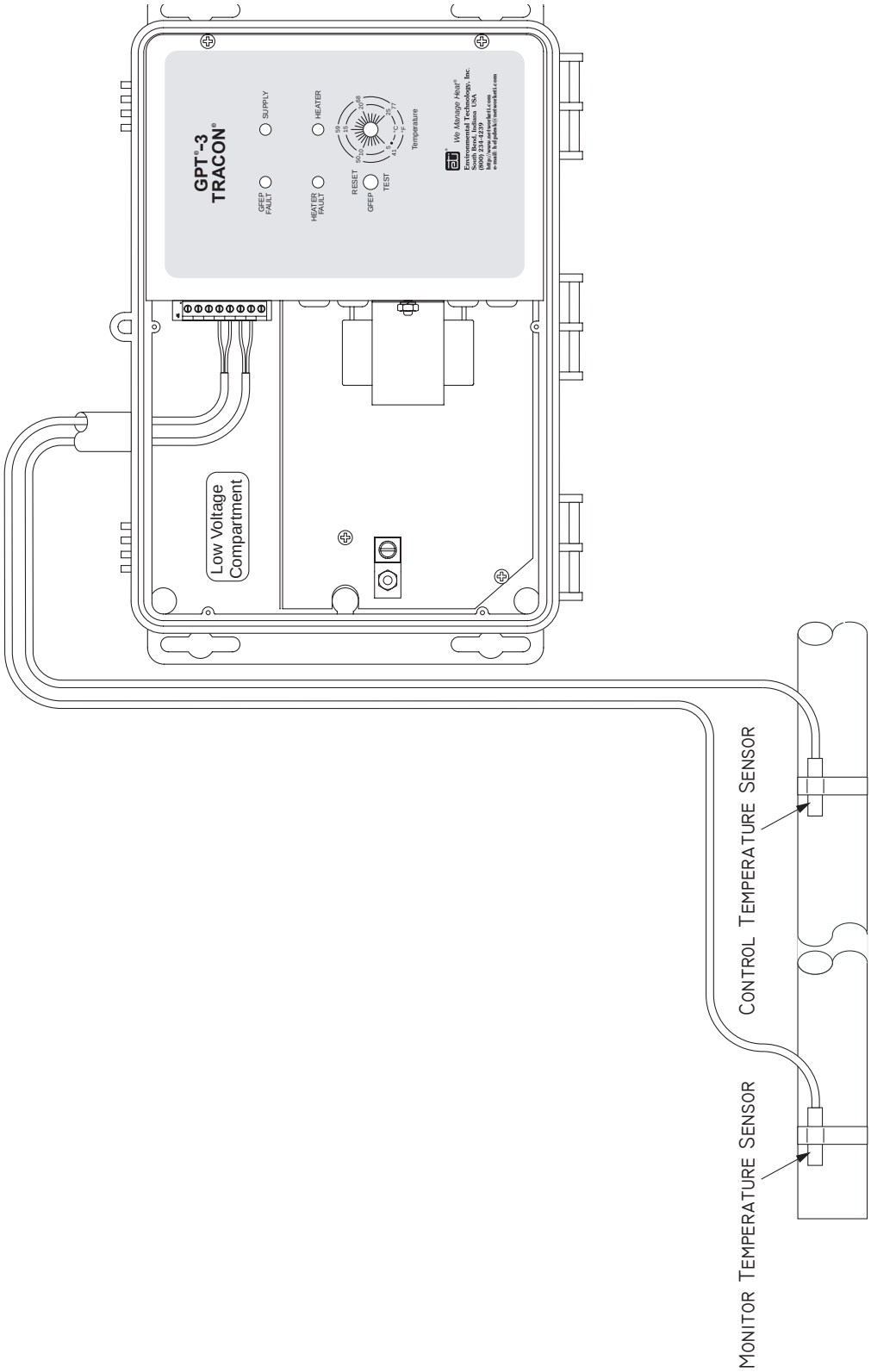
Appendix A. GPT–3 dimensional drawing.



Appendix B. GPT–3 wiring diagram.



Appendix C. Control and monitor sensor connections for self-limiting heaters.



Appendix D. Control and monitor sensor connections for constant wattage heaters