

## SKORPION™ Process Air Heater



CE



### Safety



**SHOCK HAZARD!**

Only qualified individuals should install this heater and related controls. Follow all applicable electrical codes and use proper wiring.



**BURN HAZARD!**

Avoid contact with the heater nozzle during or soon after operation.



**EXPLOSION HAZARD!**

Heater produces extremely high temperatures. Do not use in hazardous environments, and/or near explosive or reactive gases, or combustible materials.

## Description

The SKORPION™ Process Air Heater from Tutco SureHeat represents the perfect combination of power, size, reliability and control in Air Heating technology.

The SKORPION™ Process Air Heater produces air temperatures from 1200°F (650°C) (120V version) to 1400°F (760°C) (230V version). A closed-loop PID temperature control system ensures precise control of your process.

If used correctly, an element life of 5000 hours or greater can be expected.

## Limited Warranty

Tutco SureHeat Products Inc. ("OSPI") warrants that this Product will be free of defects in material and workmanship for a period of two (2) years from date of purchase. Buyer's sole remedy, and Tutco SureHeat obligation, under this warranty is limited to (at Tutco SureHeat option) repairing or replacing any non-conforming Product or granting a credit to Buyer for the Product. A replacement Product assumes the remaining warranty of the original Product. This warranty shall not apply to any Product that has been repaired or altered, except by Tutco SureHeat, or that has been subjected to abuse or mishandling. Tutco SureHeat express warranty applies only when the Product is properly operated in accordance with specifications and instructions.

THE FOREGOING CONSTITUTES THE SOLE AND EXCLUSIVE REMEDY OF BUYER. OSPI DISCLAIMS ALL OTHER REPRESENTATIONS AND WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCT, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL OSPI BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING LOST PROFITS OR REVENUES OR ANY OTHER COSTS OR DAMAGES. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS AND/OR DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS AND EXCLUSIONS MAY NOT APPLY.

To obtain service under this warranty, contact the **place of purchase** within two (2) years following date of purchase. The following information must be provided in writing:

- (i) Order number under which the Product was shipped;
- (ii) Model/Serial Number; and
- (iii) Reason for rejection.

Failure to follow this procedure shall void the warranty.

Tutco SureHeat reserves the right (i) to examine the failed Product to determine the cause of failure and patterns of usage and (ii) to be the sole judge as to whether the Product is defective and covered under this warranty.

The information contained in this manual is based on data considered to be true and accurate. Reasonable precautions for accuracy has been taken in the preparation of this manual, however Tutco SureHeat assumes no responsibility for any omissions or errors, nor assumes any liability for damages that may result from the use of the product in accordance with the information contained in this manual.

## Heater Models and Parts List

### SKORPION™ AIR HEATERS

### REPLACEMENT PARTS

|                                      | Heating Element | Temp Control | SSR Power Control | Blower  | 1" NPT adaptor plate | Nozzle Tube |
|--------------------------------------|-----------------|--------------|-------------------|---------|----------------------|-------------|
| <b>Complete Unit with Blower</b>     |                 |              |                   |         |                      |             |
| F075615 1.5kW 120V~ 1 Ø 12.5A        | F205526         | F205499      | F205486           | F205513 | N/A                  | F205494     |
| F075616 3.0kW 230V~ 1 Ø 13A          | F205502         | F205499      | F205486           | F205512 | N/A                  | F205494     |
| F076008 4.5kW 230V~ 1 Ø 20A          | F205614         | F205499      | F205486           | F205604 | N/A                  | F205494     |
| <b>Complete Unit without Blower*</b> |                 |              |                   |         |                      |             |
| F075869 1.5kW 120V~ 1 Ø 12.5A        | F205526         | F205499      | F205486           | N/A     | F205549              | F205494     |
| F075835 3.0kW 230V~ 1 Ø 13A          | F205526         | F205499      | F205486           | N/A     | F205549              | F205494     |
| F076029 4.5kW 230V ~ 1 Ø 20A         | F205614         | F205499      | F205486           | N/A     | F205549              | F205494     |

**\*SKORPION Models without Blower are supplied with a 1" NPT adaptor plate for separate air source connection (<5 PSI).**

| ACCESSORIES |                  |                          |
|-------------|------------------|--------------------------|
| F075744     | High Flow Nozzle | 21mm (1") diameter       |
| F075745     | Standard Flare   | 150mm x 12mm (6"x0.5")   |
| F075746     | Wide Flare       | 300mm x 4mm (12"x 0.16") |

## General Information

### Environmental Conditions

|                     |   |
|---------------------|---|
| Ambient Temperature | 0°C to 38°C (32°F to 100°F)             |
| Humidity            | 0% to 90% R.H.                          |
| Ambient Pressure    | 0.8 to 1.2 Bar (11.8 psia to 17.6 psia) |

### Ventilation

Use in a well-ventilated area away from excess dust, dirt, and moisture.

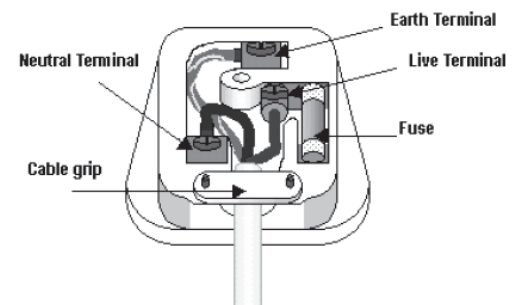
### Cleaning

With unit OFF and unplugged, exterior surfaces may be wiped clean using a damp cloth.

### Attaching 230V (European style) plugs

(see diagram):

NOTE: Use plug appropriate for local area and codes. Only qualified personnel should perform wiring. Overcurrent protection should be provided external to the heater unit within plug type shown or similar fusing.



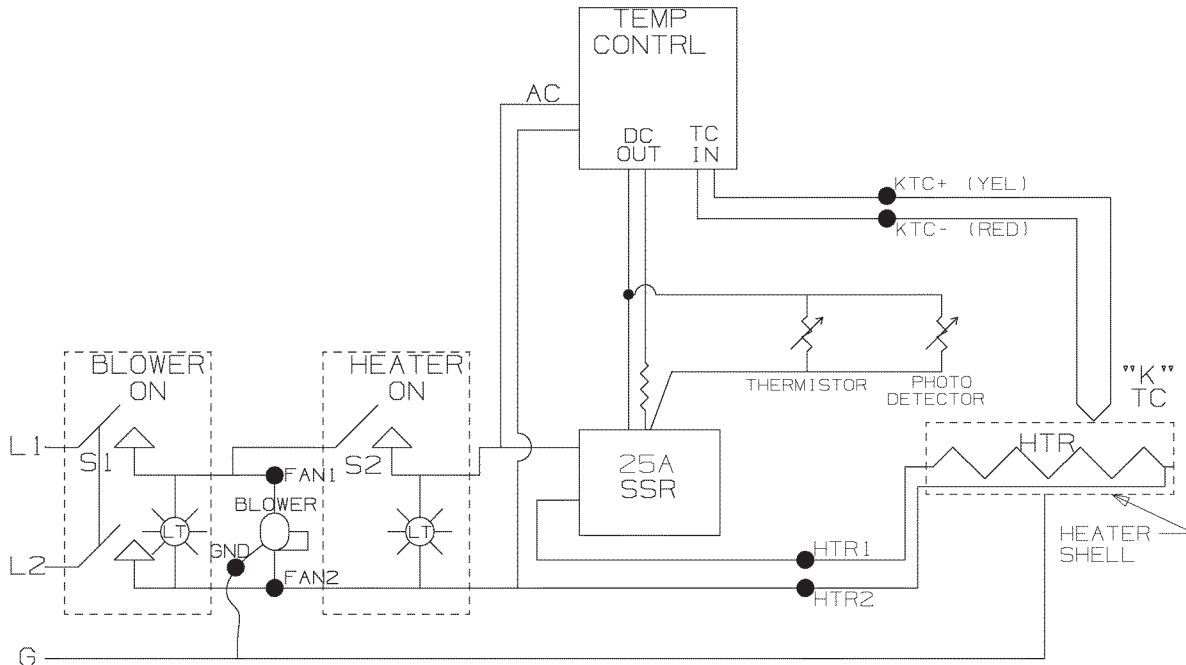
### Protective Earthing

The yellow and green ground wire in the power cable is attached directly to the aluminum base plate inside the heater via a dedicated screw terminal. Additional protective earthing can be attached to the aluminum base plate if desired.

## Basic Operation

1. **Turn SKORPION air heater ON** using two switches:
  - 1.1. Switch S1 (blower) sends power to the blower and to heater switch S2.
  - 1.2. Switch S2 (heater) sends power to the heater control circuit.
  - 1.3. Note, for heater safety, S2 (heater) cannot turn ON without S1 (blower) ON.
2. **Adjust airflow** via a rotational air damper at the blower inlet.
3. **Adjust temperature set point** with the UP/DOWN arrows on the temperature controller. Heater will ramp to temperature.
  - 3.1. The process temperature is measured with an internal type “K” thermocouple located at the end of an element inside the stainless housing.
4. When **turning the heater off** the heater power (S2) may be turned off and the blower (S1) left on to cool the heater housing assembly. This is suggested to prevent burn injury of personnel around the heater but is not necessary for safety of the heater element.

## Detailed Operation



- **Heater Voltage** is regulated by a Solid State Relay (SSR), which is turned ON and OFF rapidly according to the temperature controller DC OUT signal. A “zero cross” type SSR is used to minimize electrical noise.
- **Heater Element** is protected with a resistive photo detector and a thermal resistor (thermistor) mounted at the heater inlet. These sensors are connected in parallel with the DC input signal going to the SSR.
  - If the element overheats (bright orange color) the photo detector resistance decreases which reduces the control signal which, in turn, limits power to the heater.
  - If the air temperature in the housing reaches an unsafe level, the thermistor resistance decreases which reduces the control signal, which in turn, limits power to the heater.
  - A small fixed resistor in series with the control signal sets element and air temperature limits.
- The large black dots on the wiring diagram represent connections that are made on the internal terminal strip. The terminal strip allows the customer easy access to remove and replace the heater element and blower if necessary.

## Performance

| Heater Model   | 1.5kW 120V            | 3.0kW 230V            | 4.5kW 230V             | Without blower* |
|--|-----------------------|-----------------------|------------------------|-----------------|
| <b>MAXIMUM AIR TEMP<br/>with exit restriction</b>        |                       |                       |                        |                 |
| Open ended/flare   | 1000°F<br>(540°C)     | 1400°F<br>(760°C)     | 1400°F<br>(760°C)      | *see note       |
| High flow nozzle   | 1300°F<br>(730°C)     | 1400°F<br>(760°C)     | 1400°F<br>(760°C)      | *see note       |
| <b>MAXIMUM FLOW RATE<br/>no restriction, 60Hz power.</b> |                       |                       |                        |                 |
| At 20°C (68°F)   | 25 SCFM<br>(708 SLPM) | 25 SCFM<br>(708 SLPM) | 45 SCFM<br>(1274 SLPM) | *see note       |
| At 750°C (1400°F)  | 12 SCFM<br>(340 SLPM) | 12 SCFM<br>(340 SLPM) | 22 SCFM<br>(623 SLPM)  | *see note       |

**\* FOR SKORPION models without Blower (external air source):**

A) The maximum temperature capability of heater will depend entirely on the airflow rate produced by external air source. Higher airflow rates than those produced by the standard SKORPION blower will yield lower maximum temperatures.

B) External air supply must be turned ON prior to turning heater ON

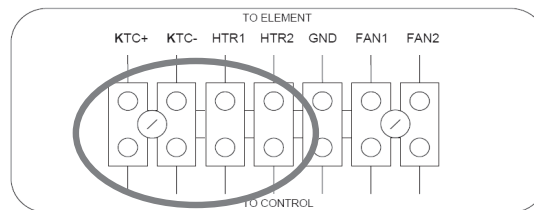
C) For best flow conditions, use min. 3/4" NPT size incoming air line.

D) Do not exceed 5 psi (.34 BAR) or air leaks will be noticeable in the heater.

## Replacement Procedures

### I. Replacing the Heating Element

1. Turn heater/blower switches OFF, and disconnect from power source.
2. Use a flat screwdriver to remove (pry open) the wiring cover under the stainless nozzle tube.
3. Remove the stainless nozzle by removing the two mounting screws, and the thru-bolt which passes through the plastic support tower and threads into the nozzle flange.
4. Disconnect the KTC+ (Yellow), KTC- (Red), HTR1, HTR2 connections from the wiring terminal as shown. Total of four wires.



5. Remove the old element, pulling the KTC and HTR wires through the plastic support tower.
6. Install new element by reversing steps 2-5.

### II. Replacing the Temperature Controller

1. Turn heater/blower switches OFF, and disconnect from power source.
2. Remove the four screws which secure the black plastic top cover plate.
3. Remove the four screws which attach the aluminum base plate to the main heater plastic structure.
4. With the top cover plate and the aluminum plate removed, you now have access to the top and bottom mounting tabs on the temperature controller.
5. While lifting the top and bottom white plastic mounting tabs, gently push the temperature controller halfway out of the faceplate.
6. Using masking tape or other method, mark each wire going to the back of the controller with a number 1-9, corresponding to its terminal location. This is CRITICAL to ensure proper wiring to the new controller.
7. Using a small screwdriver, loosen and remove the wires from the terminals at the rear of the temperature controller.
8. Remove temperature controller completely from the faceplate.
9. Install new temperature controller halfway into faceplate.
10. Reconnect the wires according to the terminal number and ID marking from step #4.
11. Press controller into faceplate while engaging the white mounting tab securely.
12. Replace the black plastic top cover plate and reattach mounting screws.

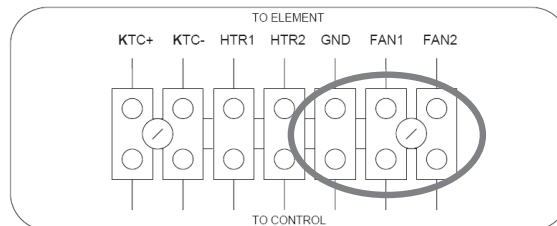
### III. Replacing the Power Controller

NOTE: Thermally conductive compound (“heat sink grease”) is required to mount new SSR.

1. Turn heater/blower switches OFF, and disconnect from power source.
2. Remove the four screws which secure the black plastic top cover plate.
3. Remove the four wires connecting to the four terminals on the solid state relay. Be sure to mark the wires clearly for re-installation.
4. Remove the two screws holding the Solid State Relay from the aluminum base plate and remove the SSR.
5. Carefully wipe off the old white heat sink putty from the base plate and apply new heat sink putty on the back of the new SSR.
6. Mount SSR onto aluminum base plate with the mounting screws and reconnect wires.
7. Replace the black plastic top cover plate and reattach mounting screws.

### IV. Replacing the Blower

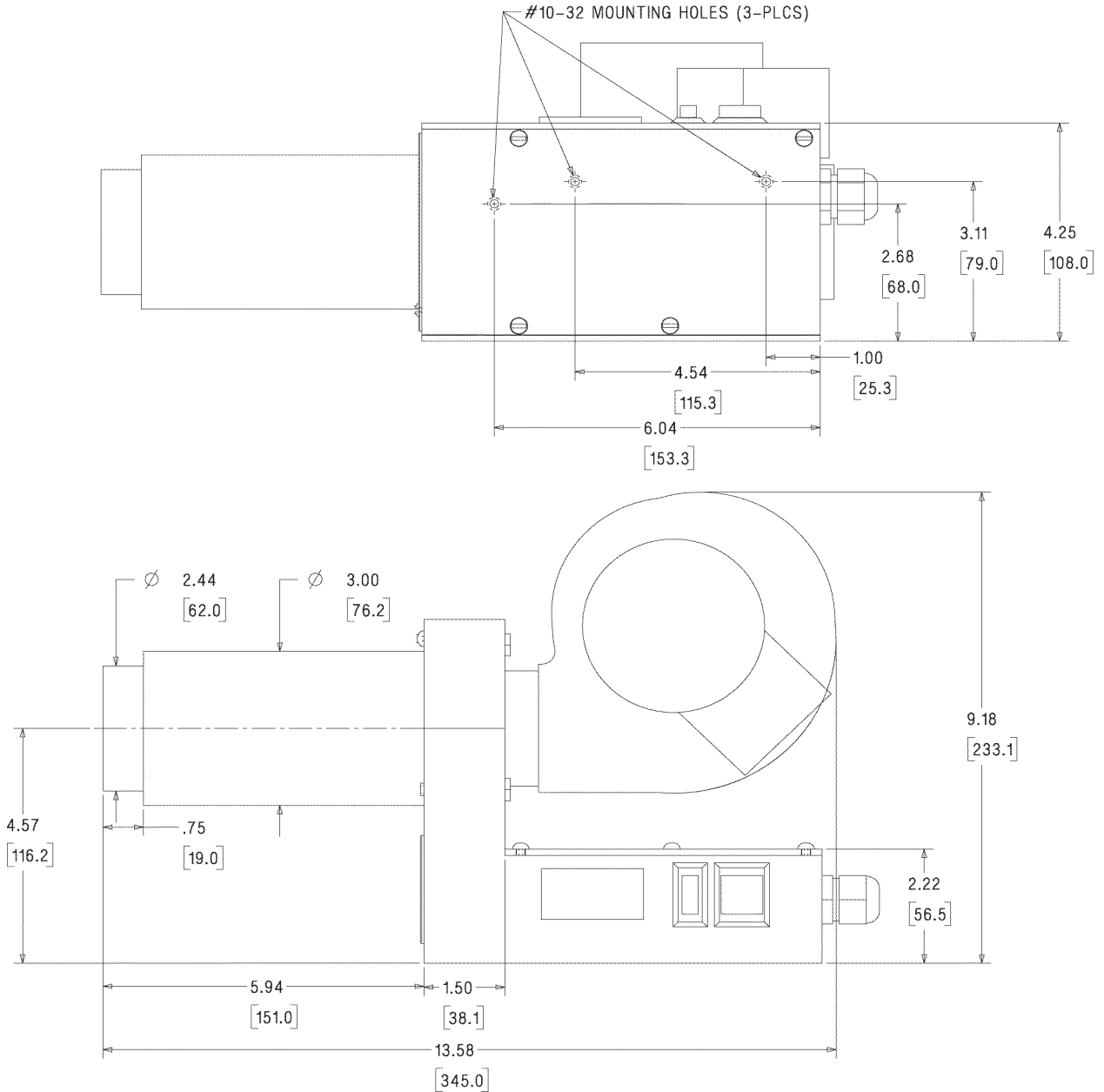
1. Turn heater/blower switches OFF, and disconnect from power source.
2. Use a flat screwdriver to remove (pry open) the wiring cover under the stainless nozzle tube.
3. Remove the blower by removing the three mounting bolts. One of these bolts passes through the plastic support tower and threads into the nozzle flange.
4. Disconnect the GND, FAN1, and FAN2 connections from the wiring terminal as shown. Total of three wires.



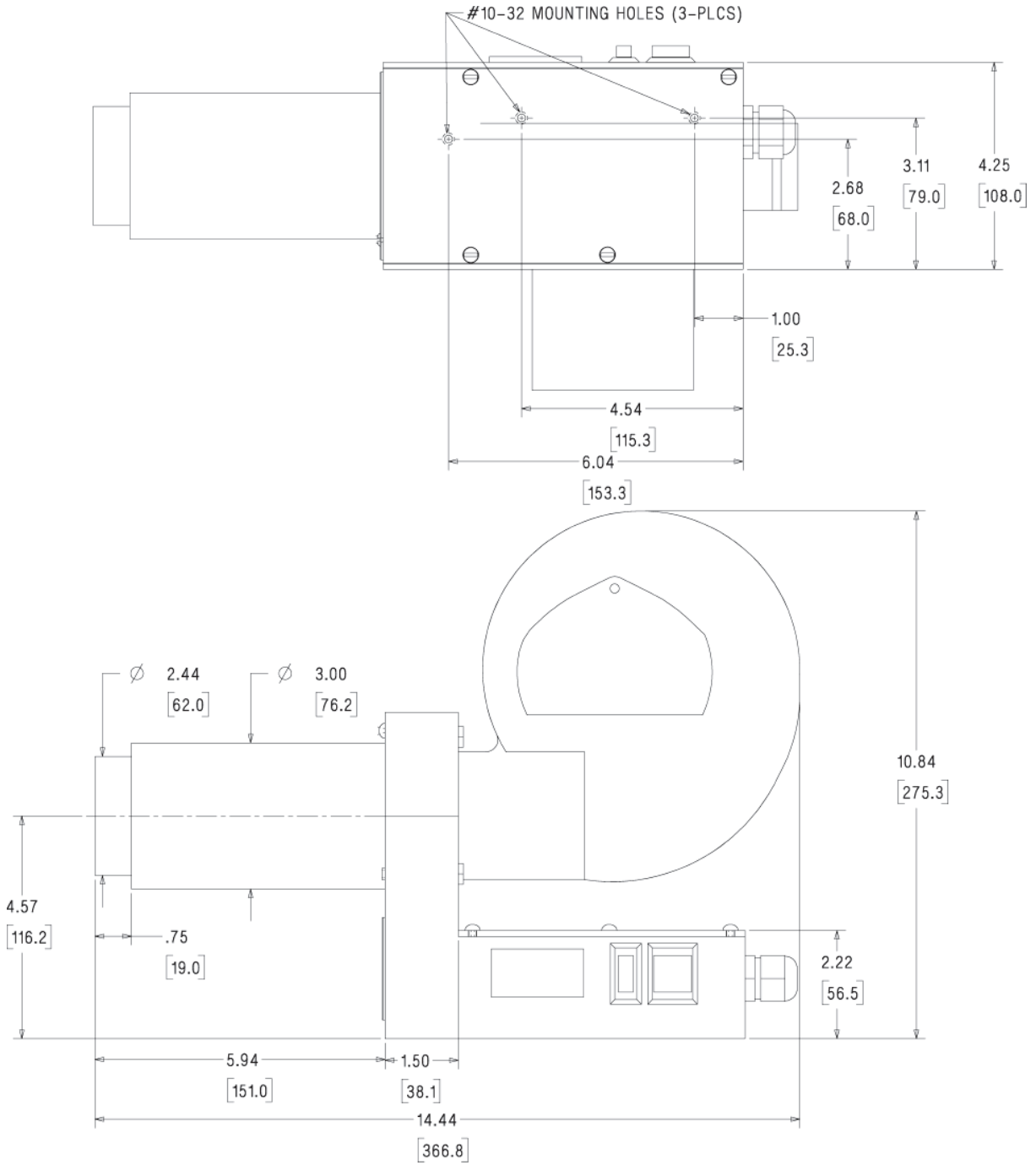
5. Remove the blower, GND, FAN1, FAN2 wires through the plastic support tower.
6. Install new blower by reversing steps 2-5.



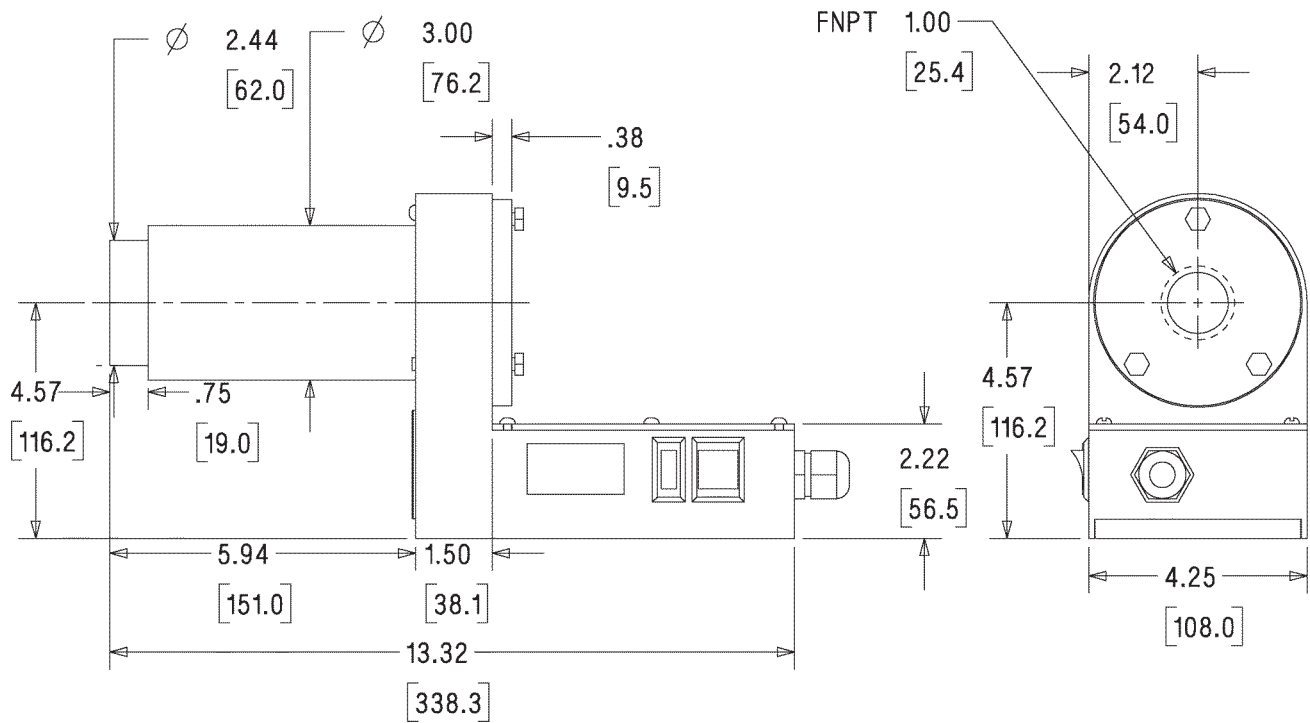
**SKORPION™ (1.5kW/3.0kW)**



**SKORPION™ (4.5kW)**



**SKORPION™ Without Blower (1.5kW/3.0kW/4.5kW)**





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