



ISO 9001  
Certified

*...Innovative liquid vaporizing and gas mixing solutions*

# COMPEXX

*Process Heater*

*Operations & Maintenance  
Manual*

Tel: +1-206-789-5410

[www.algas-sdi.com](http://www.algas-sdi.com)

MANUAL PN 55086 COMPEXX REV 8-23-23

# **WARNING**

Read the OPERATION MANUAL before operating this equipment.

- **NOTE:** Algas-SDI reserves the right to use alternate manufacturers' components as vendor delivery applicability dictates. Vendors have supplied literature contained in the Operation Manual. Please check to be sure supplied data matches your configuration. Contact Algas-SDI if any questions exist.
- This equipment handles fluids under pressure which may be flammable. Inherent hazards exist and a thorough understanding of the equipment is required to allow safe operation and maintenance.
- Allow only a **TRAINED and FULLY QUALIFIED PERSON** to service this equipment.
- Any time a component must be replaced use the same type, model etc. **DO NOT SUBSTITUTE!** The consequence from such actions is unpredictable and may lead to dire consequences.

## **Warranty and Copyright**

### **WARRANTY**

---

Algas-SDI International, LLC (ASDI) warrants that the equipment is free of defects in materials and workmanship under normal use and service. ASDI agrees to repair or replace, at our option, without charge f.o.b. factory, any part which has proven defective to the satisfaction of Algas-SDI International, LLC within one (1) year from the date of the original installation or within 18 months from the date of shipment, whichever is earlier. Equipment, which in the opinion of ASDI, has been damaged by improper installation or operation, or has been abused or tampered with in any way, will not be accepted for return under warranty.

Algas-SDI International, LLC will not accept back charges for work performed by others upon or in conjunction with ASDI equipment, unless prior authorization is given by means of an Algas-SDI International, LLC purchase order. Algas-SDI International, LLC will not be liable by reason of shutdown, non-operation or increased expense of operation of other equipment, or any other loss or damage of any nature, whether direct or consequential, arising from any cause whatsoever.

Algas-SDI International, LLC makes NO other warranty of any kind, whatsoever expressed or implied; and all warranties of merchantability and fitness for a particular purpose are hereby disclaimed by Algas-SDI International, LLC and excluded from these terms of sale. No person has any authority to bind Algas-SDI International, LLC to any representation or warranty other than this warranty.

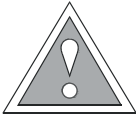
### **COPYRIGHT**

---

© Copyright 2023 by Algas-SDI International, LLC, Kent, Washington 98032 All rights reserved. No part of this manual may be reproduced or copied in any form or by any means, photographic, electronic, or mechanical, without the prior express written consent from Algas-SDI International, LLC, Kent, Washington, USA.

## **SYMBOLS AND CONVENTIONS**

*Special symbols are used to denote hazardous or important information. You should familiarize yourself with their meaning and take special notice of the indicated information. Please read the following explanations thoroughly.*



### **GENERAL WARNING OR CAUTION**

*This symbol indicates hazards or unsafe practices, which can result in damage to the equipment or cause personal injury. Use care and follow the instructions given.*



### **FLAMMABLE GAS HAZARD**

*This symbol indicates a potential hazard, which can result in severe personal injury or death. Use extreme care and follow the instructions given.*



### **ELECTRICAL DISCONNECT REQUIRED**

*This symbol indicates a potentially dangerous situation, which can result in severe personal injury or death or damage to equipment. Use great care and follow the instructions given.*

### **ASDI CONTACT NUMBERS**

*If you have questions, need help with your equipment, or want information on other products, contact Algas-SDI at:*

**Global Support Center: 206.762.HELP (4357)**

**Telephone: 206.789.5410**

**Facsimile: 206.789.5414**

**Email: [sales@algas-sdi.com](mailto:sales@algas-sdi.com)**

**Internet: <http://www.algas-sdi.com>**

# **COMPEXX TABLE of CONTENTS**

## **1. INTRODUCTION**

DESCRIPTION	1-1
-------------	-----

## **2. MAJOR COMPONENTS**

<i>Figure 2 – Heating system</i>	2-2
----------------------------------	-----

## **3. INSTALLATION**

GENERAL	3-3
SAFETY RELIEF VALVE	3-3
ELECTRICAL SERVICE	3-3
DETERMINING WIRE SIZE	3-4
<i>Table 1 – Wire Length Chart (4 AWG)</i>	3-5
<i>Table 2 – Wire Length Chart (6 AWG)</i>	3-5
<i>Table 3 – Wire Length Chart (8 AWG)</i>	3-6
<i>Table 4 – Wire Length Chart (10 AWG)</i>	3-6

## **4. OPERATION**

GENERAL	4-7
OPERATING INSTRUCTIONS	4-7
STARTING THE PROCESS HEATER	4-7
STOPPING THE PROCESS HEATER	4-8

## **5. MAINTENANCE**

GENERAL	5-9
CONTACTOR INSPECTION	5-9

## **6. TROUBLESHOOTING**

TROUBLESHOOTING TREES	6-11
TREE 1 – COMPEXX NOT HEATING – control board light off	6-12
TREE 2 – COMPEXX NOT HEATING – control board light green	6-13
TREE 3 – COMPEXX NOT HEATING – control board light red	6-14

FULL LOAD VOLTAGE CHECK	6-15
<i>Figure 3 – Full load voltage check</i>	6-15
FULL LOAD CURRENT CHECK	6-16
<i>Figure 4 – Full Load Current Check</i>	6-16
HEATER CORE RESISTANCE	6-17
<i>Figure 5 – Heater Core Resistance Wiring Connections</i>	6-17
THERMOCOUPLE SENSOR REPLACEMENT	6-18
<i>Figure 6 – COMPEXX Box showing Thermocouple location</i>	6-18
<i>Figure 7 – Thermocouple Sensor with Bayonet Style Retainer</i>	6-19

## ***DESCRIPTION***

The **Algas-SDI COMPEXX Process Heater** is intended for process heating applications requiring up to 40 kW power. The modular design allows for single- or multi-unit configurations. Utilizing electric heating elements cast “in-situ” into an Aluminum core, the COMPEXX eliminates the need for water/glycol and circulation pumps making this “dry design” simple and corrosion-free. The Process fluid itself is contained within a 316 SS coil also cast into the aluminum heater block. Two thermocouples control normal operation and provide over-temperature protection.



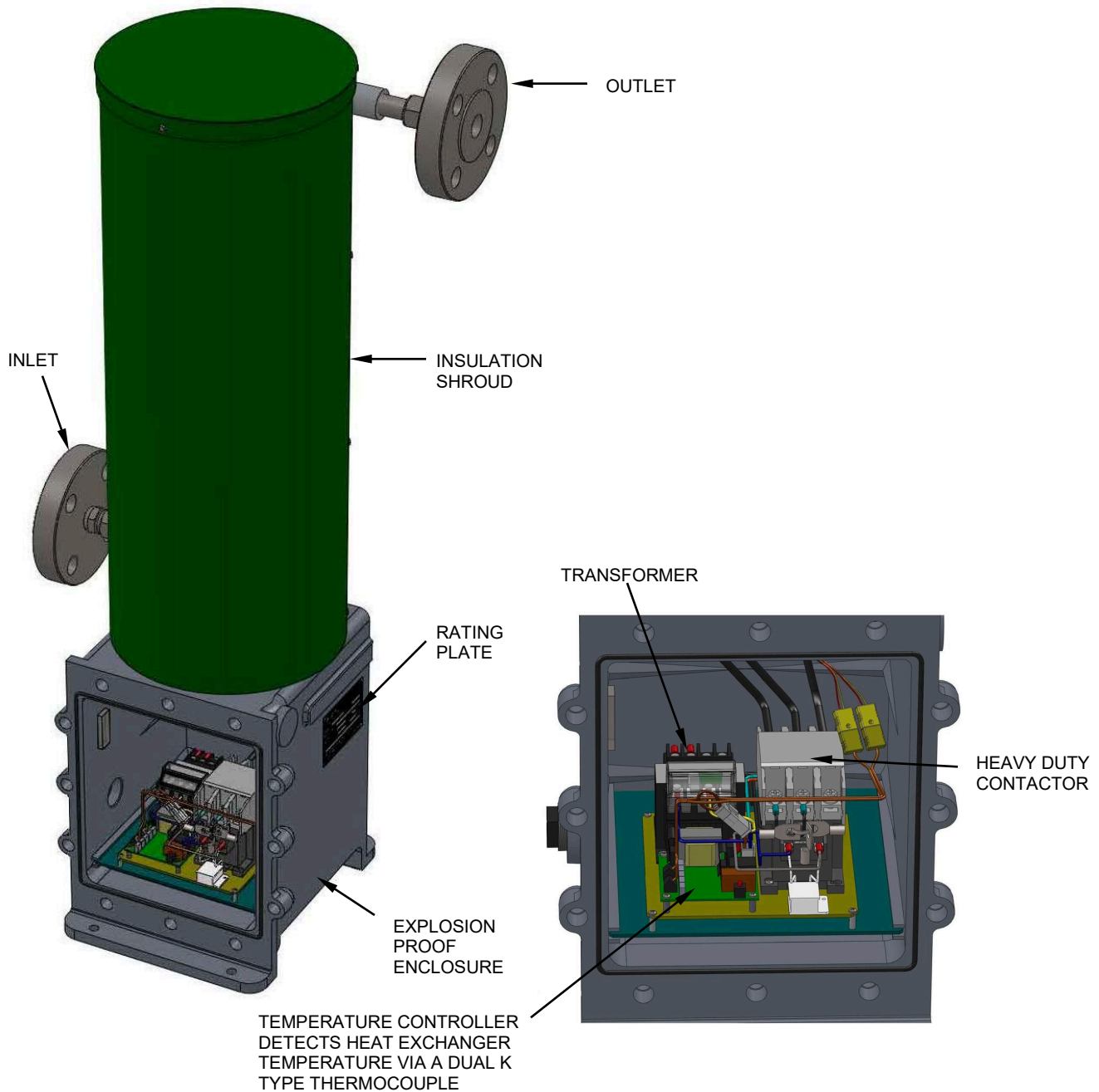


# MAJOR COMPONENTS

# 2

Your New COMPEXX Process Heater is designed to be reliable and user friendly. The heating system of the COMPEXX Process Heater is self-regulating, there are no start stop switches, it engages automatically once power is applied.

**Figure 2 – Heating system**





## GENERAL

Install the COMPEXX Process Heater on a level firm base at least 6" above grade and secure it through the four ½" holes. Protect the equipment against damage from moving vehicles by use of an appropriate barrier. Consult state, provincial, insurance carriers, and local authorities for installation requirements. Clean all foreign material from all pipelines prior to making final connections. Isolation valves are recommended on the inlet and outlet of the process heater. All joints require a pipe sealant approved for the gas, depending on type of service. Test for leaks using an inert gas, such as compressed carbon dioxide or nitrogen, at 1½ times the working pressure or as required by applicable codes. Make sure to pay attention to any relief valve setpoints. Check all connections using an appropriate leak detection solution or device. Even very small leaks are unacceptable. Eliminate all leaks prior to operation.

Install in accordance with applicable codes and local regulations as required.  
**Explosion proof seal off must carry the same approvals as the process heater in order to maintain the approval of the overall installation.**

## SAFETY RELIEF VALVE

A safety relief valve is installed at each location within the inlet and outlet piping which may be isolated and may see the pressure buildup beyond the pressure ratings of the system. Size your relief valve in such a way to protect the component with the lowest pressure rating. Install safety relief valve in accordance with applicable codes and local regulations. If the process heater is to be installed within an enclosure or building, VENT THE SAFETY RELIEF VALVE OUTSIDE THE ENCLOSURE AND REDIRECT THE DISCHARGE UPWARD. A pipe-away adapter must be used at the relief valve. Always install a rain-cap or similar device to prevent water and other debris from entering the relief discharge. If water enters, it may freeze and prevent the relief valve from proper discharge, creating a potentially hazardous situation.

## ELECTRICAL SERVICE

The rating plate on the process heater and the data sheet provided with the manual provides your specific process heater's electrical power requirements and the drawing numbers of the appropriate wiring diagrams and schematics. This unit is constructed to meet NFPA 70 Class I, Division 1, Group D requirements. All wiring to the unit, including the ground connection, must meet the applicable codes for the area in which it is being installed. Wire size and type must comply with the applicable codes for the area in which it is being installed. The Tables 1 through 4 list the recommended wire size for the different models. Those tables are to be used as guides only. Provide a fused disconnect outside of the classified area. If it is not within sight of the process heater, the fused disconnect must have a locking device. Run wire within rigid conduit and install a seal-off at the connection of the field conduit to the process heater.

## WIRE SIZE

When selecting the type and size of wire used to install the COMPEXX Process Heater, please take into account the following environmental information:

- Maximum enclosure surface temperature: 65°C (150°F).
- Maximum enclosure ambient temperature: 65°C (150°F).
- Maximum temperature allowed at contactor terminals: 90°C (195°F).
- Current draw of process heater: Indicated on process heater rating plate and on the data sheet.
- Contactor terminal lug wire size range: #2 - 10.

As the length of the wire run affects the overall wire size requirements, always refer to NFPA 70 (NEC) for proper wire selection. Several wire-sizing charts have been provided for determining the size of wire required due to load and length of wire.

When installing the wire, it is important to have a good connection at the terminal lugs. Loose terminals may cause an excessive temperature rise at the terminal lugs, which can lead, to premature contactor failure, transformer failure, and/or overheating and possible destruction of the transformer. **For this reason, it is strongly recommended that the wire terminations be checked and re-tightened periodically to prevent excessive overheating at the terminals due to loose connections.**

Table 1 – Wire Length Chart [4 AWG]

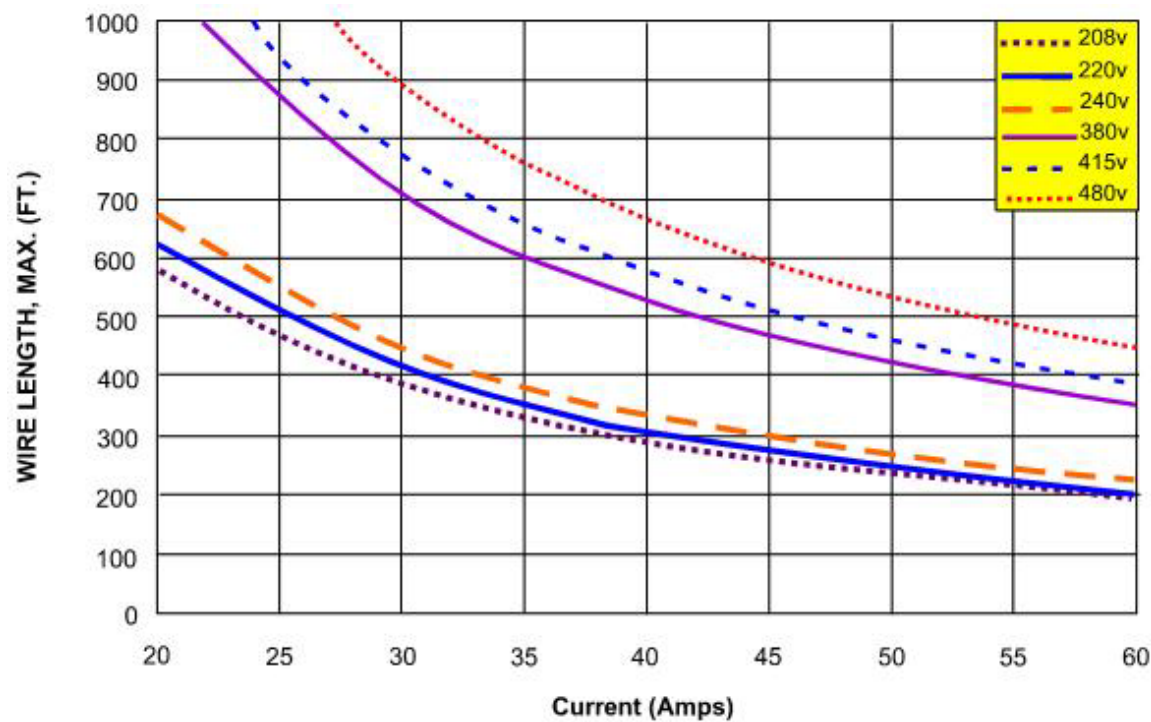


Table 2 – Wire Length Chart [6 AWG]

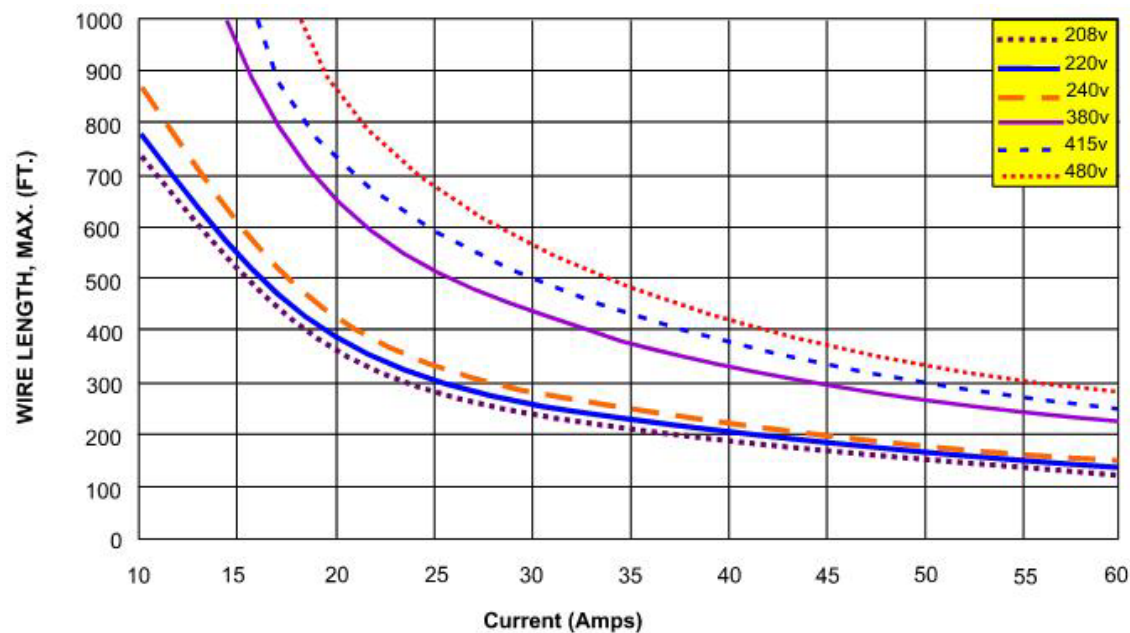


Table 3 – Wire Length Chart [8 AWG]

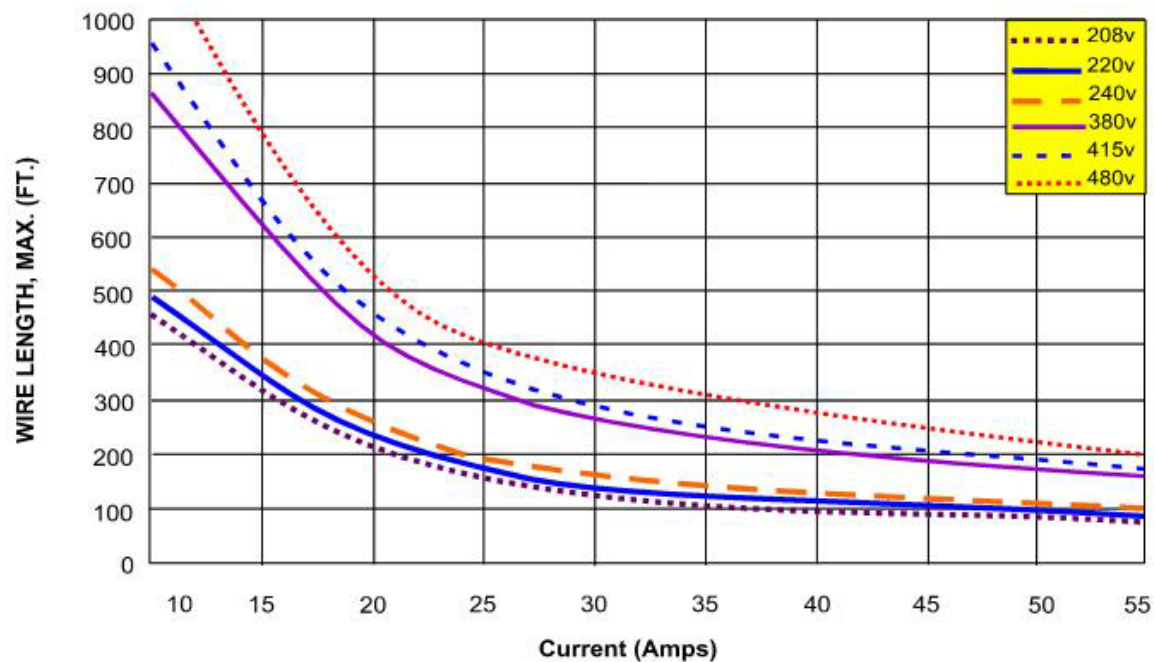
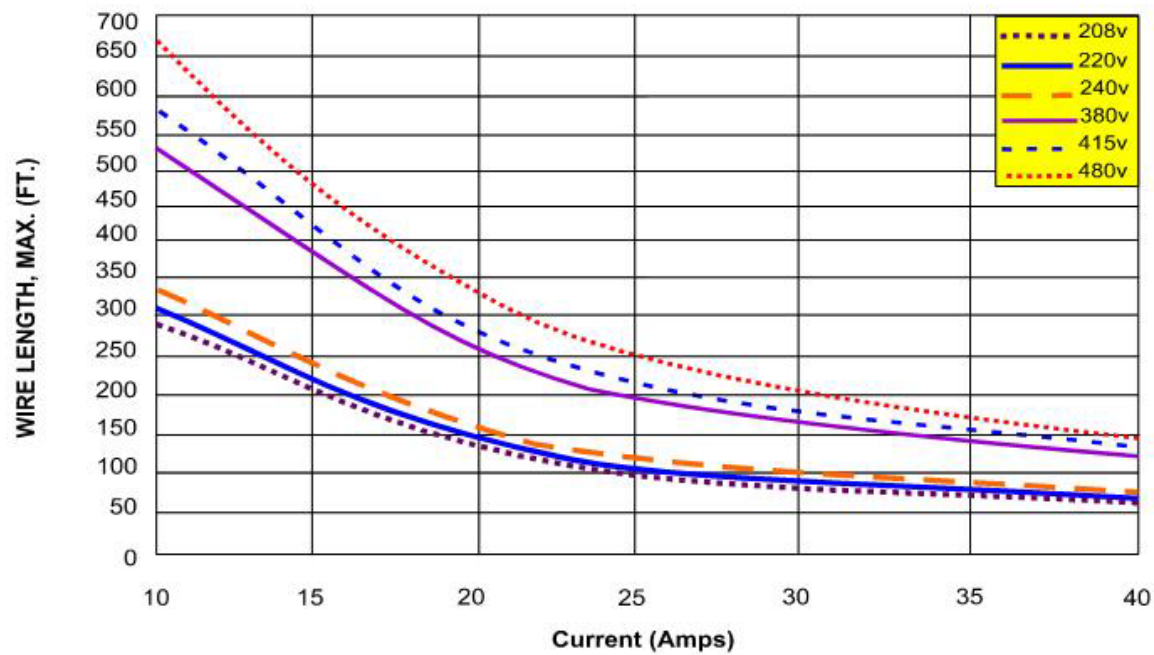


Table 4 – Wire Length Chart [10 AWG]



## GENERAL

The COMPEXX Process Heater utilizes a cast aluminum heater core. The heater core contains multiple cast-in resistance heater elements.

Gas enters the process heater through the inlet of the pressure vessel and exits thru the outlet of the vessel. **Refer to the Equipment Drawing for the inlet and outlet.**

During operation, a K-type thermocouple temperature sensor and solid state control system maintains the core temperature. Process heating takes place as the incoming gas extracts energy (heat) from the heater core. As the heater core cools, the temperature sensor provides a signal to the control system to energize the heater power contactor, applying power to the heater elements.

## OPERATING INSTRUCTIONS

- 1) Complete the installation and leak test.
- 2) Check current and voltage to verify proper operation of the process heater.
- 3) This unit will not be damaged by operating the unit in a “dry” condition. It is not necessary to have gas in the unit for testing or evaluation.
- 4) Normal operating temperature is hot. Use caution when working around vaporizer.

## STARTING THE PROCESS HEATER



### CAUTION

---

**Power wiring terminals may become loose during shipping. Prior to applying electrical power all power wiring terminals must be retightened. Recheck terminals and retighten as necessary after the first month in operation.**

---



### CAUTION

---

**Do not start the process heater when both inlet and outlet isolation valves are closed. Pressure can build in the process heater during startup beyond its rated conditions.**

---

- 1) Close the outlet isolation valve.

- 2) Open all valves between the storage tank and the process heater to allow fluid to flow to the process heater.
- 3) Apply power. A small “click” should be heard after a short delay. The process heater heating elements are now energized. It will take approximately five minutes for the process heater to reach operating temperature.
- 4) The process heater is now ready to heat gas. Slowly open the outlet isolation valve to pressurize the supply piping. Then, fully open the outlet isolation valve for gas to flow. Heaters will cycle automatically to match the flow conditions.

## **STOPPING THE PROCESS HEATER**

- 1) Close the outlet isolation valve. Do not close the inlet isolation valve. Doing so will trap gas and could allow pressure to build.
- 2) Disconnect power.

## **PURGING THE PROCESS HEATER**

Purging procedure should be followed any time a process heater needs to be maintained, serviced, relocated or shut down for any other reason.

For gas service skip to Step 4.



---

### **CAUTION**

***Prior to purging the process heater, ensure that there are no closed ball valves or back check valves restricting the flow of liquid to the tank.***

---

- 1) Close the valve at the outlet of the process heater.
- 2) If the process heater is not operating, start the process heater.
- 3) Allow, at most, 5 minutes for the process heater to heat up and push most of the remaining liquid back into the tank. You should hear the contactor cycle off.
- 4) Close the tank outlet valve.
- 5) Open the process heater outlet valve and flare or allow attached equipment to consume remaining gas in the line.



## GENERAL

The COMPEXX Process Heater is designed for long term trouble free operation. Because of the nature of its use, and the severe duty it receives, it is important to provide scheduled maintenance. A list of RECOMMENDED SPARE PARTS is located in the back of this manual.

## CONTACTOR INSPECTION



### **WARNING**

---

*The contactor that powers the heaters produces sparks which may ignite any flammable vapors in the area when the control box cover is removed. If the cover must be removed, shut off the power, remove the cover and check very carefully for fumes, leaks, or any indication of flammable vapors in the atmosphere or in the control enclosure.*

*Do not re-apply power if fumes are present. They may ignite!*

### **CAUTION**

---

*Keep a fire extinguisher available in the immediate vicinity before re-applying power when the control cover is removed.*

---

The COMPEXX Process Heater utilizes an electro-mechanical contactor to switch power to the heating elements. Since contactors wear out in normal operation, it is prudent industry practice to inspect them on a preventive maintenance basis. Manufacturers define a cycle life for contactors based upon operations at rated current. The cycle rate of the contactor in process heaters varies due to gas temperature/pressure, percent loading of the process heater, and installation specifics. Process heater testing has demonstrated that cycle rates are greatest at around 50% of the vaporizer loading and least when process heaters are energized in a standby mode.

We recommend the following inspection schedule for contactors:

- ◆ 5000 hours for process heaters in service
- ◆ 30,000 hours for process heaters in standby mode
- ◆ For process heaters operating in a combination of service and standby modes, we are providing a simple formula to help determine when contactors should be inspected.

Contactor life factor (LF) can be defined as follows:

$$LF = \frac{X}{5000} + \frac{Y}{30000}$$

When

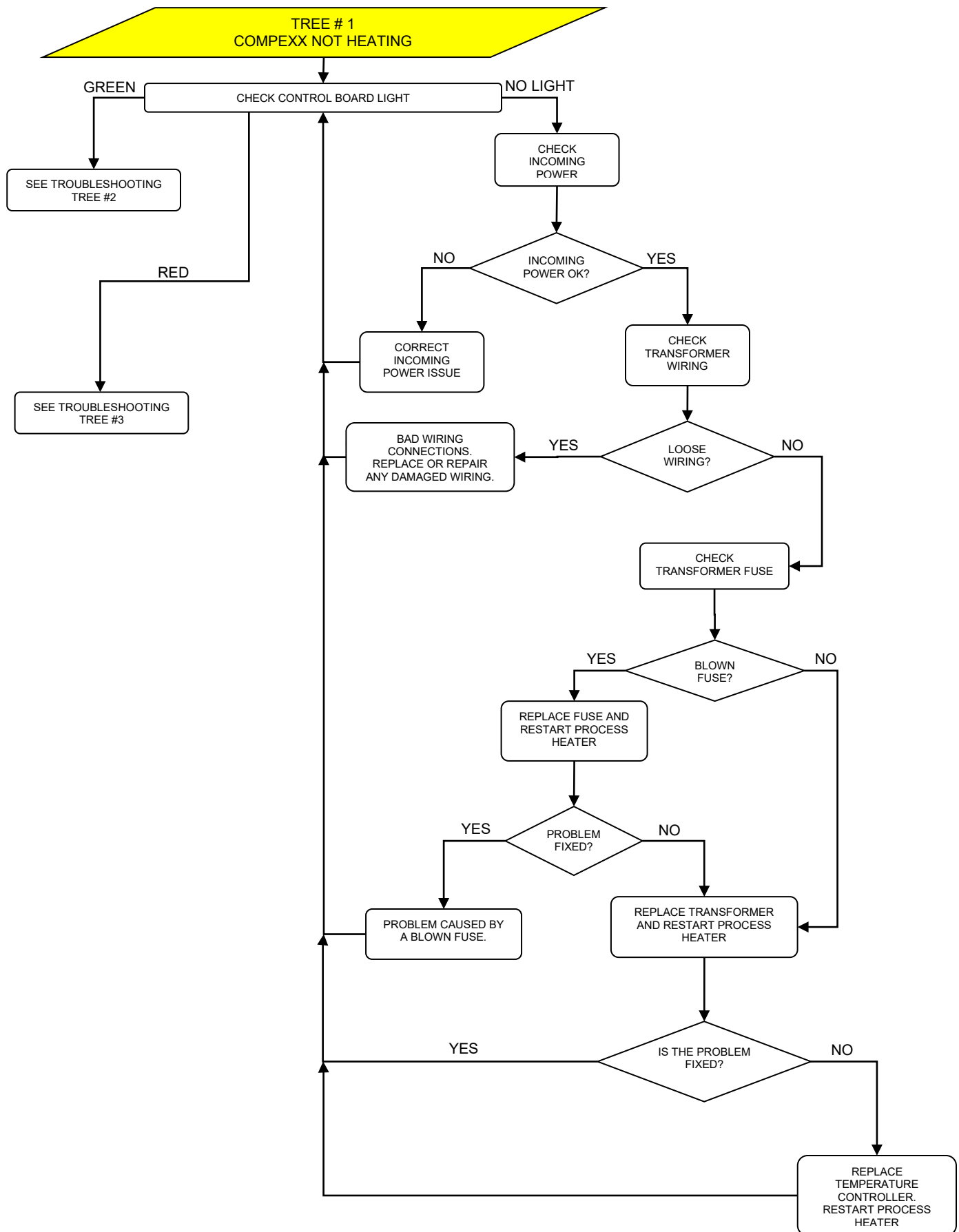
X = hours of process heater operation mode

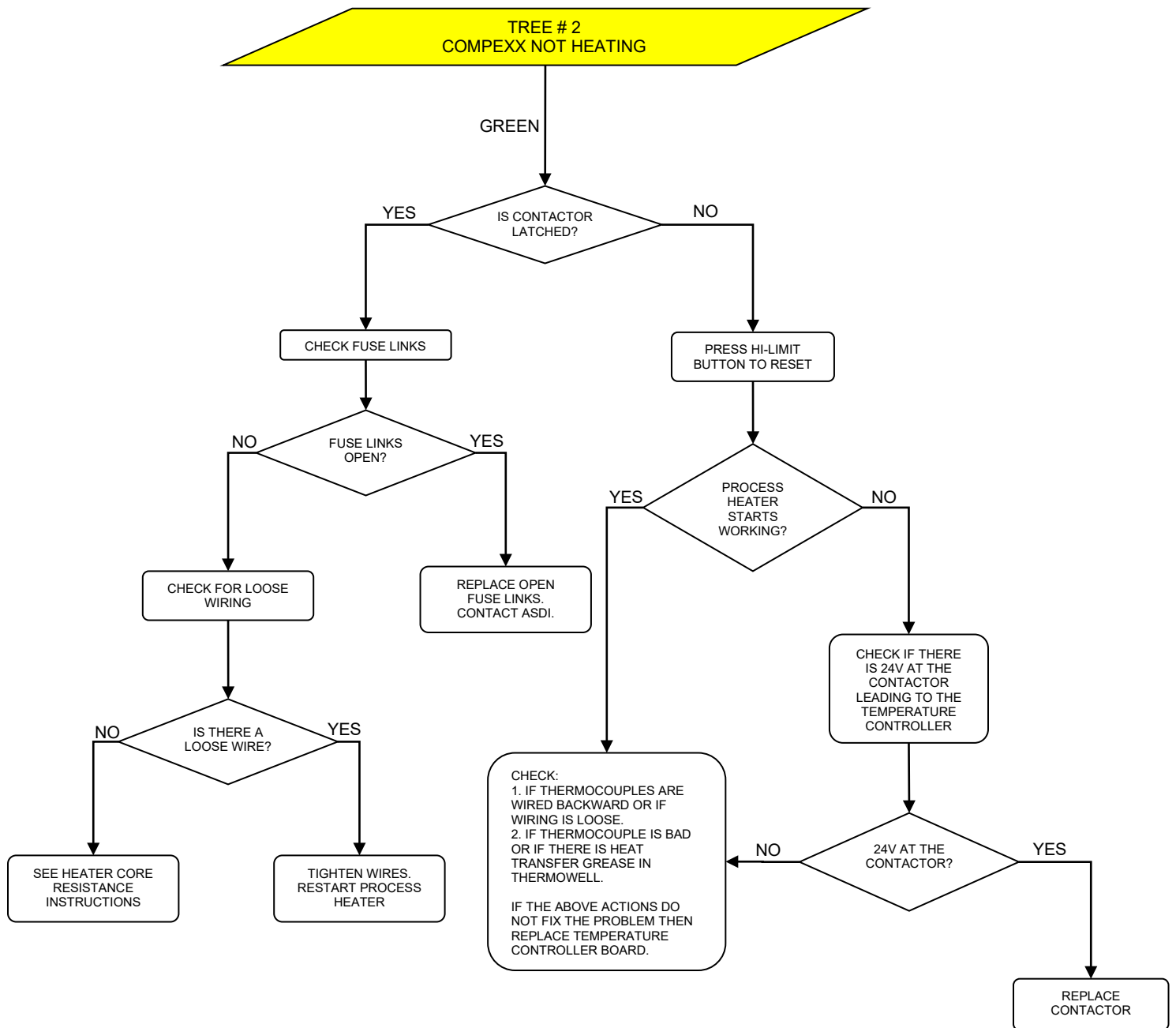
Y = hours of process heater in standby mode

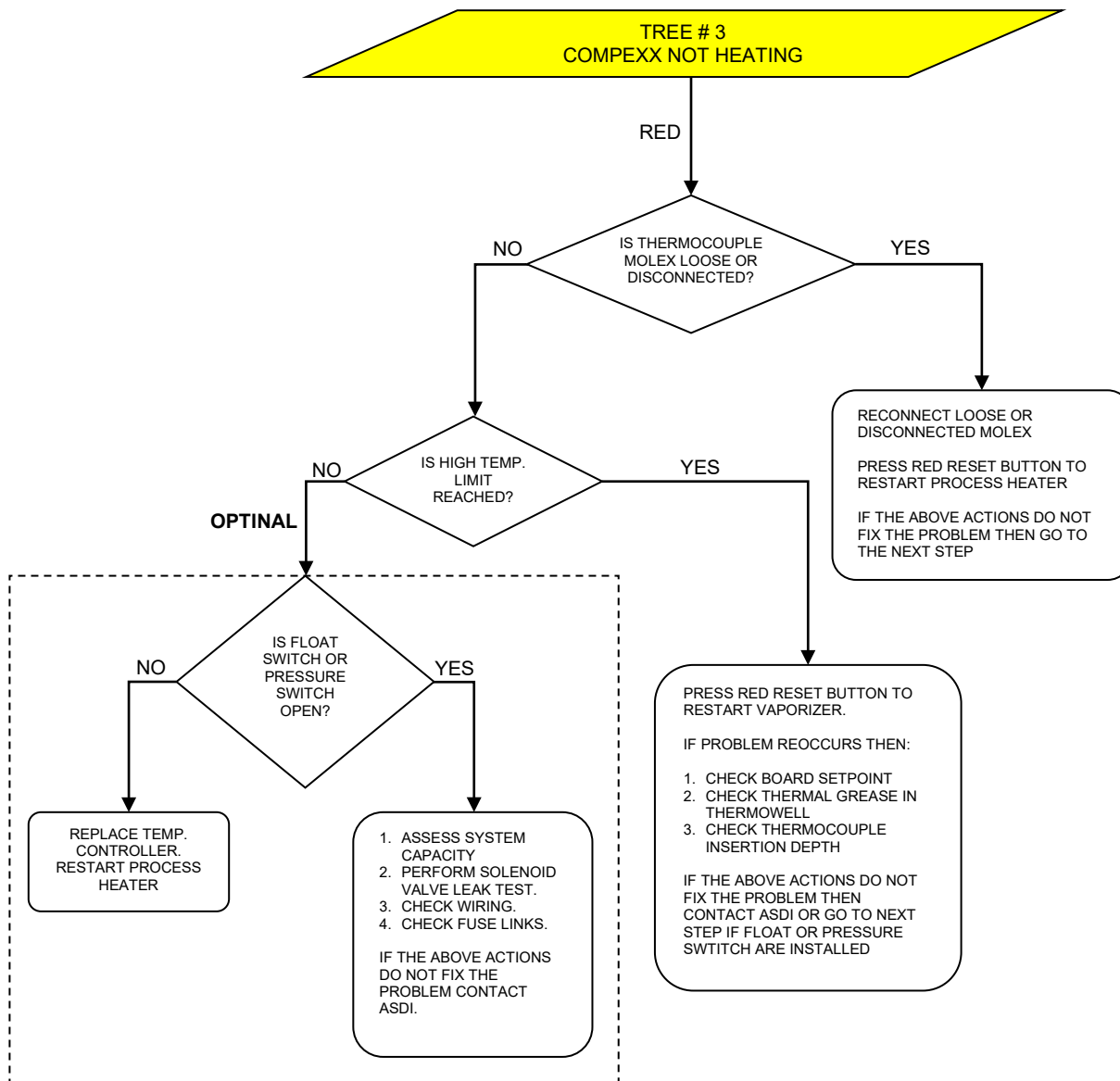
If LF is 1 or greater, the contactor should be replaced.

This data is to be used only as a guide. It is not “fool-proof” as the environment your process heater operates in and its load may affect the contactor life span.

***Follow the troubleshooting guide to identify the problem. If you need additional assistance please contact Algas-SDI.***







## Full Load Voltage Check

### NOTE

*Current flow depends on the applied voltage. Voltage lower than the specified voltage causes low current and may negatively affect operation. Make all measurements with the heater ON (Contactor closed).*

### WARNING

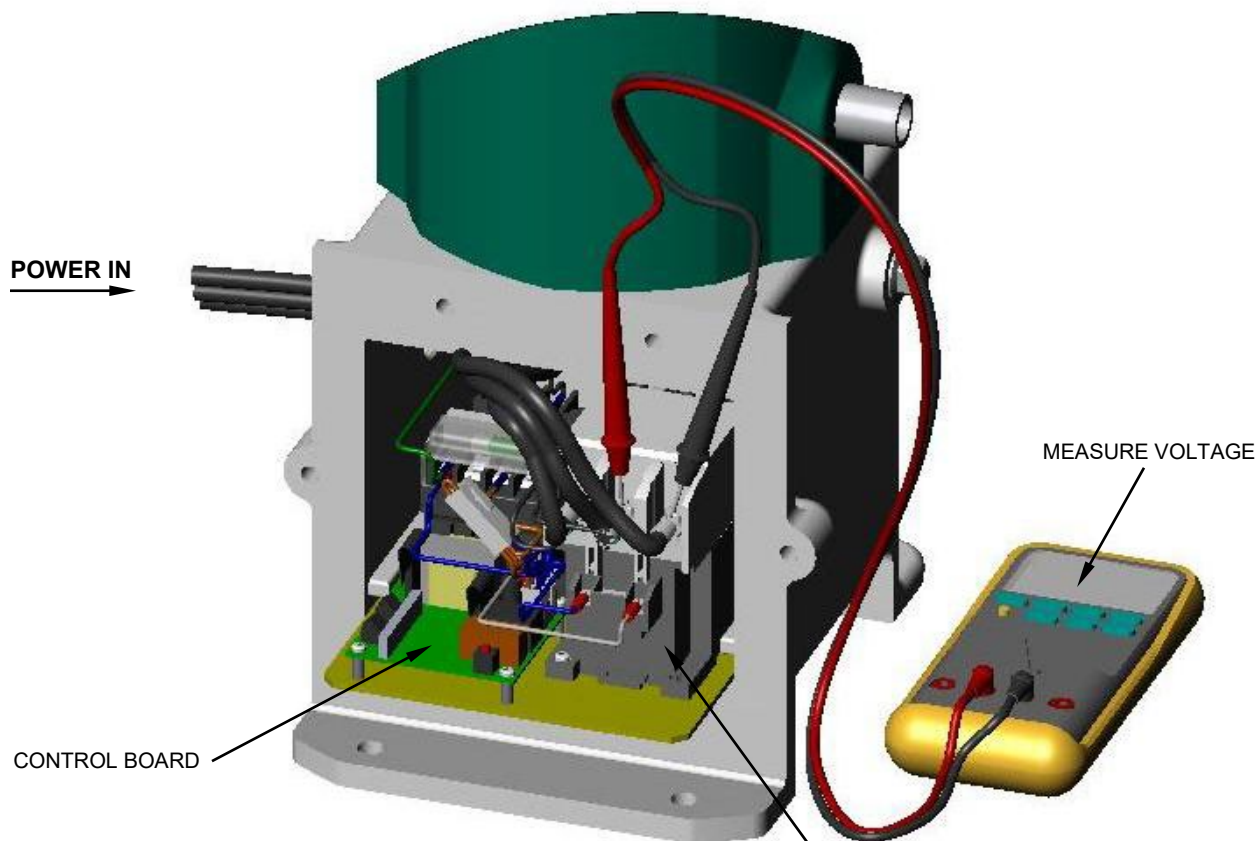


*These tests include high voltage. Exercise great caution in making the following tests. Carelessness could result in severe injury or death. See additional warnings located at the beginning of this Chapter.*

## FULL LOAD VOLTAGE CHECK

Check heater voltage by measuring voltage at the contactor terminals. See Data sheet of your manual or rating plate on the process heater to determine the correct voltage reading of your process heater. Measure voltage between all connected poles of the contactor. The readings should be equal to  $\pm 3\%$  of the value on the rating plate.

Figure 3 – Full load voltage check



## Full Load Current Check

### NOTE

See fusible link detail below for typical fusible link installation.

### WARNING

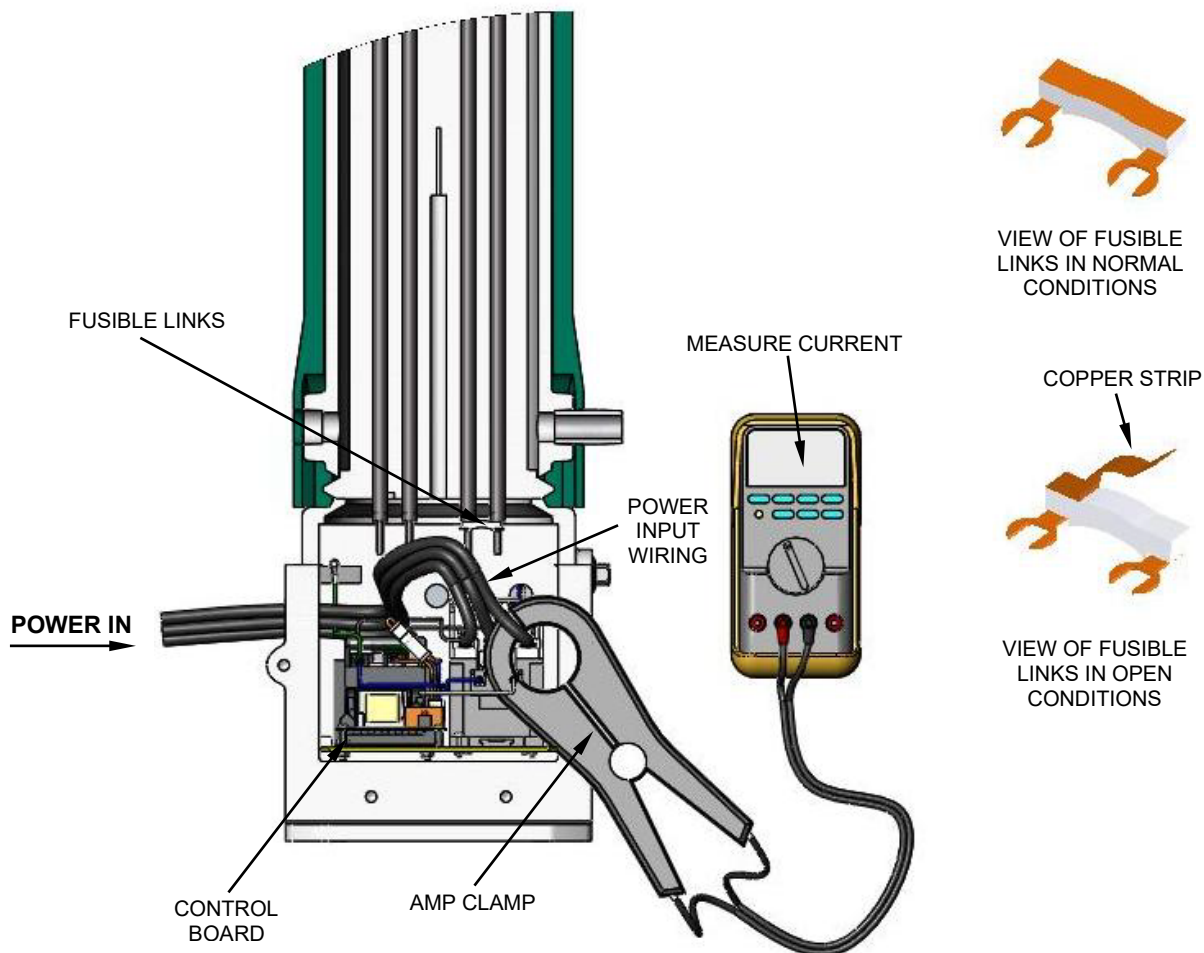


**These tests include high voltage. Exercise great caution in making the following tests. Carelessness could result in severe injury or death. See additional warnings located at the beginning of this Chapter.**

Measure the current on each of the heater AC power input wires. **See Data Sheet or rating plate** provided with your manual for the correct reading (line current) for your process heater. All wires should have readings equal to  $\pm 3\%$  of the value listed on the rating plate.

Low current on all wires indicates low input voltage. Drastically different current readings may indicate a defective heater, defective wiring, or an open fusible link due to overheating. If a fusible link is open, contact the factory. Do not attempt to repair it.

Figure 4 – Full Load Current Check





## Heater Core Resistance

### **NOTE**

*Refer to the Bussing diagram for wire to wire resistance for your process heater.*

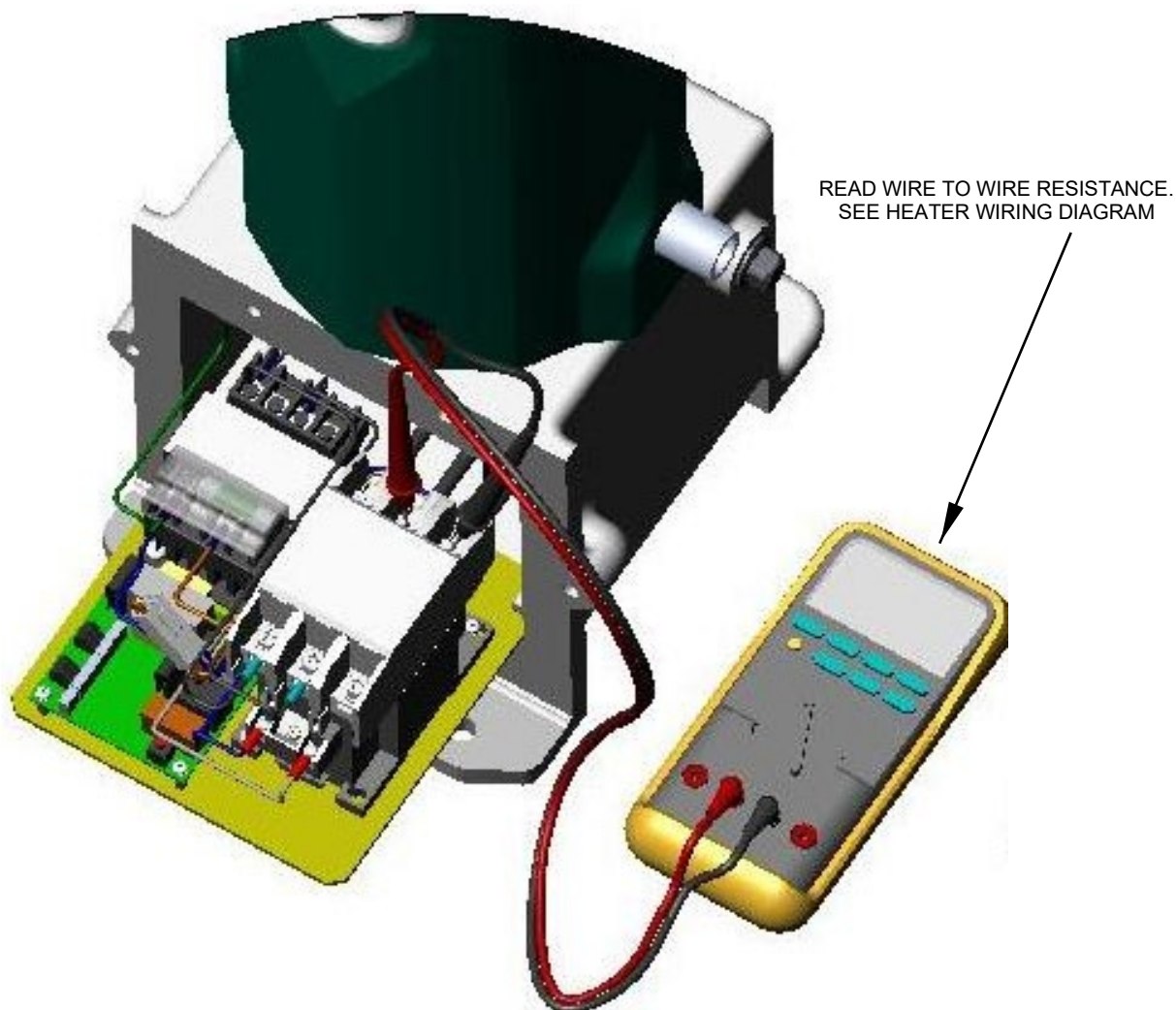


### **CAUTION**

*Turn off electrical power at the disconnect before proceeding.*

Carefully slide out the control panel for access to the heater wire connections on the contactor. Measure the resistance across each pair of wires. An incorrect resistance reading indicates a faulty heater element, a wiring problem, or an open fusible link.

**Figure 5 – Heater Core Resistance Wiring Connections**



## Thermocouple Sensor Replacement

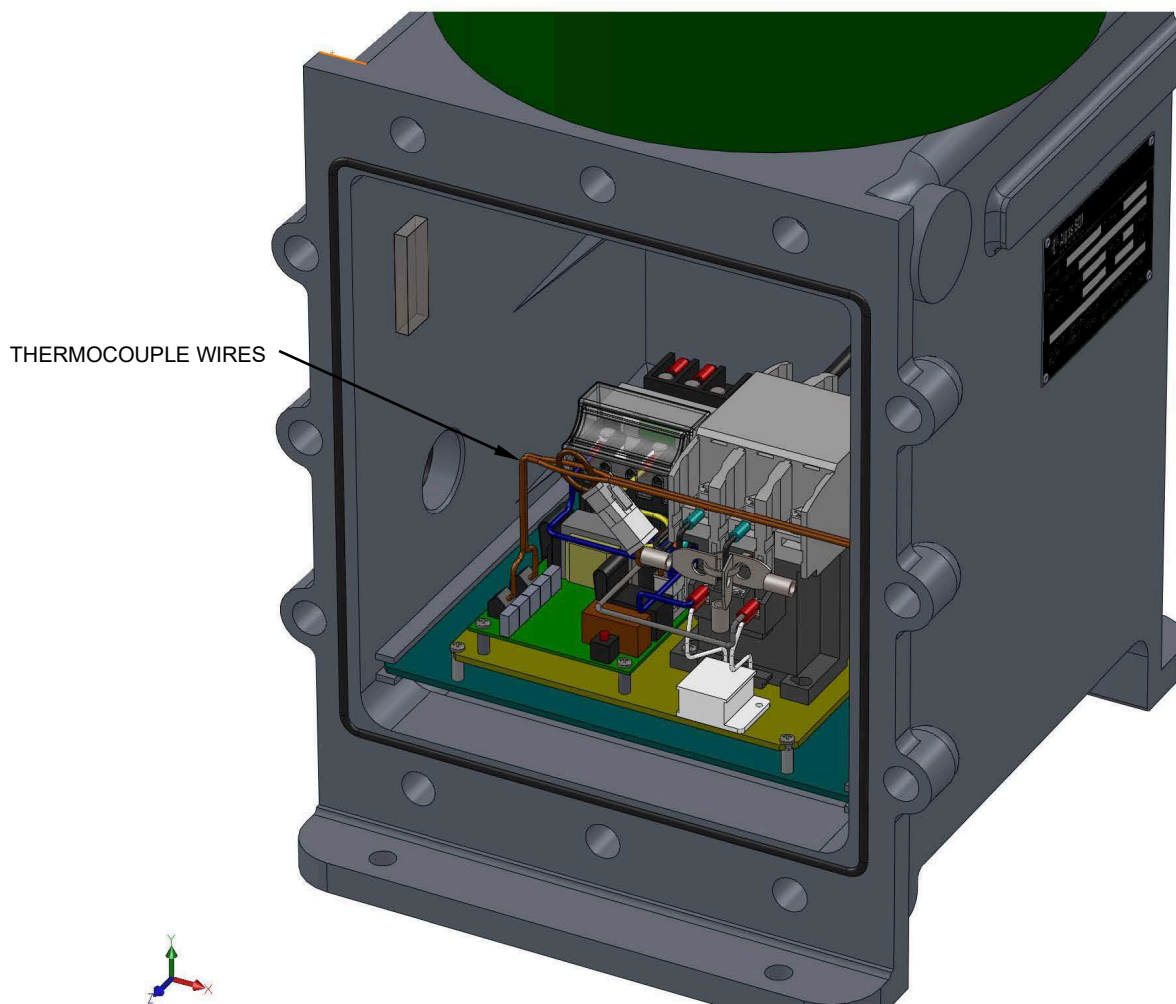


### **CAUTION**

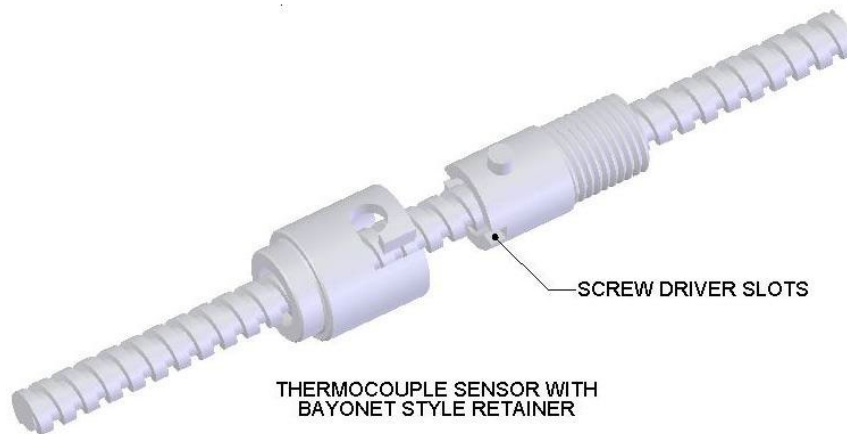
*Always disconnect power to process heater before servicing.*

- 1) Shut off power at the disconnect.
- 2) Remove the control box lid.
- 3) Disconnect the main power wires attached to the contactor and the wires going to the heaters.
- 4) Slide the circuit panel half way out of the control box.
- 5) Disconnect the yellow and red thermocouple wires from control board.
- 6) The thermocouple can now be removed the core (see Figure 6 and 7).  
Two types of locking collars have been used on the sensors.

**Figure 6 – COMPEXX Box showing Thermocouple location**



**FIGURE 7 – Thermocouple Sensor with Bayonet Style Retainer**



- 1) To remove a sensor fitted with the bayonet style retainer, push gently on the retainer while turning to the left. When the retainer is disengaged, pull out the old temperature sensor.
- 2) Use a short, flat-blade screwdriver to remove the adapter.
- 3) Install the new spring tab retainer using an appropriately sized open end wrench (1/2" or 13mm).
- 4) Install the new sensor by applying a small amount of heat transfer grease to the sensor tube and re-inserting in the unit. Squeeze the spring tab while inserting the sensor. Push firmly until the sensor is fully engaged. There should be at least 1/2" of sheath remaining.
- 5) **When connecting new thermocouple wires back to the control board ensure that the yellow wires are connected to the yellow terminals and red wires to the red terminals. Do not over tighten terminal screws!** Connect the main power wires back to the contactor and re-install the control box lid. Torque lid bolts to 19.5 ft-lb. **Failure to properly torque lid bolts may compromise explosion proof enclosure rating and may lead to water entering the enclosure.**
- 6) Restart vaporizer and check operation.

---

***Algas-SDI International, LLC***

***Ph.: 1.206.789.5410***

***www.algas-sdi.com***

