



Algas-SDITM

...Innovative vaporizing and pressure building solutions

ISO 9001
Certified

Second SunTM

Flameless Tank Heater

SS-10

*Installation, Operation, Maintenance
& Parts Manual*

151 South Michigan Street, Seattle, Washington, USA 98108
Tel: +1-206-789-5410 Fax: +1-206-789-5414 Web: www.algas-sdi.com

ECLIPSE
Innovative Thermal Solutions

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. Literature contained in the Operation Manual has been supplied by vendors. Please check to be sure supplied data matches your configuration. Contact Algas-SDI if any questions exist.
- This equipment uses LPG - a flammable fuel handled under pressure. 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 are unpredictable, will void your warranty and may lead to dire consequences. When components are replaced with components not approved for use in our FM/UL listed equipment, the FM/CSA listing becomes void for that unit.

WARRANTY REGISTRATION

To register your new equipment: Visit **Algas-SDI's** web site at: algas-sdi.com, then click on the "Tech Support" button. Select online Registration or print out the Acrobat Warranty Registration.

OR

Fill out the Warranty Registration information on the last page of this manual. Then make a photocopy and mail to the address shown at the bottom.

WARRANTY, COPYRIGHTS AND APPROVALS

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

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APPROVALS



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.

ASDI CONTACT NUMBERS

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

Telephone: 206.789.5410

Facsimile: 206.789.5414

Email: sales@algas-sdi.com

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

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DESCRIPTION

The **SECOND SUN™** flameless catalytic tank heater is a new product that Algas-SDI has been developing and testing for several years. The concept is a result of research that began in 1998. The intent of the heater is to augment natural vaporization or to build pressure in the storage tanks when the environment is not able to supply the needed energy through the “wetted” surface of the propane tank.

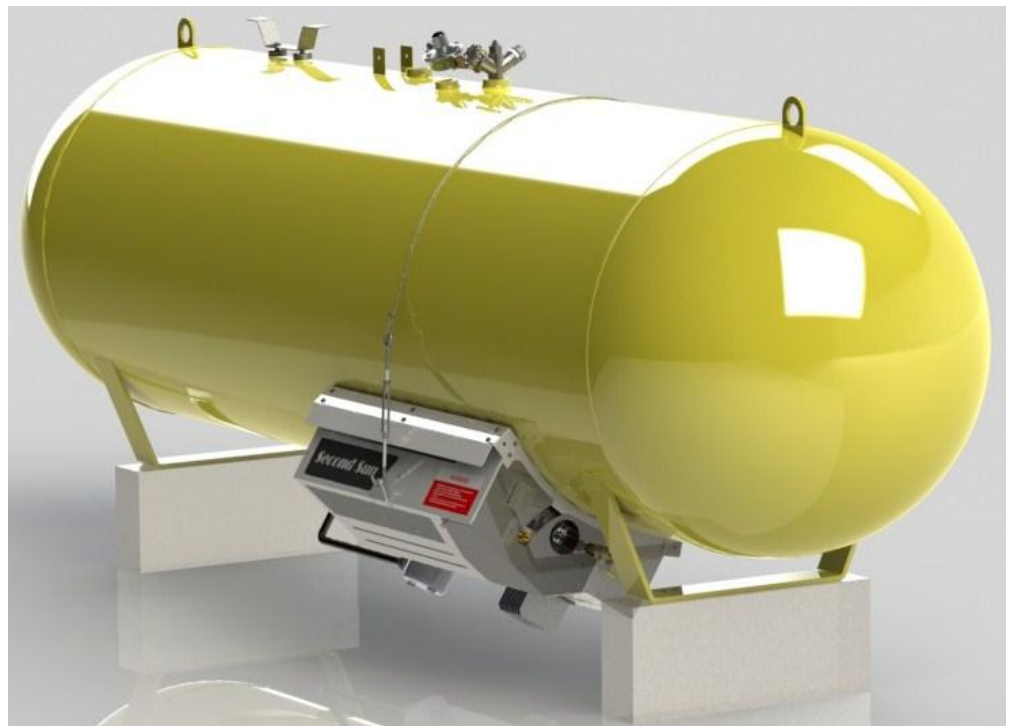
When used with propane, applications can range from boosting pressure in a tank to increase vaporization capacity for small loads. Use the heater during cold weather in lieu of a pump to boost pressure on a tank that is used with a vaporizer for larger loads. The heater can both boost pressure and serve as a vaporizer for smaller loads up to 750,000 Btu/hr. In either case the containers can be stationary or portable since the heater does not need a permanent electrical service. On a temporary basis, the **SECOND SUN™** may be used to boost the pressure in a container that has been overdrawn and refrigerated.

The **SECOND SUN™** tank heater is rated at 10-12,000 Btu/hr and should only be placed on 250 gallon and larger containers up to 1000 gallons. Catalytic heaters, properly maintained and serviced, will not ignite a mixture of fuel and air or sustain open flame combustion. A stainless steel grill is installed on the heater face to protect the catalytic material from damage such as incidental impact, insects or rodents but it is important to inspect the heater face for holes before starting the heater.

Each **SECOND SUN™** operates and is controlled by tank pressure. The safety system includes three (3) elements: an over-pressure safety switch that monitors pressure in the tank to which the heater is attached, a high temperature switch that monitors the tank surface temperature, should the liquid level fall below the heater, and a pilot heater monitor that prevents an unwanted release of gas in the event the pilot heater temperature drops below the point necessary to continue catalyzing the fuel. When any of the safety switches are triggered, manual intervention is required to restart the unit.

A solid state thermo-electric generator provides power to operate the tank heater controls. Electrical power is generated by the temperature differential between the heater and the ambient air. The small finned aluminum heat exchanger cools one side of the EMF generating device, and the heater provides heat to the opposite side. The heat exchanger must remain exposed and unobstructed. Because there is no flame, a common “flame type” thermocouple does not function in this application.

The **SECOND SUN™** operates in either pilot mode of main heater



mode. When the tank pressure is low the heater automatically switches to full heat mode. When tank pressure increases above 55 psi the heater will automatically turn-down to pilot or “stand-by” mode. The pilot heater is also used to start the catalyzing process using a preheater element and a 12V truck battery and charger. In cold environments our testing has shown that the **SECOND SUN™** performs best when the pressure setting corresponds to a saturation temperature above 32 °F (55 psi for propane). When set below this point ice formation may impede the heater performance when the main heater cycles off for long periods.

When not needed during the summer, we recommend the unit be shut off. Before restarting the unit, in the fall, the catalyst material should be visually inspected to make sure rodents have not entered and degraded the material. At the same time, the tank surface covered by the heater should be inspected for corrosion, using the same method used for inspecting all other exposed tank surfaces.

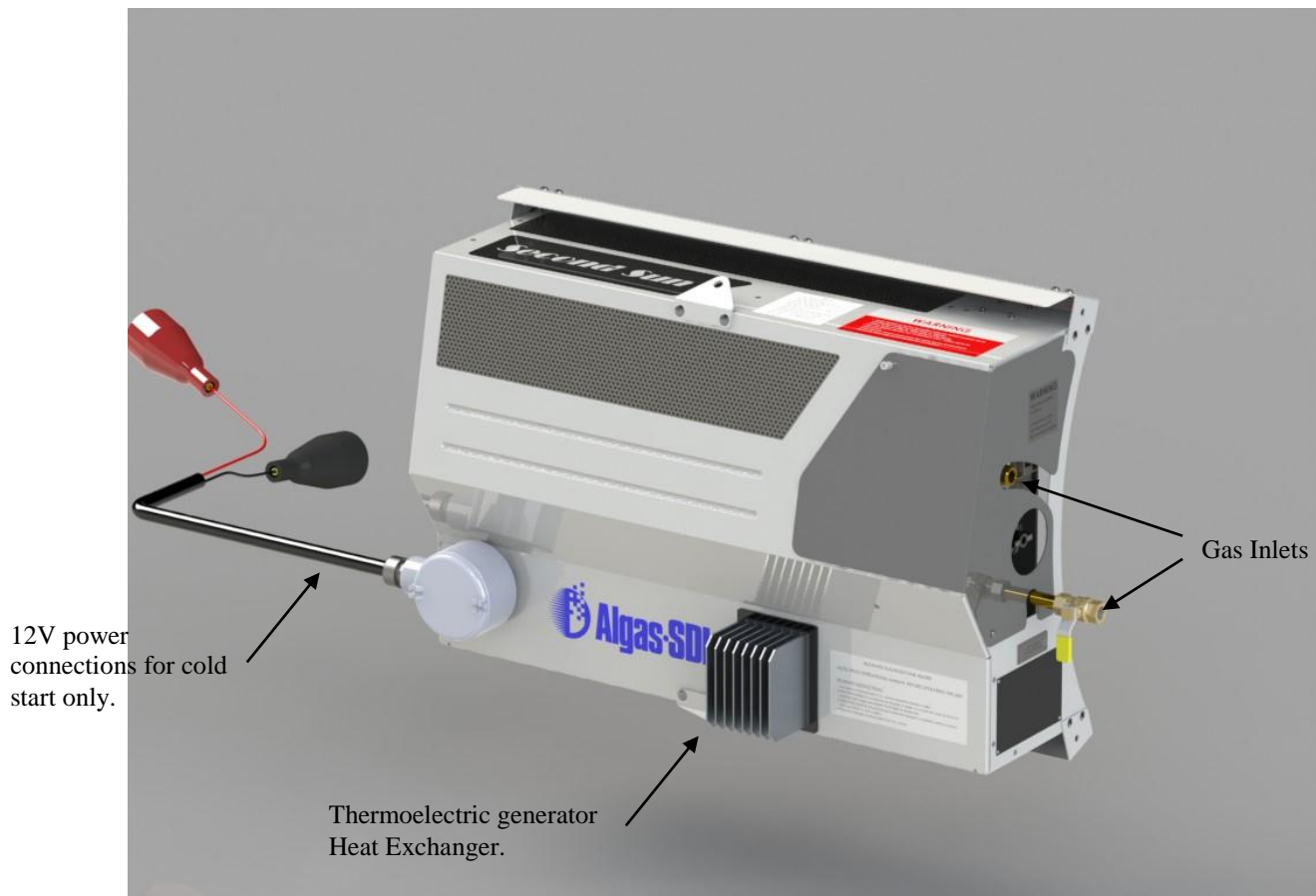
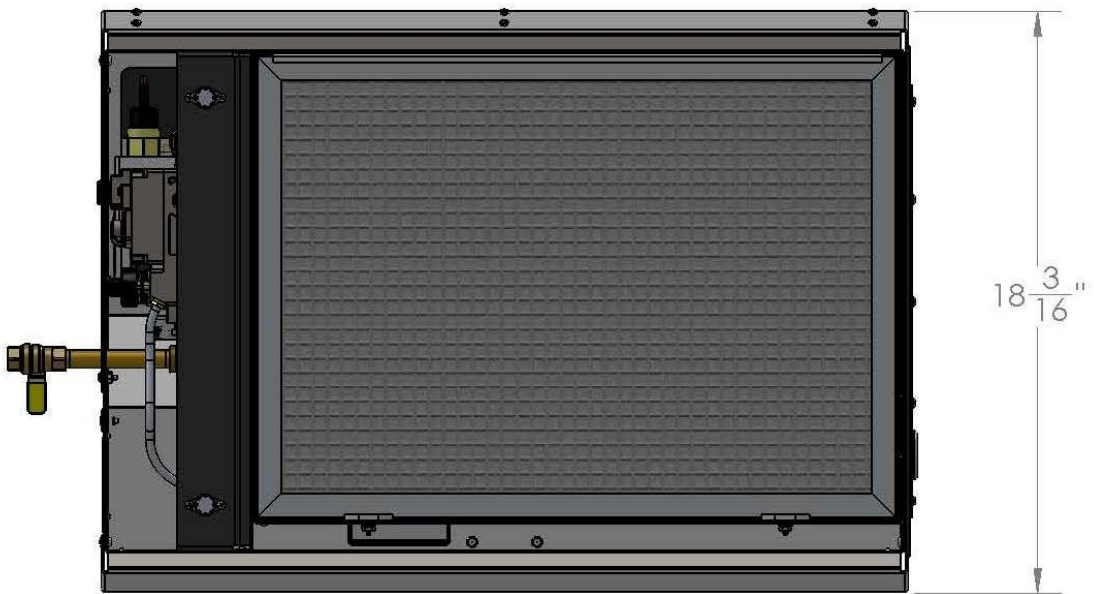
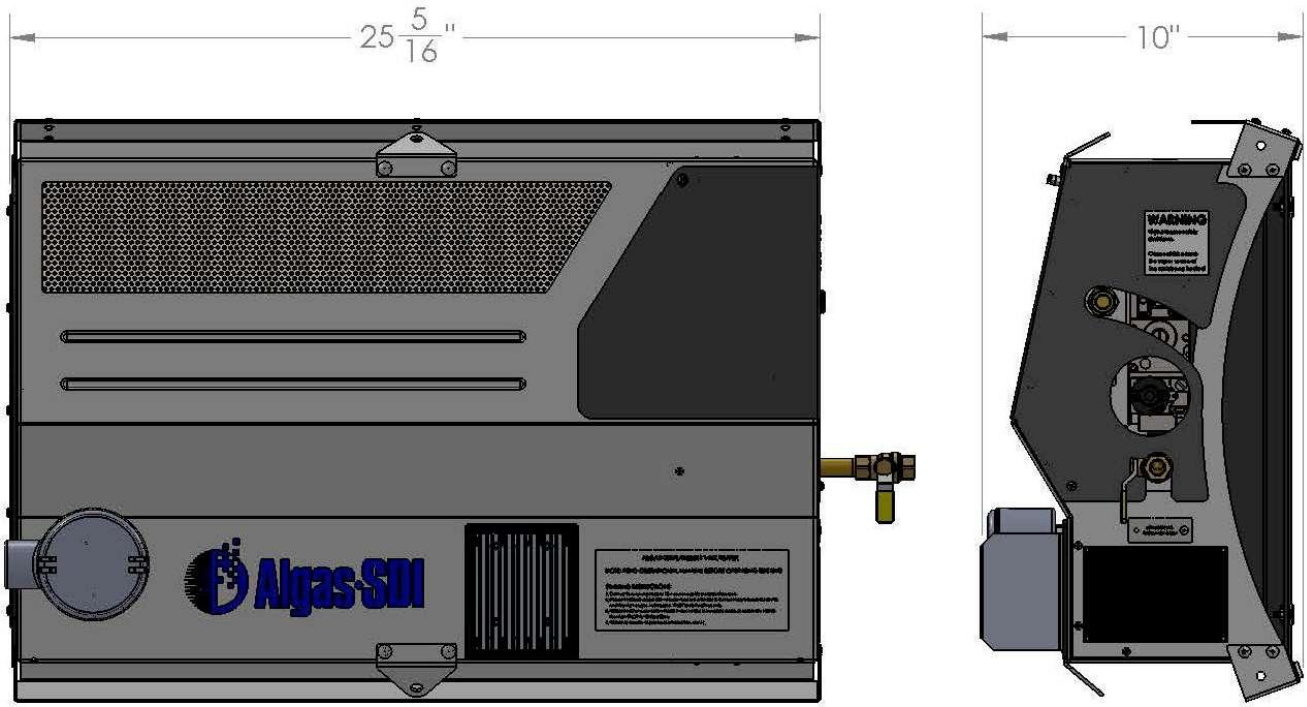


Figure 1 — SECOND SUN™



GENERAL REQUIREMENTS

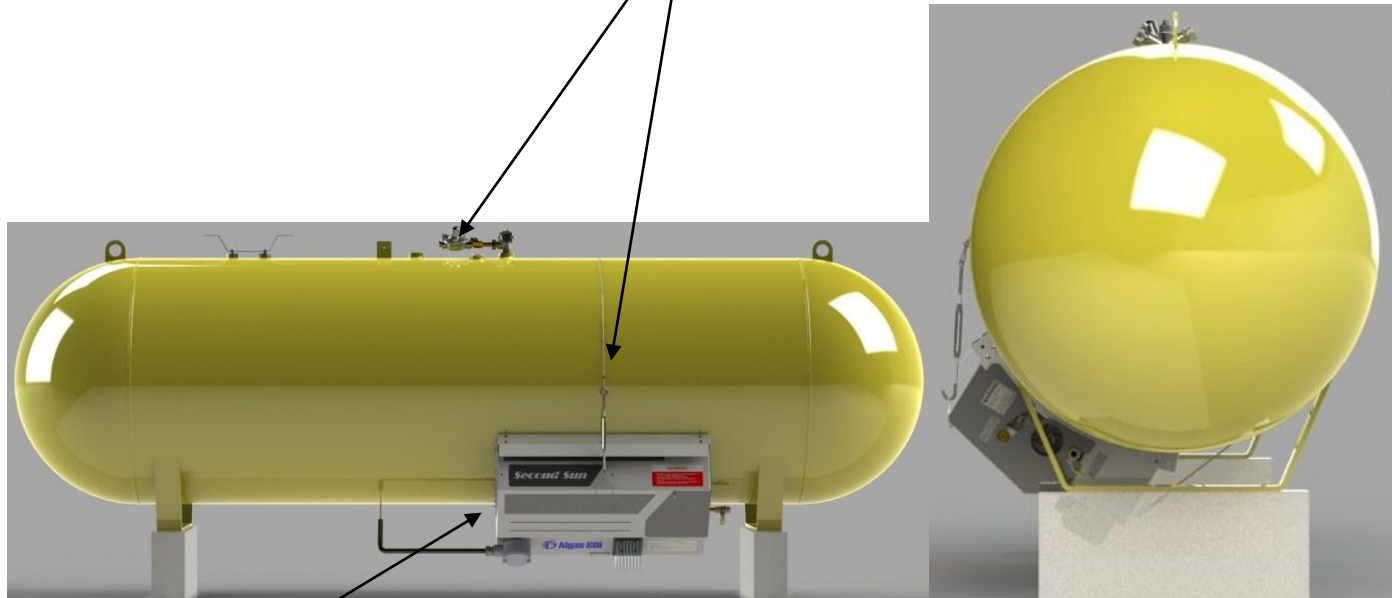
Install the Second Sun™ on a “raised” tank to allow space for the heater to be rotated to the lowest section of the tank. Inspect the heater face visually for any damage to the catalyst material. At the same time, the tank surface, covered by the heater, should be inspected for corrosion, using the same method for inspecting all other exposed tank surfaces. Clean all foreign materials from all pipelines prior to making any connections to Second Sun™. Use pipe sealant, approved for LPG use, where required. Check all connections for leaks using a leak detection solution or device. Eliminate all leaks prior to operation.

Install in accordance with NFPA 58 and local applicable codes and regulations as required.

Figure 2 – Typical Second Sun™ Installation

NOTES

1. INSTALL THE TANK STRAP WITH DIRECTIONS GIVEN BELOW BEFORE ATTEMPTING TO MOUNT THE HEATER.
2. INSTALL THE PROVIDED GAS REGULATOR ASSEMBLY TO YOUR TANKS MULTI-VALVE WITH NECESSARY FITTINGS.
3. DO NOT PLACE HEATER ON ITS BACK AT ANY TIME TO AVOID DAMAGE TO CRITICAL COMPONENTS OF SECOND SUN™.

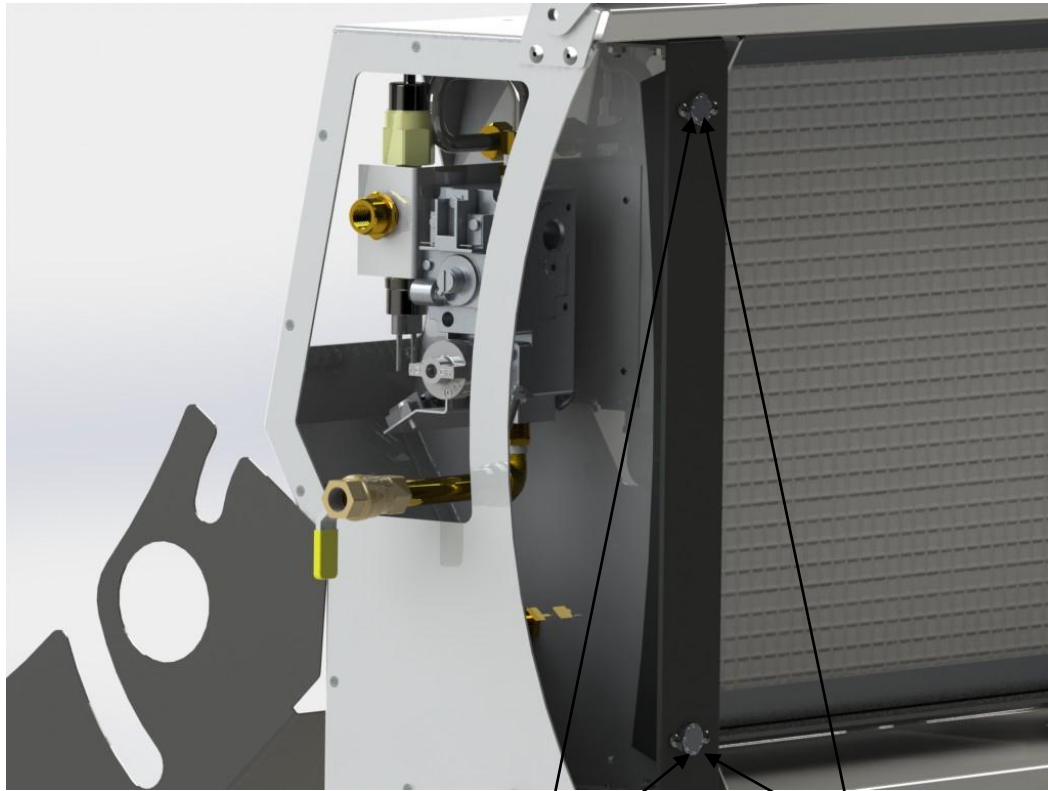


Rotate heater bottom edge to lowest point on tank.

Raise tank to allow space for heater to be rotated to the drip-line of the tank.

1. Attach the provided tank heater mounting cable around the tank as shown in Figure 2 and attach J-hooks to heater cover and tighten so that heater will support itself without slipping on the tank.
2. Level the heater at waist height to facilitate ease of access for starting.
3. Ensure that the neoprene band holding the temperature switches is folded outward against the side of the heater and not under the edge of the heater since it will prevent the temperature switches from contacting the tank surface properly.
4. Make certain the heater side skirt extends outwards from the heater to seal against the outside of the tank. Do not allow it to fold under the heater since it will prevent the heater from making full contact with the tank.
5. Connect the regulator assembly to the multi-valve (on top of the tank) that is connected to the vapor space of the tank being heated.
6. Connect the high pressure line to the upper fitting on the heater marked "**High Pressure Tank Connection**".
7. Connect the output of the regulator to the lower fitting on the side of the heater cover marked "**Low Pressure Regulator Connection**".
8. Close the on-off valve, located outside the control cover, marked as "**Low Pressure Regulator Connection**".
9. Open the isolation valve on the propane tank and check the installed plumbing for leaks.
10. Open the heater on-off valve and check for leaks in the remaining gas train.
11. Repair any leaks before proceeding with the installation.
12. Check both temperature switches for proper contact with the tank surface by looking from the side of the controls cover with a flashlight.
13. The temperature switches should be in close-contact with the tank surface over the full face of the switch. Lift the black EPDM seal and use a flashlight for easier inspection of the switches.

Figure 3 – Temperature switches



Temperature switches

Ensure that both switches are in full contact with the surface of the tank being pressurized.

CAUTION

Once full contact is made with the tank surface it can take up to 15 minutes for the switch to automatically reset. Once the switch has closed, the control circuit will allow gas to flow to the main heater.

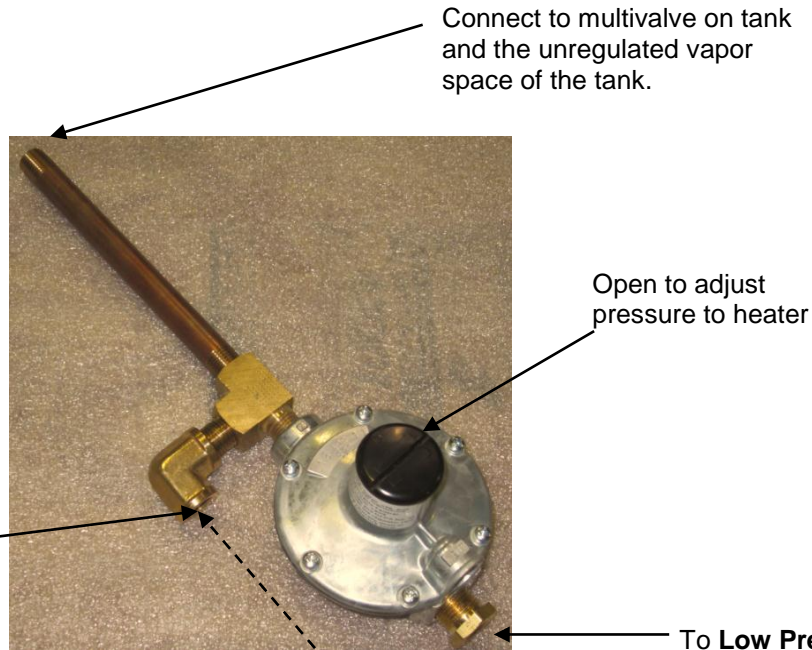


The lower switch will activate when the tank is empty and will shut off gas flow to both the pilot and main heater. This will require a cold restart procedure once the tank has been refilled. Activating (opening) the upper temperature switch will shut-off gas flow to only the main heater and will allow the pilot heater to continue to operate. Once the tank has been filled, if the pilot heater is still on, the main heater will come on automatically.

Heater should be turned OFF while refueling the tank unless the heater is mounted over 5 ft from the fill port of the tank.

GAS REGULATOR ASSEMBLY

1. Connect the regulator assembly to the multivalve on the tank.
2. Connect either copper lines or LPG hose from the outlet of the regulator to the proper ports on the heater. Ensure that the lines do not contain any low spots where liquid can accumulate without draining to the heater.

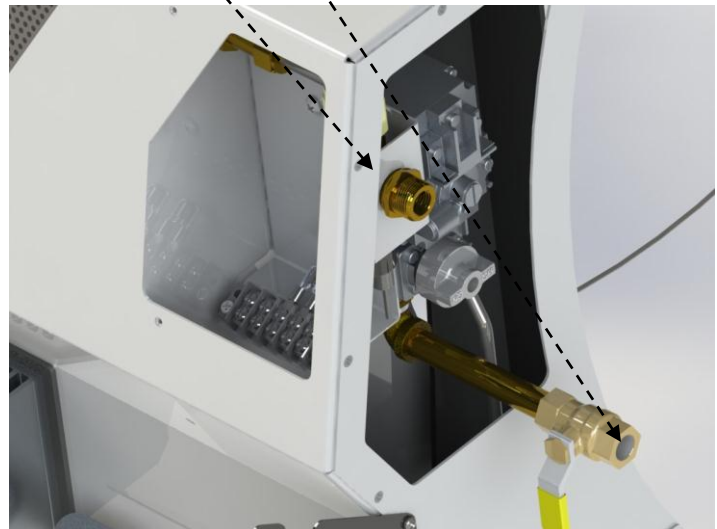
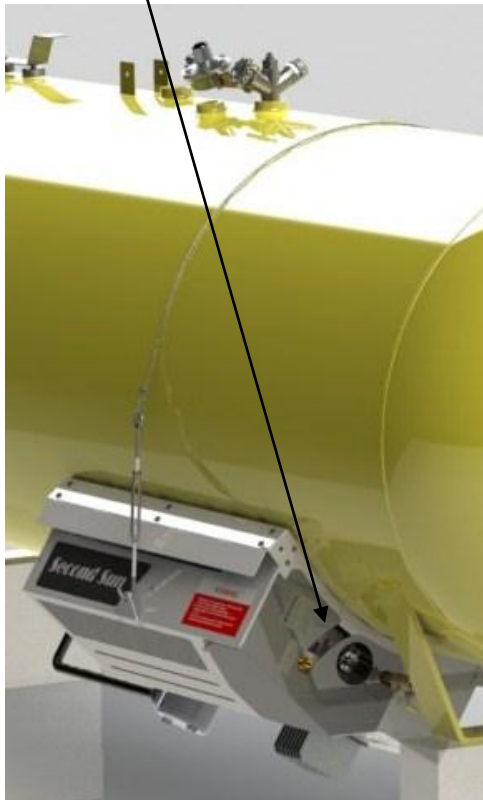


To High Pressure connection on tank heater

Open to adjust pressure to heater

To Low Pressure connection on tank heater.

CRITICAL:
Connect to unregulated tank vapor space.



GENERAL

Second Sun™ is controlled by tank pressure. The tank heater utilizes an adjustable operating pressure switch with a range of 55 psi – 100 psi. When the pressure in the storage tank falls below the operating switch set point the heater will cycle on providing heat (energy) into the liquid stored in the tank. When the pressure requirement is met, the tank heater reverts to standby mode with only the pilot operating.

OPERATING INSTRUCTIONS

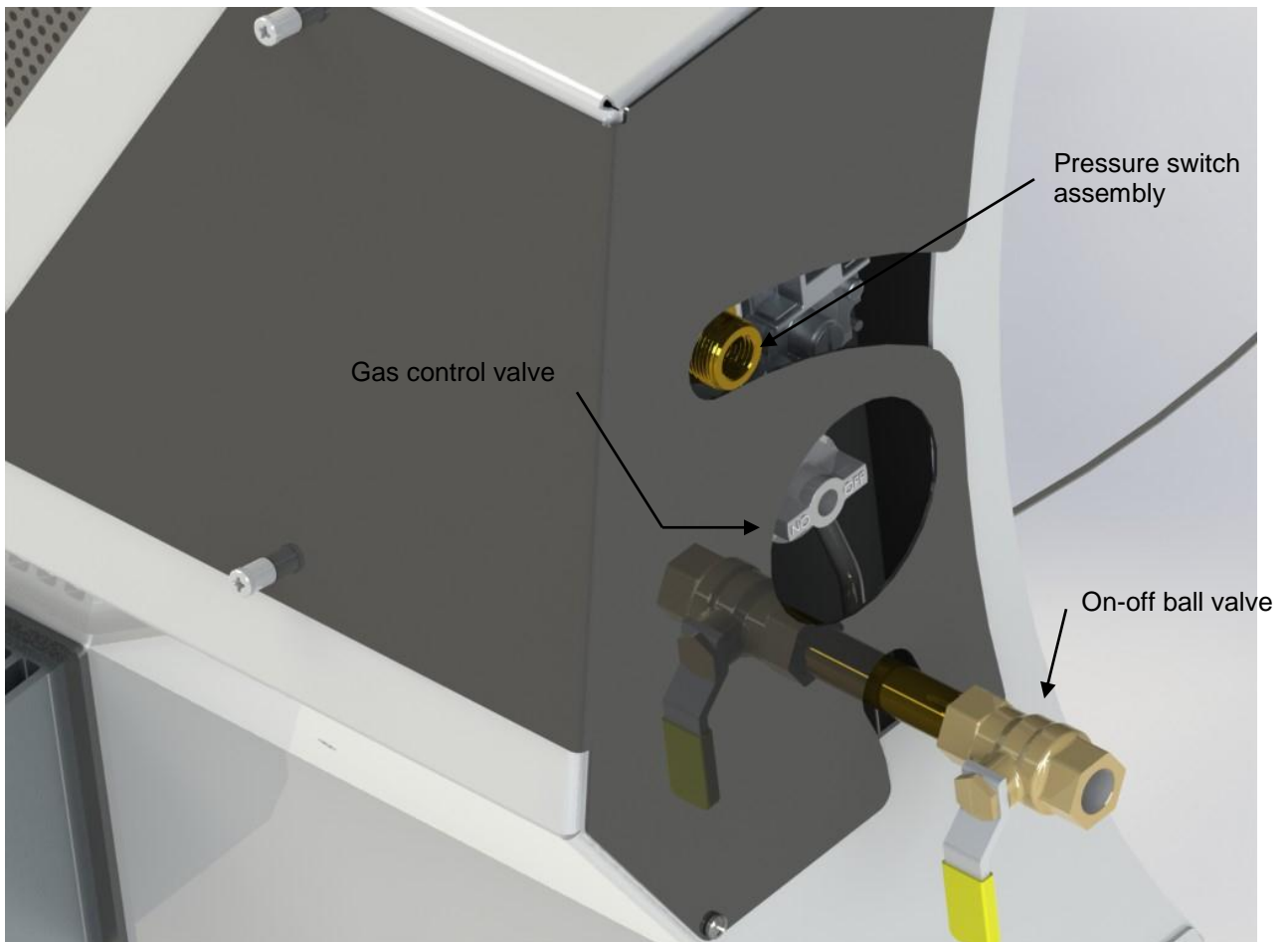
1. The heater operates automatically, turning on when tank pressure drops below 55 psi and into stand-by mode as pressure rises above 57 psi. Heater will automatically switch from stand-by to full heat mode when the pressure drops below 55 psi.
2. If the propane level, in the tank, drops below the top of the heater and the tank wall temperature rises above 125° F, the heater will switch to pilot (stand-by) mode. If the propane level, in the tank, falls to the lower section of the heater and the tank wall temperature rises above 125° F the tank main heater and pilot will shut down requiring manual restart.
3. If the tank pressure rises to 160 psi the tank heater and pilot will shut down requiring manual restart.

STARTING THE SECOND SUN

1. Attach cables to a heavy-duty 12 volt truck battery.
2. Start the truck to charge the battery during the heater start-up procedure.
3. Open the isolation valve on the propane tank and the on/off valve on the heater.
4. Check for gas leaks and repair them before proceeding.
5. Turn the black knob on the gas valve to "Pilot".
6. Wait 20-30 minutes before depressing the pilot valve. Check the back of the heater, near the 12 v. electrical connection box, to ensure pre-heat is working (warm to touch – 125 °F (52 °C)).
7. Depress and hold the pilot knob, on the gas valve, for at least 30 seconds.
8. Wait 20 - 30 minutes and check the back of the heater again for increased temperature (too warm for continual contact – 175 °F (79 °C), depress the pilot knob again to ensure that it is engaged.
9. Turn the gas valve knob to the "On" position.
10. Wait 10 minutes before disconnecting and rewinding the battery cables.

STOPPING THE HEATER

1. If the heater is on and you wish to manually switch the operation to Pilot (stand-by) mode, turn the black knob on the gas control valve to "Pilot" setting.
2. To shut the heater down, completely, close the manual, on-off, ball-valve, located on the outside of the heater cover. The heater can also be turned off by closing the isolation valve on the propane tank.



NOTES

1. WHEN INSTALLING THE TANK HEATER MAKE SURE THE TEMPERATURE SWITCHES ARE MAKING FULL CONTACT WITH THE TANK SURFACE. FAILING TO DO SO WILL TRIGGER THE TEMPERATURE SWITCHES AND KEEP THE HEATER FROM MONITORING TANK SURFACE TEMPERATURES PROPERLY.

GENERAL REQUIREMENTS

Second Sun™ is designed for long term trouble free operation. Because of the nature of its use, and the low maintenance requirements, it is important to provide scheduled maintenance. Below is a check-off list for annual inspections.

- I. Check the heater face and tank surface (under the heater) yearly. Release the heater top latch and allow the heater to tilt back on the latch. This will allow adequate space to inspect both the heater surface and the tank surface. The tank surface should be clean and the paint should be intact, without scratches and with no exposed metal. The heater face should be clean and free of debris, ice, snow and insect nests.
- II. Inspect the catalytic material for holes rips or tears. If holes are present, discontinue use immediately and ship the heater back to Algas-SDI for repair. Gas can escape from holes in the cat material and support open flame combustion.
- III. Clean obstructions from the cover inlet and exhaust vents. If the exhaust and/or inlet vents are plugged, the heater will not operate correctly and may not reach optimum temperature.
- IV. Do not use high pressure air or water to clean the cat surface. If the heater surface does not reach full temperature after an hour of operation 850 °F (454 °C) and tank pressure is less than 55 psi, contact the factory for instructions.
- V. The temperature of the heater face should be 750-1050 °F (399 – 566 °C).
- VI. Voltage of the peltier device, measured between terminal 3 and 5, should always be 90 mV or higher when the heater is running. This should measure 300 mV when the main valve is actuated. When the heater is running and only the pilot is actuated it will read 400 mv.

CAUTION



Voltage readings will change depending upon ambient conditions. In colder environments a higher voltage reading can be expected. In a warmer climate a much lower voltage reading will be obtained.

The gas valve will work properly as long as a minimum of 200 - 300 mV can be registered when only the pilot is actuated and running.

General Requirements

FOLLOW THE TROUBLESHOOTING GUIDE BELOW TO IDENTIFY A PROBLEM:

Figure 1: Heater does not start

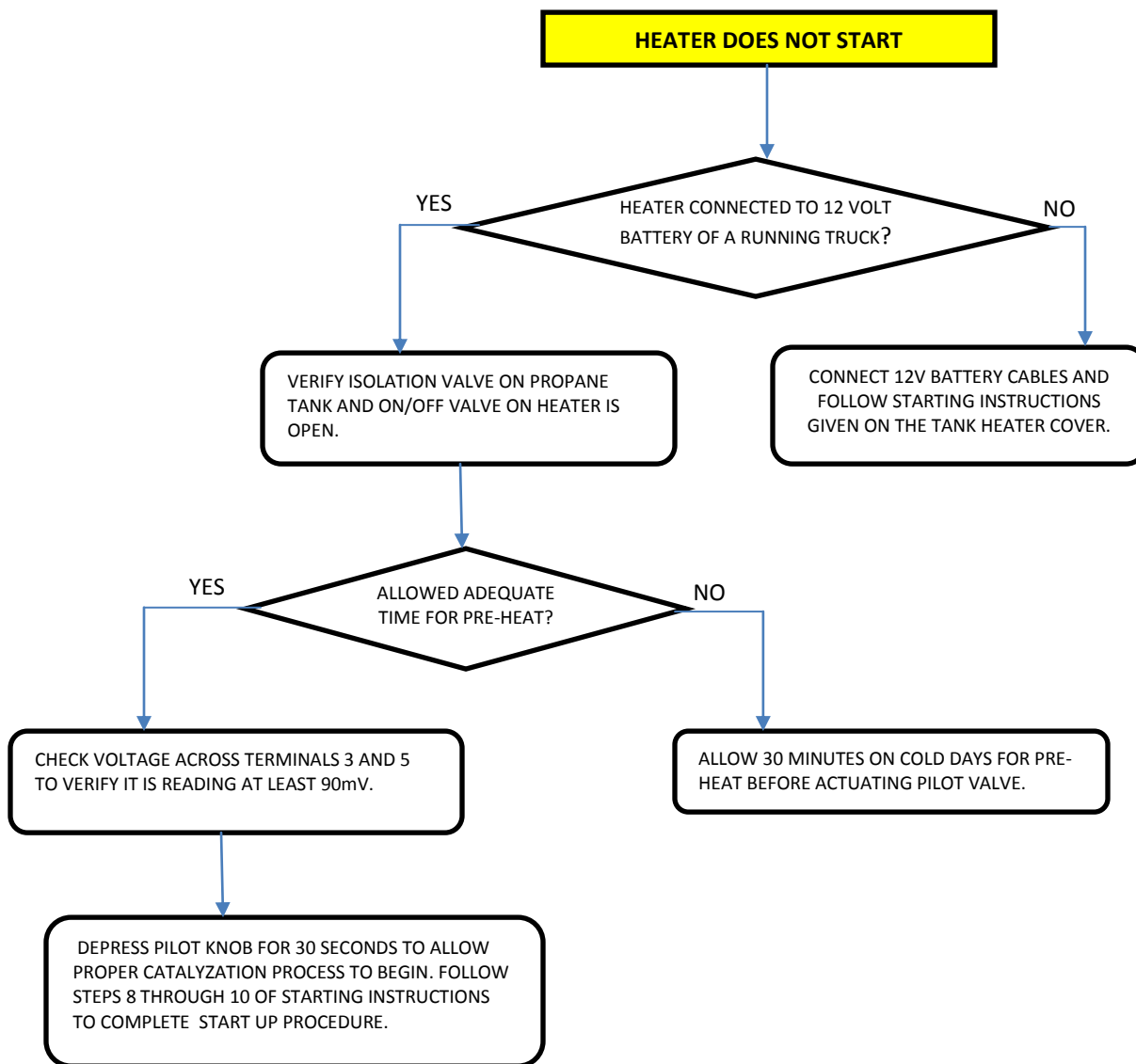


Figure 2: Heater does not come up to temperature after 30 minutes

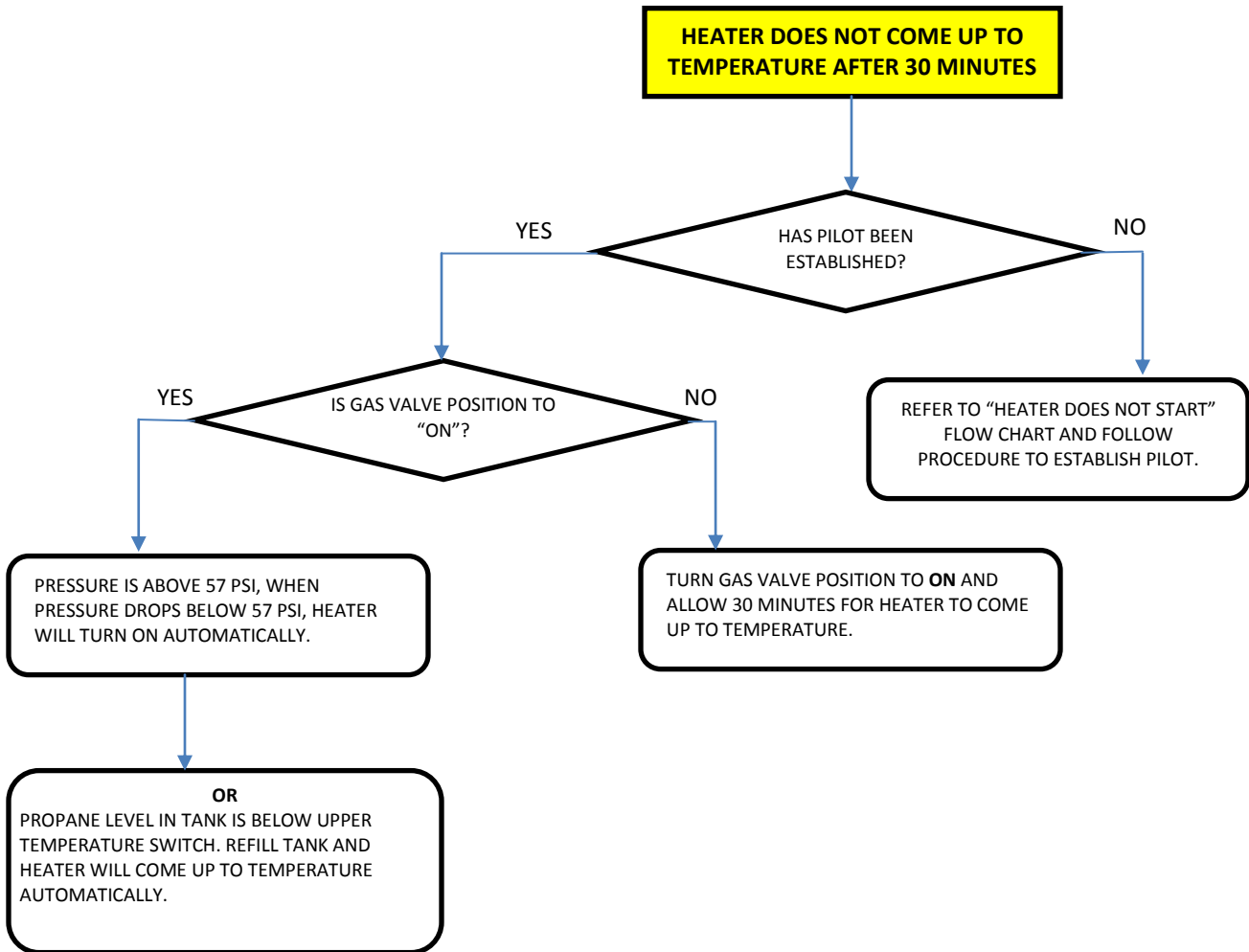


Figure 3: Heater and Pilot both turn off

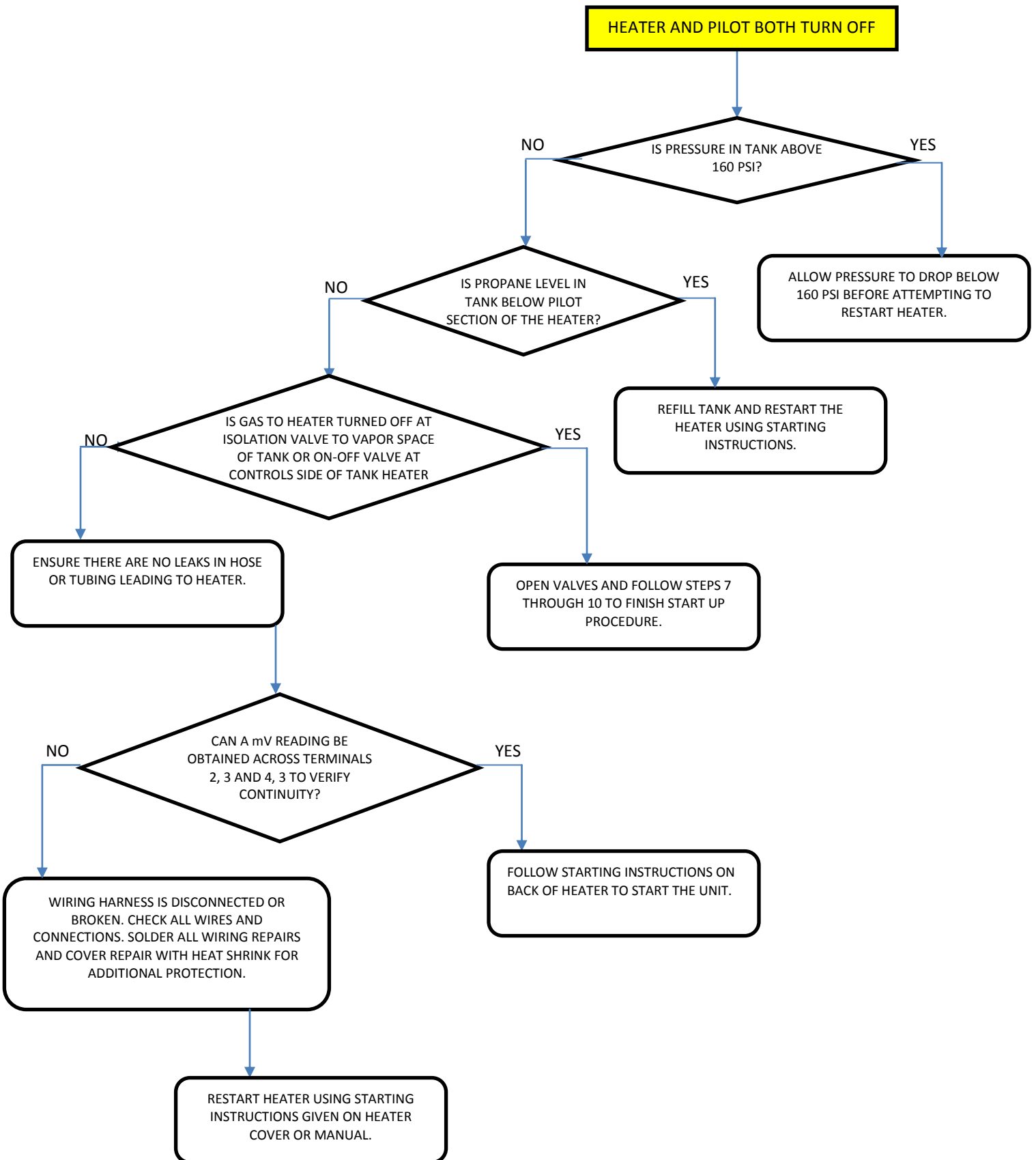
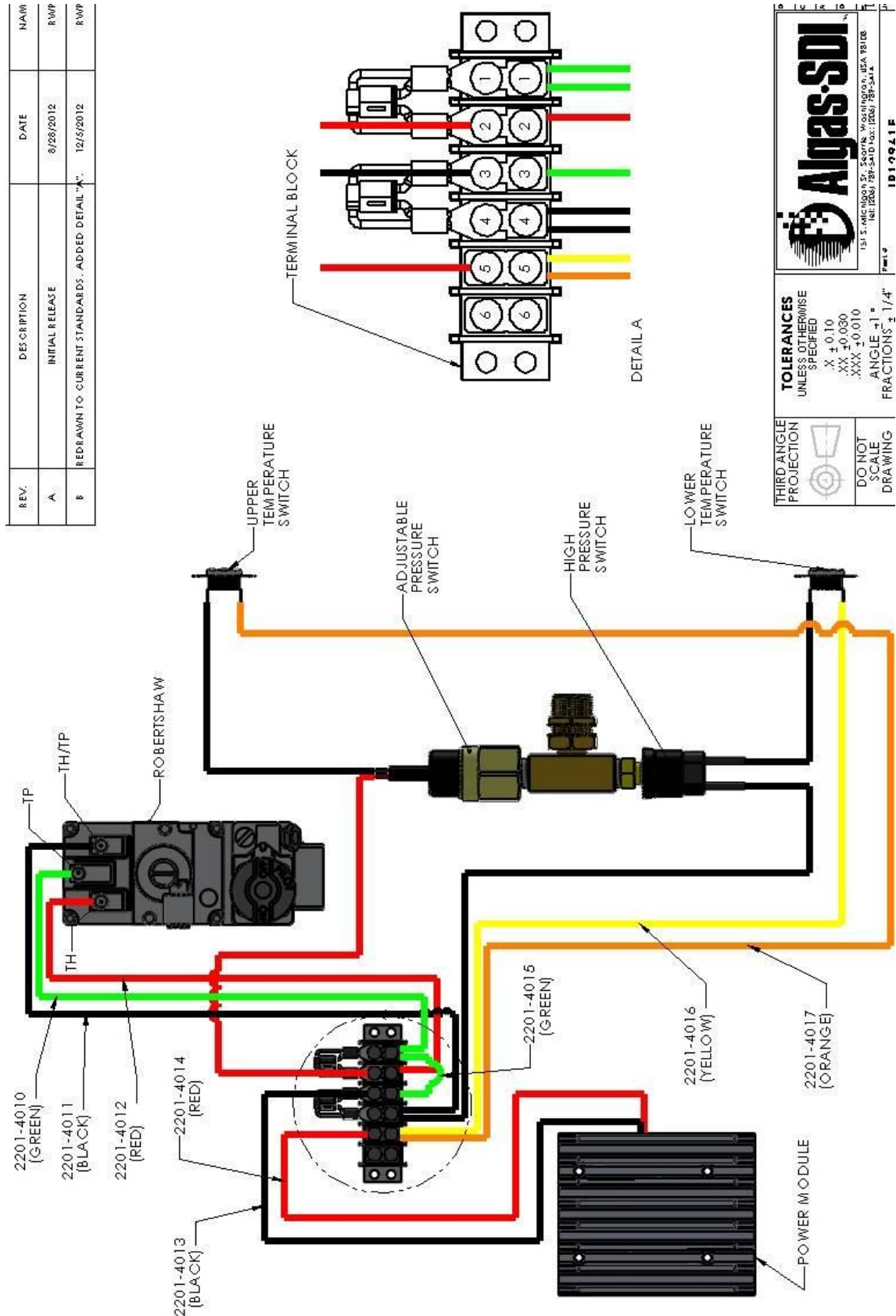


Figure 4: Wiring Diagram



REV.	DESCRIPTION	DATE	NAME
A	INITIAL RELEASE	8/28/2012	RWP
B	REDRAWN TO CURRENT STANDARDS. ADDED DETAIL "A".	12/5/2012	RWP

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

TOLERANCES UNLESS OTHERWISE SPECIFIED

X ± 0.10
 .XX ± 0.030
 .XXX ± 0.010

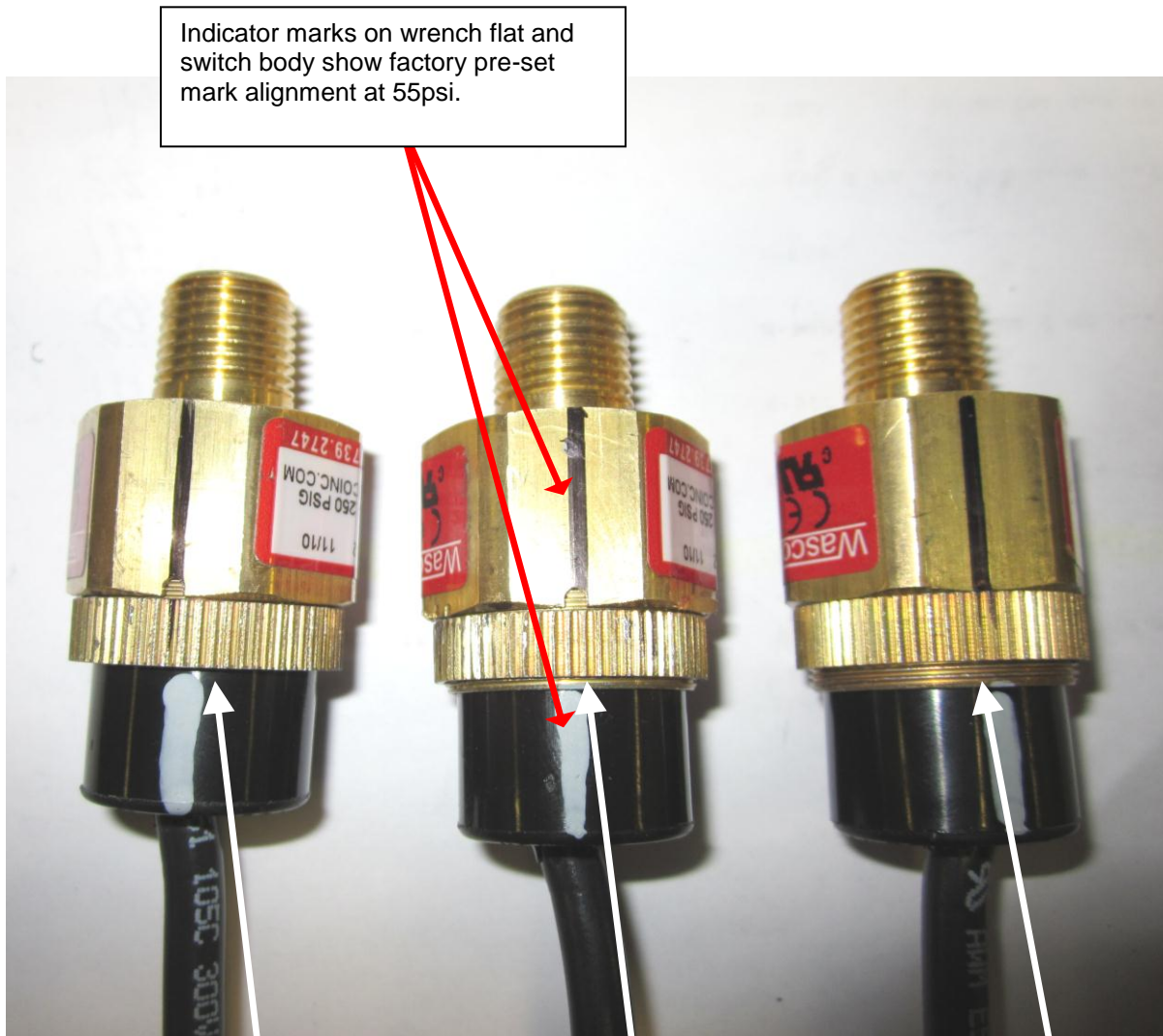
ANGLE 1°
 FRACTIONS ± 1/4"

Algas-SDI

131 S. ANGLETON ST. EL PASO, TEXAS 75108
 TEL: (956) 789-5410 FAX: (956) 789-5411

1810921E

Figure 5: Adjustable pressure switch settings



OUT OF ADJUSTMENT
No threads exposed:
Rotate switch body counterclockwise until one thread is visible outside the lock ring.

PROPER ADJUSTMENT
One exposed thread:
Pressure setting is factory pre-set at 55 psi.

OUT OF ADJUSTMENT
Multiple threads exposed:
Rotate the switch body clockwise until only one thread is visible outside the lock ring and marks are aligned.

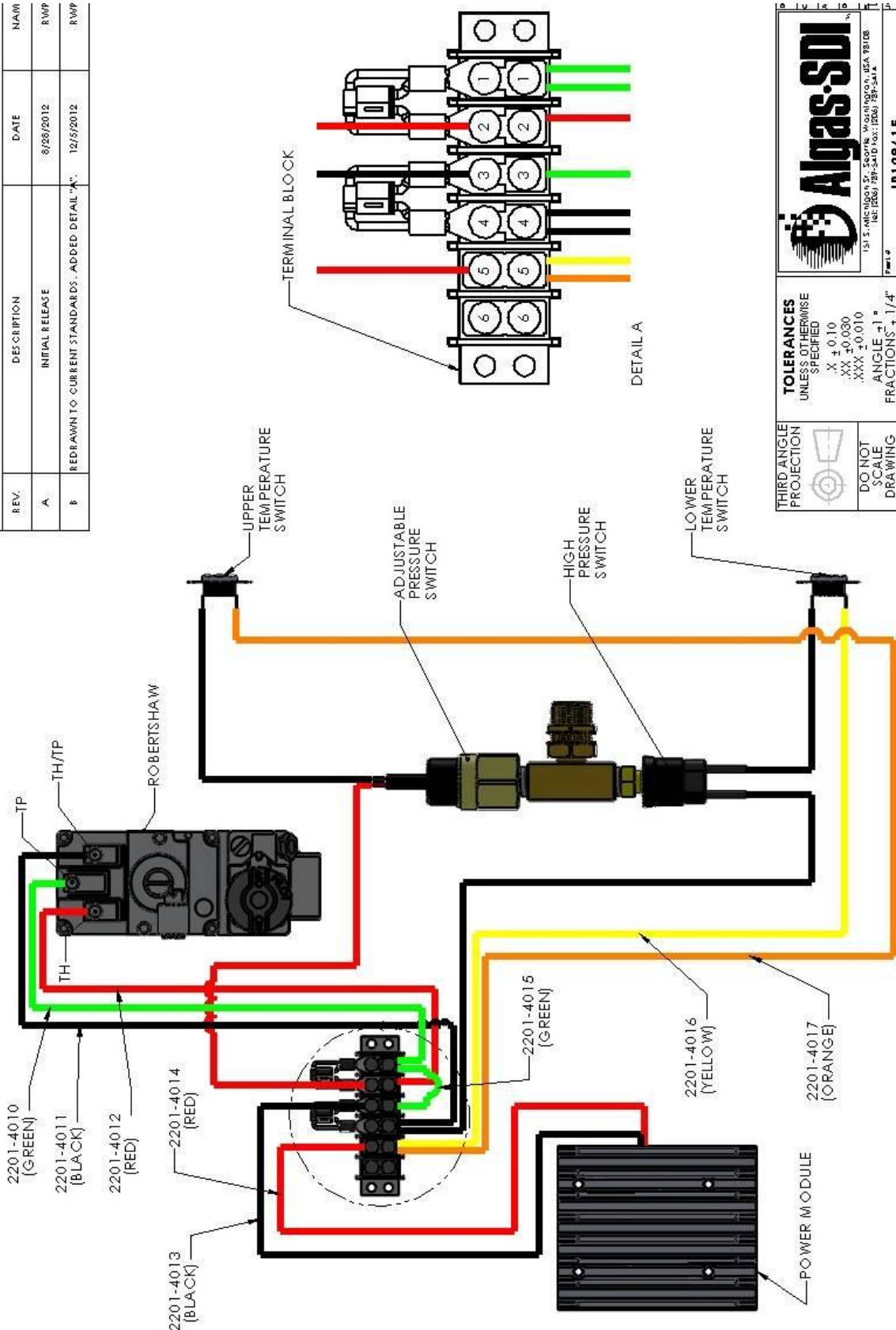
- The adjustable pressure switch is pre-set to 55 psi, unless specified by the customer to a different setting.
- Every 60 degrees of counter-clockwise rotation (one wrench flat) will **increase** the pressure setting by 30 psi.
- Every 60 degrees of clockwise rotation (one wrench flat) will **decrease** the pressure setting by 30 psi.

APPENDIX A

TECHNICAL INFORMATION

TERMINAL STRIP DRAWING FOR SECOND SUN

REV.	DESCRIPTION	DATE	NAW
A	INITIAL RELEASE	8/28/2012	RWP
B	REDRAWN TO CURRENT STANDARDS. ADDED DETAIL "A".	12/5/2012	RWP



Algas-SDI
 1515 ARCHBOLD ST. SEATTLE, WASHINGTON, USA 98108
 Tel: (206) 789-5410 Fax: (206) 789-5414

TOLERANCES UNLESS OTHERWISE SPECIFIED
 .X ± 0.10
 .XX ± 0.030
 .XXX ± 0.010

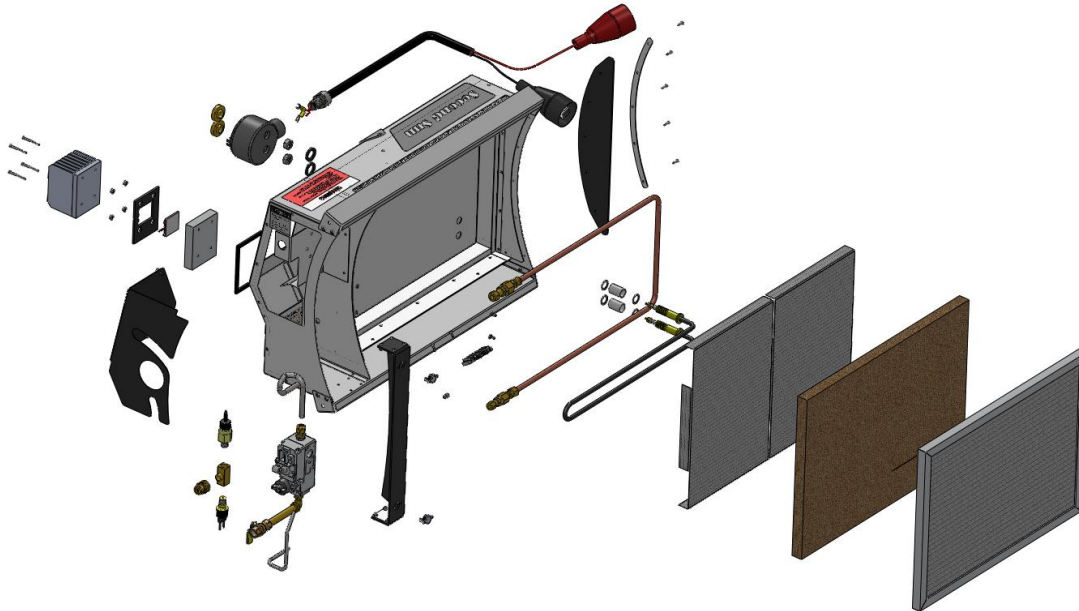
THIRD ANGLE PROJECTION
 DO NOT SCALE DRAWING

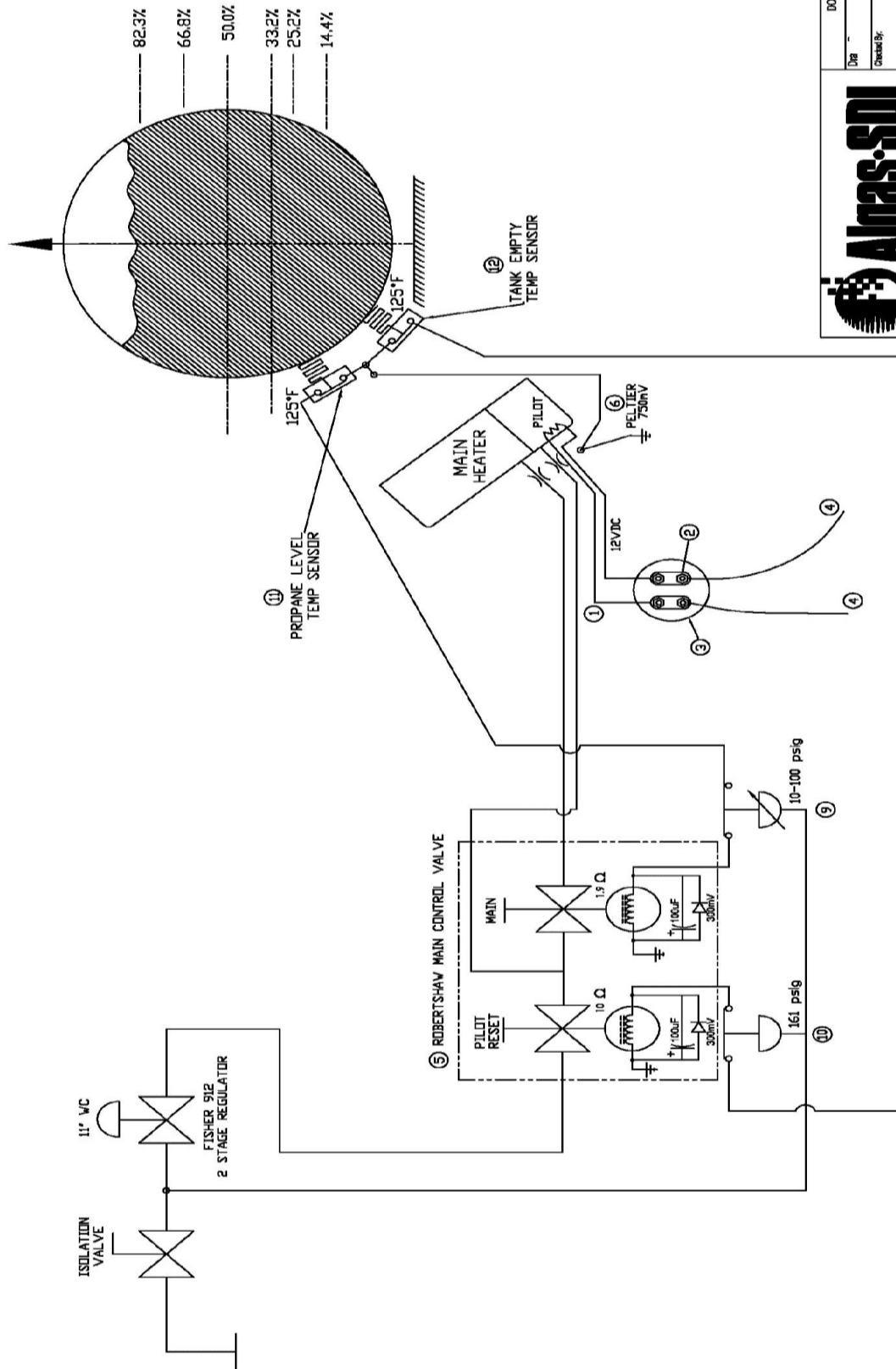
ANGLE ± 1°
FRACTIONS ± 1/4"

Part # **1019021F**

SECOND SUN Spare Parts

SPARE PARTS	PART NUMBERS
1. Gas Valve	60431
2. Peltier Assembly	JP13004A
3. High Pressure Switch	60422
4. Adjustable Pressure Switch	60423
5. Temperature Switch Assembly	JP13146A
6. Fisher Regulator	30737
7. Removable Catalytic Cartridge	JP12856A
8. Heater Cabinet Assembly	JP12993A
9. Starter Cable Assembly	2201-7002
10. Attach Assembly	JP13106A
11. Cord Wrap Magnet Assembly	JP13130A
12. Dual Gas Manifold	JP13019F
13. Gas Regulator Assembly	2201-4007
14. Schottky Diode and Capacitor Assembly	2201-4009





DO NOT SCALE DRAWING

Drawn By:	DATE:
Checked By:	Scale:
Approved By:	Job #

Algas-SDI
225 G. McLaughlin, Pelletier, Fisher, Robertshaw, etc.

A.S.D.I. STD.



Innovative Liquid Vaporizing and Gas Mixing Solutions

WARRANTY REGISTRATION

Type of Equipment: _____ Serial Number: _____
 ASDI Sales Order #: _____ Order Date: _____
 Purchased By: _____

To help us give you better service, please fill out this warranty registration form and return it to ASDI to register your purchase and for follow up on the performance of ASDI equipment. We are dedicated to producing a quality product and if a problem occurs, ASDI wants to know about it.

Please help us with a small amount of information about your company and how the equipment will be used. When contacting ASDI, please have the type of equipment and the serial number handy so we can give you accurate information. If you have had any kind of problem with this equipment, or you have any comments, please attach a separate sheet to this form. Keep a copy for your records.

End Customer/Company Name: _____
 Address: _____ Tel: _____
 City: _____ Fax: _____
 State: _____ Zip: _____

Name of individual to contact for follow up information: _____
 Title: _____

Usage - Circle one: Base Load Standby System Peak Shaving
 Other: _____

In what application is the equipment being used? _____
 When was the equipment put in service? _____ / _____ / _____

Note: If you have more than one piece of ASDI equipment, fill out one warranty sheet and staple the others to it, ASDI will do the rest.

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