

WARNING: If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

Do not store or use gasoline or other flammable vapors and liquids near this or any other appliance.

WHAT TO DO IF YOU SMELL GAS:

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbour's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

WARNING: Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

WARNING: For Outdoor Use Only.

AVERTISSEMENT: Si l'information de ce manuel n'est pas suivie exactement, un incendie ou une explosion peut résulter entraînant des dégâts matériels, des blessures ou la perte de vie.

Ne pas entreposer ou utiliser de l'essence, d'autres liquides ou vapeurs inflammables à proximité de cet appareil ou d'aucun autre appareil.

QUE FAIRE SI VOUS SENTEZ LE GAZ:

- N'allumez aucun appareil.
- Ne touchez aucun commutateur électrique; n'utilisez pas le téléphone de votre bâtiment.
- Appelez immédiatement votre fournisseur de gaz d'un téléphone dans un bâtiment voisin, si possible. Suivez les instructions du fournisseur de gaz.
- Si vous ne pouvez pas atteindre votre fournisseur de gaz, appelez le service d'incendie.

L'installation et le service doivent être effectués par un installateur qualifié, une agence de service ou le fournisseur de gaz.

AVERTISSEMENT: L'installation inexacte, l'ajustement, le changement, le service ou l'entretien peuvent causer des dommages ou des dégâts matériels. Lisez les instructions d'installation, d'opération et d'entretien complètement avant d'installer ou entretenir cet équipement.

AVERTISSEMENT: Pour l'Usage Extérieur Seulement.



GLOBAL
power technologies

1500 THERMOELECTRIC GENERATOR

Operating Manual

CSA Certified Class I, Div II, Group D Fuels

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NOTICE TO INSTALLER: These instructions shall be left with the consumer to retain them for future reference.

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1 ABOUT THIS MANUAL

This manual provides instructions for the operation and maintenance of the Model 1500 Hazardous Location Thermoelectric generator, certified by CSA to Class 1, Div II, Group D fuels.

1.1 HEALTH AND SAFETY

Correct operation and maintenance according to this manual is critical for proper equipment function and safety. Keep the following in mind when using these instructions.

1.1.1 Warnings

Throughout this manual you will notice paragraphs preceded by the text Warning. It is imperative that the advice in these paragraphs be adhered to, as failure to do so may result in personal injury or death and possible damage to the equipment.

1.1.2 Cautions

Throughout this manual you will notice paragraphs preceded by the text Caution. It is imperative that the advice in these paragraphs be adhered to, as failure to do so may result in damage to the equipment.

1.1.3 Trained Operators

Personnel performing installation, operation, and maintenance work should be properly trained in such functions.

1.2 TECHNICAL TERMS

An operator should be familiar with technical terminology. Terms of significance, defined for the model 1500, are as follows:

Thermoelectric Generator (TEG): A device that produces electrical power through the direct conversion of heat energy to electrical energy.

Power Unit (PU): The hermetically sealed portion of the TEG that contains the thermoelectric materials and cooling fins.

Rated Power: The Model 1500 TEG produces 500 W when operating in an ambient temperature of 20°C (68°F). With the fuel flow held constant TEGs operating in ambient temperatures higher than 20°C (68°F) will see power output efficiency reduce, 1.4 W per °C of temperature change up to a maximum ambient temperature of 40.0°C (104°F).

Set-up Power: Power from the power unit for a specific ambient temperature. It is derived from the open circuit voltage.

Set-up Voltage V_{set} : Voltage from the power unit for a specific ambient temperature, which is proportional to set-up power. Fuel flow to the burner is adjusted to change this voltage level.

Open Circuit Voltage: Voltage at the terminals of the power unit when no current is flowing, i.e. open circuit. This open circuit voltage is related to the temperature across the thermoelectric materials inside the power unit.

When a power unit lead is suddenly disconnected, breaking the circuit to the load, the voltage measured across the power unit leaps up to a new value. This is known as the momentary open circuit voltage (V_{oc}). The voltage continues climbing from that level and after 10-45 minutes it stabilizes at a higher voltage. When the open circuit voltage is referred to, it is indicating the first value of voltage that is displayed.

NOTE:

If the voltmeter on the intermediate panel is used to measure the open circuit voltage, the second voltage reading displayed is the open circuit voltage. The sampling rate of the electronics combined with the discrete valve displayed results in the first number displayed being in the transition range from the operating voltage to the actual open circuit voltage.

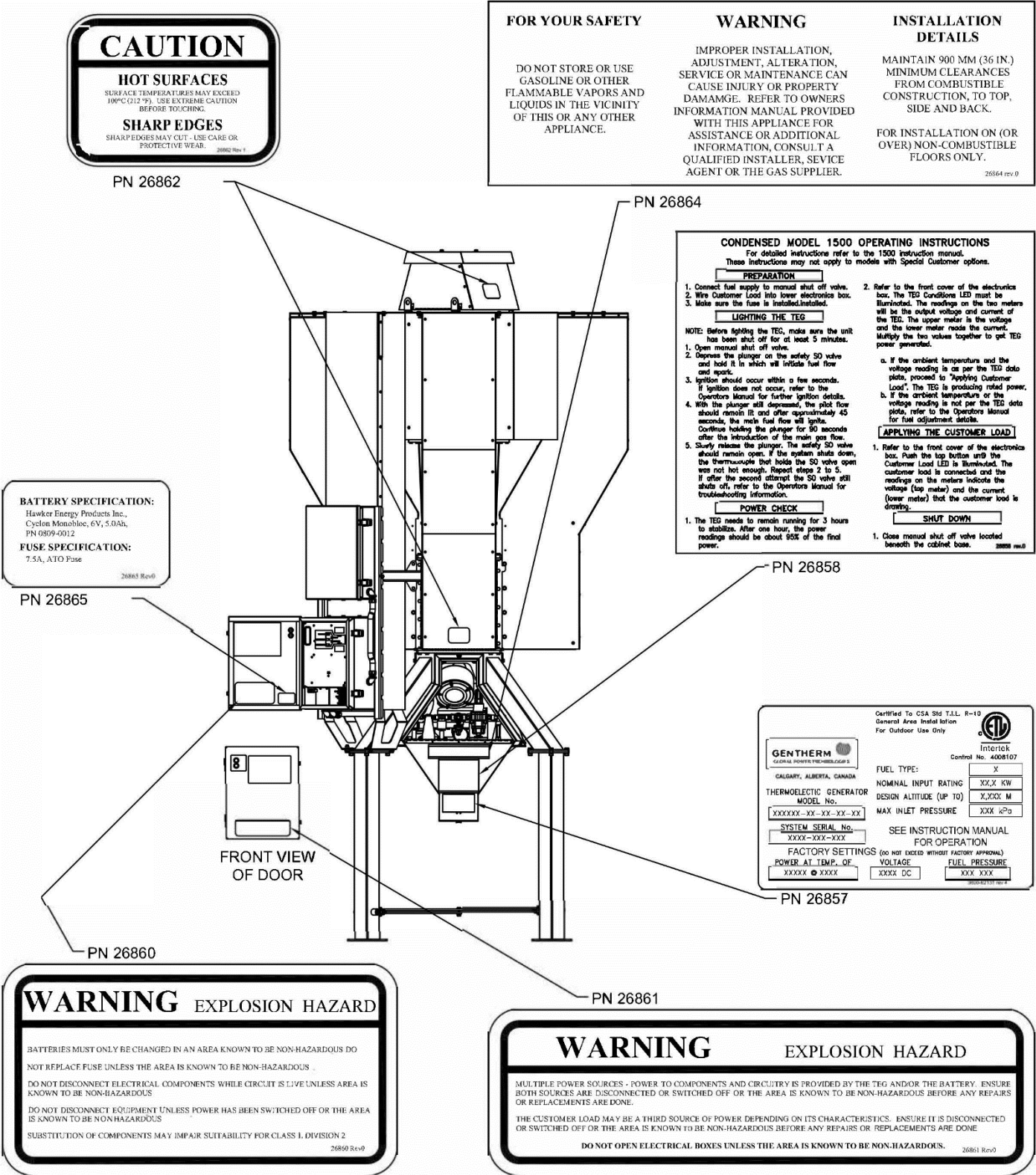
Limiter/Converter (L/C): A specific electronic device that converts one level of DC voltage to another and limits the power unit voltage.

Manual Shutoff Valve: A manually operated valve in the gas line for completely turning on or shutting off the gas supply to the TEG. This valve on the Model 1500 TEG is located directly below the cabinet.

Safety Shutoff (SO) Valve: A valve that will shut off the gas supply to the burner in event the source of ignition fails. This valve is located on the burner side of the gas regulator and interrupts the flow of gas to the rest of the fuel system/burner. This valve has a manually depressed plunger which initiates spark and fuel flow to the system. A thermocouple placed in the combustion chamber keeps this valve open when the system is hot enough.

Spark Ignition controller: This is typically called the SI Board and it has several functions with respect to the running of the TEG. It's first purpose is to provide spark to the igniter rod at startup. It also senses a flame signal indicating good combustion and, if the signal is present, it will provide power to the solenoid valves which maintains the fuel flow to the burner. In the event of no signal, it will shut down the two solenoids and hence shuts down the generator.

1.3 DECAL LOCATIONS



2 TECHNICAL SPECIFICATIONS

This section provides the technical specifications for the Model 1500 TEG.

2.1 OVERVIEW

The Model 1500 thermoelectric generator contains no moving parts. It is a reliable, low maintenance source of DC electrical power for any application where regular utilities are unavailable or unreliable. The TEG conforms to the following specifications:

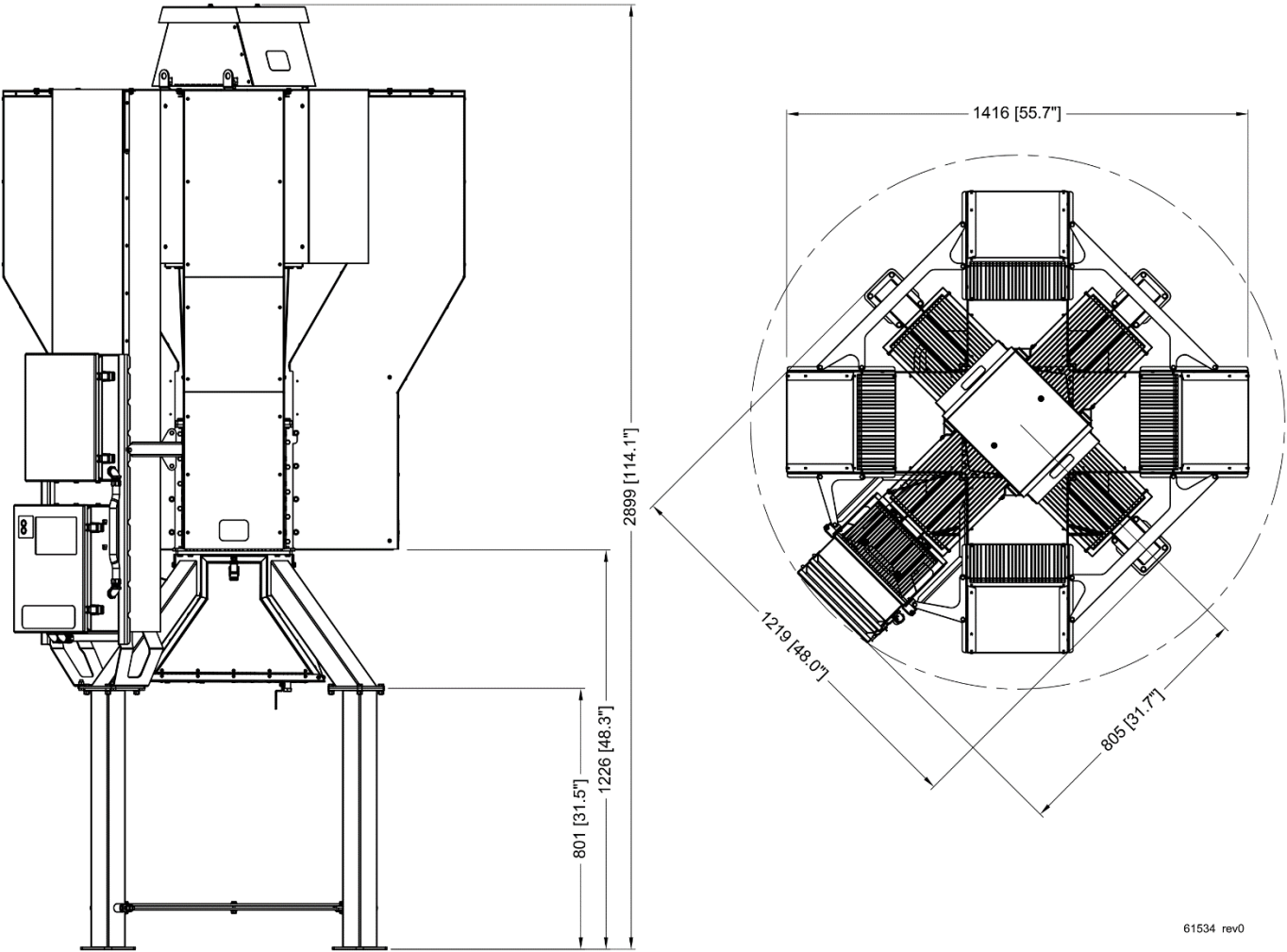
Power output	
Power Ratings 20° C, 750 m above sea level	500 Watts @ 26 Volts
Electrical	
Adjustment Range	24–32 Volts
Reverse Current Protection	Yes
Output	Terminal block located in Electronics box. Opening for 1" conduit in base of box.
Fuel	
Natural Gas	2.0 m ³ /hour of Std. 1000 BTU/SCF (37.7 MJ/Sm ³) gas
Maximum Supply Pressure	170 kPa (25 psig)
Minimum Supply Pressure	100 kPa (15 psig)
Fuel Connection	1/4" NPTF connection
Environmental	
Ambient Operating Temperature Continuously Running TEG	Max. 45° C (115° F) Min. -40° C (-40 °F)
Operating Conditions	Unsheltered Operation
Materials of Construction	
Cabinet	316 Stainless Steel
Cooling Fin	1100 H14 Aluminum
Stand and Structure	316 Stainless Steel
Cooling Type	Natural Convection
Burner	Meeker type, Haynes 214
Fuel System	Stainless Steel

NOTE: Specifications shown are for standard configurations. Global Power Technologies’ Applications Engineering Department is available to design installations meeting different specifications including custom voltages, fuel supply systems and non-standard operating temperatures.

2.2 WEIGHTS AND MEASURE

The following table gives the overall dimensions and weights of the TEG.

Depth	1638 mm (64 ½ in.)
Width	1638 mm (64 ½ in.)
Height	2.9m (114 ¼ in.)
Weight	700 kg (1530 lb.)
Shipping Weight	890 kg (1960 lb.)



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2.3 STANDARD SPECIFICATION FOR GASEOUS FUEL

Gaseous fuels provided to Global Power Technologies' (GPT) Thermoelectric Generators:

1. Shall not contain any particulates larger than 30 μm diameter, including but not limited to sand, dust, gums, crude oil, and impurities.
2. Shall not have a hydrocarbon dew point more than 0°C (32°F) at 170 kPag (25 psig).
3. Shall not contain more than 115 mg/Sm^3 ⁽²⁾ (approx. 170 ppm) of H_2S .
4. Shall not contain more than 60 mg/Sm^3 (approx. 88 ppm) of Mercaptan Sulphur.
5. Shall not contain more than 200 mg/Sm^3 (approx. 294 ppm) of total Sulphur.
6. Shall not contain more than 10% $[\text{CO}_2]$ and/or $[\text{N}_2]$ by volume, nor vary more than $\pm 1\%$ $[\text{CO}_2]$ and/or $[\text{N}_2]$ during operation.
7. Shall not contain more than 120 mg/Sm^3 of water vapour.
8. Shall not contain more than 1% by volume of free oxygen.
9. Shall have a nominal gross heating value of:
 - a) Natural Gas: 37 MJ/Sm^3 (1000 BTU/cu. ft) ⁽¹⁾
 - b) Propane/LPG: 93 MJ/Sm^3 (2500 BTU/cu. ft) ⁽¹⁾
 - c) Butane: 108 MJ/Sm^3 (2900 BTU/cu. ft) ⁽¹⁾
10. Shall not exceed 60°C (140°F) in temperature.

NOTE:

- For gaseous fuels outside of these specifications, please contact Global Power Technologies (GPT).
 - Sm^3 = Standard cubic meter of gas at 101.325 kPa at 20°C (NIST).
-

2.4 TORQUE SPECIFICATION

Bolt Size Inches or #	Thread Per Inch	18-8 Stainless Steel		316 Stainless Steel	
		(In-lbs.)	(Ft-lbs.)	(In-lbs.)	(Ft-lbs.)
#4	40	5.2		5.2	
#6	32	9.6		10.1	
#8	32	19.8		20.7	
#10	24	22.8		23.8	
#10	32	31.7		33.1	
1/4	20	75.2	6.3	78.8	6.6
1/4	28	94.0	7.8	99.0	8.3
5/16	18	132	11.0	138	11.5
5/16	24	142	11.8	147	12.3
3/8	16	236	19.7	247	20.6
3/8	24	259	21.6	271	22.6
7/16	14	376	31.3	393	32.8
7/16	20	400	33.3	418	34.8
1/2	13	517	43.1	542	45.2
1/2	20	541	45.1	565	47.1

NOTE: On the model 1500 TEG, all fasteners are 316 SS unless otherwise noted.

NOTE: On the model 1500 TEG, all fasteners are UNC thread.

3 INSTALLATION

This section provides installation instructions for the Model 1500 Thermoelectric generator.

3.1 PRECAUTIONS

The installation must conform with local codes or, in the absence of local codes, with the CSA-B149.1 Natural Gas and Propane Installation Code and CSA-B149.2, Propane Storage and Handling. The TEG must be kept clear and free from combustible materials, gasoline and other flammable vapors and liquids. Maintain 900 mm (36") minimum clearances from combustible construction, to the top, sides and back, and install over a noncombustible floor.

Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been underwater.

The TEG, when installed must be electrically grounded in accordance with local codes, or in the absence of local codes, with the applicable provisions of the Canadian Electrical Code CSA C22.1. A grounding lug is provided on the side of each leg for this purpose.

3.2 UNPACKING

Unpack the TEG from its shipping crate, keep the crate until the TEG is operational. Locate and identify the following items that were shipped with the 1500 TEG:

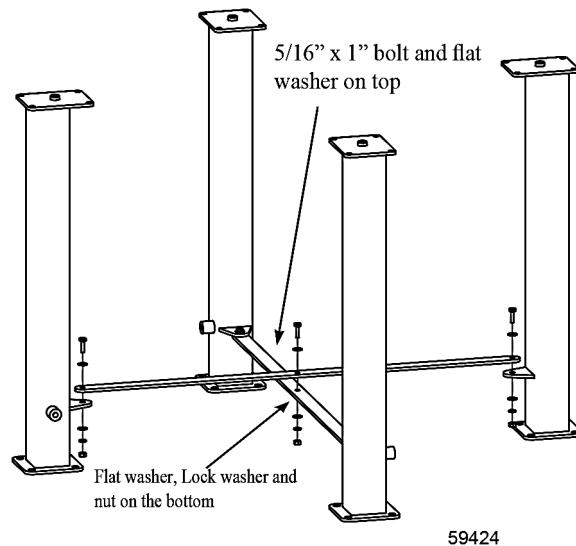
- 2 - Leg Cross Braces
- 4 - Legs
- 16 - 3/8" x 1" SS Hex Head bolt
- 16 - 3/8" SS Hex Nut
- 16 - 3/8" SS Lock-washer
- 5 - 5/16" x 1" SS Hex Head Bolt
- 5 - 5/16" SS Hex Nut
- 10 - 5/16" SS Flat washer
- 5 - 5/16" Lock-washer
- 1 - 1/4" Ball Valve
- 1 - 1/4" Adapter

NOTE:

Inspect the TEG for damage which may have occurred during shipping. Please report any damage as soon as possible as it may make the generator inoperable. Check with the factory before starting a damaged TEG.

3.3 ASSEMBLY

Start by assembling the four legs and the two cross braces together. Lay one cross brace on top of the mount lug on two of the legs. Using 5/16" x 1" SS bolt and flat washer on the top side of the joint and a flat washer, lock-washer and a nut on the bottom side, finger tighten the one cross brace to each of the two legs.

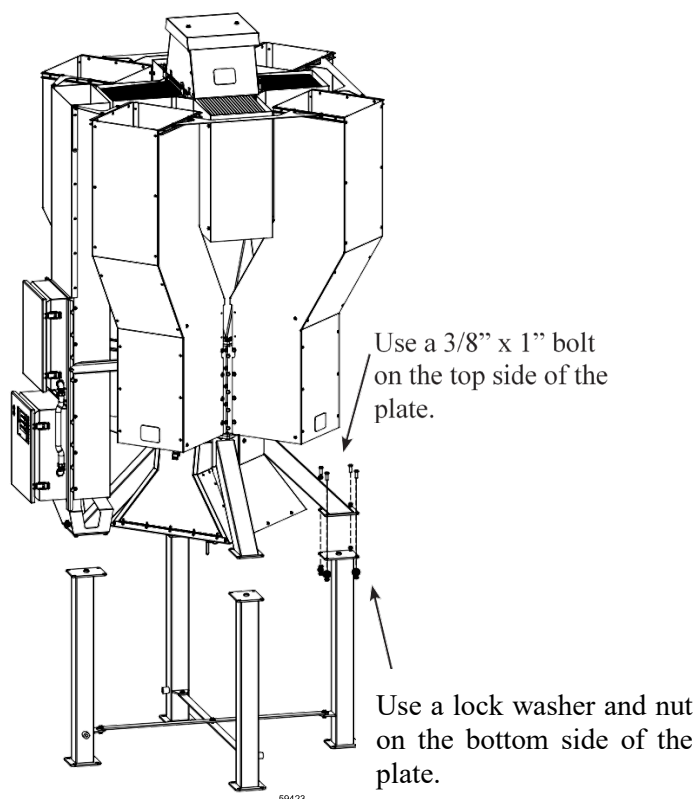


Next, position the other two legs across from each other and in between the first two legs as shown. The cross brace on this set of legs mounts to the bottom of the mount lug on each of the two legs. Using the same combination of fasteners as above, fasten the second cross brace to the next set of legs. Again, finger tighten the nuts only.

Finally, fasten the center hole of the two cross braces together using the same fastener combination as above. Finger tighten this fastener as well. All the cross-brace fasteners will remain loose until after the TEG has been mounted on the legs.

With a suitable lifting device, raise the Model 1500 above the ground to a height slightly higher than 32" (just enough to clear the legs). Slide the four-leg assembly under the four corresponding leg pads of the 1500. Gently lower the TEG until it is close or touching the four legs. On each leg is a centering pilot that will ensure the leg is positioned correctly. Loosely fasten each leg in place using four 3/8" x 1" bolts on top and a lock-washer and nut on the bottom. When all bolts are in place, tighten all the 3/8" bolts securely.

When the legs are securely fastened to the TEG, lower the TEG onto the ground. Do not remove the lifting device yet. Tighten all the cross-brace bolts at this time (they were left loose in the previous step). When all fasteners are tight, the lifting device can be removed.



3.4 MOUNTING

The lower pads of the legs are provided with four 5/8" diameter holes to allow for anchoring of the TEG to the support platform where it will sit. The fasteners required to anchor the TEG are not supplied with the unit.

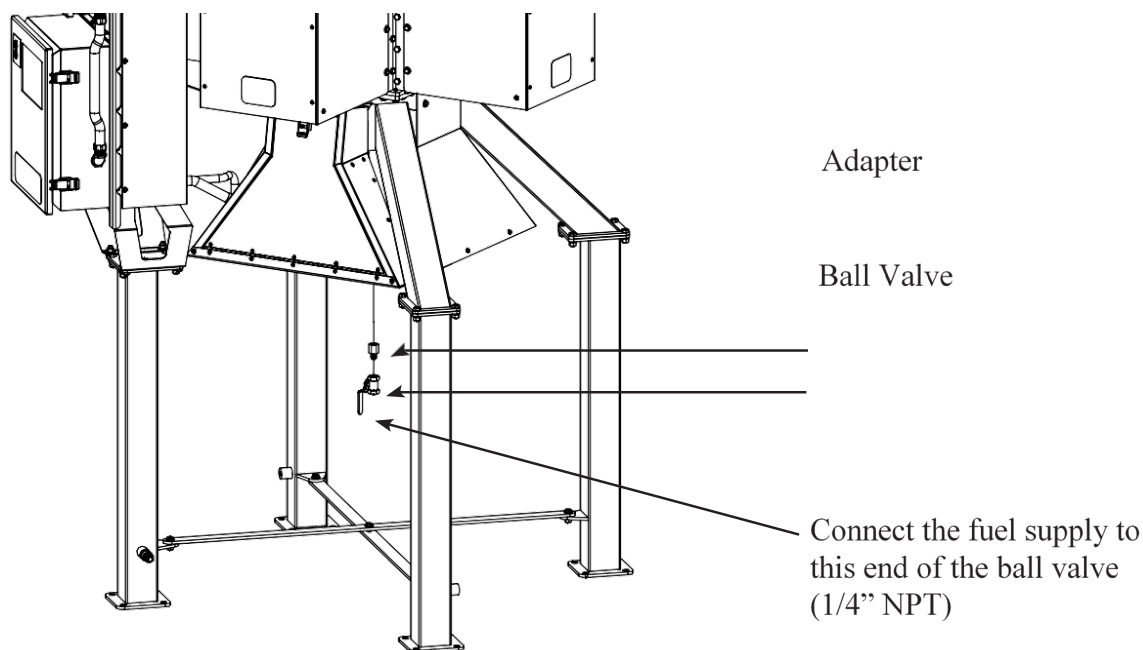
NOTE:

The Model 1500 weighs approximately 1530 lbs. (700 kg). Make sure the support platform can support this weight.

3.5 SUPPLYING FUEL FOR THE TEG

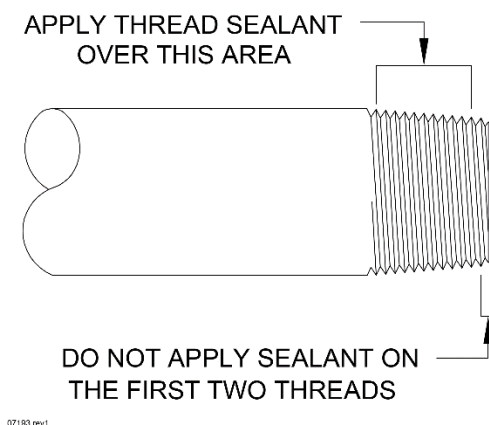
3.5.1 Connecting the External Ball Valve

An adapter and a ball valve were shipped loose with the 1500 and will need to be installed on site (after uncrating the unit). These two parts have 1/4" pipe threads so use pipe sealant on these connections.



3.5.2 Connecting the Fuel Supply

Connect the fuel supply line to the open end of the ball valve assembled above. The fuel supply must be natural gas and the fuel pressure cannot exceed 25 psi. Any fittings necessary to adapt the fuel supply line with the ball valve need to be supplied by the customer.



The supply line of fuel connects directly to the manual shut off valve located beneath the cabinet. The connection fitting required is 1/4" NPTM.

Follow these steps to connect the fuel supply:

1. Remove any protective cap or plugs.
2. Apply thread sealant to the fuel line threads. Do not apply thread sealant to the first two threads of the fitting

NOTE: Thread sealant is recommended. Sealant must be approved for use with gaseous fuels. Tape is not recommended.

3. Connect the fuel line and test all joints for leaks using a commercial leak detector fluid such as Snoop®.
4. Inspect the fuel lines and fittings to be sure they are free of foreign material.
5. Purge fuel lines of all air.

NOTE: The TEG and its manual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures more than 3.5 kPa (0.5 psig).

NOTE: The TEG must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 3.5 kPa (0.5 psig).

NOTE: All fuel piping must be in accordance with local regulations.

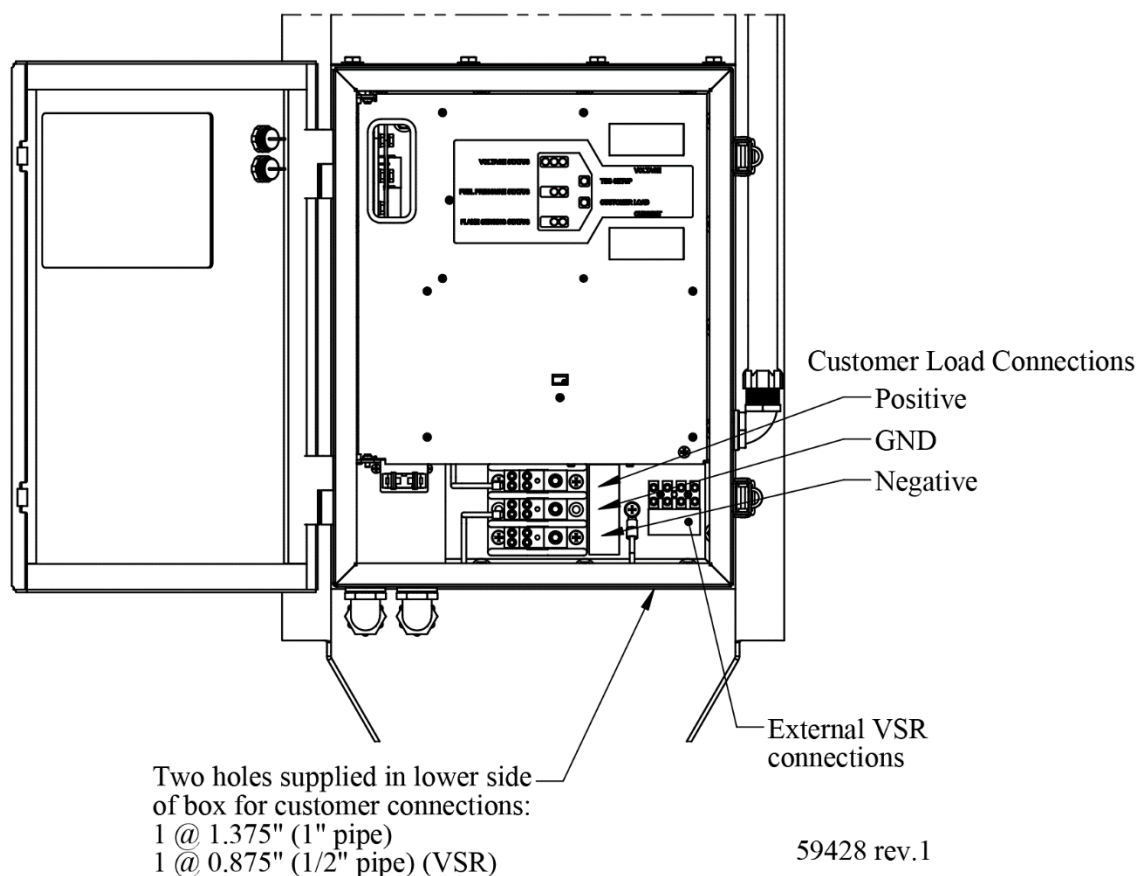
3.5.3 Fuel Considerations

Fuel Types: Fuel must be natural gas. This fuel type is listed on the TEG data plate. Do not use a different type of fuel than indicated.

Supply Pressure: Make sure that fuel pressure is at least 100 kPa (15 psig) and will not exceed 170 kPa (25 psig). If it is expected that the fuel supply pressure will vary greatly, the use of an additional primary regulator is recommended. This will hold the input pressure relatively constant.

Clean Fuel: The fuel used to operate the 1500 TEG must be clean and dry. If dirty fuel is anticipated, then a customer supplied in-line fuel filter is recommended.

Low Temperature: Regulator freeze-off can be minimized by regulating the incoming supply pressure to 138 kPa (20 psig).



3.6 CONNECTING CUSTOMER LOAD

Connect the customer load directly to the TEG using the following procedure:

NOTE: Use only copper wire, properly sized for the load current.

1. Bring the customer load wires through the strain relief bushing placed in the bottom of the electronics box (the 1.375" hole). Allow enough wire to connect the 3-position terminal block located in the lower compartment of the electronics box.
2. Connect the three wires up as indicated. Positive is on top, negative on the bottom and a ground lug in the middle.
3. If an external VSR connection is required, the smaller terminal strip has two connections that will provide the VSR with Power Unit positive and negative. These lines would be routed into the electronics box using the 0.875" hole.

NOTE: The conduit and conduit fittings connecting the load and the VSR to the electronics box are the customers responsibility to supply.

4 STARTUP AND SHUTDOWN

4.1 BEFORE STARTING

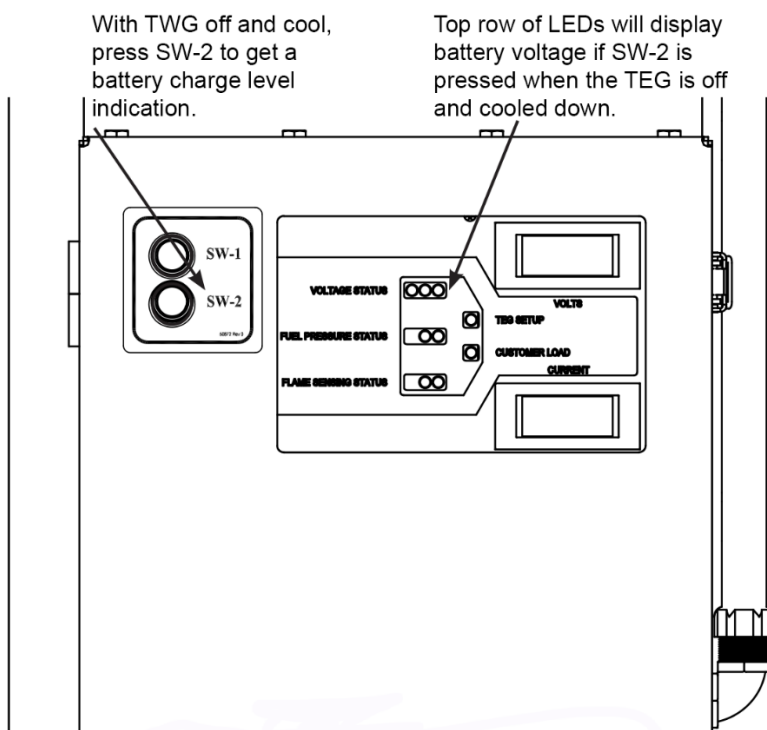
4.1.1 Installing the Fuse

To ensure that the electronics do not drain the battery while not in use, a fuse is installed that disconnects the battery from the remainder of the system. This 7.5-amp automotive type fuse needs to be installed before attempting startup. If the fuse is not installed, the startup process will not initiate.

4.1.2 Checking the Battery Charge

When the TEG leaves the factory, some precautions are taken to ensure that the unit will start no matter how long it sits. Unfortunately, the battery may slowly discharge on its own and not have enough power to initiate startup. There are two ways to check the condition of the battery. If it is removed from the electronics box, check the battery voltage with a voltmeter. The voltage reading should be greater than 5.9 V. If the battery is below this level, it will be necessary to recharge the battery. If the battery is above this level, it should satisfactorily start the TEG.

If the battery is installed in the electronics box, the status can be checked using the LEDs displayed on the front of the unit.



NOTE: The TEG must be off and cooled down for the battery voltage to display correctly.

Press the lower of the two switches on the front of the electronics box. This switch should be marked SW-2. The battery voltage will be displayed by the appropriate LED on the "Voltage Status" row of LEDs. Red means the TEG will most likely not start and that the battery should be removed and recharged. Yellow indicates the battery still has enough charge to light the TEG if the ignition occurs within the first couple of attempts. Green means the charge of the battery is good and one should not expect any issues with starting the TEG.

4.1.3 Igniter Rod Gap Setting

The igniter rod gap is preset at the factory. It is possible, however, that this setting changed during shipping. One can attempt to start the TEG without changing this setting, however, be aware that this may be an adjustment to check if the TEG will not start or run properly. Refer to the section on adjustments for the procedure to set the igniter rod gap.

4.1.4 Checking for Fuel Leaks

All the fittings of the fuel system should be snooped for leaks. This cannot occur on any fittings on the TEG side of the shutoff valve until after the unit is running. This step is included in this section because the leak check needs to occur soon after the unit is running and if leaks are detected, they should be corrected immediately.

4.1.5 Setting the Fuel Pressure

The fuel pressure is preset at the factory between 6.5 and 7.0 psi. Depending on the altitude of the installation site, it may be necessary to change this setting to achieve the desired power output. The fuel pressure should not be changed until the TEG has run at least one hour. After one hour of running, the TEG should be close to 95% of its final power level. If this output power is higher or lower than required, adjust the pressure regulator to obtain the desired power. The procedure to adjust the fuel pressure is in the adjustment section.

NOTE: The maximum power output of the Model 1500 TEG is 530 W when measured at the output of the power unit. Although it is possible to exceed this output, major damage to the TEG may result. In addition to this, surface temperature limits may be exceeded if run at higher than recommended fuel pressures which may cause safety concerns in flammable environments.

4.2 STARTUP

Follow these steps to start the Model 1500 TEG:

1. Open the manual shut off valve located beneath the cabinet.

NOTE:

If the TEG needs to be shut down, close this manual shut off valve. It will stop all fuel flow to the TEG.

2. Depress the manual plunger on the SO valve. This will initiate the pilot flow of fuel to the burner and initiates the sparking system of the spark igniter board. The pilot ignition should occur within a couple of seconds after depressing the plunger.

If ignition does not occur, the spark igniter has a fifteen second purge cycle and then will try the ignition process again. This cycle will repeat itself three times. If ignition still has not occurred, the spark igniter will lock out the startup cycle and will not continue again until the TEG has been manually reset. By resetting the TEG, the three-time cycle can repeat itself, however, there is most likely some reason that the unit did not start. The problem should be found and fixed before further attempts at starting are made.

If ignition did occur, the plunger needs to be held in until the combustion temperature is high enough to allow the thermocouple to hold the SO valve open. Initially, the pilot should remain burning for approximately 45 seconds and then the main flow of fuel will be activated. Once the main flow is activated, the plunger needs to be held down an additional 70 to 90 seconds before it can be released. Release the plunger slowly.

If the plunger was released too soon, the SO valve will close, and the fuel will not be supplied to the system. Once the spark igniter senses no flame, it will shut down the power to the solenoids. To restart it, press the plunger back in and the sequence will be repeated

3. Leak check the complete fuel system from the fuel supply line to the intake plenum using a commercial leak detection fluid such as Snoop.
4. The Model 1500 TEG requires approximately 3 hours of run time to stabilize. As the unit powers up, the voltage will progress from zero to the set voltage (24 to 32 volts) before the current changes appreciably at all. Once the voltage level is reached (approximately five minutes of running), the current will start increasing.

Approximately 95% of the power will be produced after one hour of running. To get full power, the unit needs to run approximately 3 hours.

**WARNING!**

When the TEG is operating, surface temperatures of the unit can approach temperatures close to 200°C. Avoid contact of skin and clothing with the surfaces of the TEG to avoid burns.

4.3 SHUT DOWN

Thermoelectric generators are intended for continuous operation where reliable power is required without interruption. In case the TEG must be shut down temporarily for servicing or an emergency, close the TEG manual shutoff valve.

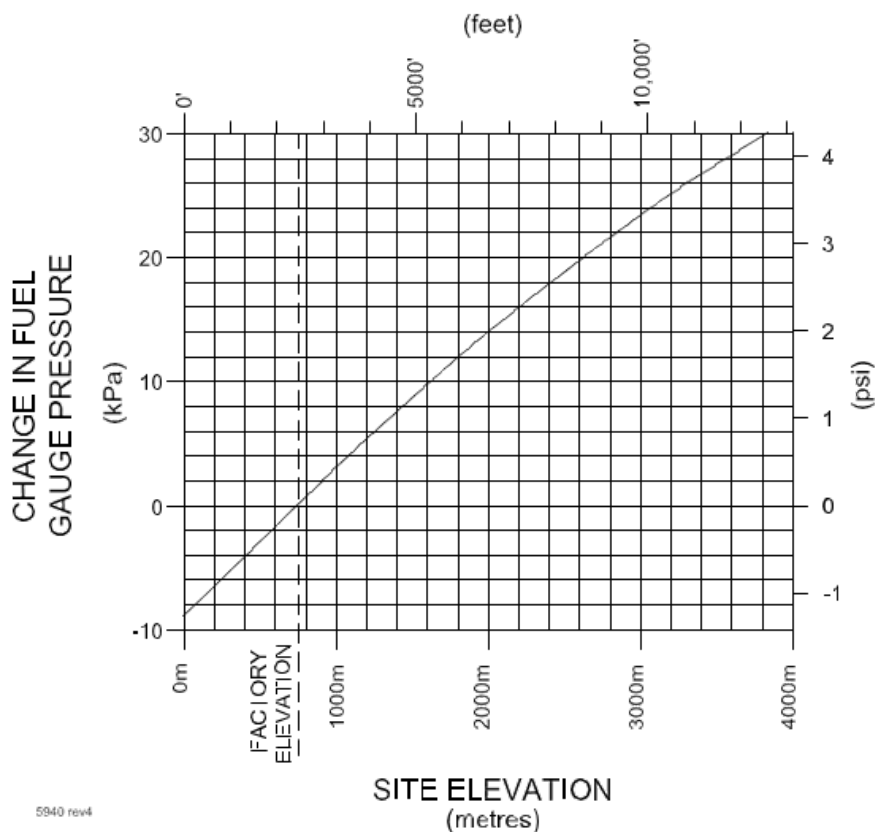
4.4 PERFORMANCE LOG

Your TEG is now operating successfully, making available continuous electrical power to the load. It is recommended that a record be kept of the TEG's performance and maintenance history. Each time adjustments are made, or servicing is carried out the details should be recorded. A blank TEG Performance Log is provided at the end of this manual.

5 ADJUSTMENTS

5.1 FUEL PRESSURE ADJUSTMENTS

The fuel pressure may need adjusting once it is installed on site. The pressure required depends on fuel BTU content as well as altitude. The chart below gives a rough indication of how the altitude will affect the fuel setting. The range should be somewhere between 5.5 psi and 7.0 psi.



To adjust the fuel pressure, open the cabinet front door. The regulator should be located on the right side of the opening.

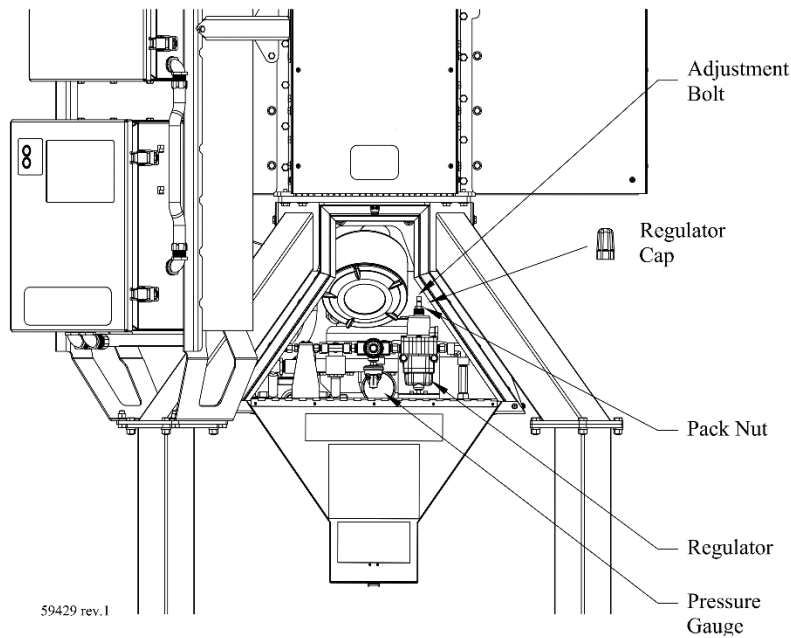
1. Remove the cap from the top of the regulator.
2. Loosen the pack nut.
3. Turn the adjustment bolt. Turning the bolt out (counterclockwise) lowers the pressure.

NOTE:

1/8 to 1/4 turn adjustments should be made and then the unit allowed to stabilize. The stabilization period should be at least 15 to 20 minutes. Depending on fuel BTU content and altitude, the fuel pressure range should be between 5.5 psi and 7 psi.

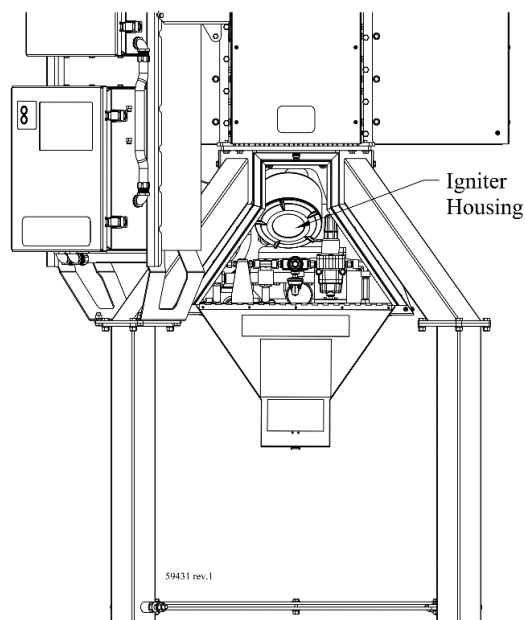
When satisfied with the adjustment,

1. Tighten down the pack nut taking care not to move the adjustment bolt when you are doing this.
2. Reinstall the regulator cap.
3. Close the cabinet door.



5.2 IGNITER ROD GAP ADJUSTMENT

To access the igniter rod, open the cabinet front door and remove the threaded cap on the Igniter housing.



The igniter rod gap is the gap between the ball end of the igniter rod and the arcing post of the burner. This gap is not visible from the outside so there is a technique required to setting the gap. This gap is important because too small of a gap will not supply sufficient enough of a spark to ignite the TEG (or keep it running when it does ignite). Too large of a gap may cause the spark to jump to another surface other than the arcing post which will show up as poor ignition and/or erratic performance issues. **MAKE SURE** the igniter rod is in good condition and not cracked or damaged. Follow the procedure below to set the appropriate gap.

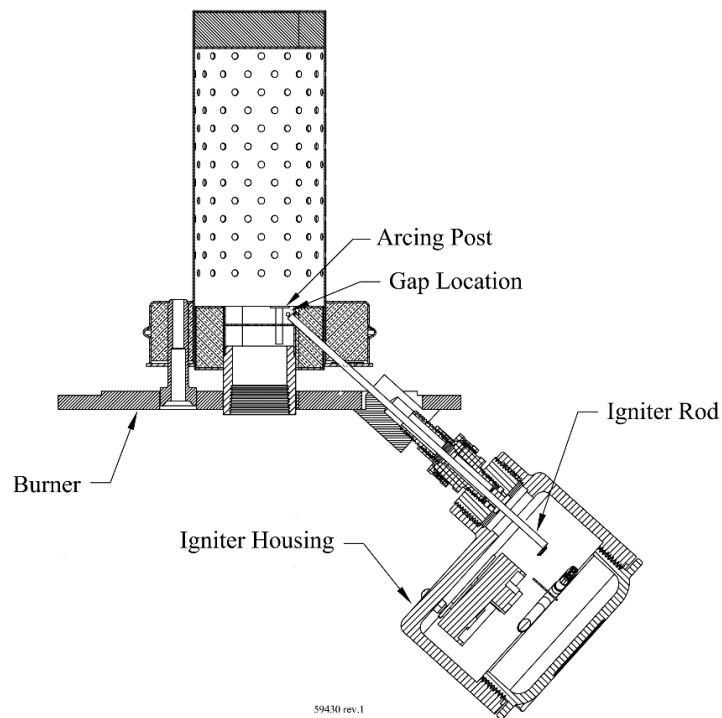
1. Loosen the nut holding the igniter rod secure. If small adjustments are required, it should not be necessary to remove the high energy spark wire.
2. Slide the igniter rod all the way into the burner until you feel it touch the arcing post. There should be less than 0.75" of igniter rod sticking out of the retaining nut when you hit the arcing post.
3. Back the igniter rod away from the arcing post approximately 1/8" to 3/16". This should be the appropriate setting range.
4. Finger tighten the nut to secure the igniter rod in this position.
5. Connect the high energy spark wire if it was removed.

The unit can now be tested to see if the gap selected is appropriate or not. If the unit does not start nicely or shuts down occasionally, move the electrode to achieve better results. Moving it in or out will depend on the original setting.

6. Replace the cap on the igniter housing when satisfied with the performance.

NOTE:	The ignitor rod can easily be broken. Special care must be taken when removing or attaching the SI wire and/or when making adjustments.
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NOTE:	If the problem with ignition persists, remove and inspect the igniter rod. The end of the rod may be damaged, or the ceramic may be cracked. If either is evident, replace the igniter rod.
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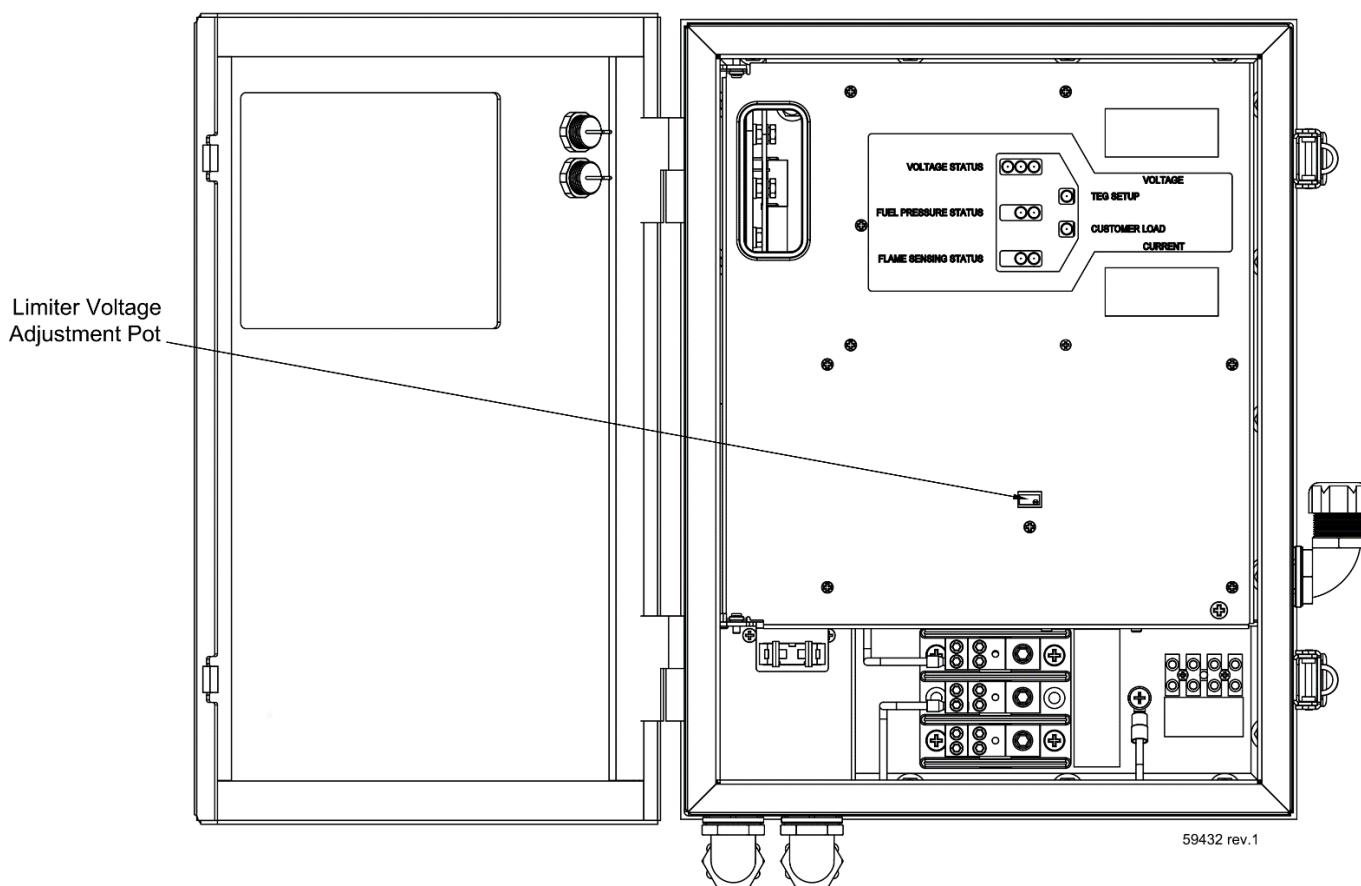
5.3 LIMITER VOLTAGE ADJUSTMENT

The limiter voltage set value is the only electrical system adjustment available. The adjustment pot is accessed by opening the electrical enclosure door. The purpose of this adjustment is to set the value when the limiter will begin to dissipate power, to protect the power unit. Whenever the load draws enough power to keep the output voltage below this value, the limiter will not conduct power. The factory setting for this adjustment is 27.0 Volts.

Any adjustments made must be given time to stabilize. Allow at least 15 to 20 minutes of time to elapse after an adjustment is made before further adjusting. The voltage adjustment range for the Model 1500 is between 24V and 32V.

To adjust the limiter voltage value, the customer load must be disconnected electrically. Press SW-1 until the yellow LED beside the "TEG SETUP" label is lit. This means the customer load is disconnected.

Turn the small screw on the limiter voltage adjustment potentiometer. The voltage level on the top meter should change. Set the voltage to the desired value. When finished, reconnect the customer load by pressing SW-1.



5.4 TIMER ADJUSTMENT

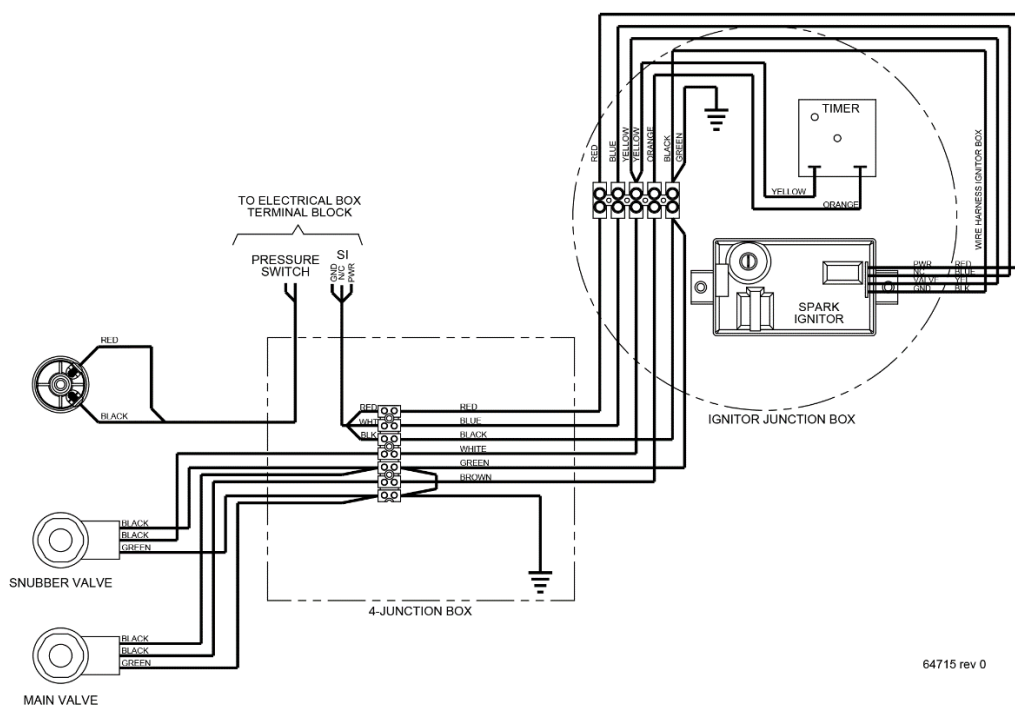
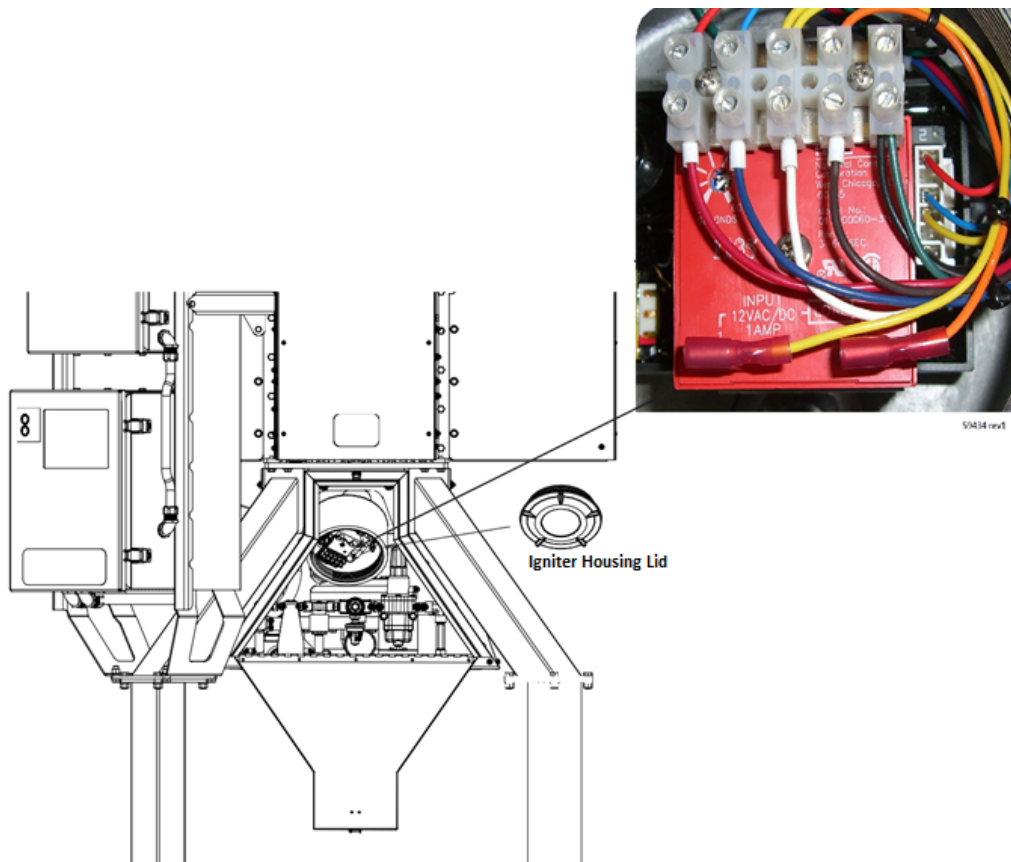
An adjustable timer is installed in the Igniter Housing that controls the length of time the pilot is lit before the main gas supply is activated. This timer is only functional at startup. Although this timer is adjustable, it is recommended that it remains at the factory setting of 45 seconds. If the timer is replaced or accidentally changed, readjust it so the main solenoid activates between 40 and 50 seconds after the pilot ignition occurs.

To adjust the timer access to the Igniter Housing is required.

1. Open the cabinet front door.
2. Remove the Igniter housing cap.
3. Locate the timer adjust location. The inset picture has the timer rotated so the writing is vertical. In the housing, the timer is upside down from what is shown.
4. Adjust the timer to 45 seconds. The tolerance range is 40 to 50 seconds. A setting less than 40 seconds may not allow sufficient warm up of the combustion chamber to allow a 90 second latch time of the Baso valve.

When the adjustment is made,

5. Replace the igniter housing cap.
6. Close the cabinet door.

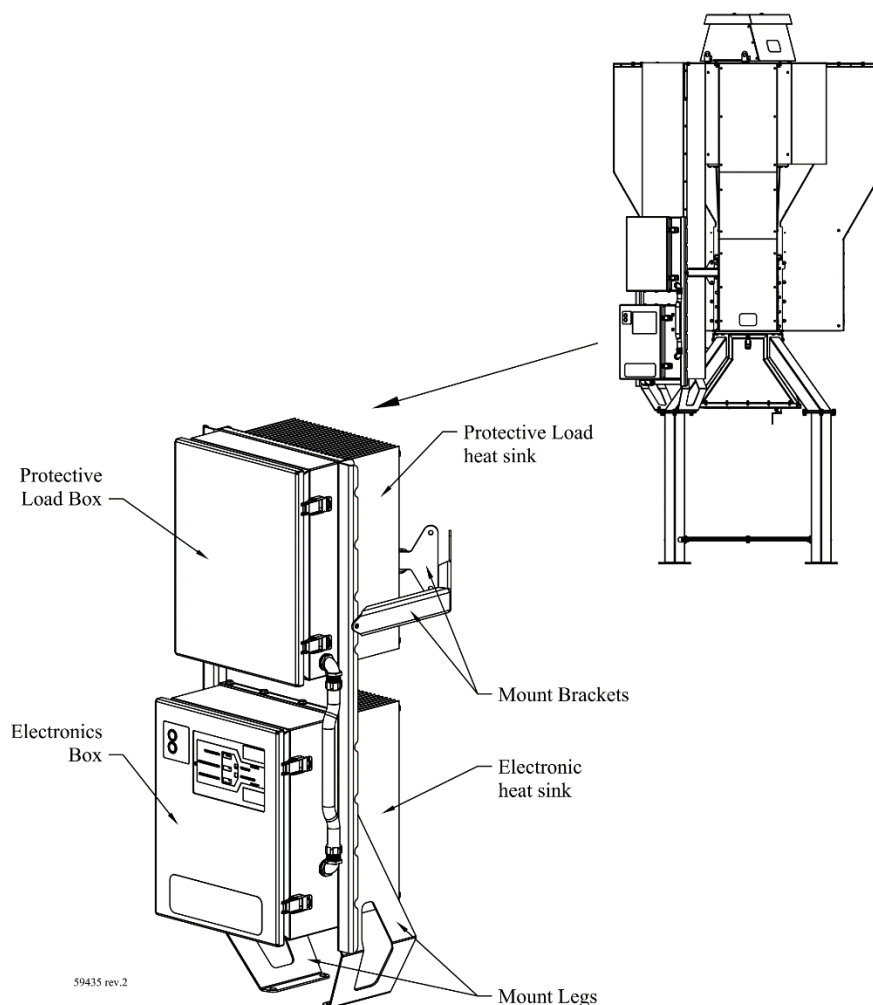


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6 ELECTRICAL SYSTEM

6.1 MODEL 1500 ELECTRICAL SYSTEM

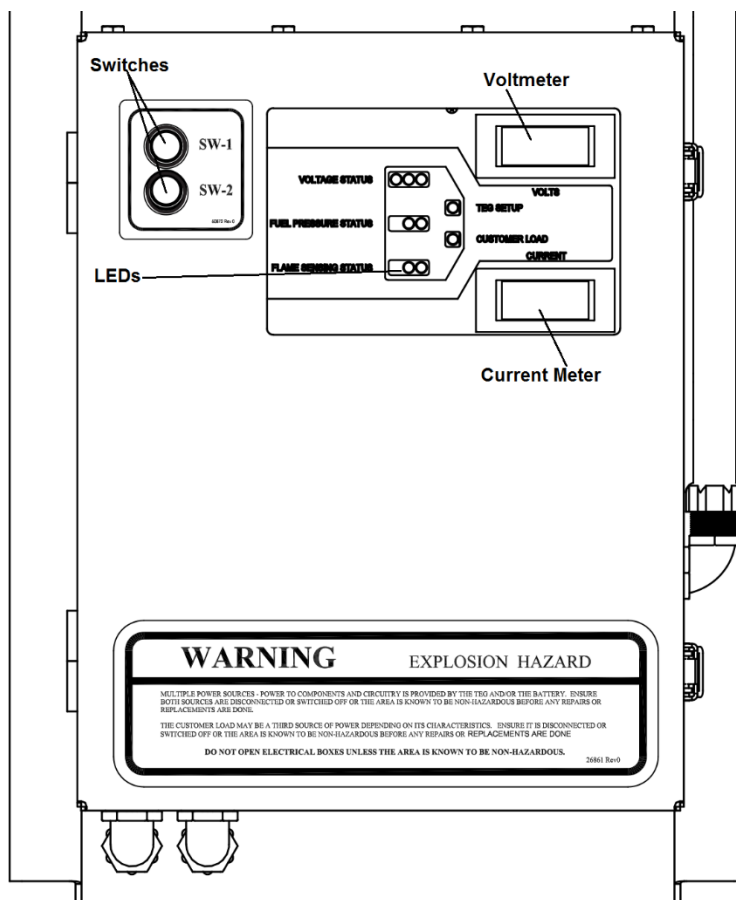
Most of the electronics that control the Model 1500 are in the electronics assembly mounted on the side of the TEG. Below is a detail of this electronics assembly with the description of the major components added. The two boxes have different functions. The Protective Load box is an enclosure that houses nine large resistors. Its function is to provide a method for the system to consume any unused power produced by the power unit but not used by the customer load. A TEG creates power whether it is used or not. If the power is not used, permanent damage to the TEG can result. This box prevents any internal damage.



The electronics box is where all the other electronics are contained. In the next few pages, the user interface will be discussed along with some of the key components. In addition, the typical customer connections will also be highlighted.

6.1.1 Electronics Box – User Interface

There are three functions of the Electronics Box that the user will interact with; the switches, the meters and the LEDs. The switches provide the user a method to communicate with the electronics. The meters provide digital feedback on the voltage and current (can be switched to show the TEG output or the Customer Load draw). The LEDs give a general indication of how the unit is working in specific areas and whether the customer load is connected or not.



6.1.2 Switches and Switch Functions

There are two switches on the external cover of the Electronics box. These are piezo electric switches that convert pressure into an electronic signal. This functionality allows them to be used in a Class 1 Div 2 area. Each switch has a couple of functions depending if the TEG is OFF or ON (running).

6.1.2.1 TEG Off

SW-1 Fault Recall Mode: With the TEG off, pressing SW-1 will cause the LED display to blink for 15 seconds indicating the last conditions the system was at before shutdown.

SW-2 Fault Recall Mode Clear: If SW-1 was pressed as per the above and the display is flashing, pressing SW-2 will clear any lockout modes that may be present (SI lockout and/or over-voltage lockout).

SW-2 On Board Battery - voltage check: If the TEG is off and cooled down, pressing SW-2 by itself will display the condition of the 6V battery. The voltage sensing line of LEDs will display a green LED if the battery is in good charge condition, a yellow LED if the battery requires recharge and a red LED if the battery is essentially dead.

If the green LED is on, successful ignition will be possible. If the yellow LED is on, a successful ignition is possible, however, if ignition does not happen in the first couple of attempts, it may fail to light. If the red LED is on, the chances of successful ignition is poor.

6.1.2.2 TEG On

SW-1 Connect/disconnect the customer load: Pressing SW-1 when the TEG is running will connect or disconnect the customer load. This is shown by the column of two LEDs marked TEG Setup and Customer Load. Pressing SW-1 causes the selection to toggle between TEG Setup and Customer Load. The TEG Setup LED is yellow and the Customer Load LED is green.

NOTE:

On startup, the default condition is to have the Customer Load connected. Since the TEG takes a while to get to the necessary temperature range to produce the power to support the customer load, the green LED will flash. This indicates that upon reaching the appropriate power level, the customer load will be connected. Connecting the customer load is a timed based decision. The timing starts once the power unit is producing more than 20V (the green LED on the Voltage Status line lights up). If a connection attempt is made and the power level of the TEG is pulled below the minimum value, the customer load is disconnected. The system will wait another time interval and try again. The time interval for the 1500 is 5 minutes.

SW-2 Open Circuit Voltage measurement: Pressing SW-2 can give an open circuit voltage measurement. This voltage will provide a guide as to how good the power unit is. When SW-2 is pressed for this function, voltage levels will start displaying on the voltage meter. These voltages will keep getting larger and larger. Use the second displayed voltage as the open circuit voltage.

NOTE:

Two conditions must occur to get an open circuit voltage:

- First, the TEG must be stabilized (i.e. needs to have run for at least 3 hours)
 - Second, the system must be in TEG ONLY mode - i.e. customer load disconnected.
-

To prevent damage to the power unit, the time interval that the unit is open circuit is 5 seconds. After the 5 seconds has expired, the system will revert to TEG ONLY mode. The operator must manually switch the system back to connect the CUSTOMER LOAD.

6.1.3 Meters

There are two meters visible from the front of the electronics box. The upper meter displays voltage and the lower meter displays current. In both cases, the meters are dual function. That is, they read either the voltage and current produced by the TEG power unit or they read the voltage and current drawn by the customer load. There are two LEDs that indicate which set of readings are displayed. If the yellow LED labeled TEG Setup is lit, the voltage and current represent what the TEG power unit is producing. If the green LED labeled Customer Load is lit, the voltage and current represent what the customer load is drawing from the TEG.

NOTE:

The TEG power unit produces a fixed amount of power regardless if the customer load is using it or not. When the customer load uses less than 100% of the power produced, the TEG electronics diverts the rest of the power into the Protective Load box for dissipation. Because of this, if the voltage and current readings are taken when the LED is on Customer Load, the power may not add up to the total power potential of the TEG. Use the TEG Setup mode if the total TEG power produced is required.

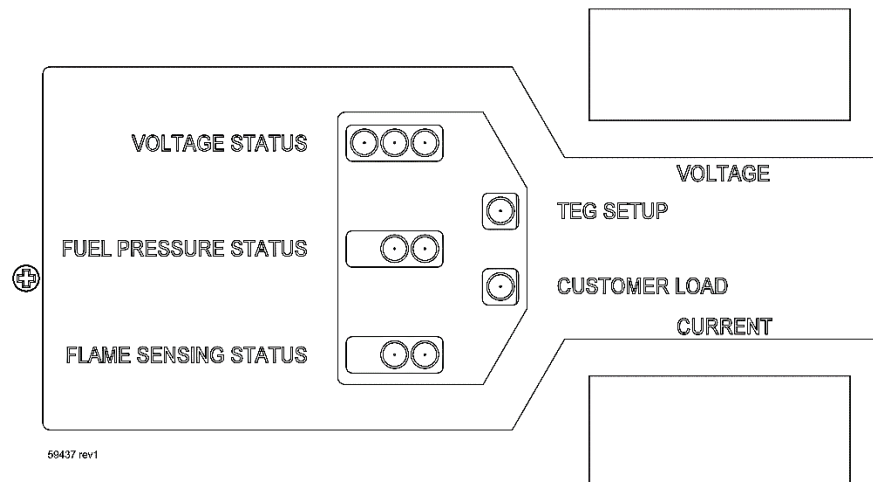
6.1.4 LEDs

There are five sets of LED indicators on the front of the Electronics box. They indicate the following:

- Voltage Status
- Fuel Pressure Status
- Flame Sensing Status TEG Setup
- Customer Load Connected

At any given time, four of the five LEDs should be lit. The TEG Setup and Customer Load LEDs toggle between one or the other. They should never be lit at the same time. If the TEG is running normal with the customer load connected, all four LEDs lit should be green.

As mentioned earlier, some LEDs have dual purposes depending if the TEG is on or not. Each case will be covered below.



6.1.4.1 TEG On Condition

TEG On Condition: Voltage Status LED - One of three LEDs can be lit; Yellow, Green or Red.

- Yellow - voltage is lower than 20V. Note that the voltage referred to will depend on whether the unit is in TEG Setup Mode or in Customer Load Mode.
- Green - voltage is above 20 V and below 35 V.
- Red - voltage is above 35 V.

Fuel Pressure Status LED: One of two LEDs can be lit; Green or Red.

- Green - indicates fuel pressure is present.
- Red - indicates no fuel pressure is present.

Flame Sensing Status LED: One of two LEDs can be lit; Green or Red.

- Green - indicates a flame is sensed in the combustion chamber.
- Red - indicates no flame is sensed.

TEG Setup or Customer Load: Either one or the other is lit. TEG Setup is Yellow and Customer Load is Green.

NOTE:

On startup, the default condition is to have the Customer Load connected. Since the TEG takes a while to get to the necessary temperature range to produce the power to support the customer load, the green LED will flash. This indicates that upon reaching the appropriate power level, the customer load will be connected. Connecting the customer load is a timed based decision. The timing starts once the power unit is producing more than 20V (the green LED on the Voltage Status line lights up). If a connection attempt is made and the power level of the TEG is pulled below the minimum value, the customer load is disconnected. The system will wait another time interval and try again. The time interval for the 1500 is 5 minutes.

6.1.4.2 TEG Off Condition

As mentioned earlier, when the TEG is off and cool, pressing SW-2 when nothing else is displayed (no flashing LEDs) will cause the status of the onboard 6V battery to display on the Voltage Status LEDs.

- Yellow LED displays: Battery voltage is low and needs recharging. There may be sufficient charge remaining to successfully ignite the TEG if it starts in the first couple of attempts.
- Green LED displays: Battery voltage is good.
- Red LED displays: Battery voltage is extremely low. The TEG most likely will not start without the battery receiving charge.

6.1.4.3 Error Codes

One feature of the LEDs is that they record the last state that the TEG was in before it shut down. To save battery power, the display goes blank when unattended for more than 30 seconds, however, the memory incorporated into a chip on the board retains the last condition. This can be recalled by press SW-1.

For instance, if the fuel pressure was lost during operation but everything else was working as it should, pressing SW-1 will have the following blinking LEDs

- Voltage Status - Green
- Fuel Pressure Status - Red (fuel pressure was lost)
- Flame Sensing Status - Green

In addition to the above, either the Customer Load LED or the TEG Setup LED will flash depending on what the setting was before the loss of fuel pressure.

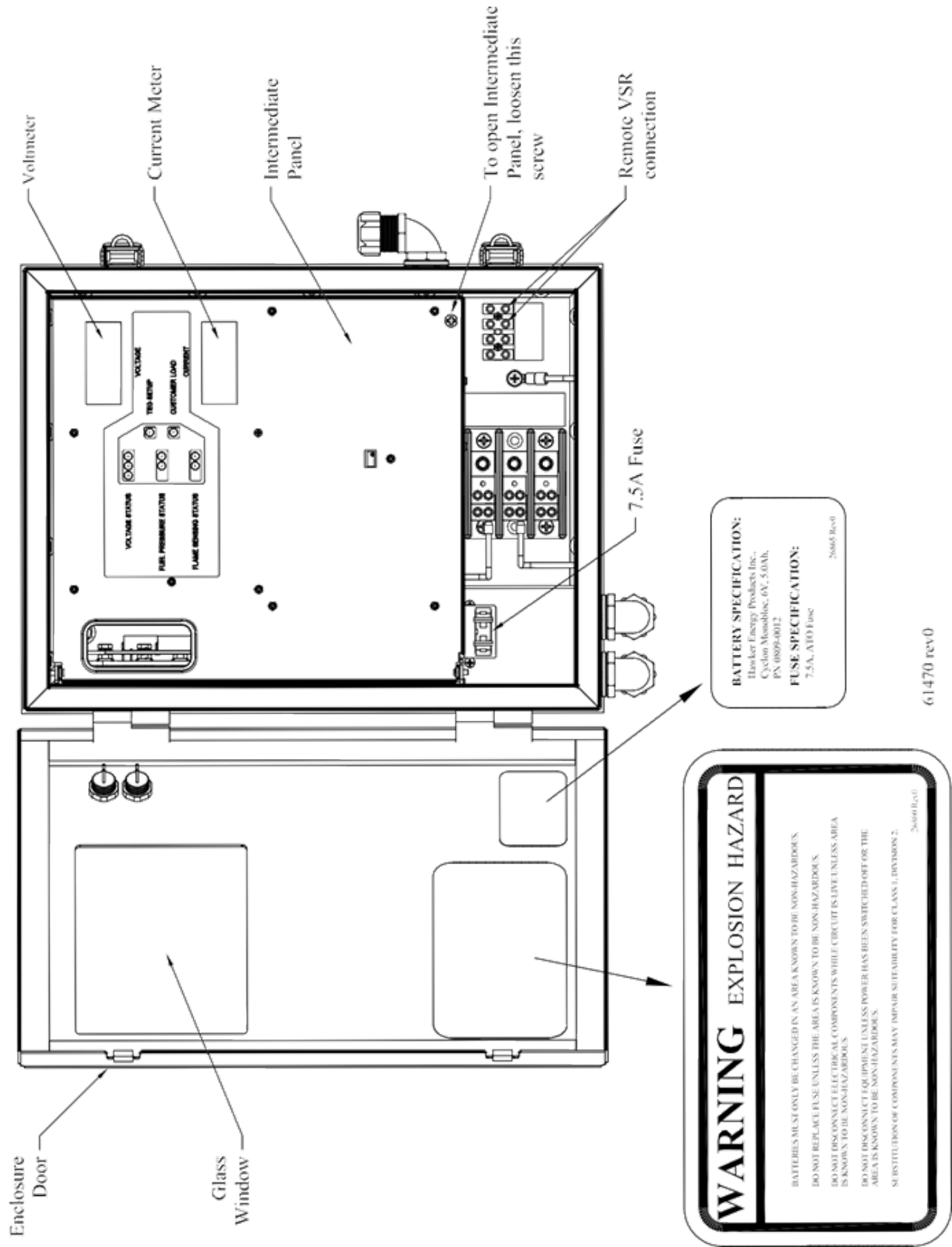
6.1.4.4 Lockout Conditions

Two conditions will cause a lockout of the electronics. They are an over-voltage condition and a flame sensing issue. If the blinking error code shows a Red Voltage Status or a Red Flame Sensing Status, the TEG must be reset. This reset feature is a safety feature to ensure no damage will be done to the TEG itself or the surrounding environment. Before resetting the error condition, BE SURE of the cause of the lockout condition to make sure permanent damage to the TEG or a catastrophic accident does not occur.

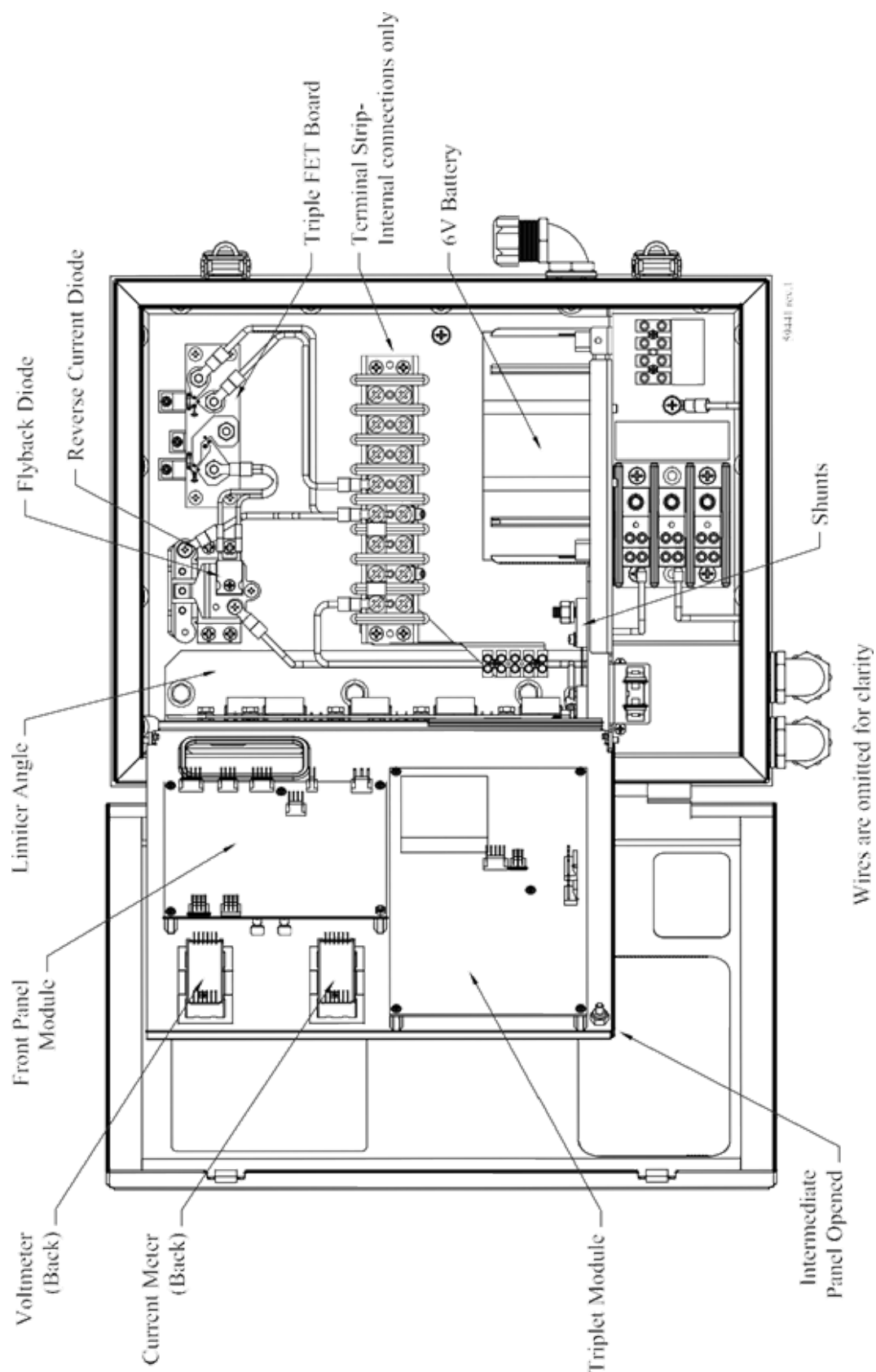
To reset the TEG, press SW-1 to have the error condition blinking and then press SW-2.

NOTE: Loss of fuel pressure will not cause the system to lock out.

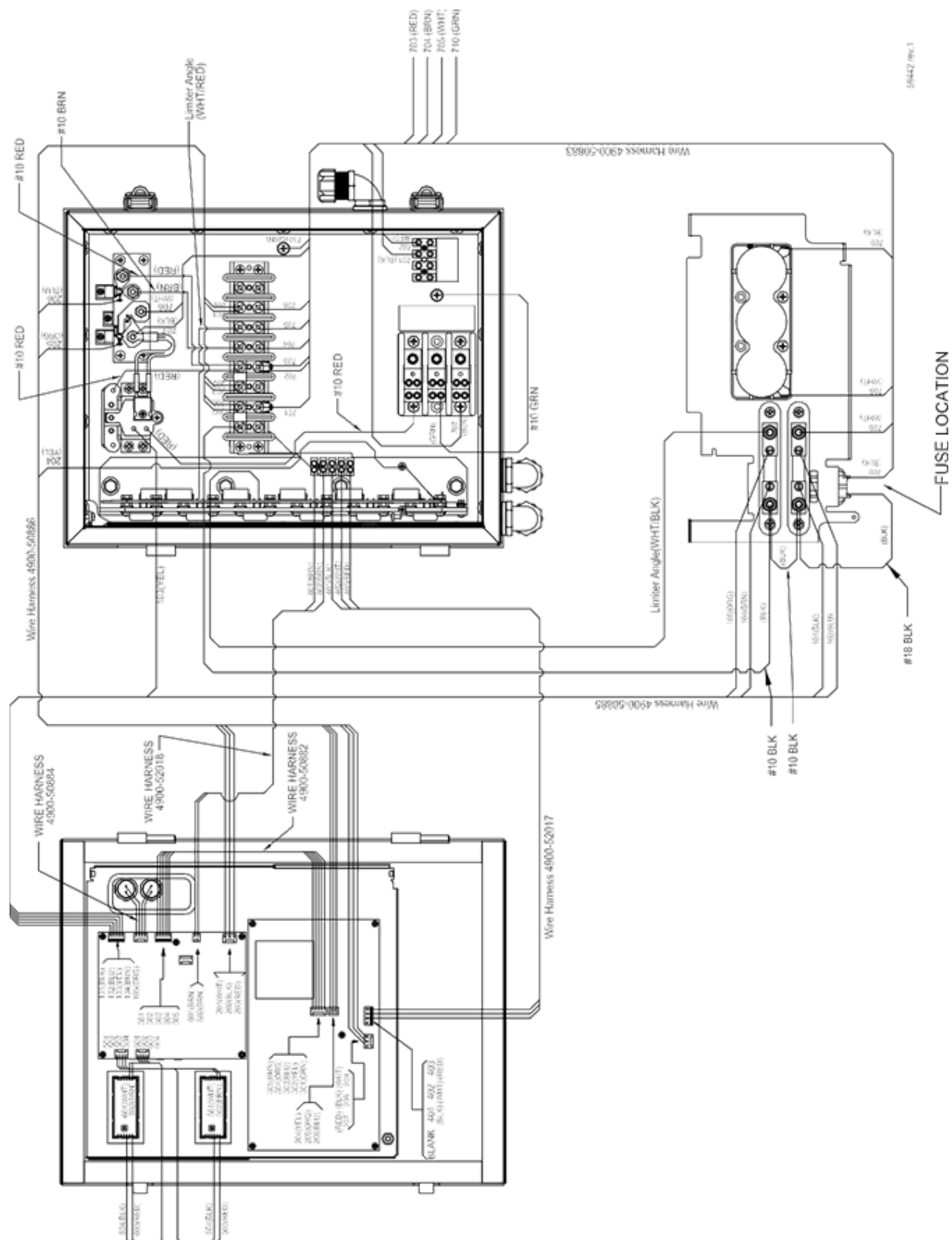
6.1.5 Electronics Box with Enclosure Door Open



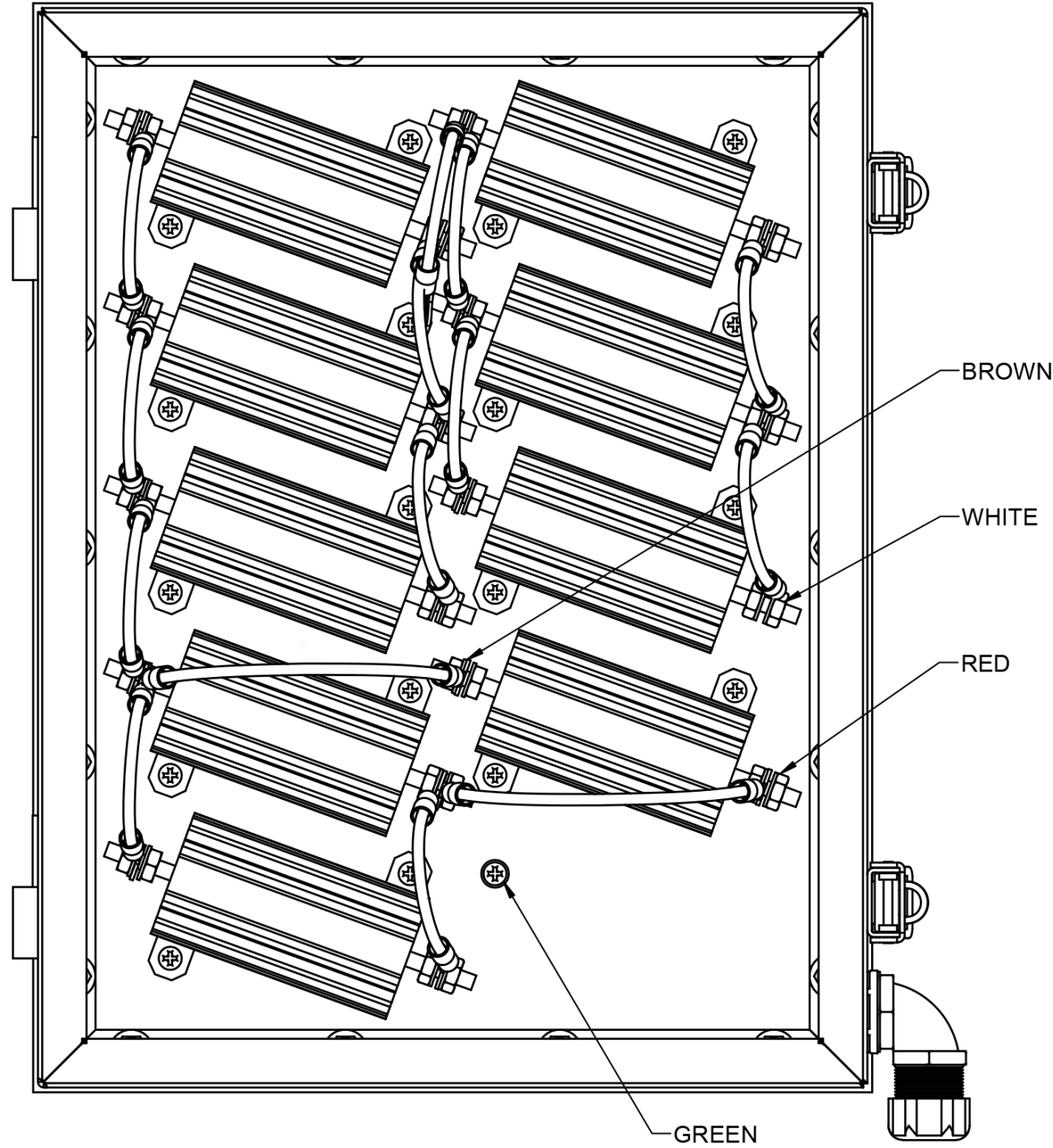
6.1.6 Electronics Box Open with Enclosure Door and Intermediate Panel Open



6.1.7 Electronics Box – Wiring Diagram

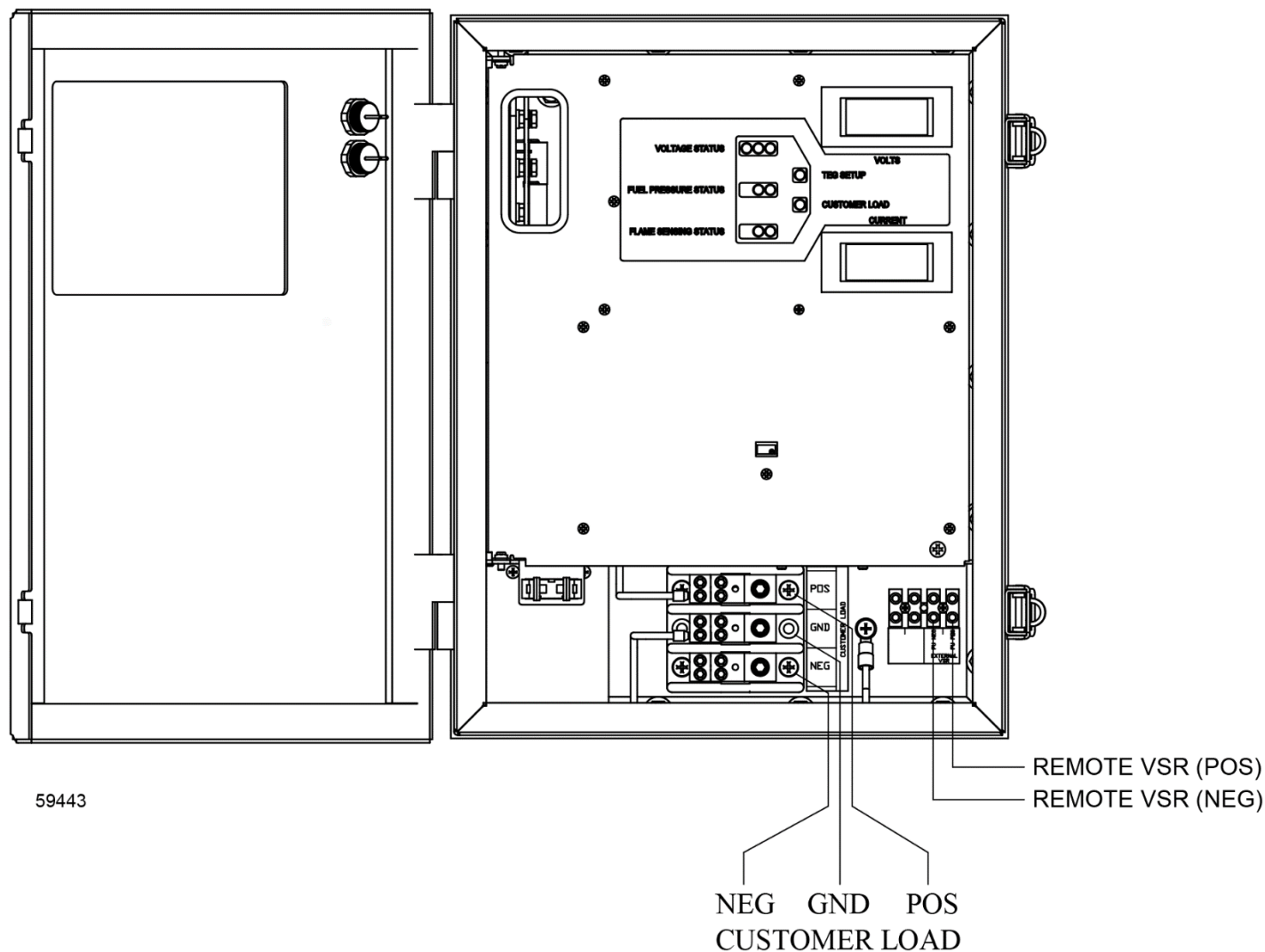


6.1.8 Resistor Box Wiring



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6.1.9 Wiring Diagram – Customer Connections



NOTE: PLUG ANY UNUSED HOLES IN THE BOTTOM OF THE BOX WITH WATER TIGHT PLUGS

6.2 RUNNING CHARACTERISTICS OF ELECTRONICS

6.2.1 Sleep Mode

When the TEG is not running, the electronics will go to a “sleep” mode which is just a power saving feature aimed at maintaining adequate battery supply for restarts. The electronics automatically wake up and display their information if either SW-1 or SW-2 is pressed.

6.2.2 Default Start Settings

Upon startup, the default setting for the Model 1500 is to have the customer load connected. This connection will only happen when the TEG can support the load which means the TEG has to be producing adequate power before the load is connected. To avoid confusion, when the customer load is not connected because the power produced by the TEG is not high enough, the Customer Load LED will blink green. Once at the appropriate power level and the customer load connects, the blinking will stop, and the LED will display a solid green.

6.2.3 Switching on And Off Customer Loads

The LEDs below the Voltage meter indicate if the customer load is connected or not. A green LED will be visible beside the "Customer Load" decal if the load is connected. At the same time, the yellow LED beside the "TEG Setup" will be off. If the yellow LED beside the "TEG Setup" is on, the green LED beside the "Customer Load" will be off.

Pressing SW-1 on the front panel will toggle the electronics between connect and disconnect of the customer load. When the customer load is disconnected, the meter reading will read the TEG power unit values.

Any maintenance should be done with the customer load disconnected.

6.2.4 Battery Charge Condition

If the TEG is not running and cooled down, it is possible to get a battery charge level indication to make sure there is enough battery voltage to try a TEG start. Pressing SW-2 will provide this indication.

By pressing SW-2 one of the three LEDs (Red, Yellow or Green) of the Voltage status should light up. Green indicates a good charge. Yellow indicates the battery should be recharged. Yellow does not mean the unit will not start, however, it would suggest that chances are not as good as with a fully charged battery. Red indicates that the battery should be charged before attempting a start.

If the 1500 was shut down for maintenance and a yellow or red LED lights up (an hour or so after shutdown), this would be a good indication that the battery should be replaced.

6.2.5 Performing an Open Circuit Test

One indication of the condition of the power unit is the open circuit voltage. The performance log at the back of this manual has it listed as one of the measurements that should be taken during maintenance.

To measure the open circuit voltage the TEG must be running and stabilized and the customer load must be disconnected. Press SW-1 to disconnect the customer load.

Once the customer load is disconnected, press SW-2 to get open circuit voltage. Watch the Voltage meter and record the second reading that is displayed as the open circuit voltage. The first reading is typically in the transition region and should not be used. The second reading will represent the open circuit voltage. The open circuit voltage continues to climb with time so subsequent readings will be slightly higher than the actual open circuit voltage.

Since a prolonged open circuit condition can do damage to the power unit, the electronics are programmed to switch out of open circuit mode in five seconds. If the reading was not recorded properly, allow the system fifteen to thirty minutes to stabilize before trying another open circuit voltage.

When finished, press SW-1 again to reconnect the Customer load.

7 MAINTENANCE

This section describes how to maintain the model 1500 TEG. Before attempting to maintain the TEG the operator should be thoroughly familiar with its:

- technical specifications;
- process description;
- installation;
- startup and shutdown;
- power output evaluation, and
- adjustment.

NOTE: Good record keeping is necessary for long term follow-up. Use the TEG Performance Log, located at the end of this manual, for recording details each time adjustments are made, or servicing is carried out.

7.1 RECOMMENDED PERIODIC MAINTENANCE

The TEG is a solid-state high-reliability device that requires very little maintenance. However, it does require periodic service checks to provide the years of trouble free service of which it is capable. The maintenance interval depends on the site conditions (fuel purity, environment, etc.) and must be established based on-site records. Field experience indicates that a properly installed TEG usually requires maintenance only once a year.

7.1.1 Routine Service

Basic annual servicing is all that is required unless other maintenance is indicated by the V_{set} evaluation.

Follow these steps to perform a routine annual service:

1. Stop the TEG and wait to let cool. See Startup and Shutdown section.
2. Drain the pressure regulator sediment bowl. See Draining the Sediment Bowl topic below.
3. Replace the fuel filter (Part# 22888) in the pressure regulator. See Fuel Filter Replacement topic below.
4. Check the fuel orifice for clogging and replace if necessary. See Fuel Orifice Replacement topic below.
5. Remove any debris, sand or dust from the cooling fins, cabinet and ducts.
6. Check all bolts and wire connections for tightness.
7. Restart the TEG. See Startup and Shutdown section.

7.2 FUEL SYSTEM MAINTENANCE

The following describes the appropriate procedures for servicing the fuel system.

7.2.1 Draining the Sediment Bowl

Follow these steps to drain the regulator sediment bowl:

1. Shut off the fuel supply to the TEG and allow the TEG to cool down.
2. The fuel regulator is accessed by opening the cabinet door. Open the drain cock located on the underside of the fuel regulator. Any impurities will drain out the drain cock.
3. Close drain cock.
4. Leak check the drain cock.



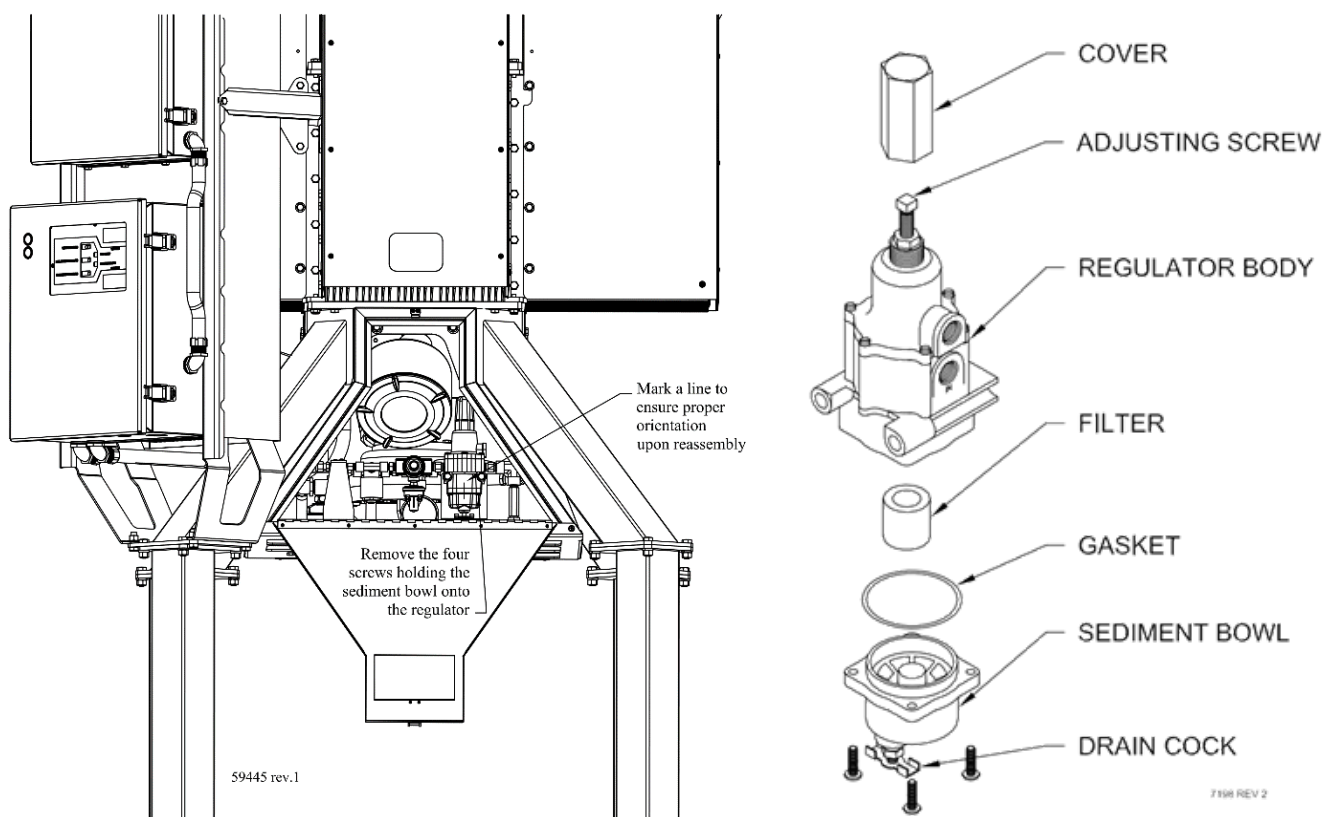
WARNING! Check for fuel leaks after any fuel system service.

7.2.2 Fuel Filter Replacement

7.2.2.1 Disassembly of The Fuel Regulator

To gain access to the fuel system and regulator, open the cabinet door.

1. Shut off the fuel supply to the TEG and allow the TEG to cool down.
2. Drain the sediment bowl by opening the drain cock.
3. Mark the regulator body and sediment bowl with a line to ensure proper orientation upon reassembly.
4. Remove the screws holding the sediment bowl onto the regulator.
5. Carefully remove the sediment bowl.
6. Remove and replace the filter and gasket with new parts. See the diagram below for a breakdown of the regulator to help in parts identification.



7.2.2.2 Reassembly of The Fuel Regulator with The New Filter And Gasket

1. Once the new filter and gasket have been replaced in the sediment bowl, replace the bowl back onto the bottom of the regulator taking care to line up the mark made above so the orientation of the parts remain the same.
2. Replace the four screws that hold the sediment bowl to the regulator.

NOTE: Make sure the gasket does not get pinched or damaged during reassembly.



WARNING!

Always check for fuel system leaks after any fuel system service.

7.2.3 Fuel Orifice Inspection

The orifice on the Model 1500 is part of the combustion system so it is nested in explosion proof enclosures to comply with the Class 1 Div 2 certification requirements. The following procedure is required to gain access to the orifice to either inspect it or replace it.

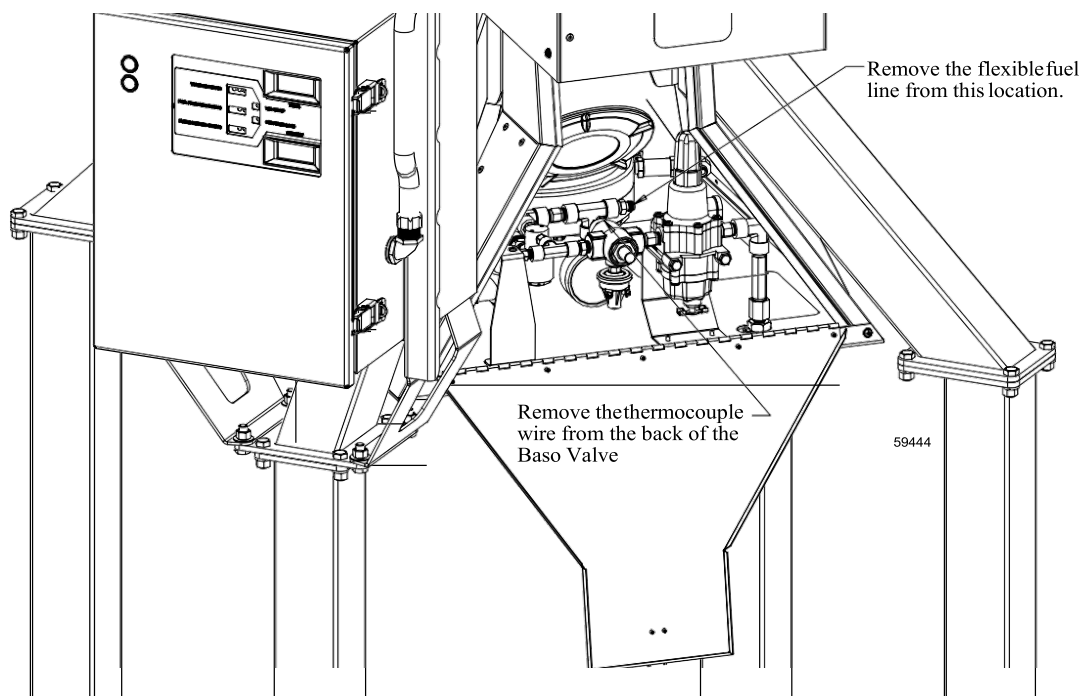
To gain access to the orifice, the cabinet floor must be hinged down out of the way. Do this as follows:

1. Shut down the main fuel supply to the TEG. This will be a site-specific task since the main fuel supply is not part of the TEG system. The external manual valve supplied with the TEG is NOT the valve to shut off. The supply must be shut down upstream of this valve.
2. Disconnect the fuel supply line.

Open the cabinet door to gain access to the fuel system. Two connections inside the cabinet must be removed to allow the cabinet floor to swing down. Refer to the diagram below for the next two steps.

3. Disconnect the flexible fuel line from its location as shown. This connection is on the right side of the tee fitting that connects the pressure gauge. It is not necessary to remove the other end of the fuel line.
4. Disconnect the thermocouple wire that is screwed into the back of the Baso Valve.

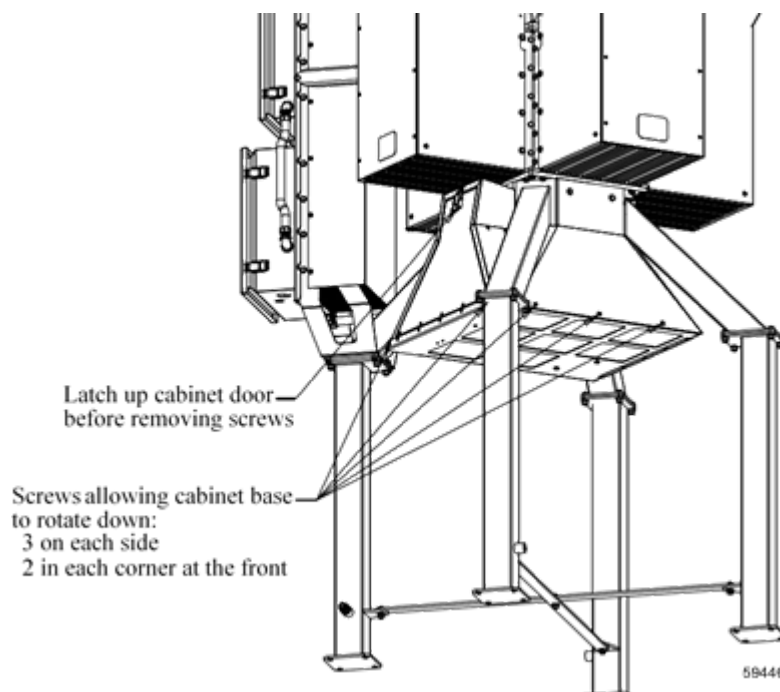
The disassembly can now begin that will allow the cabinet floor to rotate down providing service access to the lower part of the TEG. Refer to the diagram on the next page for this section. There are eight screws holding the cabinet base to the cabinet (along with the hinge at the back of the cabinet). Two are in the lower front corner of the cabinet and six are located down the sides of the cabinet (three on each side).



5. Remove the two screws in the lower front of the cabinet first. These screws have nuts on the inside of the cabinet that will need to be held with a wrench to remove.
6. Once the two front screws have been removed, close the cabinet door and latch it. This will help support the assembly while the screws are being removed.
7. Remove the six screws located along the sides of the cabinet (three on each side). These screws thread into tapped holes so there are no nuts on the inside of the cabinet.

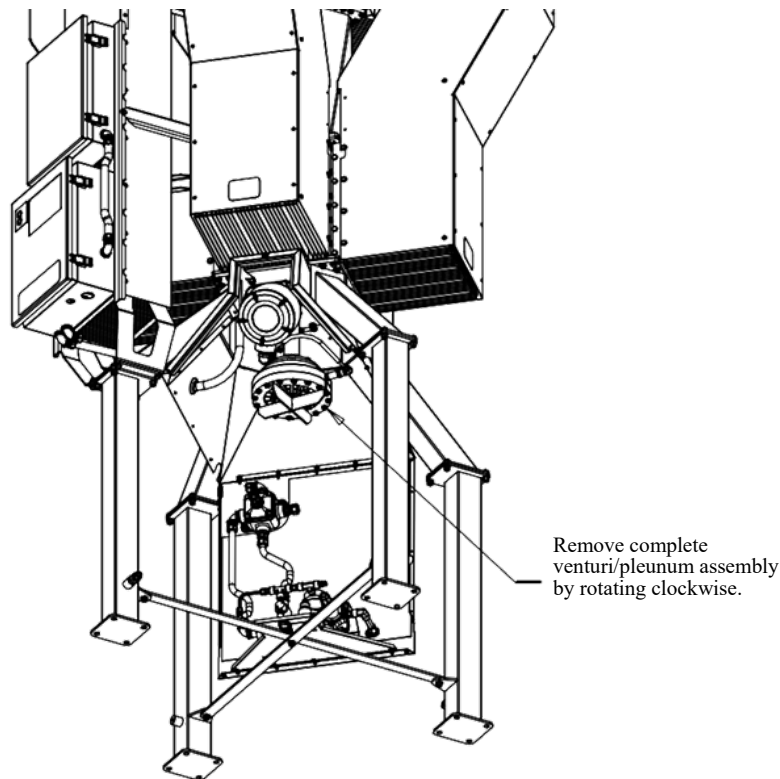
DO NOT remove the screws at the back of the cabinet. The screws at the back of the cabinet hold the hinge in place and do not need to be removed.

The cabinet should now be ready to rotate down. Carefully unlatch the cabinet door. Expect some extra weight as the latch on the door is supporting the fuel system and various other items bolted to the cabinet floor. Carefully lower the cabinet down to a resting position.



Once the cabinet base is rotated down, access to the venturi/ plenum assembly is available. The orifice is part of the plenum assembly, however, access to the bolts that secure the venturi to the plenum is limited so it is easier to remove the assembly as a whole and disassemble it on the bench.

8. Rotate the venturi/plenum assembly clockwise to remove it. This assembly weighs close to 30 lbs. (14 kg) so take care when the last threads become disengaged.

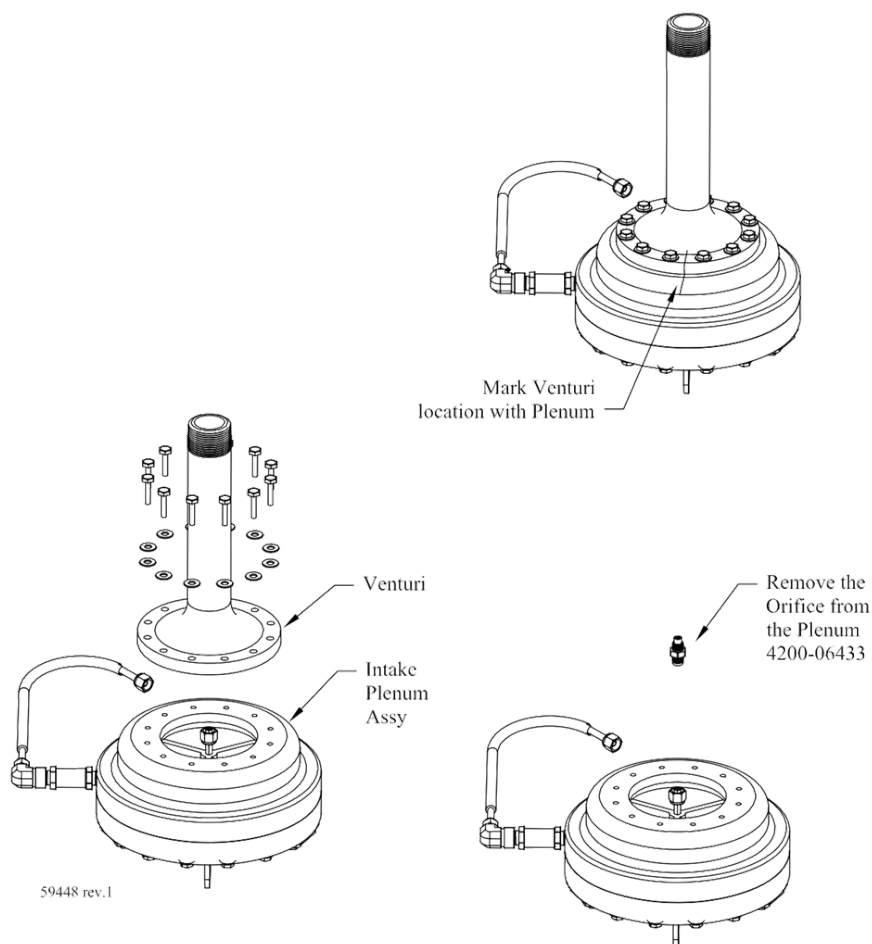


Once the venturi/plenum assembly is removed, take it to a suitable working location to perform the next steps.

7.2.4 Removal of The Orifice

With the venturi/plenum assembly on the bench, follow the instructions below to remove the orifice.

1. Mark with a grease marker a line indicating the venturi and plenum relative orientation. This will ensure that when the unit is reassembled back into the burner that the fuel line location ends up in the same area as it was originally.
2. Remove the twelve bolts holding the venturi to the plenum. This will expose the orifice.
3. Remove the orifice from the assembly. Inspect and replace if necessary.



7.2.5 Installation of The Orifice

Install the orifice back into the Intake Plenum assembly as per below:

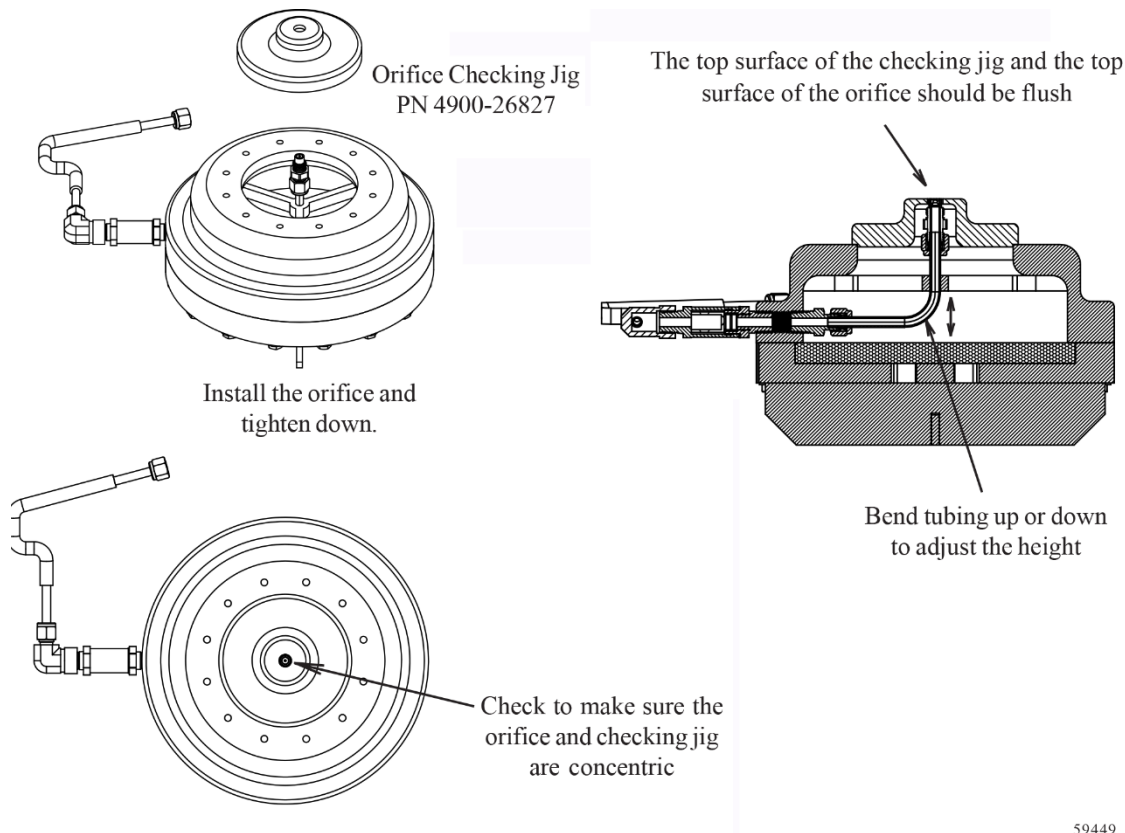
NOTE:

The performance of the 1500 TEG can be drastically altered by an incorrectly positioned orifice. The orifice must be centered, and it must be at a predetermined height. To ensure the proper placement of the orifice, an orifice checking jig is available.

1. Install the orifice back into the tubing fitting in the Intake Plenum.
2. Insert the orifice checking jig onto the top of the Intake Plenum. The checking jig has a machined lip that should fit into the hole in the top of the Plenum and a center hole that the orifice should protrude up into.

The checking jig is made so a visual check of the concentricity can be performed as well as a height check. The height should be checked first.

3. Visually check that the top surface of the orifice and the top surface of the checking jig are flush. A tolerance of ± 0.015 is acceptable. Make any changes to the height by bending the tube that the orifice screws into. The intake arrestor may have to be removed to do this. Typically, the tubing can be bent to make this adjustment without removing it.
4. Next check the concentricity of the orifice and the checking jig. If adjustments are required, hand bending force is usually enough to move the orifice location.



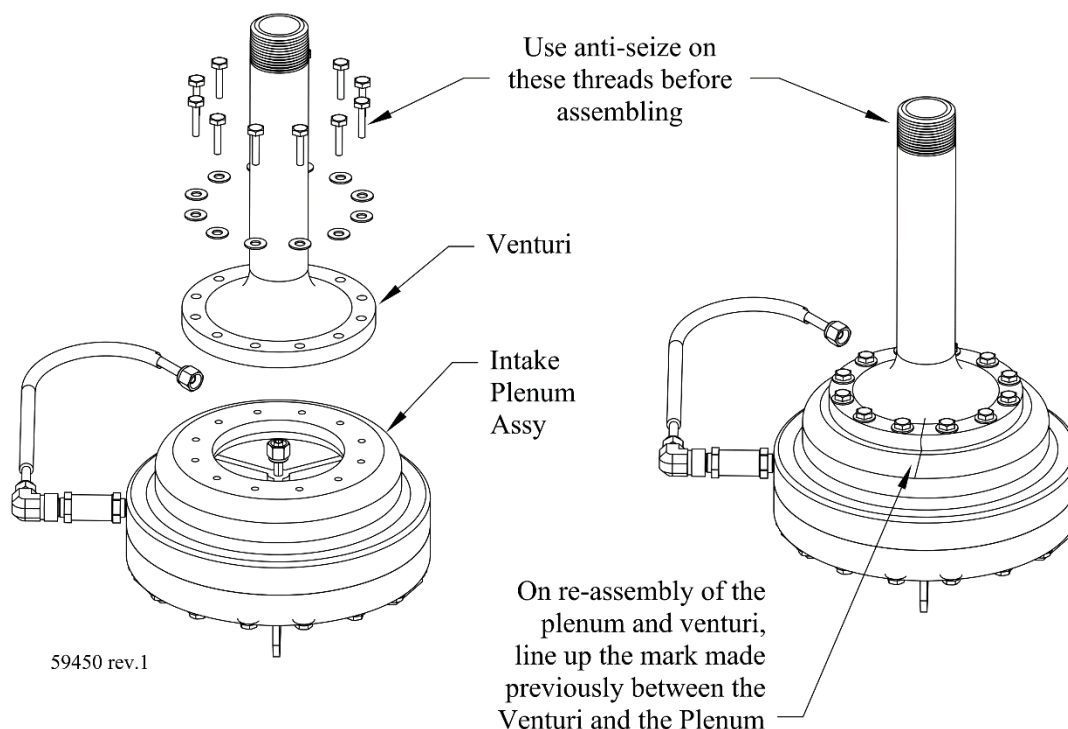
7.2.6 Replacement of The Orifice Assembly Back into the TEG

Once the orifice has been inspected and properly installed into the Intake Plenum, the venturi can be put back on and the assembly put back into the TEG.

1. Replace the venturi back onto the Intake Plenum assembly taking care to line up the mark made during disassembly. Tighten the twelve 1/4" bolts. Use anti-seize on the threads of these bolts.
2. Take the complete assembly and assemble back into the burner. Take care as the weight of this assembly makes reassembly difficult. Use anti-seize on the threads on the venturi before screwing it in.

NOTE:

By marking the venturi and plenum relative locations, the reassembly into the burner should result with the fuel line entry in a proximity to where it was on the right side of the cabinet. The fuel line is flexible so slight variations can occur. If, after the venturi is tight, the new location of the fuel inlet is not on the right side of the cabinet, it may be necessary to take the plenum assembly off and reorient it, so the fuel inlet is on the right side.



Once the plenum assembly has been replaced, the cabinet base can be rotated back up into its horizontal position and the fasteners replaced. As was the case with the disassembly, use the cabinet door latch to support the weight of the cabinet base when replacing the screws.

1. The screws on the side thread into tapped holes so replace them first. The screws on the front of the cabinet require nuts so they should be put on last.
2. Reconnect the fuel line and the thermocouple wire. The assembly is now complete.

NOTE: Check for fuel leaks after any fuel systems service.

7.3 SI SYSTEM MAINTENANCE

The Spark Ignition (SI) system may require occasional maintenance. If the SI system fails to ignite, it must be checked and serviced as necessary. Use the procedures below to maintain the SI system.

7.3.1 Inspection of The Igniter Rod

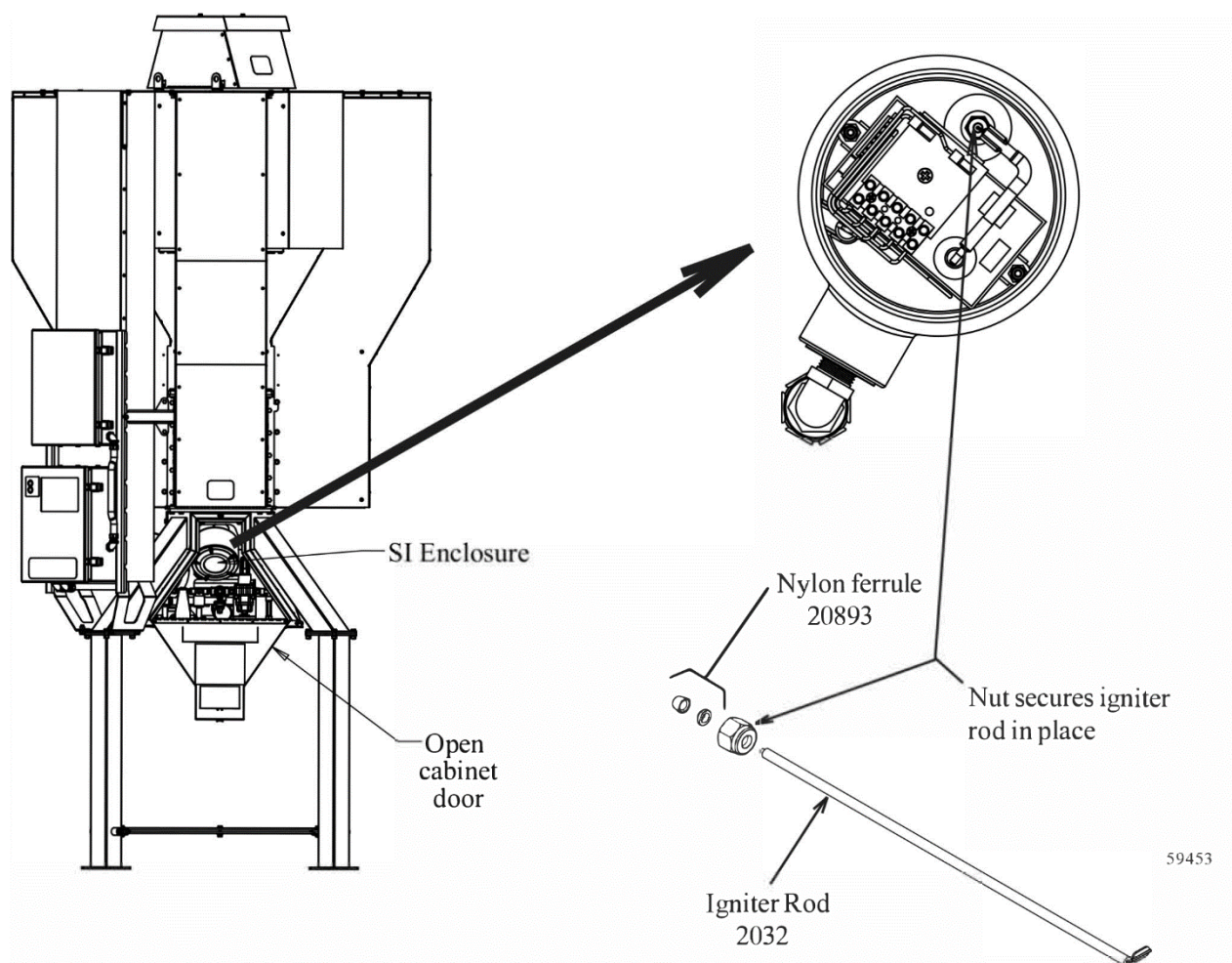
The SI system is enclosed in an explosion proof enclosure located inside the cabinet area. To access this enclosure, open the cabinet door. The enclosure has a screw lid on it. To access the SI board, the igniter rod and the timer, this lid will need to be removed.

NOTE:

Any work done on the SI system can only be performed if the TEG is shut down and cool and the area is deemed safe.

7.3.2 Removal of The Igniter Rod

1. Remove the cover of the igniter housing.
2. Remove the SI wire from the igniter rod.
3. Loosen (but do not remove) the retaining nut holding the igniter rod in place.



NOTE:

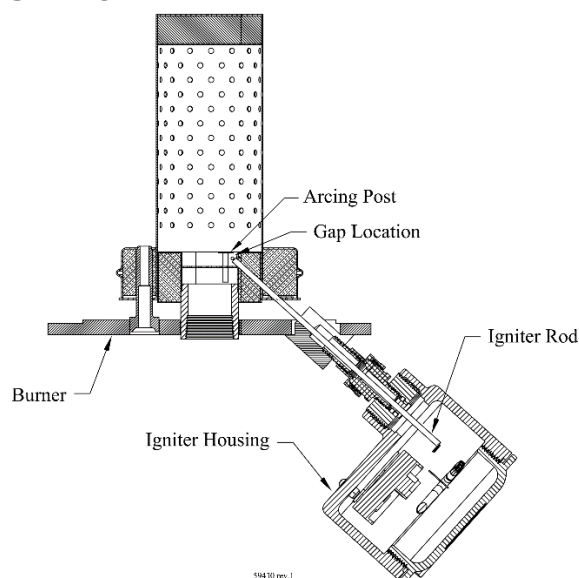
If the ignitor rod is going to be removed, make sure the system has cooled down. The ignitor rod is in the combustion stream and could be extremely hot when removed. In addition to the safety concerns regarding burning of hands and fingers, there is also the concern that the hot electrode will melt the nylon ferrules leaving a film of melted plastic on the igniter rod which may affect its performance.

4. With the nut loosened, slide the igniter rod out of its location. Inspect for cracks and excessive oxidization. Global Power Technologies recommends yearly replacement of the igniter rod.

7.3.3 Installation of The Igniter Rod

The igniter rod must be installed back into the burner assembly with a gap to allow the spark to jump across. Too small of a gap will not supply sufficient enough of a spark to ignite the TEG (or keep it running when it does ignite). Too large of a gap may cause the spark to jump to another surface other than the arcing post which will show up as poor ignition and/or erratic performance issues. Follow the procedure below to set the appropriate gap.

1. Since the nut and ferrules were not removed, the igniter rod should be able to be replaced by sliding it through the open hole in the nut. If it does not slide in easily, remove the nut and ferrules (taking care as the ferrules will be loose in the nut) and place them over the igniter rod. Then slide this assembly into the fitting and loosely tighten the nut onto the fitting.
2. Slide the igniter rod all the way into the burner until you feel it touch the arcing post. There should be less than 3/4" of igniter rod sticking out of the retaining nut when you hit the arcing post.
3. Back the igniter rod away from the arcing post approximately 1/8" to 3/16". This should be the appropriate setting range.
4. Finger tighten the nut to secure the igniter rod in this position.
5. Connect the SI wire.



The unit can now be tested to see if the gap selected is appropriate or not. If the unit does not start nicely or shuts down occasionally, move the electrode to achieve better results. Moving it in or out will depend on the original setting.

6. Replace the cap on the igniter housing when satisfied with the performance.

7.3.4 Check the Pressure Switch

Follow these steps to check the pressure switch:

1. Remove the two wires from the pressure switch and connect a multi-meter across the two pressure switch terminals. Set the multi-meter to measure resistance (ohms).
2. Provide fuel pressure to the switch by opening the manual gas valve and holding open the safety SO valve.
3. Check that the resistance measured across the pressure switch is near zero. This indicates the pressure switch is closed. Replace the pressure switch if necessary.

NOTE: The pressure switch should close at pressures above 13.8 kPa (2 psig).

4. Remove the fuel pressure by closing the manual gas valve.
5. Check that the resistance measured across the pressure switch is near infinity. This indicates the pressure switch is open. Replace the pressure switch if necessary.

NOTE: The pressure switch should open at pressures below 6.9 kPa (1 psig).

8 PARTS LIST

This section lists the parts that form the equipment.

For parts and service please contact Global Power Technologies' Customer Service Department at:

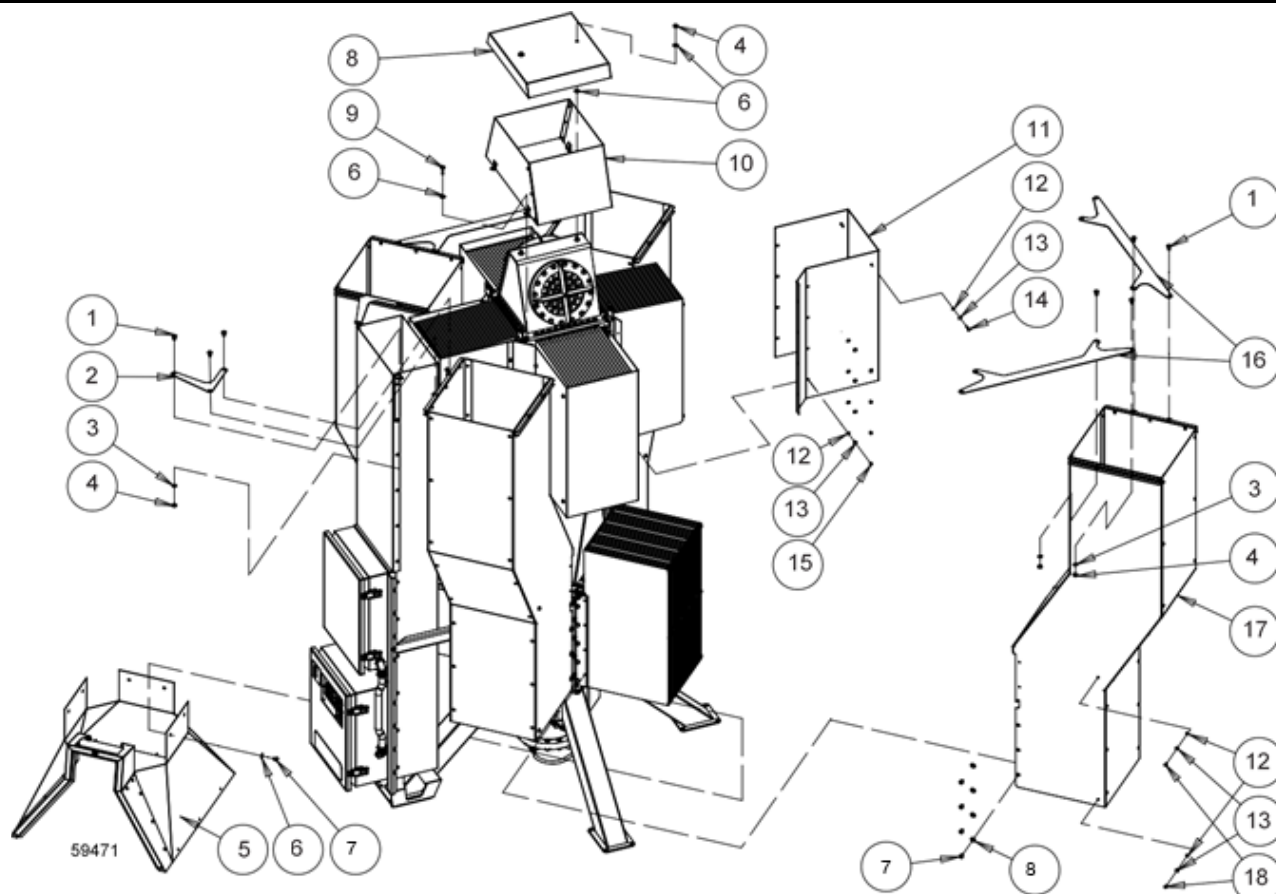


#16, 7875 - 57th Street SE
Calgary, Alberta T2C 5K7

Direct: (403) 720-1190
Fax: (403) 236-5575
Main: (403) 236-5556

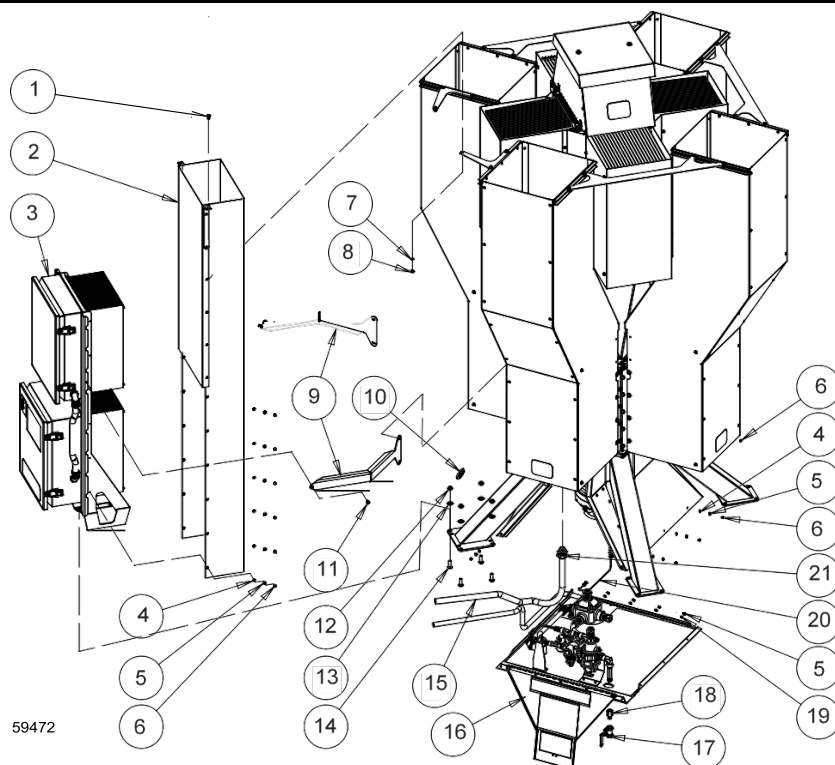
E-mail: customer.service@globalte.com
Web: www.globalte.com

8.1 TEG – DUCTS AND CABINET



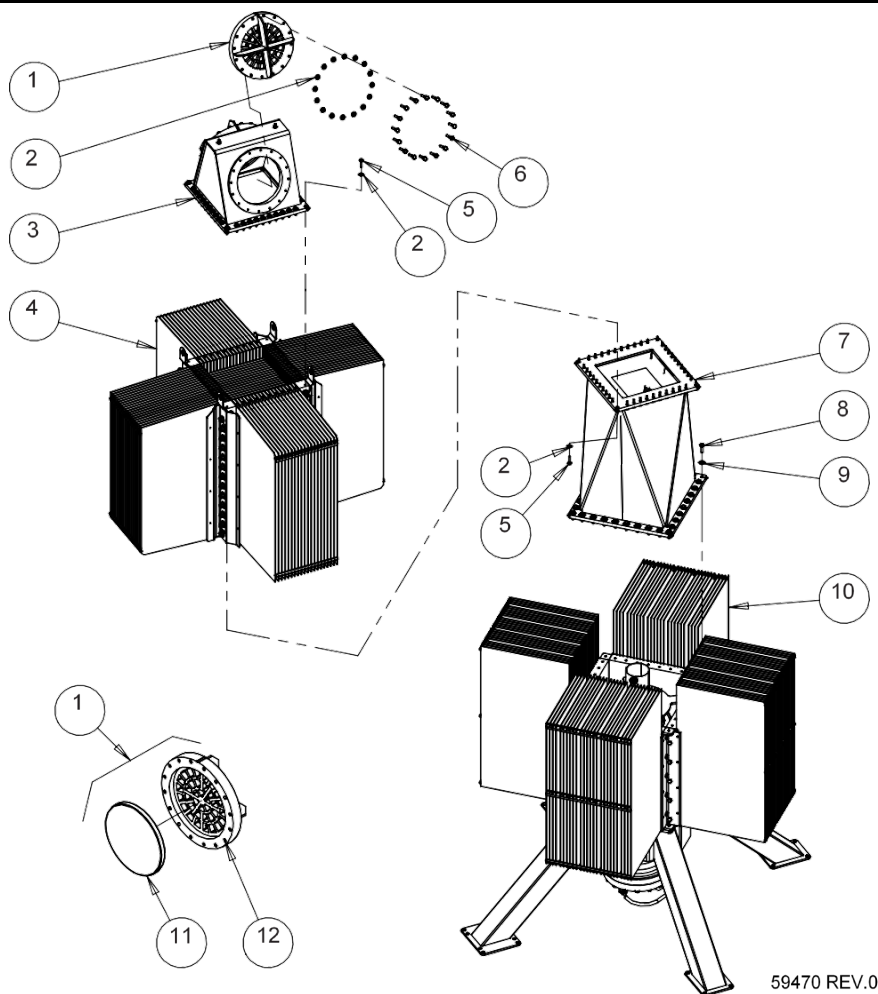
Item	Part No.	Description
1	24381	SCREW, CAP, HEX HD, 1/4-20 UNC X 0.5, 316 SS
2	27222	SHORT BRACE, 1500
3	22024	WASHER, LOCK, 1/4, 316 SS
4	20952	NUT, HEX, 1/4-20 UNC, 316 SS
5	25440	CABINET ASSY, 1500
6	22023	WASHER, FLAT, 1/4", 316 SS
7	24368	SCREW, CAP, HEX-HD, 1/4-20 UNC X 0.375, 316 SS
8	26467	DEFLECTOR, EXHAUST COVER, 1500
9	20953	SCREW, CAP, HEX-HD, 1/4-20 UNC X 1.0, 316 SS
10	26465	EXHAUST COVER ASSY, 1500
11	23402	DUCT, EXHAUST COOLER, 1500
12	23563	WASHER, FLAT, #8, 316 SS
13	20959	WASHER, LOCK, EXT, #8, 316 SS
14	7503	SCREW, MACH, P-H-P, 8-32 X 3/4, SS
15	24497	SCREW, MACH, P-H-P, 8-32 UNC X 0.25, 316 SS
16	27223	DUCT CROSS BRACE, 1500
17	24360	FIN DUCT ASSY, 1500
18	20958	SCREW, MACH, P-H-P, 8-32 X 3/8, 316 SS

8.2 TEG – ELECTRICAL AND CABINET BASE



Item	Part No.	Description
1	24381	SCREW, CAP, HEX HD, 1/4-20 UNC X 0.5, 316 SS
2	24487	DUCT ASSY, ELECTRICAL SYSTEM, 1500
3	24352	ELECTRICAL SYSTEM ASSY, 1500
4	23563	WASHER, FLAT, #8, 316 SS
5	20959	WASHER, LOCK, EXT, #8, 316 SS
6	24497	SCREW, MACH, P-H-P, 8-32 UNC X 0.25, 316 SS
7	22024	WASHER, LOCK, 1/4, 316 SS
8	20952	NUT, HEX, 1/4-20 UNC, 316 SS
9	24479	BRACE, FORMED, ELECTRICAL SYSTEM, 1500
10	58078	GROMMET, INSULATION, 1" ID, 1/16" GROOVE
11	24368	SCREW, CAP, HEX-HD, 1/4-20 UNC X 0.375, 316 SS
12	20949	NUT, HEX, 3/8-16 UNC, 316 SS
13	20869	WASHER, FLAT, 3/8", 316 SS
14	20948	SCREW, CAP, HEX-HD, 3/8-16 UNC X 1.0, 316 SS
15	20513	CONDUIT, FLEX, 1/2", LIQUID TITE X 30" LONG
16	NPN	SEE PARTS PAGE FOR CABINET BASE ASSEMBLY
17	24454	VALVE, BALL, 1/4 FNPT, 1000 LB, G1, 316 SS BODY
18	2360	ADAPTOR, 1/4 NPT, M-F, 316 SS
19	20961	NUT, HEX, 8-32, 316 SS
20	24314	THERMOCOUPLE, SOLDERED, 1500
21	20970	CONNECTOR, STRAIGHT, 1/2" LIQUID TITE, 5232AL, 1/2" CONDUIT, LIQUID TITE

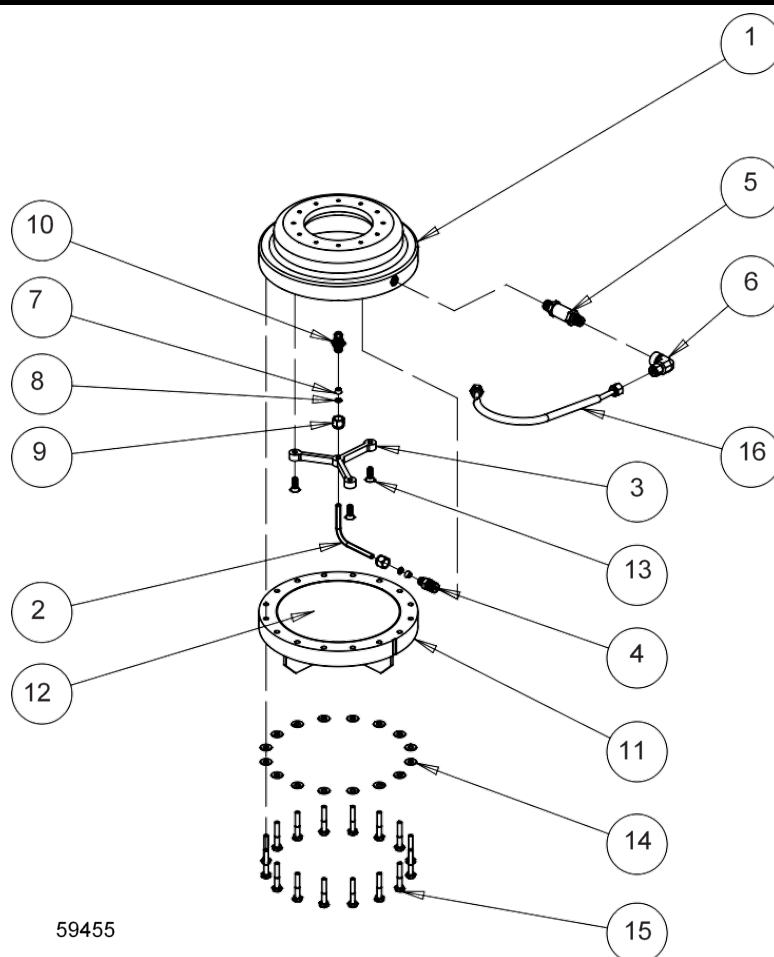
8.3 TEG – EXHAUST COOLER AND ARRESTORS



59470 REV.0

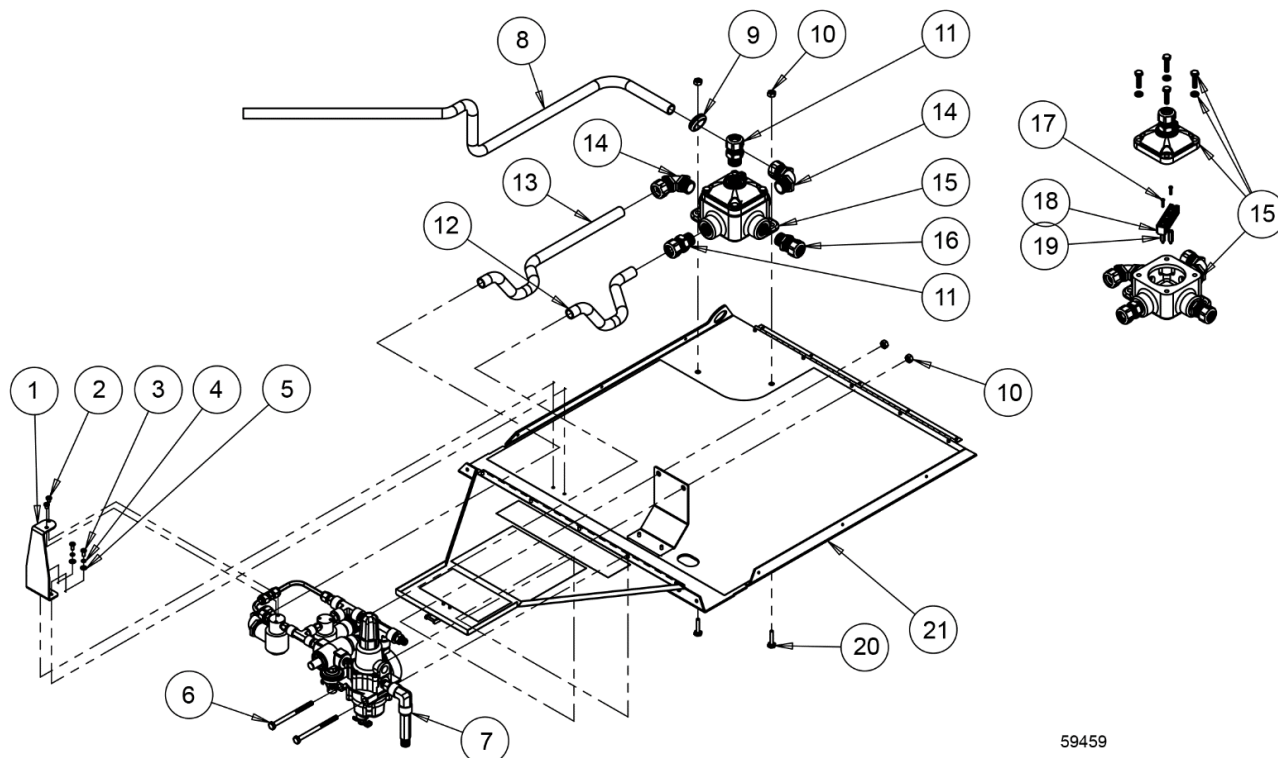
Item	Part No.	Description
1	26481	FLAME ARRESTOR ASSY, 1500
2	22023	WASHER, FLAT, 1/4", 316 SS
3	26476	MANIFOLD, EXHAUST ARRESTOR
4	24520	EXHAUST COOLER, COMPLETE, MACHINED, 1500
5	20953	SCREW, CAP, HEX-HD, 1/4-20 X 1, 316 SS
6	23567	SCREW, CAP, HEX-HD, 1/4-20 X 1 1/2, 316 SS
7	23730	EXHAUST COOLER STAND
8	24486	SCREW, CAP, HEX-HD, 5/16-18 UNC X 1.0, 316 SS
9	21130	WASHER, FLAT, 5/16, 316 SS
10	NPN	SEE PARTS PAGE FOR LOWER FRAME ASSEMBLY
11	26464	ARRESTOR, 1500
12	26472	ARRESTOR SUPPORT, 1500

8.4 INTAKE PLENUM ASSEMBLY



Item	Part No.	Description
1	26468	INTAKE PLENUM, MACHINED, 1500
2	26475	PLENUM TUBE, BENT, 1500
3	26469	NOZZLE SUPPORT, MACHINED, 1500
4	380	CONNECTOR, 1/4 TB X 1/4 MNPT, 316 SS, SS-400-1-4
5	26003	FILTER ASSY, IN-LINE, TYPE F, SS-4F2-90
6	23633	ELBOW, 1/4 TB X 1/4 FNPT, 316SS, SS-400-8-4
7	22821	FERRULE, BACK, 1/4, SS-404-1
8	22822	FERRULE, FRONT, 1/4, SS-403-1
9	22820	NUT, SWAGELOK, 1/4, SS-402-1
10	06433	ORIFICE, 0.061, 8550-N
11	26472	ARRESTOR SUPPORT, 1500
12	26464	ARRESTOR, 1500
13	26483	SCREW, F-H-P, 82 DEG, 1/4-20 X .75, 316SS
14	22023	WASHER, FLAT, 1/4", 316SS
15	23567	SCREW, CAP, HEX-HD, 1/4-20 X 1 1/2, 316 SS.
16	5286	KIT, FUEL LINE, 10 IN.

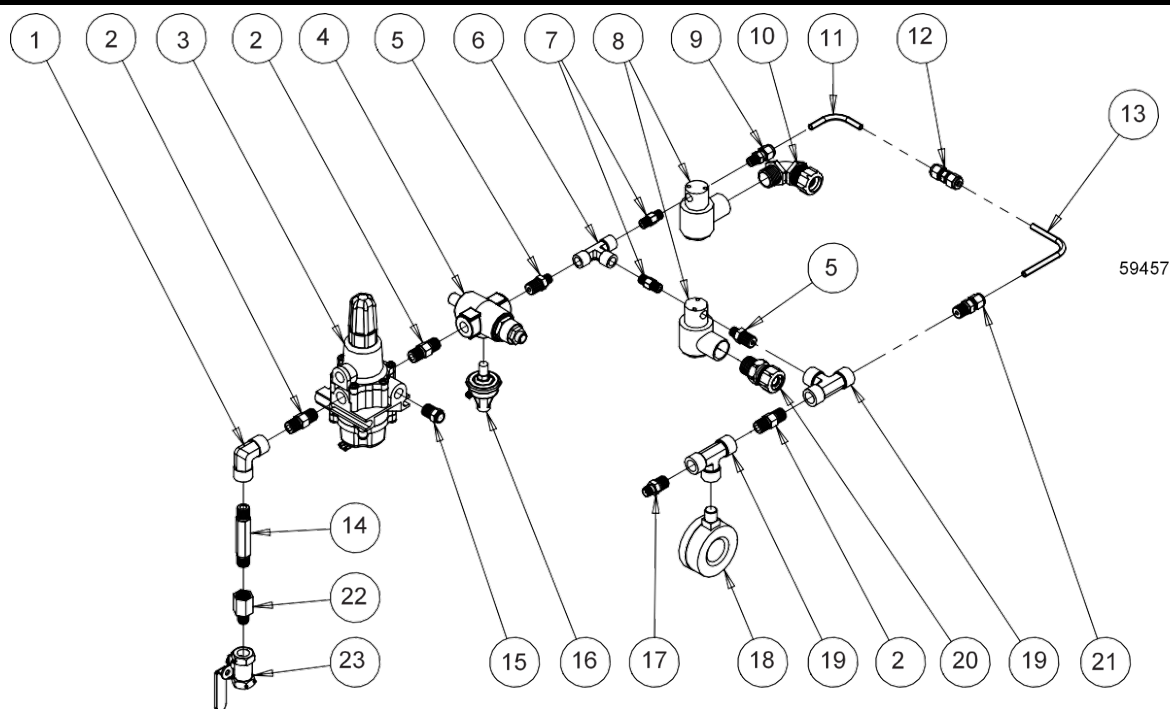
8.5 CABINET BASE ASSEMBLY



59459

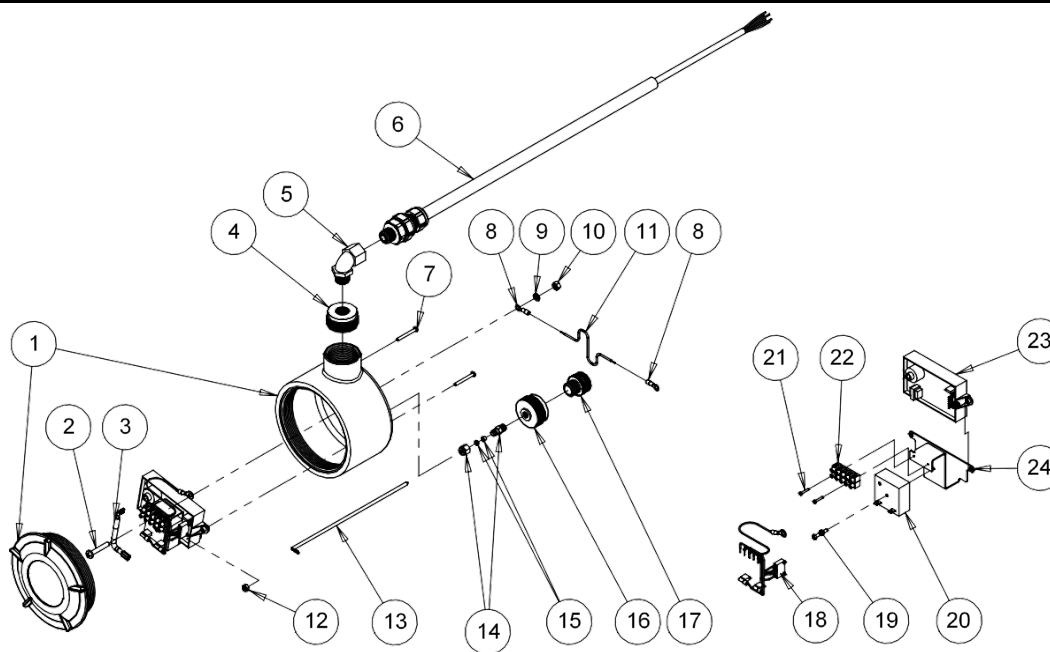
Item	Part No.	Description
1	25452	BRACKET, SOLENOID MOUNT, 1500
2	24497	SCREW, MACH, P-H-P, 8-32 UNC X 0.25, 316 SS
3	20958	SCREW, MACH, P-H-P, 8-32 X 3/8, 316 SS
4	23811	WASHER, LOCK, SPRING, #8, 316 SS
5	23563	WASHER, FLAT, #8, 316 SS
6	20955	SCREW, CAP, HEX H-D, 1/4-20 X 3.5 LG, 316 SS
7	24556	FUEL SYSTEM, 1500
8	2168	CONDUIT, FLEX, 3/8" CSA, LIQUID TITE X 36" LONG
9	58077	GROMMET, INSULATION, 13/16" ID, 1/8" GROOVE
10	20952	NUT, HEX, 1/4-20 UNC, 316 SS
11	20322	CONNECTOR, CONDUIT, 1/2 NPT X 3/8 CONDUIT
12	2168	CONDUIT, FLEX, 3/8" CSA, LIQUID TITE X 11" LONG
13	2168	CONDUIT, FLEX, 3/8" CSA, LIQUID TITE X 15" LONG
14	2163	CONNECTOR, 90 DEG, 3/8 CONDUIT, 1/2 NPT
15	25599	JUNCTION BOX ASSY, 4-OUTLET, 1500
16	2428	CONNECTOR, STRAIN RELIEF, 1/2" NPT
17	25621	SCREW, MACH P-H-P, 4-40 X 1/2, 316SS
18	25602	TERMINAL BLOCK, CUT, 1500
19	25601	SPACER, HEX, MALE/FEMALE, #4-40 X 3/4 LG, ALUMINUM
20	20953	SCREW, CAP, HEX-HD, 1/4-20 X 1, 316 SS
21	59458	CABINET BASE SUB-ASSY, FIELD REPLACEMENT, 1500

8.6 FUEL SYSTEM



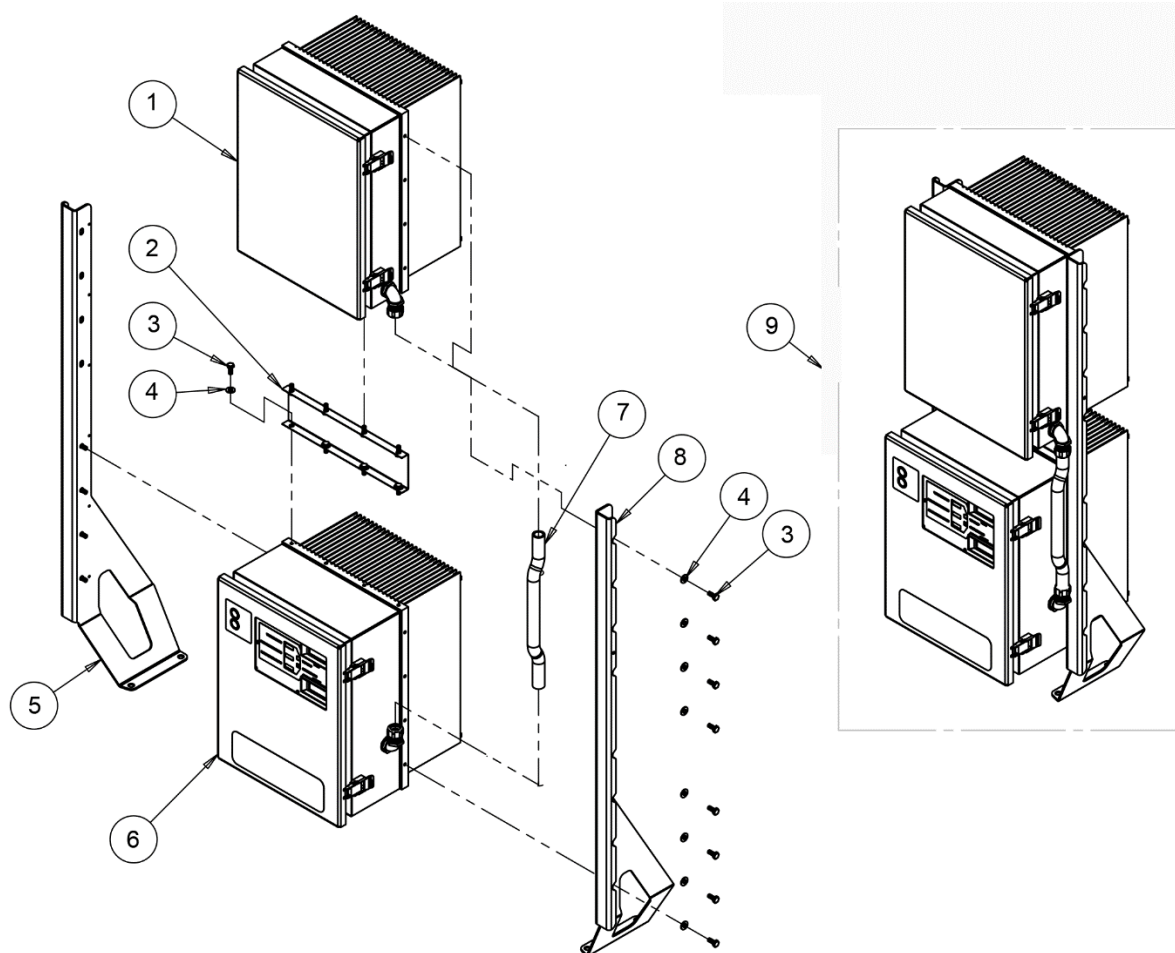
Item	Part No.	Description
1	25596	ELBOW 90DEG, 1/4FNPT, 316 SS, SS-AE
2	2359	NIPPLE, HEX, 1/4 NPT X 1.5 LO, 316 SS
3	22362	REGULATOR, FISHER 67CF, 0-20, PSI, 1120
4	176	VALVE, SHUT-OFF, BASO #H19-TA3
5	21108	NIPPLE, HEX REDUCING, SS, 1/4 X 1/8 NPT
6	7997	TEE, 1/8 FNPT, SS, SS-2-T
7	7996	NIPPLE, HEX, 1/8 NPT, 316 SS, SS-2-HN
8	24542	VALVE, PETER PAUL, 12VDC, 1/16 ORIF. EL52J8DCCM12VDC
9	20977	CONNECTOR, MALE, 1/4 TB X 1/8 MNPT, SS-400-1-2
10	2163	CONNECTOR, 90 DEG, 3/8 CONDUIT, 1/2 NPT
11	25428	TUBE, LOW FLOW 1, FORMED, 316 SS, 1500
12	25430	ORIFICE, LOW FLOW, #58 DRILL, NG, 1500
13	24475	TUBE, LOW FLOW 2, FORMED, 316L SS, 1500
14	2358	NIPPLE, HEX, 1/4 NPT X 3" LO, 316 SS
15	20748	PLUG, 1/4" NPT, SS-400-P
16	1429	PRESSURE SWITCH, HOBBS #78628
17	22790	CONNECTOR, MALE, 1/4 TB X 1/4 MNPT, SS-400-1-4G
18	691	GAUGE, PRESSURE, 0-15 PSI
19	2357	TEE, 1/4 FNPT, SS
20	20322	CONNECTOR, CONDUIT, 1/2 NPT X 3/8 CONDUIT
21	380	CONNECTOR, 1/4 TB X 1/4 MNPT, 316 SS, SS-400-1-4
22	2360	ADAPTOR, 1/4 NPT, M-F, 316 SS
23	24454	VALVE, BALL, 1/4 FNPT, 1000 LB, G1, 316 SS

8.7 IGNITER HOUSING ASSEMBLY



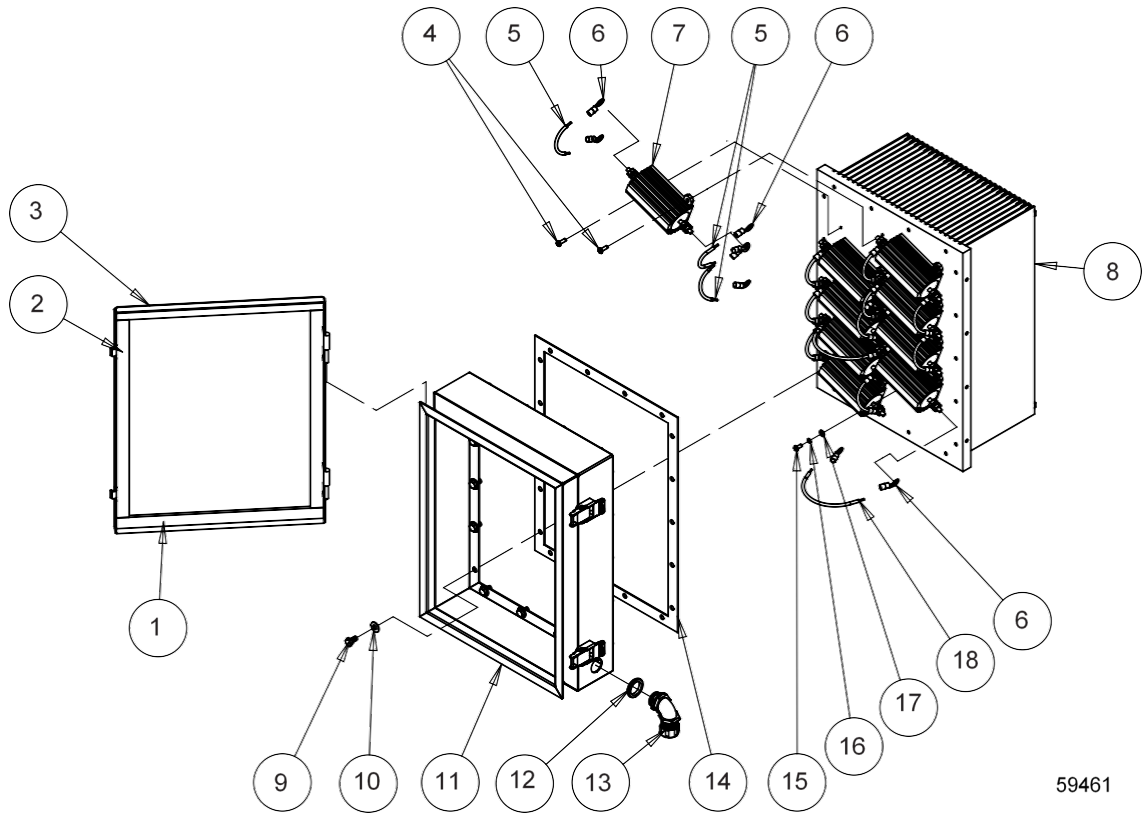
Item	Part No.	Description
1	24551	JUNCTION BOX, MACHINED, IGNITER, 1500
2	25597	SCREW, MACH, P-H-P, 1/4-20 X 1.5, FULL THREAD, 316 SS
3	50868	SPARK IGNITOR WIRE, 1500
4	24548	REDUCER, 1 1/2 X 1/2 NPT, R-51 KILLARK
5	25453	ELBOW, 1/2", MF, ALUM, MF-90-1 KIL
6	50870	CONDUIT ASSY, CLASS 1 DIV 2, ELECTRONICS, 1500
7	24553	SCREW, MACH, P-H-P, 8-32 X 1.5, FULL THREAD, 316 SS
8	23469	TERM RING, 14AWG X 1/4 STUD, PANDUIT PN14-14R
9	22024	WASHER, LOCK, 1/4, 316 SS
10	20952	NUT, HEX, 1/4-20 UNC, 316 SS
11	29970	WIRE, 14 GA, GREEN, TEFLON X 9" LONG
12	24554	NUT, LOCK, HEX, 8-32, NYLON INSERT, 316 SS
13	2032	ELECTRODE ASSY, SI, 5060, 5120, 8550
14	24464	CONNECTOR, IGNITOR, DRILLED THRU, 316 SS, 1500
15	20893	FERRULE, TEFLON, 3/16 SET, CONSISTS OF T-303-1 & T-304-1
16	24555	IGNITER HOLDER ASSY, 1500
17	2173	UNION, 1/2" ALUM M/F, CLASS 1 GROUP D
18	64613	WIRE HARNESS, SI, W, MOLEX PN CONNECTOR, 1500
19	64613	SCREW, MACH, P-H-P, 8-32 X 1", 316 SS
20	24567	CUBE TIMER, 12V, 3-60SEC DELAY, NCC# QIT-00060-316
21	53033	SCREW, MACH P-H-P, 4-40 X 5/8, 316 SS
22	50970	TERMINAL STRIP, 5 POSITION, WIELAND 21.311.0553.0
23	63096	SI BOARD ASSY, CHANNEL PRODUCTS, 2021-90 MICRO 50N-12-3-3-7-10-0-P23062
24	50971	BRACKET, TERMINAL STRIP, SI WIRING HARNESS 1120

8.8 ELECTRICAL ASSEMBLY



Item	Part No.	Description
1	24353	RESISTOR BOX, FINAL ASSY, 1500
2	24366	SPACER PLATE, ELECTRICAL SYSTEM, 1500
3	20954	SCREW, MACH, HEX HD, 1/4-20 X 5/8, 316 SS
4	22023	WASHER, FLAT, 1/4", 316 SS
5	24477	SUPPORT, LEFT, ELECTRICAL SYSTEM, 1500
6	24354	ELECTRONICS BOX, FINAL ASSY, 1500
7	20513	CONDUIT, FLEX, 1/2", LIQUID Y TITE X 13.5" LONG
8	24478	SUPPORT, RIGHT, ELECTRICAL SYSTEM, 1500
9	24352	ELECTRICAL SYSTEM ASSEMBLY, 1500

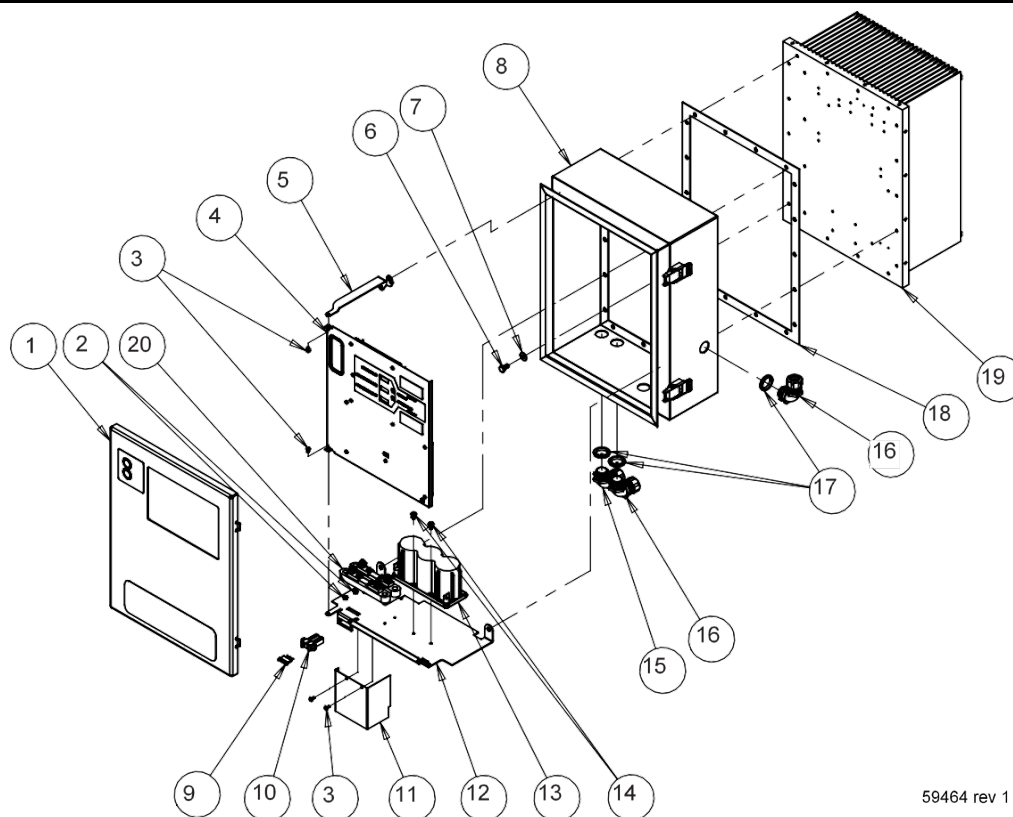
8.9 RESISTOR BOX ASSEMBLY



59461

Item	Part No.	Description
1	24525	FOAM STRIP, 0.25X 0.75, ADHESIVE BACKED, 13.80 LONG
2	24525	FOAM STRIP, 0.25X 0.75, ADHESIVE BACKED, 11.87 LONG
3	24373	LID ASSY, RESISTOR BOX, 1500
4	20960	SCREW, P-H-P, 8-32 X 1/2, 316 SS
5	154	WIRE, #10 WHT, SIL-PLT-COP X 3.25" LONG
6	203	TERM RING, YELLOW, PN10-14R, 12-10 WIRE, 1/4" STUD
7	122	RESISTOR, 1 OHM, 100W, 5%, DALE RH-100
8	24355	FIN BASE, RESISTOR BOX, 1500
9	24381	SCREW, CAP, HEX HD, 1/4-20 UNC X 0.5, 316 SS
10	22023	WASHER, FLAT, 1/4", 316 SS
11	52043	RESISTOR FRAME ASSY, 1500
12	23911	GASKET, LIQUID TITE, 1/2", T&B THS 5262
13	58638	CONNECTOR, 1/2" X 90 DEG, T&B, LIQUID TITE, CI6304
14	51518	SEAL, ELECTRONICS BOX, 1120/1500
15	20958	SCREW, MACH, P-H-P, 8-32 X 3/8, 316 SS
16	23811	WASHER, LOCK, SPRING, #8, 316 SS
17	23563	WASHER, FLAT, #8, 316 SS
18	154	WIRE, #10 WHT, SIL-PLT-COP X 6.25" LONG

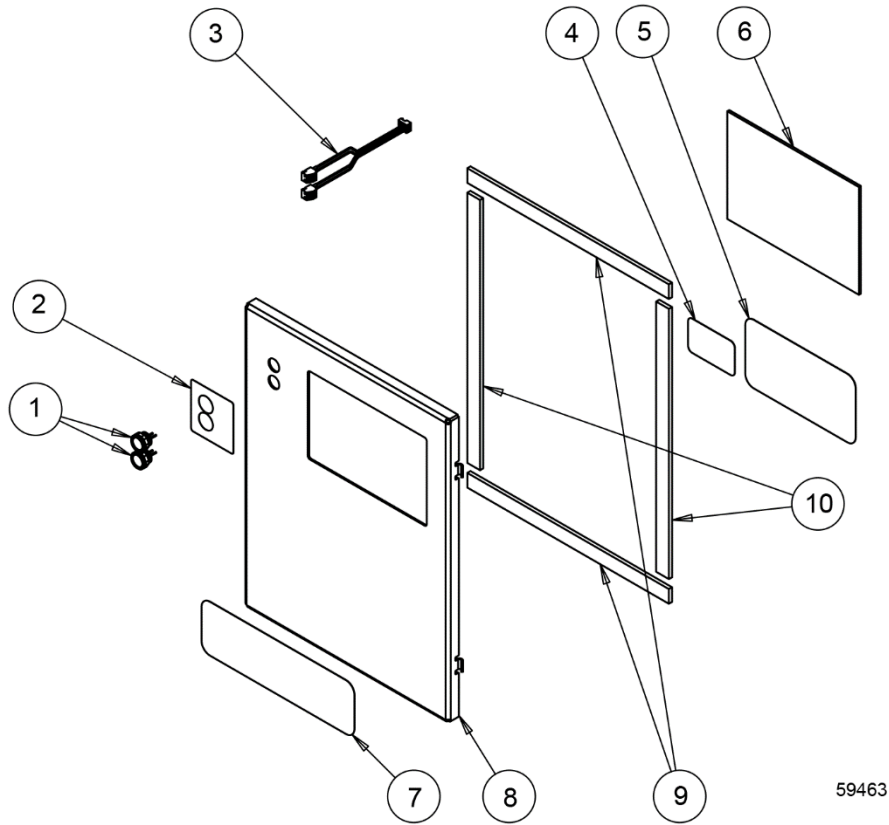
8.10 ELECTRONICS BOX ASSEMBLY - GENERAL



59464 rev 1

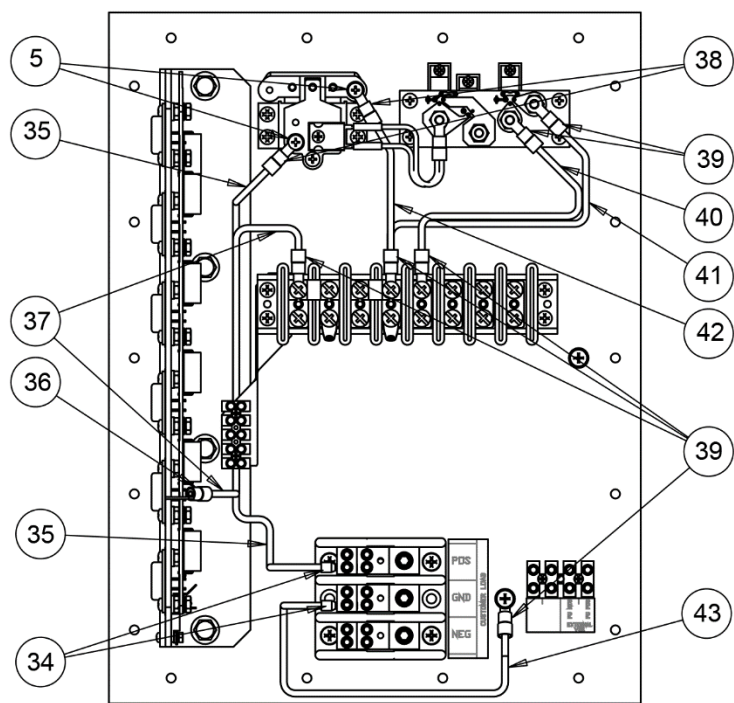
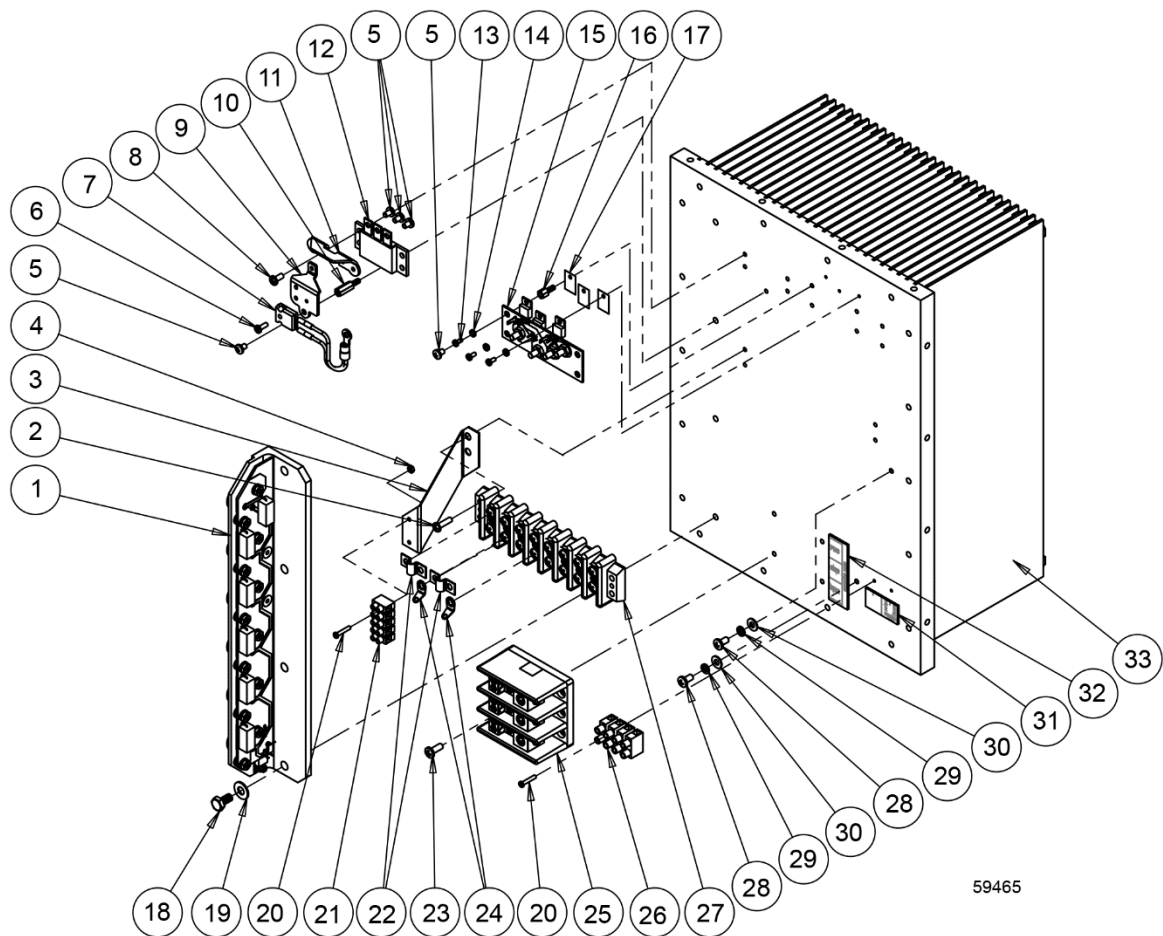
Item	Part No.	Description
1	NPN	SEE PARTS PAGE FOR FRONT DOOR
2	20958	SCREW, MACH, P-H-P 8-32 X 3/8" 316 SS
3	52679	SCREW, MACH, P-H-P 6-32 X 1/4" 316 SS
4	NPN	SEE PARTS PAGE FOR INTERMEDIATE PANEL
5	27246	HINGE BRACKET, TOP, ELECTRONICS BOX, 1500
6	24381	SCREW, CAP, HEX HD, 1/4-20 UNC X 0.5, 316 SS
7	22023	WASHER, FLAT, 1/4", 316 SS
8	27260	ELECTRONICS FRAME ASSY, 1500
9	50862	FUSE, BLADE, 7.5A, 32V ATO FAST ACT, F999-ND
10	52024	FUSE HOLDER, PANEL MOUNT, IN-LINE ATO, 20A, LITTLEFUSE 155320U
11	27248	SHIELD, CORNER ANGLE, 1500
12	27244	BOX DIVIDER, ELECTRONICS, 1500
13	24559	BATTERY, 6V, 5.0AHR, MONOBLOC
14	24502	SCREW, MACH, P-H-P, 10-32 X 0.375 LO, 316 SS
15	2163	CONNECTOR, 90 DEG, 3/8 CONDUIT, 1/2 NPT
16	58638	CONNECTOR, 1/2" X 90 DEG, T&B, LIQUID TITE, CI6304
17	23911	GASKET, LIQUID TITE, 1/2", T&B THS 5262
18	51518	SEAL, ELECTRONICS BOX, 1120/1500, AEI 109289
19	24356	FIN BASE, ELECTRONICS BOX, 1500
20	24526	SHUNT, 50mV, 50A, HOLLOWAY

8.11 ELECTRONICS BOX ASSEMBLY - DOOR



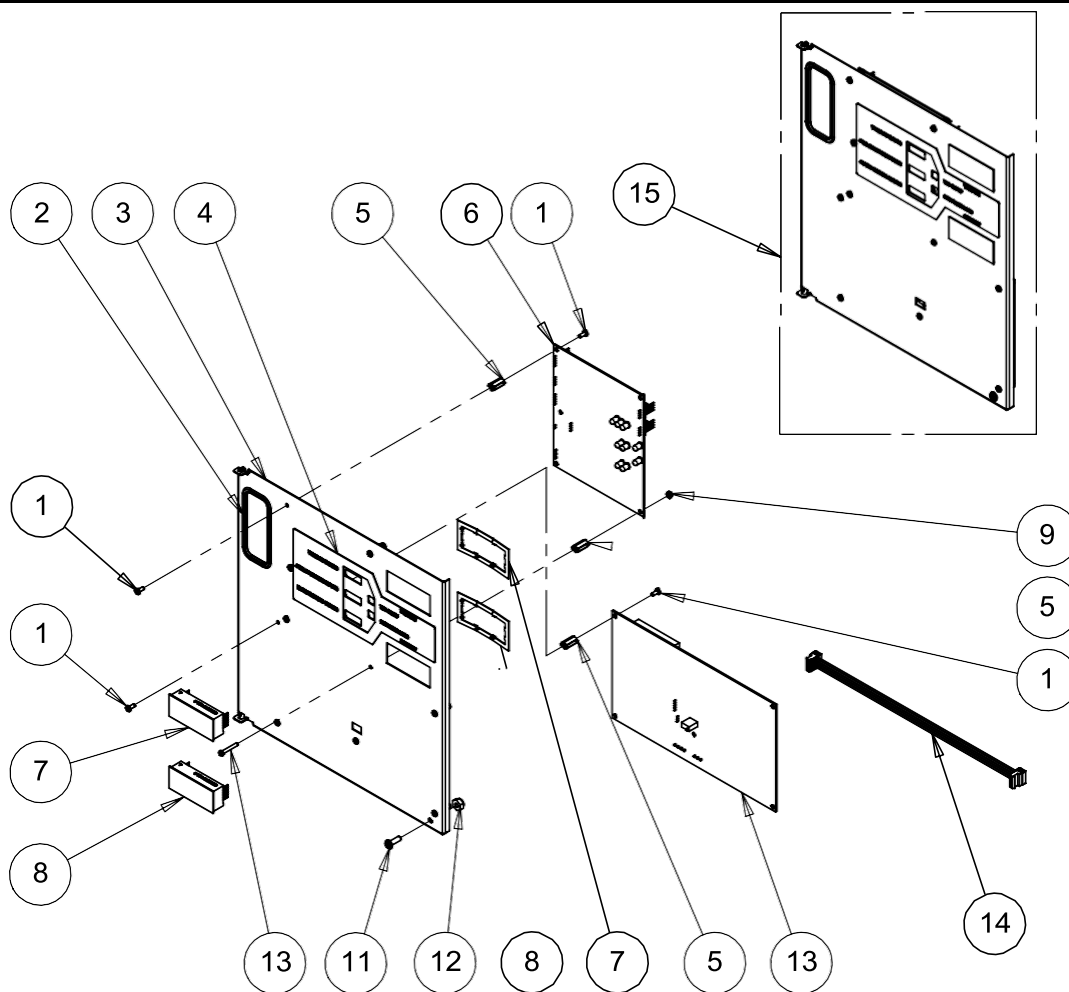
Item	Part No.	Description
1	24533	SWITCH, DATA PIEZO, SCHURTER #1241.2611
2	50872	LABEL, SWITCH DESIGNATION, 1500
3	50884	WIRE HARNESS, SWITCHES, 1500
4	26865	LABEL, COMPONENT SPECIFICATION, 1500
5	26860	LABEL, WARNING, EXPLOSION HAZARD, BATTERIES, 1500
6	27259	GLASS PANEL, 5.50" X 7.75" X 3 MM THICK, 1120/1500
7	26861	LABEL, WARNING, EXPLOSION HAZARD, POWER SOURCES, 1500
8	24538	LID ASSY, ELECTRONICS BOX, 1500
9	24525	FOAM STRIP, 0.25 X 0.75, ADHESIVE BACKED, 11.87 LONG
10	24525	FOAM STRIP, 0.25 X 0.75, ADHESIVE BACKED, 13.80 LONG

8.12 ELECTRONICS BOX ASSEMBLY - BOX COMPONENTS



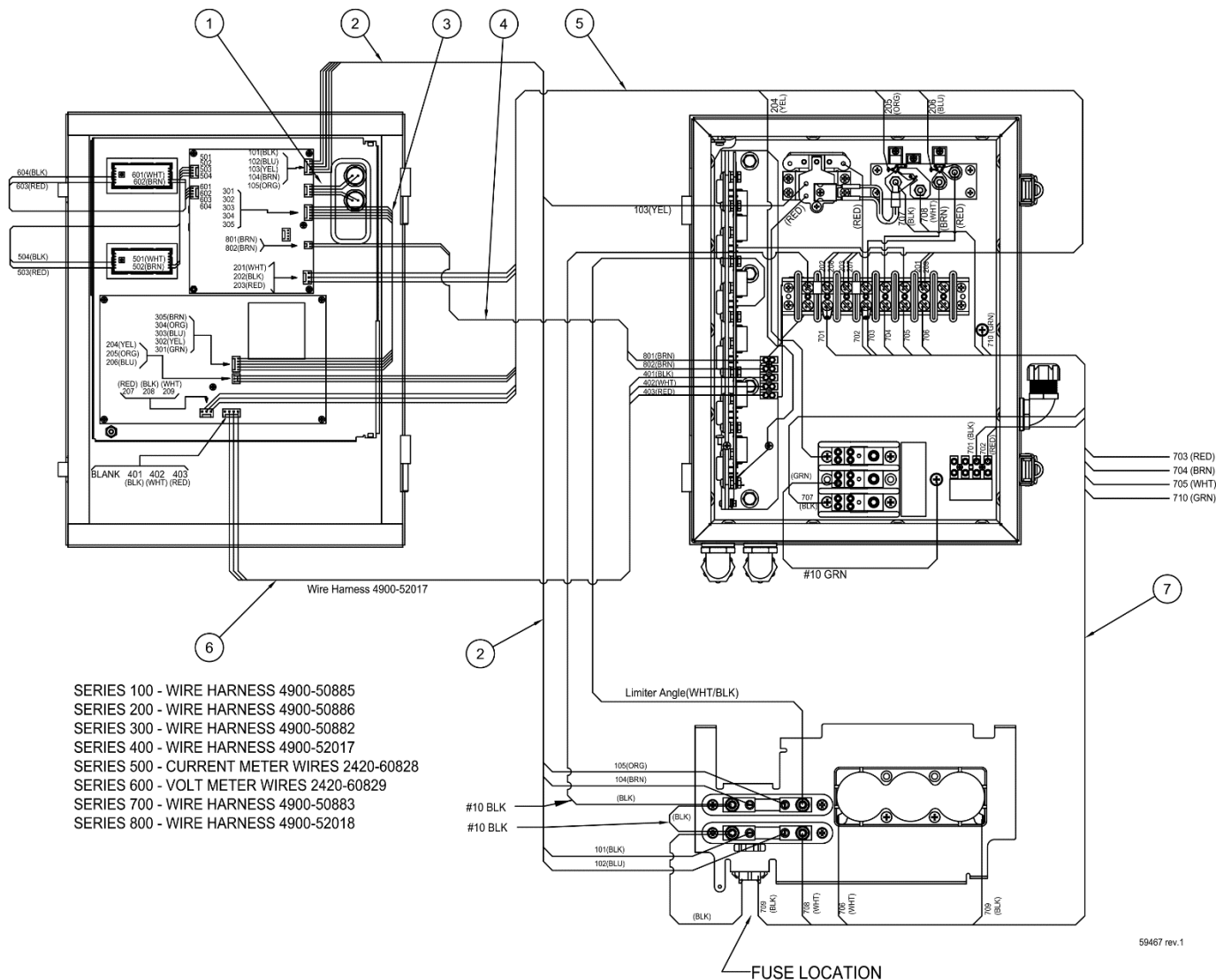
Item	Part No.	Description
1	24359	TRANSISTOR ANGLE ASSY, ELECTRONICS BOX, 1500
2	53035	SCREW, MACH, P-H-P, 8-32 X 5/8, 316 SS
3	52016	BRACKET, TERMINAL STRIP, 1500
4	53032	NUT, HEX, 4-40, 316 SS
5	24497	SCREW, MACH, P-H-P, 8-32 X 1/4, 316 SS
6	29606	SCREW, MACH P-H-P, 6-32 X 3/8, 316 SS
7	50881	DIODE, FLYBACK W/WIRES, 30CPU04, 1500
8	20958	SCREW, MACH, P-H-P, 8-32 X 3/8, 316 SS
9	27231	CONNECTOR, CENTRE TAP, DIODE, 1500
10	53036	STANDOFF, M-F, NYLON, 8-32 X 0.625"
11	27232	CONNECTOR, OUTER LEGS, DIODE, 1500
12	50880	DIODE, OUTPUT, 163CMQ100, 1500
13	52680	SCREW, MACH, P-H-P, 4-40 X 1/4, 316 SS
14	53681	WASHER, SHOULDER, NYLON, #4, KEYSTONE 3049
15	50879	PCB ASSY, TRIPLE FET BOARD
16	53038	STANDOFF, M-F, NYLON, 8-32 X 1/4", DK 4828K-ND
17	53039	ISOLATOR, WAKEFIELD 173-7-240A
18	24381	SCREW, CAP, HEX HD, 1/4-20 UNC X 0.5, 316 SS
19	22023	WASHER, FLAT, 1/4", 316 SS
20	53033	SCREW, MACH P-H-P, 4-40 X 5/8, 316 SS
21	52028	TERMINAL BLOCK, 5 POS, WIELAND, 4E/5DS 21.305.0553.0
22	220	CLIP, JUMPER
23	29695	SCREW, MACH, P-H-P, 10-32 X 1/2, 316 SS
24	11	LUG, LOCK
25	06714	TERMINAL BLOCK, 3 POLE, HEAVY DUTY
26	52673	TERMINAL BLOCK, 4 POS., WEILAND 21.311.0453.0
27	2110	TERMINAL BLOCK, 8 POS, KULKA 603-8
28	24502	SCREW, MACH, P-H-P, 10-32 X 0.375 LO, 316 SS
29	29696	WASHER, LOCK, SPRING, #10, 316 SS
30	24503	WASHER, FLAT, #10, 316 SS
31	58492	LABEL, EXT VSR CONNECTIONS, 1500
32	58491	LABEL, CUSTOMER LOAD CONNECTIONS, 1500
33	24356	FIN BASE, ELECTRONICS BOX, 1500
34	25986	FERRULE, WIRE, 10 AWG, YELLOW, WIELAND 06.600.2927.0
35	27097	WIRE, 10 GA, RED, TEFLON X 11.75" LONG
36	203	TERM RING, YELLOW, PN10-14R, 12-10 WIRE, 1/4" STUD
37	27098	WIRE, 10 GA, BLACK, TEFLON X 10.375" LONG
38	210	TERM RING, YELLOW, #10 WIRE, #8 STUD
39	208	TERM RING, YELLOW, #PN10-10R, 12-10 WIRE, #10 STUD
40	53041	WIRE, 10 GA, BROWN, TEFLON X 7.25" LONG
41	27097	WIRE, 10 GA, RED, TEFLON X 8" LONG
42	27097	WIRE, 10 GA, RED, TEFLON X 4" LONG
43	57148	WIRE, 10 GA, GREEN, TEFLON X 11" LONG

8.13 ELECTRONICS BOX ASSEMBLY - INTERMEDIATE PANEL



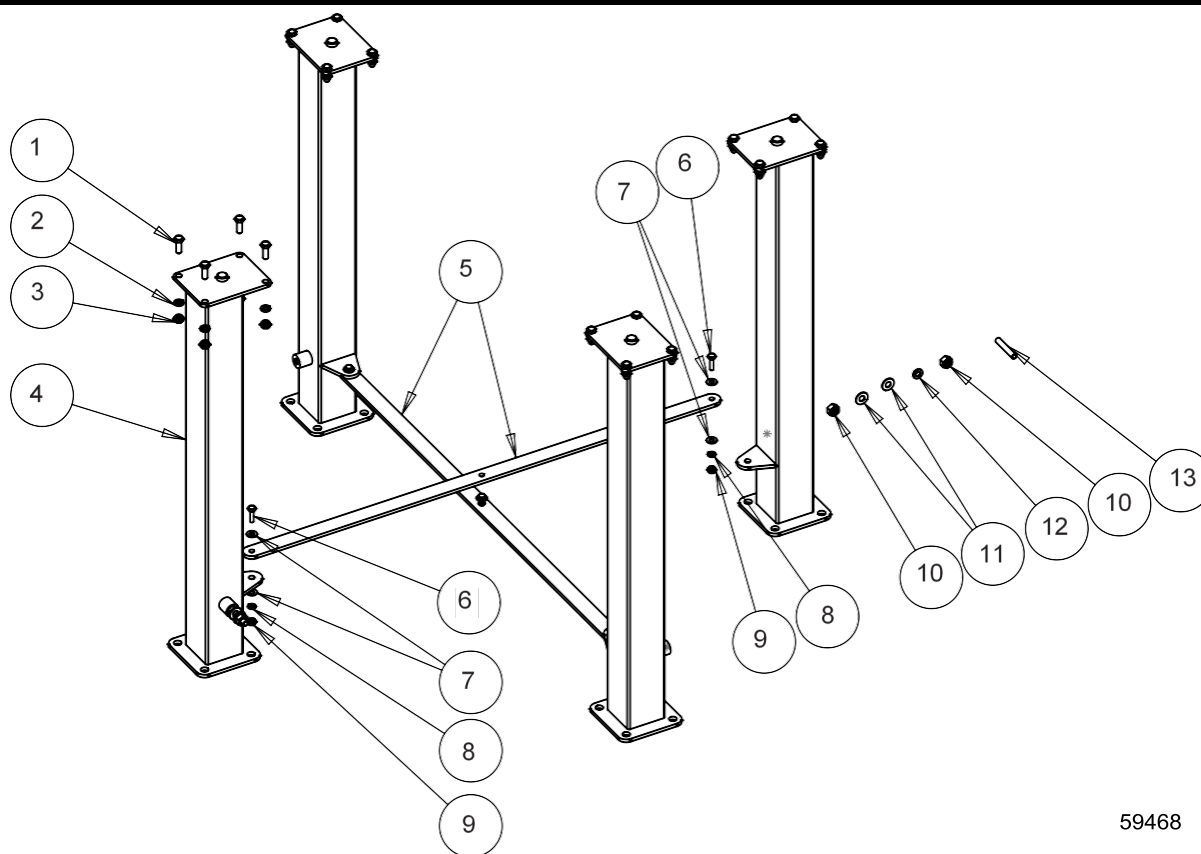
Item	Part No.	Description
1	52680	SCREW, MACH, P-H-P, 4-40 X 1/4, 316 SS
2	58075	GROMMET EDGING, 0.036-0.062 PANEL THK, X 12" LONG, PANDUIT GEE62F-A-C
3	60863	PANEL DOOR, ELECTRONICS, 1500
4	50856	LABEL, FRONT PANEL, LED DESCRIPTIONS, 1500
5	53034	STANDOFF, F-F, #4-40 X 0.500", DK 1902CK-ND
6	26462	PCB ASSY, FRONT PANEL MODULE, 1500
7	60829	VOLT METER, PANEL, LED, 1120/1500
8	50861	CURRENT METER, PANEL, LED, 1120/1500
9	53032	NUT, HEX, 4-40, 316 SS
10	53280	SCREW, MACH P-H-P, 4-40 X 0.75, SS
11	20960	SCREW, P-H-P, 8-32 X 1/2, 316 SS
12	24554	NUT, LOCK, HEX, 8-32, NYLON INSERT, 316 SS
13	27253	PCB ASSY, TRIPLET, 1500
14	50882	WIRE HARNESS, TRIPLET MODULE TO FPM, 1500
15	52019	INTERMEDIATE PANEL ASSEMBLY, 1500 ELECTRONICS

8.14 ELECTRONICS BOX ASSEMBLY - WIRE HARNESSSES



Item	Part No.	Description
1	50884	WIRE HARNESS, SWITCHES, 1500
2	50885	WIRE HARNESS, SHUNTS, 1500
3	50882	WIRE HARNESS, TRIPLET MODULE TO FPM, 1500
4	52018	WIRE HARNESS, PRESSURE SWITCH INTERMEDIATE WIRE, 1500
5	50886	WIRE HARNESS, POWER & SIGNAL, 1500
6	52017	WIRE HARNESS, SI INTERMEDIATE WIRE, 1500
7	50883	WIRE HARNESS, MAIN COLD PLATE, 1500

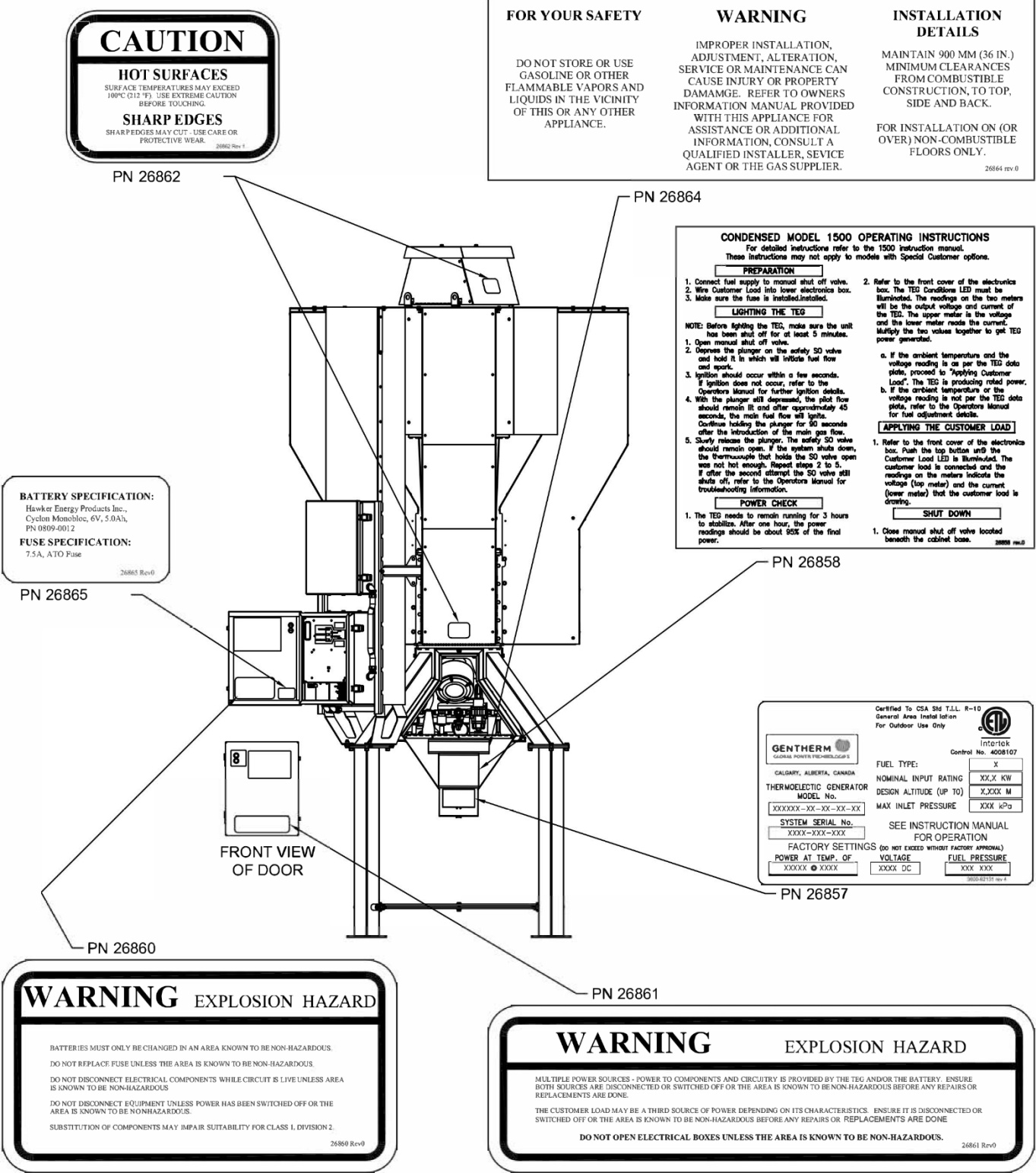
8.15 TEG – LEG ASSEMBLY



59468

Item	Part No.	Description
1	20948	SCREW, CAP, HEX-HD, 3/8-16 UNC X 1.0, 316 SS
2	22021	WASHER, LOCK, 3/8, 316 SS
3	20949	NUT, HEX, 3/8-16 UNC, 316 SS
4	23744	WELDMENT, LEG. LOWER, 1500
5	23746	CROSS BRACE, STAND, 1500
6	24486	SCREW, CAP, HEX-HD, 5/16-18 UNC X 1.0, 316 SS
7	21130	WASHER, FLAT, 5/16, 316 SS
8	21129	WASHER, LOCK, 5/16, 316 SS
9	21131	NUT, HEX, 5/16-18, 316 SS
10	55922	NUT, HEX, M10, 316 SS
11	55923	WASHER, FLAT, M10, 316 SS
12	55924	WASHER, LOCK, SPRING, M10, 316 SS
13	55921	STUD, M10 X 1.5, 60MM LO, 316 SS

8.16 TEG – DECALS



61466 rev2

MODEL NO:
TEG SERIAL NO:
FUEL TYPE:

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MODEL NO:
TEG SERIAL NO:
FUEL TYPE:

[illegible]