



BRIDGEPOINT
SYSTEMS

200,000 BTU Operator's Manual



thermal energy system



Bridgepoint Systems
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Salt Lake City, UT 84123
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“TES - World's Fastest Drying System”™

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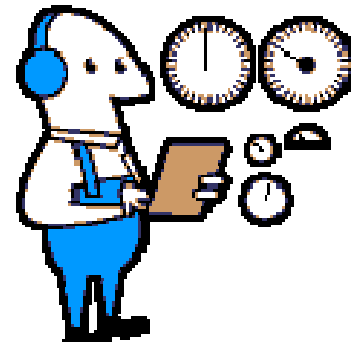
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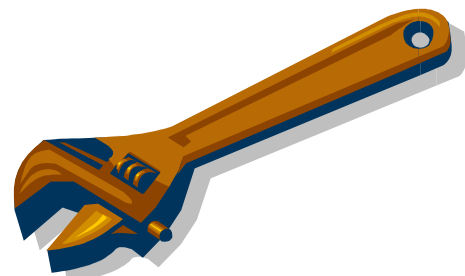
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Introduction

Congratulations on your purchase of the Bridgepoint Systems TES Thermal Energy System unit. This manual is a guide for safe operation and maintenance of this unit.

Read and understand this manual completely before installing or operating this unit.

This manual should be maintained in legible condition adjacent to the TES Heater or in a secure location for future reference.

Any questions pertaining to the operating or servicing of this unit should be directed to your nearest Bridgepoint Systems distributor.

Local regulations regarding the storage, transportation and use of propane may restrict or prohibit the operation of the TES Thermal Energy System in some areas. Check with your local fire safety authorities before operating this equipment.

Warning: Improper installation, operation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer, service agency or gas provider. Bridgepoint Systems is in no way responsible and is excluded from liability in respect to any loss or damage which may arise due to improper installation, operation or maintenance.

This manual is written specifically for the TES Thermal Energy System units manufactured by:
Bridgepoint Systems
4282 S 590 W
Salt Lake City, UT 84123
801-261-1282

Information in this manual is subject to change without notice and does not represent a commitment on the part of Bridgepoint Systems.

General Information

TES HEATER ASSEMBLY

200,000 Btu Propane/LP Gas Boiler – Outdoor Model

Stainless steel covers and Stainless Steel base with powder coated steel reinforcements and mounting feet.

Height:	36-3/8" (Without wheels & vent cap) 45-7/8" (With wheels & without vent cap) 47-3/8" (Without wheels & with vent cap) 56-7/8" (With wheels & vent cap)
Length:	47-1/2" (Without handle) 50" (With handle)
Width:	25-5/8" at base 35-1/8" at widest point (Outdoor Hood)
Weight:	450 lbs.
Pump:	All stainless steel liquid end construction – Close coupled end suction single stage centrifugal pump with high temp seal. 3/4HP – 3450 rpm - 75 psi Maximum liquid temperature - 250°F (120°C)

TEX THERMAL EXCHANGER

Height:	19-7/8"
Length:	24"
Width:	20-5/8"
Weight:	50 lbs.

Standard Equipment

TES Heater Assembly

1 – 10' Propane Hose with Regulator

4 - TEX Thermal Exchangers

2 - TES Hose 3/4" x 50' Red Insulated w/ 3/4" Quick connects

2 - TES Hose 3/4" x 50' Blue Insulated w/ 3/4" Quick connects

4 - TEX Hose 5/8" x 50' Red Insulated w/1/2" Quick connects

4 - TEX Hose 5/8" x 50' Blue Insulated w/1/2" Quick connects

2 - Inlet Solution Tee - 3/4" Female QC to (2) 1/2" Male QC's

2 - Outlet Solution Tee - 3/4" Male QC to (2) 1/2" Female QC's

4 - QD Wraps – Large

8 - QD Wraps – Medium

Additional / Optional Equipment

Wheel Kit:	AT52
50' Power Cord:	AX33
Shock buster GFCI:	AX126
TES Hose 3/4" x 50' Red Insulated w/ 3/4" Quick connects:	AH108
TES Hose 3/4" x 50' Blue Insulated w/ 3/4" Quick connects:	AH110
TES Hose 3/4" x 5' Red Insulated w/ 3/4" Quick connects:	AH109
TES Hose 3/4" x 5' Blue Insulated w/ 3/4" Quick connects:	AH111
TES Hose 5/8" x 25' Red Insulated w/ 3/4" Quick connects:	AH116
TES Hose 5/8" x 25' Blue Insulated w/ 3/4" Quick connects:	AH118
TEX Hose 5/8" x 50' Red Insulated w/1/2" Quick connects:	AH112
TEX Hose 5/8" x 50' Blue Insulated w/1/2" Quick connects:	AH114
Inlet Solution Tee - 3/4" Female QC to (2) 1/2" Male QC's:	AH104
Outlet Solution Tee - 3/4" Male QC to (2) 1/2" Female QC's:	AH106
Inlet Solution Tee - 3/4" Female QC to (3) 1/2" Male QC's:	AH115
Outlet Solution Tee - 3/4" Male QC to (3) 1/2" Female QC's:	AH119
TEX Thermal Exchangers:	MB212
TES Thermal Fluid – Gallon:	CR01GL
QD Wraps – Large:	AH10L
QD Wraps – Medium:	AH10M
Adapter for Dual Propane Tanks:	AT68
Adapter for Triple Propane Tanks:	AT69
Trailer Rack for 3 Propane Tanks:	AT70
TES Trailer Mount Support Frame:	AT78
Trailer Fan Kit:	AT76
Shelf for 4 Air Movers:	AT72
Shelf for 6 Air Movers:	AT74
Trailer 7" Vent Cap (J-cap):	NM4330
Floor Anchor:	NM4328
TES Fluid Filtering Kit:	AT84

High Altitude Burner Jets:

The efficient operation of this heater depends on the proper fuel air mixture in the combustion chamber. The amount of fuel required for proper combustion will vary with changes in altitude. With less oxygen available for combustion at higher altitudes, less fuel can be burned and the Btu input rating of the heater is reduced by 4% for each 1000 feet above sea level.

The standard TES unit is designed for operation at elevations from sea level to 2000 feet. Use of the TES unit at altitudes above 2000 feet will require replacing the burner jets with smaller jets to reduce the gas flow to match the lower oxygen levels. If the jets are not changed, the excess fuel will result in poor combustion and black soot build up that will impair the heater's performance or damage the heater. Burner jet replacement should only be performed by trained technicians.

The following Burner Jets are available for operation of your TES unit at higher altitudes:

2000 – 4000 Feet:	NM4294	(4 required)
4000 – 6000 Feet:	NM4296	(4 required)
6000 – 8000 Feet:	NM4298	(4 required)

Burner jets are installed at the factory for operation at the altitude of your location at the time your unit was shipped from the factory. Check the rating plate to assure jets are matched to your altitude.

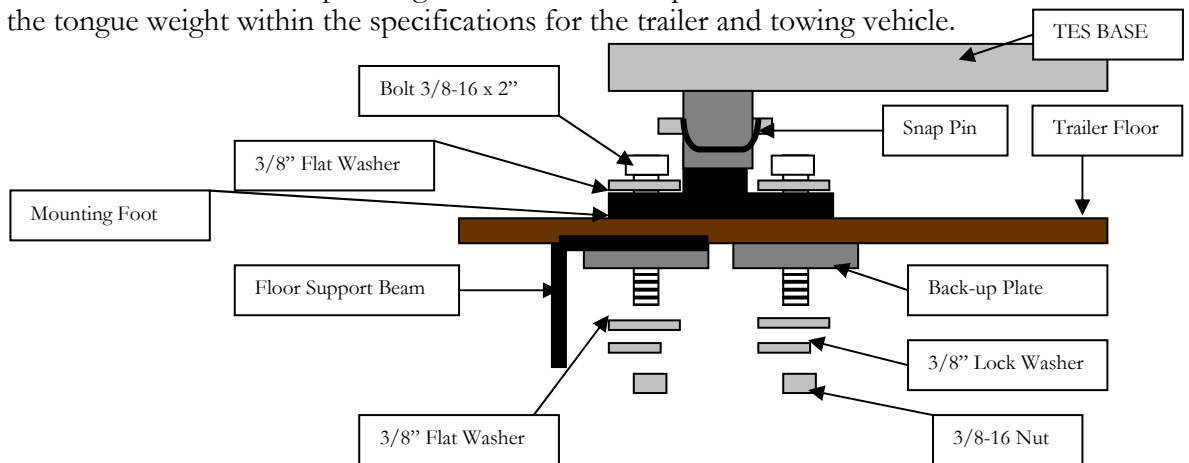
Installation & Transportation

The TES unit must be properly installed in a trailer or secured properly during transportation to the job sites. **Installation must be performed by an authorized service center.** Failure to do so will void the warranty and may result in property damage, personal injury or death.

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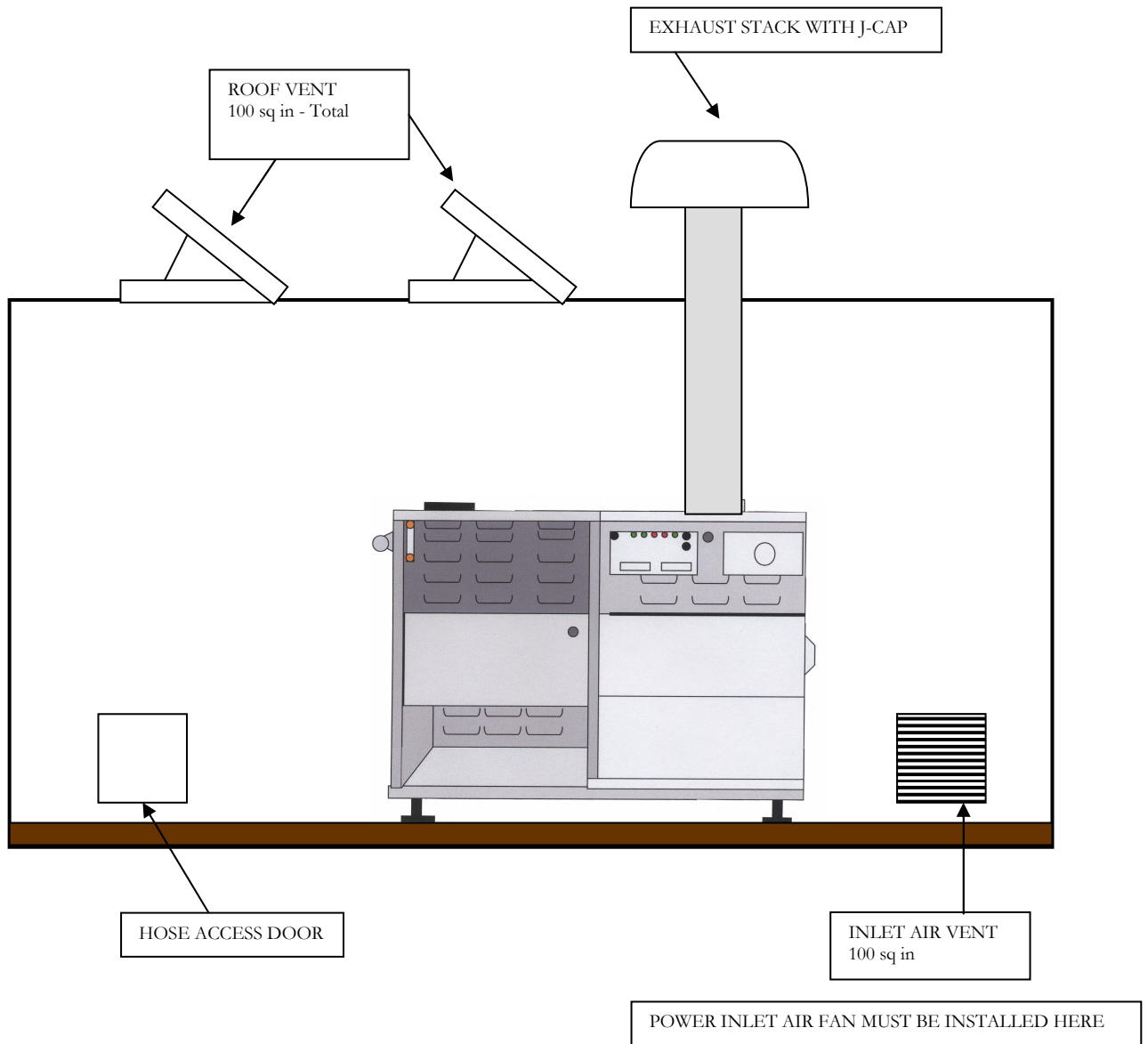
When selecting a vehicle or trailer to transport or mount the TES unit, be sure the trailer or vehicle can handle the combined weight of the TES unit, TEX units, hoses, propane tanks and accessories. The approximate combined weight of the standard package TES Thermal Energy System with three 100# propane tanks is 1600 lbs.

Trailer Use Mounting: Secure the TES unit to the floor of the trailer with the four mounting feet provided with the base. Each foot is secured to the TES unit base with a snap pin. The mounting foot secured to the floor with hardware as shown below. At least two bolts through each mounting foot with back-up plates under the floor. If possible place one bolt from each mounting foot through a steel support beam under floor. Position the TES unit to balance the load over the axle or axles. Proper weight distribution is important to balance the trailer and keep the tongue weight within the specifications for the trailer and towing vehicle.



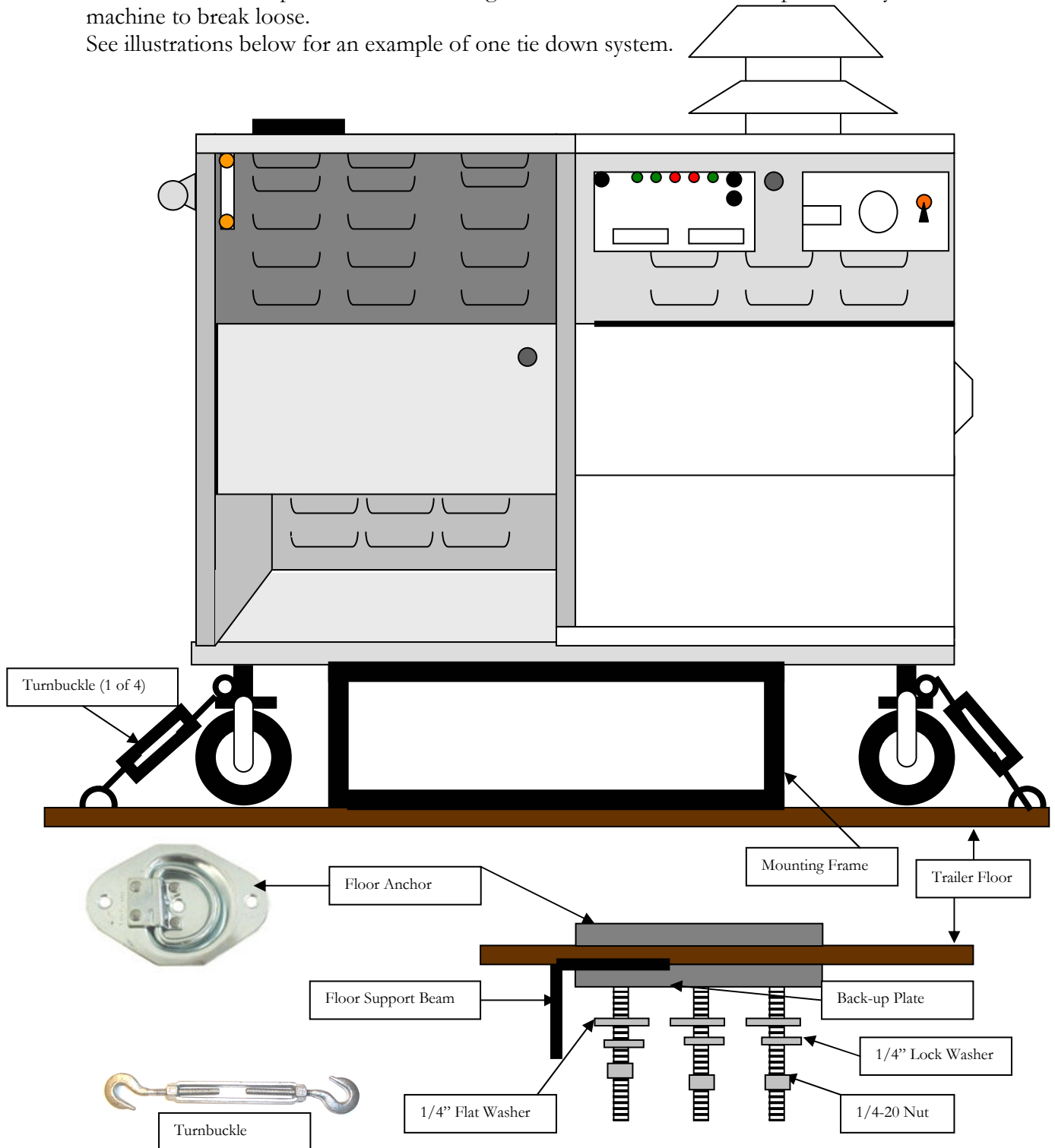
- If the TES unit is to be installed for use in a closed trailer, there must be at least 6" of space between the heater and the trailer wall. An exhaust stack must be installed to vent the burner exhaust through the roof of the trailer. There must be sufficient ventilation to exhaust the heat and supply adequate combustion air to the burner.
- A 7" diameter exhaust stack with vent cap is required. Use a "J" cap or other wind resistant style vent cap. Never install an exhaust pipe of a diameter smaller than that recommended. 6" of clearance is required between the exhaust stack and any combustible materials. Use the shortest, straightest exhaust system possible.
- Two roof vents must be installed to exhaust the heat from the trailer and allow proper flow of combustion air. The roof vents must have a total minimum free area of 100sq. in. When calculating the vent area, consideration must be given to the blockage effects of louvers, grills and screens. The installation of two roof vents should easily provide sufficient vent air space when allowing for blockage. **Power vents should not be used.** The heater should not be subjected to negative air pressure. Negative air pressure can affect the burner flame and exhaust flow.

- Openings for the combustion air supply must have a total minimum free area of 100 sq. in. When calculating the vent area, consideration must be given to the blockage effects of louvers, grills and screens. The openings must be within 12” but not less than 3” from the floor of the trailer. A power inlet air fan must be used to bring in combustion air. The free air space of the hose access door can be used as part of the total vent space. The blockage of the hoses must be considered when calculating the free space of the hose access door. The hoses may reduce the total free area to a total less than the required 100 sq. in. and require the addition of a second vent.
- The power inlet air fan must be used to bring in combustion air and to provide adequate cooling for TES operation. Power exhaust vents should not be used. Fan should have at least 600 cfm of air movement to provide proper operation of the TES unit. Locate fan within 12” but not less than 3” from the floor of the trailer. **Failure to install and use an inlet air fan may void your warranty.**



Portable Use Mounting: The TES unit must be securely mounted to the floor of the van or trailer. The anchors and tie down system must be rated to hold more than the 450 lb. weight of the TES unit. The anchors must be securely attached to the vehicle floor and floor support beams to prevent the TES Heater from coming loose in a collision or quick stop situation. Align anchors and tie downs to provide adequate restraint to prevent forward and back as well as side to side movement during transportation. For the most secure mounting, place a Mounting Frame under the TES unit before tightening tie down turnbuckles. Tighten turnbuckles until TES base contacts mounting frame. Inspect the turnbuckles, feet and anchors after each use and replace if worn or damaged. A weakened tie down component may allow the machine to break loose.

See illustrations below for an example of one tie down system.



Propane Tank Mounting: When the TES unit is mounted in the trailer the propane tanks cannot be used inside the trailer. The propane tanks must be secured properly for both transportation and use – in accordance with local, state and federal regulations. A rack for the propane tanks can be installed on the trailer tongue. The tanks can be removed from the rack for portable use or connected to the heater for in trailer use.

Read the section in this manual on propane safety. (Pages 10 & 11)

Check with your local propane supplier for local regulations regarding the use, storage and transportation of propane. Bridgepoint Systems is in no way responsible and is excluded from liability in respect to any loss or damage which may arise due to improper installation, use, storage or transportation of propane and propane tanks.

- A full 100# propane tank weighs approximately 150 lbs.
- Tongue mounting of propane tanks will greatly increase tongue weight. Balance trailer load to keep total tongue weight within limits of towing vehicle.
- Install a gas shutoff valve between the propane tanks and TES unit in trailer.
- Propane regulator must be installed outside of trailer. Install regulator with vent down or under protective cover. A second regulator can be purchased for more convenient use with the TES unit outside of the trailer.
- Use bulkhead fittings to make hose connections through floors and walls.
- Route and secure hoses to protect them from wear or damage.
- Close propane tank valves during transportation and storage.
- Close gas valve during transportation and storage.
- Turn open side of propane tank valve guard toward trailer during transportation.
- Make sure tanks are secured and will not move during transportation.
(Tank Rack part #AT70)
- Check for leaks before turning on heater every time TES unit is used.
- Examine hoses and fittings before and after each use. Repair or replace hoses and fittings as needed to assure safe operation before using TES unit.
- Examine tanks and replace if damaged. Do not use tanks if heavily dented, bulging or corroded.



Propane Safety

Propane is highly flammable, always contained under pressure and the liquid can freeze skin. It is important to understand the safety rules for propane storage and use.

- Propane or LP-gas is a true gas compressed into liquid form for easy transportation and storage. While stored in a compressed liquid form, most appliances such as the TES Heater use propane vapor only. Propane tanks designed for vapor service must be transported, stored and used in the proper position. Do not transport, store or use vertical cylinders in a horizontal position. Never use a horizontal tank on its improper side. **Failure to follow these guidelines may allow liquid propane to get into the heating system, create unsafe conditions and damage the heater.**
- Do not fill propane tanks to more than 80% of capacity.
- Secure the tanks during transportation, storage and use to prevent falling and rolling.
- Do not use damaged or rusted tanks. Tanks that show excessive denting, bulging, gouging or corrosion must be removed from service. Do not attempt to repair propane tanks, valves or regulators.
- A two-stage propane regulator of sufficient capacity must always be installed between the propane tanks and the TES unit to assure that the gas is delivered at the correct pressure for safe operation. Unregulated propane pressure can create unsafe conditions and damage the heater.
- When connecting the propane regulator and hose to the tank valve, turn the fitting nut counter-clockwise to tighten. Draw the fitting snug with the proper wrench. Do not over tighten. No thread sealant is needed.
- Do not operate the TES unit with a propane tank inside a closed trailer.
- Keep a dry chemical fire extinguisher with a B:C rating within 50 feet of tanks during use or storage.
- Laws concerning the proper storage of propane tanks may vary in different jurisdictions. Consult your local fire protection authorities.
- Do not use a wrench to close tank valve. These valves are designed to be closed leak tight by hand. If a wrench is needed to stop leaking, remove the tank from service immediately and have the valve replaced by a qualified professional.

- Do not smoke in the area of the propane tanks or heater.
- Do not operate the TES unit indoors.
- Position TES unit and tanks to keep tanks away from heater.
- Before operating the TES unit check around the heater for the smell of propane. Propane gas is heavier than air and can collect in low areas. Check around base of the heater for the smell of propane.
- A distinctive odor is added to propane. However propane leaks cannot always be detected by smell. Some people do not have a good sense of smell or certain conditions may affect your sense of smell. In rare cases propane gas can lose its added odor. This is called “odor fade”. It may occur when air, water or rust accumulates in a propane tank. The smell of escaping gas can also be absorbed by water, some soils or other materials. If you think your propane gas has lost its odor contact your propane dealer to check it out.
- Electronic gas detectors are commercially available and may provide an additional means of warning about the presence of propane.
- Use soapy water to check connection for propane leaks.
- Never use a match or flame to check for propane leaks.
- If you suspect a leak:
 - Do not attempt to start heater.
 - Close the valves on the propane tanks.
 - Do not touch any electrical cords, plugs or switches in the area of the suspected leak.
 - Do not operate any phone or electrical device in the area of the suspected leak.
 - Leave the area until the propane smell dissipates. If a large amount of propane is being released or the gas cannot be dissipated, leave the area and contact the fire department.
 - Have the propane system checked and repaired before using the heater.
- Absolutely no alterations or modifications should be made to your propane system. The slightest modification or alteration to your propane system by untrained personnel may cause a potentially dangerous or life-threatening situation.
- Do not operate this heater if any part has been under water. Have a qualified propane system service technician inspect the system and replace any part of the control system that has been under water.
- Have the propane system checked annually by a qualified propane system service technician
- To reduce the risk of property damage or injury, repairs to propane systems should only be performed by experienced technicians. Contact your nearest service center for assistance.

Check with your local propane supplier for local regulations regarding the storage, transportation and use of propane.

Heater Operation Safety

This heater is designed for outdoor use. It is not to be operated indoors.

- The TES unit was designed for outdoor use and **is not** to be used indoors. The TES unit can be operated from an enclosed trailer with the proper installation and venting for combustion air and exhaust. Do not operate the TES unit in a trailer with the trailer doors open. Do not place TES unit where exhaust fumes can enter buildings. The TES unit must be at least 10 ft. away from any door, window or gravity air inlet into any building and at least 3 ft. from any overhang.
- **The TES unit must level during operation.** Using the heater in a sloped position will change the position of the burner flame in relation to the burner tubes and heat exchanger. This can result in property damage, personal injury or loss of life.
- Secure TES unit and propane tanks as needed to prevent movement during operation. Position TES unit and tanks to keep tanks away from heater.
- Colder temperatures will decrease the vaporization rate of Propane and may require the use of additional tanks and more frequent refilling of the tanks to supply enough propane to maximize heater output. Contact your nearest service center for more information on propane vaporization rates at different temperatures.
- Do not use the TES unit if outdoor temperature may drop close to or below -30°F. TES Thermal Fluid has a freezing point of approximately -30°F. If the heater shuts off, freezing of the fluid will cause severe damage to the TES unit, TES Thermal Exchangers, hoses and fittings. Store your equipment indoors and protect from freezing.
- Do not place the TES unit in a location that would subject it to runoff from adjacent buildings.
- The combustion of propane produces carbon dioxide, carbon monoxide and oxides of nitrogen. An adequate supply of combustion air and sufficient ventilation is required to prevent these compounds from accumulating in toxic concentrations. Carbon monoxide is a colorless and odorless gas. If you are exposed to carbon monoxide, you may experience any or all of these symptoms:
 - Headaches, tightness across the forehead and temples.
 - Weariness, weakness, dizziness and vomiting.
 - Loss of muscular control. Watering and smarting of the eyes.

If any of these symptoms should develop, get into fresh air immediately, see your doctor for treatment and have your heater checked and repaired as needed.

- If the TES unit is to be installed for use in a closed trailer. It must have an exhaust stack installed to vent the burner exhaust through the roof of the trailer. Do not operate the TES unit in a trailer with the trailer doors open. There must be sufficient ventilation to exhaust the heat and supply adequate combustion air to the burner. A power fan must be used to bring air into the trailer. In a closed locked trailer the control panel door should be left open to keep the gauges and controls cooler.
- A 7" diameter exhaust stack with vent cap is required. A "J" cap or other wind resistant vent cap should be used. Never install an exhaust pipe of a diameter smaller than the recommended size. 6" of clearance is required between the exhaust stack and any combustible materials. Use the shortest, straightest exhaust system possible.
- Two roof vents must be installed to exhaust the heat from the trailer and allow proper flow of combustion air. The roof vents must have a total minimum free area of 100sq. in. When calculating the vent area, consideration must be given to the blockage effects of louvers, grills and screens. The installation of two roof vents should easily provide sufficient vent air space when allowing for blockage. **Power vents should not be used.** The heater should not be subjected to negative air pressure. Negative air pressure can affect the burner flame and exhaust flow.
- Openings for the combustion air supply must have a total minimum free area of 100 sq. in. When calculating the vent area, consideration must be given to the blockage effects of louvers, grills and screens. The openings must be within 12" but not less than 3" from the floor of the trailer. A power inlet air fan must be used to bring in combustion air. The free air space of the hose access door can be used as part of the total vent space. The blockage of the hoses must be considered when calculating the free space of the hose access door. The hoses may reduce the total free area to a total less than the required 100 sq. in. and require a second vent.

This heater is an electrical appliance. Care must be taken to reduce the risk of electrical shock. Use of a Ground Fault Interrupting (GFI) device is recommended

- Extension cords must be rated for outdoor use, grounded and able to deliver the proper current to the heater and pump. (10 amps)
- Do not use a multiple outlet power cord to connect to TES unit plug.
- Keep cord connections off the ground. Protect cord connections from rain or other water sources.
- Never operate this heater with a damaged power cord. If the power cord is damaged it must be replaced.
- Unplug machine power cord from outlet before connecting or disconnecting quick connects on TES unit.
- Unplug machine power cord from outlet before performing any repair on the TES heater or pump.
- To reduce the risk of property damage or injury, repairs to electrical systems should only be performed by experienced technicians. Contact your nearest service center for assistance.
- If solution lines, pump or heater are leaking, unplug machine power cord from outlet before approaching or touching machine.
- Remove Feet or carpet clamps from snout of air mover before placing air mover into TEX Thermal Exchanger to prevent damage to air seal gasket.

This heater operates with hot solution under pressure. TES Thermal fluid under pressure and at high temperature can cause burns, severe personal injury or death. The TES Thermal Energy System must be operated and maintained properly to reduce the risk of burns or other injuries.

- Always connect at least two TEX Thermal Exchangers with hoses, make sure manual pressure relief valve is closed and by-pass valve is open before turning pump and heater ON.
- Always turn Pump ON before turning Heater ON. Always turn Heater OFF and allow solution to cool before turning Pump OFF. The air movers must be kept running in each TEX Thermal Exchanger to draw heat and cool the solution.
- Always turn Heater OFF, allow solution to cool, then turn Pump OFF and disconnect power cord before relieving system pressure and disconnecting any hose from the TES unit. Wear eye protection when connecting and disconnecting hoses. Turn Heater OFF, allow solution to cool, turn Pump OFF and relieve system pressure before disconnecting any hose from the thermal exchangers, solution tees or other hoses. Wear eye protection when connecting and disconnecting hoses.
- Stainless steel covers and doors have sharp edges. Wear leather work gloves when connecting or disconnecting quick connects or performing any maintenance or repair procedures on the TES unit.
- With pump OFF, hoses and fittings will retain 12 psi system pressure. When system has cooled, use the manual pressure relief valve to release pressure from system before disconnecting hoses. Quick connects may stick open and leak. Press nipple on quick connect to release fluid and flush debris and allow the quick connect to re-seal. Wrap a towel around quick connects when disconnecting hoses to catch released fluid.
- Do not operate this heater unless all panels are in place and properly secured. Keep hose access door on TES unit closed and locked during operation. Keep control panel door on TES unit closed and locked during operation. Do not leave keys in locks. When TES unit is in closed locked trailer, the control panel door should be left open.
- Keep cover on TES fluid reservoir during operation. Add TES Thermal Fluid to reservoir as needed to maintain an adequate fluid supply to pump and heater. Do not use water in the heater, hoses or heat exchangers. Use only TES Thermal Fluid. Failure to do so may result in damage to heater and will void warranty.
- Hot brass fittings can damage some carpets or cause burns. Wrap and insulate quick connects and solution tees to prevent damage or burning.
- Hoses must be rated to handle 250°F fluid temperatures, 5/8" or 3/4" ID for adequate flow and insulated to hold heat and protect from burns.
- Do not by-pass Flow Switch. A continuous adequate flow of solution through heater must be maintained. Failure to do so may result in damage to heater and will void warranty.
- Never try to repair the pressure relief valve. If the valve fails to operate properly, replace the valve. Removal or restriction of the pressure relief valve could damage heater, cause severe personal injury or death.
- If solution lines, pump or heater are leaking, unplug machine power cord from outlet before approaching machine.

Heater Operation Procedure

Knowledge of the proper operation of the heater and heat exchange system is required for safe operation and to keep heater and components operating properly.

- 1) Place the TES unit in an area close to a convenient entry point for hoses to heat exchangers. Heater must be level and in a well ventilated area. Consideration must be given to the security of the selected area in regards to theft, tampering and safety.
- 2) Propane tanks must be placed in proper use position on a solid level area and secured if necessary to prevent tipping. Position TES unit and tanks to keep tanks away from heater.
- 3) Connect the hoses to the outlet and inlet quick connects and run hoses to TEX Thermal Exchangers as needed. Wear leather gloves and eye protection when connecting hoses. **For proper heater operation two or more TEX Thermal Exchangers must be connected to the heater.** For extended hose runs use more 3/4" TES hoses for improved flow. Place quick connect wraps on all hose connections to hold heat and prevent burning from contact with hot brass fittings.
- 4) Add TES Thermal Energy Fluid to reservoir as needed to keep fluid level above half full.
- 5) Connect the power supply cord to the TES heater.
- 6) Connect the propane hose and regulator to the propane tank. Use a tee connector to connect two or three tanks together for larger jobs. Operation time per 100 lb. tank is dependant on altitude and heat draw requirements. Heat draw requirements can change with the outside temperature, number of TEX Thermal Exchangers, length of hose used and air flow required to float the carpet. The average operation time per tank using four TEX Thermal Exchangers is 12-16 hours. Longer operation time can be expected using fewer heat exchangers. Shorter operation time can be expected in lower temperature use, when the decrease in the vaporization rate will decrease the BTU/hr available from each propane tank.
- 7) Open the valves on the connected propane tanks. Open valve slowly to allow lines to slowly pressurize. Opening valve too quickly may activate flow restrictor valve in POL fitting and stop gas flow to heater.

Wait 5 minutes and check around heater, tanks and hoses for gas leaks.

- If no gas leaks are detected proceed with start up procedures.
- If a gas leak is detected or suspected, close tank valves and follow safety procedures.

- 8) Make sure the manual pressure relief valve is closed and open the by-pass valve located between the quick connects and then turn the pump ON to circulate solution through heater and activate flow switch. Listen for air release or cavitation in pump. Observe pressure gauge reading. Pressure reading will vary with the number of TEX units used, the length hose used and position of by-pass valve. Gauge should read between 30 – 50psi and pressure will stabilize as air is removed from the system. Add TES Thermal Energy Fluid to reservoir as needed. Excessive cavitation, air release or fluid loss may indicate a system fluid leak. Check fittings, hoses and TEX Thermal exchangers for leaks and repair or replace as needed.
- 9) For maximum heat production the by-pass valve, located between quick connects, should be closed. However, depending on the number of TEX units connected, the by-pass valve may need to be opened to maintain the required fluid flow rate through the TES heater. The valve should be opened before turning the pump on. Now slowly close the valve until the valve is closed completely or the LOW FLOW light turns off.
 - If the valve can be closed and the LOW FLOW light stays on, leave the valve closed and continue with set-up.
 - If the LOW FLOW light turns off, slowly open the valve until the light comes back on. When the light comes on, open the by-pass valve an extra 1/2 turn and continue with set-up.
- 10) Turn TES unit heater switch to the ON position. Observe indicator lights. When all lights are illuminated system is within operating limits and the heater is firing.
 - **POWER** – When lighted indicates that the heater switch is in the ON position and the heater has power.
 - **OPERATOR** – When lighted indicates that the solution temperature is below the preset temperature limit and the heater can fire. Operator set point is 200°F, preset at the factory.
 - **HI-LIMIT** – When lighted indicates that the solution temperature is below the Hi-Limit safety setting and the heater can fire. The Hi-Limit set point should be at least 20°F above the Operator set point. And never set above 230°F.
 - **LOW FLOW** – When lighted indicates there is adequate solution flow and the heater can fire.
 - **MAIN GAS** – When lighted indicates the main gas valve is open and the heater is firing.
 - When the lights are not all lighted look for the following: See the troubleshooting section for more information on the meaning different light configurations.
 - When the **LOW FLOW** light does not come on, make sure you have all your hoses connected to the TEX Thermal Exchangers and the pump is ON and running. (For better flow and heater operation have at least two TEX Thermal Exchangers connected.) Then open the by-pass valve slowly until the **LOW FLOW** light comes on. Once the **LOW FLOW** light comes on continue opening the by-pass valve 1/4 – 1/2 turn. If the **LOW FLOW** light does not come on recheck your hose connections and repeat the procedure or contact your nearest service center for advice or assistance.
 - If all the other lights are on, but the **MAIN GAS** light does not come on, turn the heater switch off and turn it back on again wait 5-10 seconds and repeat as needed. It may take a few tries to get the air out of the propane lines and allow the heater to fire.
 - When the solution temperature reaches the Operator set point, the **OPERATOR**, **LOW FLOW** and **MAIN GAS** lights will turn off and the heater will stop firing.
 - When the Solution temperature reaches the Hi-Limit set point, the **HI-LIMIT** and **MAIN GAS** lights will turn off and the heater will stop firing.
 - If the solution flow rate is too low, the **LOW FLOW** and **MAIN GAS** lights will turn off and the heater will stop firing.

- 11) Turn the air movers ON for each TEX unit.
- 12) Observe TES unit operation until the temperature stabilizes or the operator set point is reached for the first time and then heater re-starts after cooling. Open by-pass valve as needed to maintain proper flow rate to engage flow switch on heater. As the system heats up, pressure and flow rate may change and the by-pass valve may need to be re-adjusted to maintain flow and keep the heater firing.
- 13) When the TES unit is adjusted properly and operating normally, close and lock hose access door then close and lock control panel cover on TES unit. (Control panel door should be left open when operating unit inside a locked trailer.)

CHANGING PROPANE TANKS

- 1) Unlock and open control panel.
- 2) Turn TES unit heater OFF. Leave pump switch ON.
- 3) Close valves on propane tanks. Close gas shutoff valve between tanks and TES unit if so equipped. Remove regulator and hoses from propane tanks.
- 4) Reconnect regulator and hoses to new, full propane tanks.
- 5) Open valves on propane tanks. Then open gas shutoff valve if so equipped.
- 6) Check for propane leaks. If leaks are found or suspected follow safety procedures. If no leaks are detected continue with procedure.
- 7) Turn TES unit heater switch to the ON position. Observe indicator lights. When all lights are illuminated system is within operating limits and the heater is firing. If all the other lights are on, but the **MAIN GAS** light does not come on, turn the heater switch off for 5-10 seconds and turn it back on again wait 5-10 seconds and retry as needed. It may take a few tries to get the air out of the propane lines and allow the heater to fire.
- 8) Observe TES unit operation until temperature stabilizes or solution temperature returns to the operator set point. Open by-pass valve as needed to maintain proper flow rate to engage flow switch on heater. As the system heats up, pressure and flow rate may change and the by-pass valve may need to be re-adjusted to maintain flow and keep the heater firing.
- 9) When the TES unit is adjusted properly and operating normally, close and lock control panel cover on TES unit. (Control panel door should be left open when operating unit inside a locked trailer.)

HEATER SHUTDOWN PROCEDURE

- 1) Unlock and open control panel on TES unit.
- 2) Turn TES unit heater switch OFF and leave pump switch ON.
- 3) Close valves on propane tanks. Close gas shutoff valve between tanks and TES unit if so equipped.
- 4) Keep air movers running through TEX Thermal Exchangers to draw heat and cool the heating system.
- 5) When the solution temperature has cooled to the point where you can comfortably handle the quick connects and hoses (Approximately 120°F or lower.) turn the pump OFF.
- 6) Turn the air movers OFF at each TEX unit.
- 7) Unlock hose access door on the TES unit.
- 8) Disconnect power cord from the power outlet and heater connection. Roll up and store cord.
- 9) With the Pump OFF, hoses and fittings will retain 12 psi system pressure. Use the manual pressure relief valve to release the system pressure before disconnecting hoses. Close valve when pressure has returned to zero.
- 10) Disconnect hoses from TES Heater and TEX Thermal Exchangers. Wear eye protection and leather gloves when disconnecting or connecting hoses. With pump OFF, hoses and fittings will retain 12 psi system pressure. Quick connects may stick open and leak. Press nipple on quick connect to release fluid and flush debris and allow the quick connect to re-seal. Wrap a towel around quick connects when disconnecting hoses to catch released fluid.
- 11) Roll up and store hoses.
- 12) Disconnect propane regulator and hose from tank. Store propane hose and regulator.
- 13) Remove and store air movers and TEX Thermal Exchangers.
- 14) Store propane tank and heater.

Heater Troubleshooting

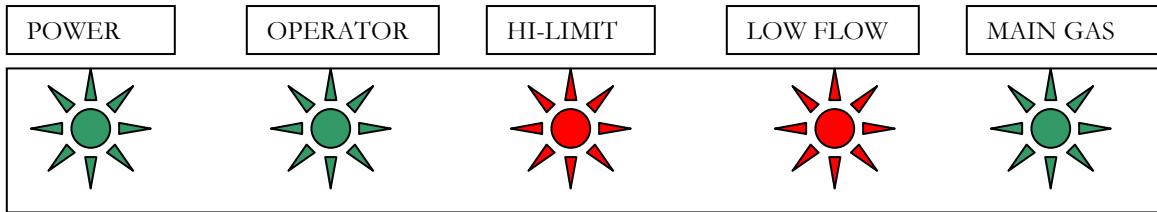
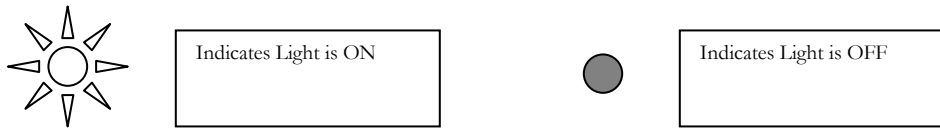
Problem	Cause	Solution
Circuit Breaker Blowing	Too much current demand on circuit	Move plug to another outlet & circuit
	Circuit breaker faulty	Move plug to another outlet & circuit
	Faulty Pump - Pump seized	Repair or replace pump as needed
	Pump motor faulty	Replace pump motor
	Restriction in hoses and fittings	Remove and clean or replace hoses & fittings as needed
	Faulty power cord	Replace cord
	Faulty switches or internal wiring	Check wiring & test switches - Repair as needed *
Solution Pump not running	Pump switch in the OFF position	Turn the pump switch to the ON position
	Building circuit breaker tripped.	Reset breakers or move cord to another outlet
	Faulty power cord	Replace cord
	Faulty switches or internal wiring	Check wiring & test switches - Repair as needed *
	Pump thermal protector tripped	Allow pump motor to cool and restart
	Pump motor faulty	Replace pump motor
	Pump seized - trips breaker	Repair or replace pump head - Check motor
Solution Pump Not Pumping	Air in System	Prime pump & bleed air from system – Add Fluid as needed. Check System pressure pump, Pressure Reducing Valve and wiring.
	Low on Fluid	Add fluid, prime pump & bleed air from system
	Faulty Pump	Repair or replace Solution Pump
	Low Voltage	Check wiring & test switches - Repair as needed *
	Restriction in hoses and fittings	Remove and clean or replace hoses & fittings as needed
Heater Power Light Not Lighted	Heater switch in the OFF position	Turn heater switch to the ON position
	Building circuit breaker tripped.	Reset breakers or move cord to another outlets
	Faulty power cord	Replace cord
	Heater Fuse Blown	Replace 2 amp fuse & Check wiring & test - Repair as needed *
	Faulty switches or internal wiring	Check wiring & test switches - Repair as needed *
	Faulty indicator light	Replace light
Heater Operator Light Not Lighted	Solution temperature above set point	Normal Operation - If needed raise set point
	Loss of power	See Power Light (All other lights also off.)
	Faulty switches or internal wiring	Check wiring & test switches - Repair as needed *
	Faulty indicator light	Replace light

* To reduce the risk of injury, repairs to electrical, propane or fluid pressure systems should only be performed by experienced technicians. Contact your nearest service center for assistance.

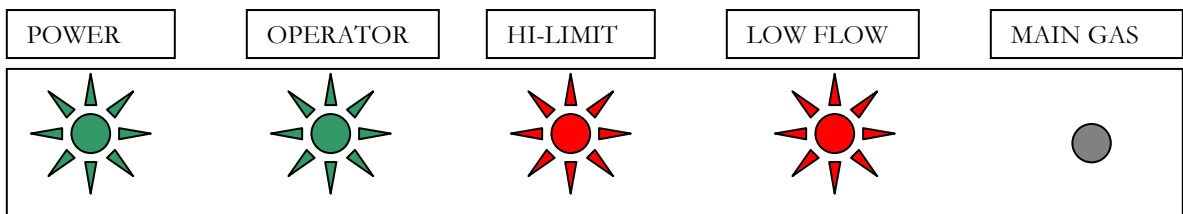
Problem	Cause	Solution
Heater Low Flow Light Not Lighted	Flow rate too low	Check Pump - Open by-pass valve to increase flow.
	Solution temp over operator set point	Normal Operation (Operator light also off.)
	Loss of power	See Power Light (All other lights also off.)
	Faulty switches or internal wiring	Check wiring & test switches - Repair as needed *
	Faulty indicator light	Replace light
Heater Hi-Limit Light Not Lighted	Solution temperature above set point	Normal Operation - If needed raise set point
	Loss of power	See Power Light (All other lights also off.)
	Faulty switches or internal wiring	Check wiring & test switches - Repair as needed *
	Faulty indicator light	Replace light
Heater Main Gas Valve Light Not Lighted	Solution temp over operator set point	Normal Operation
	Solution temp over Hi-limit set point	Normal Operation
	Flow rate too low	Check Pump - Open by-pass valve to increase flow.
	Loss of power	See Power Light (All other lights also off.)
	Failed Ignition	Check Propane supply - Check Flow rate - Restart heater
	Faulty Valve	Replace Main Gas Valve*
	Faulty switches or internal wiring	Check wiring & test switches - Repair as needed *
	Faulty indicator light	Replace light
	Out of Propane	Refill Tanks - Check Hoses, regulator and connections
System Overheating	Faulty switches or internal wiring	Check wiring & test switches - Repair as needed *
	Flow rate too low	Check Pump - Open by-pass valve to increase flow.
	Not enough Heat draw from system	Turn air movers switches to higher speed Increase number of TEX Thermal Exchangers
System Not Heating	Faulty switches or internal wiring	Check wiring & test switches - Repair as needed *
	Out of Propane	Refill Tanks - Check Hoses and connections
	Restriction in Propane delivery	Check regulator, gas valves, fittings and hoses.*
	Thermostats set too low	Adjust thermostats - Raise set points
	Too Much Heat loss from system	Turn air movers switches to lower speed Reduce number of TEX Thermal Exchangers Reduce length of hose being used – Insulate fittings
	By-pass Valve opened too much	Adjust by-pass valve as needed
	Flow Rate too low	Check pump, hoses and connections. Adjust by-pass valve
	Faulty Heater	Check heater jets, burners, etc – Repair as needed*
Heater Cycling Too Often	Faulty switches or internal wiring	Check wiring & test switches - Repair as needed *
	Flow rate too low	Check Pump - Open by-pass valve to increase flow. Increase number of TEX Thermal Exchangers Check hoses – Hose may be restricted Un-kink, repair or replace hoses
	Not enough Heat draw from system	Turn air movers switches to higher speed Increase number of TEX Thermal Exchangers
	By-pass Valve opened too much	Adjust by-pass valve as needed

* To reduce the risk of injury, repairs to electrical, propane or fluid pressure systems should only be performed by experienced technicians. Contact your nearest service center for assistance.

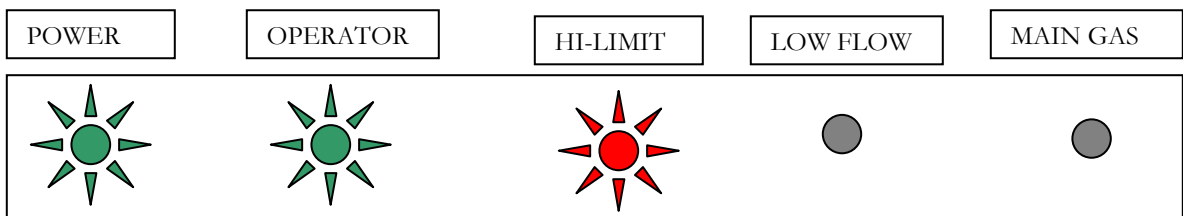
TES INDICATOR LIGHT PANEL CONFIGURATIONS



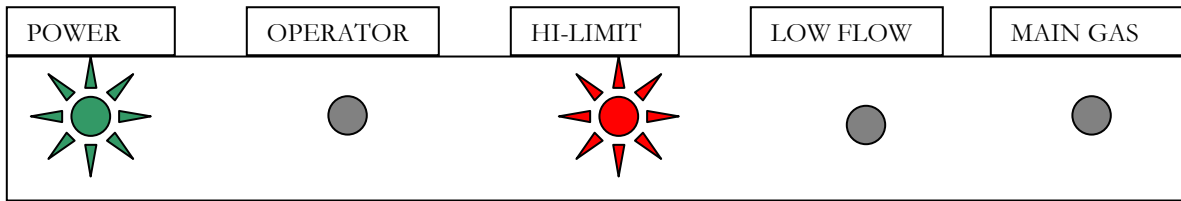
When all the lights are ON as shown above, the heater is operating normally and the heater is firing.



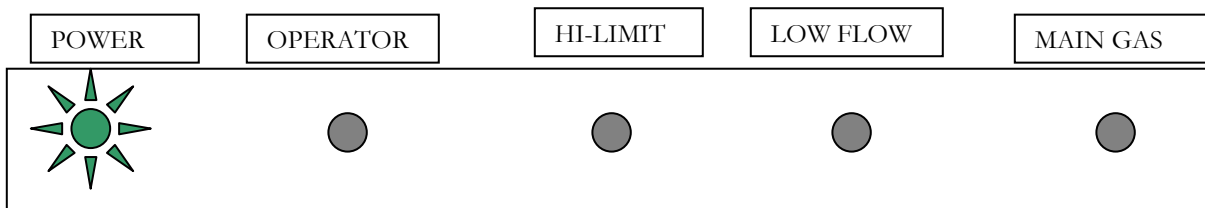
When the POWER, OPERATOR, LOW FLOW and HI-LIMIT lights are all ON and the MAIN GAS light is OFF, it means a lack of propane or ignition failure is preventing the burner from firing. This is a common occurrence at initial start up as air is bled from the propane hoses. Check the propane supply and shutoff valves to be sure propane is being supplied to the heater. Turn the power switch ON, wait 5-10 seconds for ignition to fire and if the burner does not fire and light does not come turn switch OFF and back on to repeat ignition process. This procedure may need to be repeated several times to get air out of the lines and allow the burner to fire.



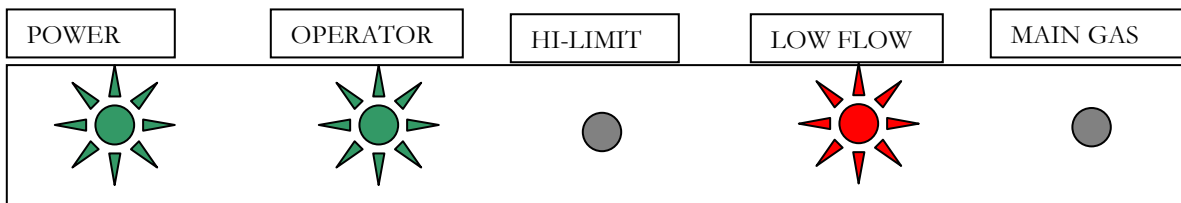
When the POWER, OPERATOR and HI-LIMIT lights are ON and the LOW FLOW and MAIN GAS lights are OFF it is an indication that the solution flow is too low to trigger the Flow Switch and the burner will not fire. Make sure pump switch is ON; pump is running and showing pressure on gauge. At least two TEX Thermal Exchangers must be connected for proper flow. With the TEX units connected and pump ON, open the By-Pass Valve to increase the solution flow. Open the valve slowly until the LOW FLOW light comes ON. Once LOW FLOW light comes ON continue opening the by-pass valve 1/4 – 1/2 turn. If the LOW FLOW light does not come ON recheck your hose connections and repeat the procedure.



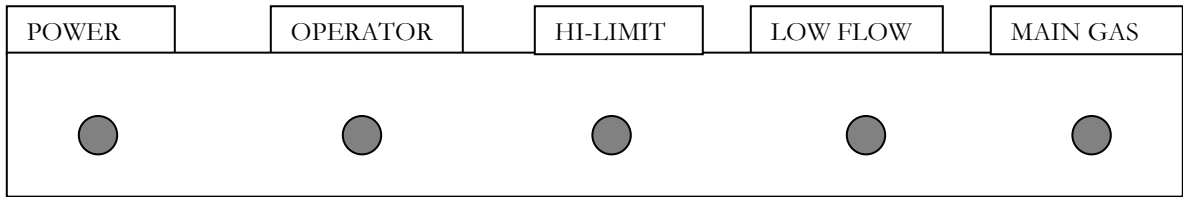
During normal operation there may be times when the POWER and HI-LIMIT lights are ON and the other lights are OFF. This indicates that the Operator set point temperature has been reached and the heater is not firing. When the Operator set point is reached the burner shuts OFF and the MAIN GAS light goes OFF. The power to the Flow switch and LOW FLOW light goes through the Operator control, so when the OPERATOR light goes out when the Operator set point is reached the LOW FLOW light will turn OFF too. When the solution temperature cools below the Operator set point the lights will all come back ON. The Operator set point is 200°F.



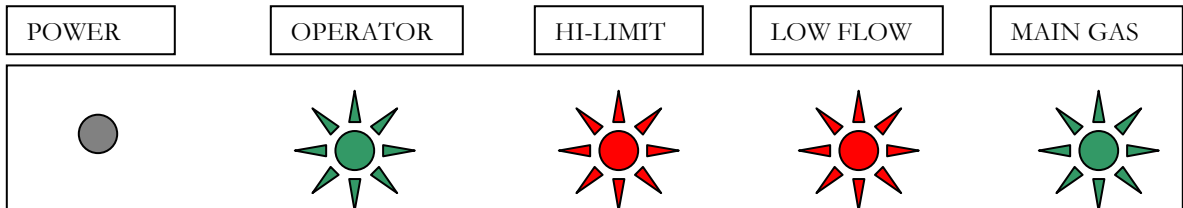
When the POWER light is the only light ON, it indicates that the solution temperature has exceeded both the Operator set point and the Hi-Limit set point and the burner has shut OFF. This could mean that the Hi-Limit set point is set too low or that there is a flow restriction to the TEX units and the heater is getting too hot. The Operator set point should be 200°F and the Hi-limit set point should be 230°F. If only one TEX unit is connected and the by-pass valve is opened too much or there is a flow restriction that reduces the amount of heat draw from the system the heater may overheat and exceed the Hi-Limit set point even if it is adjusted properly. Re-set Operator and Hi-Limit controls and add TEX units to improve flow as needed to correct the overheating. If this light pattern occurs while the TES unit is cool and control temperatures are properly set, it could indicate an electrical problem in the control panel contact your nearest service center for assistance.



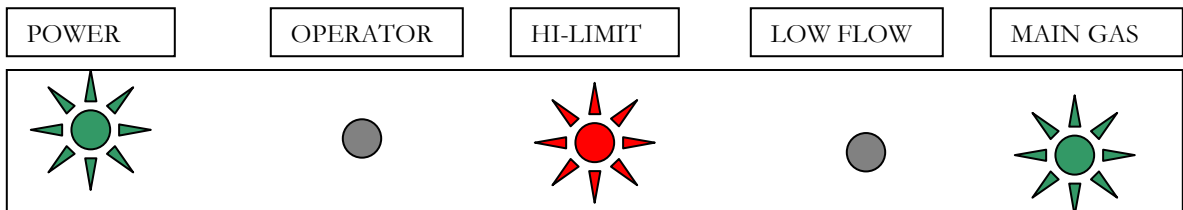
If the HI-LIMIT and MAIN GAS lights are OFF and the POWER, OPERATOR and LOW FLOW lights are ON, there is a problem with the light panel or other wiring. The power to the OPERATOR, LOW FLOW and MAIN GAS lights flows through the HI-LIMIT control first. So if the HI-LIMIT light is OFF the other three lights would also be OFF. Repair the wiring or contact your nearest service center for assistance.



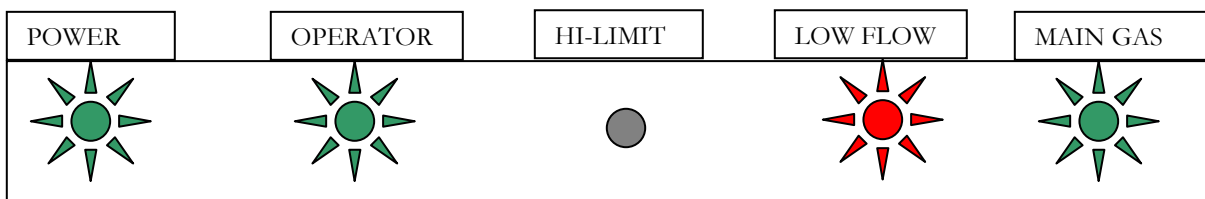
If all lights are OFF, the heater switch may be in the OFF position. Turn switch ON and check power supply to assure that power is being supplied to the TES unit. If the lights are still OFF remove Hood Assembly to access wiring and check fuse. Replace 2 amp fuse as needed or contact your nearest service center for assistance.



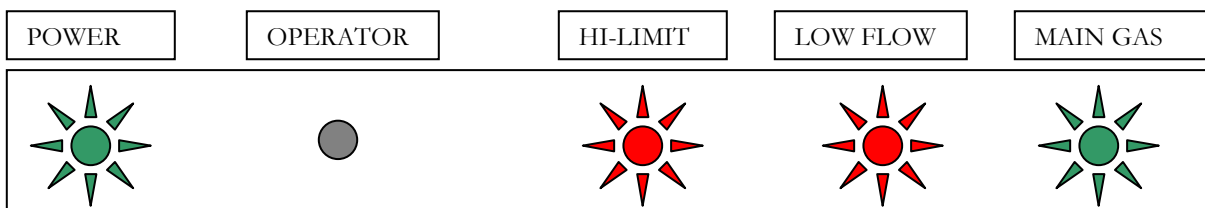
If the POWER light is OFF and the other lights are ON there is a problem with the light panel or other wiring. Contact your nearest service center for assistance.



If the POWER, HI-LIMIT and MAIN GAS lights are ON, and the OPERATOR and LOW FLOW lights are OFF there is a problem with the light panel or other wiring. Contact your nearest service center for assistance.



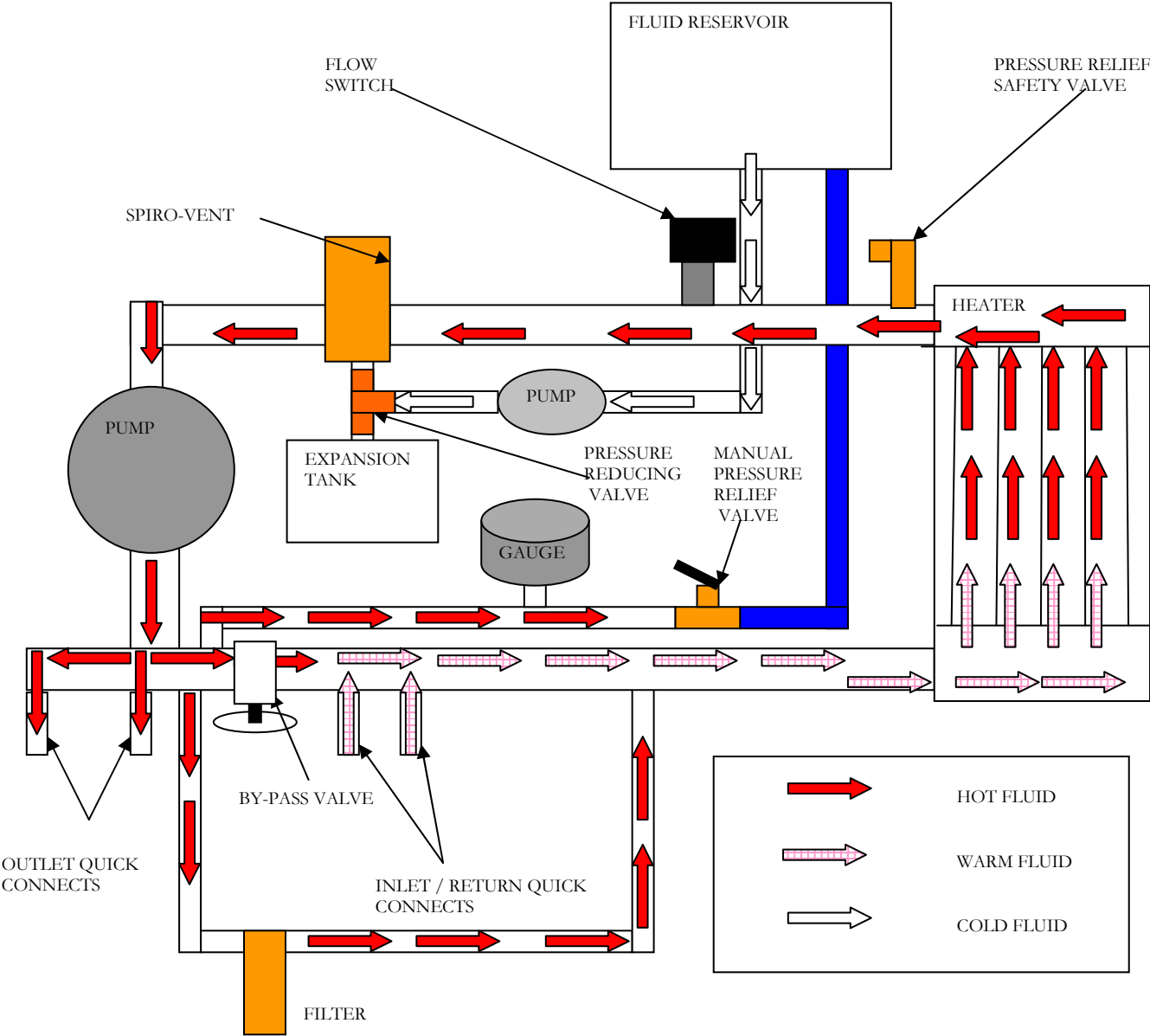
If the POWER, OPERATOR, LOW FLOW and MAIN GAS lights are ON and the HI-LIMIT light is OFF there is a problem with the light panel or other wiring. Contact your nearest service center for assistance.

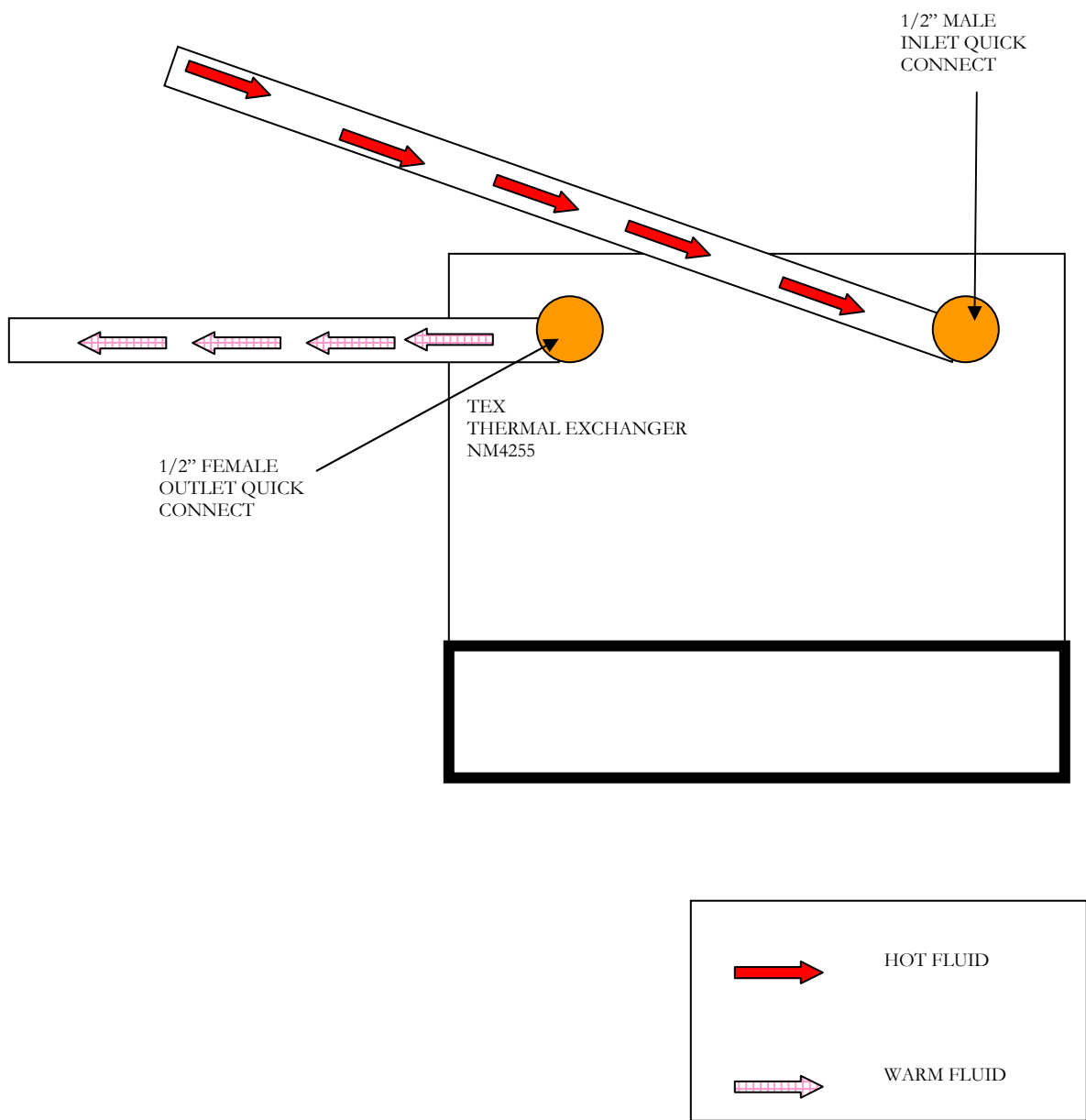


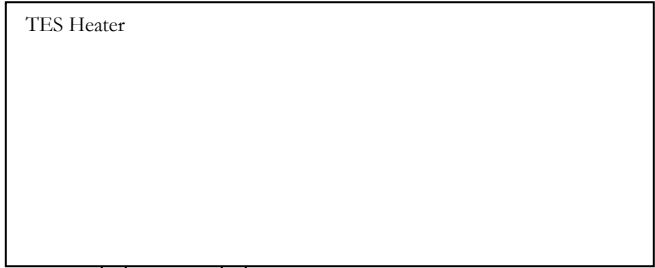
If the POWER, LOW FLOW, HI-LIMIT and MAIN GAS lights are ON and the OPERATOR light is OFF there is a problem with the light panel or other wiring. Contact your nearest service center for assistance.

Section
2

Heater Flow Path







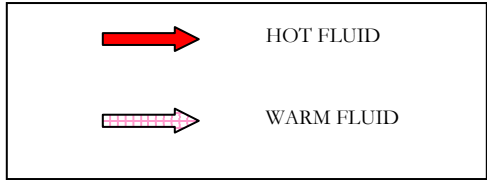
TES Outlet Hose
3/4" x 50' Red
with 3/4" QC's
AH108

TES Inlet Hose
3/4" x 50' Blue
with 3/4" QC's
AH110

For extended hose runs use
additional sections of TES 3/4"
hose for improved flow.

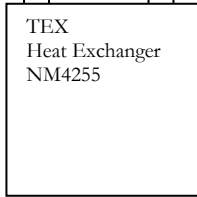
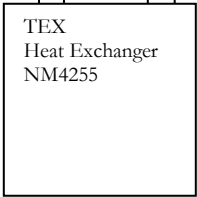
Inlet Solution Tee
AH104

Outlet Solution
Tee AH106

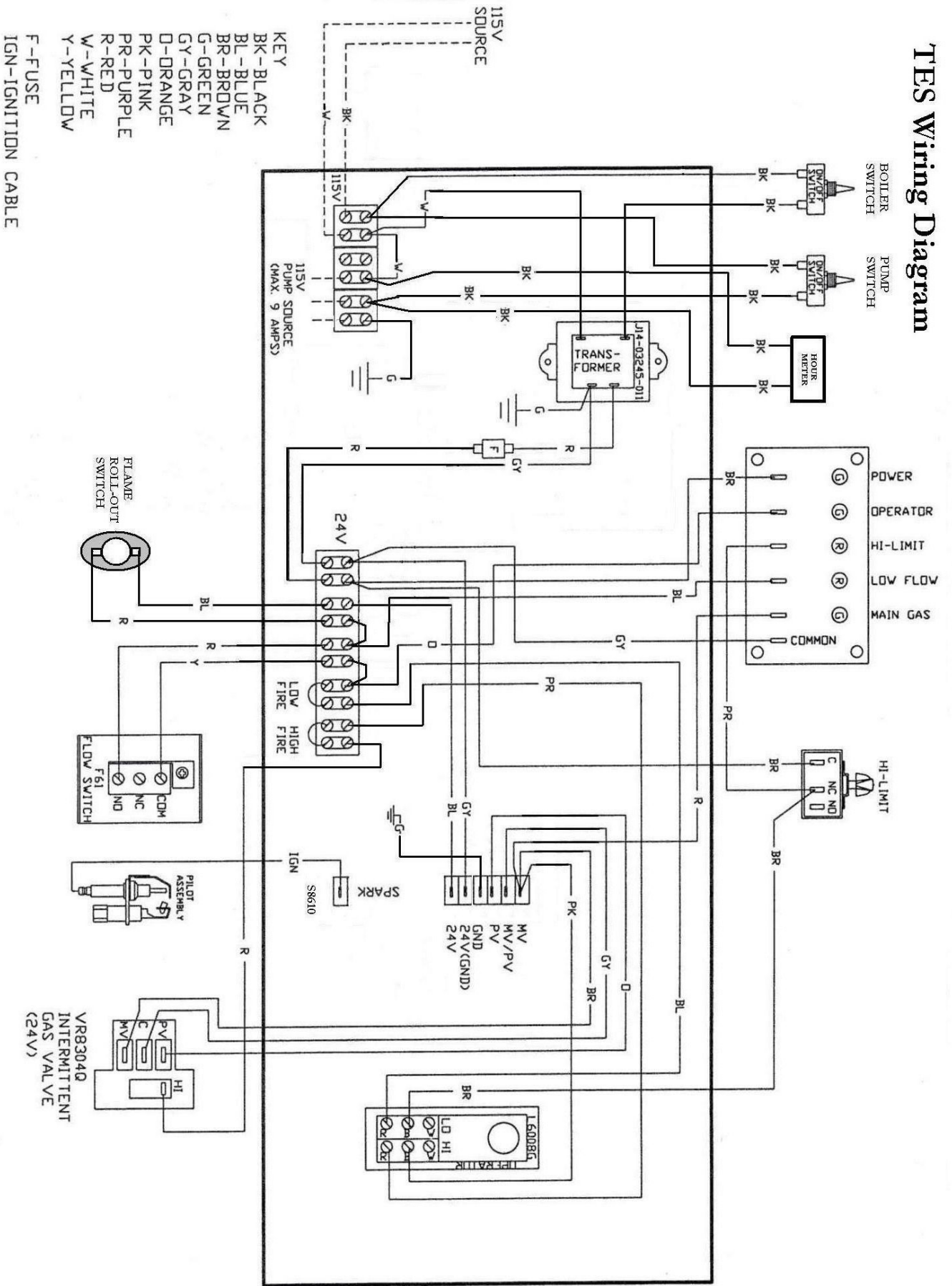


TEX Inlet Hose
5/8" x 50' Red
with 1/2" QC's
AH112

TEX Outlet Hose
5/8" x 50' Blue with 1/2" QC's
AH114



TES Wiring Diagram

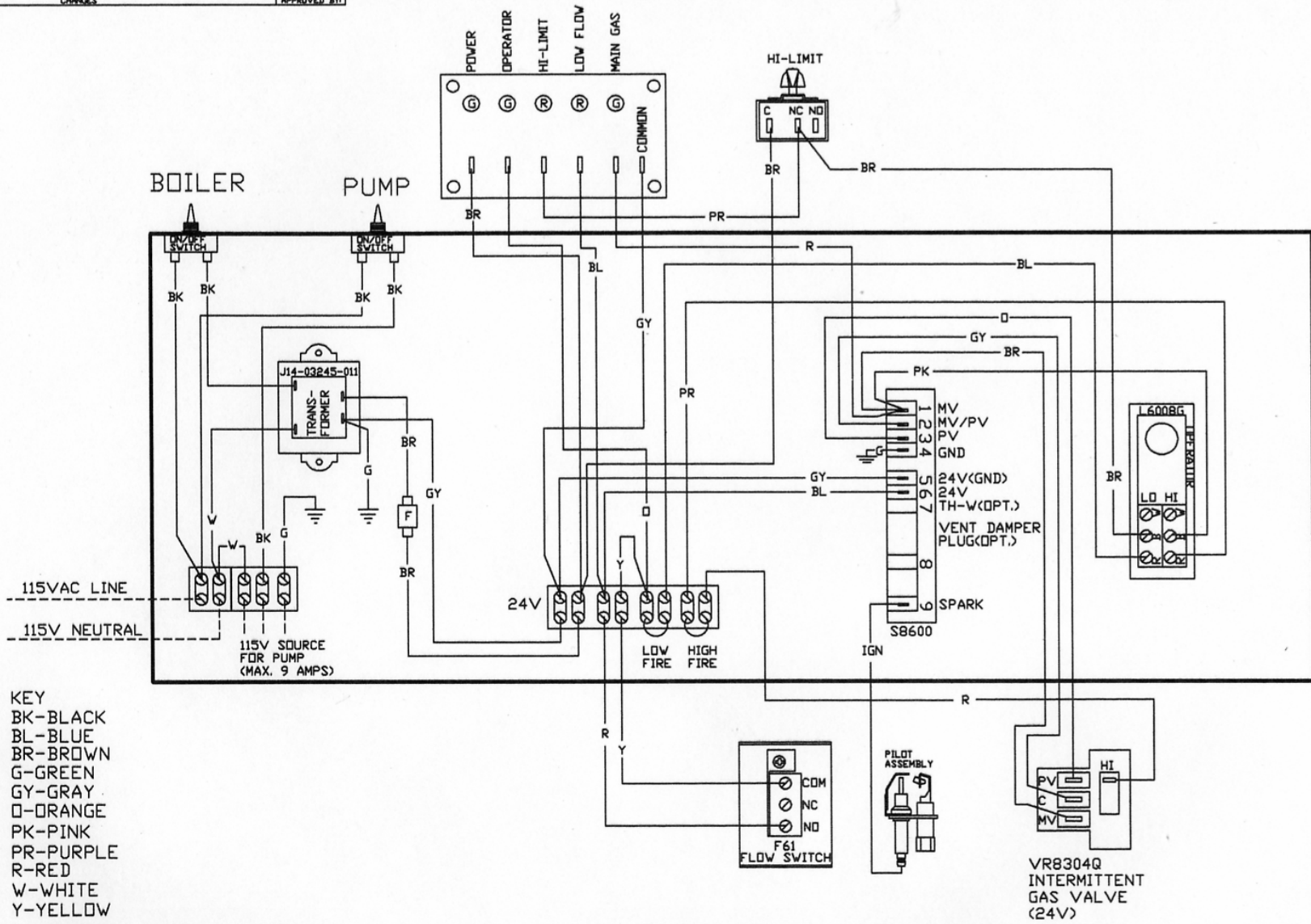


TES Wiring Diagram

Old Style without Roll-out Switch

CHANGES

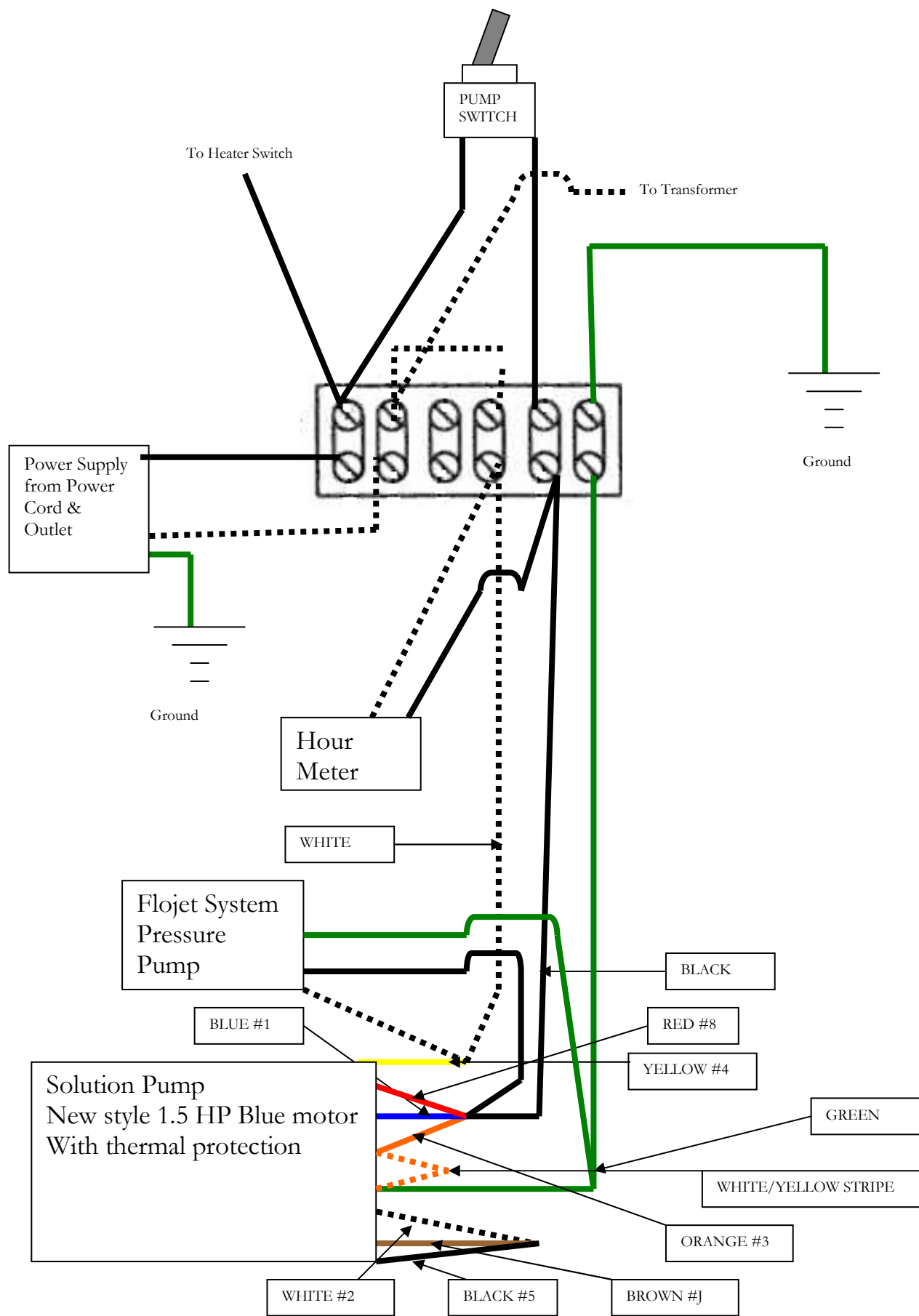
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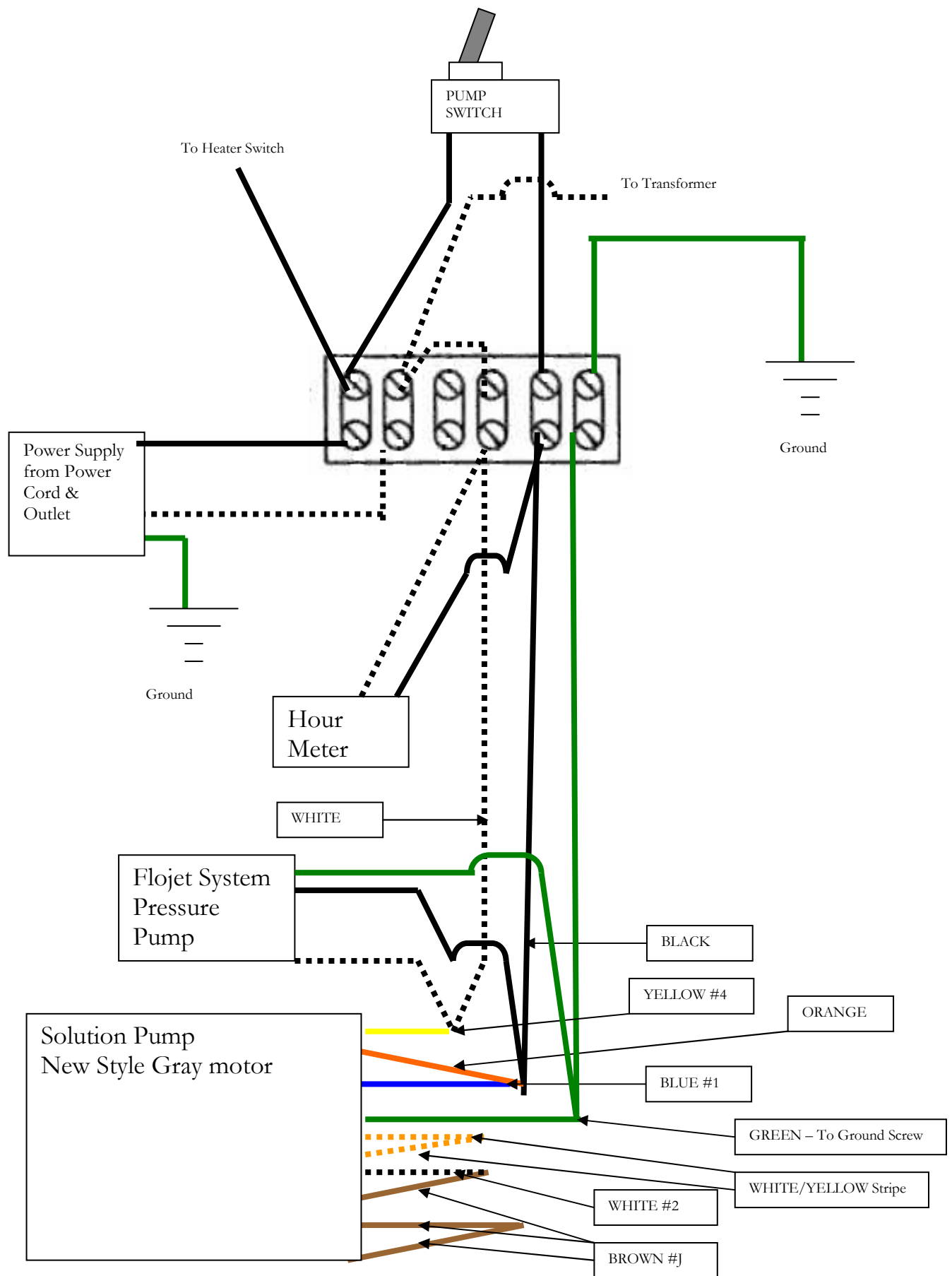


- KEY
- BK-BLACK
 - BL-BLUE
 - BR-BROWN
 - G-GREEN
 - GY-GRAY
 - Ø-ORANGE
 - PK-PINK
 - PR-PURPLE
 - R-RED
 - W-WHITE
 - Y-YELLOW
 - F-FUSE
 - IGN-IGNITION CABLE

TOLERANCES
UNLESS OTHERWISE SPECIFIED

- 1/4 ON FRACTIONAL DIMS.
- ON DECIMAL DIMS.





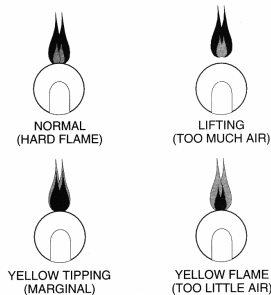
Heater Maintenance

Proper maintenance is required to keep the heater operating properly, prevent downtime and to extend the life of your equipment.

Caution: Servicing, inspection and adjustment of propane heater must be done by trained technician in accordance with all applicable local and national codes. Improper servicing or adjustment can damage the heater.

WARNING: Disconnect electrical power and shutoff propane tank valve before performing any service or maintenance. Failure to do so may result in severe personal injury or death.

- The heater should be cleaned and inspected once a year. Make sure that the burners and ignition components are free from dust, soot, dirt corrosion or other deposits that would impair the heater's performance. Visually check the main burner flames to ensure proper operation.



WARNING: Yellow, floating flames indicate a lack of combustion air. Do not operate the boiler until the problem is solved or severe personal injury or death may occur.

Propane: (Read Safety Information Section of this manual.)

Though only qualified professionals should service your propane system, there are maintenance procedures you must perform to keep your system operating safely:

- Check propane hoses for wear or damage every time before using heater. Replace hoses as needed.
- Check propane connections and fittings for leaks using soapy water. Tighten, re-seal or replace fittings as needed.

Heater Vent System:

Outdoor vent cap must be in place during outdoor operation. If the heater is installed in a closed trailer with a ducted vent system, thoroughly inspect the heat exchangers, combustion chamber and vent system for any signs of blockage, corrosion or leakage. Immediately replace any unsound vent system piping. This applies to exhaust vents and combustion air supply vents.

TES Wheels:

Check tire pressure before each job. Add air and repair tires as needed to maintain adequate air pressure. Maximum tire pressure is 50psi. You will find two grease zerks on each rigid wheel and three zerks on each swivel wheel. Use grease gun to lubricate the axles, bearings and swivel bearings in each wheel assembly as needed to maintain proper operation. Frequency of lubrication and amount of grease needed will vary with amount of use and conditions of use.

Controls:

- a) Check pump switch and heater switch for proper operation.
- b) Check the thermostat or operating controls for proper operation. Use the heater operation section as a guide for checking the thermostat operation.
- c) Check flow switch for proper operation. Use the heater operation section as a guide for checking the flow switch operation.
- d) The pressure relief valve should not weep or discharge water at normal system pressures. If it does, perform a “try lever test”. Even if the valve is not leaking, a “try lever test” should be performed once every two months. Before performing test place a container under the discharge hose port on the machine base to catch fluid released during the test. With the TES unit pump ON, hold the test lever open for at least 5 seconds to flush the valve seat free of sediment and debris. Then release the lever and allow the valve to snap shut. If the lever does not activate or there is no evidence of discharge, Shut off the TES unit immediately and replace the pressure relief valve. If the valve continues to weep or discharge at normal system pressures, replace the pressure relief valve. **Never try to clean or repair the relief valve.**
- e) The hi-limit controls the maximum water temperature in the heater. It should be set at least 20°F above the operator set point. If the water temperature reaches the set temperature before the demand for heat has been met, the hi-limit should shut the heater off. The water temperature should never exceed the maximum set point of 240°F. The hi-limit control cannot be repaired. If it fails to function properly it must be replaced.

TES Thermal Energy Fluid:

To prevent freeze damage in freezing conditions and provide corrosion protection for the heater components TES Thermal Energy Fluid (**CR01GL**) is used in this heater. The freezing point of TES Thermal Energy Fluid is thirty degrees below zero Fahrenheit (-30°F).

In areas where freezing is not a concern, a 50-50 mix of TES Thermal Energy Fluid and distilled water may be used.

The TES unit, hoses and TEX Thermal Exchangers come pre-filled with TES Thermal Energy Fluid.

Breakdown of the fluid or dilution may over time reduce the level of protection provided by the TES Thermal Energy Fluid. The fluid should be tested periodically to check concentration and current level of protection. Testing should be performed by your TES distributor service personnel.

If fluid leaks out or is drained during repairs, the heater, pump, fittings and hoses must be re-filled with this solution and air must be removed from the system for proper operation. See the solution pump section for instructions on how to add fluid and remove air from the system.

To operate the heater a continuous flow of solution, at a flow rate high enough to activate the flow switch must be maintained. Approximately 20 to 22 gallons of solution are required to completely fill the TES unit, hoses and TEX Thermal Exchangers. The filter element in the solution filter should be changed after every 200 hours of operation or sooner if heavily soiled or damaged. A complete filtering of the TES Thermal Fluid in the system should be performed after the first 300 hours of operation and every 1000 hours thereafter. It is recommended that the Filtering procedure be performed by your TES distributor service personnel. However a Filter Kit (AT84) is available for performing the filtering yourself.



Solution Pump:

The solution pump provides the solution flow and pressure for the heater system. The solution pump requires no periodic maintenance. The closed loop system must be filled with TES Thermal Fluid and air must be removed for proper pump operation.



To prime pump, add fluid, and remove air from system:

- a) With the pump OFF, open the by-pass valve.
- b) Make sure fluid reservoir is filled. Add TES Thermal Fluid as needed.
- c) Turn the pump ON. The System Pressure Pump will pump fluid from the reservoir into the pump inlet lines. Add TES Thermal Fluid as needed to keep the reservoir filled.
- d) Continue to run until flow becomes steady and most of the air is removed from the flow. Observe pressure gauge. The pressure will vary but should read between 30 – 50psi. Pressure will stabilize as air is removed from system. Add TES Thermal Fluid to the fluid reservoir as needed to maintain adequate fluid level.
- e) Turn the pump OFF and close the by-pass valve.
- f) Connect hoses and TEX Thermal exchangers to the TES Heater and turn pump ON. The System Pressure Pump will pump fluid from the reservoir into the solution pump inlet lines and the solution pump will pump the fluid into the hoses and TEX units. As the air is replaced by fluid in the hoses and released through the Spiro-vent add TES Thermal Fluid as needed to keep the reservoir filled.
- g) Continue to run until flow becomes steady and the air is removed from the flow. Observe pressure gauge. Pressure will stabilize as air is removed. Add TES Thermal Fluid to the fluid reservoir as needed to maintain adequate fluid level.
- h) Turn the pump OFF and disconnect hoses and TEX Thermal Exchangers.

System Pressure Pump:

A Flojet 30psi pump is used to maintain system fluid pressure, replace lost fluid and prime the solution pump. A Pressure reducing valve is used to set the system pressure at 12psi. The only required maintenance is to keep an adequate supply of TES Thermal Fluid in the reservoir and check and clean the strainer in the reservoir to prevent debris from restricting the flow to the pump.



Manual System Pressure Relief Valve:

The system will maintain a pressure of 12psi even after the pump is turned off. Before disconnecting any hoses the system must be cooled and the pressure relieved. Do not activate the pressure relief valve until machine has cooled. No maintenance is required.



Pressure Reducing Valve:

Located between the Expansion Tank and Spiro-Vent this valve is used with the System Pressure Pump to maintain the system pressure by automatically opening when fluid is required to increase system pressure. The valve is factory preset to the normal system pressure of 12psi. There are no maintenance procedures to perform on the pressure reducing valve. If your system is not filling properly or the pressure is too high, the valve may require cleaning or adjustment.

Three different valves have been used on TES units, as suppliers have discontinued production or changed design. Identify which valve you have and contact your TES distributor for information on adjustment, cleaning or repair.



OLDER STYLE



SPARCO VALVE



TACO VALVE

Spiro-vent:

The Spiro-vent removes air from the solution system. Aside from periodic cleaning of the check valve assembly, little maintenance is required. A small amount of fluid may occasionally be released from the Spiro-vent outlet. Excessive fluid release may indicate check valve failure and Spiro-vent will need to be cleaned, repaired or replaced.

Expansion Tank:

The expansion tank absorbs pulsations and pressure spikes in the solution system. Check bladder pressure and re-pressurize as needed to maintain 12psi.

If pressure continuously leaks or bladder is ruptured, replace the expansion tank with new tank set at 12psi bladder pressure. Over-charging the expansion tank may cause pressure relief valve to open and discharge fluid.



Solution Reservoir:

Holds a supply of TES Thermal Energy Fluid to be added to the closed loop solution system that may leak during the connecting and disconnecting of the hoses and heat exchangers or to replace the volume of air removed by the Spiro-Vent with liquid to maintain the system level and maintain flow and pressure. The System Pressure Pump draws the solution from the tank and pumps it into the system as needed. Add TES Thermal Energy Fluid as needed to maintain the fluid level above the 1/2 full point in the reservoir. Keep lid on tank during storage and operation to keep debris or other contamination out of tank. Check and clean filter screen and remove debris from tank as needed. Remove and dispose contaminated fluid.

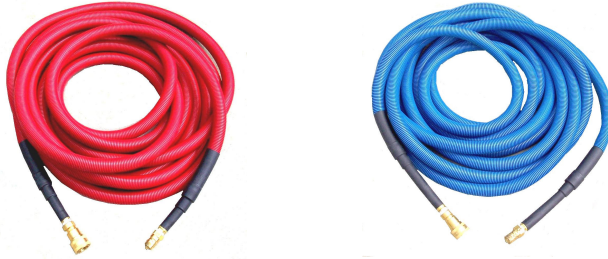
Solution Filter:

Filter Element should be checked after every job. Filter element should be rinsed after every job and replaced after every 200 hours of operation or replaced sooner if heavily soiled or damaged. (Replacement element: Item #NM4319). Place container under filter. Open the valve on the bottom of the filter and drain the fluid from the filter bowl into the container. Un-screw the filter bowl from the top of the filter. Unscrew the filter retainer from top of filter and remove the old element. Rinse out filter bowl and rinse the retainer. Place the new element on the retainer and screw retainer back into the top of the filter. Re-install the filter bowl. Close the valve on the bottom of the filter bowl. The fluid which was drained from the filter can be filtered through a cloth or paper filter and poured back into the fluid reservoir.



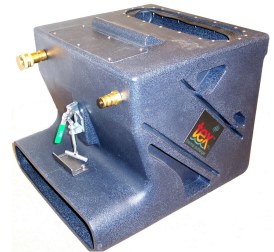
TES & TEX Solution Hoses:

Hoses come pre-filled with TES Thermal Fluid. If hoses or quick connects leak are repaired or replaced fluid may drain out of hose and need to be replaced before returning hoses to service. See solution pump section for instructions on how to add solution and remove air from the system. Check hoses for wear and repair or replace as needed. Normal life expectancy of these hoses is 9,000 to 10,000 hours of operation. Hoses should be replaced after this level of use. Check quick connects for dirt and wear. Clean off quick connects and replace as needed. Do not disconnect hoses while machine is hot or pump is ON. Debris may cause quick connects to stick open. System pressure of 12psi is maintained even when pump is off. Open Manual Pressure Relief valve to release system pressure before disconnecting hoses. Wear eye protection when disconnecting hoses. Wrap quick connect in a towel while disconnecting to catch released fluid. Store hoses with ends connected together to prevent leaking of fluid during storage.



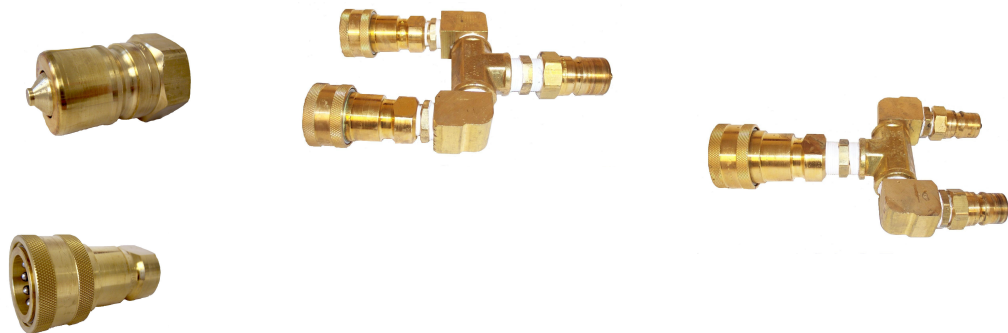
TEX Thermal Exchangers:

TEX Thermal Exchangers come pre-filled with TES Thermal Fluid. If coil, hoses or quick connects leak are repaired or replaced fluid may drain out of coil and need to be replaced before returning TEX Thermal Exchanger to service. See solution pump section for instructions on how to add solution and remove air from the system. Check coil and fittings for leaks. Clean coil and comb fins as needed. Clean off or replace quick connects as needed. Apply a small amount of synthetic grease with Teflon, such as Super Lube, to the o-rings in each of the female quick connects.



TES & TEX Quick Connects:

Check the quick connects for dirt and wear. Clean off quick connects and replace as needed. Apply a small amount of synthetic grease with Teflon, such as Super Lube, to the o-rings in each of the female quick connects. Wear eye protection when disconnecting hoses. Wrap quick connect in a towel while disconnecting to catch released fluid. Debris will occasionally cause quick connects to leak and system pressure may cause spraying. If quick connect leaks, press in the nipple of the quick connect to allow some liquid flow out to remove debris. If leaking cannot be stopped the quick connect should be replaced. Store hoses with ends connected together to prevent leaking of fluid during storage.



TES MAINTENANCE LOG

	MAX HRS	SERVICE	DATE & HOURS					
Daily Service should be performed before every job on which the TES unit is to be in operation. Required repairs must be completed before the unit is returned to service.								
DAILY		Check Fluid Level – Add Fluid						
DAILY		Inspect Solution Hoses						
DAILY		Inspect Propane Hoses						
DAILY		Rinse Filter Element						
DAILY		Inspect & Clean Reservoir Filter						
DAILY		Inspect TEX box heat exchanger						
DAILY		Inspect TES hoses & Hose Clamps						
MONTHLY	100	Clean & Lubricate Quick Connects						
2 MONTHS	200	Flush Pressure Relief Safety Valve						
2 MONTHS	200	Replace Filter Element						
3 MONTHS	300	Check TES Tire Pressure						
6 MONTHS	600	Clean Spiro-vent Check Valve						
6 MONTHS	600	Tighten TEX Box Hose Clamps						
10 MONTHS	1000	Filter System Fluid						
Fluid Filtering to be done after the first 300 hours of operation and every 1000 hours thereafter. Evidence of heavy debris levels may indicate that more frequent Fluid Filtering is required.								
ANNUALLY	1200	Check Propane Gas Pressure						
ANNUALLY	1200	Check Pilot Flame						
ANNUALLY	1200	Check Propane System for Leaks						
ANNUALLY	1200	Inspect Combustion Chamber						
ANNUALLY	1200	Inspect Heat Exchangers						
ANNUALLY	1200	Inspect Burner Tubes						
ANNUALLY	1200	Inspect Heater Vent System						
ANNUALLY	1200	Clean Fluid Reservoir						
ANNUALLY	1200	Test TES Fluid						
ANNUALLY	1200	Grease Axles & Swivels on wheels						
BIANNUALLY	2400	Replace TES Fluid						
Fluid should be tested annually or every 1200 hours and replaced at that time as required by test results.								

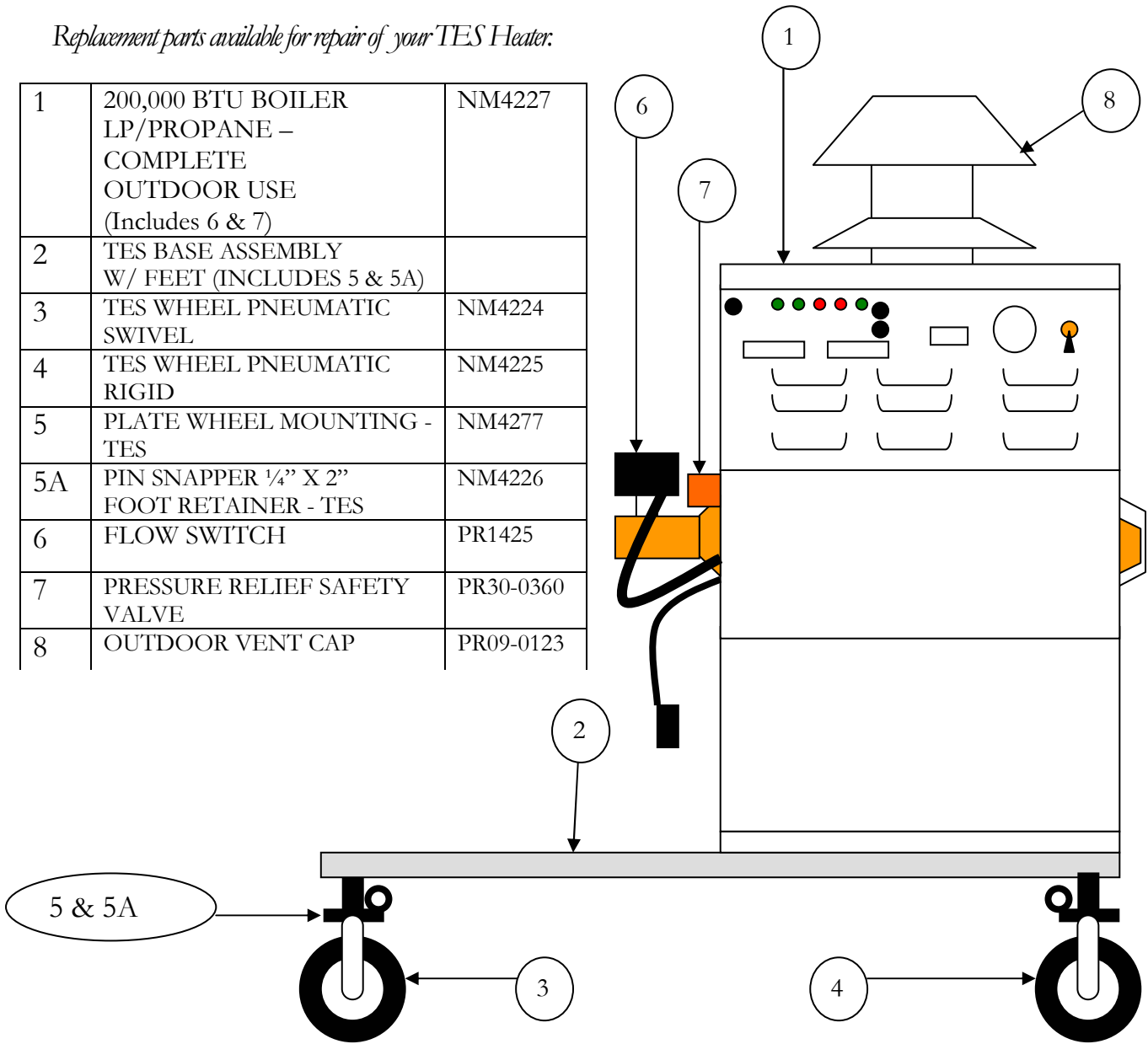
Servicing, inspection and adjustment of the propane heater must be done by trained technicians in accordance with all applicable local and national codes.

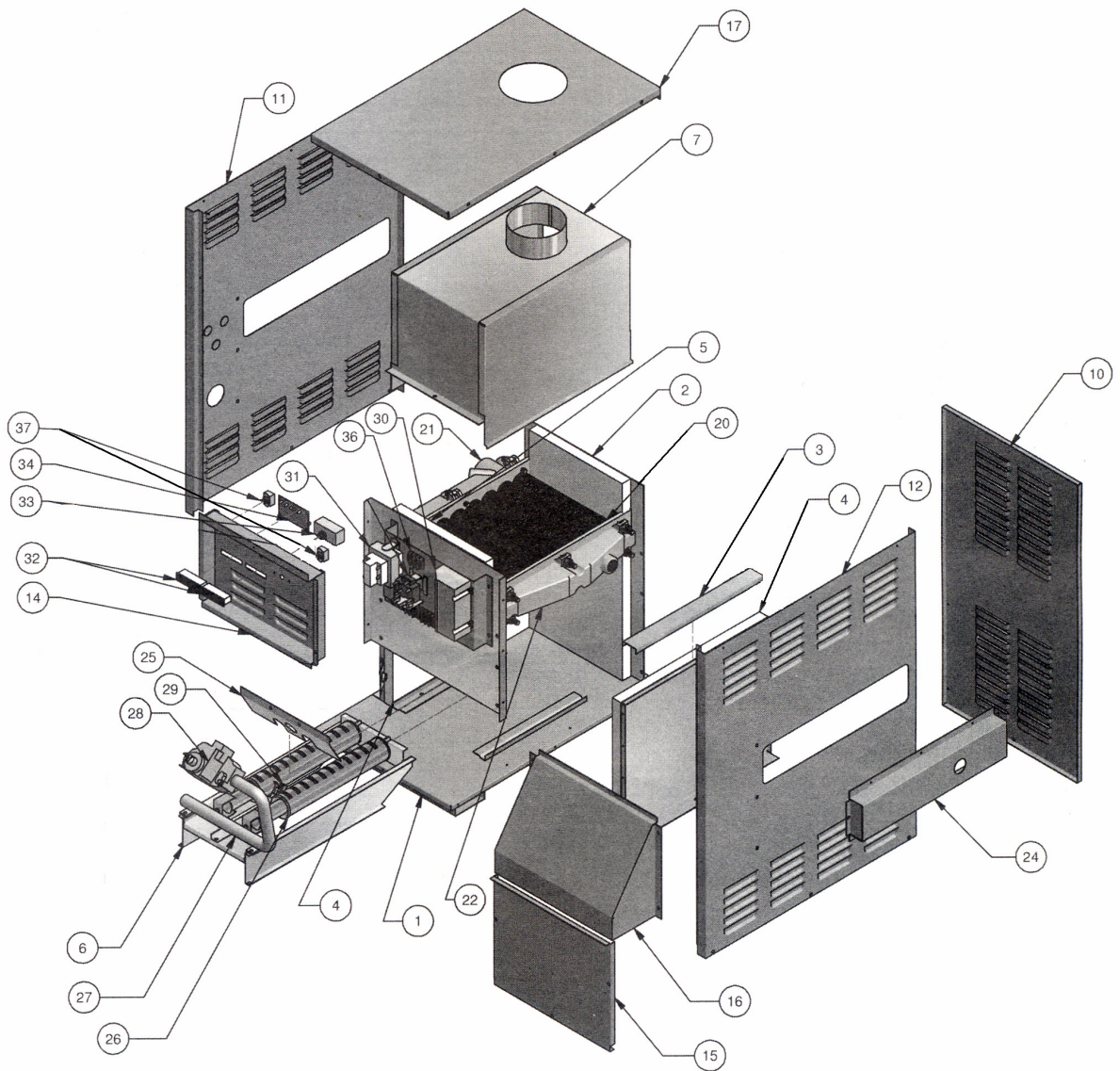
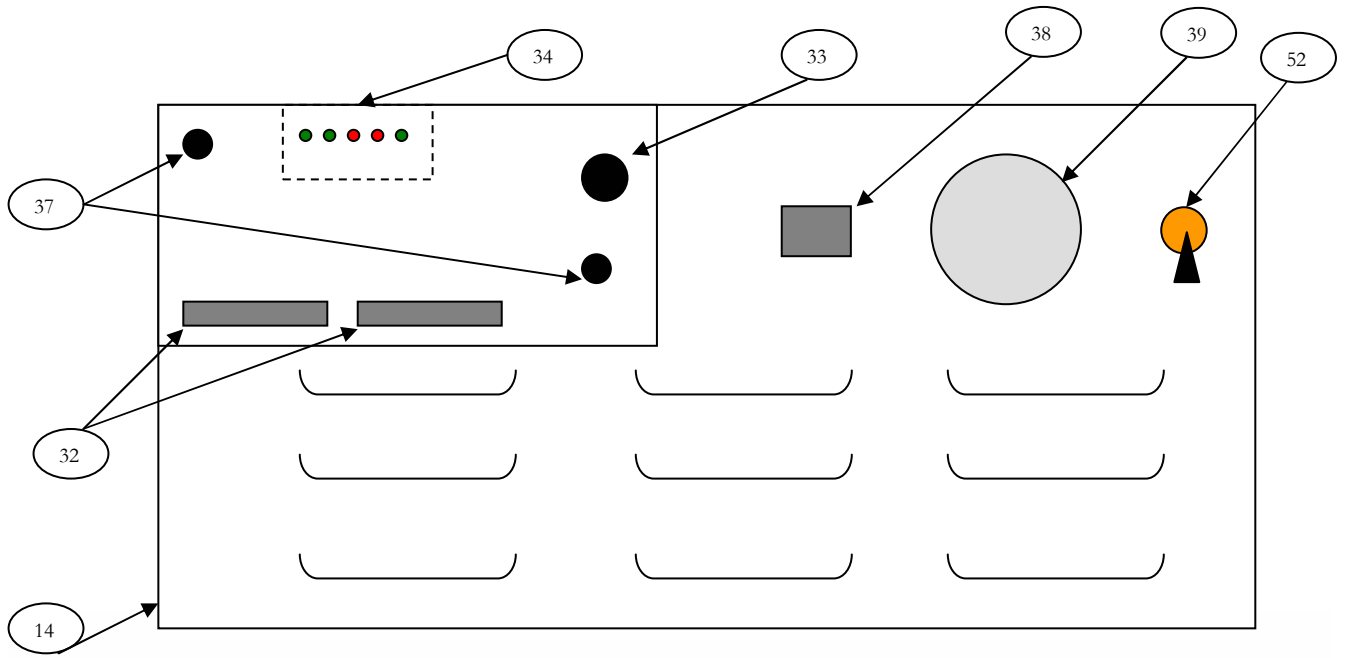
Section
3

Parts

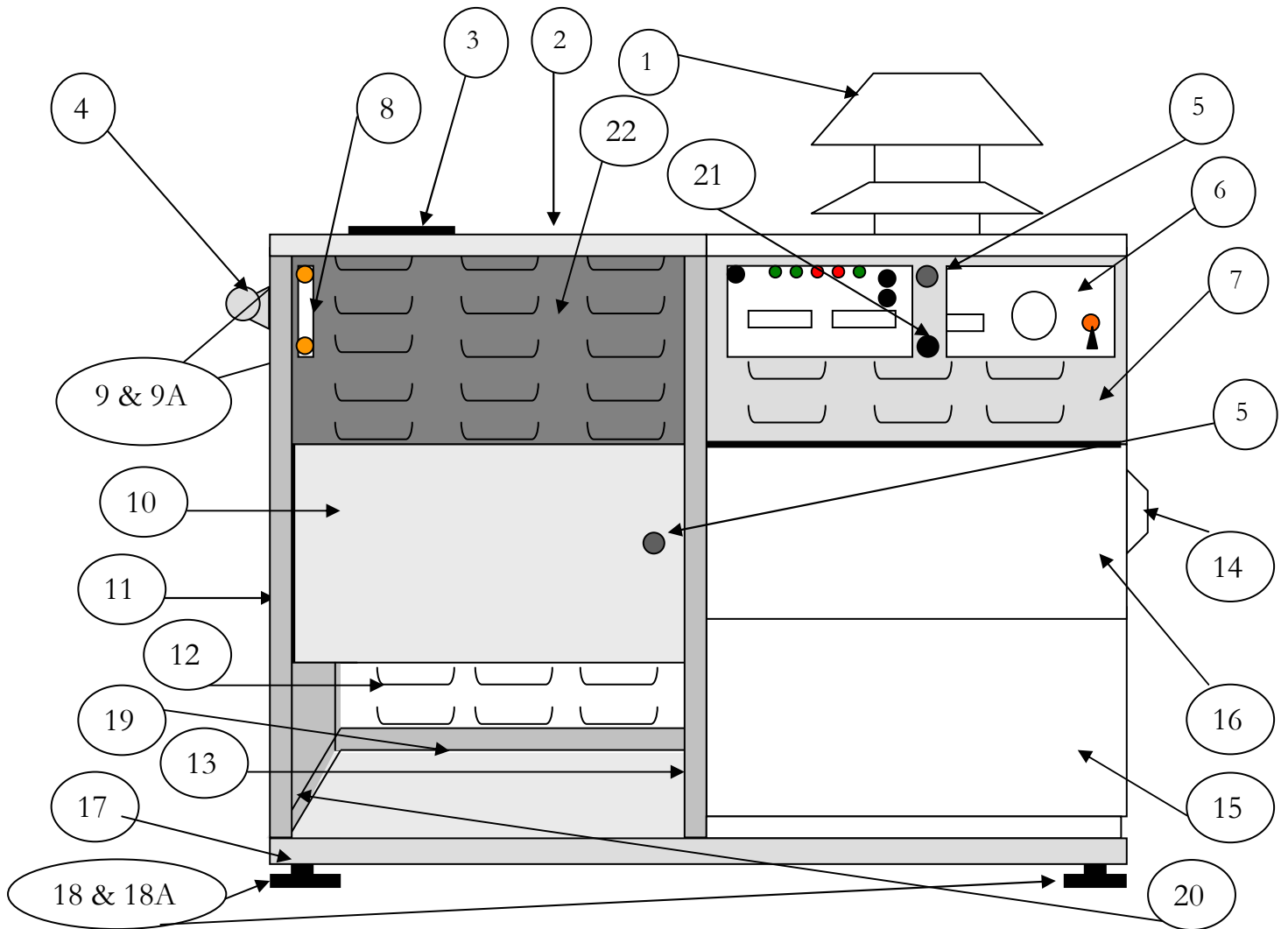
Replacement parts available for repair of your TES Heater.

1	200,000 BTU BOILER LP/PROPANE – COMPLETE OUTDOOR USE (Includes 6 & 7)	NM4227
2	TES BASE ASSEMBLY W/ FEET (INCLUDES 5 & 5A)	
3	TES WHEEL PNEUMATIC SWIVEL	NM4224
4	TES WHEEL PNEUMATIC RIGID	NM4225
5	PLATE WHEEL MOUNTING - TES	NM4277
5A	PIN SNAPPER ¼" X 2" FOOT RETAINER - TES	NM4226
6	FLOW SWITCH	PR1425
7	PRESSURE RELIEF SAFETY VALVE	PR30-0360
8	OUTDOOR VENT CAP	PR09-0123

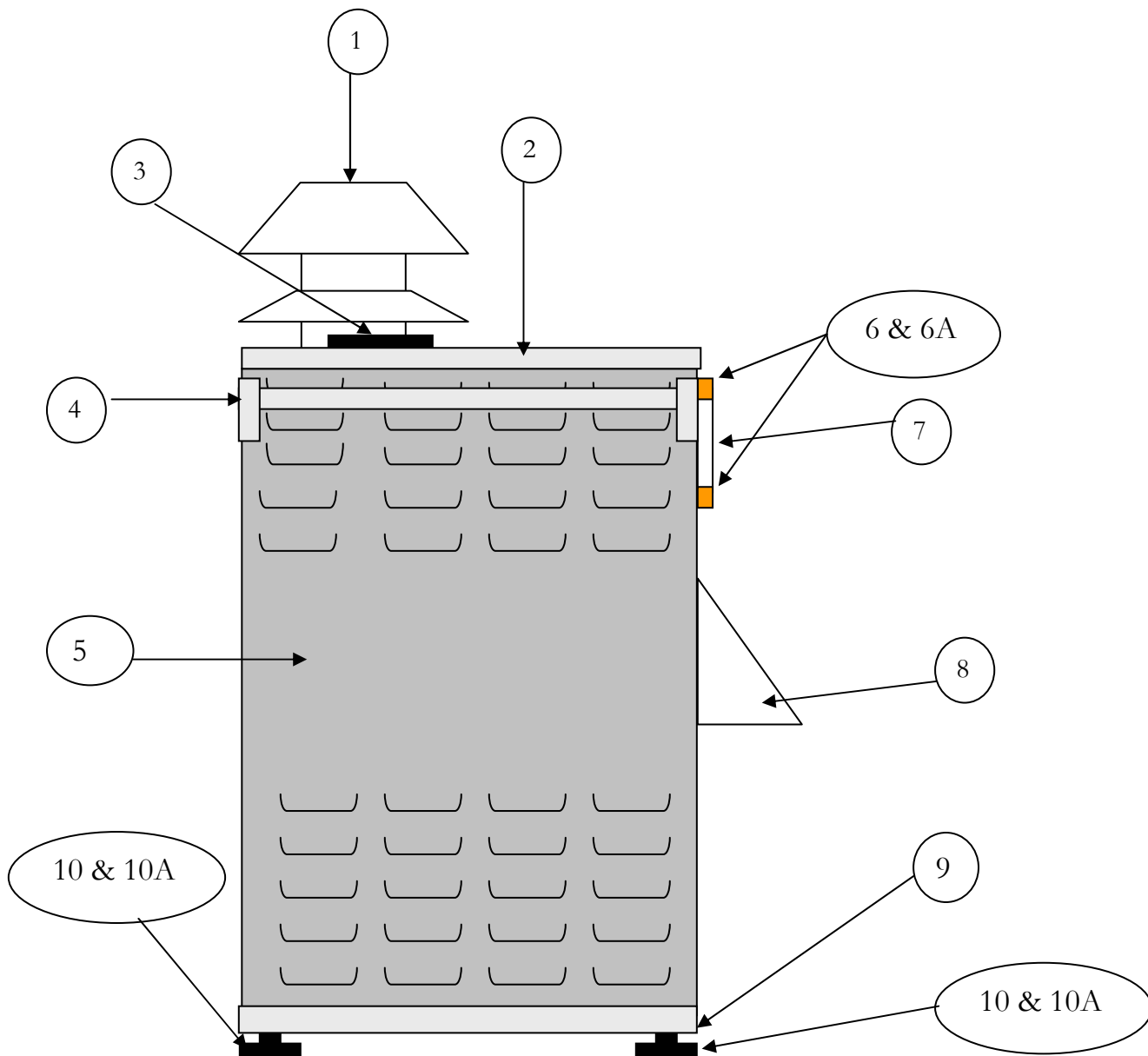




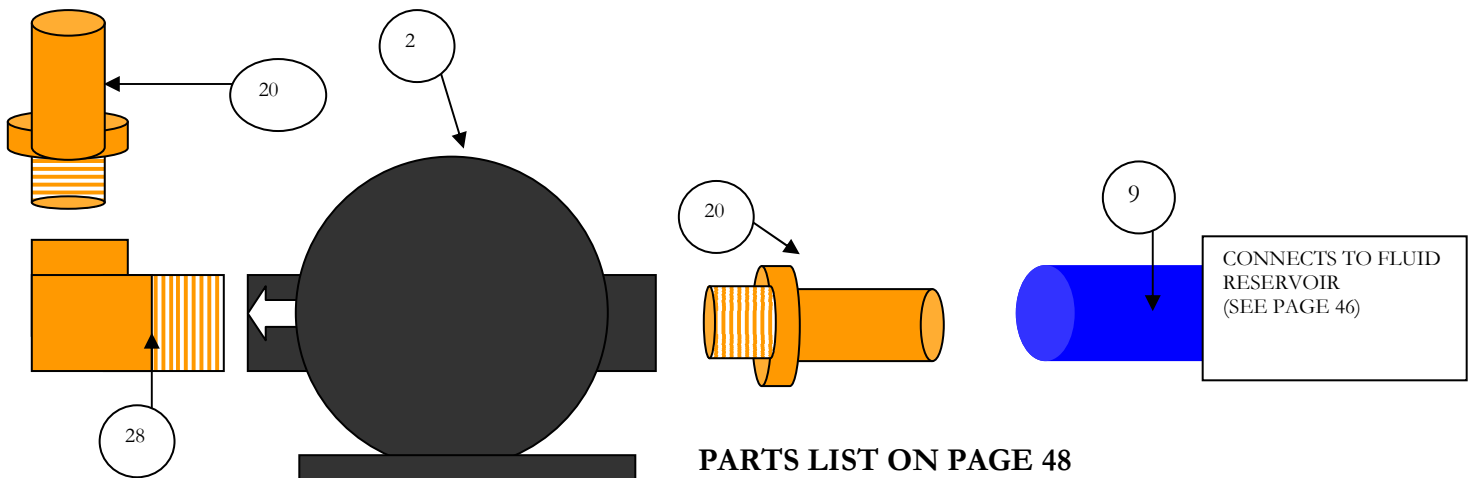
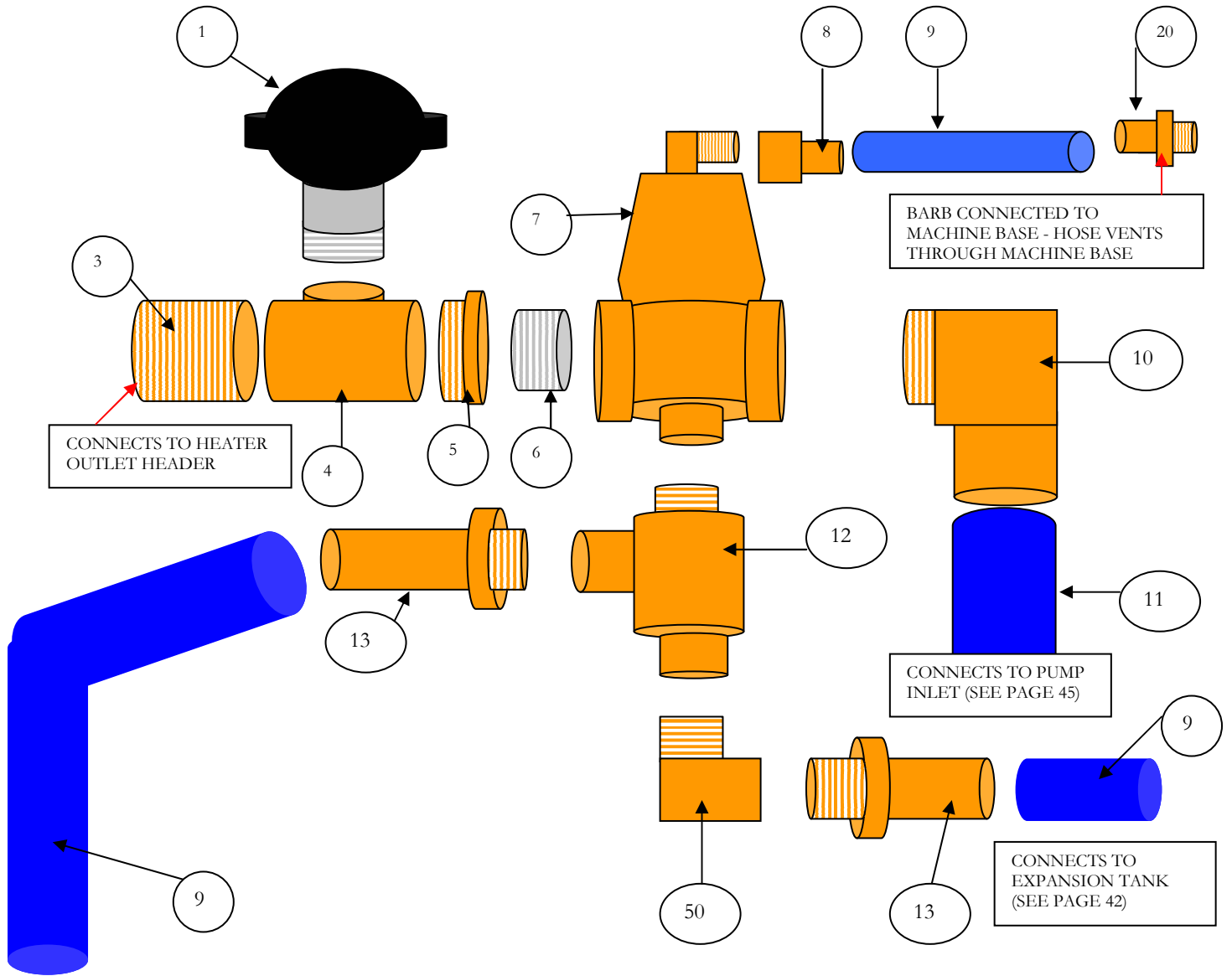
1	BASE ASSEMBLY COMBUSTION CHAMBER	70-1223		34	LIGHT PACKAGE INDICATOR LIGHTS	40-0052
2	PANEL REAR REFRACTORY	05-0037		36	TERMINAL BLOCK	48-0151
3	CHANNEL UPPER REFRACTORY	03-0884		37	TOGGLE SWITCH WITH ON / OFF PLATE	PR4810
4	PANEL SIDE REFRACTORY LEFT & RIGHT	05-0033		37	RUBBER COVER – TOGGLE SWITCH	NS160
5	PANEL FRONT REFRACTORY	05-0045		38	HOURMETER	NM4300
6	BURNER DRAWER ASSEMBLY 0-2000 FT ALTITUDE	70-1370		39	PRESSURE GAUGE 60PSI	NM4230
7	FLUE COLLECTOR	70-1258		52	MANUAL PRESSURE RELIEF VALVE	NM4316
10	PANEL REAR JACKET	03-0721		NS	PRESSURE RELIEF SAFETY VALVE	PR30-0360
11	PANEL LEFT JACKET	03-0774		NS	V-BAFFLES HEAT EXCHANGERS	03-0871
12	PANEL RIGHT JACKET	03-0775		NS	HEADER O-RING	PR060001
14	PANEL FRONT UPPER JACKET	03-0759		NS	VENT DAMPER 7"	09-0009
15	PANEL FRONT LOWER JACKET	03-0729		NS	BURNER ORIFICE PROPANE #47 0-1999 FT	NM4295
16	HOOD ASSEMBLY	70-1215		NS	BURNER ORIFICE PROPANE #49 2000-3999 FT	NM4294
17	PANEL TOP JACKET	70-1207		NS	BURNER ORIFICE PROPANE #50 4000-5999 FT	NM4296
20	TUBE BUNDLE – COPPER HEAT EXCHANGER	70-1314		NS	BURNER ORIFICE PROPANE #51 6000-7999 FT	NM4298
21	HEADER BRONZE INLET / OUTLET	01-0010-1S		NS	GAUGE SENSOR WELL	13-0102
22	HEADER BRONZE RETURN	01-0011-1S		NS	HI-LIMIT SENSOR WELL	13-0104
24	COVER RETURN HEADER	03-0737				
25	SHIELD FLAME ROLL OUT	03-0906				
26	BURNER TUBE STAINLESS STEEL	10-0251		NS	HI-LIMIT CONTROL HONEYWELL (New Style)	PR0102
27	MANIFOLD BURNER	10-0454		NS	OPERATOR CONTROL 2 STAGE – HONEYWELL (Old)	PR1417
28	MAIN GAS VALVE – LP / PROPANE - 2 STAGE	PR71579		NS	OPERATOR CONTROL 2 STAGE – JUMO (New)	PR1417A
29	PILOT ASSY – LP / PROPANE	PR709020		NS	FLOW SWITCH	PR1425
30	BURNER IGNITION CONTROL S8610M	PR16-0054		NS	HEADER STUD	57-0223
31	TRANSFORMER	PR15-0002		NS	HEADER NUT	57-0492
32	GAUGE TEMPERATURE INLET & OUTLET	PR14-0004		NS	BURNER TUBE STRAP	NM4322
33	KNOB HI-LIMIT CONTROL	14-0120		NS	BRACKET ROLL-OUT SWITCH	
33	HI-LIMIT CONTROL JUMO (Old Style)	PR14117		NS	200°F TEMPERATURE SWITCH – FLAME ROLL-OUT	NM4404

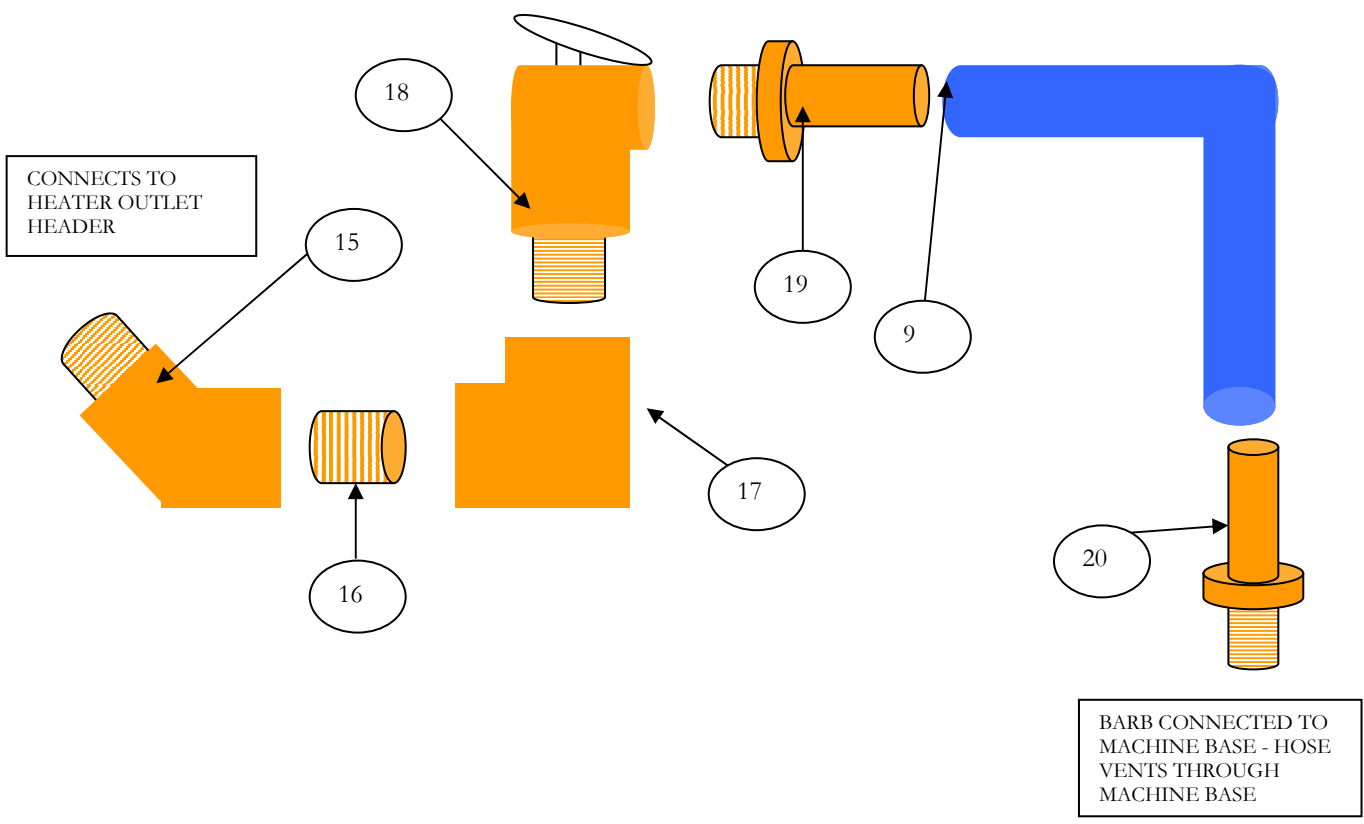
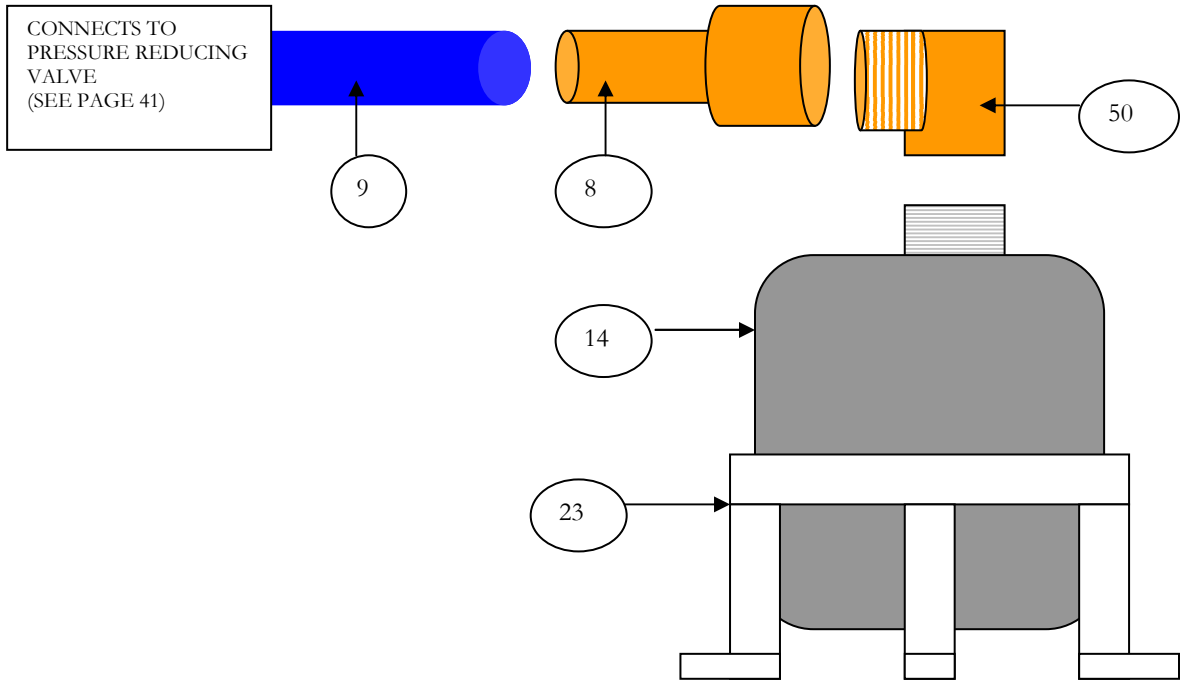


1	OUTDOOR VENT CAP	PR09-0123	15	LOWER FRONT PANEL TES HEATER	03-0729
2	TOP COVER SS - TES	BSRBA1	16	HOOD ASSY SS – TES HEATER	70-1215
3	COVER FLUID RESERVOIR	NM5004	17	TES SS BASE COVER	BSRBA8
4	HANDLE ASSEMBLY - TES	NM4249	NS	TES BASE STEEL FRAME	
5	LATCH W/LOCK & KEY	NM4218	18	PLATE WHEEL MOUNT - TES	NM4277
6	PLEXIGLASS PANEL	NM4265	18A	PIN SNAPPER ¼" X 2" FOOT - TES	NM4226
7	DOOR TES CONTROL PANEL - SS	BSRBA6	19	SUPPORT BACK PANEL BASE SS	BSRBA7C
NS	HINGE CONTROL PANEL DOOR	BSRBA9A	20	SUPPORT SIDE PANEL BASE SS	BSRBA7B
8	TUBING ¼" ID VINYL (5")	XAF1	21	KNOB PANEL DOOR	NM4271
9	ELBOW 90° 1/8" F-F BRASS	BR290	22	FRONT PANEL SS - TES	BSRBA5
9A	BARB ¼" X 1/8" MPT BRASS	BR010	NS	WASHER PANEL KNOB - NYLON	NM4313
10	DOOR PANEL SS - HOSE ACCESS - TES	BSRBA3	NS	SCREW 10-32 X1/2" SOCHD SS	NM4061
11	SIDE PANEL SS - TES	BSRBA4	NS	TES WHEEL PNEUMATIC RIGID	NM4225
12	BACK PANEL SS - TES	BSRBA2	NS	TES WHEEL PNEUMATIC SWIVEL	NM4224
13	SUPPORT FRONT PANEL SS	BSRBA7A	NS	TRIMLOCK – EDGE GUARD (per inch)	NM4273
NS	FRONT SUPPORT BASE SS	BSRBA9B	NS	TES DECAL SET	NM4284
14	COVER HEADER SS - TES	03-0737	NS	TANK FLUID RESERVOIR - TES	NM4275

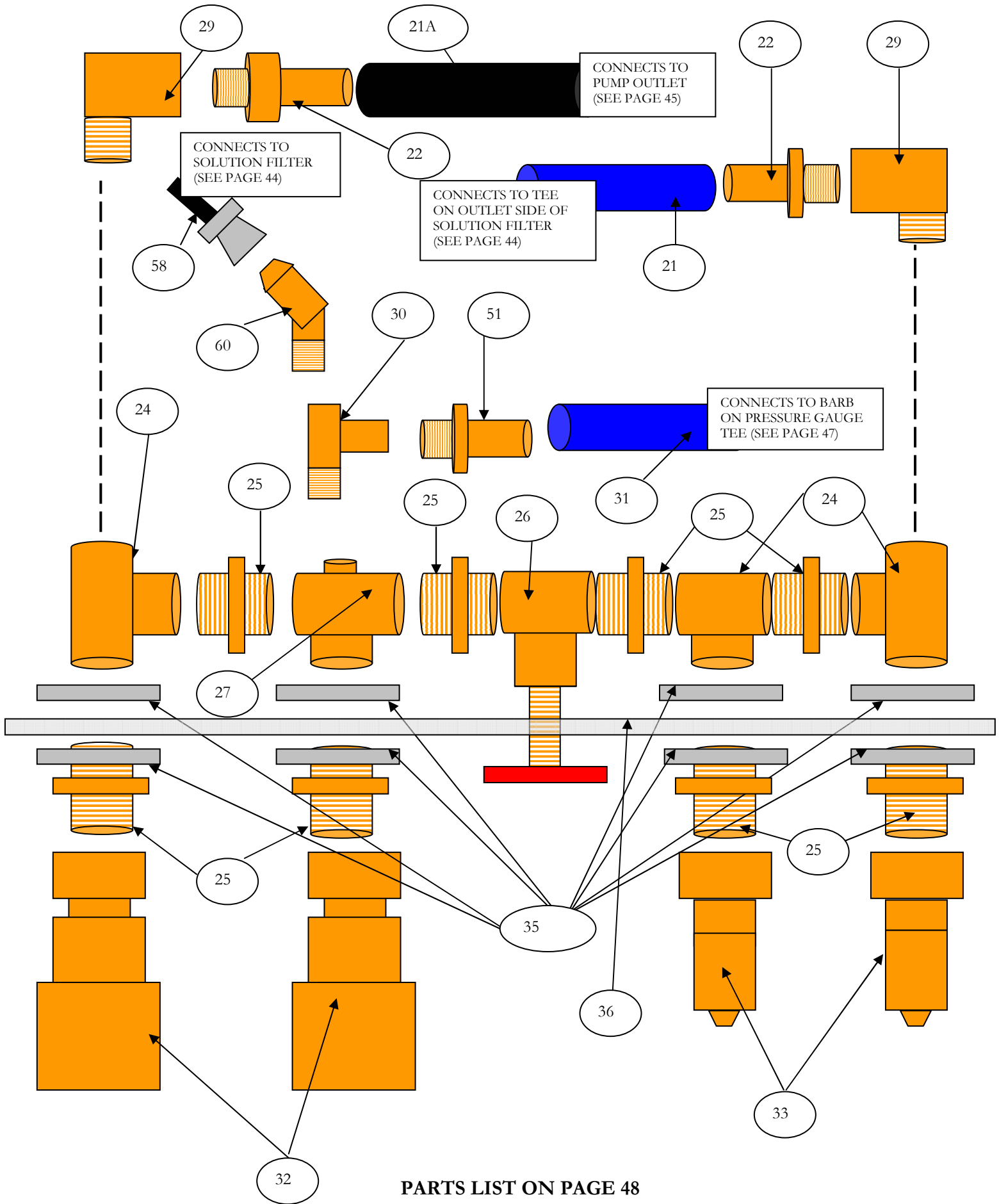


1	OUTDOOR VENT CAP	PR09-0123		10	PLATE WHEEL MOUNT - TES	NM4277
2	TOP COVER SS - TES	BSRBA1		10A	PIN SNAPPER 1/4" X 2" FOOT RETAINER - TES	NM4226
3	COVER FLUID RESERVOIR	NM5004				
4	HANDLE ASSEMBLY - TES	NM4249		NS	TES WHEEL PNEUMATIC RIGID	NM4225
5	SIDE PANEL SS - TES	BSRBA4		NS	TES WHEEL PNEUMATIC SWIVEL	NM4224
6	ELBOW 90° 1/8" F-F BRASS	BR290		NS	WHEEL KIT - TES	AT52
6A	BARB 1/4" X 1/8" MPT BRASS	BR010		NS	TES DECAL SET	NM4284
7	TUBING 1/4" ID VINYL (5')	XAF1		NS	FLUID RESERVOIR - TES	NM4275
8	HOOD ASSY SS - TES HEATER	70-1215		NS	TRIMLOCK - EDGE GUARD (Sold per inch)	NM4273
9	TES BASE SS COVER	BSRBA8		NS	TES BASE STEEL FRAME	

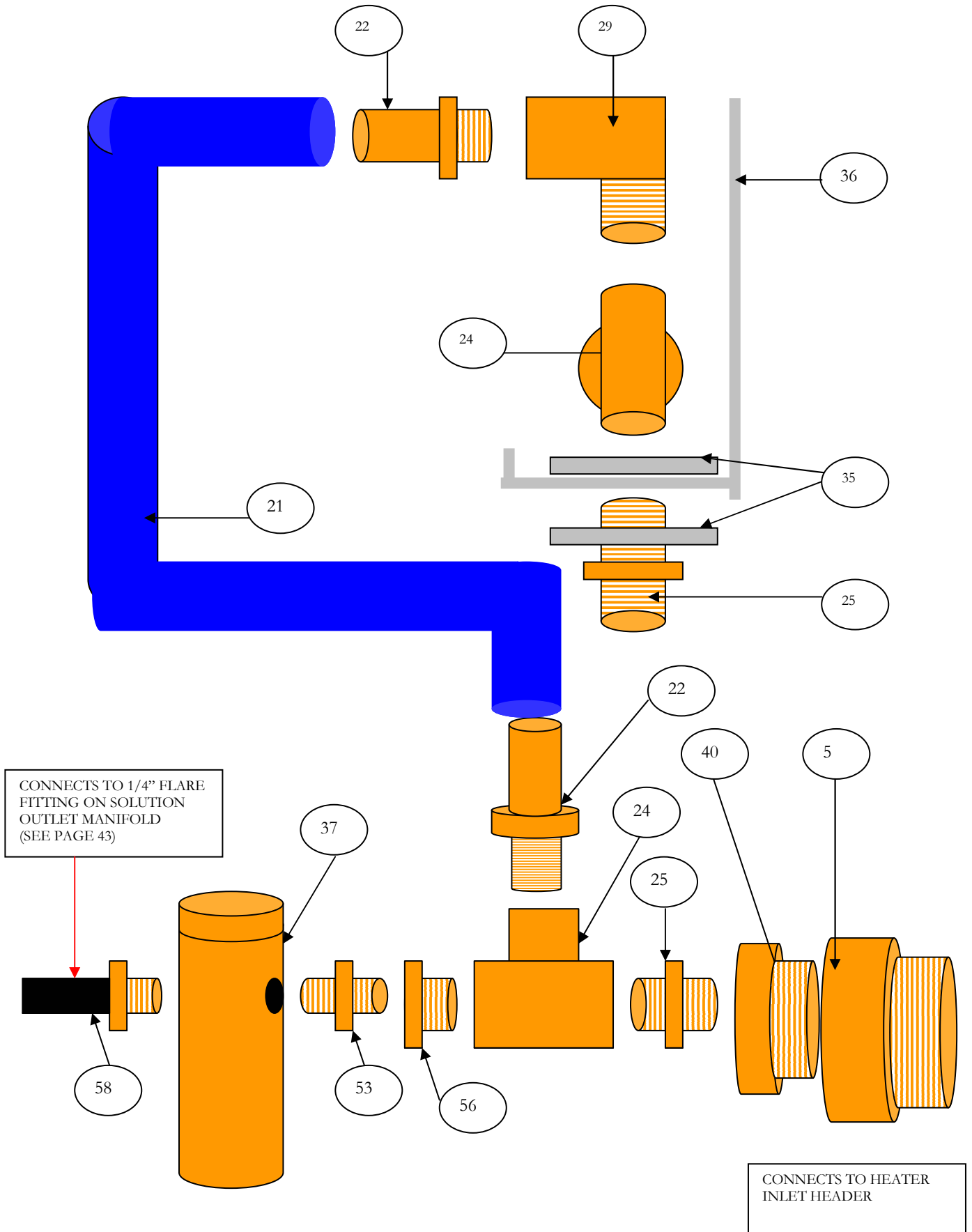




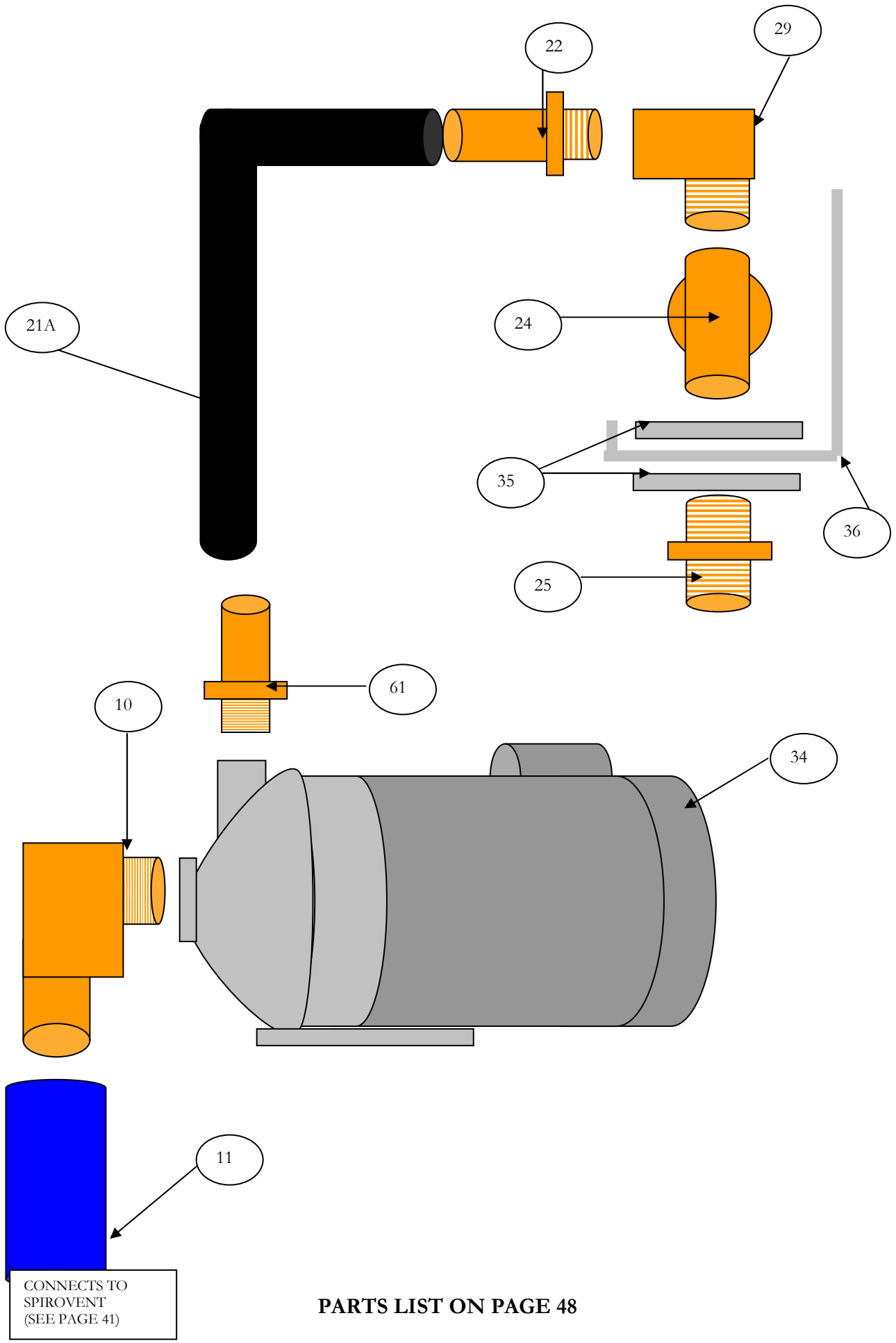
PARTS LIST ON PAGE 48



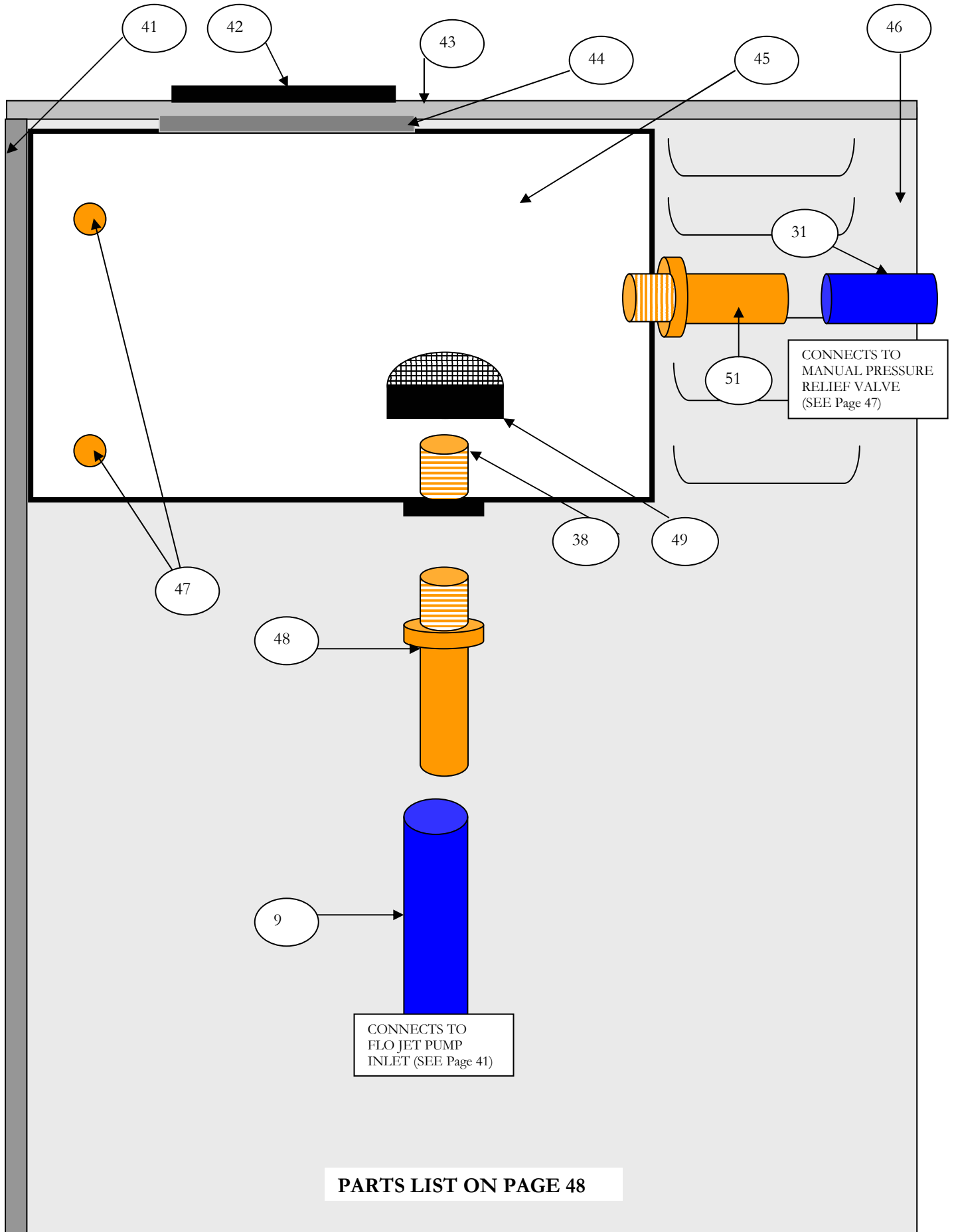
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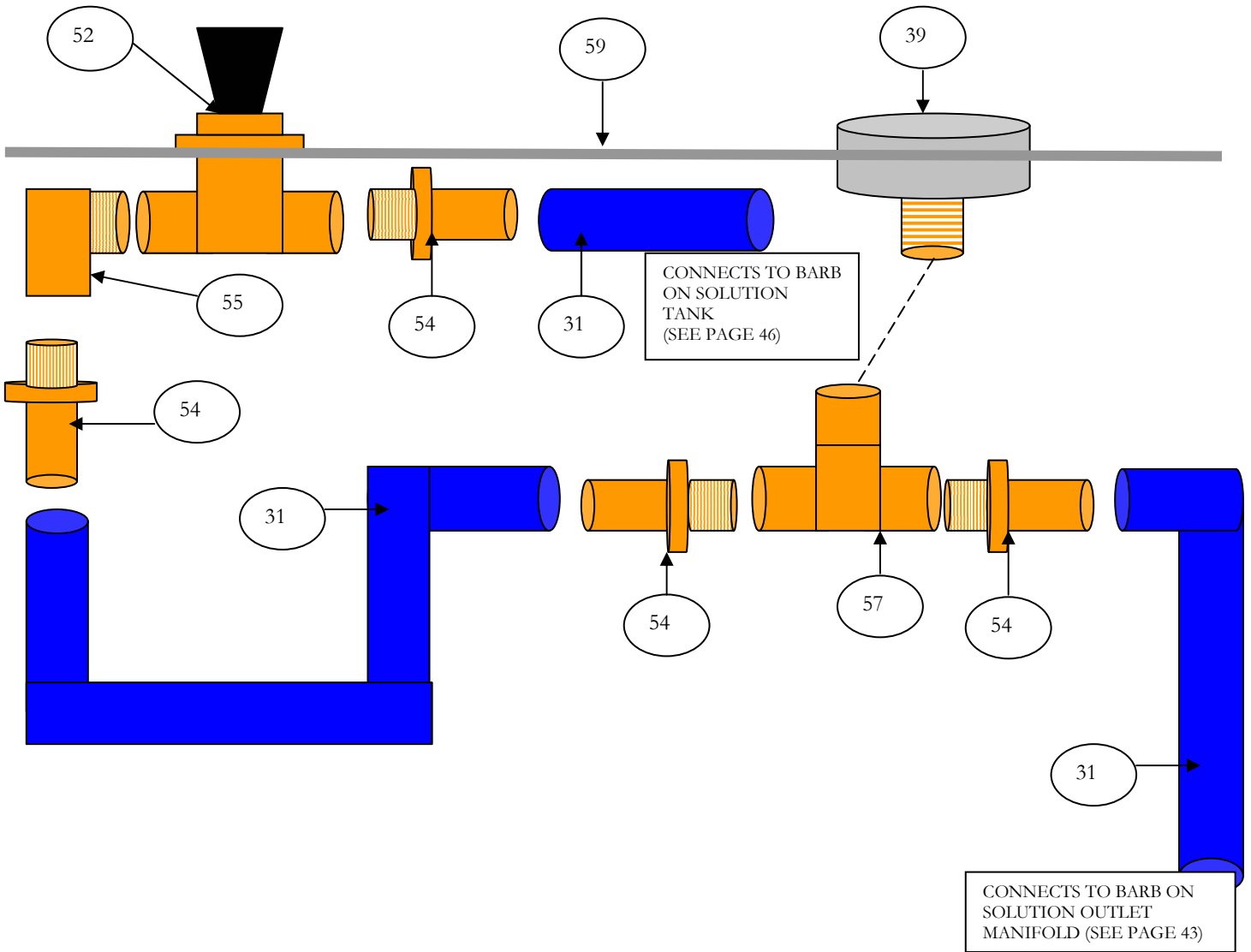


PARTS LIST ON PAGE 48



PARTS LIST ON PAGE 48



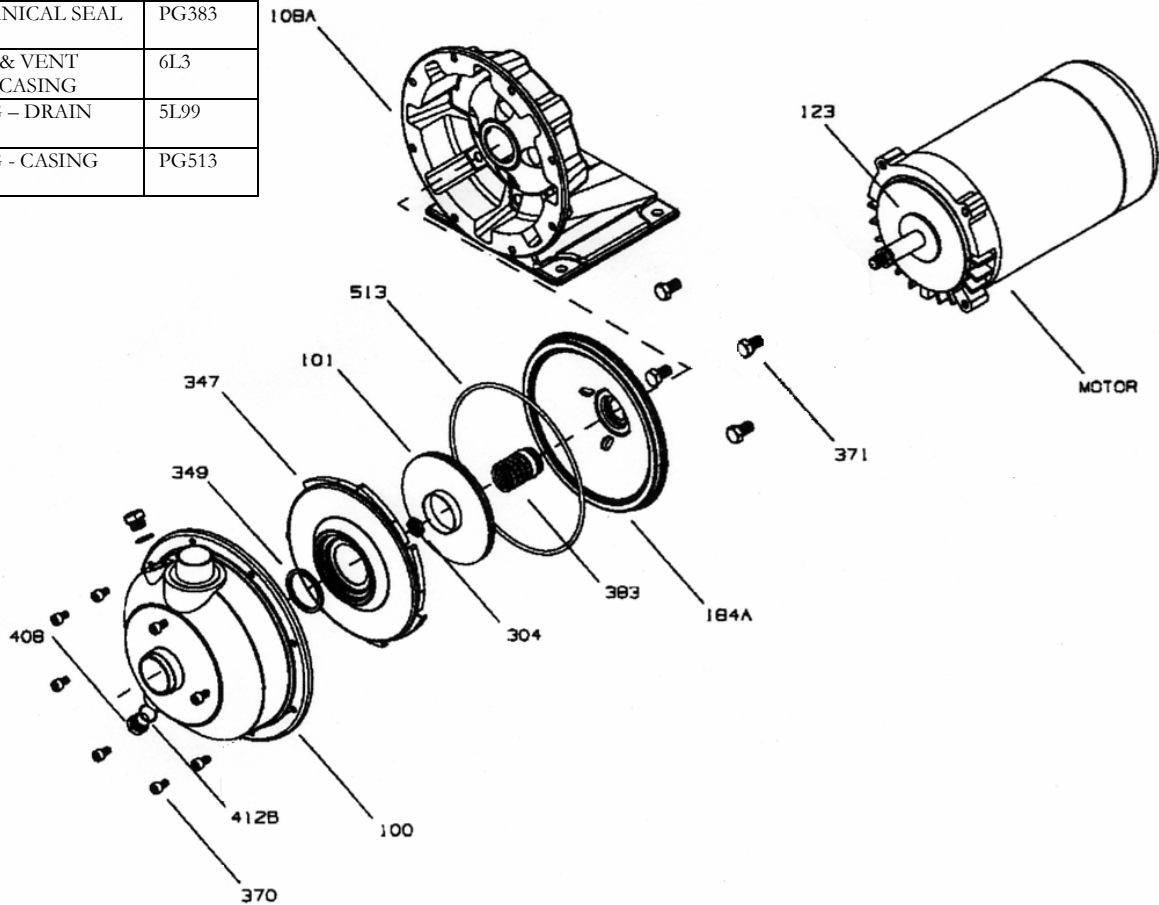


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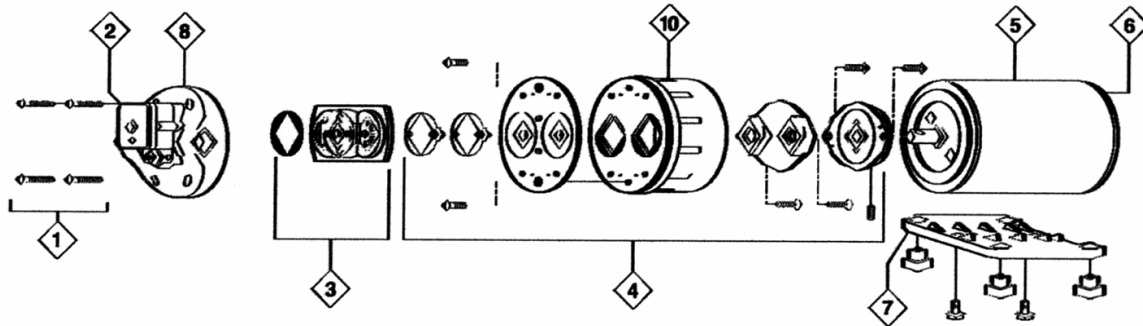
1	FLOW SWITCH	PR1425		36	PANEL FRONT SS	BSRBA5
2	PUMP FLOJET 30PSI	AP23		37	FILTER ASSEMBLY 1 MICRON	NM4318
3	NIPPLE 1-1/2" BRASS			NS	REPLACEMENT FILTER ELEMENT FOR NM4318 SOLUTION FILTER	NM4319
4	TEE 1-1/2" X 1" FPT BRASS			38	NIPPLE 1/2" CLOSE BRASS	BR086
5	BUSHING 1-1/2" X 1-1/4"	NM4219		39	PRESSURE GAUGE 0-60PSI	NM4230
6	NIPPLE 1-1/4" CLOSE STAINLESS STEEL	NM4220		40	BUSHING 1-1/4" X 3/4" BRASS	NM4222
7	SPIRO-VENT	NM4205		41	PANEL SIDE SS - TES	BSRBA4
8	BARB 1/2" X 1/2" FPT BRASS	BR026		42	COVER FLUID RESERVOIR	NM5004
9	HOSE 1/2" ID HI-TEMP	NM4274		43	PANEL TOP SS - TES	BSRBA1
10	ELBOW 90° - 1-1/4" MPT W/ 1-1/4" BARB	NM4221		44	GASKET	NM5059
11	HOSE 1-1/4" ID - PER FOOT	NM4210		45	TANK SOLUTION - TES	NM4275
12	VALVE PRESSURE REDUCING	NM4234		46	PANEL BACK SS - TES	BSRBA2
13	BARB 1/2" X 1/2" MPT BRASS	BR032		47	BARB 1/4" X 1/8" MPT BRASS	BR010
14	EXPANSION TANK	NM4207		48	BARB 1/2" X 1/2" MPT BRASS - MODIFIED (NIPPLE END TAPPED 1/2" FPT)	
15	ELBOW 45° 3/4" M-F BRASS	BR278		49	STRAINER ACORN 1/2" FPT	PP14-806540
16	NIPPLE 3/4" X 2" BRASS			50	ELBOW 90° 1/2" M-F BRASS	BR286
17	ELBOW 90° 3/4" F-F BRASS			51	BARB 3/8" X 1/8" MPT BRASS	BR018
18	PRESSURE RELIEF SAFETY VALVE	PR30-0360		52	MANUAL PRESSURE RELIEF VALVE	NM4316
19	BARB 1/2" X 3/4" MPT BRASS	NM4214		53	NIPPLE 1/4" HEX BRASS	BR072
20	BARB 1/2" X 3/8" MPT BRASS	BR030		54	BARB 3/8" X 1/4" MPT BRASS	BR020
21	HOSE 1" ID HI-TEMP	NM4211		55	ELBOW 90° - 1/4" STREET M-F	BR282
21A	HOSE 1" ID HI-TEMP HEAVY DUTY	NM4303		56	BUSHING 3/4" MPT X 1/4" FPT BRASS	BR203
22	BARB 1" X 3/4" MPT BRASS	BR050		57	TEE 1/4" FPT BRASS	BR242
23	CLAMP EXPANSION TANK SUPPORT	NM4269		58	HOSE ASSY HP 3/16" X 16" (1/4" MPT X 1/4" FT ENDS)	
24	TEE 3/4" FPT BRASS	BR248		59	PANEL FRONT UPPER JACKET	03-0760
25	NIPPLE 3/4" HEX BRASS	BR078		60	ELBOW 45° 1/4" FLARE X 1/8" MPT BRASS	PP12-800261
26	VALVE GATE 3/4"	NM4212		61	BARB 1" X 1" MPT BRASS	NM4209
27	TEE 3/4" FPT BRASS - MODIFIED (1/8" FPT - PRESSURE GAUGE TAP)					
28	ELBOW 90° - 3/8" STREET M-F	BR284		NS	GROMMET 3/4"	NM4117
29	ELBOW 90° - 3/4" STREET M-F	BR288		NS	SCREW 1/4-20 X 1" BHCS SS (10 - TANK COVER)	NM4260
30	TEE 1/8" STREET M-F-F	BR250		NS	NUT 1/4-20 NYLOCK SS (10 - TANK COVER)	NM4261
31	HOSE 3/8" HI-MILER HOSE SOLD PER FOOT	NM4340		NS	HOSE CLAMP 3/4" - 1-3/4" SS	PH011
32	QUICK CONNECT 3/4" FEMALE BRASS	NM4202		NS	HOSE CLAMP #6 MINI	NA2250
33	QUICK CONNECT 3/4" MALE BRASS	NM4203		NS	HOSE CLAMP 7/32" - 5/8" SS	PH05
34	SS SOLUTION PUMP HI-TEMP	NM4204		NS	HOSE CLAMP 9/16" - 1-1/4" SS	PH09
35	WASHER 2" X 1" SS	NM4264		NS	SCREW TEK #10 X 5/8" SS	NM4263

100	CASING	1L81
101	IMPELLER	2L45
108A	MOTOR ADAPTER WITH FOOT	1L80
123	DEFLECTOR	5K7
184A	SEAL HOUSING	1L79
304	IMPELLER LOCKNUT	13K286
347	GUIDEVANE	3L23
349	SEAL RING GUIDEVANE	PG349
370	SOCKET HEAD SCREW - CASING	13L65
371	BOLTS - MOTOR	13K252
383	MECHANICAL SEAL	PG383
408	DRAIN & VENT PLUG - CASING	6L3
412B	O-RING - DRAIN PLUGS	5L99
513	O-RING - CASING	PG513

HIGH TEMP SOLUTION PUMP NM4204



SYSTEM PRESSURE PUMP – AP23



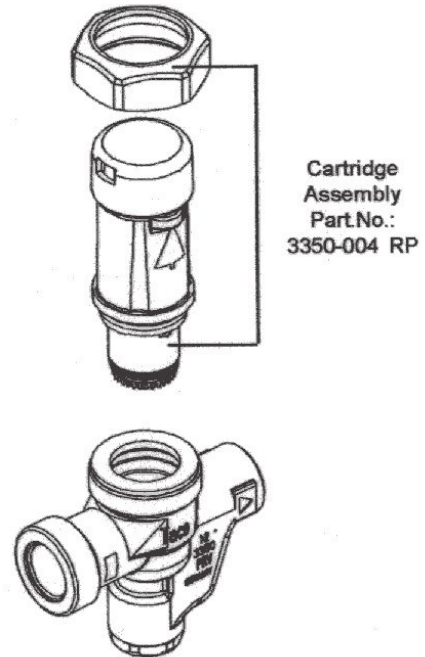
1	SCREWS PUMP HOUSING	20131-001
2	DEMAND SWITCH 30PSI	PF02090-117
3	CHECK VALVE ASSEMBLY WITH O-RING	PF20914-003A
4	KIT LOWER HOUSING DIAPHRAGM / CAM BEARING ASSEMBLY	PF21022-030A
5	MOTOR (WITHOUT BASEPLATE)	02029-000A
6	MOTOR REAR END BELL ASSEMBLY	20115-126
7	BASE PLATE & GROMMETS	11028-101
8	UPPER HOUSING WITH SWITCH	PFDH21E301

PRESSURE REDUCING VALVE (Taco Valve) NM4234

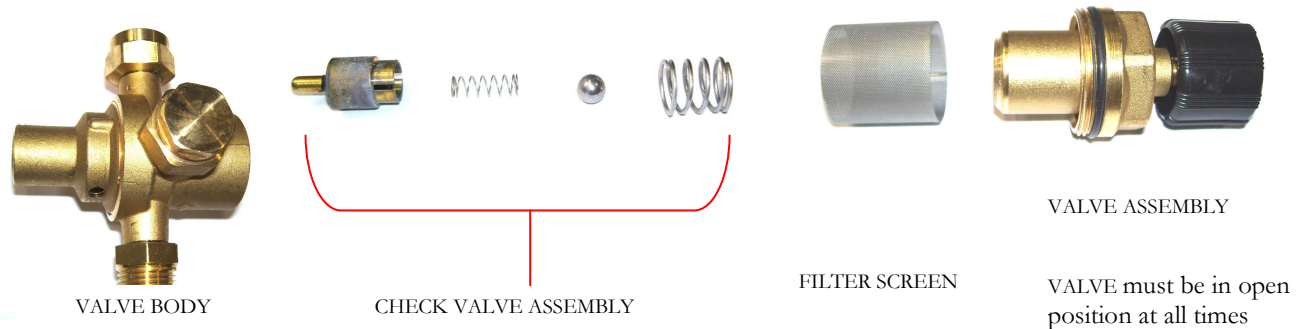


Push and hold knob to activate fast fill

Replacement Parts



PRESSURE REDUCING VALVE (Sparco Valve) NM4234

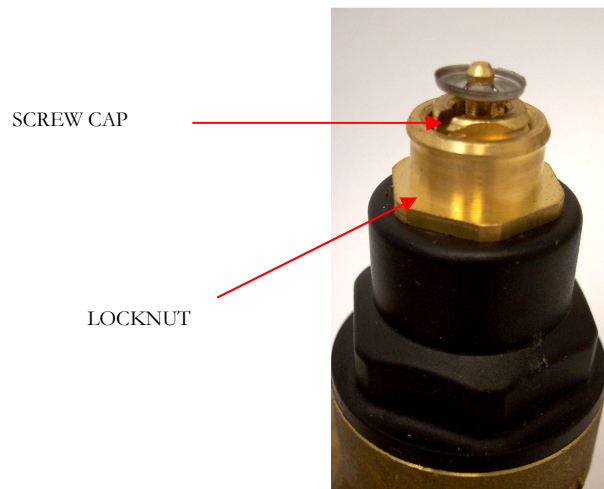


This valve does not have fast fill feature

PRESSURE ADJUSTING SCREW

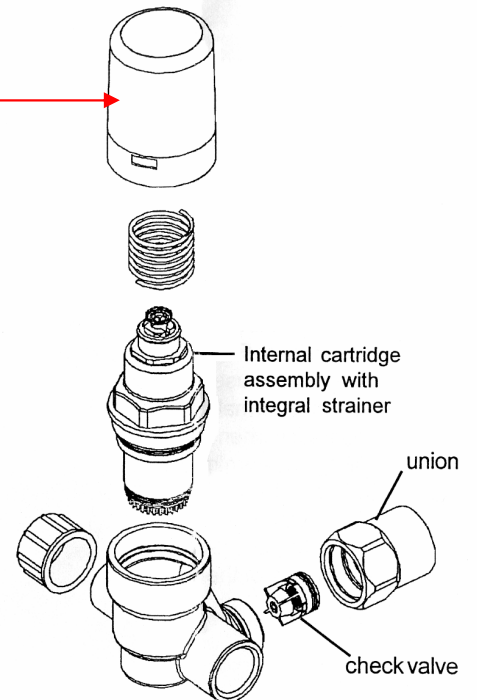
- TURN CLOCKWISE TO LOWER PRESSURE
- TURN COUNTER-CLOCKWISE TO INCREASE PRESSURE

PRESSURE REDUCING VALVE (Older Style) NM4234

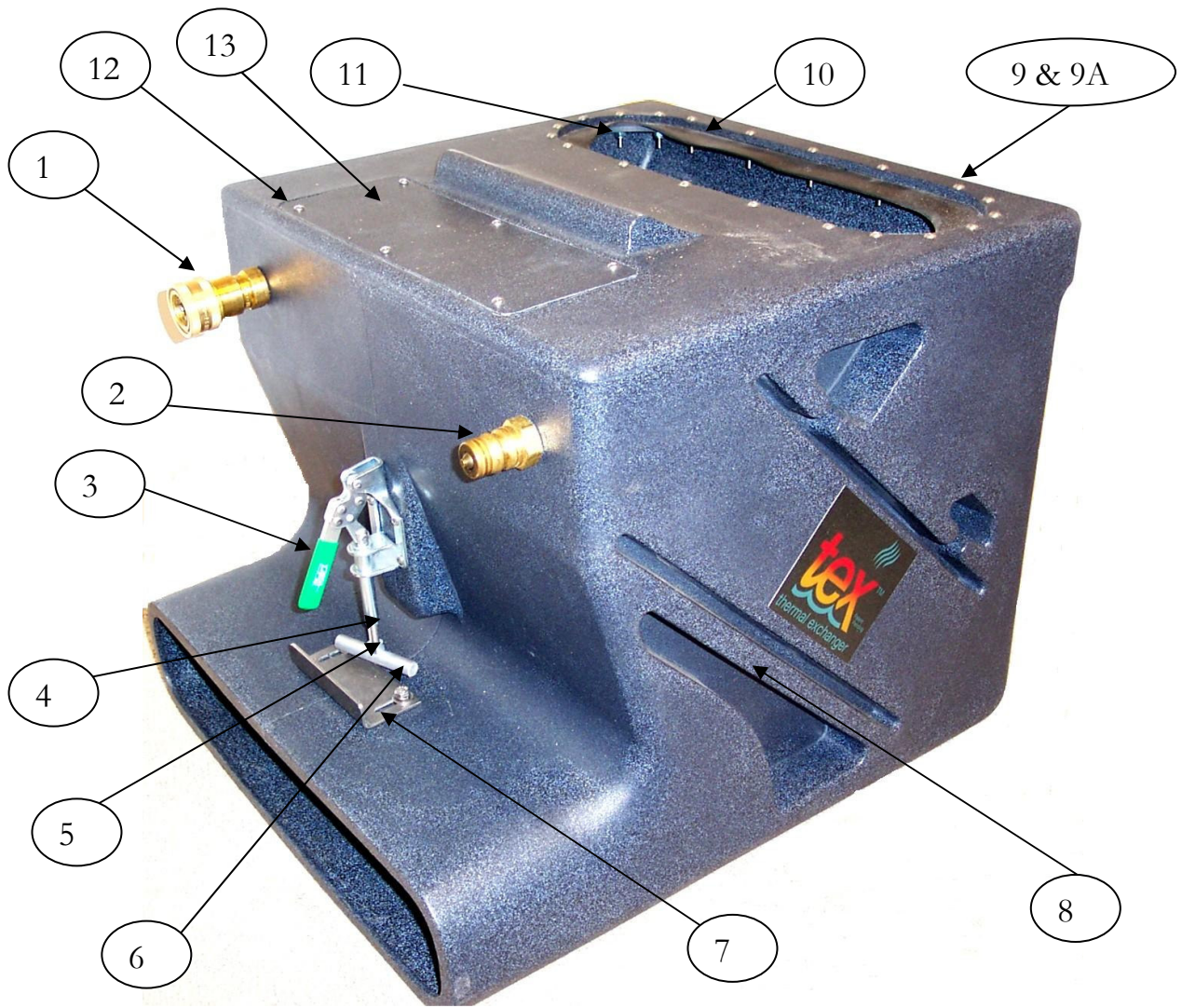


Replacement Parts

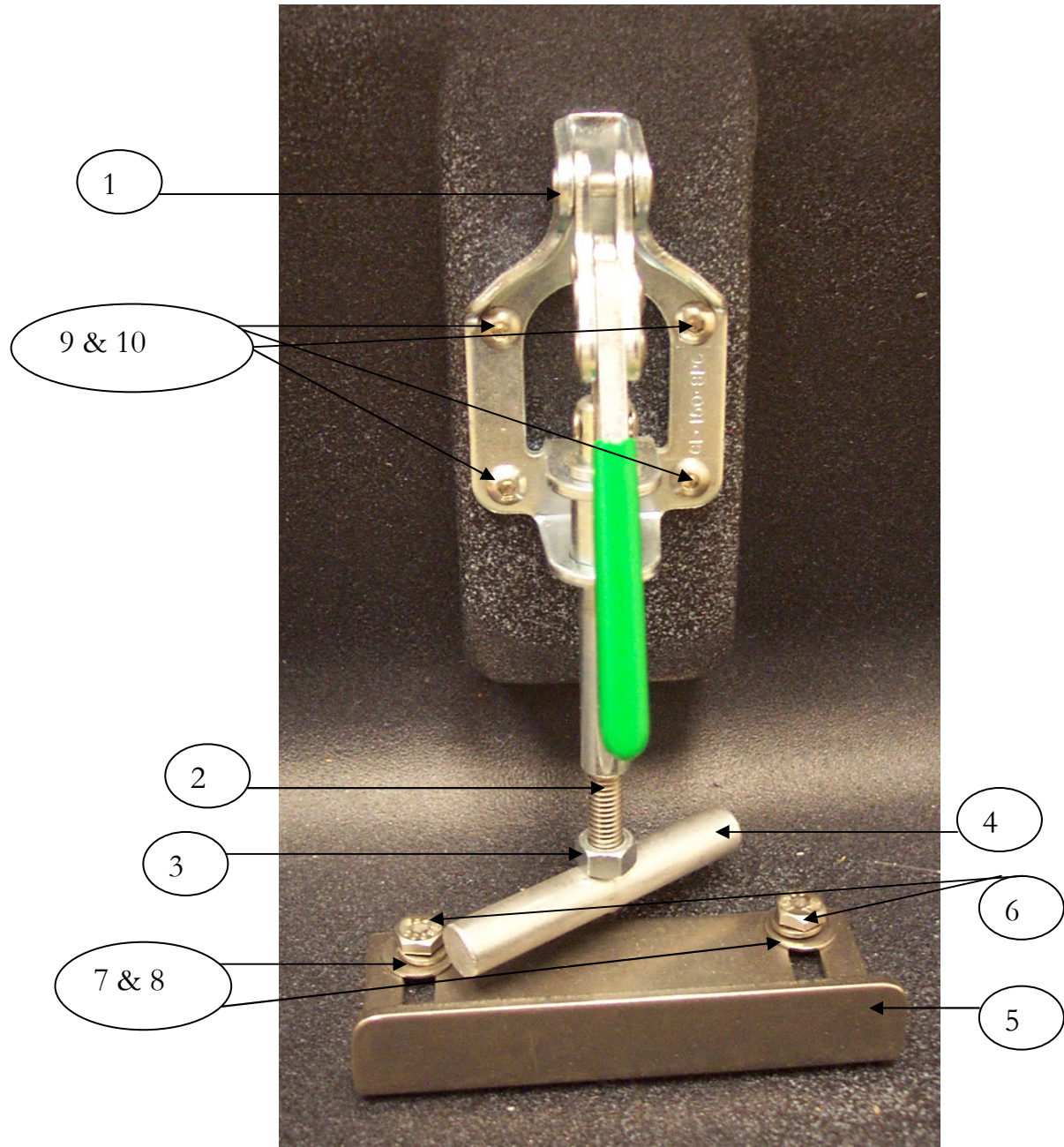
Push and hold knob to activate fast fill



TES THERMAL EXCHANGER – MB212



1	QUICK CONNECT 1/2" FEMALE BRASS	NM4200	11	RETAINER PLATE - GASKET	NM4241
2	QUICK CONNECT 1/2" MALE BRASS	NM4201	12	SCREW 10-32 X 3/8" PH SS	
3	CLAMP TOGGLE	NM4245	10	GASKET SILICONE RUBBER	NM4238
4	STUD 5/16-18 X 2"	NM4246	13	COVER PLATE - TEX	
5	NUT 5/16-18 HEX	NM4290	NS	COIL TEX THERMAL EXCHANGER	NM4252
6	BAR CARPET CLAMP 1/2" X 3"	NM4247	NS	BRACKET SNOOT SUPPORT TEX	
7	PLATE CARPET CLAMP		NS	PLATE QUICK CONNECT SUPPORT	
8	BODY TEX THERMAL EXCHANGER - PLASTIC	NM4250	NS	ELBOW 90° 1/2" STREET M-F BRASS	BR036
9	SCREW 10-32 X 7/8" BHCS SS	NM4240	NS	BARB 5/8" X 1/2" MPT BRASS	BR286
9A	NUT 10-32 NYLOCK SS	NM4081	NS	HOSE 5/8" ID HI-TEMP	NM4237
			NS	HOSE CLAMP 9/16 – 1-1/4" SS	PH09



1	CLAMP TOGGLE	NM4245	7	FLAT WASHER 1/4" SS	
2	STUD 5/16-18 X 2"	NM4246	8	LOCK WASHER 1/4" SS	
3	NUT 5/16-18 HEX	NM4290	9	SCREW 10-32 X 7/8" BHCS SS	NM4240
4	BAR CARPET CLAMP 1/2" X 3"	NM4247	10	NUT 10-32 NYLOCK SS	NM4081
5	PLATE CARPET CLAMP				
6	SCREW 1/4-20 X 3/4" HXHD SS		NS	BRACKET SNOUT SUPPORT TEX	

Warranty

Your TES Thermal Energy System is designed to give you years of reliable service. If a problem should arise use the troubleshooting section in the operation manual to diagnose and correct the problem if possible. If you are unable to determine the cause or solution to the problem contact your distributor or Bridgepoint Systems for assistance.

Bridgepoint Systems warrants the heat exchanger inside the TES unit to be free from defects in material or workmanship for five years from the date of purchase.

Bridgepoint Systems warrants the roto-molded body of the TEX Thermal Exchanger to be free from defects in material or workmanship for five years from the date of purchase.

All other components of the TES Thermal Energy System are warranted to be free of defects in material and workmanship for one year from the date of purchase.

During the warranty period, Bridgepoint Systems will, at its option repair or replace components which prove to be defective.

- This warranty does not provide for replacement of complete units due to defective components.
- Service Labor is only covered for the first 90 days after the date of purchase.
- Any costs for transportation are not covered in this warranty.
- Replacement parts are warranted only for the remainder of the original warranty period.

This warranty **shall not** apply to defects resulting from improper operation, lack of maintenance, hard water deposits, condensation, chemical corrosion, unauthorized modification, misuse, abuse or exposure to freezing temperature conditions without proper propylene glycol & water solution.

This warranty **does not** cover normal wear items such as o-rings, valve seals, pump seals, hoses, quick connects, cords, tires, burner jets, or other items which require replacement as a result of ordinary usage.

To obtain warranty service for the TES Thermal Energy System, contact your distributor or Bridgepoint Systems. If the unit must be returned to Bridgepoint Systems or an authorized service center, the purchaser shall prepay shipping charges for products returned for warranty service.

- No returned items will be accepted by Bridgepoint Systems without prior authorization. All returns must have a return authorization number, issued by Bridgepoint Systems, clearly marked on the exterior of the package.

Bridgepoint Systems makes no other warranty either expressed or implied with respect to this product. The remedies provided herein are the purchaser's sole and exclusive remedies.

In no event shall Bridgepoint Systems be liable for any direct, indirect, special, incidental or consequential damages.

This warranty gives you specific legal rights. You may also have other rights which vary from jurisdiction to jurisdiction.