Super-Saver XL™ Heater

Agricultural Building Heater 120V, 60 Hz, ETL

Owner's Manual

4801-1015

Version: 3.0

Date: 05-08-19

4801-1015

Model	BTUH	kW
HH-SS-250-XL	250,000	73.3
HH-SS-225-XL	225,000	65.9
HH-SS-200-XL	200,000	58.6
HH-SS-175-XL	175,000	36.6
HH-SS-120-XL	120,000	35.2
SS-75-XL	75,000	21.9
SS-40-XL	40,000	11.7

- Hot Surface Ignition
- Direct Spark Ignition
- Wash-Down Design
- 120 Volt (only)

All information, illustrations, photos and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

Contents

Safety Guidelines

Safety guidelines are general-to-specific safety rules that must be followed at all times. This manual is written to help you understand safe operating procedures and problems that can be encountered by the operator and other personnel when using this equipment. Read and save these instructions.

As owner or operator, you are responsible for understanding the requirements, hazards, and precautions that exist and to inform others as required. Unqualified persons must stay out of the work area at all times.

Alterations must not be made to the equipment. Alterations can produce dangerous situations resulting in SERIOUS INJURY or DEATH.

This equipment must be installed in accordance with the current installation codes and applicable regulations, which must be carefully followed in all cases. Authorities having jurisdiction must be consulted before installations are made.

When necessary, you must consider the installation location relative to electrical, fuel and water utilities.

Personnel operating or working around equipment must read this manual. This manual must be delivered with equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

ST-0001-4

Cautionary Symbols Definitions

Cautionary symbols appear in this manual and on product decals. The symbols alert the user of potential safety hazards, prohibited activities and mandatory actions. To help you recognize this information, we use the symbols that are defined below.

DANGER — This symbol indicates an imminently hazardous situation which, if not avoided, **will result in serious injury or death.**

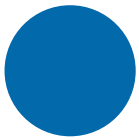
WARNING — This symbol indicates a potentially hazardous situation which, if not avoided, **can result in serious injury or death.**

CAUTION — This symbol indicates a potentially hazardous situation which, if not avoided, **can result in minor or moderate injury.**

NOTICE — This symbol is used to address practices not related to personal injury.

This symbol indicates a general hazard.

This symbol indicates a prohibited activity.



This symbol indicates a mandatory action.

ST-0005-2

Safety Cautions

Use Personal Protective Equipment

- Use appropriate personal protective equipment:

Eye Protection

Respiratory Protection

Foot Protection

Hearing Protection

Head Protection

Fall Protection

Hand Protection

- Wear clothing appropriate to the job.
- Remove all jewelry.
- Tie long hair up and back.

ST-0004-1

Follow Safety Instructions

- Warning: If the information in the manual is not followed exactly, a fire or explosion can result, causing property damage, personal injury or loss of life.
- Carefully read all safety messages in this manual and safety signs on your machine. Keep signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from the manufacturer.
- Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.
- If you do not understand any part of this manual or need assistance, contact your dealer.
- Retain these instructions for future reference.

ST-0025-3

Sharp Edge Hazard

- This product has sharp edges, which can cause serious injury.
- To avoid injury, handle sharp edges with caution and always use proper protective clothing and equipment.

ST-0036-2

Maintain Equipment and Work Area

- Do not attempt maintenance or repairs on the heater unless you are competent to do so. Understand service procedures before doing work.
- Use only genuine Cumberland/AP parts when maintaining the heater. Use of other non-genuine parts is a misuse and may lead to dangerous situations.
- Heater should be inspected before each use and at least annually by a qualified service person.

- Be aware that the heater may operate under automatic control and may start without warning.
- Do not service the heater without first disconnecting and locking-out power.
- Keep area clean and dry.
- Keep hands, feet, and clothing away from moving parts.
- Keep the heater in proper working condition. Replace worn or broken parts immediately.
- Keep the heater clean. Do not allow debris to collect around motor, blower wheel, burner or controls. Burner orifice and hot surface igniter must be kept clean and free of carbon build up.
- Be sure that all electrical enclosures and guards are closed and locked before re-starting the heater.
- Igniter must be cool before wash-down. Heater must not be operated for one hour following wash-down.

ST-0067-1

Install and Operate Electrical Equipment Properly

- The electrical connections and grounding of the appliance shall be in compliance with the National Electric Code ANSI/NFPA 70 for the United States or the Canadian Electrical Code for Canada, as well as all local and state codes.
- This appliance is equipped with a three prong (grounding) plug for your protection against electrical shock and should be plugged directly into a properly grounded three-prong receptacle. Failure to use a properly grounded receptacle can result in electric shock, personal injury or death.
- If permanently connected to power supply, make sure a circuit breaker or similar cutoff device is provided to permit disconnection of power for servicing.
- Electrical equipment must be installed by a qualified electrician.
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.

ST-0069-1

Lifting Hazard

- Single person lift can cause injury.
- Use a mechanical lifting device to lift or move the equipment during installation.

ST-0021-2

For Your Safety

- If you smell gas:
  1. Open windows.
  2. Don’t touch electrical switches.
  3. Extinguish any open flames.
  4. Immediately call your gas supplier.
- Do not store or use gasoline or any flammable vapors and liquids in the vicinity of this or any other appliance.

ST-0064-1

Install and Operate Gas-Fired Equipment Properly

- Gas-fired equipment should be installed by a qualified pipe fitter and must conform with local codes.
- For Canada: The equipment shall be installed in accordance with the *Natural Gas and Propane Installation Code, CSA B149.1, or the Propane Storage and Handling Code, CSA B149.2,* or applicable provincial regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.
- For the United States: The equipment shall be installed in accordance with the *National Fuel Gas Code ANSI Z223.1/ NFPA 54.*
- Check all connections for gas leaks.
- Do not operate heater with door open or panels.
- Do not move or handle heater while it is operating, hot, or connected to power supply.
- Adequate ventilation is required. Combustion and ventilation air must not be obstructed.

ST-0068-1

General Hazard Warning

- Failure to comply with precautions and instructions provided with this heater can result in death, serious bodily injury and property loss or damage from hazards of fire, explosion, burn, asphyxiation, carbon monoxide poisoning, and/or electrical shock.
- If you need assistance or heater information such as an instruction manual, labels, etc. contact the manufacturer.

ST-0065-1

Improper Use Warning

- The intended use of this appliance is the heating of agricultural animal confinement buildings.
- Not for home or recreational vehicle use. Installation of this heater in a home or recreational vehicle may result in a fire or explosion, property damage, personal injury or loss of life.
- Heater is not recommended for heating human living quarters.
- Keep solid combustibles, such as building materials, paper, cardboard, feathers, straw and dust a safe distance away from the heater as recommended by the instructions.
- Never use the heater in spaces which contain or may contain volatile or airborne combustibles, or products such as gasoline, solvents, paint thinner, dust particles, or unknown chemicals. Failure to follow these instructions may result in a fire or explosion, property damage, personal injury or loss of life.

ST-0066-1

Maintain Proper Gas Pressure

- Proper gas pressure must be provided to the inlet of the appliance. Refer to the rating plate for proper gas supply pressure.
- Gas pressure in excess of the maximum inlet pressure can cause fires or explosions, leading to serious injury, death, building damage or loss of livestock.
- Gas pressure below the minimum inlet pressure can cause improper combustion leading to asphyxiation or carbon monoxide poisoning, causing serious injury or death.

ST-0041-1

Safety Sign-Off Sheet

Below is a sign-off sheet that can be used to verify that all personnel have read and understood the safety instructions. This sign-off sheet is provided for your convenience and personal record keeping.

Date	*Employee Name*	*Supervisor Name*

ST-0007

CAUTION

1. ***Installation must conform with local, state, and national codes, or in the absence of local codes, with the Standard for the Storage and Handling of Liquefied Petroleum Gases, in accordance with ANSI/NFPA 58 and/or the National Fuel Gas Code, ANSI Z223.1, as applicable.***
2. ***Follow safety, maintenance, and test firing instructions packaged with Heater.***
3. ***Refer to model specifications label for gas type (LP or Natural Gas).***
4. ***Check all connections for gas leaks.***
5. ***Gas supply and regulator must be installed outside building.***
6. ***The hose assembly should be protected from traffic, building materials, and any contact with hot surfaces both during and while in storage.***
7. ***Do not open heater doors, or remove a heater panel, or move or handle the heater while it is operating, hot, or connected to power supply.***
8. ***Turn power OFF before servicing. (Heater may start at any time if power is connected.)***
9. ***Heater is not recommended for heating human living quarters.***
10. ***Not to be used for heating where flammable liquids and vapors are stored or used.***
11. ***Inadequate gas volume and (or) pressure will directly influence the combustion efficiency of the heater. Adequate gas volume and (or) pressure is the responsibility of the installer.***
12. ***Adequate ventilation is required.***
13. ***Combustion and ventilation air must not be obstructed.***
14. ***Not for use with duct work other than types provided by manufacturer.***
15. ***Position heater properly before use. Heater must be level and in accordance with minimum clearances .***
16. ***For safety, this heater is equipped with air flow proving switch and manual reset high limit switch.***
17. ***Keep temperature of fuel containers below 100°F (37.8°C). Containers must be installed outside building.***
18. ***Heater must not be operated for one hour following wash-down.***

Heater Dimensions

Models	40K and 75K BTU	120K and 225K BTU Universal Mount	250K BTU Universal Mount
Weight	70 lbs.	135 lbs.	153 lbs.
Height	26" (66 cm)	31" (79 cm)	32" (81 cm)
Width	20-1/2" (52 cm)	24-1/2" (62 cm)	27-1/2" (70 cm)
Depth	15-1/2" (39 cm)	19-1/4" (49 cm)	19-1/4" (49 cm)

Tools Required

1. Adjustable Wrench
2. Pipe Glue
3. Gas Leak Testing Solution
4. 1/4" (7 mm) Nut Driver

NOTE: *Install screw hooks with hammer or drill.*

Be Sure to Check Delivery

Locate packing slip and make sure all of the listed parts are enclosed. If not, call your Distributor immediately.

Minimum Clearances

The heater must be located a minimum of 12" (305 mm) from the ceiling, a minimum of 12" (305 mm) from the wall on the sides and back, a minimum of 20" (508 mm) from the ground, and positioned such that livestock and combustible materials are unable to come in contact with the heater or within 10' (3 m) of the hot air discharge. *(See Figure 3A on Page 14.)*

Specifications and Requirements

Model #	Maximum Input	Ventliation (Air required to support combustion)
SS-40-XL	40,000 BTUH (11.7 kW)	500 CFM (849.5 m^3/hr)
SS-75-XL	75,000 BTUH (21.9 kW)	500 CFM (849.5 m^3/hr)
HH-SS-120-XL	120,000 BTUH (35.2 kW)	1000 CFM (1699 m^3/hr)
HH-SS-175-XL	175,000 BTUH (36.6 kW)	1000 CFM (1699 m^3/hr)
HH-SS-200-XL	200,000 BTUH (58.6 kW)	1000 CFM (1699 m^3/hr)
HH-SS-225-XL	225,000 BTUH (65.9 kW)	1000 CFM (1699 m^3/hr)
HH-SS-250-XL	250,000 BTUH (73.3 kW)	1200 CFM (2039 m^3/hr)
LP/Propane Gas	Maximum 14" W.C. (34.8 mbar) and minimum 12-1/2" W.C. (31.1 mbar) inlet gas supply pressure acceptable at gas regulator connection. Burner manifold pressure 11" W. C. (27.4 mbar) at maximum input. Gas pressure should be checked by a certified gas technician while heater is in operation.	
Natural Gas	Maximum 14" W.C. (34.8 mbar) and minimum 5" W.C. (12.5 mbar) inlet gas supply pressure acceptable at gas regulator connection. Burner manifold pressure of 3-1/2" W. C. (8.7 mbar) at maximum input. Gas pressure should be checked by a certified gas technician while heater is in operation.	

NOTE: *Refer to heater ratings plate for unit voltage, amperage, and frequency ratings.*

Hanging the Heater

Chain Suspension

Mount the heater with chain hooks and chains so that the back of the heater is at least 12" (305 mm) from the ceiling and wall. The heater must be a minimum of 20" (500 mm) from floor, and located so that livestock and combustible materials are unable to come in contact with heater or within 10' (3 meters) of the hot air discharge.

Cable Suspension

If frequent height adjustment is required, use cables and pulleys. Main line cable would be connected to a winch.

Directions for Leveling

Adjust cables or chains as required to level the heater. Use a carpenter's level to check that the heater is level.

Installing the Dual-Flare Duct

Fold Dual-Flare duct (1) to shape as shown in *Figure 3A*. Install Dual-Flare duct to heater exhaust as shown with sheet metal screws (3) provided. This provides a multi-directional heat flow (2) that may be set by bending flaps.

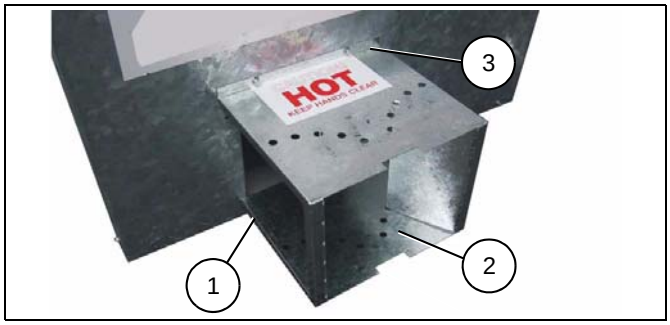


Figure 3A

Ref #	Description
1	Flare Duct
2	Adjust flap to direct heat flow.
3	Attach flare duct to heater with sheet metal screws.

Connecting the Gas Supply

For gas connection, attach the regulator (2) to the High Pressure Line (3) at the outside of the building as shown in *Figure 3B*. Connect flexible hose (1) to low pressure end of the regulator with special brass coupling. Refer to table *on Page 13* for LP and natural gas requirements.

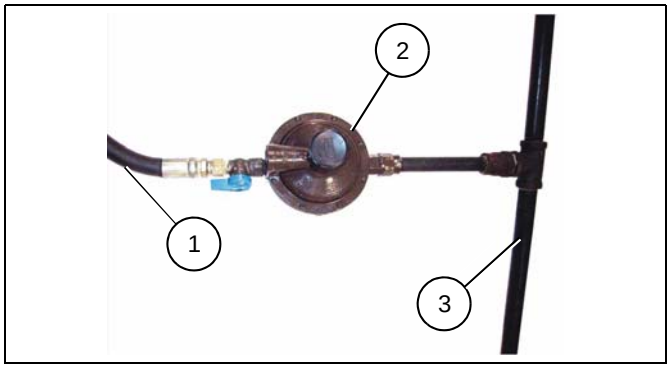


Figure 3B

Ref #	Description
1	Flexible Hose
2	Gas Regulator
3	High Pressure Line

Outside Mount (Optional)

Heaters are available with Outside Mount (OSM) kits. These heaters are designed to be mounted to the outside wall of a building. This saves valuable space inside the building and ensures fresh air intake for the heater. If you have purchased one of our OSM heater kits, please read the following before installing your new heater.

1. Before disposing of the box, cut the installation template from the side (250K BTU models ONLY). All other models installation template is placed inside the OSM kit box.
2. Position template on the outside of the building where heater is to be mounted. Be sure the template is level.
3. **120K-225K BTU**: Drill 6.3 mm (1/4") holes through all 8 x's shown on template.

   NOTE: *Opening for duct measures 254 mm (10") width (W) x 254 mm (10") height (H).* *(See Figure 3C.)*

   250K BTU: Drill 6.3 mm (1/4") holes through all 8 x's shown on template.

   NOTE: *Opening for duct measures 280 mm (11") width (W) x 254 mm (10") height (H).* *(See Figure 3C.)*
4. Locate 4 x's for thru-wall extension duct (6) and cut from one hole to the next until opening is removed. *(See Figure 3C.)*
5. If additional support is needed, add support by fastening two 2' x 4' boards on the outside of the wall where heater support brackets are to be positioned. The two 2' x 4' boards are to be fastened to studs inside the wall. *(See Figure 3D.)*

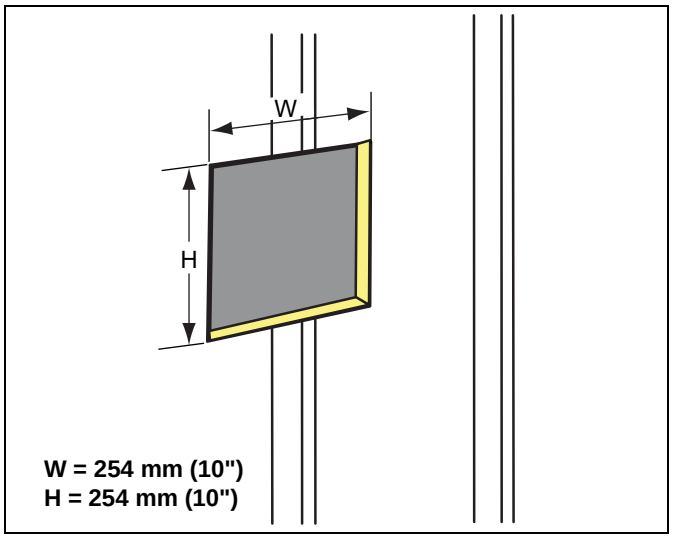


Figure 3C *120K-225K BTU Model*

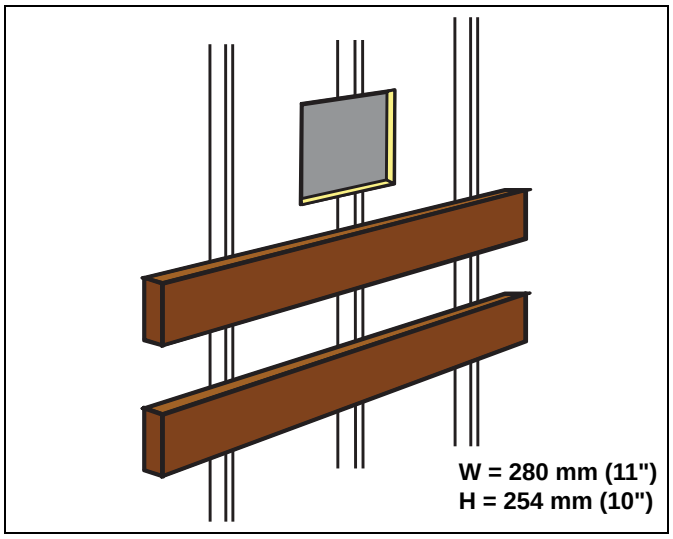


Figure 3D *250K BTU Model*

6. Assemble heater support bracket as shown in *Figure 3E on Page 16*.
7. Attach insert thru-wall extension duct assembly (6) through opening in wall. The "varmint" flap (11), located inside the thru-wall extension duct, should be positioned as shown in *Figure 3F on Page 16*.
8. Bend extension duct mounting flange (8) into a rectangle and fasten around exhaust outlet on the front of the heater with sheet metal screws provided.

9. Place heater on the support bracket. Support bracket must be level before heater is set in place.
10. Slide thru-wall extension duct assembly (6) into flange, and secure with sheet metal screws.
11. Place outer flashing seal (13) around thru-wall extension duct (6) and secure with sheet metal screws to the inside of the wall.
12. Fasten directional duct to extension duct mounting flange (8), then bend deflectors until they force heated air in the desired direction.

CAUTION

The minimum side clearance to combustible walls must be 305 mm (12").
The minimum clearance between the appliance and rear wall must be 305 mm (12").
Weeds, snow, or other materials must not be allowed to accumulate on heater or adjacent to heater. Heater and thru-wall extension duct must be a minimum of 500 mm (20") above ground and out of reach of livestock.

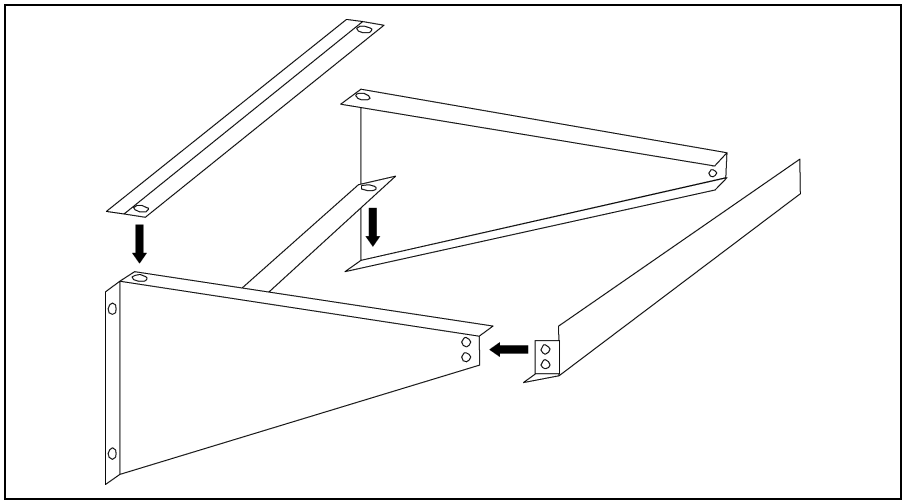


Figure 3E

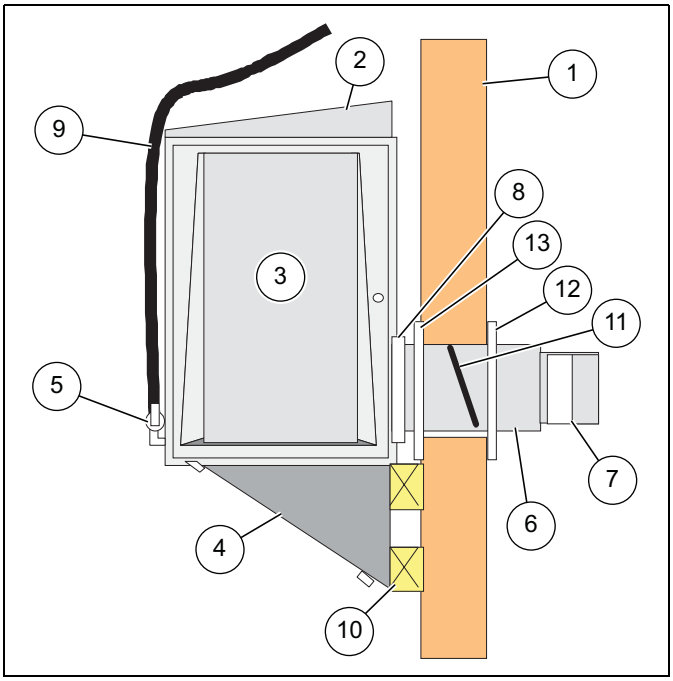


Figure 3F

Ref #	Description
1	Wall (By Others)
2	Universal Mount Heater
3	Door Cover (Ordered Separately for OSM Heater)
4	Mounting Brace (Included with OSM Kit)
5	Gas Shut Off Valve (Included with Heater)
6	Thru-Wall Extension Duct (Included with OSM Kit)
7	Dual Flare Duct. Use T-duct included with heater or use optional OSM Y-duct ordered separately.
8	Extension Flange (Included with OSM Kit)
9	Gas Hose (Optional Ordered Separately)
10	2" x 4" Framing for Brace (Not Included)
11	“Varmint” Flap (Included with OSM Kit)
12	Inner Flashing Seal (Included with OSM Kit)
13	Outer Flashing (Included with OSM Kit)

13. If not already bent, bend the sides of two door covers (3) 90° by hand (15) in the direction of the existing top and bottom bends (14). *(See Figure 3G.)*

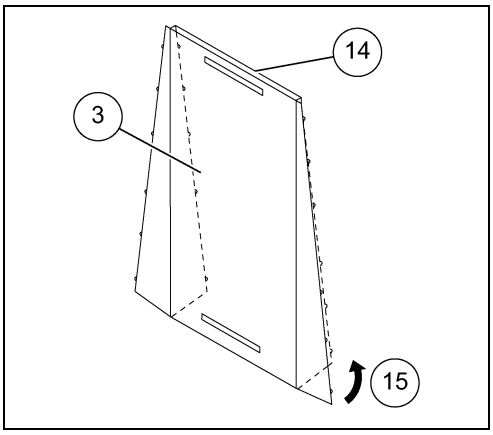


Figure 3G

Ref #	Description
3	Door Cover
14	Existing Bend Direction
15	Hand Bend 90°

14. Insert tabs of door cover (3) in slots on heater door and slide down. This will lock the cover in place on the door. *(See Figure 3I.)* (Repeat this step for the second door.)

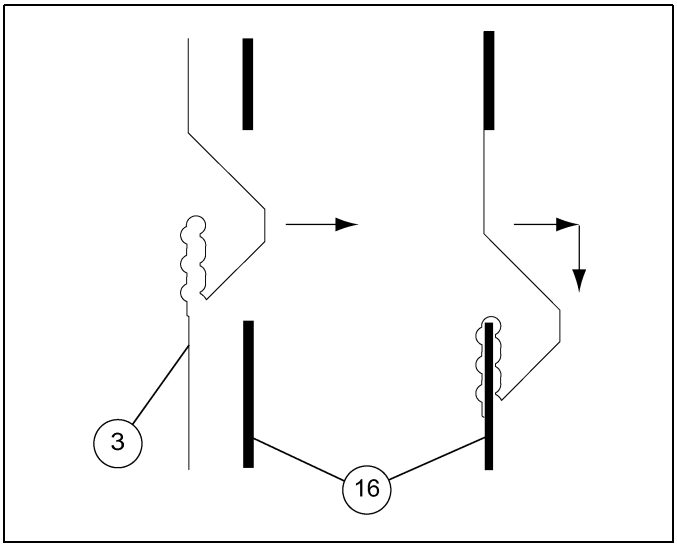


Figure 3H

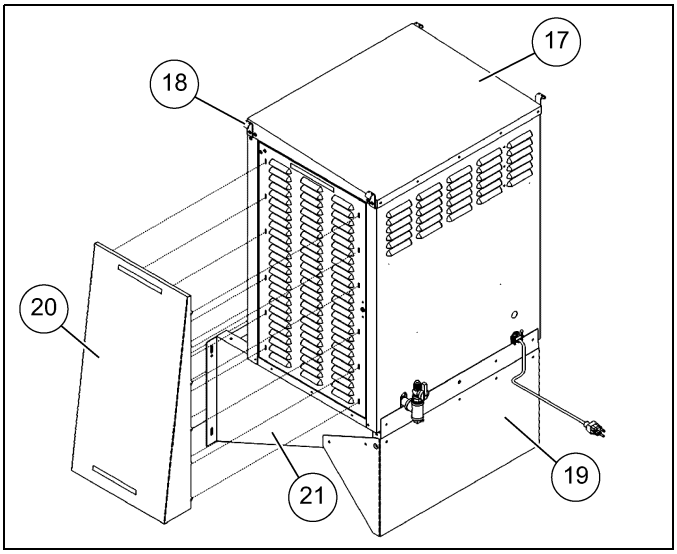


Figure 3I

Ref #	Description
3	Door Cover
16	Door

Ref #	Description
17	Assembled Heater
18	Chain Hooks
19	Optional Wind Guard
20	Door Cover Bent
21	OSM Kit

15. To continue with installation of your heater, Refer to “User Instructions” section *on Page 18*.

Before turning ON gas, check main supply valve to be sure it is open. *(See Figure 4A.)* Be sure to check all connections for leaks with a Gas Leak Testing solution, (soap and water work well). Check to see if gas valve knob is in the ON position. If not, turn counterclockwise until knob “clicks” into the ON position. (This may not apply to all units.) Turn ON gas by turning ball valve handle into vertical position.

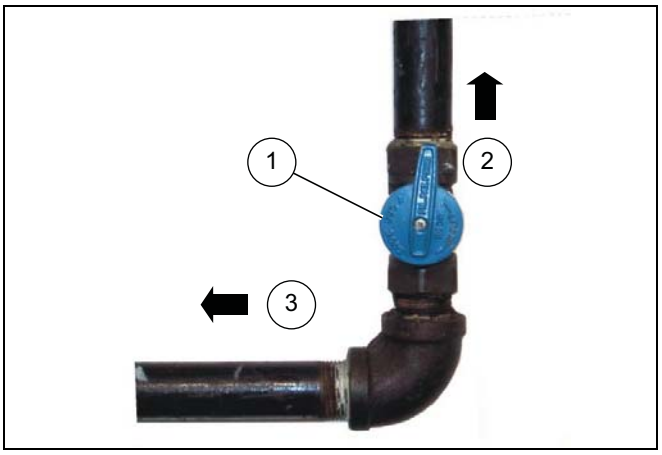


Figure 4A

Ref #	Description
1	Gas Valve “ON” Position
2	To Gas Supply
3	To Heater

Connecting Electrical Power

Make sure a circuit breaker or similar cutoff device is provided to permit disconnection of electrical power to heater for service and cleaning. All electrical work should be performed by a certified electrician. If no adjustments are made, the heater will operate every time power is supplied and the ON/OFF switch is activated. If an external thermostat is to be used (see component and wiring diagrams for HSI model *on Page 20* and for DSI model *on Page 27*), the heater will operate only when power is supplied, the ON/OFF switch is activated, and the thermostat indicates a call for heat.

Start-Up

Adjust thermostat higher than house temperature. Allow 20 seconds for heater to ignite. On initial start-up or when heater has not been in service for some time, heater may require more than one attempt to purge air and ignite heater. (IF HEATER FAILS TO IGNITE. REFER TO TROUBLE SHOOTING GUIDE.) Adjust thermostat to desired house temperature.

Shutting OFF Heater

Shut OFF main gas supply valve, close ball valve, and disconnect electrical power.

CAUTION

Limiting Excess Carbon Dioxide (CO_2)

In order to prevent hazardous accumulation of CO_2 gases, the heater must operate ONLY in a properly ventilated room.

Ventilation requirements are given in the Specifications and Requirements section *on Page 13****.***

Both installer and operator must ensure that the building’s ventilation rate never drops below the noted limits.

1.The appliance area should be kept clear and free from combustible materials, gasoline and other flammable vapors, and liquids.

2. The flow of combustion and ventilation air must not be obstructed.

3. Your Super Saver XL^{TM} Heater should be inspected before each use, and at least annually by a qualified service person.

4. The hose should be visually inspected prior to each use of the heater. If it is evident there is excessive abrasion or wear or the hose is cut, it must be replaced prior to the heater being put into operation. The replacement hose assembly shall be that specified by the manufacturer. (Refer to parts list on *on Pages 38-49*.)

5. Inspect heater and gas connections periodically for gas leaks with an approved gas leak testing solution; applying a soapy water mixture to gas connections works well. Bubble formation indicates a leak.

6. Keep heater clean at all times.

   a. Open doors and blow out dust with high pressure air hose. Be sure interior of burner and flared end are kept clean.

   b. Burner orifice and hot surface ignition assembly must be kept clean and free of carbon build-up.

   c. Check blower wheel regularly for dust accumulation and clean periodically for maximum airflow.

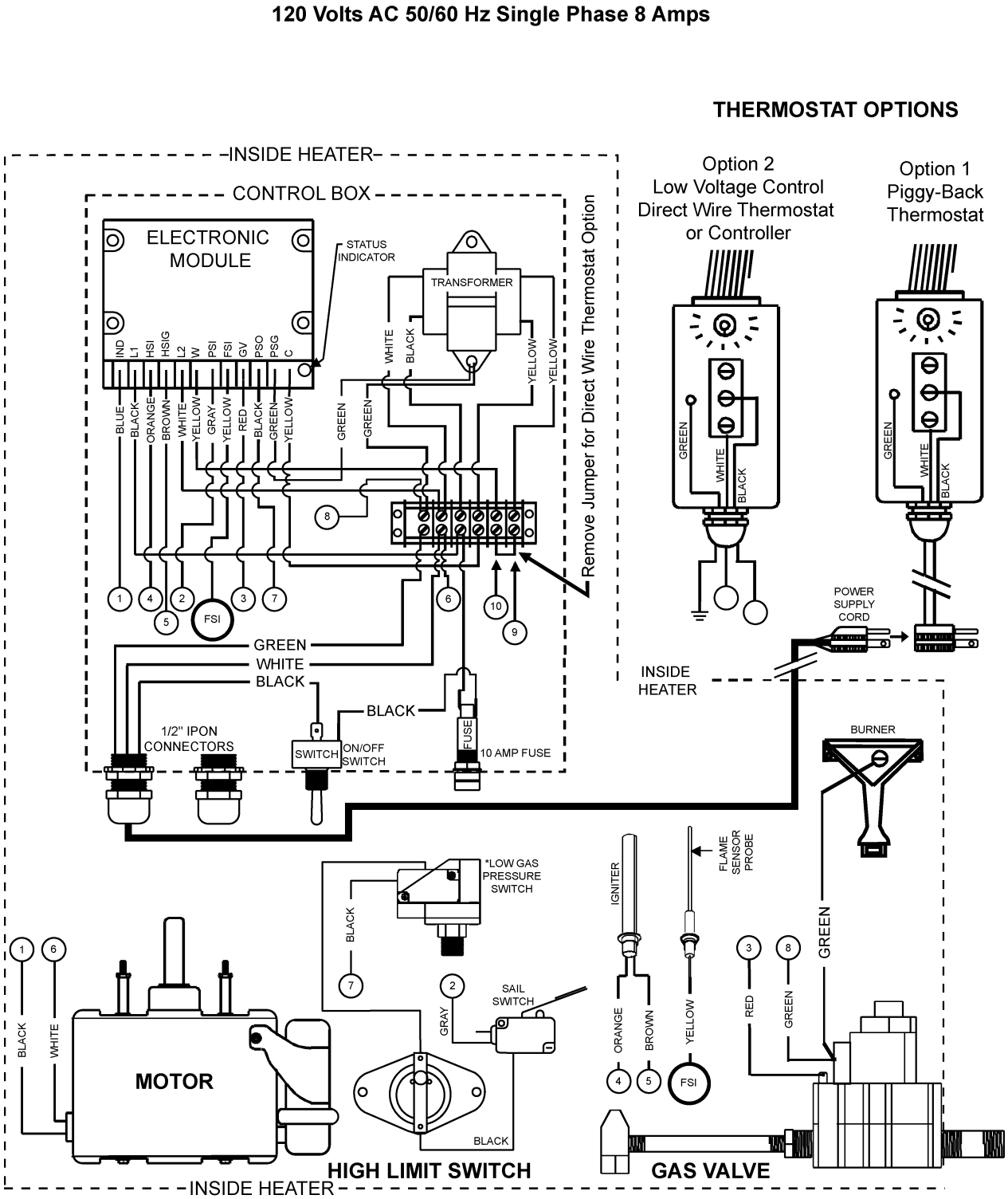
   d. Thermostat coils must be kept clean to assure proper temperature control.

   e. Igniter must be cool before wash-down. Do not operate the heater for one hour following wash-down.

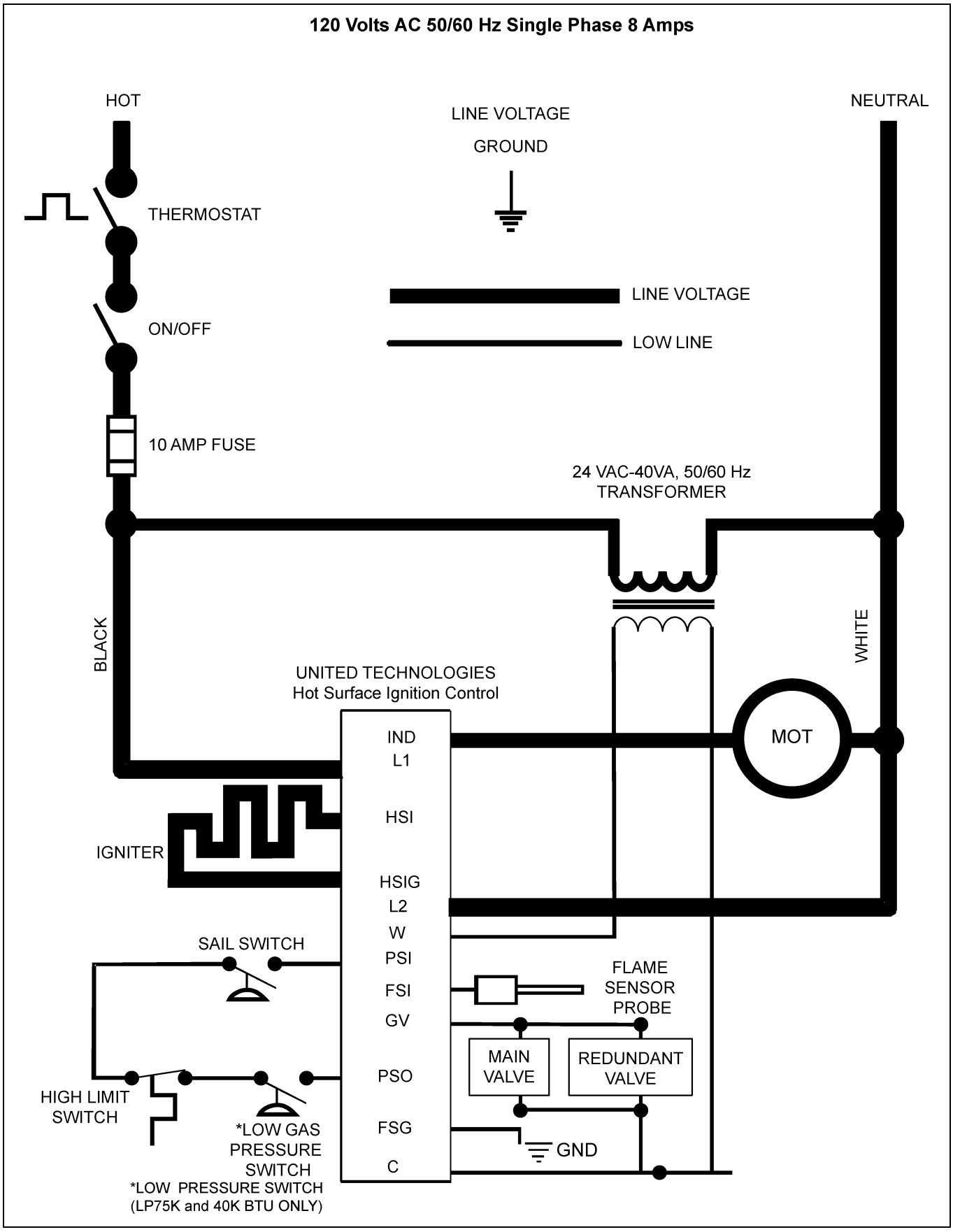
DISCLAIMER

This appliance rating is based on the use of ANSI LC-2 test gases including LP (2500 BTU/ft^3, 93.15 MJ/m3) and natural gas (1075 BTU/ft^3, 40 MJ/m^3). Cumberland makes no guarantees regarding the proper operation of this appliance when these conditions are not met.

Component and Wiring Diagram



Ladder Type Schematic Diagram



United Technologies Hot Surface Ignition System

IMPORTANT: *Inspect and check operation of this appliance monthly. Follow the instructions below. If a problem is detected, contact a qualified technician to make any necessary repairs.*

In an effort to minimize the time required to troubleshoot this system:

1. Turn OFF the gas supply at the main gas valve.
2. Disconnect electric power to the system at the main fuse of the circuit breaker, if connected.
3. Visually inspect equipment for apparent damage. Check wiring for loose connections.
4. Inspect igniter for visible cracking or scale deposits. Inspect flame sensor for position or deposits shorting sensor to burner.
5. After performing the above inspections, restore gas supply, and electric power to the equipment. Close thermostat contacts to cycle the system. If a “no heat” condition persists, the three visual indicators listed below will help determine if system is operating properly.
   a. The igniter will warm up and glow bright red.
   b. The main burner flame will ignite.
   c. The main burner flame will continue to burn after the igniter is turned OFF.

Troubleshooting the system consists of checking for these three visual indications. The Visual Check Charts define the proper action if any of these indications do not occur.

DANGER

Do not omit the below steps when troubleshooting the appliance.

Line voltage (120 volts) could be present on the surface of the igniter if the system is not correctly wired. Such voltage can cause death or serious injury.

1. Disconnect electric power to the system at the main fuse of the circuit breaker.

2. Remove draft shield (if necessary) to gain access to the igniter.

3. Disconnect the igniter socket from the wiring harness.

4. Connect an AC voltmeter across the terminal connected to the white wire and the chassis ground, and then reconnect electric power to the system.

5. If voltage exists between the terminal connected to the white wire and the chassis ground, the main power supply lines are improperly connected to the furnace. Reverse incoming line voltage leads.

1018 Series Hot Surface Ignition

Status Indicator Error Conditions

The status indicator LED will not be lit with power applied to the board and the control operating properly. However, if the control is not operating properly, the status indicator LED will flash in one of the following error codes.

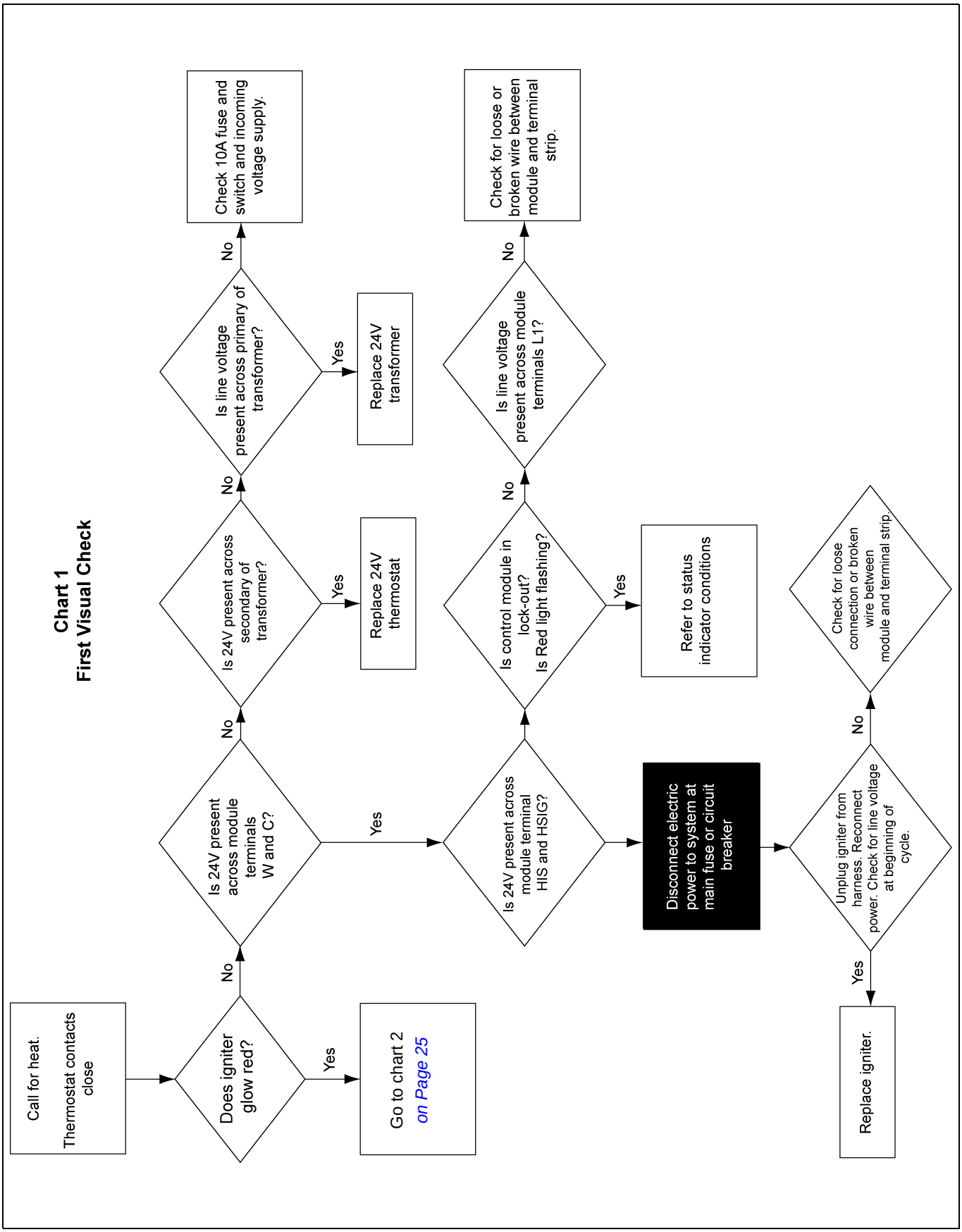
1. **Status Indicator Flashing One Time:**
   When the status indicator LED shows the error code of a single repeated flash, the control is in lock out, because the sail switch was stuck closed.
2. **Status Indicator Flashing Two Times:**
   When the status indicator LED shows the repeating error code of two flashes, the control is in lock out because the control circuits did not receive the “closed” signal from the high limit switch and the sail switch within the required amount of time.
3. **Status Indicator Flashing Three Times:**
   When the status indicator LED shows the repeating error code of three flashes, the control is in lock out due to either a failed ignition attempt, a gas valve error, or a false flame sensed during the pre-purge of warm-up periods. If false flame has been sensed, the control will return to the normal operation, and begin a new ignition sequence when the false flame is no longer present.
4. **Status Indicator Flashing Four Times:**
   When the status indicator LED shows the repeating error code of four flashes, the control has gone into lock out due to a failure within the control board.

Checking Manifold Pressure

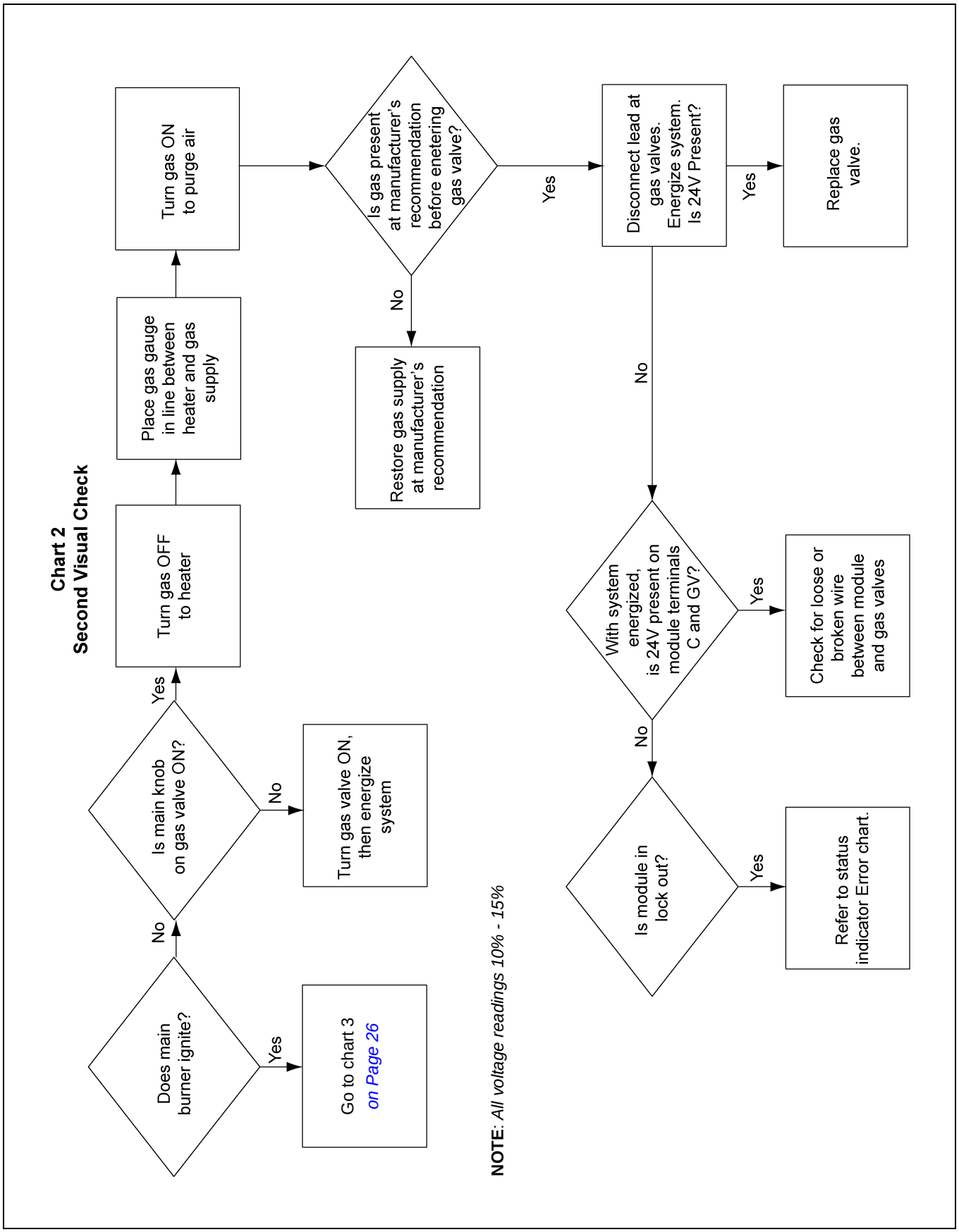
NOTE: *Below steps to be performed by a certified gas technician only.*

1. Un-plug heater from the power source and turn ball valve to OFF position.
2. Remove outlet pressure tap plug from gas control valve and connect pressure gauge.
3. Return electrical power to the heater and plug to power source and turn ball valve to ON position.
4. To obtain an accurate manifold pressure reading, heater must be cycled ON and OFF several times to stabilize the pressure regulator diaphragm.
5. Return the heater to operation and read pressure gauge.
6. If necessary, adjust pressure regulator on gas control valve to the acceptable manifold pressure found on rating plate and refer to *Page 13* of owner’s manual.
7. Remove pressure regulator adjustment screw.
8. Using a screwdriver, turn inner adjustment screw clockwise to increase or counterclockwise to decrease manifold pressure to burner.
9. Always replace cap screw and tighten firmly to prevent gas leakage.
10. Un-plug heater from the power source and turn ball valve to OFF position.
11. Remove pressure gauge and replace outlet pressure tap plug.
12. Return heater to operation and observe through at least one complete cycle to ensure all controls are operating properly.
13. Perform gas leak test at outlet pressure tap plug. (Soap and water work well.)

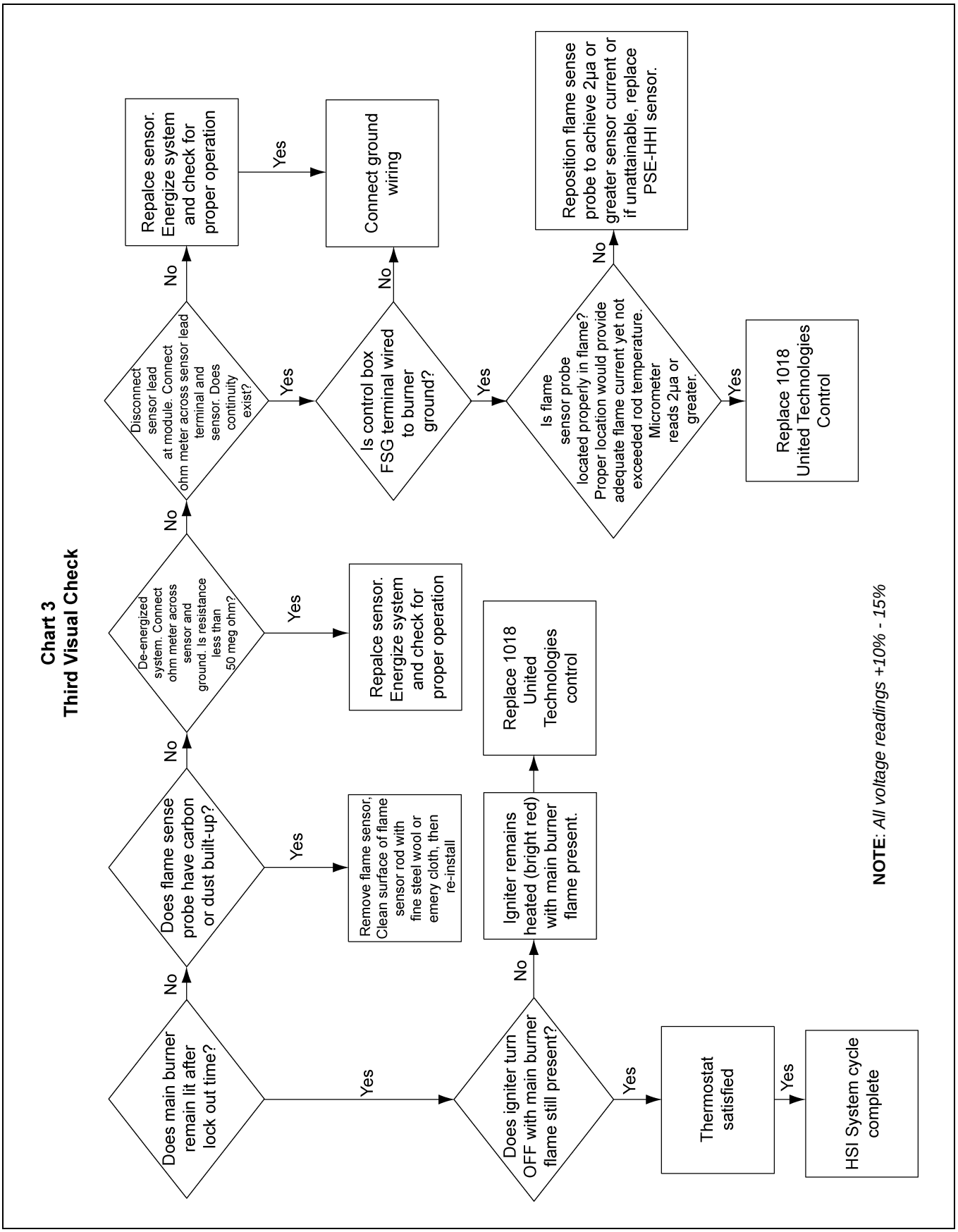
First Visual Check Chart



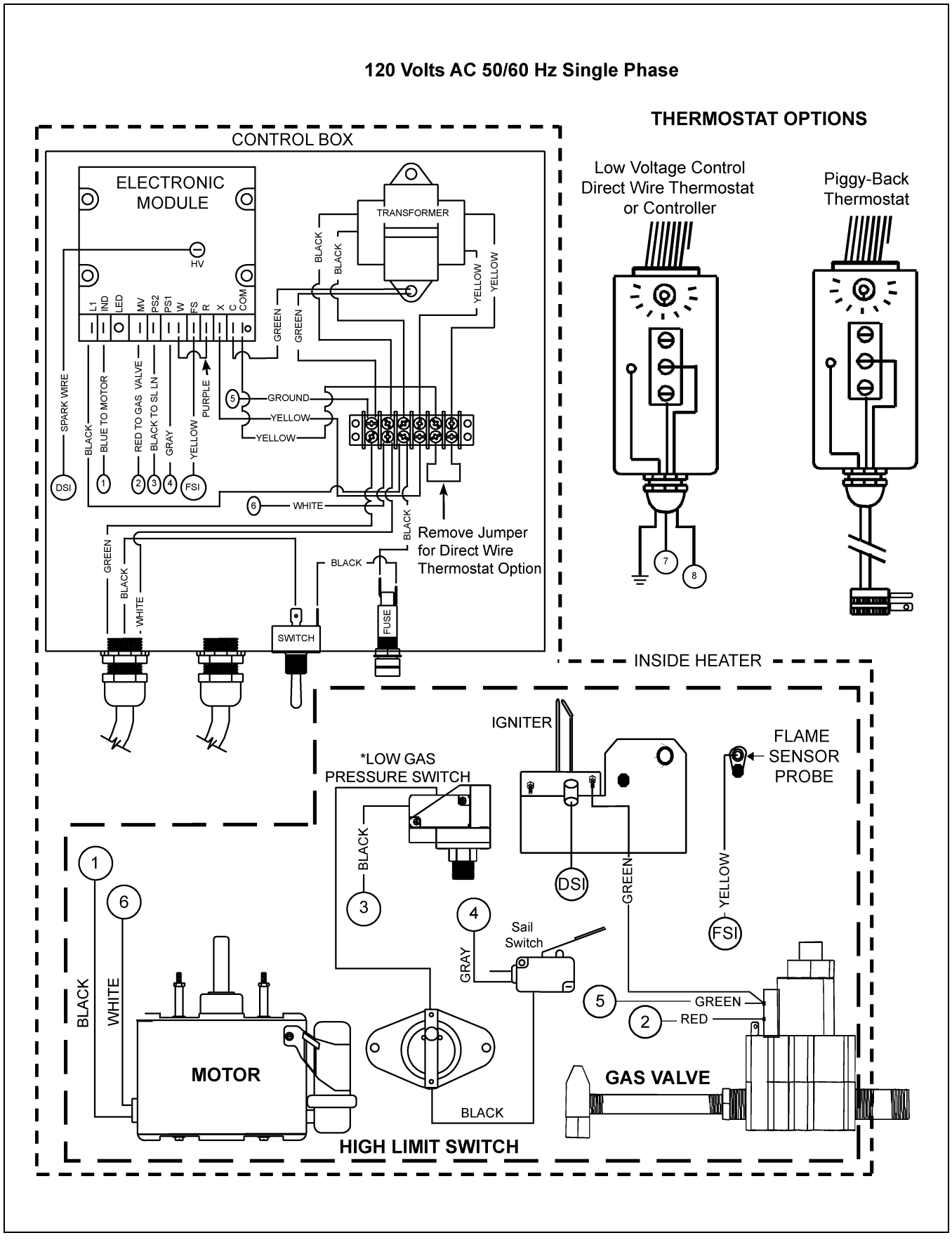
Second Visual Check Chart



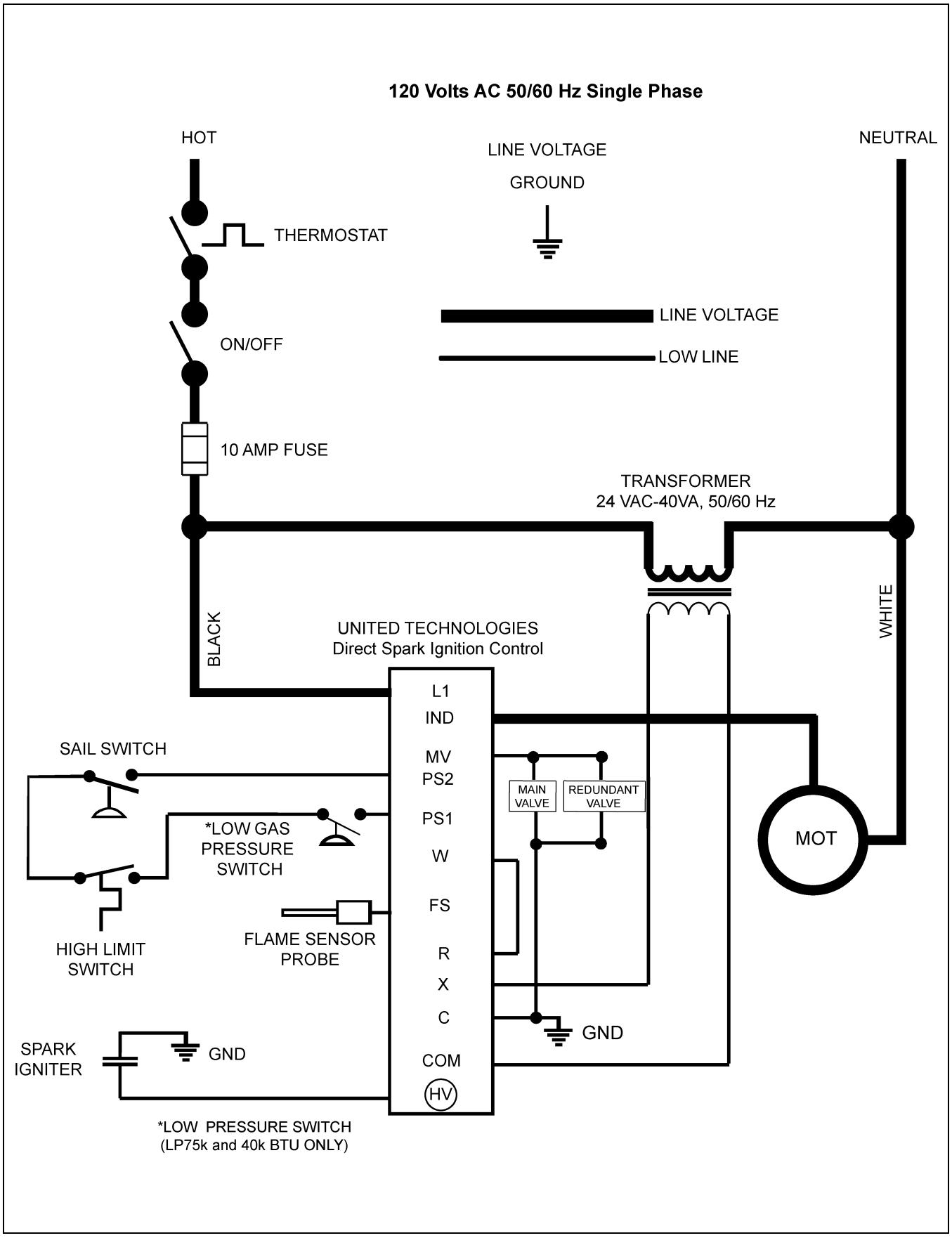
Third Visual Check Chart



Component and Wiring Diagram



Ladder Type Schematic Diagram



United Technologies Direct Spark Ignition System

IMPORTANT: *Inspect and check operation of this appliance monthly. Follow the instructions given below. If a problem is detected, contact a qualified technician to make any necessary repairs.*

In an effort to minimize the time required to troubleshoot this system:

1. Turn OFF the gas supply at the main gas valve.
2. Disconnect electric power to the system at the main fuse of the circuit breaker, if connected.
3. Visually inspect equipment for apparent damage. Check wiring for loose connections.
4. Inspect igniter for visible cracking or scale deposits. Inspect flame sensor for position or deposits shorting sensor to burner.
5. After performing the above inspections, restore gas supply, and electric power to the equipment. Close thermostat contacts to cycle the system. If a “no heat” condition persists, the three visual indicators listed below will help determine if system is operating properly.
    a. The igniter will spark.
    b. The main burner flame will ignite.
    c. The main burner flame will continue to burn after the igniter is turned OFF.

Troubleshooting the system consists of checking for these three visual indications. The Visual Check Charts define the proper action if any of these indications do not occur.

1016 Direct Spark Ignition

Status Indicator Error Conditions

The status indicator LED will not be lit with power applied to the board and the control operating properly. However, if the control is not operating properly, the status indicator LED will flash in one of the following error codes.

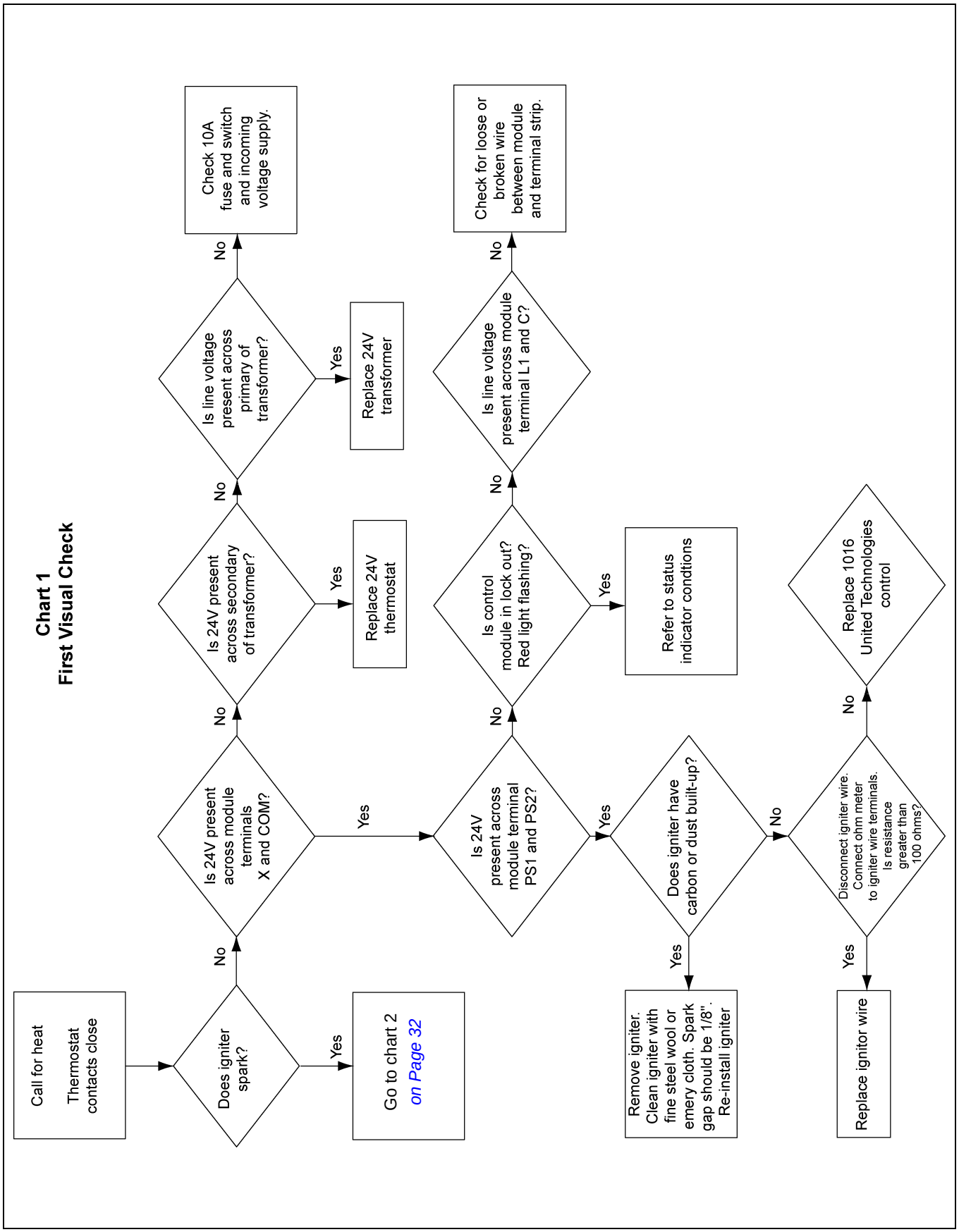
1. **Status Indicator Flashing One Time:**
   When the status indicator LED shows the error code of a single repeated flash, the control is in lock out, because the sail switch was stuck closed.
2. **Status Indicator Flashing Two Times:**
   When the status indicator LED shows the repeating error code of two flashes, the control is in lock out because the control circuits did not receive the “closed” signal from the high limit switch, the sail switch within the required amount of time.
3. **Status Indicator Flashing Three Times:**
   When the status indicator LED shows the repeating error code of three flashes, the control is in lock out due to a failed ignition attempt.
4. **Status Indicator Flashing Four Times:**
   When the status indicator LED shows the repeating error code of four flashes, the control has gone into lock out due to a failure within the control board.

Checking Manifold Pressure

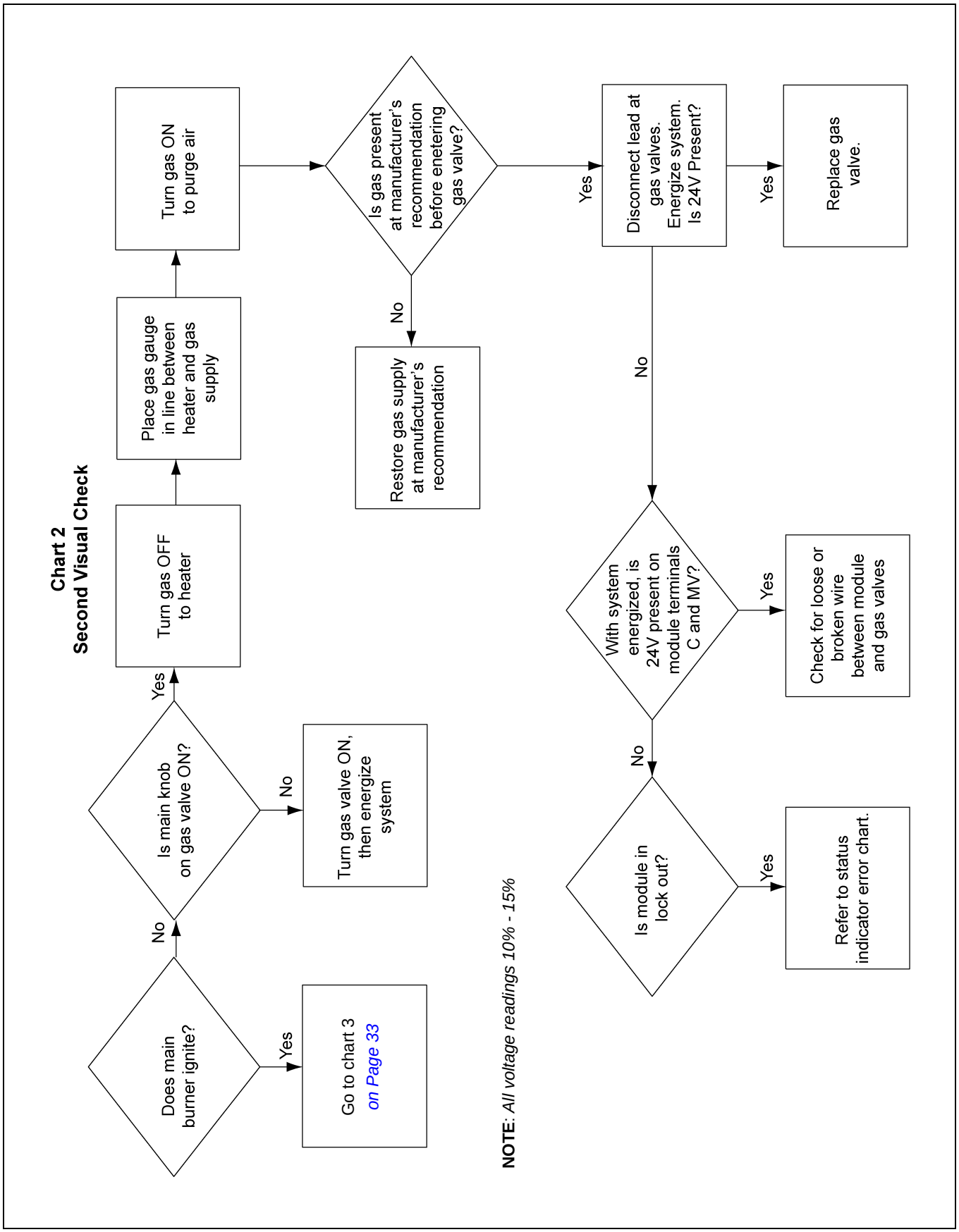
NOTE: *Below steps to be performed by a certified gas technician only.*

1. Un-plug heater from the power source and turn ball valve to OFF position.
2. Remove outlet pressure tap plug from gas control valve and connect pressure gauge.
3. Return electrical power to the heater and plug to power source and turn ball valve to ON position.
4. To obtain an accurate manifold pressure reading, heater must be cycled ON and OFF several times to stabilize the pressure regulator diaphragm.
5. Return the heater to operation and read pressure gauge.
6. If necessary, adjust pressure regulator on gas control valve to the acceptable manifold pressure found on rating plate and refer to *Page 13* of owner’s manual.
7. Remove pressure regulator adjustment screw.
8. Using a screwdriver, turn inner adjustment screw clockwise to increase or counterclockwise to decrease manifold pressure to burner.
9. Always replace cap screw and tighten firmly to prevent gas leakage.
10. Un-plug heater from the power source and turn ball valve to OFF position.
11. Remove pressure gauge and replace outlet pressure tap plug.
12. Return heater to operation and observe through at least one complete cycle to ensure all controls are operating properly.
13. Perform gas leak test at outlet pressure tap plug. (Soap and water work well.)

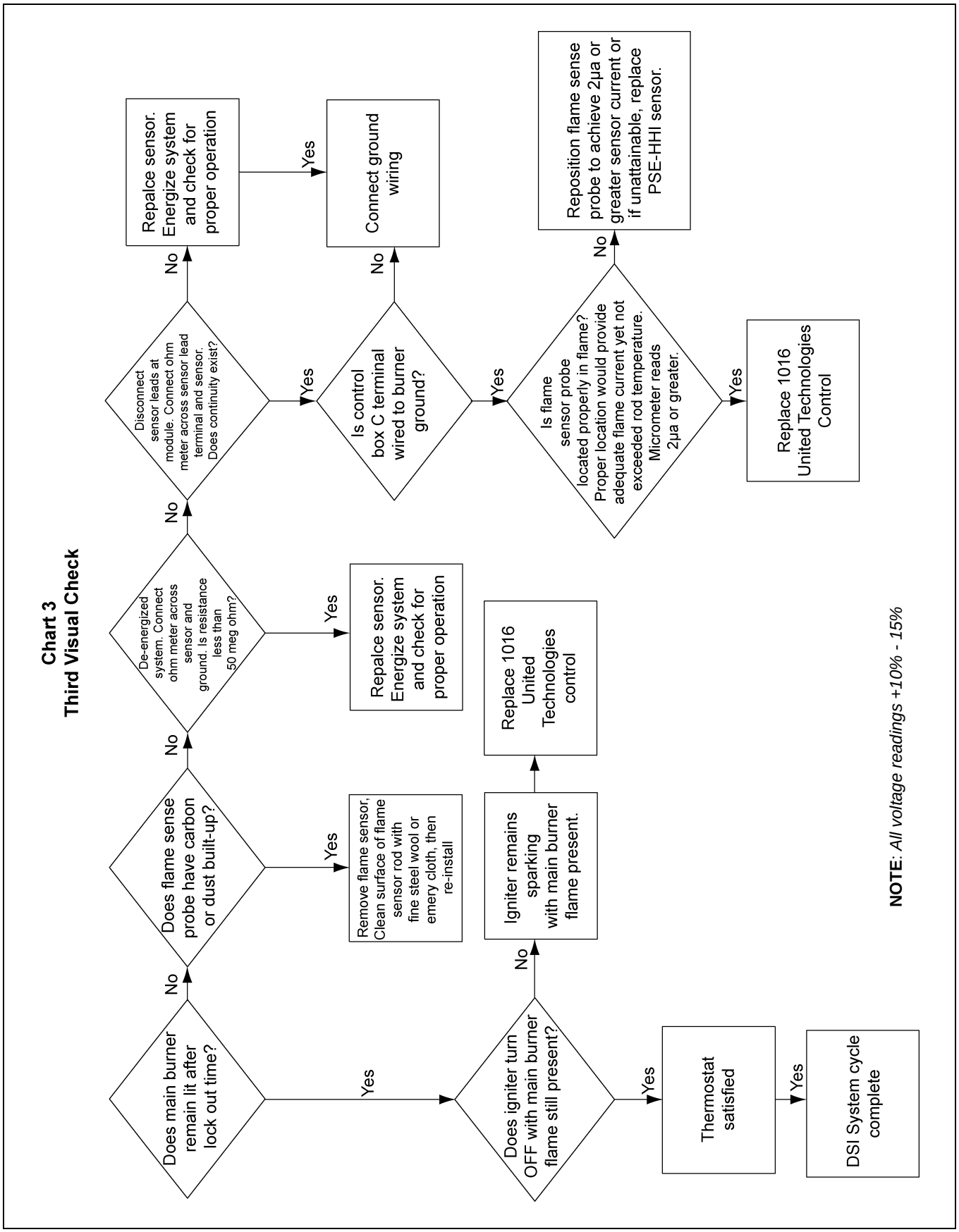
First Visual Check Chart



Second Visual Check Chart



Third Visual Check Chart



Calculating HVR and ELOP

1. Using a system schematic, label each piping section of the system starting at the meter or regulator. A different pipe section starts where the gas demand of the system changes, usually at a junction.
2. Determine the Heating Value Required (HVR) in BTUH (BTU's per hour) for each section of pipe.

   HVR = (No. heaters supplied by pipe section) x (Heat output per heater)
3. Determine the Equivalent Length Of Pipe (ELOP) required for sufficient gas service.

   ELOP = (Length from meter to most remote heater) + (Minor loss equivalents of the system)

   IMPORTANT: *Use the ELOP value from this equation for size determination of all pipe sections.*
4. Use the ELOP value from step 3, and the HVR of each pipe section to determine the required pipe size for either natural gas (NG) (Refer to Table 1 *on Page 35*) or liquid propane (LP) (Refer to Table 2 *on Page 36*) from the table "Maximum Capacity Of Pipe".

Directions for Reading Pipe Size from Tables

Example: Four 40,000 BTUH (12 kW) heaters will be installed on the gas pipe line as shown in *Figure 10A* "Arbitrary Piping System" *on Page 35*. **NOTE**: *Values given in English and Metric equivalent units.*

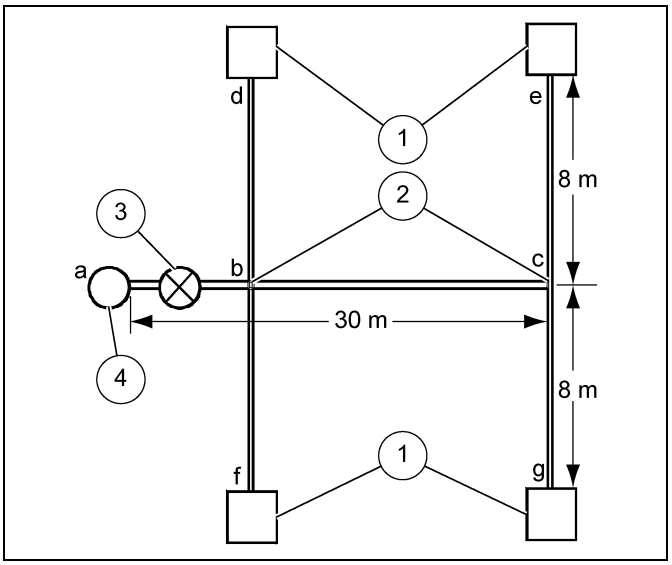
1. Determine the HVR value for each pipe section of the system.

Pipe Section	# of Heaters	HVR Calculation		HVR Value	
		BTUH	kW	BTUH	kW
a-b	4	4 x 40,000	4 x 12	160,000	48
b-c	2	2 x 40,000	2 x 12	80,000	24
c-e	1	1 x 40,000	1 x 12	40,000	12
b-d	1	1 x 40,000	1 x 12	40,000	12
b-f	1	1 x 40,000	1 x 12	40,000	12
c-g	1	1 x 40,000	1 x 12	40,000	12

2. Determine the ELOP. Length from meter to most remote heater = length from a to e (or g) = 100' (30 m) + 25' (8 m) = 125' (38 m). Minor loss equivalents from Table 1 = 1 gate valve x 2'/valve (1 m/valve) + 3 tees x 11'/tee (4 m/tee) = 35' (13 m). Calculated ELOP = 125' (38 m) + 35' (13 m) = 160' (51 m). Tabulated ELOP = 200' (60 m). Round up to the nearest table value.

3. In the appropriate table, NG (Refer to Table 2 *on Page 36*) or LP (Refer to Table 3 *on Page 36*), select the column showing the ELOP or the next longer length, if the table does not give the exact length. Use this column to compare table values to the HVR values. Use the Natural Gas table (Refer to Table 2 *on Page 36*) in this example. From step 2, ELOP = 200' (60 m). Locate the column labeled 200' (60 m) in Table 2 *on Page 36*.

4. Select a pipe section and read down the ELOP column to find the maximum gas capacity that matches the HVR for that particular pipe section. If the exact value is not listed, choose the next larger value in the column. In this example, start with pipe section c-e. For pipe section c-e, HVR = 40,000 BTUH (12 kW). From Table 2 *on Page 36*, column 200', 40 (12) is not listed. (**NOTE**: *The table values are in thousands of BTUH's*). The next larger value of 72 (21) is read from the table, corresponding to 72,000 BTUH (21 kW).



Ref #	Description
1	Heaters
2	Tees
3	Gate valve
4	Gas Meter

Figure 10A *Arbitrary Piping System*

5. Follow the row leftward until you reach the columns labeled “Internal Diameter” and “Nominal Pipe Size”. Read the pipe size for the particular pipe section. Example: For pipe section c-e, the pipe size is 3/4" (0.824") (19.1 mm). Repeat for each pipe section.

Table 1

Minor Loss Equivalents				
Fitting	**2" (5.08 cm) IPS or Smaller**		**2" (5.08 cm) IPS to 4" (10.16 cm) IPS**	
	Feet per fitting	**Meters per Fitting**	**Feet per Fitting**	**Meters per Fitting**
45° Elbow	3	1	5	2
90° Elbow	6	2	10	3
Tee	11	4	20	6
Gate Valve	2	1	3	1
Angle Valve	29	9	60	18
Swing Valve	15	5	30	9

Pipe Sizes Determined for Diagram				
Pipe Section	**Max. Gas Capacity Value Determined from Table 2**		**Pipe Size Determined from Table 2**	
	BTUH	**kWh**	**Inches**	**mm**
a-b	280,000	82	1-1/4	31.8
b-c	135,000	40	1	25.4
b-d	72,000	21	3/4	19.1
b-f	72,000	21	3/4	19.1
c-e	72,000	21	3/4	19.1
c-g	72,000	21	3/4	19.1

10. Pipe Sizing Guidelines

IMPORTANT: *Tables 2 and 3 given below are based on values given in the Gas Engineers Handbook and are intended as a guide only. Consult your gas supplier for gas capacity and pipe size information for your particular piping system.*

Table 2

Nominal Iron Pipe Size (*Inch)	Internal Diameter, (IPS) (*Inch)	Maximum Capacity of Pipe in Thousands of BTU Per Hour Natural Gas (Methane) @ Pressure Drop of 0.5 in W.C. (0.2 mbar) Values listed are for 0.6 sp.gr. based on Heat of Combustion of 1000 BTU/cu.ft													
		Length of Pipe, Feet (multiply ft by 0.3 to convert to meter)													
		10	20	30	40	50	60	70	80	90	100	150	200	250	300
1/2	0.622	175	120	97	82	73	66	61	57	53	50	40	35	29	25
3/4	0.824	360	250	200	170	151	138	125	118	110	103	84	72	59	53
1	1.049	680	465	375	320	285	260	240	220	205	195	160	135	109	100
1-1/4	1.380	1400	950	770	660	580	530	490	460	430	400	325	280	219	206
1-1/2	1.610	2100	1460	1180	990	900	810	750	690	650	620	500	430	325	309
2	2.067	3950	2750	2200	1900	1680	1520	1400	1300	1220	1150	950	800	614	596
2-1/2	2.469	6300	4350	3520	3000	2650	2400	2250	2050	1950	1850	1500	1280	966	950
3	3.068	1100	7700	6250	5300	4750	4300	3900	3700	3450	3250	2650	2280	1855	1680
4	4.026	2300	1580	1280	1090	9700	8800	8100	7500	7200	6700	5500	4600	3783	3432

NOTE: *Table values given in BTUH/1000. To convert to kW, multiply table values by 0.3.*

* 1 Inch = 25.4 mm

Table 3

Nominal Iron Pipe Size (*Inch)	Internal Diameter, (IPS) (*Inch)	Maximum Capacity of Pipe in Thousands of BTU per Hour Liquid Propane (LP) @ Pressure Drop of 0.5 in W.C. Values listed are for 1.6 sp.gr. based on Heat of Combustion of 2500 BTU/cu.ft														
		Length of Pipe, Feet (multiply ft by 0.3 to convert to meter)														
		10	20	30	40	50	60	80	100	125	150	200	250	300	350	400
1/2	0.622	291	200	161	137	122	110	94	84	74	67	58	51	46	43	40
3/4	0.824	608	418	336	287	255	231	198	175	155	141	120	107	97	89	83
1	1.049	1146	788	632	541	480	435	372	330	292	265	227	201	182	167	156
1-1/4	1.380	2353	1617	1299	1111	985	892	764	677	600	544	465	412	374	344	320
1-1/2	1.610	3525	2423	1946	1665	1476	1337	1144	1014	899	815	697	618	560	515	479
2	2.067	6789	4666	3747	3207	2842	2575	2204	1954	1731	1569	1343	1190	1078	992	923

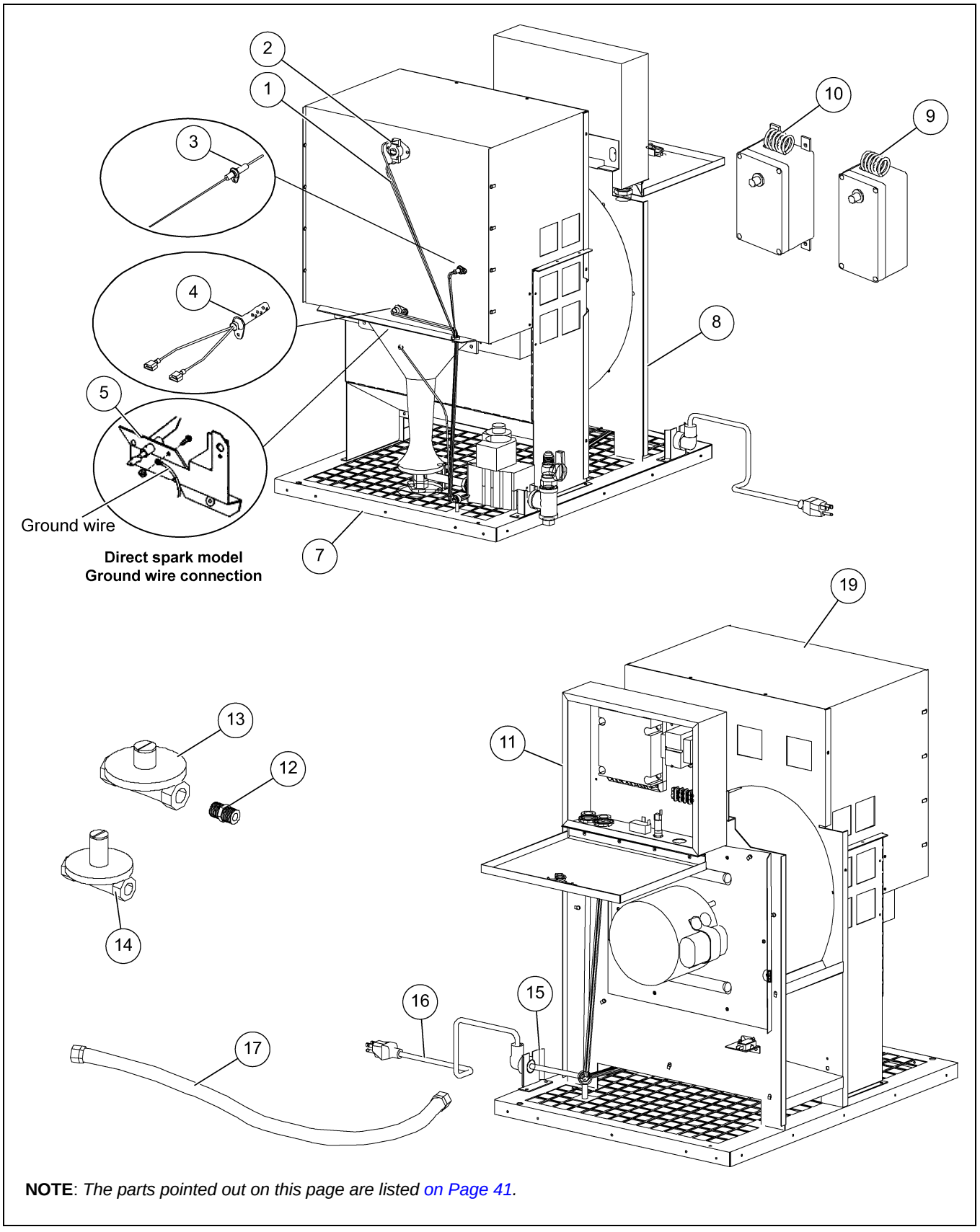
NOTE: *Table values given in BTUH/1000. To convert to kW, multiply table values by 0.3.*

* 1 Inch = 25.4 mm

NOTE: ***Contact dealer for replacement parts.***

When ordering service parts, please specify the country, model number, date of manufacture, voltage, frequency, gas type, inside or outside mount, and whether the heater is constructed of galvanized or stainless steel.

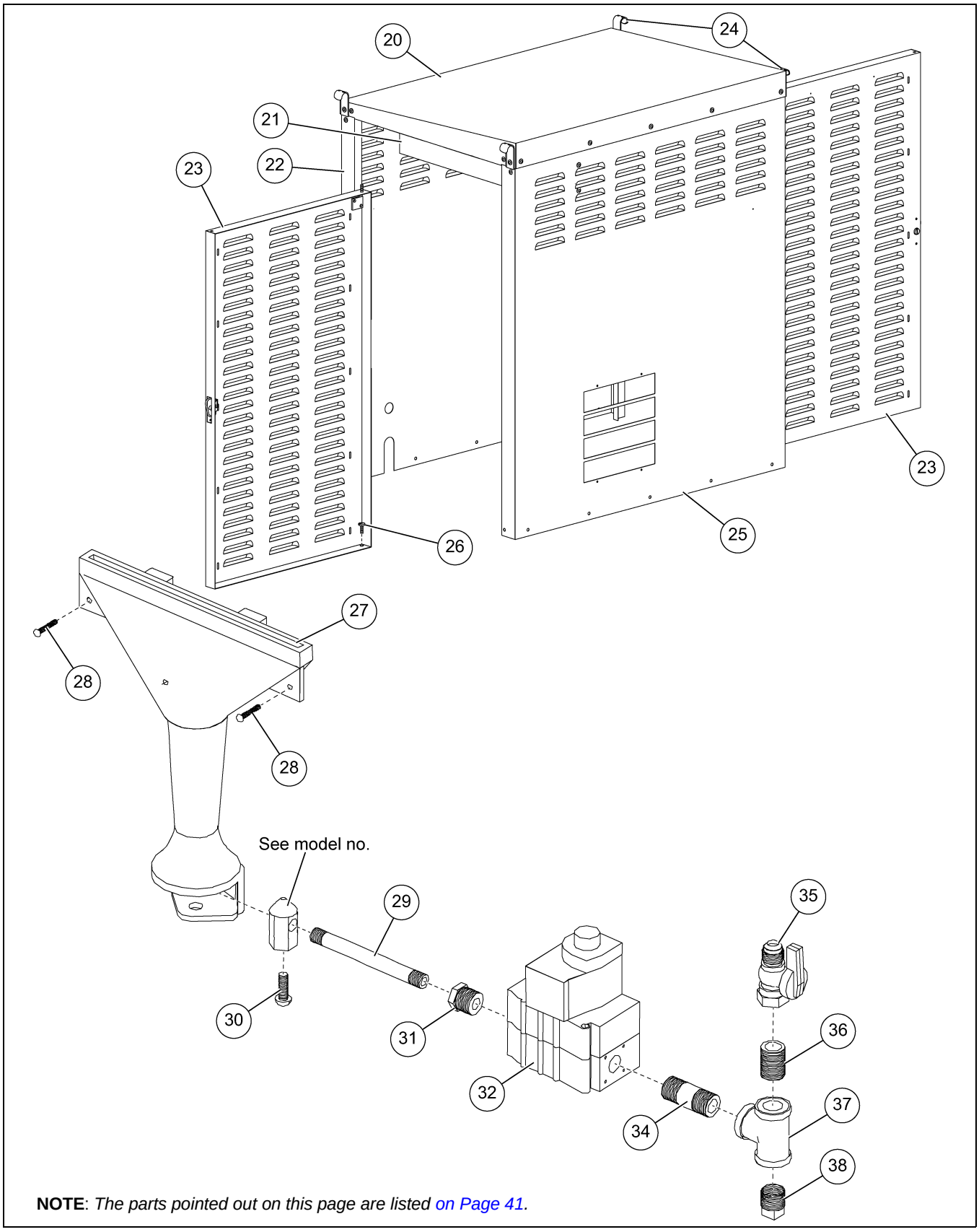
120K-225K BTU (HSI and DSI)



NOTE: *The parts pointed out on this page are listed on Page 41.*

Figure 11A *Models SS-225-XXL, SS-200-XL, SS-175-XL and SS-120-XL*

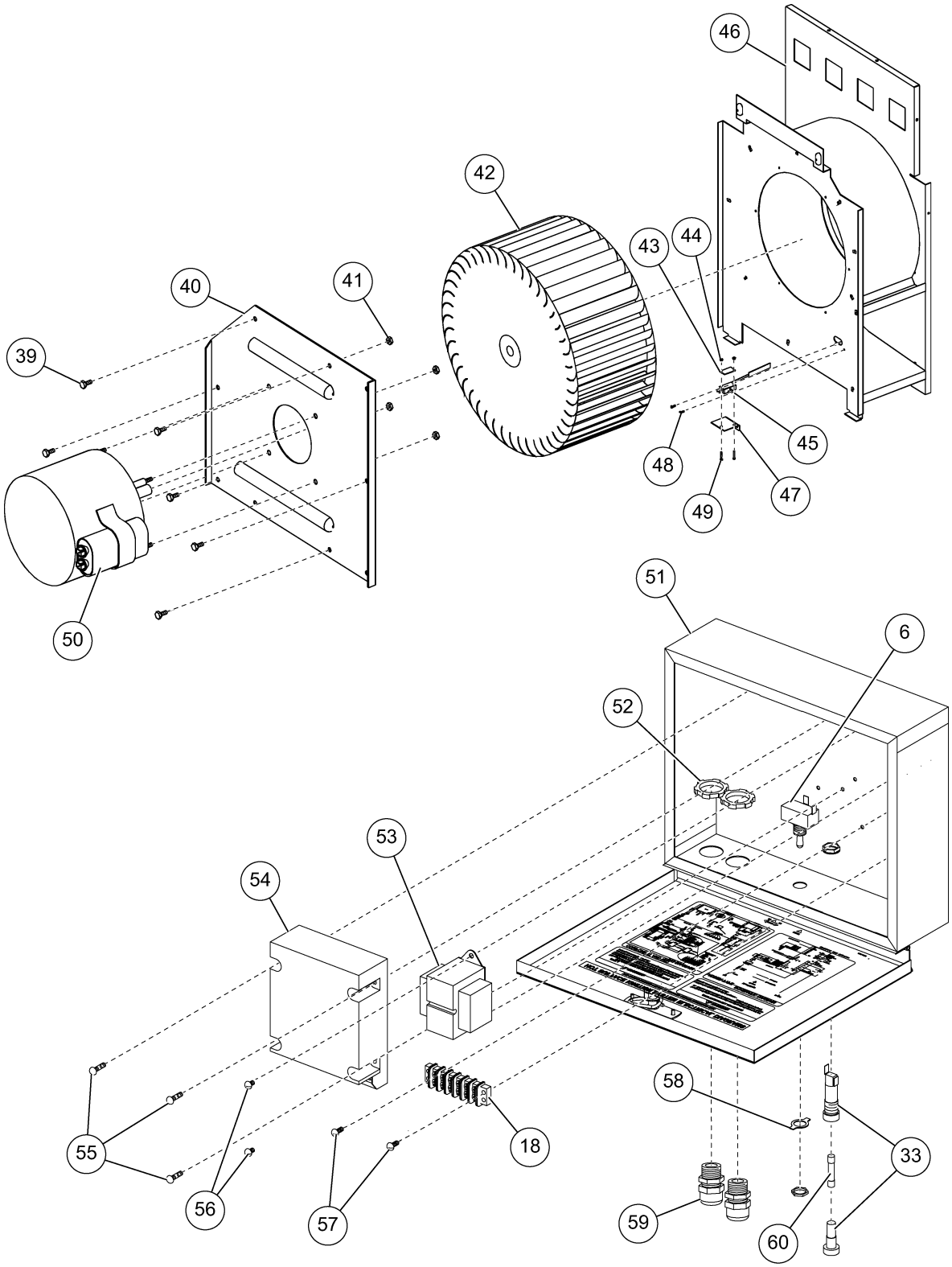
120K-225K BTU (HSI and DSI) (Continued)



NOTE: *The parts pointed out on this page are listed on Page 41.*

Figure 11B *SS-225-XXL, SS-200-XL, SS-175-XL and SS-120-XL*

120K-225K BTU (HSI and DSI) (Continued)



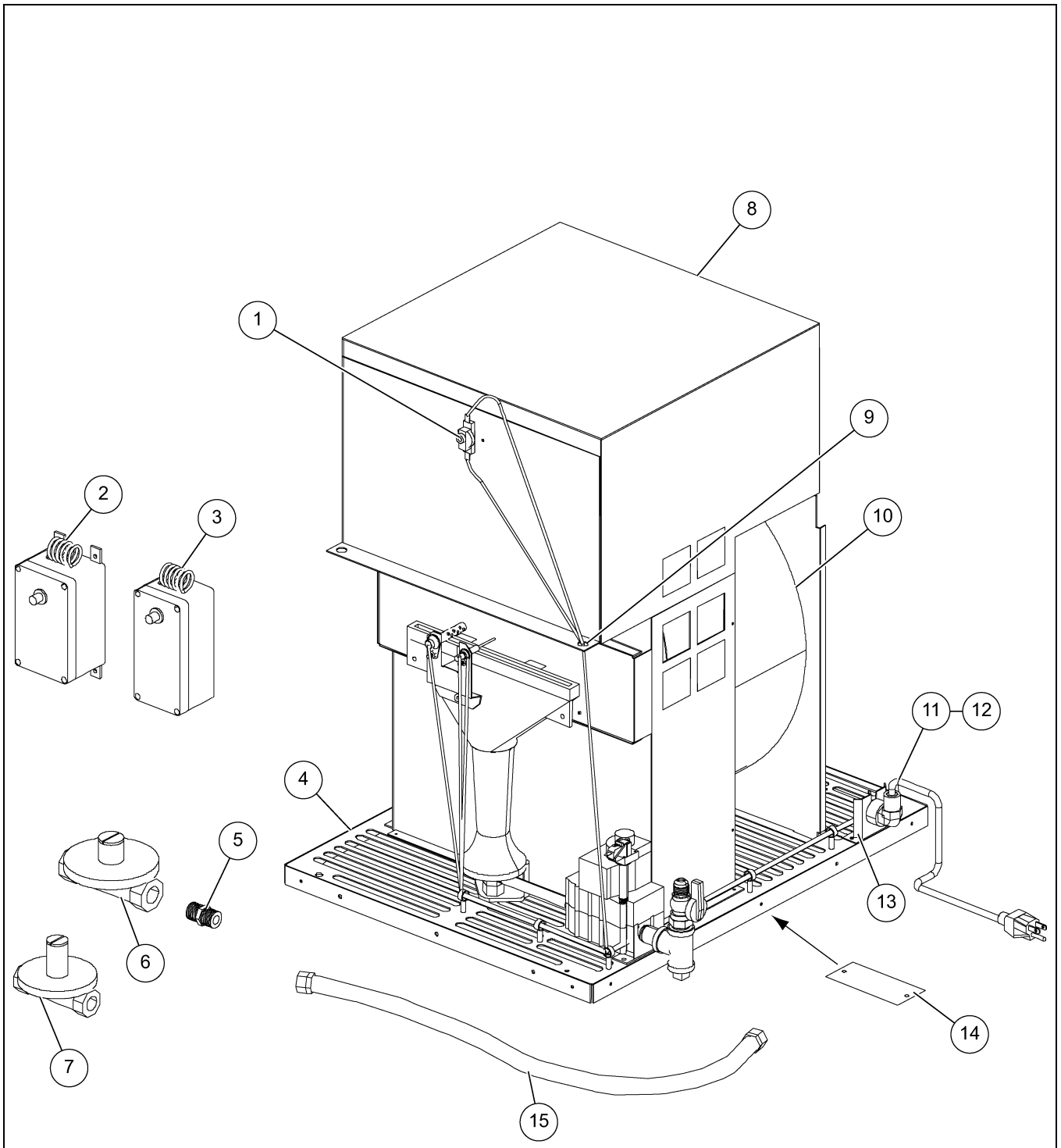
NOTE: *The parts pointed out on this page are listed on Page 41.*

Figure 11C *Models SS-225-XXL, SS-200-XL, SS-175-XL and SS-120-XL*

120K-225K BTU (HSI and DSI) Parts List

Ref #	Part #	Description
1	1903-3800	Harness Control 120V-K - HSI
	1903-3802	Harness Control 120V-K - DSI
2	3005-0107	TSTAT TDISC 60T15 320D Airstream
3	6450-0094-HH	RK Flame Probe 2.2"
4	3002-3004	Igniter 120 VAC Mini 3" SCB
5	3002-6010	Electrode DSI Fenwall Brooder
6	3001-2862	Switch SPST Toggle Tabs
7	6401-4515	Bottom Assembly
8	6401-4512	Blower Wheel Housing Welded
9	3005-0102	TSTAT T19SB-1C SS Single SPDT
10	3005-2130	TSTAT T19PC-3C C/F Liquid Tight
11	6401-4501	Control Enclosure Complete 12V - HSI
	6401-4543	Control Enclosure Complete 12V - DSI
12	1021-2501	Pipe Brass Fitting
13	1045-0100	Gas Regulator - LP
14	1045-1305	Gas Regulator - NG
15	0404-2358	Cord Connection Support Bracket
16	1902-4010	Cable Assembly
17	1010-1317	Hose, Gas LP or NG 10'
18	3006-1581	Connection Terminal Block
19	6401-4510	Burn Chamber Assembly
20	0404-11050	Panel Top
21	0404-7036	Plate Elect Enclosure Mount
22	0404-11467	Panel Cable Back
23	6401-0226-HH	Door Assembly
24	0404-10773	Heater Hanger Bracket
25	0404-11466	Panel Cable Front
26	1004-1406	Screw, Machine 1/4"-20 x 1/2"
27	6401-1308	Burner Painted
28	1004-1102	Screw, SM #8-15 x 1-1/2"
29	1041-5004	Nipple, Pipe 1/4" x 5" Black
30	1004-1422	Screw, Cap 3/8"-16 x 3/4"
31	1021-1495	Pipe, 1/2" to 1/4" Reducer Fitting
32	3004-0100	Gas Valve - LP
	3004-0101	Gas Valve - NG
33	1042-2693	Fuse Holder, Shock Safe, Lit Fuse
34	1041-1491	Nipple, 1/2" x 2" Black
35	1009-1500	Valve Bronze Ball 1/2" NPT x 1/2"
36	1041-1488	Nipple, 1/2" Close Black
37	1021-1500	Fitting Pipe 1/2" T Galvanized
38	1021-1496	Fitting Pipe 1/2" Plug
39	1004-6035	Screw, 3/16" x 1/2"
40	0408-6673-HH	Motor Mount Plate
41	1001-2599	Nut, Lock #10-32
42	6401-1318	Blower Wheel
43	0408-5017-HH	Plate Sail Switch Spacer
44	1001-1452	Nut, Lock #4-40
45	3001-1740	Switch Micro with Sail Lever
46	6401-4508	Blower Wheel Housing Assembly
47	0408-7022	Sail Switch Bracket
48	1004-1130	Screw, SM #8-15 x 1/2"
49	1004-1410	Screw, Machine #4-40 x 3/4"
50	3017-1300	Motor, 1100 1/3 HP 120V 60 Hz
51	6401-4502	Control Enclosure Assembly 120V - HSI
	6401-4545	Control Enclosure Assembly 120V - DSI
52	1001-2158	Nut, Lock 1/2" Romex Connection
53	6401-2911-HH	Transformer 120V/24V 40VA 50/60 Hz
54	3591-1851	Module UT Electronic - HSI
	3591-1200	Module UT - DSI
55	1004-2136	Screw, 8/32" x 5/8"
56	1004-2306	Screw, 8/32" x 1/4"
57	1004-2138	Screw, 8/32" x 1/2"
58	3001-2080	Switch Indicator ON/OFF
59	1013-2047	Liquid Tight Fitting 1/2"
60	3010-2139	Fuse 10 Amp 1/4" x 1-1/4"

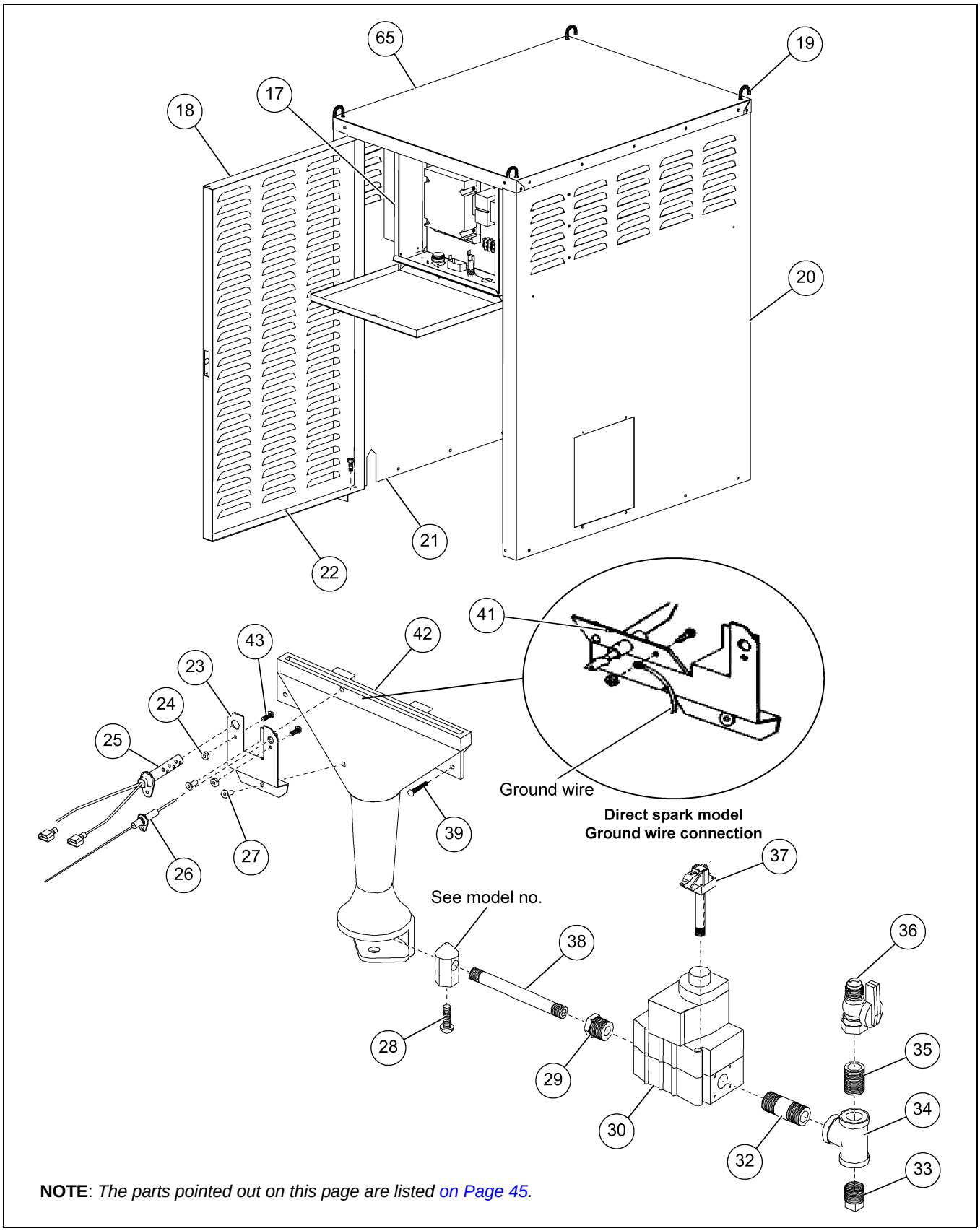
40K and 75K BTU (HSI and DSI)



NOTE: *The parts pointed out on this page are listed* *on Page 45*.

Figure 11D *Models SS-75-XL and SS-40-XL*

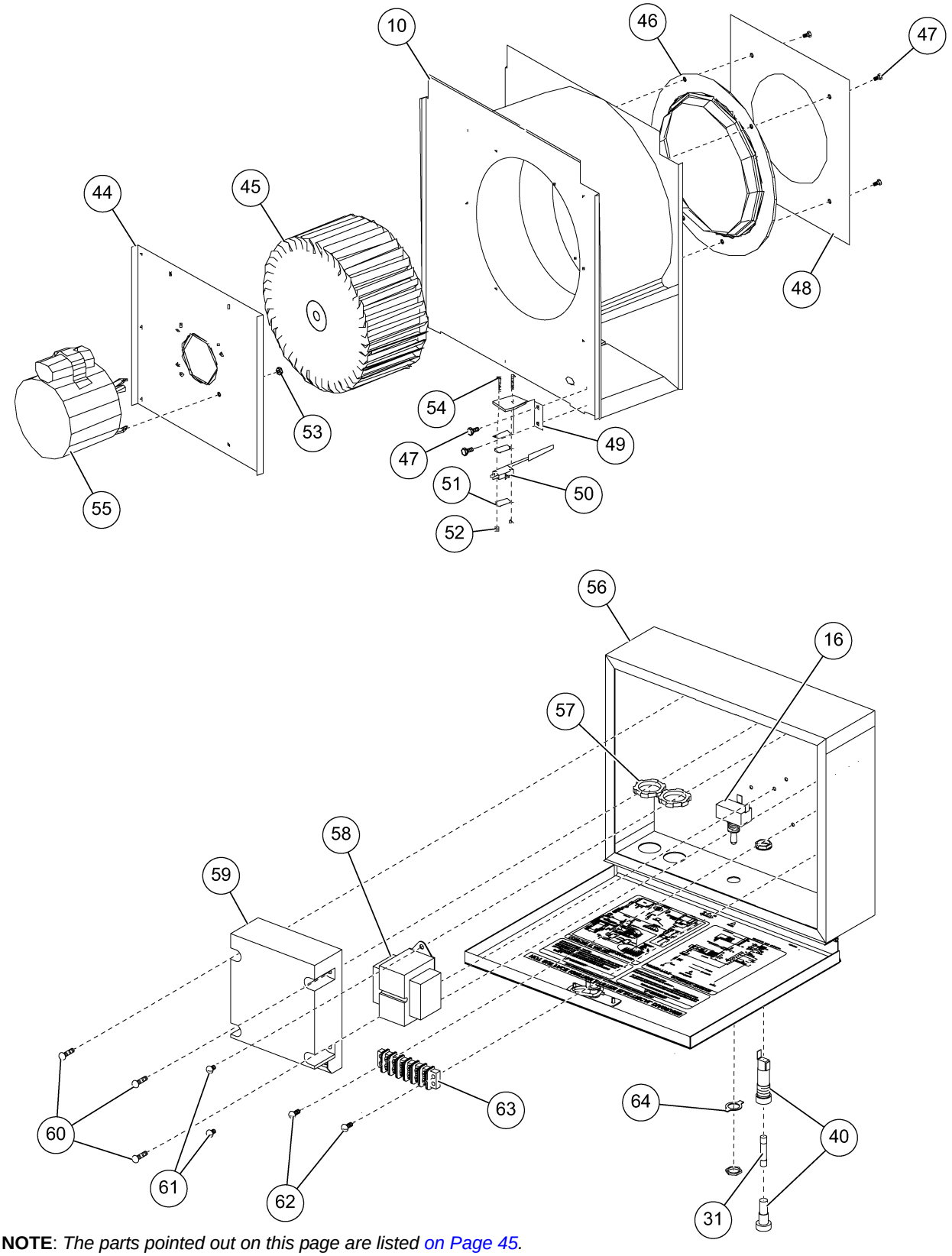
40K and 75K BTU (HSI and DSI) (Continued)



NOTE: *The parts pointed out on this page are listed* *on Page 45*.

Figure 11E *Models SS-75-XL and SS-40-XL*

40K and 75K BTU (HSI and DSI) (Continued)



NOTE: *The parts pointed out on this page are listed* *on Page 45*.

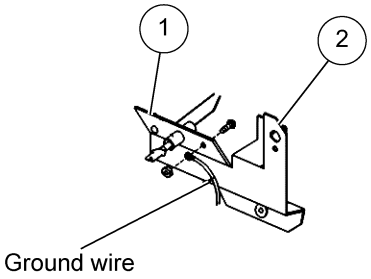
Figure 11F *Models SS-75-XL and SS-40-XL*

40K and 75K BTU (HSI and DSI) Parts List

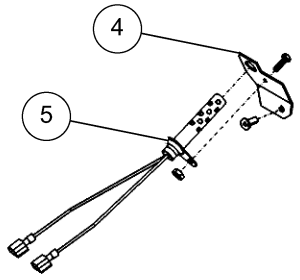
Ref #	Part #	Description
1	3005-0108	TSTAT TDISC 60T15 350D Airstream - 75K
	3005-0111	TSTAT TDISC 60T15 280D Airstream - 40K
2	3005-2130	TSTAT T19PC-3C C/F Liquid Tight
3	3005-0102	TSTAT T19SB-1C SS Single SPDT
4	0404-2742	Panel Cable Bottom
5	1021-2501	Pipe Brass Fitting
6	1045-0100	Gas Regulator - LP
7	1045-1305	Gas Regulator - NG
8	6401-2890	Burner Chamber Welded
9	1007-1614	Strain Relief 1/4" Heyco
10	6401-2881	Blower Wheel Housing Welded
11	1903-3803	Harness Control 120V-K - HSI for Low Pressure Switch
	1903-3804	Harness Control 120V - DSI for Low Pressure Switch
12	1903-3805	Harness Control 120V-K - HSI for Natural Gas
	1903-3806	Harness Control 120V - DSI for Natural Gas
13	0404-2358	Cord Connection Support Bracket
14	0408-1885	Plate Inlet Restrict (40K Only)
15	1010-1317	Hose, Gas LP or NG 10'
16	3001-2862	Switch SPST Toggle Tabs
17	6401-4543	Control Enclosure Assembly 120V - HSI
	6401-4501	Control Enclosure Assembly 120V - DSI
18	6401-2866-HH	Door Assembly
19	6401-1140	J-Bolt with Nut Assembly
20	0404-2739	Panel Cable Front
21	0404-2740	Panel Cable Back
22	1004-1406	Screw, Machine 1/4"-20 x 1/2"
23	0408-4347	Bracket Igniter 225/75" Mini
24	1001-2597	Nut, Lock #8-32
25	3002-5000	Igniter 120 VAC Mini 2-1/2" Hot
26	1901-4015	WCS 18 Gauge Yellow 50 Flame Probe 7
27	1005-0100	Rivet
28	1004-1422	Screw, Cap 3/8"-16 x 3/4"
29	1021-1495	Fitting Pipe 1/2" to 1/4" Reducer
30	3004-0100	Gas Valve - LP
	3004-0101	Gas Valve - NG

Ref #	Part #	Description
31	3010-2139	Fuse 10 Amp 1/4" x 1-1/4"
32	1041-1491	Nipple, 1/2" x 2" Black
33	1021-1496	Pipe Fitting 1/2" Plug
34	1021-1500	Pipe Fitting 1/2" T Galvanized
35	1041-1488	Nipple, 1/2" Close Black
36	1009-1500	Valve Bronze Ball 1/2" NPT x 1/2"
37	3001-0111	Switch Gas Pressure
38	1041-2427	Nipple, 1/4" x 3-1/4" Black
39	1004-1102	Screw, SM #8-15 x 1-1/2"
40	1042-2693	Fuse Holder, Shock Safe, Lit Fuse
41	3002-6010	Electrode DSI Fenwall Brooder
42	6401-1307-HH	Burner Painted
43	1004-6029	Screw, #8-32 x 1/2"
44	0408-1231-HH	Plate Motor Mount
45	6401-1726	Blower Wheel
46	0408-1883	Baffle Inlet
47	1004-1130	Screw, SM #8-15 x 1/2"
48	0408-2314	Plate Blower Inlet Rest (40K Only)
49	0408-1146-HH	Sail Switch Bracket
50	3001-1740	Switch Micro with Sail Lever
51	0408-5017-HH	Plate Sail Switch Spacer
52	1001-1452	Nut, Lock #4-40
53	1001-2599	Nut, Lock #10-32
54	1004-1410	Screw, Machine #4-40 x 3/4"
55	3017-1302	Motor, 1/10 HP 115V 60 Hz BLW
56	6401-4502	Control Enclosure Assembly 120V - HSI
	6401-4545	Control Enclosure Assembly 120V - DSI
57	1001-2158	Nut, Lock 1/2" Romex Connection
58	6401-2911-HH	Transformer 120V/24V 40VA 50/60 Hz
59	3591-1851	Module UT Electronic - HSI
	3591-1200	Module UT - DSI
60	1004-2136	Screw, 8/32" x 5/8"
61	1004-2306	Screw, 8/32" x 1/4"
62	1004-2138	Screw, 8/32" x 1/2"
63	3006-1581	Connection Terminal Block
64	3001-2080	Switch Indicator ON/OFF
65	0404-2738	Panel Cable

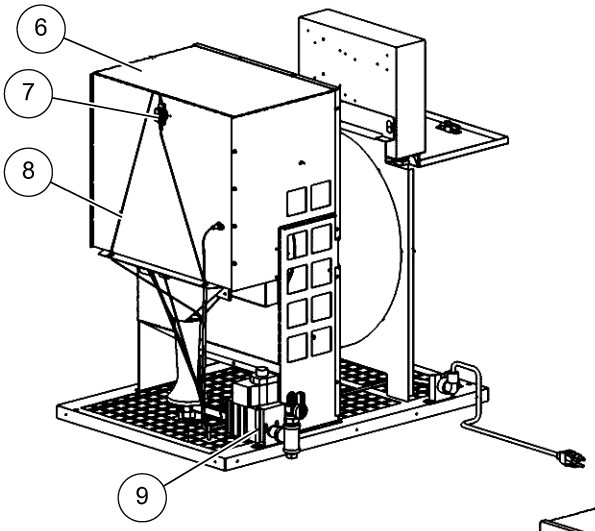
250K BTU (HSI and DSI)

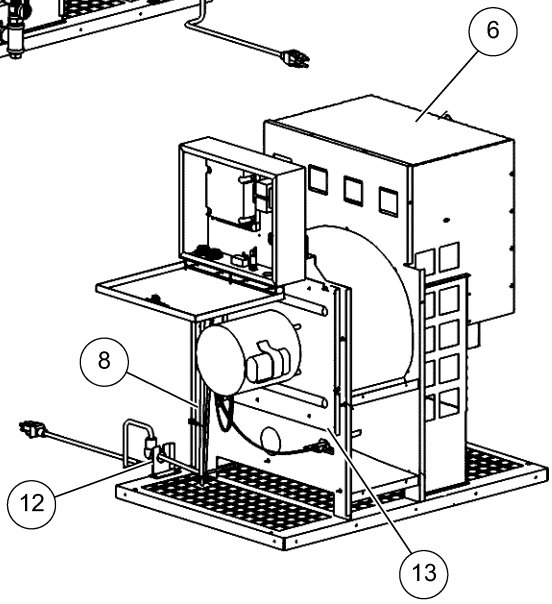


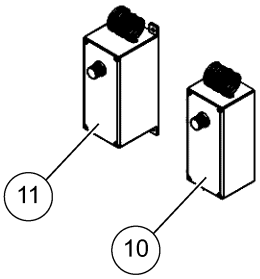
Direct spark model
Ground wire connection



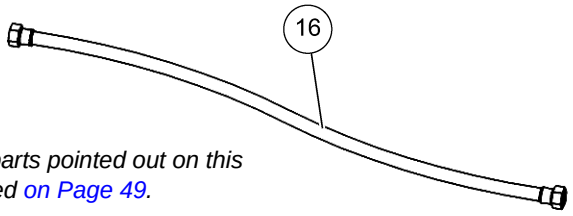
Hot surface ignition model

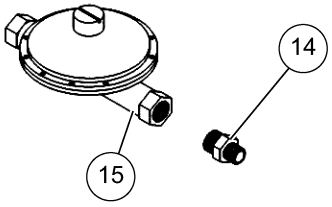






Thermostats

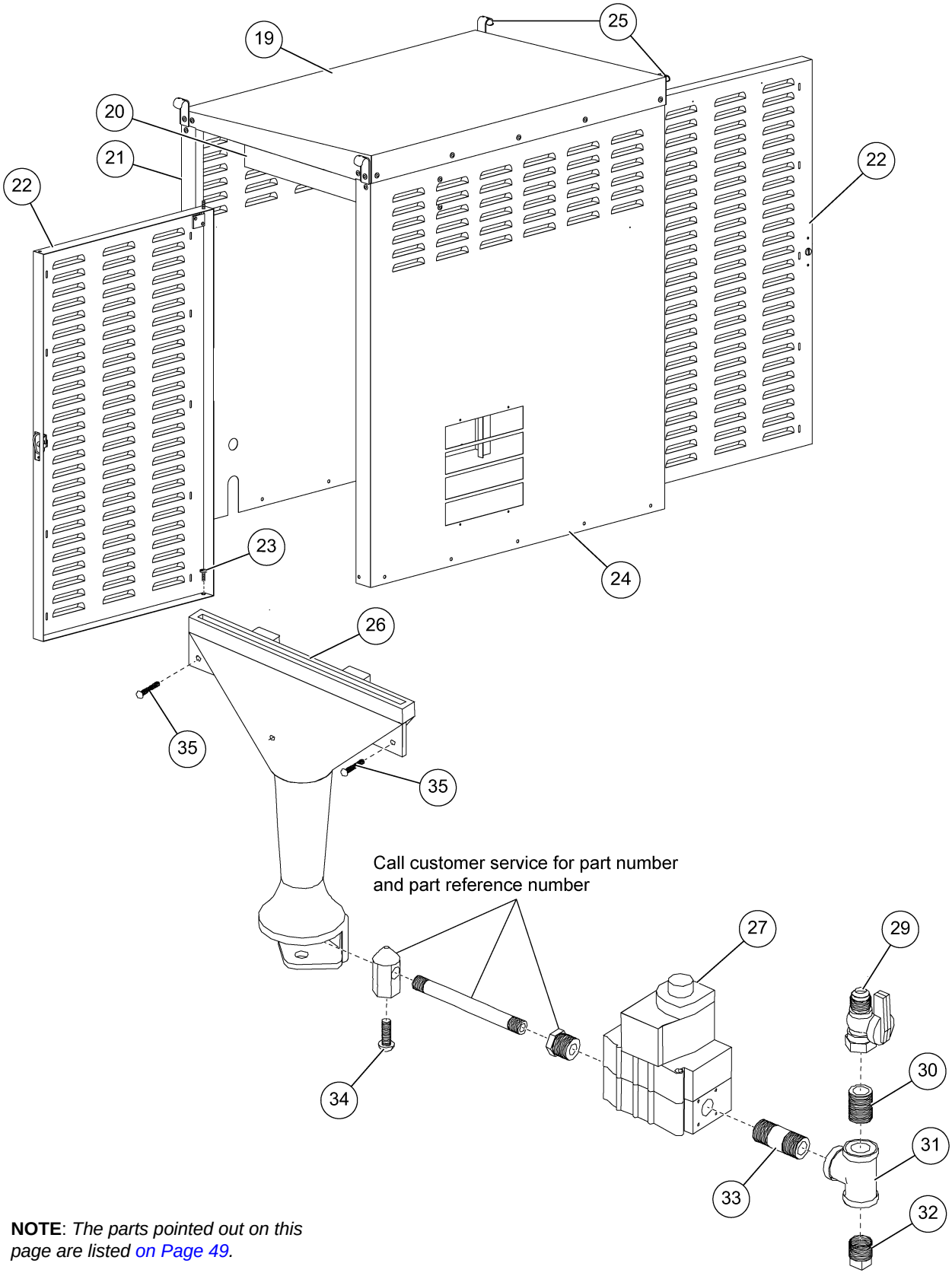




NOTE: *The parts pointed out on this page are listed on Page 49.*

Figure 11G

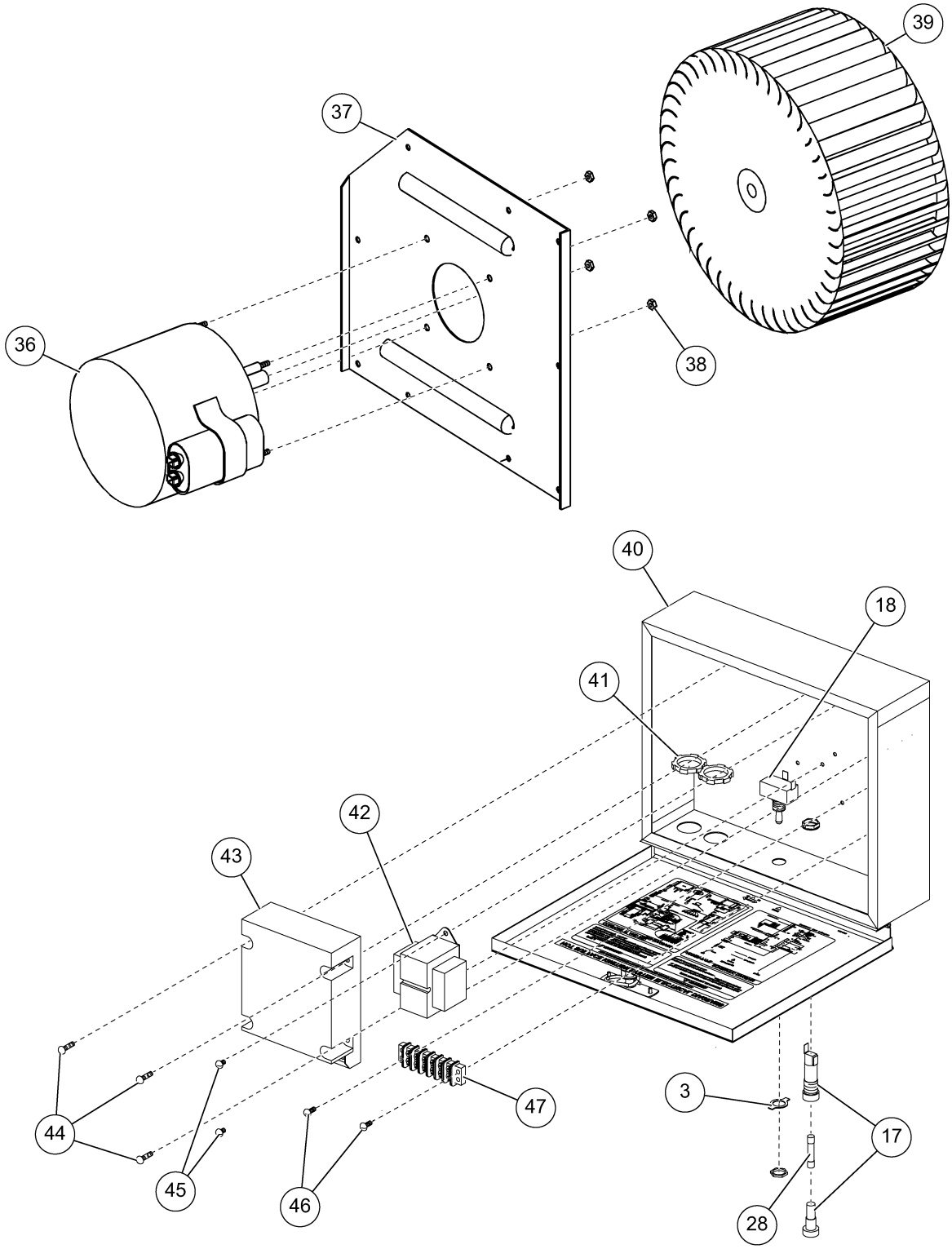
250K BTU (HSI and DSI) (Continued)



NOTE: *The parts pointed out on this page are listed* *on Page 49*.

Figure 11H

250K BTU (HSI and DSI) (Continued)



NOTE: *The parts pointed out on this page are listed* *on Page 49*.

Figure 11I

250K BTU (HSI and DSI) Parts List

Ref #	Part #	Description
1	3002-6010	Electrode DSI Fenwall Brooder
2	0408-8089-HH	Igniter Bracket
3	3001-2080	Switch Indicator ON/OFF
4	0408-10606	Retro Bracket Ignition
5	3002-3004	Igniter 120 VAC Mini 3" SCB
6	6401-4547	Burn Chamber/Bottom
7	3005-0109	TSTAT TDISC 60T15 310D Airstream
8	1903-3800	Harness Control 120V-K - HSI
	1903-3802	Harness Control 120V-K - DSI
9	0404-3267	Gas Valve Support Bracket
10	3005-0102	TSTAT T19SB-1C SS Single SPDT
11	3005-2130	TSTAT T19PC-3C C/F Liquid Tight
12	0404-2358	Cord Connection Support Bracket
13	6401-4550-HH	Blower Wheel Motor Assembly
14	1021-2501	Pipe Brass Fitting
15	1045-0100	Gas Regulator - LP
	1045-1305	Gas Regulator - NG
16	1010-1317	Hose, Gas LP or NG 10'
17	1042-2693	Fuse Holder, Shock Safe, Lit Fuse
18	3001-2862	Switch SPST Toggle Tabs
19	0404-10658	Blower Wheel Motor Assembly
20	0404-7036	Plate Elect Enclosure Mount
21	0404-10629	Panel Cab Back
22	6401-0226	Door Assembly
23	1004-1406	Screw, Machine 1/4"-20 x 1/2"
24	0404-10628	Panel Cable Front
25	0404-10773	Heater Hanger Bracket

Ref #	Part #	Description
26	6401-4546	Burner Assembly LP/NG - HSI
	6401-0158	Burner 240/120 - DSI
27	3004-0100	Gas Valve - LP
	3004-0101	Gas Valve - NG
28	3010-2140	Fuse 10 Amp 1/4" x 1-1/4"
29	1009-1500	Valve Bronze Ball 1/2" NPT x 1/2"
30	1041-1488	Nipple, 1/2" Close Black
31	1021-1500	Pipe Fitting 1/2" T Galvanized
32	1021-1496	Pipe Fitting 1/2" Plug
33	1041-1491	Nipple, 1/2" x 2" Black
34	1004-1422	Screw, Cap 3/8"-16 x 3/4"
35	1004-1102	Screw, SM #8-15 x 1-1/2"
36	3017-1303	Motor, 1100 1/3 HP 120V 60 Hz
37	0408-6673-HH	Motor Mount Plate
38	1001-2599	Nut, Lock #10-32
39	6401-1319	Blower Wheel
40	6401-4502	Control Enclosure Assembly 120V - HSI
	6401-4545	Control Enclosure Assembly 120V - DSI
41	1001-2158	Nut, Lock 1/2" Romex Connection
42	6401-2911-HH	Transformer 120V/24V 40VA 50/60 Hz
43	3591-1851	Module UT Electronic - HSI
	3591-1200	Module UT - DSI
44	1004-2136	Screw, 8/32" x 5/8"
45	1004-2306	Screw, 8/32" x 1/4"
46	1004-2138	Screw, 8/32" x 1/2"
47	3006-1581	Connection Terminal Block

NOTES

Limited Warranty - Protein Products

The GSI Group, LLC. (“GSI”) warrants products which it manufactures, to be free of defects in materials and workmanship under normal usage and conditions for a period of 12 months from the date of purchase (or, if shipped by vessel, 14 months from the date of arrival at the port of discharge). If, in GSI’s sole judgment, a product is found to have a defect in materials and/or workmanship, GSI will, at its own option and expense, repair or replace the product or refund the purchase price. This Limited Warranty is subject to extension and other terms as set forth below.

Warranty Enhancements:

The warranty period for the following products is enhanced as shown below and is in lieu of (and not in addition to) the above stated warranty period.

	Product	Warranty Period
AP® Fans	Performer Series Direct Drive Fan Motor	3 Years
AP® and Cumberland®	Flex-Flo/Pan Feeding System Motors	2 Years
Electronic Controls	All Protein controls manufactured by GSI	24 Months from date code on part
Cumberland® Feeding and Watering Systems	Feeder System Pan Assemblies	5 Years, Prorated **
	Feed Tubes (1.75" and 2.00")	10 Years, Prorated **
	Centerless Augers	10 Years, Prorated **
	Watering Nipples	10 Years, Prorated **

* Warranty prorated from material list price:
0 to 3 years - no material cost to end user
3 to 5 years - end user pays 25%
5 to 7 years - end user pays 50%
7 to 10 years - end user pays 75%

** Warranty prorated from material list price:
0 to 3 years - no material cost to end user
3 to 5 years - end user pays 75%

Conditions and Limitations:

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY DESCRIPTION SET FORTH HEREIN; SPECIFICALLY, GSI DISCLAIMS ANY AND ALL OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH: (I) ANY PRODUCT MANUFACTURED OR SOLD BY GSI, OR (II) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

The sole and exclusive remedy for any claimant is set forth in this Limited Warranty and shall not exceed the amount paid for the product purchased. This Warranty only covers the value of the warranted parts and equipment, and does not cover labor charges for removing or installing defective parts, shipping charges with respect to such parts, any applicable sales or other taxes, or any other charges or expenses not specified in this Warranty. GSI shall not be liable for any other direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. Expenses incurred by or on behalf of a claimant without prior written authorization from the GSI warranty department shall not be reimbursed. This warranty is not transferable and applies only to the original end user. GSI shall have no obligation or responsibility for any representations or warranties made by or on behalf of any dealer, agent or distributor. Prior to installation, the end user bears all responsibility to comply with federal, state and local codes which apply to the location and installation of the products.

This Limited Warranty extends solely to products sold by GSI and does not cover any parts, components or materials used in conjunction with the product, that are not sold by GSI. GSI assumes no responsibility for claims resulting from construction defects, unauthorized modifications, corrosion or other cosmetic issues caused by storage, application or environmental conditions. Modifications to products not specifically delineated in the manual accompanying the product at initial sale will void all warranties. This Limited Warranty shall not extend to products or parts which have been damaged by negligent use, misuse, alteration, accident or which have been improperly/inadequately maintained.

Service Parts:

GSI warrants, subject to all other conditions described in this Warranty, Service Parts which it manufactures for a period of 12 months from the date of purchase, unless specified in Enhancements above. Parts not manufactured by GSI will carry the Manufacturer’s Warranty.

(Protein Limited Warranty_REV01_06 November 2018)

This equipment shall be installed in accordance with the current installation codes and applicable regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

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