SURE FLAME

IX1500 / IX1500L / IX1500NC

INDIRECT CONSTRUCTION HEATER

1,500,000 Btu/h

Operation and Maintenance Manual

Retain these instructions for future reference.

⚠ WARNING

Read and follow all installation, and operating instructions before first use of this product.

Sure Flame Products
A Divison of Haul-All Equipment
4115 - 18 Avenue North
Lethbridge, Alberta T1H 5G1
www.sureflame.com

P/N 974-9464
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GENERAL HAZARD WARNING

Failure to comply with the 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.

Only persons who can understand and follow the instructions should use or service this heater.

If you need assistance or heater information such as an instruction manual, labels, etc. Contact the manufacturer.

WARNING

Fire, burn, inhalation, and explosion hazard. Keep solid combustibles, such as building materials, paper or cardboard, a safe distance away from the heater as recommended by the instructions. Never use the heater in spaces which do or may contain volatile or airborne combustibles, or products such as gasoline, solvents, paint thinner, dust particles or unknown chemicals.

WARNING

Not for home or recreational vehicle use.

Read this Warning First

This heater is designed and approved for use as a construction heater under ANSI Z83.7/CSA 2.14. The primary purpose of construction heaters is to provide temporary heating of buildings under construction, alteration, or repair and to provide temporary emergency heat. Properly used, the heater provides safe economical heating. Since the products of combustion are released, it is imperative that the flue stack is extended outside of the enclosed area when the heater is positioned indoors.

This heater is not designed as an Unvented Gas Fired Room Heater under ANSI-Z21.11.2 and should not be used in the home. ANSI A119.2 (NFPA 501C) Recreational Vehicle Standard prohibits the installation or storage of LP-Gas containers even temporarily inside any recreational vehicle. The standard also prohibits the use of Unvented Heaters in such vehicles.

Installation must comply with local codes, or in the absence of local codes, with the *National Fuel Gas Code ANSI Z223.1/NFPA 54* and the *Standard for the Storage and Handling of Liquified Petroleum Gases ANSI/NFPA 58*.

Gas inspection authorities in Canada require that the installation and maintenance of heaters and accessories be accomplished by qualified gas fitters.
Installation must comply with local codes, and with the Natural Gas and Propane Installation Code CSA-B149.1.

We cannot anticipate every use which may be made for our heaters.
CHECK WITH YOUR LOCAL FIRE SAFETY AUTHORITY IF YOU HAVE QUESTIONS ABOUT LOCAL REGULATIONS.
Other standards govern the use of fuel gases and heat producing products in specific applications. Your local authority can advise you about these

WARNING
Air Quality Hazard

• Do not use this heater for heating human living quarters.
Use of direct-fired heaters in the construction environment can result in exposure to levels of CO, CO2, and NO2 considered to be hazardous to health and potentially life threatening.
• Do not use in unventilated areas.
• Know the signs of CO and CO2 poisoning.
- Headaches, stinging eyes
- Dizziness, disorientation
- Difficulty breathing, feels of being suffocated
• Proper ventilation air exchange (OSHA 29 CFR 1926.57)to support combustion and maintain acceptable air quality shall be provided in accordance with OSHA 29 CFR Part 1926.154, ANSI A10.10 Safety Requirements for Temporary and Portable Space Heating Devices and Equipment used in the Construction Industry or the Natural Gas and Propane Installation Codes CSA B149.1.
- Periodically monitor levels of CO, CO2 and NO2 existing at the construction site - at the minimum at the start of the shift and after 4 hours
- Provide ventilation air exchange, either natural or mechanical, as required to maintain acceptable indoor air quality

	USA 8-Hr Time weighted average (OSHA 29 CFR 1926.55 App A)	Canada 8-hr time weighted average WorkSafe BC OHS Guidelines Part 5.1 and Ontario Workplaces Reg 833
CO	50 ppm	25 ppm
CO2	5000 ppm	5000 ppm
NO2		3 ppm (Reg 833)

	USA - Ceiling Limit (Short Term Exposure Limit = 15 minutes)	Canada STEL (15 minutes Reg 833/1 hour WSBC) WorkSafe BC OHS Guidelines Part 5.1 and Ontario Workplaces Reg 833
CO		100 ppm
CO2		15000 ppm(WSBC) 30000 ppm(Reg 833)
NO2	5 ppm	1.0 ppm(WorkSafeBC) 5.0 ppm (Reg 833)

• Ensure that the flow of combustion and ventilation air exchange cannot become obstructed.
• As the building 'tightens up'during the construction phases ventilation may need to be increased.

Table of Contents

Specifications

IX1500/IX1500L

Fuel

Natural Gas
Vapour Propane

Input Capacity

Maximum: 1,500,000 Btuh (440 kWh)
Minimum: 1,150,000 Btuh (337 kWh)

Inlet Pressure

Maximum 5 psi (35 kPa)
Minimum 9” W.C. (2.2 kPa)

Manifold Pressure

	Natural Gas		Propane	
Altitude	Max	Min	Max	Min
0' - 2000'	4.4" (1100 Pa)	4.0" (1000 Pa)	3.9" (975 Pa)	3.7" (925 Pa)
2500'	4.2" (1050 Pa)	3.8" (950 Pa)	3.8" (950 Pa)	3.6" (900 Pa)
3000'	4.1" (1025 Pa)	3.7" (925 Pa)	3.8" (950 Pa)	3.5" (875 Pa)
3500'	4.1" (1025 Pa)	3.7" (925 Pa)	3.8" (950 Pa)	3.5" (875 Pa)
4000'	4.0" (1000 Pa)	3.6" (900 Pa)	3.7" (925 Pa)	3.5" (875 Pa)
4500'	4.0" (1000 Pa)	3.6" (900 Pa)	3.7" (925 Pa)	3.5" (875 Pa)

Fuel Consumption

Natural Gas 1500 ft^3/h (42.5 m^3/h)
Propane 69.2 lb/h (31.4 kg/h)

Electrical Rating

See specification decal on heater

Fan

8000 cfm (3775 l/s)

Temperature Rise

125-215 °F (70-120 °C)

Maximum Temperature Output

293 °F (145 °C)

Rated Flue Temperature

480°F (250 °C)
Rated vent pressure - Positive
Category III

Minimum Operating Temperature

-22 °F (-30 °C)

Dimensions

LxWxH 114” x 32.5” x 77.5”
(290 cm x 83 cm x 197 cm)

IX1500NC

Fuel

Natural Gas

Input Capacity

Maximum: 1,500,000 Btuh (440 kWh)

Inlet Pressure

Maximum 5 psi (35 kPa)
Minimum 9” W.C. (2.2 kPa)

Manifold Pressure

Altitude	Max / Min
0' - 2000'	4.5" (1125 Pa)
2500'	4.3" (1075 Pa)
3000'	4.2" (1050 Pa)
3500'	4.2" (1050 Pa)
4000'	4.1" (1025 Pa)
4500'	4.1" (1025 Pa)

Fuel Consumption

Natural Gas 1500 ft^3/h (42.5 m^3/h)

Electrical Rating

See specification decal on heater

Fan

8000 cfm (3775 l/s)

Temperature Rise

170-215 °F (95-120 °C)

Maximum Temperature Output

293 °F (145 °C)

Rated Flue Temperature

480°F (250 °C)
Rated vent pressure - Positive
Category III

Minimum Operating Temperature

-22 °F (-30 °C)

Dimensions

LxWxH 114” x 32.5” x 77.5”
(290 cm x 83 cm x 197 cm)

Installation

The Sure Flame Model IX1500/IX1500L/IX1500NC is an indirect-fired gas heater intended to be used primarily for the temporary heating of buildings under construction, alteration or repair. Since the products of combustion are released, it is imperative that the flue stack is extended outside of the enclosed area when the heater is positioned indoors. The flow of supply air and exhaust gasses must not be obstructed in any manner.

The equipment shall be installed in accordance with theNational Fuel Code, ANSI 223.1/NFPA 54, and/or the Natural Gas and Propane Installation Code CSA B149.1, and applicable local regulations, which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

The heater shall be used in a horizontal position on a firm, non-combustible surface.

The electrical grounding of the appliance shall be in compliance with National Electrical Code, ANSI/NFPA 70, or the CSA C22.1, Canadian Electrical Code, Part I.

Installation at altitudes above 2000 ft (610 m) shall be in accordance with local codes, or in the absence of local codes, the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or National Standard of Canada, Natural Gas and Propane Installation Code, CSA B149.1.

Warning: The installation and maintenance of the heater must be accomplished by a qualified service person. The heater should be inspected before each use and at least annually.

Warning: Do not use this heater in a space where gasoline of other liquids with flammable vapours are stored or used.

Clearances

Clearance required for combustibles:

Front Outlet:	20 ft	(6 m)
Sides:	2 ft	(0.6 m)
Intake:	2 ft	(0.6 m)
Top:	5 ft	(1.5 m)
Ducts:	1 ft	(0.3 m)
Floor:	Noncombustible	

Minimum clearance required to LP Gas containers:

Outlet:	25 ft (7.6 m)
Top & Sides:	10 ft (3.0 m)

Position heater properly on a horizontal surface before use.

The hose assembly shall be protected from traffic, building materials and contact with hot surfaces both during use and while in storage. For use with or without ductwork. Only ductwork supplied by the manufacturer shall be used with this heater. For either indoor or outdoor use. Adequate ventilation must be provided. This heater is for operation at a temperature rise from 125°F to 215°F (70°C to 120°C).

All gas inspection authorities in Canada require that the installation and maintenance of heaters and accessories shall be accomplished by qualified gas fitters.

Ducting

The IX1500 series can be ducted on both the inlet and outlet. The inlet duct can be up to 50' of smooth 24”x24" metal duct The outlet duct shall be of a material able to withstand temperatures of up to 450F. Total outlet duct length may be up to 300' of straight, smooth, insulated metal duct 24”x24”. For each elbow, the allowable length is reduced by 50’.

Venting

The flue material is to be constructed of a **Type B (Type BH in Canada), Category III** venting material. The vent connector should be designed for a positive pressure and be constructed from material having corrosion resistance and durability to heat at last equivalent to that of No. 24 GSG galvanized steel. The venting system must be in accordance with the Installation Codes for Gas Burning Appliances and Equipment, As well as other local Regulations that may apply.

Flue Diameter	**12”**	**10”†**
Min. vertical height	15’	20’
Max. lateral length*	15’	0’
Max. # of added elbows**	2	0

*Lateral lengths must have a minimum 10% rise.
** A minimum vertical length of 3’ is required before the first elbow and after the last elbow.
† A minimum 3’ of 12” vertical flue should be installed before reducing to smaller diameters.

Consult the manufacturer for additional venting options.

Gas Connections

Ensure the correct regulator is used to supply the heater with maximum inlet pressure of 5 psi. Excessive pressure will damage components and void the warranty.

Visually inspect the fuel supply hose assembly. Ensure that it is protected from traffic, building materials, and contact with hot surfaces. Replace if there is evidence of excessive wear or abrasion.

After installation, check for gas leaks by applying a soapy solution at each piping and hose assembly connection.

Electrical Connection

Each time the heater is connected to a new electrical supply, it is critical that the rotation of both the burner impeller and the main cooling impeller be checked for proper rotation. This will require a visual check. It is not adequate to simply check for the flow of air because air will be flowing even with reversed rotation. Impellers can be activated by pressing the push button on the contactors in the control box.

The correction of the rotation should be made at the main electrical connection to the heater, and should only be performed by a qualified service person in accordance with local and national electrical codes.

Contact Sure Flame if you have any questions.

INSTALLATION USING A PROPANE SUPPLY TANK

1 When installing the heater for use with propane gas, set the gas selector valve to “Propane” and lock in position.

2 Arrange the propane supply system to provide for vapour withdrawal from the operating container. Supplying liquid propane to the heater is dangerous and will damage the components. Another regulator must be installed on the heater to reduce the pressure from this regulator to a maximum inlet pressure of 5 psi.

3 Ensure that for the surrounding temperature the size and capacity of the propane supply container is adequate to provide the rated Btu/h input to the heater.

4 Turn off the propane supply valve at the container when the heater is not in use.

5 The installation must conform with local codes, or in the absence of local codes, with the *Standard for the Storage and Handling of Liquedied Petroleum Gases, ANSI/NFPA 58* or the *Natural Gas and Propane Installation Code CSA-B149.1.*

6 When the heater is to be stored indoors the propane container must be disconnected from the heater and the container moved away and stored in accordance with the above national standards.

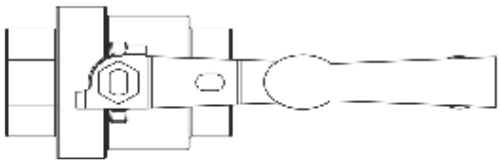
INSTALLATION FOR NATURAL GAS APPLICATIONS

1 When installing the heater for use with natural gas, set the gas selector valve to the “Natural” position.

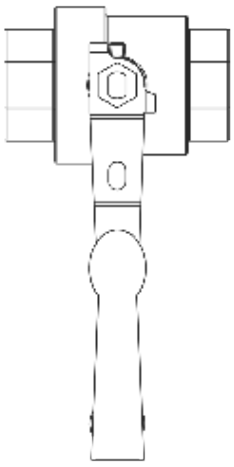
2 A regulator must be installed on the heater to ensure that the pressure to the heater does not exceed 5 psi inlet pressure.

3 The installation of this heater to a natural gas supply must conform with all applicable local codes, or in the absence of local codes, with the *National Fuel Gas Code ANSI Z223.1/ NFPA 54* or the *Natural Gas and Propane Installation Code CSA-B149.1.*

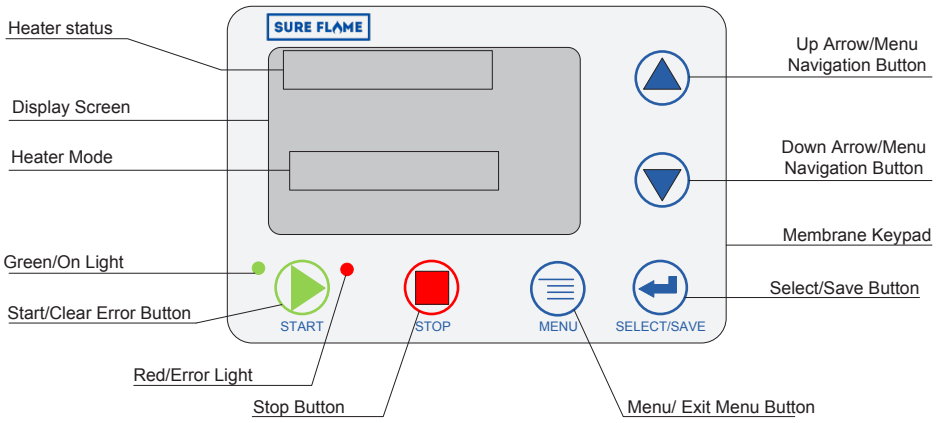
NATURAL GAS



PROPANE



Keypad and Display



When heater is first plugged in and the power selector switched on, the screen first displays the logo “SURE FLAME,” then displays the heater model and software version currently installed, and finally the Status/Mode/Run page.

Status

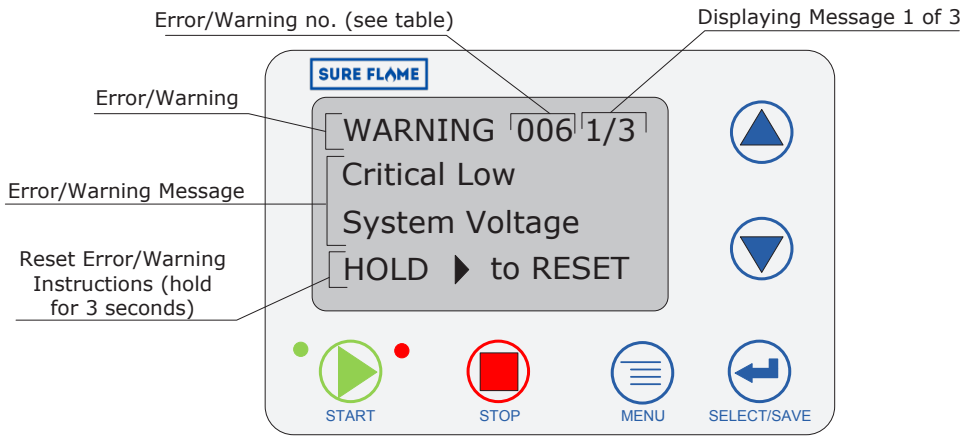
Status	Description
OFF	The heater goes to “OFF” when it is powered off. The heater also goes to “OFF” when STOP button is pressed. Heater does not start on its own when power is provided to unit.
Standby	When the start button is pressed and the heater is set to work with thermostat but there is no call for heat the heater will be in “Standby”. The modes that require a thermostat are “HI/LO/OFF, HI/OFF, & LO/OFF”.
Ignition	This status will always show when burner is firing up after a call for heat through thermostat or “CONST HI”, “CONST LO” modes and “HI/LO.”
ON	Burner is on and flame has been established.

Errors

Occasionally errors and warnings may be displayed on the screen. If more than one error is triggered the arrow keys can be used to scroll between the errors and warnings. The top right displays the current and total number of errors with the most recent being shown first. To reset the errors and warnings hold down the start button for 3 seconds. If the errors and warnings do not reset then the underlying problem must be addressed first. The error or warning can then be successfully reset.

When errors are triggered the error is displayed, the heater will shut down and the red light on the keypad will be turned on. When a warning is triggered it will display the message but it will not impede the function of the heater.

Warning /Error Message Example:



Menu

To access the menu press the MENU button and scroll using the arrow keys. Press SELECT/SAVE to select an option. Press MENU to back out of the menu.

Menu Item	Description
Heat Mode	Allows the switching between different heat modes and fan only mode.
Statistics	In this section the software version, heater serial number, voltage, flame rod signal, burner and blower hours of function can be viewed.
Error log	The past 50 errors are saved here and can be viewed.
Settings	Date and time can be set and viewed here. Language can be set here.

Heat Modes

To access heat modes, press the MENU button and scroll using the arrow keys to Heat Mode and press SELECT/SAVE.

Heater Mode	Description
Heater Mode	Heater switches between high fire, low fire and off based on thermostat.
HI/LO*	Heater switches between high and low fire based on thermostat and never turns off.
HI/OFF*	Heater runs between high fire and off based on thermostat. No low fire.
LO/OFF**	Heater runs between low fire and off based on thermostat. No high fire.
CNST ON/HI	Heater runs on high fire all the time and disregards thermostat. No jumper is required.
CNST ON/LO	Heater runs on low fire all the time and disregards thermostat. No jumper is required.
Fan Only	Circulation fan runs continuously. No heat.

*With a jumper instead of thermostat the heater runs constantly on high.
**With a jumper instead of thermostat the heater runs constantly on low.

Statistics

To access Statistics press the MENU button and scroll using the arrow keys to Statistics and press SELECT/SAVE.

Page	Descrition	
1	PCB voltage in	PCB system voltage
2	PCB system voltage	Circulation blower hours
3	PCB software version	Heater Serial Number

Error Log

To access the Error Log press the MENU button and scroll using the arrow keys to Error Log and press SELECT/SAVE.

Scroll up and down using the arrow keys to view the error history from most recent to oldest.

To clear the error log press and hold the SELECT/SAVE till the first line of the Error Log reads “End of Error Log”.

Settings

To access Settings, press the MENU button and scroll using the arrow keys to Settings and press SELECT/SAVE.

Setting	Description
Units	Choice between metric and imperial units (not applicable to this heater).
Date/Time	Set date and time here.
Language	Set Language here.

Set Date/Time

Access the settings menu. Scroll using the arrow keys to “Date/Time” and press the SELECT/SAVE. To set the date or time hold the SELECT/SAVE until the month starts blinks. To move from month to day or year press SELECT/SAVE until you reach the desired position. Use the arrow keys to set the new value. Press SELECT/SAVE to move to the next value to be changed. To save changes press and hold SELECT/SAVE until the seconds start counting up again.

Set Language

Access the settings menu. Scroll using the arrow keys to “Language” and press the SELECT/SAVE.

Scroll up and down using the arrow keys to the desired language setting and press SELECT/SAVE to set the new language. An asterisk * should appear next to the selected language. Press MENU button twice to return to status page.

Operating Instructions

Start

1. Set GAS SELECTOR VALVE to gas being used (dual-fuel models).
   NOTE: When using Propane Gas the Selector valve must be locked in position.
2. Ensure the firing valve (manual valve nearest the burner) is in the “ON” position.
3. Connect power. Use appropriate power supply as indicated by the ELECTRICAL RATING information.
4. Open gas supply.
5. Select desired heat mode (see above).
6. Press the START button.
7. The status will change to “Ignition.” Burner fan will start up and heater will attempt to ignite.
8. After flame is established, the status will change to “ON” with one or two flame symbols depending on whether the heater is in high or low fire (2 for high or 1 for low).

Stop

1. Press the STOP button.
2. Status will change to “OFF.”
3. Heater will go through shutdown phase. Burner will be in post purge for approximately 20 seconds. Main fan will shut down when heater has cooled down enough.

Warning: Do not stop the heater by turning off the main electrical switch. Heat accumulated in the heater can damage burner or safety equipment.

Maintenance

Warning: Disconnect gas and electrical supplies before servicing.

Weekly:

Gas Hose	Check for cracks and damaged connectors
Air flow	Remove any obstructions to air flow
Bearings	Lubricate bearings according to details below

Monthly:

Cords and Connectors	Check for cracks, exposed wires, and dirt in electrical connectors
Physical Integrity	Check for damage to body, louvers, and inlet screens that may obstruct air flow and impact combustion quality
Belts	Replace belts accordingly to details below

End of Season:

Combustion Chamber	Remove burner assembly and clean inside of combustion chamber with a wire brush. Vacuum all ash and soot from combustion chamber. Inspect combustion chamber for any damage. Do not use a heater that has a hole in the combustion chamber.
Heat Exchanger	Inspect the heat exchanger for any damage. Do not use a heater that has a hole in the heat exchanger. Remove any dust or dirt from heat exchanger enclosure with a metal brush and compressed air blower.
Burner	Remove burner from burner assembly Clean UV sensor and igniter with solvent or emery cloth. Inspect for cracked ceramic. Ensure the igniter is centered in the burner openings. Inspect wires for cracks or evidence of overheating. Ensure burner head screws are tight. Ensure gasket is in place and not damaged.
Electrical components	Check all wiring for loose, cracked, or overheated wires and connectors. Replace if necessary. Ensure ground wires are properly connected. Ensure control box seal is in place and not damaged.
Electric Motors	Wipe dirt from motors. Motors do not require lubrication.
Valve Train	Verify that manifold pressure matches the specification label. Adjust regulator pressure if necessary accordingly to details below. Inspect strainer and clean if necessary. Using soapy water or gas leak detector, check all gas connections for leaks.
Impellers	Remove any dirt build-up on both burner and blower impellers. Inspect impellers for loose or damaged fins. Run heater and check for vibration. Replace impellers that are damaged or causing vibration.
Body	Ensure all panels and shields are in place and that fasteners are tight.

Lubricating Bearings:

Warning: Disconnect power before servicing bearings.

Two pairs of bearings are installed in the heater. One pair is on the burner impeller, the second is on the main blower impeller. They need to be periodically lubricated according to the schedule below. Some situations may require a change in lubricating periods as dictated by experience. Generally, a lower quantity of grease at frequent intervals is more effective than a greater quantity at extended lubrication intervals. Select a grease that is compatible with a lithium or lithium complex grease.

Recommended Lubrication Schedule

	Lubrication Interval in Weeks	
Hours Run Per Day	Main Blower (2.7 gram per bearing)	Burner Blower (1.0 gram per bearing)
8	5	3
16	2	1
24	1	1

Storage: If equipment will be idle for some time, before shutting down, add compatible grease to the bearing until grease purges from the seals. This will ensure protection of the bearing, particularly when exposed to severe environmental conditions. After storage period, add fresh grease to the bearings before starting.

Replacing Belts:

Warning: Disconnect power before servicing belts.

There are two belt locations. The main blower uses a double belt transmission. It requires the belts to be paired, Both need to be changed at the same time and it should be replace/ serviced by qualified mechanic.

Tension the belts to a deflection force of 6.1Lbs (new) or 4.1Lbs (used) at 0.34” deflection.

(46.7Hz for new or 38.1Hz for use belt if using belt frequency meter).

Burner blower belt tension must be set according to the belt manufacturer’s specification. When replacing belts, also inspect sheaves for wear and misalignment. Replace if worn. With burner shroud in place and heater operating, look and listen for any unusual vibration or sound. A well maintained drive will operate smoothly and quietly.

Electric Motor should be service/replace by a qualified mechanic.

Ensure the both sheaves are aligned after motor replacement.

Adjusting Manifold Pressure:

Remove valve cover. Connect manometer to the port on the inlet flange of the regulator. While heater is operating, verify that the inlet pressure is between 9" WC and 5 psi. Connect manometer to manifold pressure tap on burner gas supply line**.** Ensure that the gas selector valve is set to the proper fuel. While the heater is operating check the manifold pressure. If the manifold pressure differs from specifications, re-adjust.

Single stage models: The adjusting screw is located on top of shutoff valve. Use 2.5mm Allen wrench.

Dual stage models: With thermostat set to high flame, adjust manifold pressure on **gas regulator** using screwdriver (adjusting screw located under black cup). Then switch the heater to low flame and adjust manifold pressure on **second stage shutoff valve** turning black wheel (to increase turn counterclockwise). Lock the wheel by tightening small screw in front knob.

Reinstall valve cover, remove the manometer and securely tighten the manifold pressure tap.

Troubleshooting

The troubleshooting section has been divided in to six tables. Choose the appropriate table from the list below:

Chart A – Burner blower does not start, Flame does not start,
Chart B – Burner blower starts, Flame starts but goes out after a few seconds,
Chart C – Burner blower starts, Flame does not start
Chart D – Burner blower starts, Flame starts, but fails during operation
Chart E – Burner blower starts, Flame starts, but main blower does not
Chart F – Other problems

A-Burner blower does not start. Flame does not start.

Green light	Red light	Error Code	Symptoms	Possible problem
OFF	OFF	No display.	NO PCB LED lights (3 solid 1 flashing). No power on secondary side of step down transformer (check for 120VAC on "0" to "115V" terminals of the step down transformer).	No electrical supply.
				Main power switch off.
				Transformer failure.
				Control box circuit breaker is OFF.
				Overload in control circuit.
				High voltage - wrong power source.
				Wrong voltage setting on the transformer.
OFF	OFF	Display on. No error code.	Heater will not start. No green light. Secondary side of step down transformer has 120VAC. PCB LED lights on.	Keypad failure.
OFF	OFF	Display on. No error code.	Display does not show "Status" screen. PCB LED lights on.	PCB failure.
				Software corrupted.
OFF	OFF	Display on. No error code.	Cooling blower and/or burner blower turn on right away and don't stop after power is switched on without pressing START.	PCB hardware failure.
OFF	ON	150	Heater does not start after pressing START. Siemens briefly displays "P21-P22-P10-OFF" in sequence.	Burner motor failure.
				Burner contactor failure.
				PCB hardware failure.
				Broken fan belt.
				Burner fan failure or foreign object in fan mechanism.
OFF	ON	151	Heater does not start after pressing START. Siemens displays "P21-P10-OFF" in sequence.	Air switch contacts welded.
				Air switch failure.
OFF	ON	126	Heater does start. Siemens displays "P04" with flashing red and green lights. Then it displays "LOC4" with solid red.	Both solenoid valves fail to close.
				Flame not extinguished.
ON	OFF	NONE	No reaction from heater. Displays "Status: Ready". Jumper not plugged in for "HI/LO/OFF", "HI-OFF", or "LO-OFF" modes.	No call for heater from thermostat.
				Defective thermostat.

Green light	Red light	Error Code	Symptoms	Possible problem
OFF	OFF	Warning 005	Heater does not start.	Low supply voltage.
				Transformer wired for incorrect voltage (Low).
OFF	OFF	Warning 004	Heater does not start.	High voltage.
				Transformer wired for incorrect voltage (High).
OFF	ON	153	Heater does not start. Siemens displays"P21-P22-P10-OFF" in sequence.	Flame controller defective.
				Wire disconnected from terminal X2-01 -3 on Siemens.
OFF	ON	127	Heater does not start.	Burner motor/overload defective.
OFF	ON	128	Heater does not start.	Circulation motor/overload defective.
OFF	ON	147	Heater does not start and will not reset.	Heater on unstable/inclined platform.
				Heater fell over on its side PCB failure.

B-Burner blower does start. Flame starts then goes out after a few seconds.

Green light	Red light	Error Code	Symptoms	Possible problem
OFF	ON	126	Siemens displays" P21-P22-P30-P40-P42-LOC2"	UV Sensor failure.
				Flame Rod failure.
				Improper Grounding.
				Back pressure in exhaust system.
				Manifold pressure too high or too low.
OFF	ON	127	Siemens displays "P21-P22-P30-P40-P74-OFF"	Burner blower belt too tight.
				Burner motor defective.
				Burner motor overload incorrectly set or defective.
OFF	ON	128	Siemens displays "P21-P22-P30-P40-P74-OFF" Burner motor runs during post purge.	Circulation motor defective.
				Circulation motor overload incorrectly set or defective..

C-Burner blower does start. Flame does not start.

Green light	Red light	Error Code	Symptoms	Possible problem
OFF	ON	126	Siemens displays “P20-P21-P22-LOC20” in sequence.	Signal to X5-01-2 disconnected.
				Gas inlet pressure switch failure (when installed).
OFF	ON	150	Siemens displays “P21-P22-P10-OFF” in sequence	No air pressure indication.
				No air pressure indication.
				Air switch adjusted too high.
				Air tubes plugged in wrong position (“-“ instead of “+”).
				Air switch defective (NO contacts stay open when burner blower is working).
				Variable pulley pitch too high (aka burner fan rpm too low).
				Motors rotating in wrong direction.
OFF	ON	126	Siemens displays “P21-P22-LOC3” in sequence.	PCB failure.
				Remote air switch harness defective or disconnected.
OFF	ON	126	Siemens displays” P21-P22-P30-P40-P42-LOC2”	Inlet pressure too high (over 5 psi) regulator damaged.
				Solenoid valve damaged or valve electric circuit defective.
				Gas pressure too low.
				Manual cut off valve closed.
				Interruption in flame continuity.
				Strainer plugged or dirty.
OFF	ON	127	Siemens displays “P21-P22-P30-P10-OFF” in sequence.	Burner motor/overload defective.
				High limit switch failure.
OFF	ON	126 157	Siemens displays “P21-P22-P30-P40-P42-LOC 2“	Exhaust limit switch failure.

D- Burner blower does start. Flame does start, but fails during operation.

Green light	Red light	Error Code	Symptoms	Possible problem
OFF	ON	153	Siemens resets to "P01" with orange and red flashing on LED. "Critical Low Voltage" or similar may show in error history.	Too much load on power supply
				Low Voltage
				Long power lines or low gauge power lines.
OFF	ON	127	Siemens goes to "P74-OFF". Noisy burner blower operation. Overload on power relay. No burner fan post-purge.	Damaged bearings on burner
				Burner blower Belt too tight
OFF	ON	128	Siemens goes to "P74-OFF". Burner fan does go through post purge. Overload on power relay.	Damaged circulation fan bearings
				Belt tensioned too tight on circulation fan
OFF	OFF	N/A	Scrambled or no display on screen. Heater fails to stay lit. Excessive motor noise	Poor quality power.
				Dirty generator power.
OFF	ON	126	Siemens displays "LOC7". Noisy burner operation. Irregular flame. Heater turns off	Burner orifices plugged or dirty.
OFF	ON	126	Siemens displays "LOC7". Heater starts ok but fails in function	Propane tank too small - not able to vaporize fast enough; tank freezes up.
				Too small of a hose, too long of a hose, blocked hose; Too low of an inlet pressure
OFF	ON	126	Siemens displays "LOC7". Yellow flame and rumbling burner operation. POSSIBLE EXPLOSION	Liquid propane entering heater
				Damaged regulator
				Damaged solenoid valve
OFF	ON	126	Siemens displays "LOC7". Combustion unstable, burner fails to stay lit, and low outlet air temperature	Changeover valve set to propane when connected to natural gas
OFF	ON	126	Siemens displays "LOC7". Combustion unstable, rumbling noises, burner fails to stay lit, and high outlet temperature	Changeover valve set to natural gas when connected to propane.
OFF	ON	126 156	Siemens displays "LOC 7" Burner doesn't cycle. Heater runs through one cycle and then turns off.	RTD sensor out of calibration.
				Heater High limit switch opens
				Heater Hi limit switch failure – too sensitive
OFF	ON	126 158	Burner will fail to stay lit at start up or soon after with no/or very short exhaust pipe	Exhaust Hi limit switch failure – too sensitive
				Blocked or restricted exhaust
OFF	ON	126	Siemens displays "LOC 7"	Interruption in gas delivery
				Clogged filter or strainer
				Defective safety solenoid valves
				Gas regulator vent is plugged
				UV sensor failure
OFF	ON	147	Siemens displays "P74-OFF". Burner fan undergoes a short post purge then stops.	Heater is tilted too much/unstable
				Heater flat on its side
				PCB failure

E- Burner blower starts, flame starts, but main blower does not.

Green light	Red light	Error Code	Symptoms	Possible problem
OFF	ON	126 155	Siemens displays “P21-P22-P30-P40-P42-LOC 2“. Heater goes through one heat cycle then shuts down.	Contactor failure
				PCB failure
				Circulation fan motor failure
				Broken belt
				Circulation fan failure
ON	OFF	N/A	Main blower fails to start. The burner cycles often. Signs of overheating and discolored paint.	Contactor failure
				PCB failure
				Circulation fan motor failure
				Broken belt
				Circulation fan failure

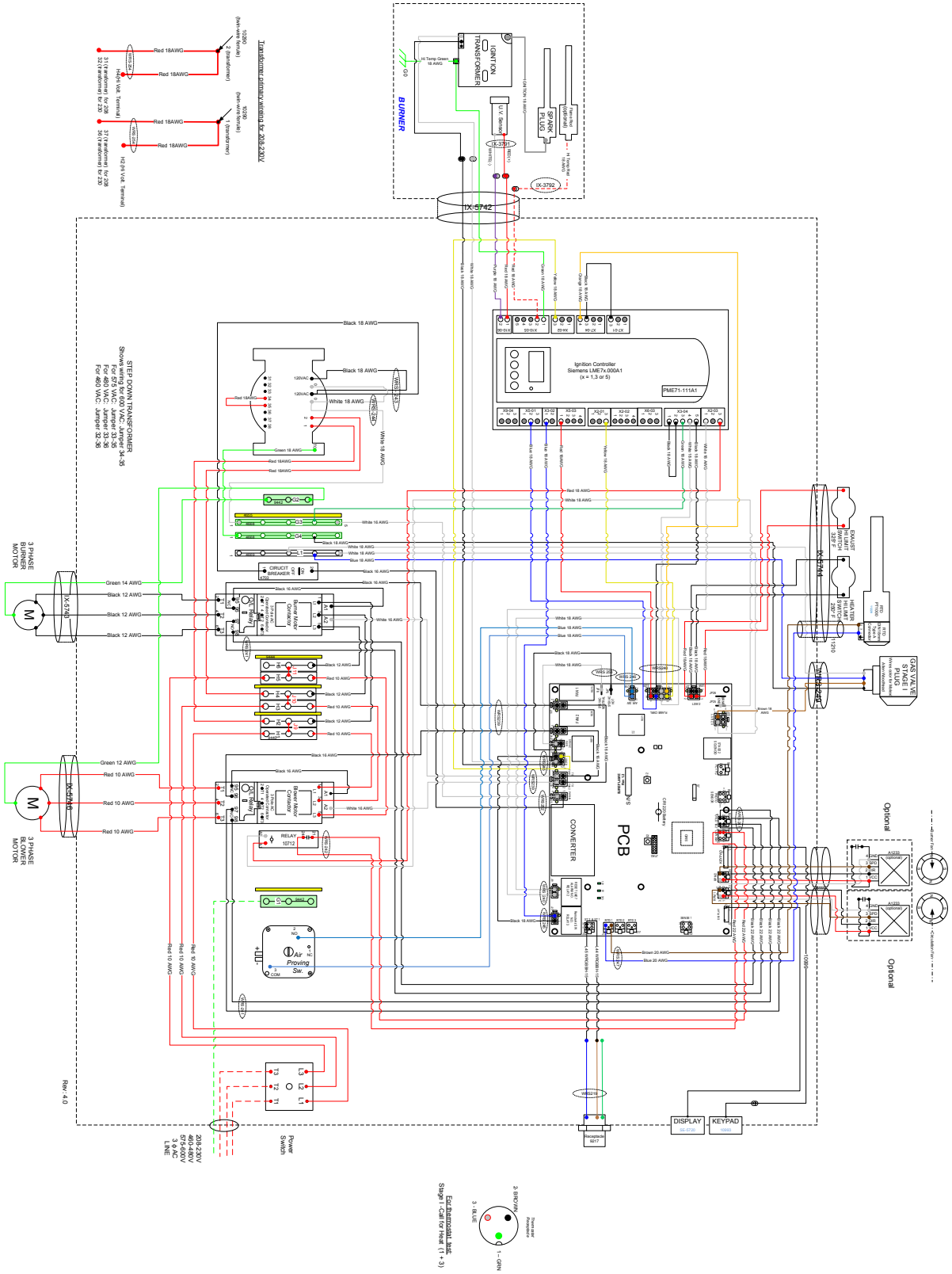
*The situations listed above are ambient temperature and setup dependant.

F- Other problems

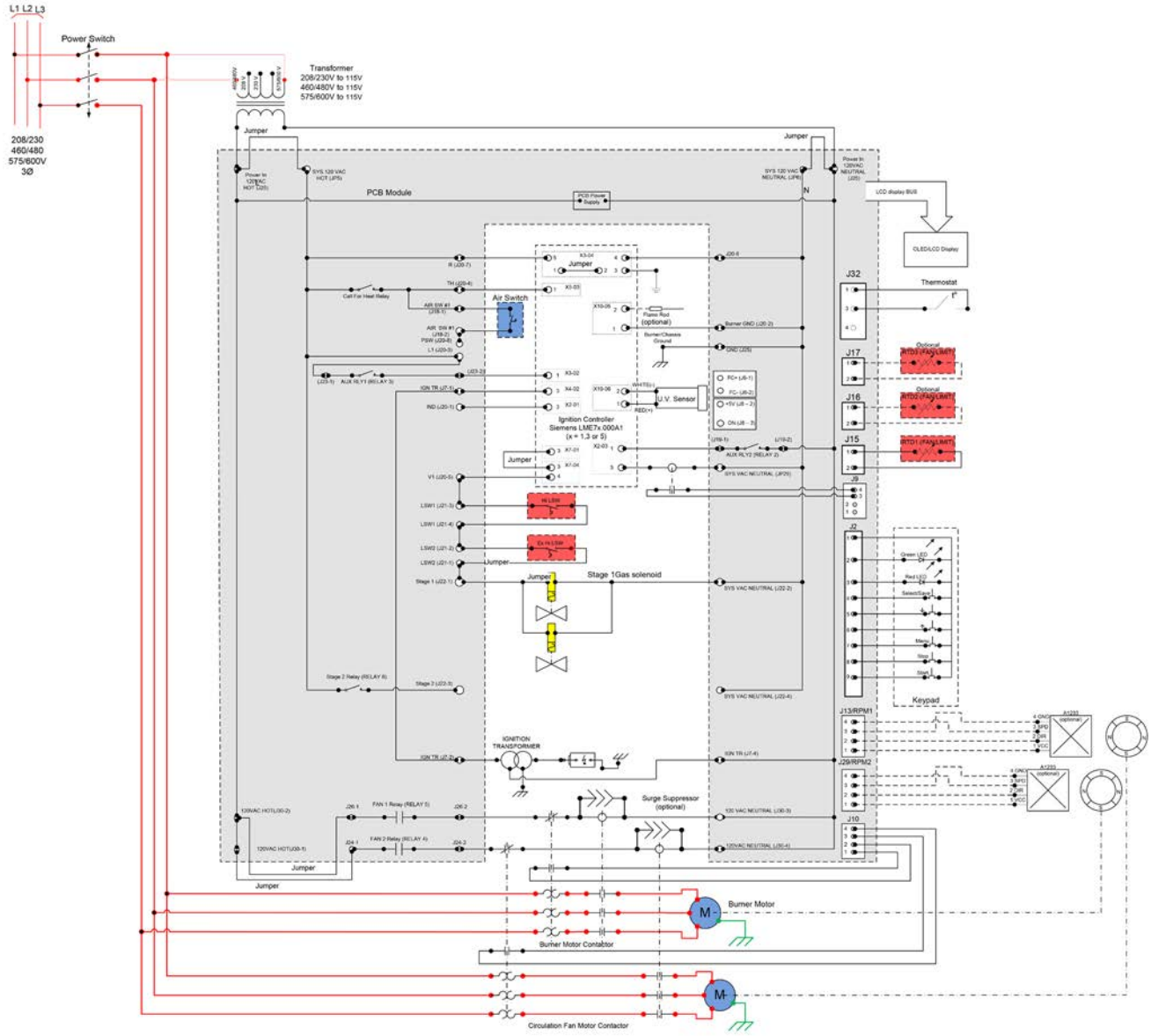
Green light	Red light	Error Code	Symptoms	Possible problem
ON	OFF	N/A	Main blower and/or burner blower spin in reverse. Low volume air coming from blowers with yellow flame and rumbling burner operation (unstable burner)	Wrong Phase (3 PH - reversed phase)
				Incorrect wiring on motor
ON	OFF	N/A	Low temperature output. High CO Combustion unstable, rumbling burner operation and/or burner turns of turns off moments later.	Changeover valve set to propane when connected to natural gas (if applicable)
ON	OFF	N/A	High temperature output. High CO. Burner cycles. Yellow flame	Changeover valve set to natural gas when connected to propane. (if applicable)
ON	OFF	N/A	Heater will not turn off by pressing the stop button	Stop switch (red) fails to closed
ON	OFF	N/A	Main blower works for a long time after the burner is turned off or never stops. Blowing cold air.	RTD out of calibration
				Contactor welded
				PCB failure
				Intake temperature is too high for OFF set point
ON	OFF	N/A	Main blower starts too soon and blows cold air for a long time at start up.	RTD sensor out of calibration
ON	OFF	N/A	The burner cycles often. Average output temperature lowered.	RTD sensor out of calibration
				Mechanical damage to heat exchanger
ON	OFF	N/A	No output temperature variation from low fire to high fire	Stage I valve not adjusted to a lower value (if applicable)
				Appliance regulator adjusted to a lower value
				Defective valve

				Thermostat failure
ON	OFF	N/A	Noisy burner fan operation. Yellow flame and high CO generation	Burner blower belt too loose
				Variable pulley pitch set too high (aka RPM is too low on burner fan)
ON	OFF	N/A	Noisy fan operation. High vibration. Structural damage to fan and/or bearing	Damaged or unbalanced fan blade
ON	OFF	N/A	Burner cycles more often	Inlet duct too long.
				Outlet duct too long
ON	OFF	N/A	Noisy operation. Heater body vibration.	Heater not positioned on a level surface
ON	OFF	N/A	Static charge. Static shocks. UV Flame detection works ok	Improper grounding
ON	OFF	N/A	Heater works all the time (doesn't react to adjusted temperature on the thermostat) – stops if thermostat is disconnected when set to work with "HI/LO/OFF, HI/OFF, & LO/OFF".	Thermostat failure
ON	OFF	N/A	Heater works all the time	Hi/Lo mode
				Constant Hi mode
				Constant Lo mode
ON	OFF	N/A	Cooling fan blowing cold air all the time	Fan only mode

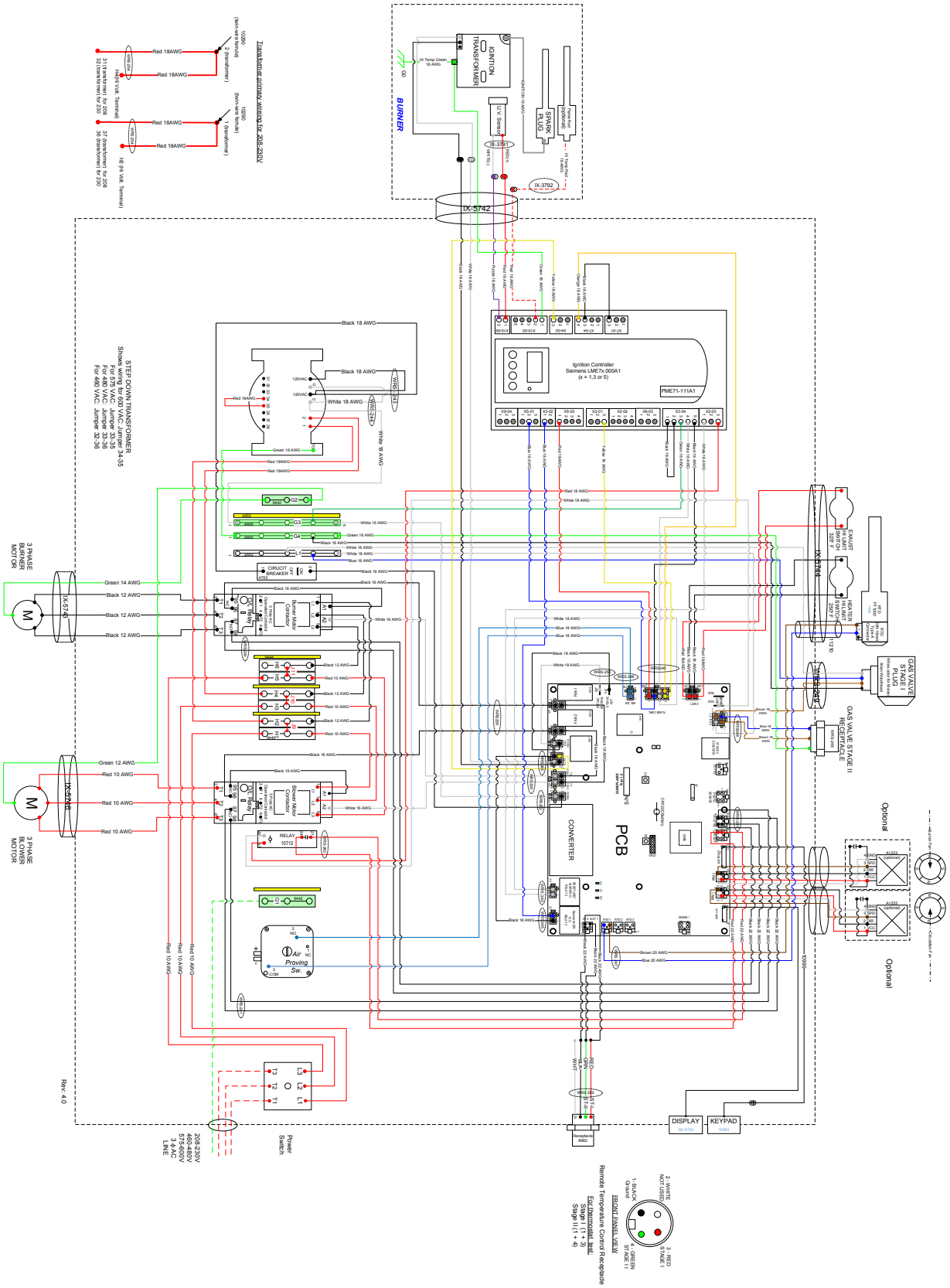
IX1500L/IX1500NC Wiring Diagrams (1 stage)



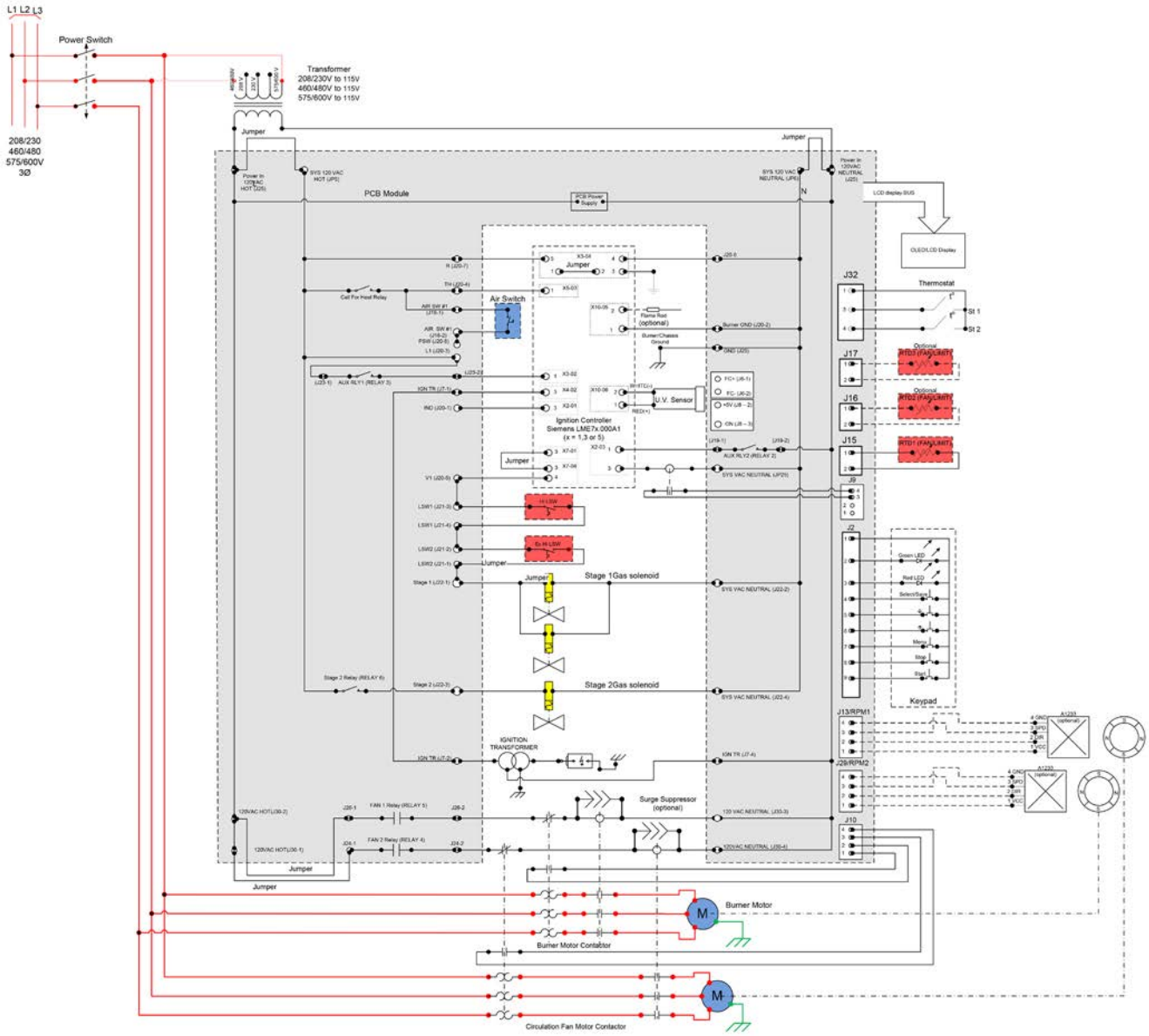
IX1500L/IX1500NC Ladder Diagram (1 stage)



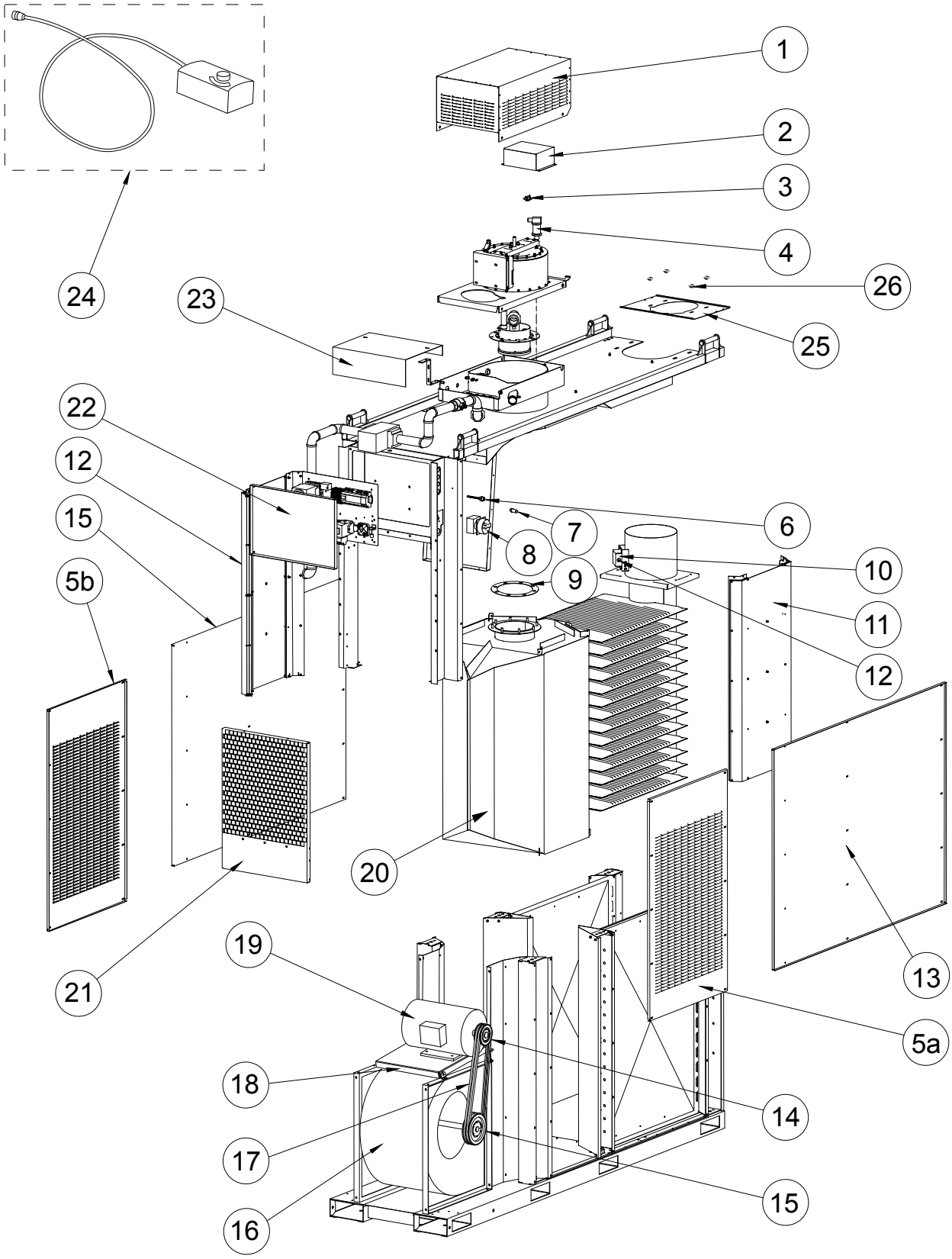
IX1500 Wiring Diagrams (2 stage)



IX1500 Ladder Diagram (2 stage)



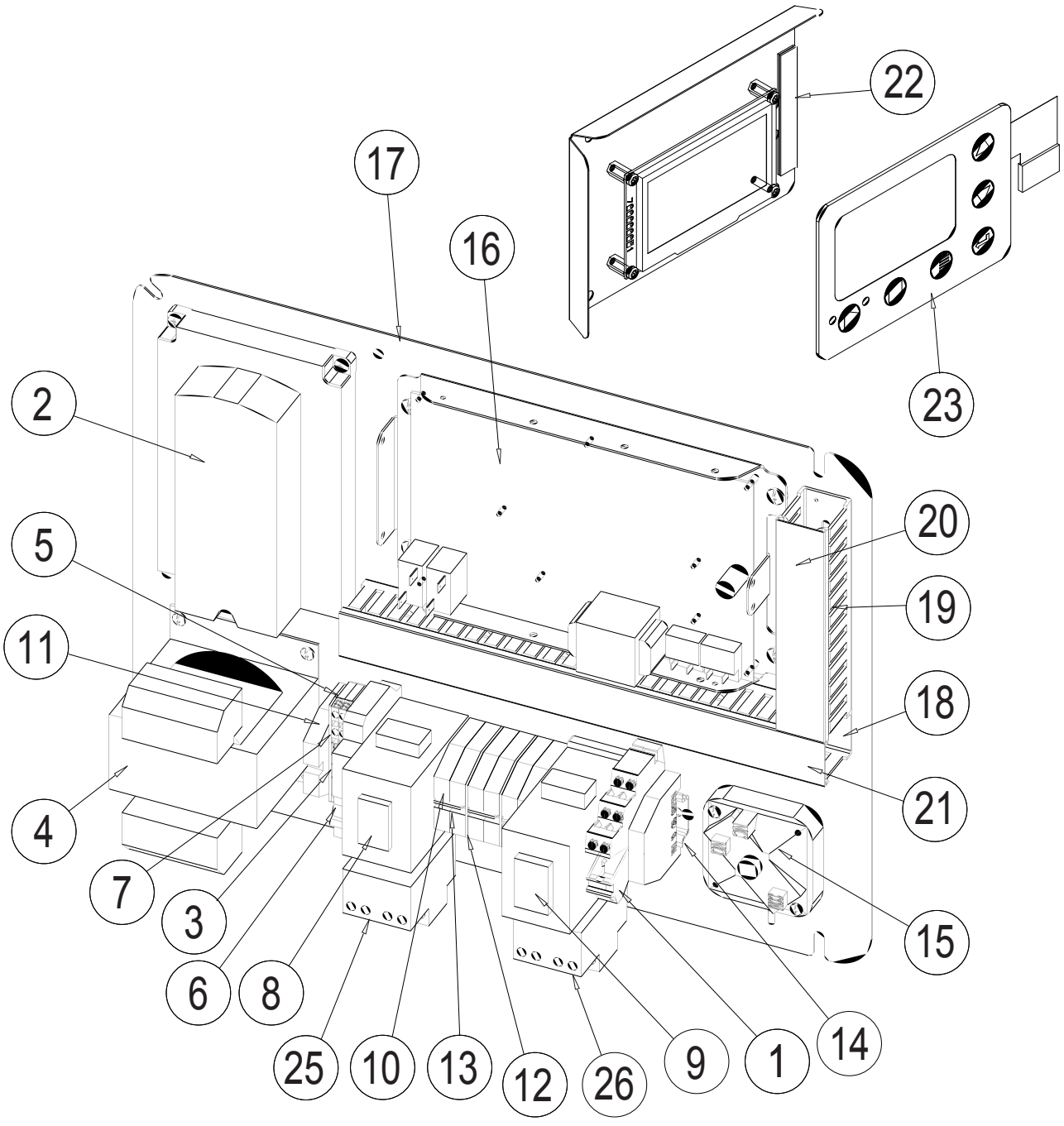
Main Assembly Replacement Parts



Main Assembly Replacement Parts

Ref #	Part #	Description	Quantity
1	IX-3738	Shroud	1
2	IX-5542	Limit Switch Cover	1
3	4711	Limit Switch 250°F	1
4	11229	RTD Sensor	1
5a	IX-5022	Outside Blower Panel	1
5b	IX-6213	Outside Blower Panel	1
6	WRS-250 WRS-219	Thermostat Receptacle IX1500 Thermostat Receptacle IX1500L,NC	1
7	S1500-713 SE-4716	Thermostat Jumper Assy IX1500 Thermostat Jumper Assy IX1500L,NC	1
8	9439	Disconnect Switch	1
9	IX-3037	Burner Gasket	1
10	FN12-517	Exhaust Limit Switch Cover	1
11	IX-5741	Heat Shield & Air Deflector Assy	2
12	4712	Limit Switch 325°F	1
13	IX-5225	Combustion Chamber Panel	2
14	11264	Motor Sheave	1
15	1096	Blower Sheave	1
16	4709	Blower	1
17	11193	Belt	2
18	IX-5614	Motor Mount	1
19	4716	Blower Motor (208/230/460V)	1
20	IX-4552	Combustion Chamber/Exchanger	1
21	IX-5250	Inlet Screen	1
22	IX-6217	Control Box Cover	1
23	IX-5040	Valve Cover	1
24	S1500-714 SE-4715	Thermostat Assembly IX1500 Thermostat Assembly IX1500L,NC	1
25	IX-6187	Exhaust Support Plate	1
26	8508	Bushing	4

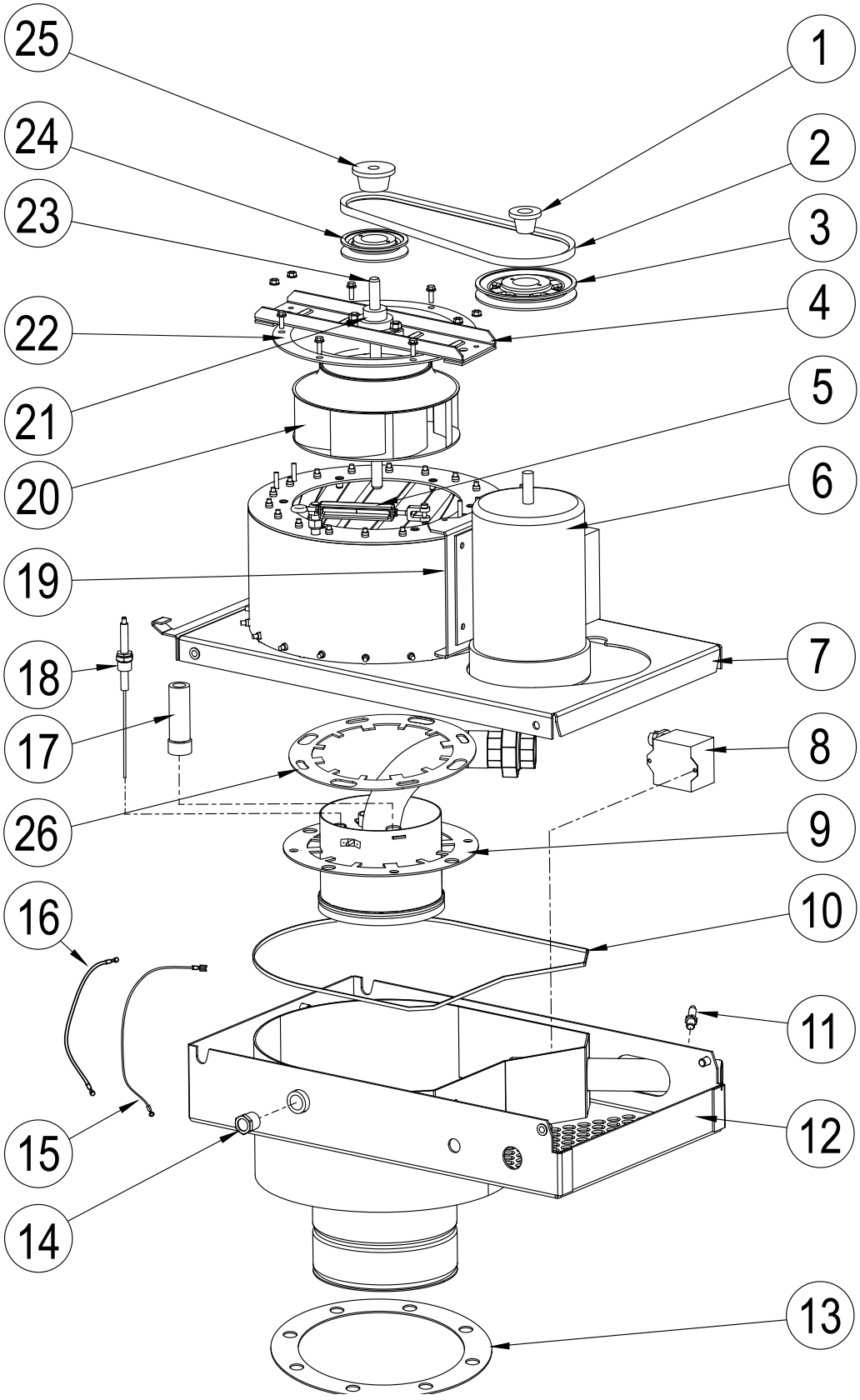
Control Box Replacement Parts



Control Box Parts List

Ref #	Part #	Description	Quantity	
			IX1500	IX1500L,NC
1	10712	Relay 120VAC	1	1
2	11469	LME71 Flame Controller	1	1
3	4703	Circuit Breaker	1	1
4	2502	Stepdown Transformer	1	1
5	4655	End Plate Green	2	2
6	4668	Ground Terminal Block	2	2
7	4669	Terminal Block	1	1
8	4719	Burner Contactor	1	1
9	8629	Blower Contactor	1	1
10	9440	Terminal Block	6	6
11	9442	Ground Terminal Block	2	2
12	9444	End Plate	3	3
13	9445	Jumper	3	3
14	IX-5237	Mounting Tail Bottom	1	1
15	IX-5834	Adjusted Air Switch	1	1
16	IX-5847	Programmed PCB	1	1
17	IX-6205	Electrical Chassis	1	1
18	IX-6219	Wire Duct 12.5”	1	1
19	IX-6220	Wire Duct 6”	1	1
20	IX-6221	Wire Duct Cover 6”	1	1
21	IX-6222	Wire Duct Cover 12”	1	1
22	SE-5725	Display	1	1
23	10993	Keypad	1	1
24	10999	Extension (not shown)	1	1
25	4717 (208/230V) 4718 (460/575V)	Burner Overload Relay	1	1
26	9938	Blower Overload Relay	1	1

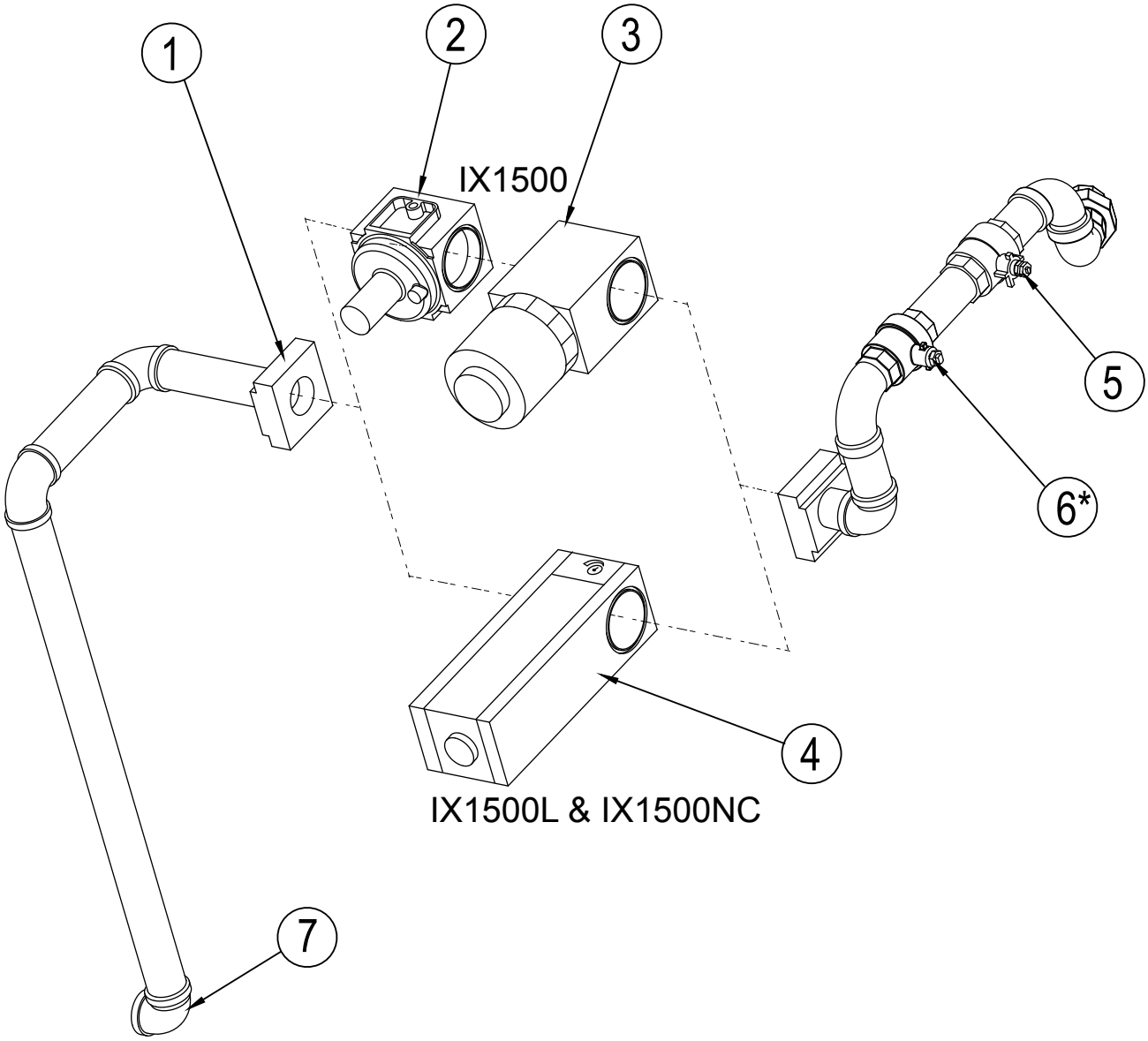
Burner Assembly Replacement Parts



Burner Assembly Parts List

Ref #	Part #	Description	Quantity
1	7751	Motor Bushing	1
2	1088	Burner Belt	1
3	9556	Motor Sheave	1
4	IX-3547	Bearing Mount	1
5	IX-3715	Turnbuckle Assembly	1
6	9453	Burner Motor (208/230/460)	1
7	IX-3739	Blower Housing	1
8	8676	Ignition Transformer	1
9	IX-3712 IX-3740	Burner Head Assembly IX1500(L) Burner head Assembly IX1500NC	1
10	1093	Trim Seal Band	5’
11	8708	Test Nipple	1
12	IX-3512	Burner Housing	1
13	IX-3037	Burner Gasket	1
14	9475	Observation Port	1
15	WR9GER-18	Hi Temp. Ground Wire	1
16	WRIXX-30	Ignition Wire	1
17	9005	UV Flame Sensor	1
18	9407	Flame/Spark Rod	1
19	IX-3057	Motor Mount	1
20	4708	Fan Wheel	1
21	9411	5/8” Flange Bearing Unit	2
22	4707	Inlet Cone	1
23	IX-3902	Burner Impeller Shaft	1
24	7746	Impeller Sheave	1
25	6133	Impeller Bushing	1
	IX-3257	Flame Viewing Reflector (not Shown)	1
26	IX-6199	Secondary Air Flange	1

Valve Train Replacement Parts



Ref #	Part #	Description	Quantity
1	4723	1-½" NPT Flange	2
2	8685	Gas Regulator	1
3	8648	Second Stage Shutoff Valve	1
4	4725	Combination Valve	1
5	2539	1-½" Ball Valve	1
6	IX-3733	Changeover Valve (*not use in IX1500NC)	1
7	SL11B-715	1-½" Strainer Assembly	1

LPG - PROPANE FUEL VAPORIZATION RATE

The following chart shows the amount of BTU's that various sizes of tanks will produce on the average at specific temperatures and regular atmospheric conditions.

Tank Size Gallons (Pountds)	Maximum intermittent withdrawal rate (BTU/hr) without tank frosting* if lowest outdoor temperature (average for 24 hours) reaches.							
	+40°F (+4°C)	+30°F (-1°C)	+20°F (-7°C)	+10°F (-12°C)	0°F (-18°C)	-10°F (-23°C)	-20°F (-29°C)	-30°F (-34°C)
150 (600)	214,900	187,900	161,800	148,000	134,700	132,400	108,800	107,100
250 (1000)	288,100	251,800	216,800	198,400	180,600	177,400	145,800	143,500
500 (2000)	478,800	418,600	360,400	329,700	300,100	294,800	242,300	238,600
1000 (4000)	852,800	745,600	641,900	587,200	534,500	525,400	431,600	425,000

* Frosting on the outside of the tank acts as an insulator, reducing the vaporization rate.

MAXIMUM BTU CONTENT (PROPANE)

The following table shows the maximum BTU's that a cylinder contains.

Cylinder Size	BTU Content
100 pound	2,159,100
250 gallon USA	22,922,500
500 gallon USA	45,845,000
1000 galons USA	91,690,000

CAUTION: In extremely cold weather it is impossible to completely empty a propane cylinder.

Sure Flame Products
A Divison of Haul-All Equipment
4115 - 18 Avenue North
Lethbridge, Alberta T1H 5G1
www.sureflame.com