



## Operation and Maintenance Manual

**Model No. S2200D**  
**CONSTRUCTION HEATER**  
2,250,000 Btu/h



### **⚠ WARNING**

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

**Retain these instructions for future reference.**

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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 !

The heater is designed and approved for use as a construction heater under CSA 2.14/ANSI Z83.7. 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. Products of combustion are vented into the area being heated.

The 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.

Use of the heater must be in accordance with this Standard and in compliance with all governing codes.

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

**In Canada, installation must comply with CAN/CGA-B149.1 Natural Gas and Propane Installation Code.**

**In the United States, storage and handling of propane gas and propane cylinders must be in accordance with NFPA 58 and all local governing codes.**

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, CO<sub>2</sub>, and NO<sub>2</sub> considered to be hazardous to health and potentially life threatening.
- Do not use in unventilated areas.
- Know the signs of CO and CO<sub>2</sub> 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, CO<sub>2</sub> and NO<sub>2</sub> 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

CO<sub>2</sub> 5000 ppm

5000 ppm

NO<sub>2</sub>

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

CO<sub>2</sub>

15000 ppm (WSBC)  
30000 ppm (Reg 833)

NO<sub>2</sub> 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.

## FOR YOUR SAFETY

DO NOT USE THIS HEATER IN A SPACE WHERE  
GASOLINE OR OTHER LIQUIDS HAVING  
FLAMMABLE VAPOURS ARE STORED OR USED.

## Table of Contents

Specifications	5	On-site Safety Problems	13
Heater Installation	6	Preventative Maintenance	14
Installation for Propane Applications	7	Troubleshooting	15
Installation for Natural Gas Applications	7	Wiring Diagrams	22
Keypad and Display	8	Replacement Parts	26
Menu	10		
Operating Instructions	12		
Common Installation and Operational Problems	13		

# Specifications

## Model No.

S2200D Construction Heater

## Certification

Gas Fired Construction Heaters, CSA 2.14 /  
ANSI Z83.7

## Fuel

Natural Gas or Propane Vapour

## Input Rating

Maximum (Second Stage)  
2,250,000 Btu/h (659 kW)

Minimum (First Stage)  
1,950,000 Btu/h (571 kW) Propane  
1,650,000 Btu/h (484 kW) Natural Gas

## Operating Temperature

Minimum -30°C (-28°F)

## Burner Orifice Size

40 DMS x 45 holes  
42 DMS x 33 holes

## Electrical Rating

Varies - Rating determined as stated on the  
Specification Label and the Electric Motor on  
the heater

## Supply Pressure to Regulator

Propane & Natural Gas  
Minimum: 12" WC (3.0 kPa)  
Maximum: 5 psi (34 kPa)

## Pressure to Manifold

Propane  
Minimum: 0.4" WC (100 Pa)  
Maximum: 0.7" WC (170 Pa)

Natural Gas  
Minimum: 2" WC (500 Pa)  
Maximum: 4.6" WC (1.1 kPa)

(Minimum inlet pressure is for purpose of input  
adjustment)

## Weight

860 lbs (390 kg)

## Manifold Pressure Altitude Adjustment

Altitude	Natural Gas	Propane
0' - 2000'	4.6" w.c. (1150 Pa)	0.7" w.c. (175 Pa)
2500'	4.1" w.c. (1025 Pa)	0.6" w.c. (150 Pa)
3000'	4.1" w.c. (1025 Pa)	0.6" w.c. (150 Pa)
3500'	4.0" w.c. (1000 Pa)	0.6" w.c. (150 Pa)
4000'	3.9" w.c. (975 Pa)	0.6" w.c. (150 Pa)
4500'	3.8" w.c. (950 Pa)	0.55" w.c. (125 Pa)

# Heater Installation

The Sure Flame Model S2200D is a direct fired gas heater intended to be used primarily for the temporary heating of buildings under construction, alteration, or repair. Since all the products of combustion are released into the area being heated, it is imperative that adequate ventilation is provided. The flow of supply air must not be obstructed in any way.

1. Install the heater in a horizontal position at least 10 feet (3 m) from any LP-gas container. The front outlet must be at least 20 feet (6 m) from any LP-gas container. Allow the following clearances from any combustible material or fuel containers:

Outlet:	25 feet (7.6 m)
Sides:	3 feet (0.9 m)
Intake:	3 feet (0.9m)
Top:	4 feet (1.2 m)
Duct:	1 foot (0.3 m)
Floor:	Noncombustible

Also make sure that no flammable vapours are present in the space where the heater is being used.

2. When connecting the heater to a natural gas or propane supply line ensure that the pressure at the heater inlet is within the specified range. Excessive pressure (over 5 psig or 34 kPa) will damage the controls and void the warranty.
3. Visually inspect the supply hose assembly and ensure that it is protected from traffic, building materials, and contact with hot surfaces. If it is evident that there is excessive abrasion or wear, or the hose is cut, it must be replaced.
4. After installation, check the hose assembly for gas leaks by applying a water and soap solution to each connection.

5. Connect the heater to an adequate electric power supply as specified on the Heater Specification label and the Electric Motor plate.
6. For protection against shock hazard the supply cord should be plugged directly into a properly grounded receptacle in compliance with the

*Canadian Electrical Code,  
CSA C22.1, Part 1.  
National Electrical Code,  
ANSI/NFPA 70*

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

Ensure that the flow of supply air is not obstructed.

The installation and operation of the heater shall comply with the code requirements specified by the authorities having jurisdiction.

General criteria for the installation and use of construction heaters may be found in the applicable sections of the

*Natural Gas and Propane Installation  
Code, CSA B149.1  
ANSI A10.10, Safety Requirements for  
Temporary and Portable Space Heating  
Devices and Equipment*

The installation and maintenance of the heater must be accomplished by a qualified service person.

This heater is approved for use without ductwork, or with up to 40 feet of 24" square ductwork. Only ductwork supplied by the manufacturer should be used with this heater.

When using the heater without ductwork, securely fasten the outlet screen in the down position.

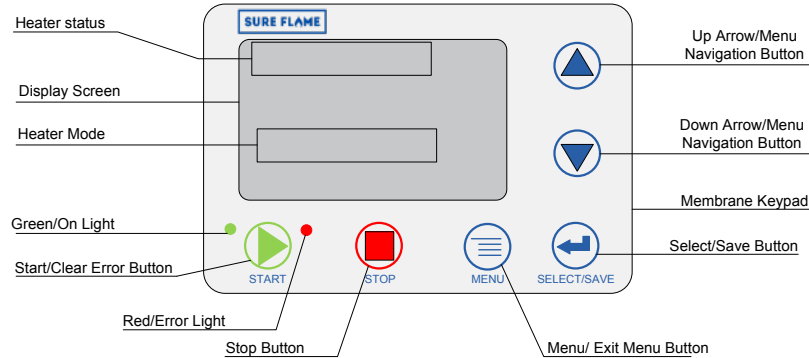
## Installation For Propane Applications

1. When installing the heater for use with propane gas, ensure that the gas selector valve is LOCKED in the propane position.
2. The supply container MUST be equipped with a suitable UL listed gas pressure regulator. This is essential to reduce the gas pressure to a safe transmittable pressure that does not exceed the maximum input pressure of the heater.
3. Arrange the supply system to provide for vapour withdrawal from the operating tank. Supplying liquid propane to the heater is dangerous and will damage the components.
4. Ensure that for the surrounding temperature the size and capacity of the propane supply tank is adequate to provide the rated Btu/h input to the heater.
5. Turn off the propane supply valve at the tank when the heater is not in use.
6. The installation must conform with local codes, or in their absence, with the following:  
  
CAN/CGA - B149.1 Natural Gas and Propane Installation Code, or  
*Storage and Handling of Liquidified Petroleum Gases, ANSI/NFPA 58*
- 7) When the heater is to be stored indoors the propane tank must be disconnected from the heater and stored in accordance with the above mentioned National Standard.

## Installation For Natural Gas Applications

1. When installing the heater for use with natural gas, ensure that the gas selector valve is set in the natural gas position.
2. Ensure that the supply is equipped with a suitable UL listed gas pressure regulator to limit the gas to a pressure that does not exceed the maximum inlet pressures of the heater.
3. The installation must conform with local codes, or in their absence, with the following:  
  
CAN/CGA - B149.1 Natural Gas and Propane Installation Code, or  
*National Fuel Gas Code, ANSI Z223.1/NFPA 54*

# 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

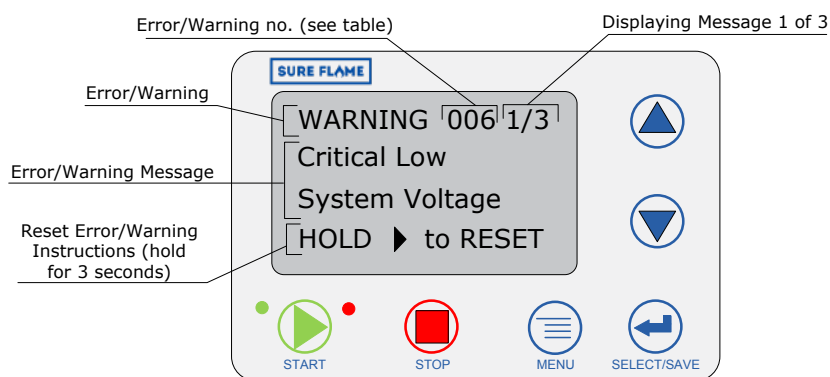
Status	Description
OFF	The heater goes to “OFF” when it is powered off. The heater also goes to “OFF” when STOP button is pressed. Heater does not start on its own when power is provided to unit.
Standby	When the start button is pressed and the heater is set to work with thermostat but there is no call for heat the heater will be in “Standby”. The mode that requires a thermostat is “ON/OFF.”
Ignition	This status will always show when burner is firing up after a call for heat through thermostat or “CONST ON.”
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
HI/LO/OFF	Heater switches between high, low and off based on thermostat.*
HI/LO	Heater switches between high and low based on thermostat.
HI/OFF	Heater switches between high and off based on thermostat.
LO/OFF	Heater switches between low and off based on thermostat.
Cnst. ON/HI	Heater runs all the time on high and disregards thermostat. No jumper is required.
Cnst. ON/LO	Heater runs all the time on low 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.

## Statistics

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

Page	Description	
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

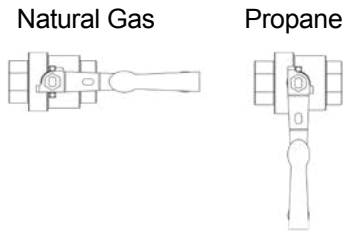
Access the settings menu. Scroll using the arrow keys to "Language" and press the SELECT/SAVE.

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 specification label and the electric motor plate.
4. Open gas supply.
5. Select desired heat mode (see above).
6. Press the START button.
7. If the thermostat is calling for heat then the status will change to "Ignition." Blower will start up and after about 30 seconds the burner will 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 20-30 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.**

# Common Installation And Operational Problems

## **Low Voltage**

This is one of the most common problems and is usually the result of the supply cord having too small a wire gauge for its length. Low voltage results in the motor overheating, burnt relay contacts, or a relay that will not make contact.

## **Supply Line Too Small**

### **Insufficient Vaporization At Supply**

Normally caused by too small size of supply tank.

## **Improper Gas Supply Pressure**

Usually a result of supply pressure being too high because of improper or lack of regulation.

## **Dirty Gas Supply**

Dirty gas can cause strainers to plug or form a build-up in the burner orifice.

## **Lack Of Preventative Maintenance**

Heaters must be cleaned as required, especially when used in a dirty environment.

## **Improper Supply Of Fresh Air**

It is normally recommended that the intake air of the heater be taken from outside the enclosed area. This provides a slight pressurization and prevents any problems associated with recirculation.

# On-site Safety Problems

## **Bypassing of Defective Components**

This is a potentially dangerous problem which saves short term expense at the risk of a large future cost. Any heaters found in this condition should be removed from service immediately

## **Improper Enclosures**

When heaters are installed partially to the outside for fresh air intake, strict adherence must be made to the minimum clearance to combustibles given on the instruction plate. Wood framing around a heater is a hazard and should not be used.

## **Supplying Liquid Propane To Heater**

This heater is not intended to burn liquid propane. To minimize the damage, shut off the gas supply and let the heater run until all of the liquid in the lines has been burnt.

# Preventative Maintenance

Sure Flame Construction Heaters are built to withstand the rigours of operating on construction sites, for mining applications, and a multitude of other locations where heaters are used. To maintain the reliable performance required it is necessary to do a certain amount of regular maintenance.

The heater should be inspected before each use, and at least annually by a qualified service person.

## Visual Checks

The following items should be checked for excessive wear or damage:

1. Cords and Connectors
2. Wiring and Conduit
3. Heater Shell (including heat shield), Blower Housing and Control Box
4. Blower Drive Belts and Bearings
5. All Screens and Guards

## Burner

**Flame Rod and Insulator** - Clean with soap and water or solvent on a routine basis. Any build up on burner should also be removed at this time.

**U.V. Flame Sensor** - Clean the bulb with a soft cloth.

**Ground Wire** - Ensure that the ground wire is secured to the burner. This is necessary for the flame detection system to operate.

**Spark Plug** - Clean with solvent and check spark gap.

## Flame Safeguard Control

The Flame Safeguard Control should be cleaned using alcohol. Do not use any other liquid or aerosol spray cleaners.

## Motor

Motors equipped with oil cups should require only a few drops of clean, light machine oil every year. Motors not equipped with oil cups are fitted with sealed bearings and no oiling is required.

## Blower

Check for dust or dirt build up on fan blades. Check the tightness of the set screw and run the heater to check for fan vibration.

# Trouble Shooting

The troubleshooting section has been divided into five tables. Choose the appropriate table from the list below:

Chart A – Fan does not start. Flame does not start,

Chart B – Fan starts. Flame does not start

Chart C – Fan starts. Flame starts but goes out after a few seconds,

Chart D – Fan starts. Flame starts, but fails during operation

Chart E – Other problems

## A-Fan 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	Fan turns on right away and doesn't stop after power is switched on without pressing START ►.	PCB hardware failure.

<b>Green Light</b>	<b>Red Light</b>	<b>Error Code</b>	<b>Symptoms</b>	<b>Possible Problem</b>
OFF	ON	126	Heater does not start after pressing START ►. Siemens briefly displays “P21-P22-LOC3” in sequence.	Fan motor failure
				Fan motor contactor failure
				PCB hardware failure
				Broken fan belt
				Fan failure or foreign object in fan mechanism.
OFF	ON	126 151	Heater does not start after pressing START ►. Siemens displays “P21-P10-OFF” or “P10-LOC5” in sequence.	Air switch contacts welded
				Air switch failure
OFF	ON	126	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 heat from thermostat
				Defective thermostat
ON	OFF	Warning 307	Heater does not start	Defective thermostat
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	126	Heater does not start. Siemens displays”P21-P22-LOC3” in sequence.	Fan 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-Fan starts. 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	126	Siemens displays “P21-P22-LOC3” in sequence	No air pressure indication
				Air tube leaking or disconnected
				Air switch adjusted too high
				Air tubes plugged in wrong position (“-“ instead of “+”)
				Air switch defective (NO contacts stay open when fan is working)
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
OFF	ON	126 155	Siemens displays “P21-P22-P30-P40-P42-LOC 2”	Strainer plugged or dirty
				fan motor/overload defective
OFF	ON	127	Siemens displays “P21-P22-P30-P10-OFF” in sequence.	High limit switch failure

**C-Fan starts. Flame starts but goes out after a few seconds**

Green Light	Red Light	Error Code	Symptoms	Possible Problem
OFF	ON	126 155	Siemens displays "P21-P22-P30-P40-P42-LOC2"	UV Sensor failure
				Flame Rod failure
				Improper Grounding
				Manifold pressure too high or too low.
OFF	ON	127	Siemens displays "P21-P22-P30-P40-P74-P10-OFF"	Fan belt too tight
				Fan motor defective
				Fan motor overload incorrectly set or defective.

**D- Fan starts. Flame starts 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-P10-OFF". Noisy fan operation. Overload on power relay. No fan post-purge.	Damaged fan bearings
				Fan belt too tight
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; inlet pressure too low
OFF	ON	126	Siemens displays "LOC7". Yellow unstable flame that extends out of fan. POSSIBLE EXPLOSION (when used with duct)	Liquid propane entering heater
				Damaged regulator
				Damaged solenoid valve

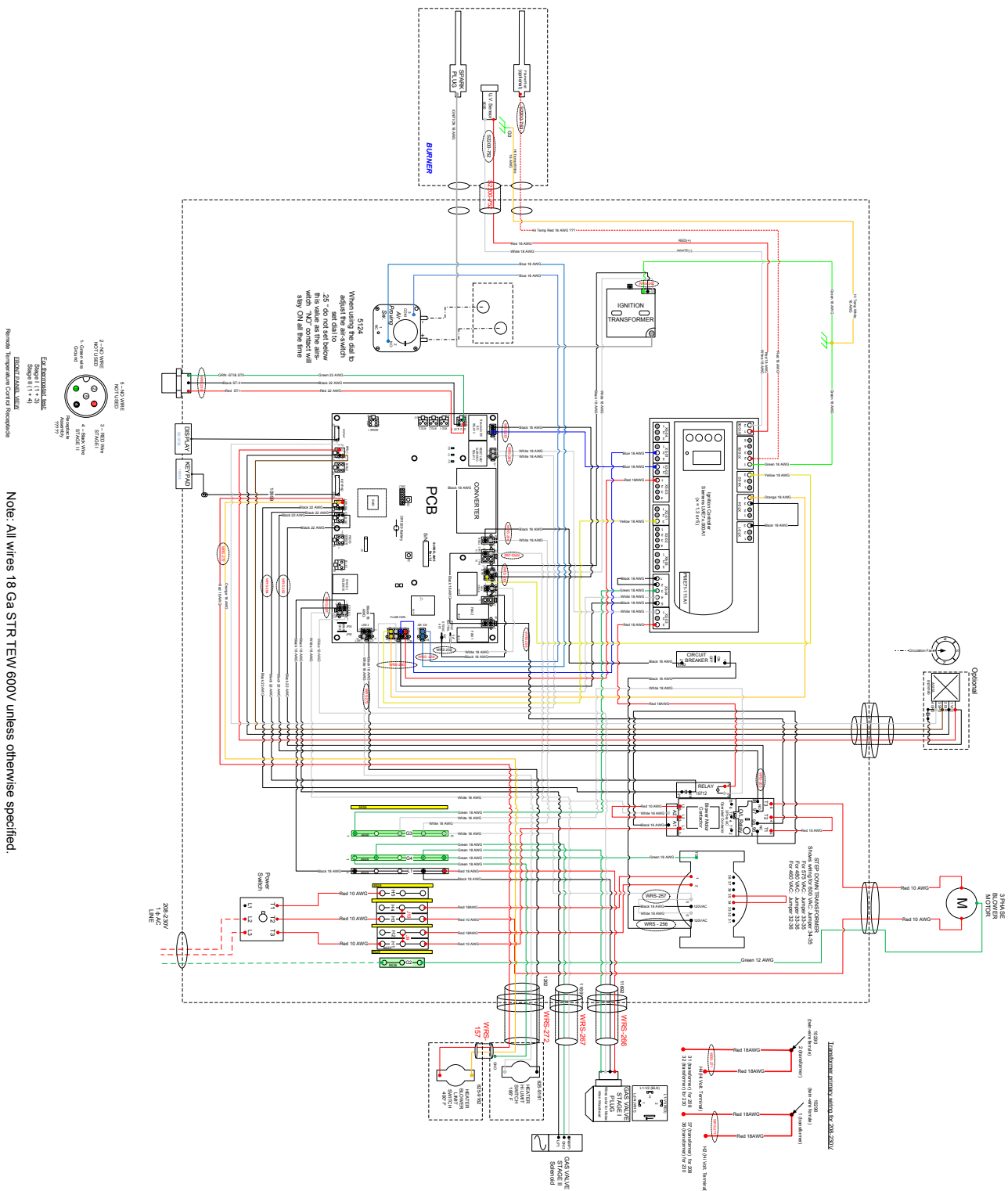
Green Light	Red Light	Error Code	Symptoms	Possible Problem
OFF	ON	126	Siemens displays “LOC7”. Combustion unstable, burner fails to stay lit, and low outlet air temperature	Changeover valve set to propane when connected to natural gas
OFF	ON	126	Siemens displays “LOC7”. Combustion unstable burner fails 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.	Heater High limit switch opens
				Heater Hi limit switch failure – too sensitive
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-P10-OFF”. Fan undergoes a short post purge then stops.	Heater is tilted too much/unstable
				Heater flat on its side
				PCB failure

**E- Other problems**

<b>Green Light</b>	<b>Red Light</b>	<b>Error Code</b>	<b>Symptoms</b>	<b>Possible Problem</b>
ON	OFF	N/A	Blower impeller spins in reverse. Low volume air coming from outlet with yellow flame and unstable burner operation.	Wrong Phase (3 PH - reversed phase)
				Incorrect wiring on motor
ON	OFF	N/A	Low temperature output. High CO  Combustion unstable and/or burner turns off moments later.	Changeover valve set to propane when connected to natural gas (if applicable)
ON	OFF	Warning 025	High temperature output.  Burner cycles to low fire (for 15 minutes) then off. Burner then cycles often and is on for seconds.	Changeover valve set to natural gas when connected to propane. (if applicable)
				Sensitive/faulty blower hi-limit switch.
ON	OFF	N/A	Heater will not turn off by pressing the stop button	Stop switch (red) fails to close
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 fan operation. Yellow flame and high CO generation	Fan belt too loose
				Cracked belt
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	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

Green Light	Red Light	Error Code	Symptoms	Possible Problem
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	Fan blowing cold air all the time	Fan only mode

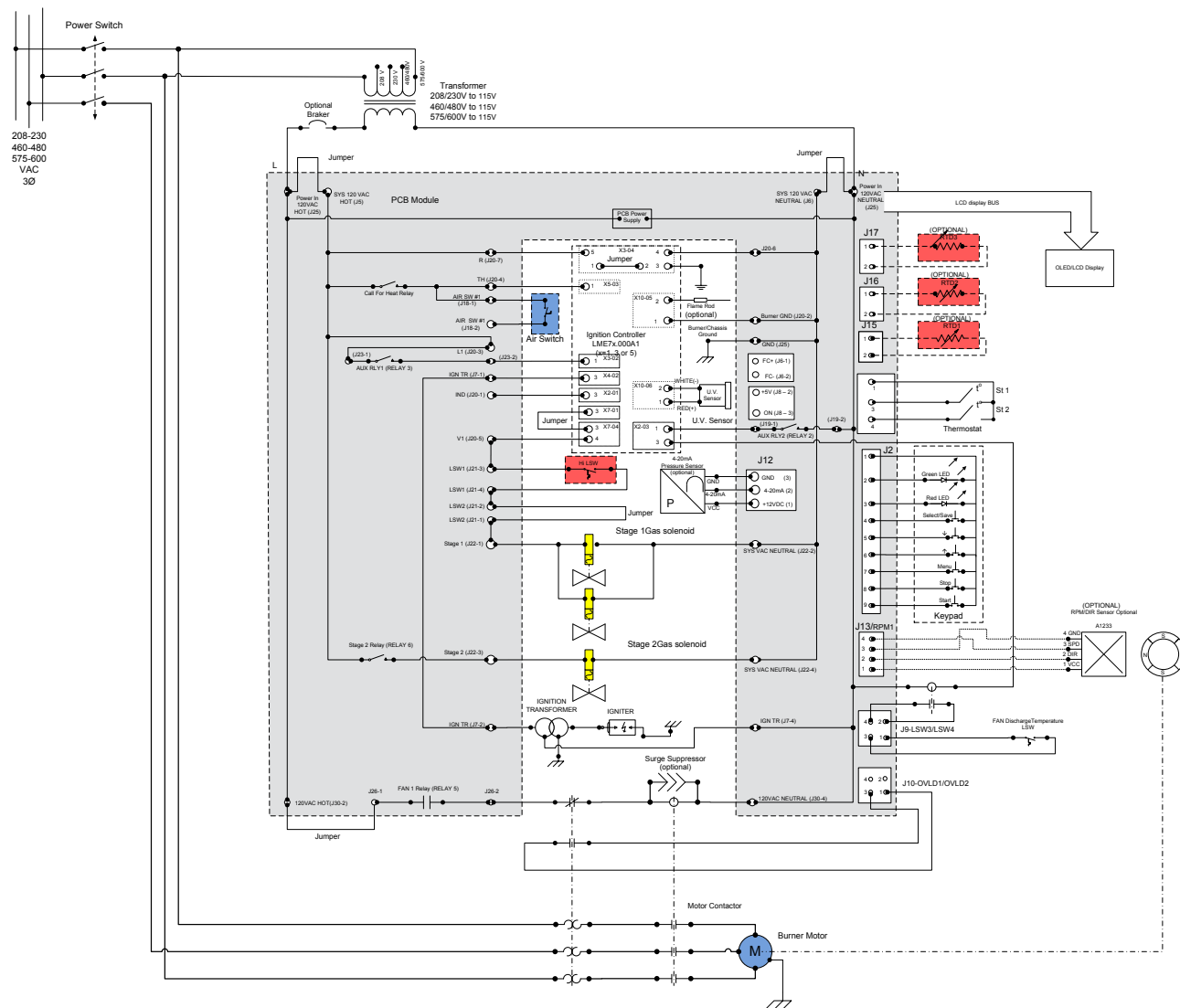
# Wiring Diagrams (1 Phase)



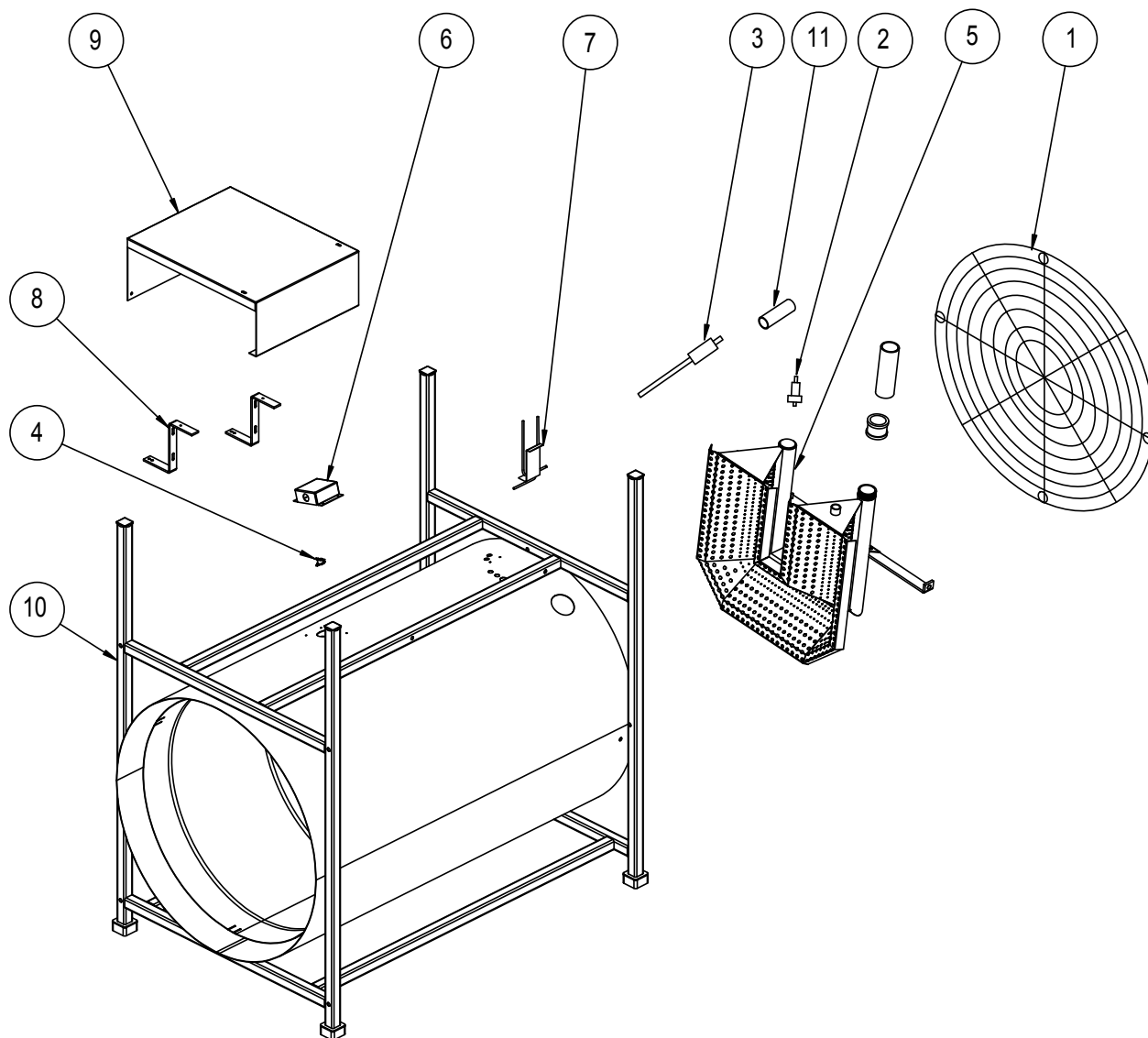




# Ladder Diagram (3 Phase)



# Heater Parts Diagram



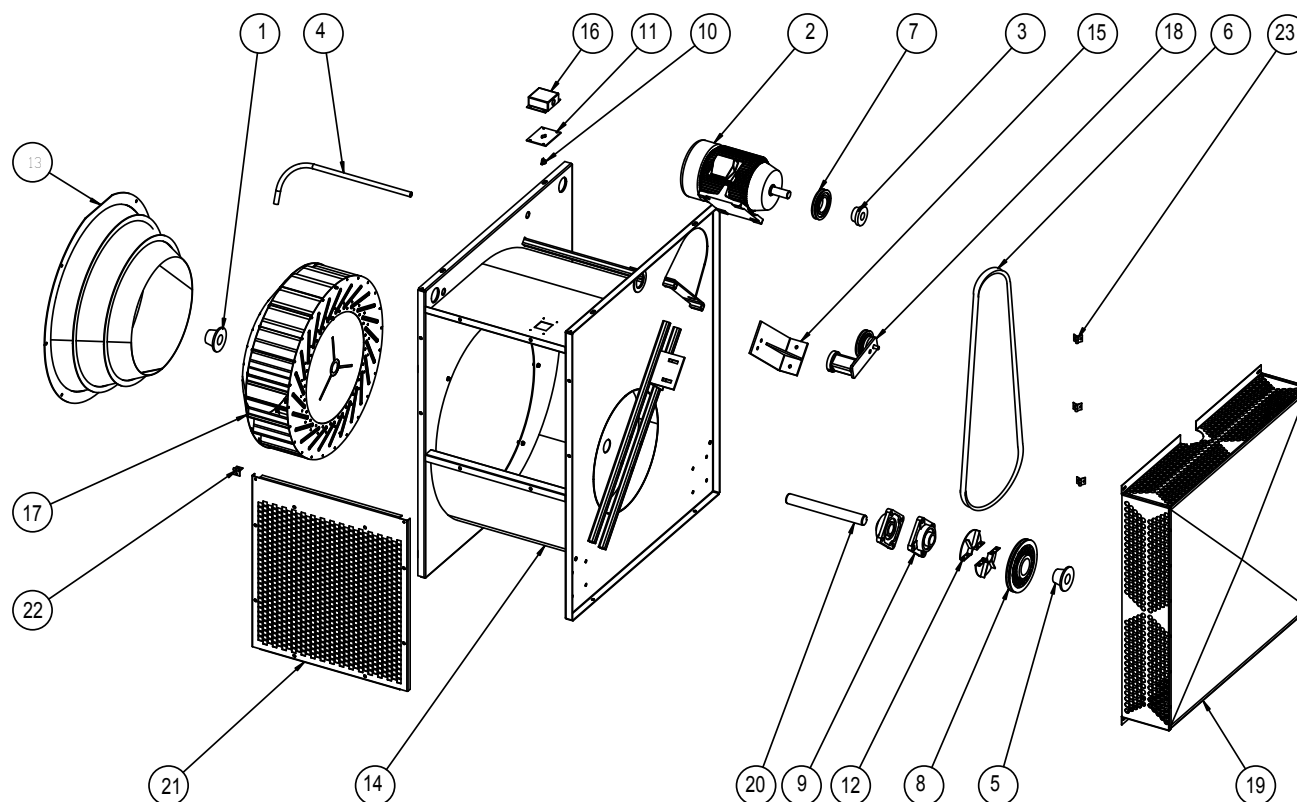
## Heater Parts List

Ref #	Part #	Description	Qty
1	6032	Inlet Screen	1
2	2143	Spark Plug	1
3	S2200-753 SL11B-86	Flame Rod Assy (optional) Flame Rod only (optional)	1
4	9161	Limit Switch	1
5	BV14-506	Burner	1
6	FN12-157	Limit Switch Box	1
7	S2200-740	Air Tube Bracket Assembly	1
8	S2200-235	Valve Train Cover Bracket	1
9	S2200-260	Gas Valve Cover	1
10	S2200-512	Heater Body	1

The following Labels are not shown:

Ref #	Part #	Description	Qty
	0880	Shock Hazard Label	1
	2849	Natural Gas/Propane Label	1
	4505	Valve On/Off Label	1
	4506	Rotation Label	1
	4802	Sure Flame Decal	2
	7362	General Warning Label, En.	1
	8517	Electrical Warning Label	1
	8821	General Warning Label, Fr.	1
	9418	Wiring Diagram Label 3-Ph	1
	9799	Wiring Diagram Label 1-Ph	1
	11488	Altitude Correction Label	1
		Specification Label	1

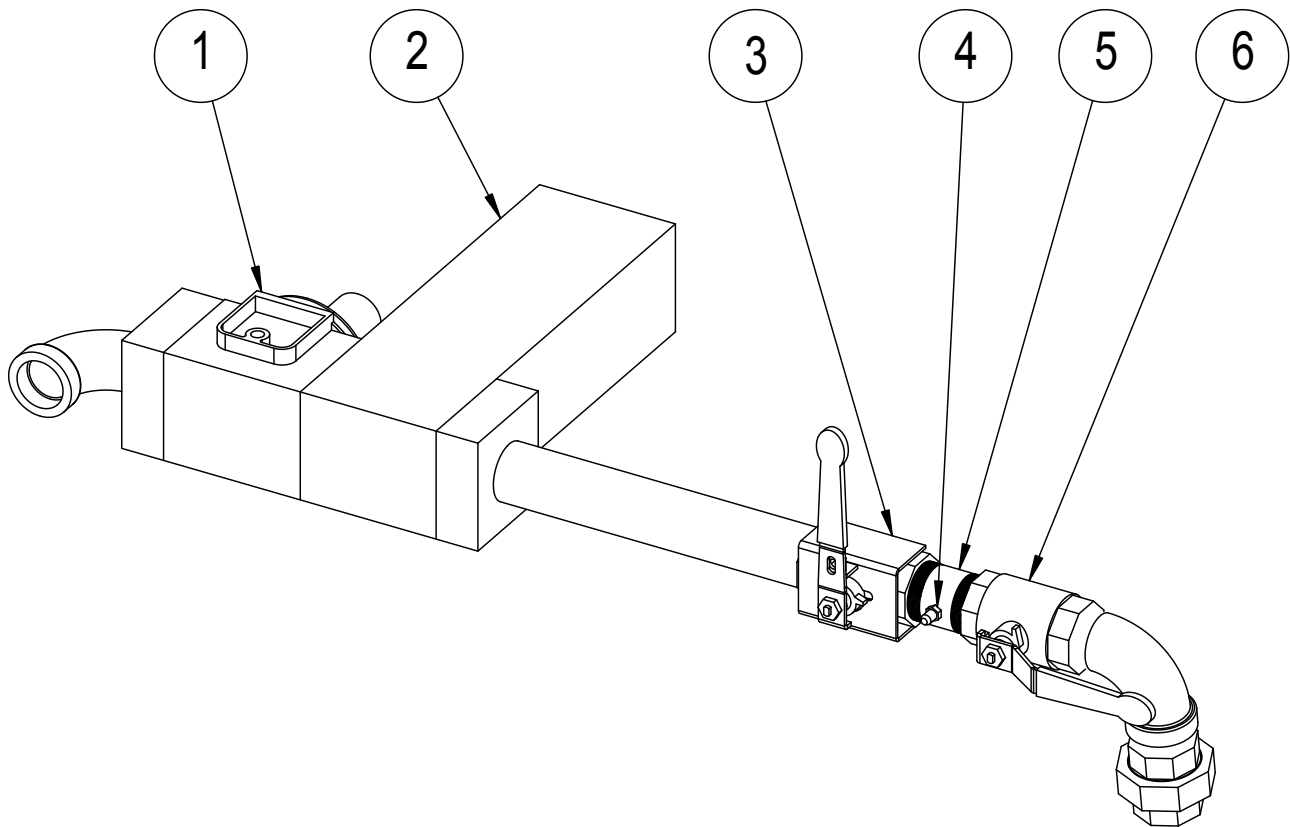
# Blower Parts Diagram



## Blower Parts List

Ref #	Part #	Description	Qty	Ref #	Part #	Description	Qty
1	2408	Impeller Bushing	1	11	FN12-148	Limit Switch Plate	1
2	6162	Motor 5hp 3Ph 208/230/460V	1	12	FN12-711	Heater Slinger	1
2	6422	Motor 5hp 1Ph 208/230V	1	13	FN12-510	Inlet Cone	1
2	7713	Motor 5hp 3Ph 575V	1	14	FN12-512	Blower Housing	1
3	6292	Motor Bushing	1	15	FN12-514	Belt Tensioner Bracket	1
4	6293	Flex Conduit	1	16	FN12-517	Limit Switch Box	1
5	6978	Sheave Bushing	1	17	FN12-707	Impeller	1
6	9688	Belt	1	18	FN12-708	Belt Tensioner	1
7	9133	Motor Sheave	1	19	FN12-709	Belt Guard	1
8	9134	Impeller Sheave	1	20	FN12-903	Impeller Shaft	1
9	9136	Bearing	2	21	S2200-240	Outlet Screen	1
10	9162	Blower Limit Switch	1	22	S2200-241	Outlet Screen Hinge	2

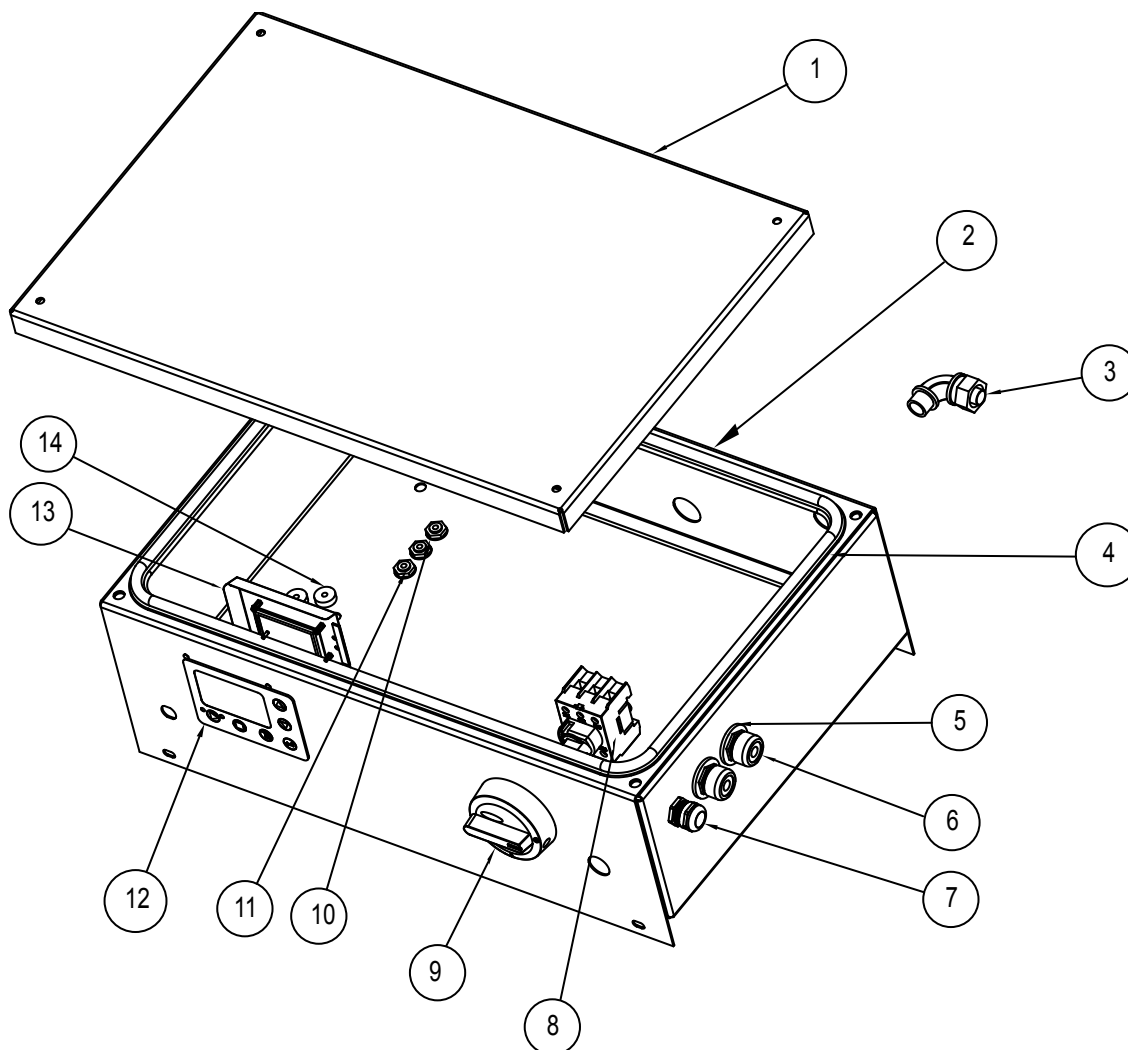
# Valve Train Parts Diagram



## Valve Train Parts List

Ref #	Part #	Description	Qty
1	8685	Gas Regulator	1
2	8648	2 Stage Valve	1
3	S2200-712	Changeover Valve	1
4	8708	G1/8" Test Port	1
5	S2200-132	Test Nipple	1
6	2539	1.5" Ball Valve	1

# Control Box Parts Diagram



## Control Box Parts List

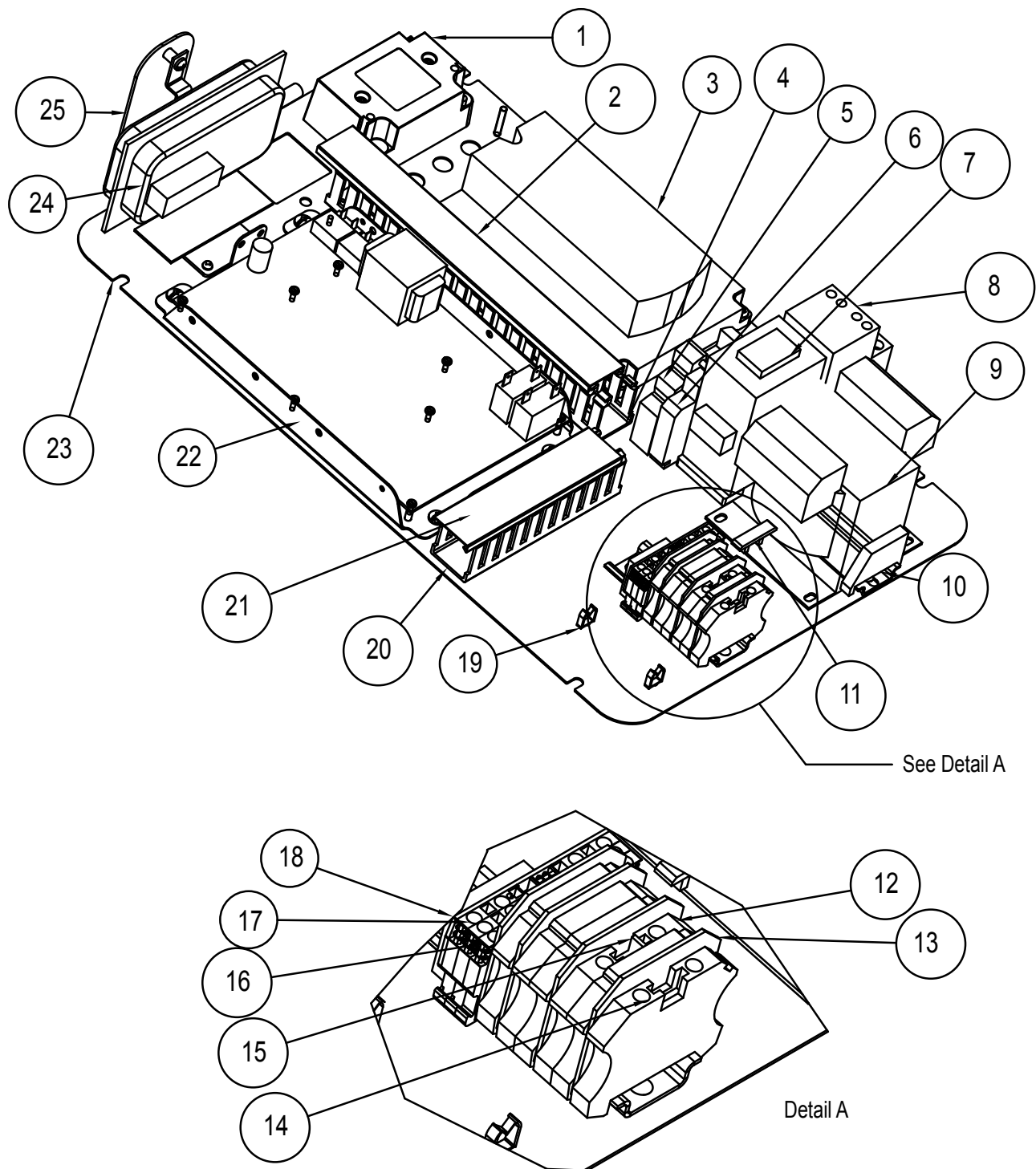
Ref #	Part #	Description	Qty
1	S2200-261	Control Box Lid	1
2	S2200-514	Control Box Weldment	1
3	6283	½" 90° Connector	1
4	S2200-265	Seal	1
5	9219	½" Sealing O-Ring	2
6	3976	½" Strain Relief	2
7	3983	Dome Connector	1
8	11686	Switch	1
9	11687	Switch Mounting Kit	1
10	8734	Hexagonal Jam Nut	3

Ref #	Part #	Description	Qty
11	8691	Cable Gland	3
12	10993	Keypad	1
13	SE-5725	Display Assembly	1
14	8687	Cable Gland Membrane	2

### Not Shown:

	IX-5853	Thermostat Assembly	1
	WRS-266	Stage Valve Cable	1
	WRS-267	Stage 2 Valve Cable	1
	WRS-269	Thermostat Receptacle	3
	WRS-272	High Limit Cable	4

# Control Box Chassis Parts Diagram



## Control Box Chassis Parts List

Ref #	Part #	Description	Qty
1	8676	Ignition Transformer	1
2	S2200-257	Wire Duct Cover 10"	1
3	IX-5867	Flame Controller	1
4	S2200-256	Wire Duct 10"	1
5	10712	Relay	1
6	4703	Circuit Breaker	1
7	8629	Contactor	1
8	9938	Overload Relay	1
9	2502	Stepdown Transformer	1
10	8651	Din Rail End Bracket	3
11	8628	Terminal Block Cover	5
12	8623	Feed-Through Terminal Block	5
13	8624	End Plate	4
14	8626	Protective Earth Terminal Block	1
15	8627	Cross Connector	2
16	4669	Terminal Block 4P	1
17	4668	Terminal Block Green 4P	2
18	4655	End Plate	1
19	9959	Wire Saddle Clip	3
20	S2200-263	Wire Duct 5.5"	1
21	S2200-264	Wire Duct Cover 5.5"	1
22	S2200-748	Control Board	1
23	S2200-751	Chassis	1
24	5124	Air Switch	1
25	S2200-754	Air Switch Bracket	1



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