heat wagon

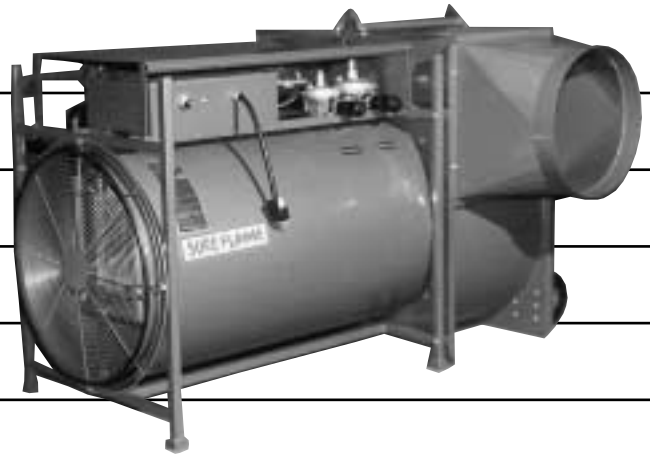
342 N. Co. Rd. 400 East
Valparaiso, IN 46383
219-464-8818 • Fax 219-462-7985
www.heatwagon.com

Installation and Maintenance Manual

Please retain this manual for future reference.

S2200

Construction Heater



For your safety: Do not use this heater in a space where gasoline or other liquids having flammable vapors are stored.

Revision 7-29-02

IMPORTANT INFORMATION! READ FIRST

The heater is designed for use as a construction heater under ANSI Z83.7a-1991. The primary purpose of construction heaters is to provide temporary heating of buildings under construction, alteration, or repair and to provide 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)-1987 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.

NFPA-58 1989 STANDARD FOR THE STORAGE AND HANDLING OF LIQUEFIED PETROLEUM GASES

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

FOR YOUR SAFETY

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

CONSTRUCTION HEATER 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 your local Heat Wagon dealer or the manufacturer.

W A R N I N G

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.

Not for home or recreational vehicle use!

Installation and Maintenance Manual
Model S2200
Construction Heater

Table of Contents:

WARRANTY

All new Heat Wagon and Sure Flame heaters and fans are guaranteed against defective materials and workmanship for one (1) year from invoice date.

Warranty repairs may be made only by an authorized, trained and certified Heat Wagon dealer. Warranty repairs by other entities will not be considered. Warranty claims must include model number and serial number.

LIMITATIONS

Warrant claims for service parts (wear parts) such as spark plugs, igniters, flame rods will not be allowed. Diagnostic parts such as voltage meters and pressure gauges are not warrantable.

Evidence of improper fuel usage, fuel pressures outside of manufacturer's specification, poor fuel quality, and improper electric power, misapplication or evidence of abuse may be cause for rejection of warranty claims.

Travel time, mileage and shipping charges will not be allowed. Minor adjustments of heaters are dealers' responsibility. Defective parts must be tagged and held for possible return to the factory for 60 days from date of repair. The factory will provide a return goods authorization, (RGA) for defective parts to be returned.

No warranty will be allowed for parts not purchased from Heat Wagon.

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DESIGN RELATED SAFETY FEATURES

1. DUAL SIZED GAS INLETS:Units used with LPG supplied through the Natural Gas inlet will throw significantly more heat than the rated Btu/h. This is definitely a safety hazard.

2. LOW SKIN TEMPERATURE: Sure Flame Heaters are designed to have a low skin temperature. This provides added safety in the work place.

3. DURABLE CONSTRUCTION: The Model S2200 uses a stainless steel burner for long life and consistent performance.

   In order to maintain the highly efficient combustion of the Sure Flame Heater, the combustion chamber must remain as manufactured. Any change or distortion could alter the fuel/air mixture and create unwanted gases.

SAFETY FEATURES

Servicing of Sure Flame Construction Heaters normally involves one of several built-in safety features. The Model S2200 incorporates devises to detect the following:

1. LOSS OF FLAME — Gas supply is shut off if flame is lost to prevent raw gas from leaving heater

2. OVERHEATING — a) Thermal overload protection in the motor
   b) High temperature limit switch in the combustion chamber

3. LOSS OF POWER — Total shutdown with manual reset required. Any one of the safety devices will create a loss of power situation

4. BLOCKED AIR SUPPLY — A switch detects the differential pressure in the combustion chamber and shuts down when insufficient

5. COOL DOWN PERIOD — Built in delay timer to run blower for 1-2 minutes. In addition to purging all unburned gases from the combustion chamber.

SPECIFICATIONS

Model No. S2200

Designed to ANSI Z83.7-1990 Construction Heater

Gases:	Natural or Propane
Capacity:	2,250,000 Btu/h maximum 1,100,000 Btu/h maximum
Orifice Size:	43 DMS (x78)
Blower:	10,000 CFM
Electrical Rating:	Varies: Rating determined as stated on Specification label and the electric motor on the heater

Gas Supply:	**Inlet Pressure**		**Manifold Pressure**	
	Max W.C.	**Min W.C.**	**Max W.C.**	**Min W.C.**
Propane	14”	11” W.C.	3.1”	.35”
Natural Gas	14”	11” W.C.	7.0	1.25”

(Minimum inlet pressure is for purpose of input adjustment)

Inlet Connection:

Weight (approximate): 100 lbs.

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INSTALLATION

The **Sure Flame S2200** 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 and combustion gases must not be obstructed in any way.

1. Install the heater in a horizontal position and allow the following clearances from any combustible material or fuel containers:

Front Outlet:	25 feet	Sides:	3 feet
Intake:	2 feet	Top:	4 feet

   Also make sure that no flammable vapors are present in the space where the heaters 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. Please refer to Propane and Natural Gas installation sections on pages 7-8. Excessive pressure (over 1/2" psig) will damage the controls and void the warranty.

3. Visually inspect the 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 115 volt electrical supply and in compliance with the National Electrical Code ANSI/NFPA 7.0. For protection against shock hazard the supply cord should be plugged directly into a properly grounded three-prong receptacle.

INSTALLATION USING 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 only if the line pressure to the heater is greater than 1/2 psi.

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.

INSTALLATION USING A PROPANE SUPPLY TANK(S)

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

2) The supply container **must** be equipped with an LP Gas Regulator that complies with ANSI/UL 144 Standard for Pressure Regulating Valves for LP Gas. Another regulator must be installed on the heater to reduce the pressure from this regulator down to a maximum inlet pressure of 1/2 psig.

3) Arrange the cylinder supply system to provide for vapor withdrawal from the operating cylinder. 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 cylinder is adequate to provide the rated BTU/H input to the heater.

5) Turn off the propane supply valve at the cylinder when the heater is not in use.

6) The installation must conform with local codes, or in the absence of local codes, with the Standard for Storage and Handling of Liquefied Petroleum Gases ANSI/NFPA 58-1989

7) When the heater is to be stored indoors the propane cylinder must be disconnected from the heater and the cylinder moved away and stored in accordance with Chapter 5 of the above National Standard.

COMMON INSTALLATION AND OPERATIONAL PROBLEMS

1) LOW VOLTAGE AT THE HEATER
   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, or low voltage at the power source. Low voltage results in the motor overheating, burnt relay contacts, or a relay that will not make contact. Check voltmeter on heater before start-up.

2) GAS SUPPLY LINE UNDERSIZED

3) INSUFFICIENT VAPORIZATION AT SUPPLY
   Normally caused by undersized supply tank.

4) IMPROPER GAS SUPPLY PRESSURE
   Usually a result of propane supply pressure being too high because of improper or lack of regulation or too low of natural gas pressure at meter.

5) DIRTY GAS SUPPLY
   Dirty gas can cause strainers to plug or form a build-up in the burner orifice.

6) LACK OF PREVENTIVE MAINTENANCE
   Heaters must be cleaned as required, especially when used in a dirty environment.

7) 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 re-circulation.

ON-SITE SAFETY PROBLEMS

1) SHORTING OUT OF DEFECTIVE COMPONENTS
   This is a very common problem which saves short term expense at the risk of a large future cost. Any heaters found in this condition should be removed immediately.

2) IMPROPER ENCLOSURES
   When heaters are installed partially to the outside for fresh air intake, strict adherence must be made to he minimum clearance to combustibles given on the instruction plate. Wood framing around a heater is a request for trouble.

3) SUPPLYING LIQUID PROPANE TO HEATER
   This problem has occurred from time to time. 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.

OPERATING INSTRUCTIONS

1) Connect gas supply to appropriate inlet as indicated by decal. The conversion shall only be done by the owner or lessor of the heater.

   IMPORTANT: Ensure gas inlet not in use is securely plugged.

2) Insure the manual firing valve is in the “ON” position, and thermostat set on minimum setting.

3) Connect power - use adequate electric power supply as specified on the heater specification label and the electric motor plate.

4) Open gas supply

5) Engage “START” switch and hold. Light will come on during purge (5 sec). Light will go out during firing sequence (5 sec. max). When light comes on again release the switch. If light fails to remain on, engage “OFF” switch, and repeat sequence.

6) Set thermostat to desired temperature.

7) To stop, turn gas off, engage “OFF” switch. Blower will automatically shut off in 1-2 minutes.

The appliances are should be kept clear and free from combustible materials, gasoline, and other flammable vapors and liquids.

Ensure that the flow of supply air is not obstructed.

The installation and operation of the heater shall comply with 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 following standards:

CAN/CGA-B149.1-M Natural Gas Installation Code
CAN/CGA-B149.2-M Propane Installation Code

THE INSTALLATION AND MAINTENANCE OF THE HEATER MUST BE ACCOMPLISHED BY A QUALIFIED SERVICE PERSON.

PREVENTIVE MAINTENANCE

Sure Flame construction heaters are built to withstand the rigors 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.

A)VISUAL CHECKS

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

1) Wheels (if installed), cords and connectors, wiring and conduit
2) Heater shell (including heat shield), blower housing, & control box
3) Blower drive belts and bearings, all screens and guards

B)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.

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, approximately .070 to .085

C)FLAME SAFEGUARD CONTROL

The Fireye control should be cleaned using compressed air or alcohol. Do not use any other liquid or aerosol spray cleaners. In areas of high humidity, the control should be removed and placed in a dry atmosphere when the heater is expected to be out of service for an extended time. It is recommended that units purchased as spares be rotated periodically, so that each unit will be placed in operation at least once every 90 days.

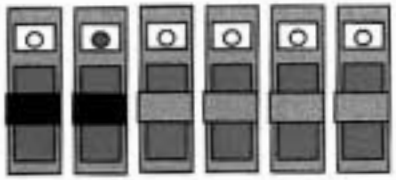
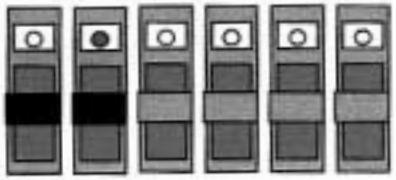
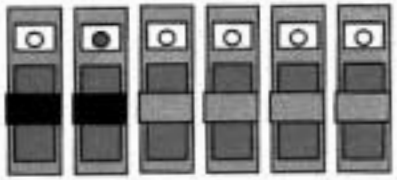
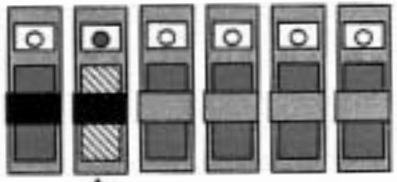
D)MOTOR

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.

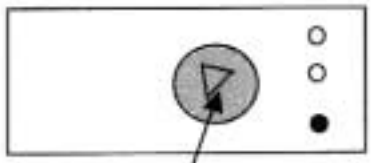
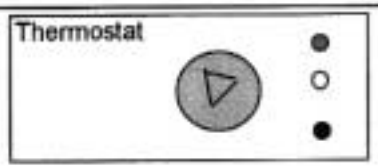
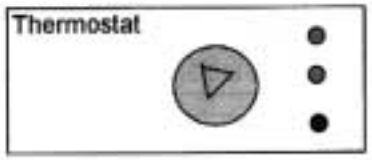
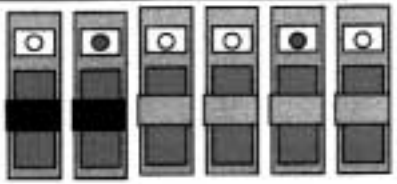
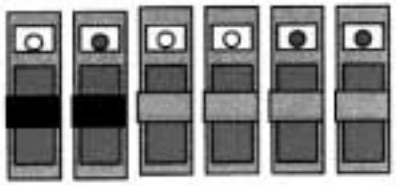
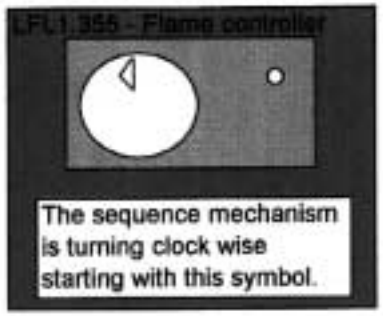
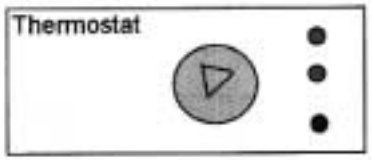
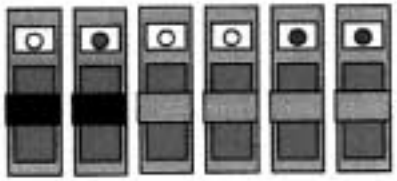
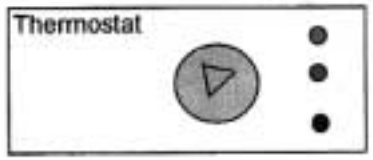
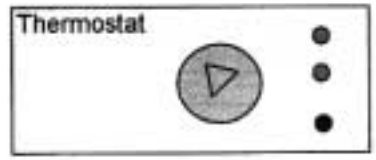
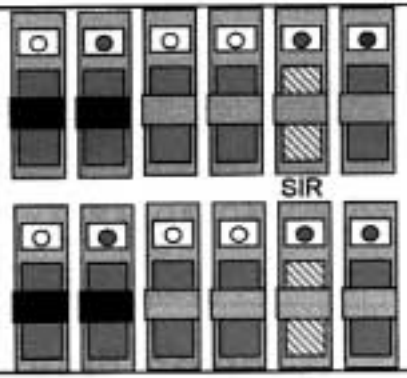
E)BLOWER

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

S2200 Troubleshooting Guide

	SEQUENCE	EXTERNAL EFFECT	INTERNAL EFFECT	CAUSE
1	START BLOWER / STOP/ RESET / START HEATER TO START THE HEATER PUSH	START BLOWER / STOP/ RESET / START HEATER Thermostat		NO ERROR
2		START BLOWER / STOP/ RESET / START HEATER Thermostat		The START HEATER green bulb should be replaced.
3		START BLOWER / STOP/ RESET / START HEATER Thermostat		-faulty thermostat connection -faulty thermostat
4	The START HEATER green button light stays on only when the push button is held on.	START BLOWER / STOP/ RESET / START HEATER Thermostat	 HR	Change HR relay block.

S2200 Troubleshooting Guide

5	 Turn the thermostat knob clock wise to set the temperature. The room temperature should be lower then the set temperature.	 OR 	   The sequence mechanism is turning clock wise starting with this symbol.	NO ERROR
6				-faulty thermostat
7	The blower does not start.	 		-faulty SIR relay

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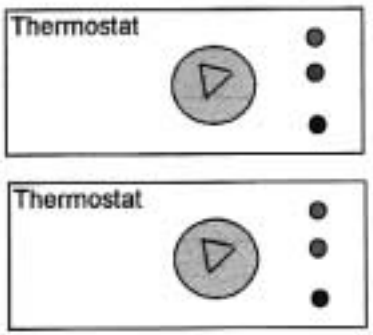
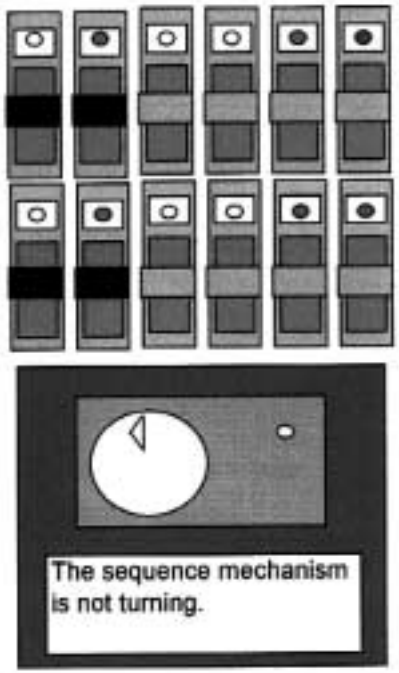
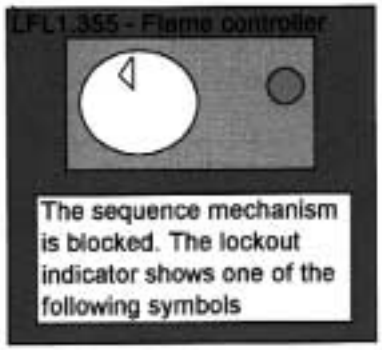
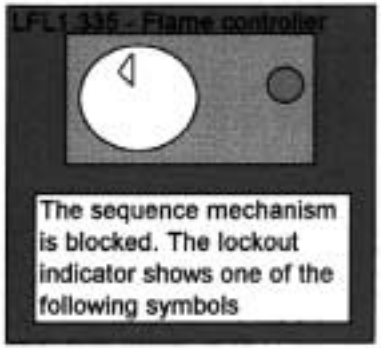
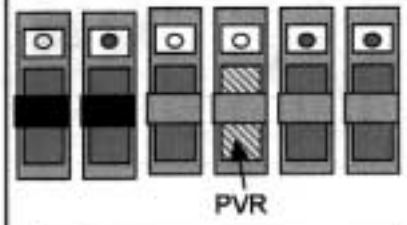
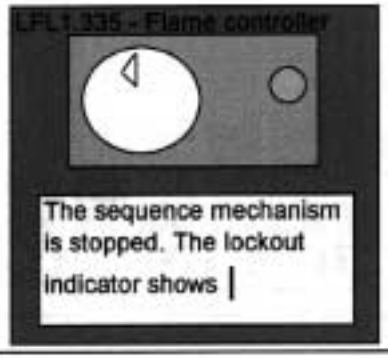
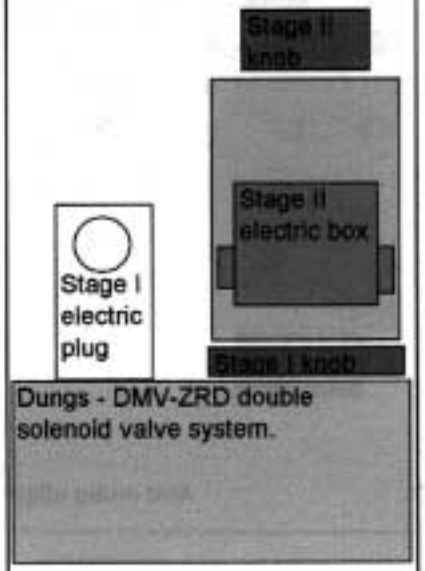
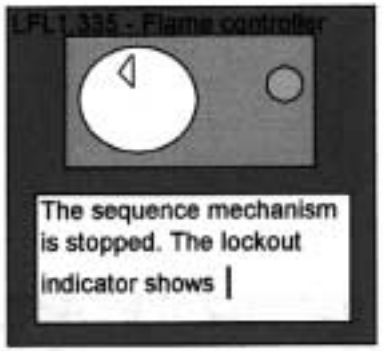
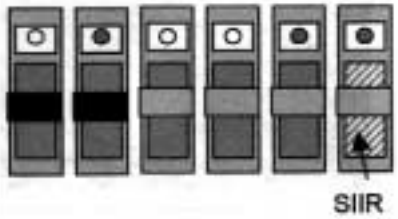
S2200 Troubleshooting Guide

8	The blower does not start.			-NO START, because: existing flame, defects in flame supervisor circuit. -Check, also, the LFL1.335 controller fuse. -Check the air switch contacts: between the black and red wires the contact is NC and between the black and blue wires the contact is NO when there is no air flow. - Check 3 phase overload relay status. On "Auto" mode the relay will reset itself after 150 seconds. Check, also, the blower motor - probably one phase function. -For a one phase motor the thermal overload switch is on the motor. Push the reset button located on the motor.
9	The STOP/RESET push button red light is on. Push the STOP/RESET red push button and then the START HEATER green button Also see next page	 The voltage at detector circuit (between flame rod and ground) during the test is AC 380V±10%, and during operation AC 330V±10%. The short-circuit current 0.5mA max. Minimum ionization current required is 6µA. Recommended range of measuring instrument is between 0 to 50µA. Check the flame rod, and the flame rod wire status.		P Lockout, because there is no air pressure indication at the beginning of air pressure control. Check the blower rotation for three phase motor and if it is reversed,change any two phases of the motor. -Check the air switch contacts ■ Lockout due to a fault in the flame supervisor circuit. -Check the LFL1.355-22 terminal's grounding circuit. -Check the LFL1.355-24 terminal's flame rod circuit. -Check the flame rod status.

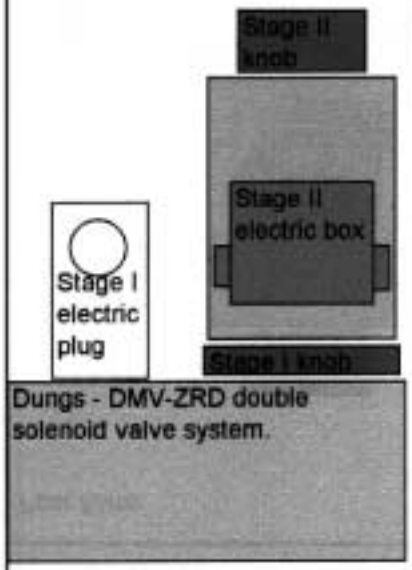
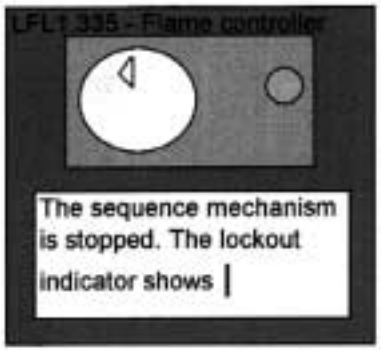
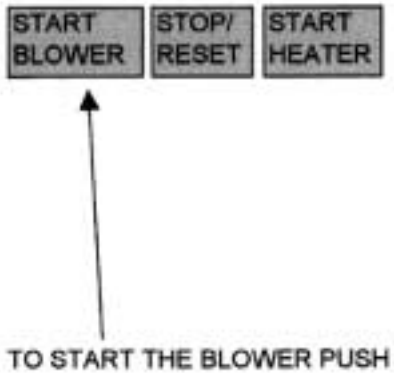
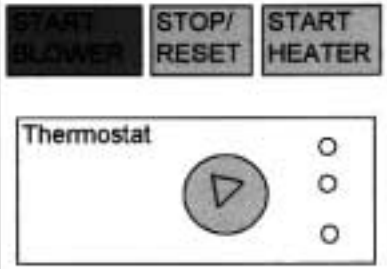
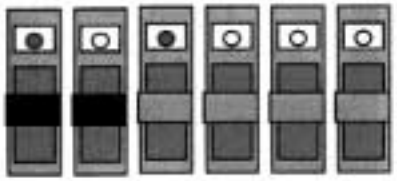
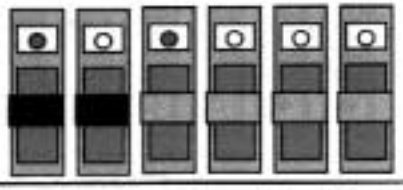
S2200 Troubleshooting Guide

10	The STOP/RESET push button red light is on. Push the STOP/RESET red push button and then the START HEATER green button OR direct the START HEATER green button.	START BLOWER [redacted] START HEATER Natural gas minimum manifold pressure: 1.25"WC. Natural gas maximum manifold pressure: 7.00"WC. Propan vapors minimum manifold pressure: 0.7"WC. Propan vapors maximum manifold pressure: 3.00"WC.		**1** Lockout, because no flame signal is present after the first safety time. -Check the natural gas or propan supplay pressure. -Check the manifold pressure. -Check the Dungs valve coils integrity. **2** Lockout, because no flame signal is present after the second safety time Check the natural gas or propan supplay pressure. -Check the manifold pressure -Check the Dungs valve coils integrity. | Lockout, because the flame signal has been lost during burner operation -Check the fuel gas supplay. -Check connection between LFL1.335 NO19 terminal and ignition tranformer - brown wire -Check connection between LFL1.335 ground terminal and ignition transformer - blue wire -Check the spark plug
11		No spark		
12	Function without errors.	No prepurge		-Check connection between LFL1.335 NO6 terminal and B4 terminal block.
13	Also see next page	No postpurge		-Check connection between LFL1.335 NO7 terminal and B3 terminal block.

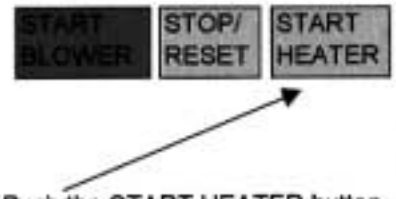
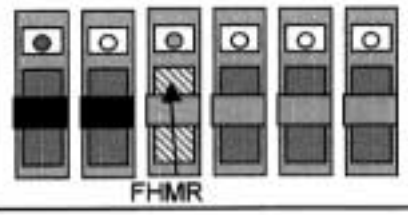
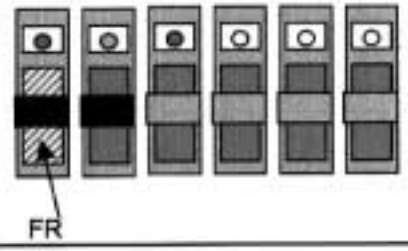
S2200 Troubleshooting Guide

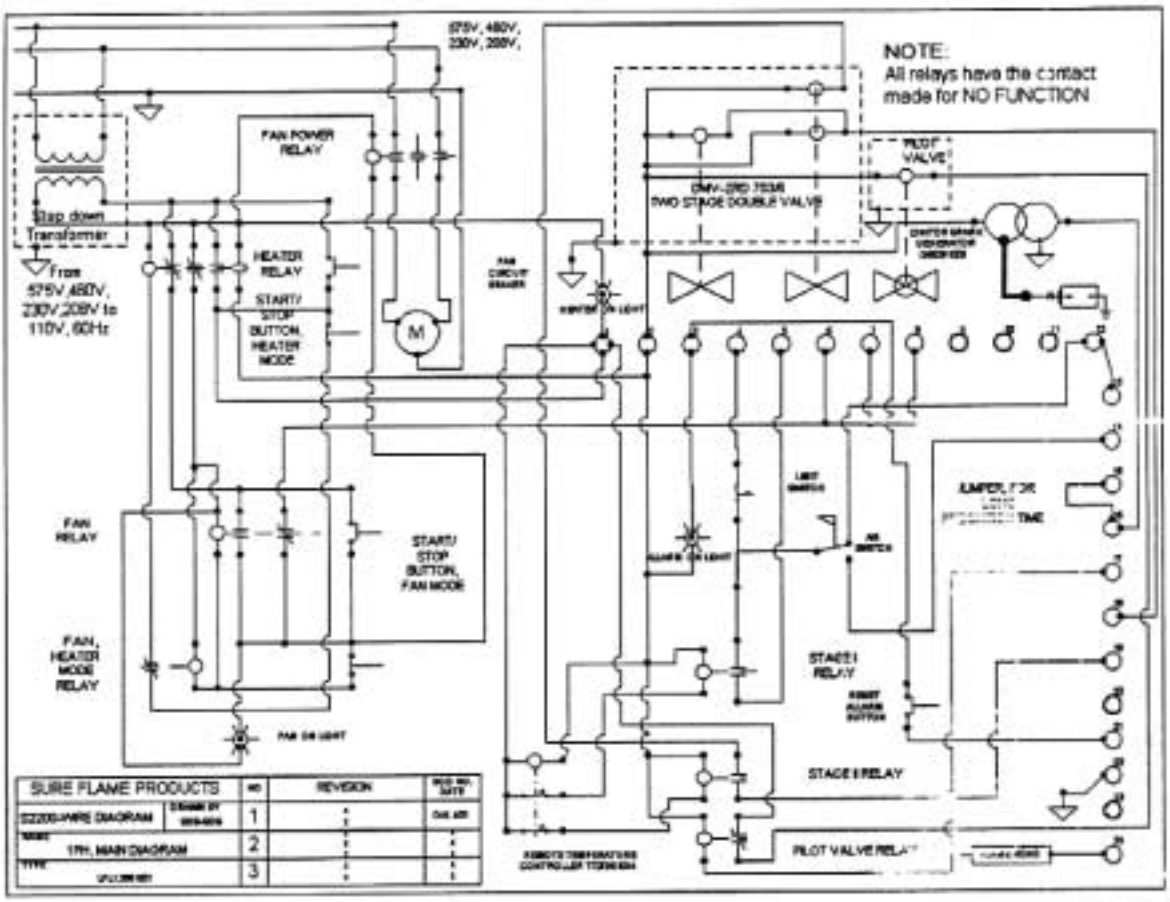
14	Function without errors	Poor flame	 	- faulty PVR relay
15	Also see next page	Poor flame 	 	-Check Stage II knob.It is possibly closed. -Check Stage II electric box. - faulty SIIR relay.

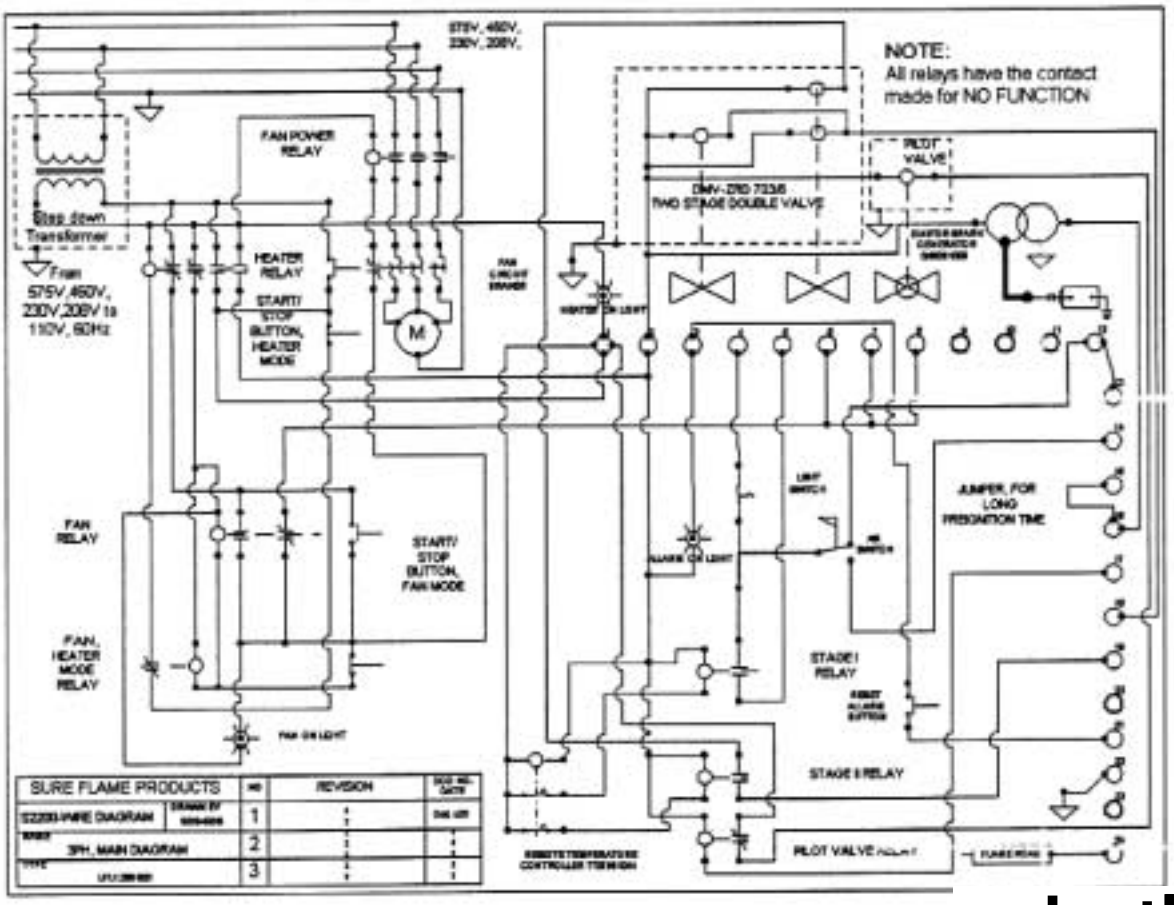
S2200 Troubleshooting Guide

16	Function without errors	High flame only 		-Check Stage I knob.It is possibly full open. -Check Stage I electric plug.
17				NO ERROR The blower mode function does not allow the heater mode function. To switch to heater mode first press the Stop/Reset push button.
18				The START Blower blue bulb should be replaced.

S2200 Troubleshooting Guide

19	 Push the START HEATER button			-faulty FHMR RELAY -faulty thermostat
20	The START BLOWER blue button light stays on only when the push button is held on.			Change FR relay block.


NOTE:
All relays have the contact made for NO FUNCTION
575V, 460V, 230V, 208V,
Step down Transformer
From 575V,460V, 230V,208V to 110V, 60Hz
FAN POWER RELAY
HEATER RELAY
START/ STOP BUTTON, HEATER MODE
FAN RELAY
START/ STOP BUTTON, FAN MODE
FAN, HEATER MODE RELAY
FAN ON LIGHT
PILOT VALVE
DMV-2RD 7336 TWO STAGE DOUBLE VALVE
HEATER ON LIGHT
STAGE I RELAY
STAGE II RELAY
PILOT VALVE RELAY
SURE FLAME PRODUCTS
REVISION
1
2
3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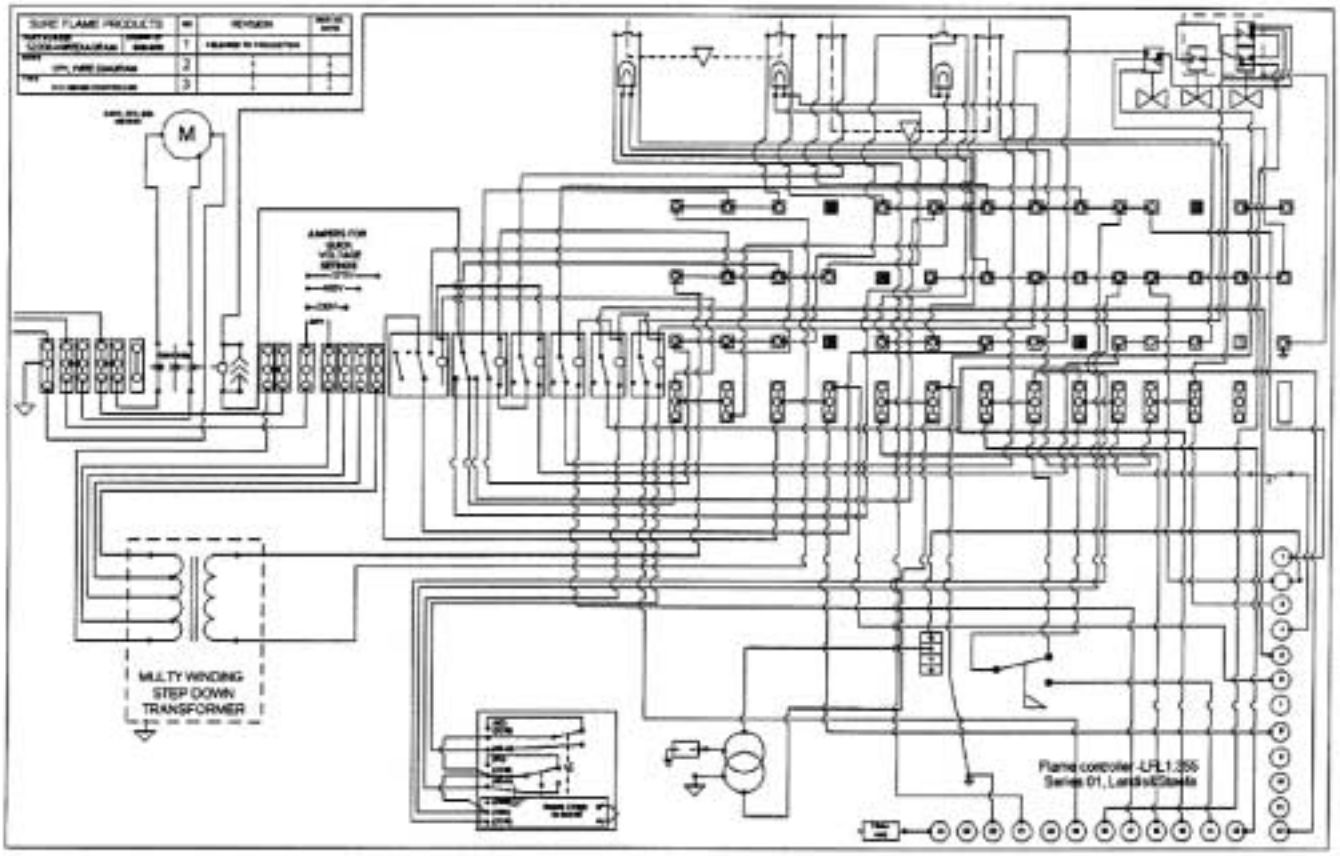
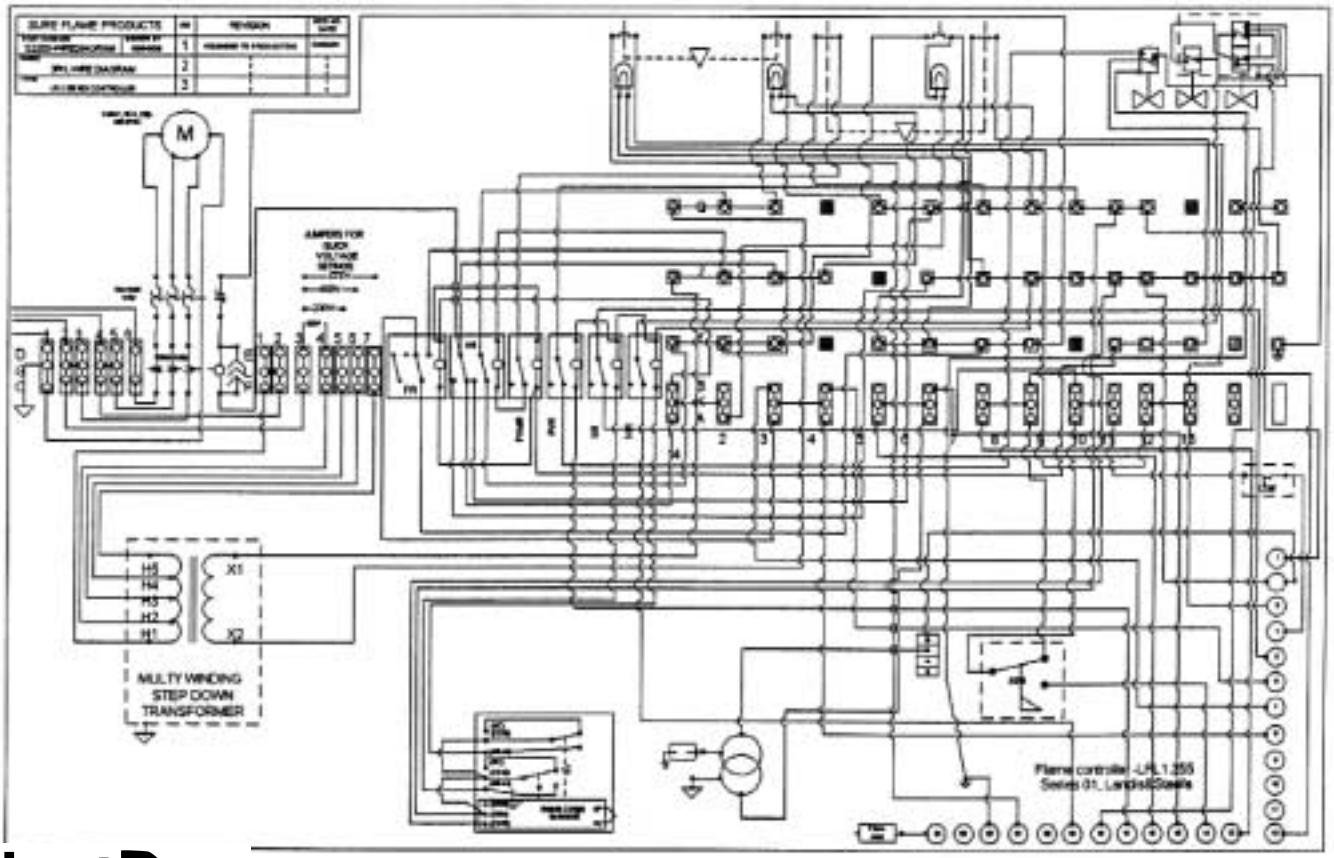
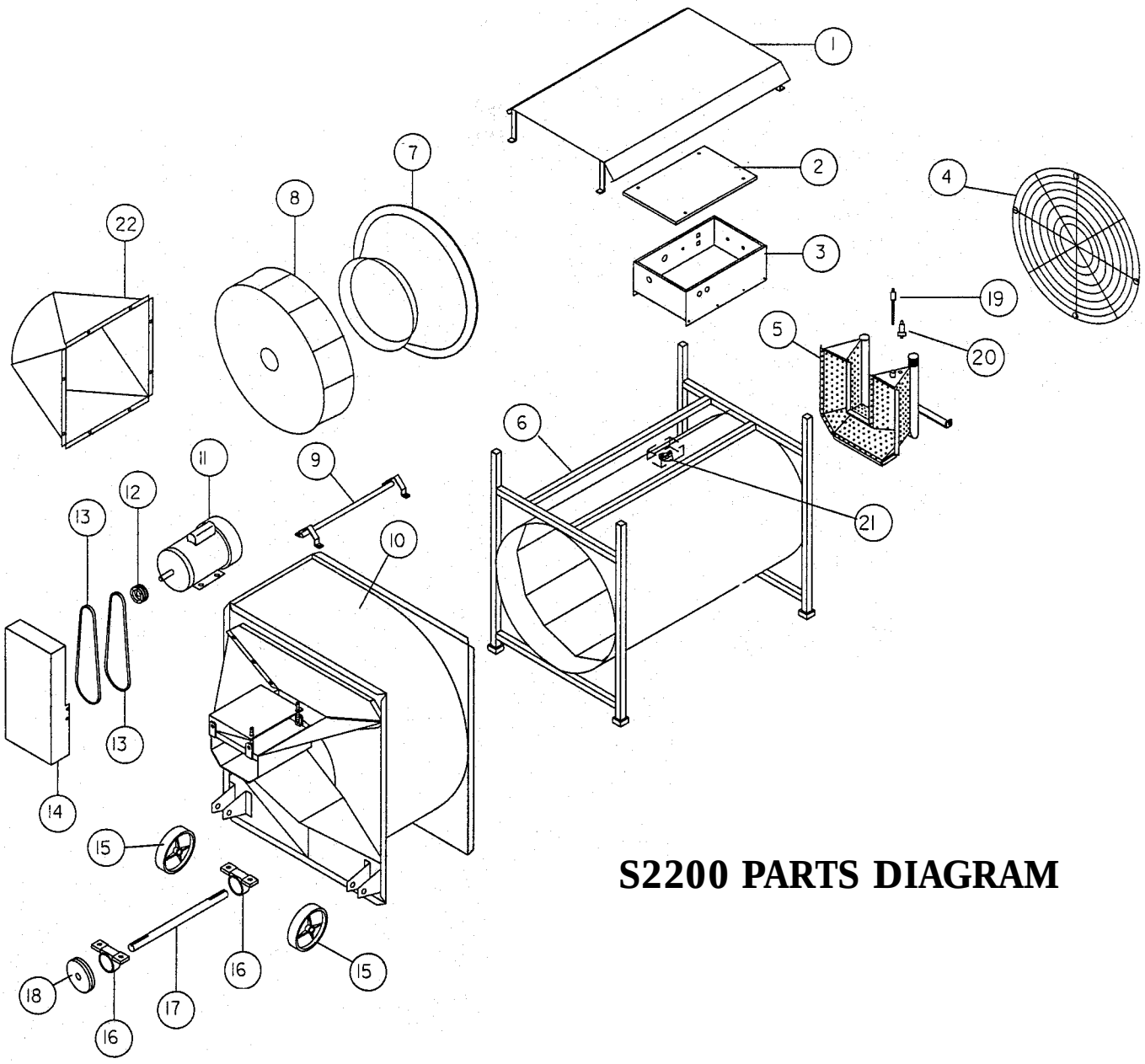

M
MULTY WINDING
STEP DOWN
TRANSFORMER


M
MULTY WINDING
STEP DOWN
TRANSFORMER



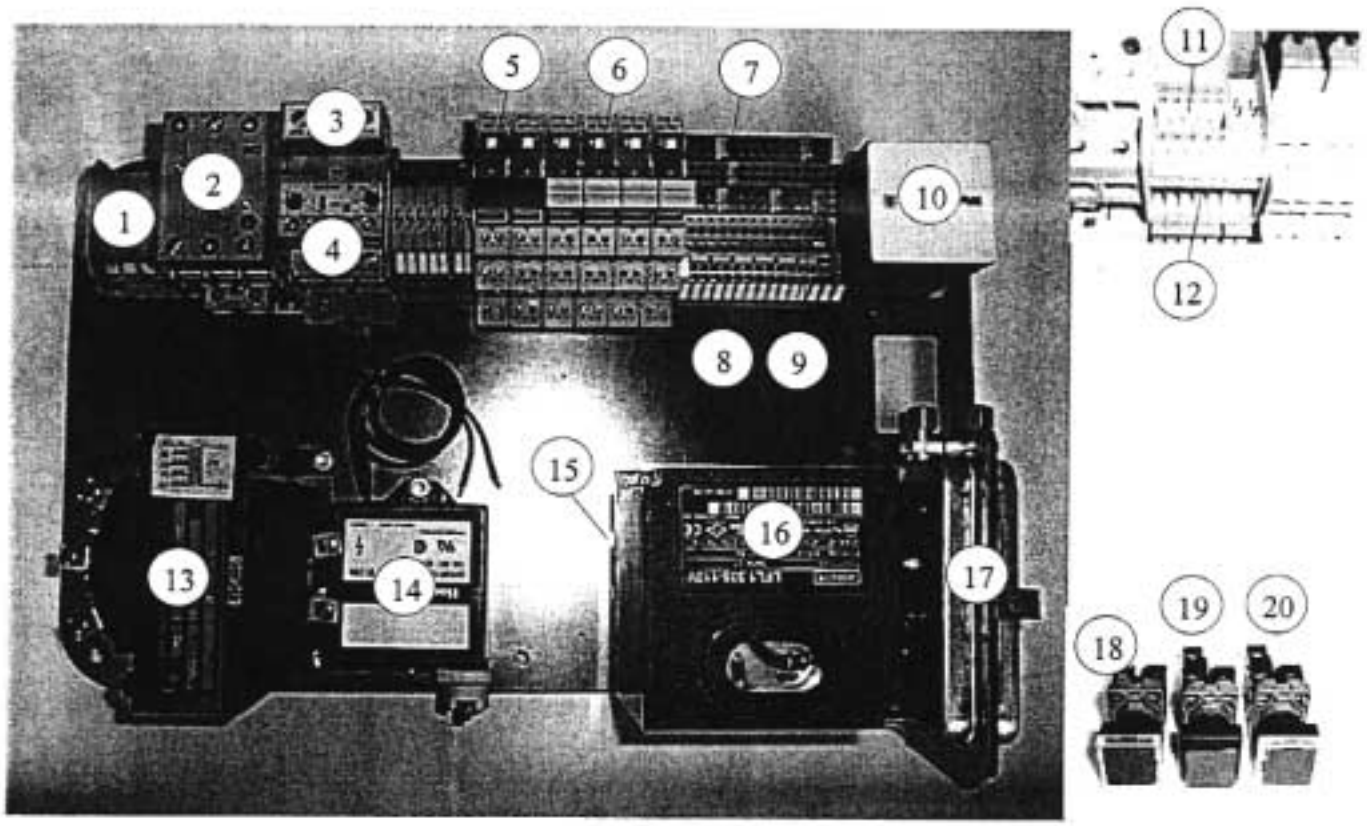
S2200 PARTS DIAGRAM

Item #	Part #	Description
1	SFP S2200-505	COVER
2	SFP S2200-196	CONTROL BOX LID
3	SFP S2200-509	CONTROL BOX
4	SFP 6032	FAN GUARD
5	SFP BV14-504	BURNER
6	SFP S2200-504	HEATER BODY
7	SFP FN12-123	INLET CONE
8	SFP FN12-591	27” IMPELLER
9	SFP FN12-506	LIFT HOOK
10	SFP FN12-703	HOUSING ASSEMBLY
11	SFP VARIOUS	MOTOR
(specify which motor the heater was supplied with)		
12	SFP 7063	3.15” SHEAVE

Item #	Part #	Description
13	SFP 2378	3V BELT 47.5”
14	SFP FN12-119	BELT GUARD
15	HWP HW1164	8” WHEEL
16	SFP 2384	1.5” BEARING
17	SFP LL-593	SHAFT
18	SFP 7064	6.0” SHEAVE
19	SFP 2441	FLAME ROD
20	SFP 2143	SPARK PLUG
21	SFP 2446	HIGH LIMIT SWITCH
22	SFP FN12-505	TRANSITION

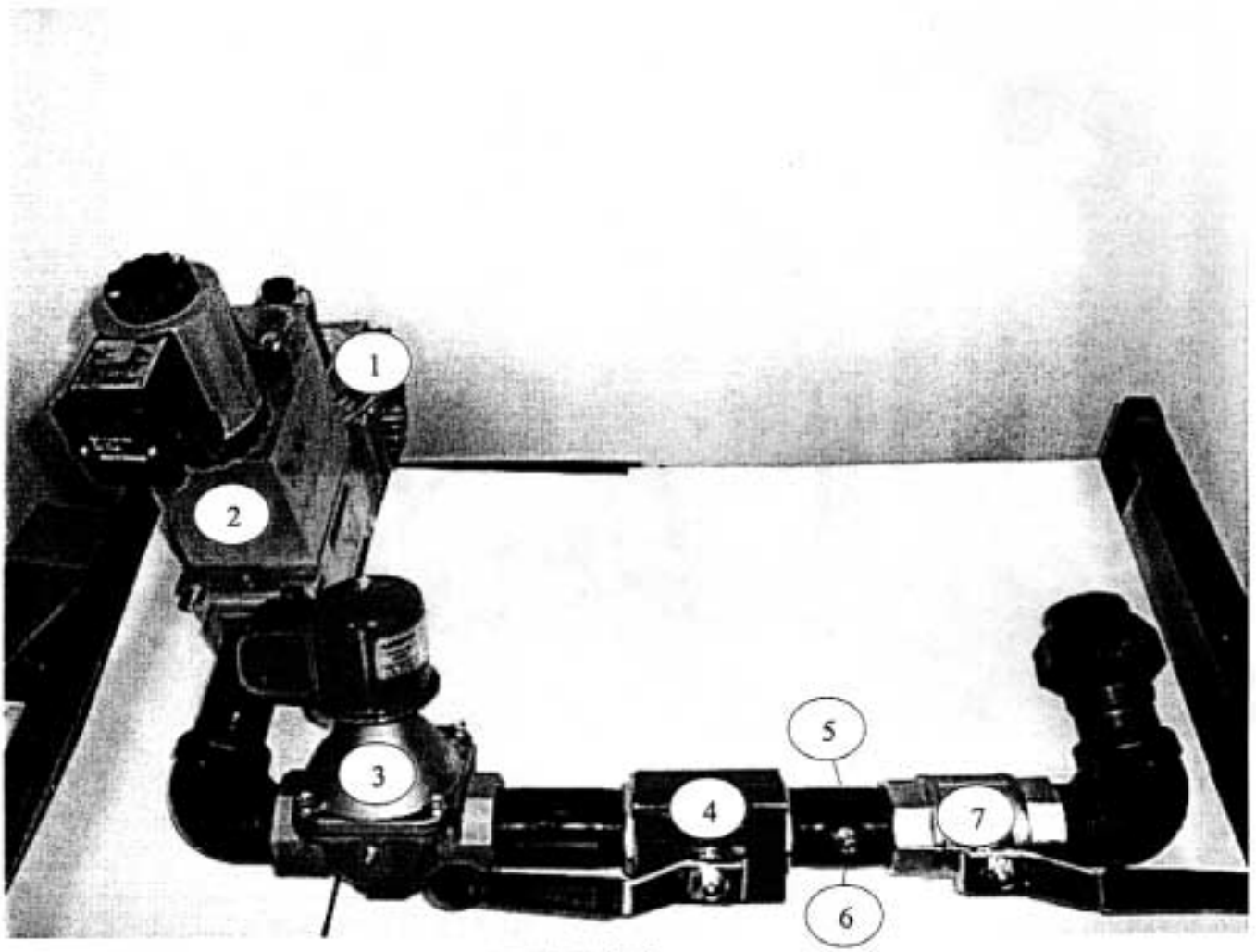
PARTS NOT SHOWN

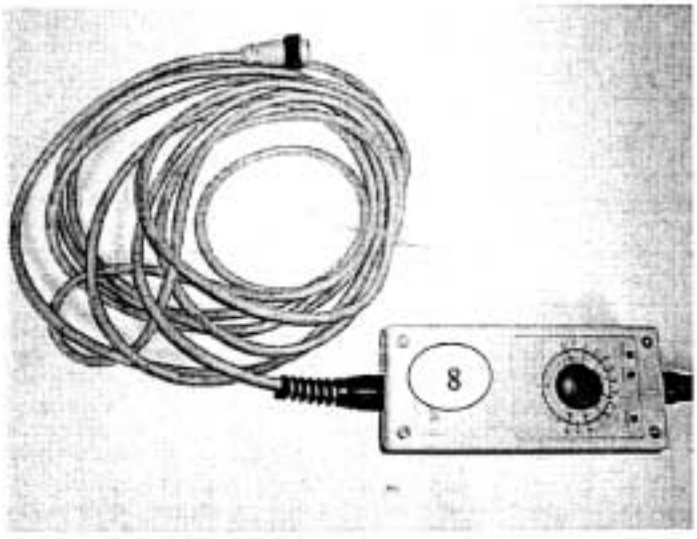
SFP 235	OPERATOR’S MANUAL
SFP 210	S2200 SPEC SHEET
DEC DK2200	DECAL KIT



Item #	Part #	Description
1	SFP 8623	FEED-THROUGH TERM. BLOCK 6
1	SFP 8626	PROTECTIVE EARTH TERM. BLOCK
1	SFP 8627	TERM. BLOCK CROSS CONN.
2	SFP 8629	3 POLE POWER RELAY
3	SFP 8632	DIN RAIL ADAPTOR
4	SFP 8630	OVERLOAD RELAY 12-37 AMP
4	SFP 8631	OVERLOAD RELAY 3.7-12 AMP
5	SFP 8661	PRS RELAY - DPDT - 8 AMP
6	SFP 8662	PRS RELAY - SPDT - 16 AMP
7	SFP 8654	DISTRIBUTION ELEMENT-BROWN
7	SFP 8655	DISTRIBUTION ELEMENT-BLUE
7	SFP 8656	DISTRIBUTION ELEMENT-GREEN
7	SFP 8657	MARKER CARRIERS
8	SFP 8713	TERM. BLOCK CROSS CON.
9	SFP 8652	BASIC ELEMENT
9	SFP 8653	GROUNDED BASIC ELEMENT

Item #	Part #	Description
9	SFP 8660	END PLATE
10	SFP 8659	DIN RAIL MNTD. UTILITY BOX
11	SFP S2200-718	575 VOLT JUMPER
11	SFP S2200-719	460 VOLT JUMPER
11	SFP S2200-720	230 VOLT JUMPER
11	SFP S2200-721	208 VOLT JUMPER
12	SFP 8637	FEED-THROUGH TERM. BLOCK
13	SFP 2502	STEPDOWN TRANSFORMER
14	SFP 8676	IGNITION TRANSFORMER
15	SFP 8678	FLAME CONTROLLER BASE PLATE
16	SFP 8677	FLAME CONTROLLER
17	SFP 5124	AIR SWITCH
18	SFP S2200-725	“START BLOWER” SWITCH
19	SFP S2200-726	“STOP/RESET” SWITCH
20	SFP S2200-724	“START HEATER” SWITCH





Item #	Part #	Description
1	SFP 8685	GAS REGULATOR
2	SFP 8648	2 STAGE VALVE
3	SFP S2200-130	MODIFIED SOLENOID VALVE
4	SFP S2200-712	CHANGEOVER VALVE
5	SFP S2200-132	TEST NIPPLE
6	SFP 8708	G1/8” TEST NIPPLE VALVE
7	SFP 2539	1.5” BALL VALVE
8	SFP S2200-714	THERMOSTAT ASSEMBLY