



**SURE FLAME<sup>®</sup>**

**S150**

**&**

**S300**

**CONSTRUCTION HEATERS**

**Rev: 2.7.2 August 15, 2008**

**SERVICE AND MAINTENANCE MANUAL No. 934-6637**

**PLEASE RETAIN FOR FUTURE REFERENCE**

**SURE FLAME<sup>®</sup> PRODUCTS**

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# S150 & S300 CONSTRUCTION HEATERS



## 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!**

Failure to comply to any of the safety precautions stated in this manual or on the heater could result in an explosion and/or fire hazard causing serious personal injury and/or property damage, and will void the warranty.

Safe and satisfactory operation of this propane gas fired construction heater depends upon its proper use in accordance with the manufacturer's instructions and all applicable local, municipal and national installation codes.

Propane gas is extremely flammable and explosive. Avoid serious injury and property damage. If you see, smell, or hear escaping propane gas.... Evacuate area immediately! Call your local fire department. Do not attempt to repair heater, all repairs or service to this heater must be performed by a qualified service person.

Sure Flame S150 and S300 construction heaters are approved for use with vaporized propane gas only. They are not to be used with propane gas in a liquid state or with any other type of fuel or gas.

A regulator, which is to be mounted at the propane cylinder or supply source, is supplied with all Sure Flame S150 and S300 construction heaters. This regulator, which is preset, must not be tampered with, removed or replaced with any regulator other than the one supplied by the manufacturer.

Notice - all references to propane or propane gas herein refer to propane in a vaporized state.



# S150 & S300 CONSTRUCTION HEATERS

## FOR YOUR SAFETY

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

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## S150 & S300 SPECIFICATIONS

CSA Certified to CSA 2.14-2000 and ANSI Z83.7-2000 Construction Heater

	<u>S150</u>	<u>S300</u>
Gas:	Vaporized Propane	Vaporized Propane
Capacity:	150,000 Btu/h (44 kW)	300,000 Btu/h (88 kW)
Manifold Pressure:	20 psig (138 kPa)	20 psig (138 kPa)
Orifice Size:	54 DMS	54 DMS (x2)
Propane Supply Pressure: (to regulator)	Bottle pressure	Bottle pressure

FN2 Blower (Optional)

Air Output:	700 cfm (330 l/s)
Electrical Rating:	115 V, 60 Hz, <12 A, 1 PH

# INSTALLATION

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

Sure Flame S150 & S300 Construction Heaters are direct fired propane gas heaters intended to be used primarily for the temporary heating of buildings under construction, alteration, or repair. Since all the products of combustion produced by heaters are released into the area being heated, it is imperative that adequate ventilation is provided. The flow of supply air to the heater and combustion gases must not be obstructed in any way. Do not use these heaters with ductwork as this will restrict the flow of supply air to or from the heater.

- 1 First, ensure that the surrounding temperature, size and capacity of the propane supply cylinder is adequate to provide the required Btu/h input of propane to the heater. Refer to the Vaporization Rate table at the back of this manual.
- 2 Always provide an opening where fresh air will enter the enclosed area that is being heated. This is of extreme importance if personnel will be working inside the enclosed area.
- 3 Arrange the propane supply system to provide for vapour withdrawal from the operating container(s).

**DANGER - Supplying liquid propane to the heater is dangerous and may cause an explosion and/or fire resulting in personal injury and/or damage to heater components.**

- 4 Install the heater on a horizontal surface at least 10 feet (3m) from any propane gas container. The front outlet must not be directed toward any propane gas container within 20 feet (6m). Allow the following clearances from combustible materials:

Outlet:	10 feet (3m)	Sides:	2 feet (0.6m)
Intake:	2 feet (0.6m)	Top:	7 feet (2.1m)
Floor:	Noncombustible		

Make sure that flammable vapours are not present in the space where the heater is being operated.

## **IMPORTANT!**

**Heater must always be placed on a horizontal surface. If the heater is positioned with the outlet pointing downwards, the heater will not function properly. PERSONAL INJURY could result due to incorrect installation.**

- 5 When connecting the heater to a vaporized propane supply, ensure that the pressure is as specified. Do not remove the regulator bolt or tamper with the setting. The regulator is preset to 20 psi (138 kPa).
- 6 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 or damaged, it must be replaced.
- 7 After each installation, check the hose assembly for propane leaks by applying a water and soap solution to each connection. Repair leaks immediately with the propane supply shut off.
- 8 If the heater is used with the optional FN2 Blower, connect the Blower to an adequate 115 volt electrical supply and in compliance with the Natural Electrical Code, ANSI/NFPA 70, or the CSA C22.1, Canadian Electrical Code, Part I. For protection against shock hazard the electrical supply cord must be plugged directly into a properly grounded three-prong receptacle.
- 9 In all applications install the heater in such a manner that it is not directly exposed to water spray, rain and/or dripping water.
- 10 Turn off the propane supply valve at the cylinder when the heater is not in use.
- 11 Heater installation must conform with all local codes, or in the absence of local codes, with the *Standard for Storage and Handling of Liquefied Petroleum Gases ANSA/NFPA 58* and the *Natural Gas and Propane Installation Code, CSA B149.1*.
- 12 When the heater is to be stored indoors, the connection between the propane supply cylinder(s) and the heater must be disconnected and the cylinder(s) removed from the heater and stored in accordance with the *Standard for Storage and Handling of Liquefied Petroleum Gases ANSA/NFPA 58* and, *CSA B149.1, Natural Gas and Propane Installation Code*.

# OPERATING INSTRUCTIONS

- 1 Turn on propane at the container.
- 2 Hold flame to burner, depress stem of control valve, pilot flame should light. Keep stem depressed for one minute. When stem is released the high flame should immediately come on and stay lit.
- 3 Connect FN2 Blower to 115 volt electrical power (if equipped with this option).
- 4 To shut down, turn propane off at container, burn off remaining propane in supply line.
- 5 Disconnect blower electrical supply (if equipped with FN2 Blower).

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 to the heater and combustion gases is not obstructed.

General criteria for the use of construction heaters may be found in the application sections of the American National Standard A10.10-1987, Safety Requirements for Temporary and Portable Space Heating Devices and Equipment Used in the Construction Industry.

## COMMON INSTALLATION & OPERATIONAL PROBLEMS

- 1 **INSUFFICIENT VAPORIZATION AT PROPANE SUPPLY**  
Normally caused by too small a size of propane supply tank. Use proper size & type of tank.
- 2 **IMPROPER PROPANE SUPPLY PRESSURE**  
Usually a result of the propane supply pressure being too high or too low, caused by improper or lack of regulation.
- 3 **DIRTY PROPANE SUPPLY**  
Dirty propane may cause strainers to plug or form a build-up in the burner orifice. Keep clean.
- 4 **LACK OF PREVENTATIVE MAINTENANCE**  
Heaters must be cleaned as required, especially when used in a dirty environment.
- 5 **IMPROPER SUPPLY OF FRESH AIR TO THE HEATER**  
It is essential that fresh air from outside the enclosed area be provided. This ensures that the heater will have a constant supply of fresh air for proper combustion.



# SAFETY FEATURES

S150 & S300 Construction Heaters incorporate the following safety features:

- 1 LOSS OF FLAME Propane supply is shut off 100% on flame failure, this prevents raw propane from leaving the heater.
- 2 CUT/DAMAGED HOSE Excess flow device is supplied to limit the flow of propane should the hose be cut or damaged during operation.

## ON-SITE SAFETY PROBLEMS

- 1 INSTALLING THE HEATER ON A NON HORIZONTAL SURFACE  
Heater is designed to operate at the designed angle of inclination. Changing this by blocking up either the front or rear legs will cause damage to the controls and void the warranty.
- 2 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 request for trouble and must not be used.
- 3 SUPPLYING LIQUID PROPANE TO HEATER (VERY DANGEROUS)  
Propane in the liquid state should never be supplied directly to the heater. If liquid propane is inadvertently supplied to the heater, immediately shut off the valve at the propane supply container.
  - a) IF HEATER IS RUNNING THEN:  
After shutting off the valve at the propane supply source, let the heater burn off all the propane in the hose. After heater flame has gone out correct the propane supply situation to provide only vapour propane before attempting another lighting sequence.
  - b) IF HEATER HAS NOT YET BEEN LIT THEN:  
After shutting off the valve at the propane supply container, the liquid propane must be bled out of the hose. This can be accomplished by firstly providing excessive ventilation or if possible moving heater and container outdoors. Then press on the heater valve button until the propane flow has ceased. Do not attempt to relight the heater immediately. First correct the propane supply situation and then wait 5 minutes before attempting to light the heater.

# PREVENTATIVE MAINTENANCE

Sure Flame Construction Heaters are built to withstand the extreme conditions of operating on construction sites. 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) Heater Shell (including heat shield)
- 2) Burner (proper alignment inside shell)
- 3) Electrical Cords & Connectors (if equipped with FN2 Blower)

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.

## B BURNER

Strainer & Orifice - Clean with soap and water or solvent on a routine basis.

Burner Head - Any buildup on burner should be removed.

## C MOTOR ( if equipped with optional FN2 Blower )

The electric motor on the Blower is fitted with sealed bearings and no oiling is required. Keep the motor clean by blowing or wiping off dust or dirt in order to prevent it from over heating.

## D FAN ( if equipped with optional FN2 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.

# S150 & S300 TROUBLESHOOTING

- 1 Attach the hose and regulator to the vaporized propane supply source, and the other end to the hose coupling on the heater.
- 2 Open the valve on the cylinder and check all fittings and connections for leaks using soapy water. If any leaks are detected, shut off the propane at the supply tank and repair the leaks.
- 3 Following the instructions on the heater, proceed with lighting the heater. Once the valve is opened at the propane supply tank, hold a flame to the pilot\* or burner\* and depress the button on the 100 % safety shut-off valve. Keep the button depressed for 60 seconds, then release. The heater should now fire on full flame.

**\* NOTICE:**

On S150 with Serial Number 13020 or lower, and on S300 with Serial Number 6811 or lower, the burner had a small pilot burner attached at the side of the main burner.

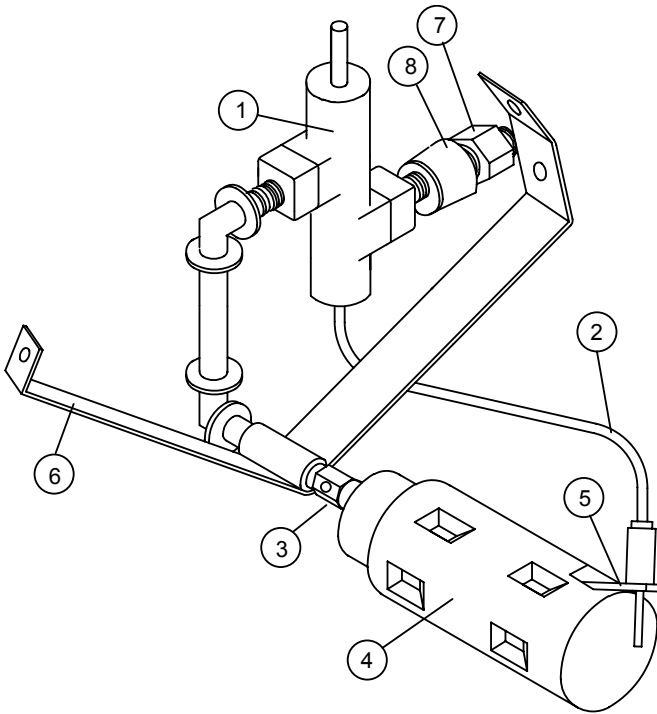
On S150 with Serial Number 13021 and higher, and S300 with Serial Number 6812 and higher, the pilot lights are within the burner head.

- 4 If the pilot and/or burner fails to light, inspect the regulator by removing the test plug, check for escaping propane. If none is present, replace the regulator. If problem still exists shut off the propane, remove the burner from the heater body, and check both the pilot orifice (if so equipped) and the burner orifice for any damage or blockage in the propane supply lines. Clean or replace as required.
- 5 If the pilot and/or burner is lit, but the main burner will not stay lit when button is released. Check for 16 mV at the valve end of the thermocouple. If not present, replace thermocouple.
- 6 If the thermocouple is not defective then replace the 100% safety shut off valve.
- 7 The 100% safety shut off valve is designed to provide safety for unattended operation of the heater. To check that the valve is performing its function properly, follow the testing procedure below.

Should the flame be extinguished, the valve should shut off the propane flow through the burner manifold. To check for proper operation, fire up the heater and allow to run for several minutes. Turn off the propane at the source. After about 30 seconds you should be able to hear the valve “click” indicating that it has closed, shutting off the propane. Open the propane supply again and without depressing the valve stem, hold a flame to the pilot\* or burner\*. If it ignites, the valve did not close properly. Close valve at propane tank and replace the heater valve.

- 8 When operating the heater with the optional FN2 Blower, be sure to check the electrical cord and plug, the motor rotation, and ensure the blade is secure on the motor shaft.

# S150 HEATER PARTS (with Internal Pilot)



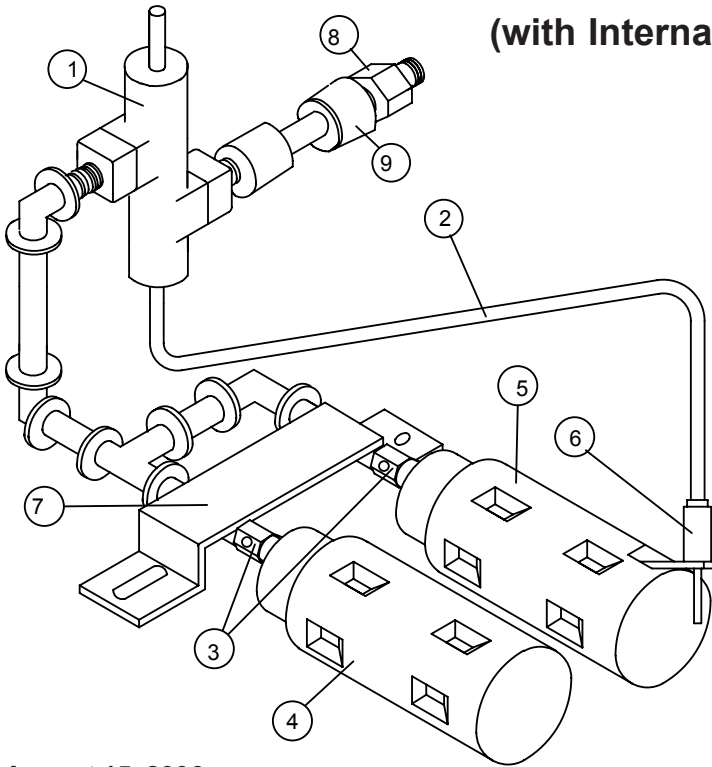
**August 15, 2006**

	S150-84	Burner Assembly w/Internal Pilot
1	7559	100% Shut-Off Valve w/by pass
2	2444	18" Thermocouple
3	2559	Burner Orifice
4	S150-54	Burner Head w/ "L" Bracket
5	S150-76	"L" Bracket w/ Thermocouple Holder
6	S150-52	Mounting Bracket w/Coupling
7	2563	Hose Coupling
8	S150-80	Strainer Assembly

**Not Shown**

	S150-53	S150 Heater Body w/Legs
	S150-81	Regulator with POL and hose coupling
	8922	Regulator
	2561	POL Fitting 1/4" RH
	8518	15 Foot Hose Assembly
	S150-113	Heat Shield for Internal Pilot

# S300 HEATER PARTS (with Internal Pilot)



**August 15, 2006**

	S300-75	Burner Assembly w/Internal Pilot
1	7559	100% Shut-Off Valve w/by pass
2	2444	18" Thermocouple
3	2559	Burner Orifice
4	BV1-51	Burner Head Only
5	S150-54	Burner Head w/ "L" Bracket
6	S150-76	"L" Bracket w/ Thermocouple Holder
7	S300-51	Mounting Bracket w/Coupling
8	2563	Hose Coupling
9	S150-80	Strainer Assembly

**Not Shown**

S300-53	S300 Heater Body w/Legs
S300-54	S300 Front Leg Weldment
S150-81	Regulator with POL and hose coupling
8922	Regulator
8518	15 Foot Hose Assembly
2561	POL Fitting 1/4"RH

# PROPANE VAPORIZATION RATE

The following chart shows the amount of BTU's that a 100-Lb cylinder will vaporize at various temperatures.

100-lb. Propane Cylinders (Approximate)

Lbs. of Propane in Cyl.	MAXIMUM CONTINUOUS DRAW IN BTU PER HOUR AT VARIOUS TEMPERATURES		
	0°F (-18°C)	20°F (-7°C)	40° F(4°C)
100	113,000	167,000	214,000
90	104,000	152,000	200,000
80	94,000	137,000	180,000
70	83,000	122,000	160,000
60	75,000	109,000	140,000
50	64,000	94,000	125,000
40	55,000	79,000	105,000
30	45,000	66,000	85,000
20	36,000	51,000	68,000
10	28,000	38,000	49,000

The chart shows the vaporization rate of containers in terms of the temperature of the liquid and the wetted surface area of the container. When the temperature is lower or if the container has less liquid in it, the vaporization rate of the 100-lb. cylinder is a lower value.

## MAXIMUM BTU CONTENT

Propane Cylinder Size	Max. BTU Content
100 pound	2,159,100
250 gallon US	22,922,500
500 gallon US	45,845,000
1000 gallon US	91,690,000

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

## PRESSURE & FLOW EQUIVALENTS

- 1 Std. Atmosphere = 14.73 lb./sq. in. = 1.014 bar
- 1" Water Column (W.C.) = 0.58 oz./sq. in. = 2.49 millibar
- 11" Water Column = 0.4 lb./sq. in. = 27.39 millibar
- 1 lb./sq. in. (psig) = 27.71" W.C. = 0.0689 bar
- 1" Mercury = 0.49 psig = 33.86 millibar
- 1 Std. Cubic Ft./Hr. = 2,500 BTU/Hr. = 0.02832 cubic metres/hr.
- 1 BTU/Hr. = 0.2931 Watts



# S150

150,000 Btu/hr (44 kW)  
(Operational with or  
without Fan)



# S300

300,000 Btu/hr (88 kW)  
(Operational with or  
without Fan)



# FN2

Optional Clamp-on  
Fan Assembly

