



**SURE FLAME<sup>®</sup>**

**S100**

**CONSTRUCTION HEATER**

August 18, 2006

**SERVICE AND MAINTENANCE MANUAL No. 934-6891**

**PLEASE RETAIN FOR FUTURE REFERENCE**

**SURE FLAME<sup>®</sup>**

**PRODUCTS**

A Division of Haul-All Equipment Ltd.  
Lethbridge, Alberta

# S100 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 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 2.14-2000 and ANSI Z83.7-2000. 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)-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.

**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, or in the absence of local codes, with the *Natural Gas and Propane Installation Code CSA-B149.1*, the *National Fuel Gas Code ANSI Z223.1/NFPA 54* and the *Standard for the Storage and Handling of Liquefied Petroleum Gases ANSI/NFPA 58*.**

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.

# S100 CONSTRUCTION HEATER

## 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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# SPECIFICATIONS

Model No. S100 Construction Heaters

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

Gases:	Natural or Propane
Capacity:	100,000 Btu/h (29 kW) maximum
Orifice Size:	43 DMS (x10)
Blower:	1,300 cfm (615 l/s)
Electrical Rating:	115 volts, 60 Hz., 4 amps, single phase

Gas Supply:

	<u>Inlet Pressure</u>		<u>Manifold Pressure</u>
	Max. W.C.	Min. W.C.	Max. W.C.
Propane	14" (3.5 kPa)	5" (1.25 kPa)	0.4" (100 Pa)
Natural	14" (3.5 kPa)	5" (1.25 kPa)	1.1" (275 Pa)

(Minimum inlet pressure is for purpose of input adjustment)

# INSTALLATION

The Sure Flame Model S100 Construction Heater 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. Do not use the heater with ductwork as this will restrict the flow of supply air.

- 1 Install the heater in a horizontal position at least 10 feet (3m) in Canada or 6 ft. (1.83 m) in the U.S. from any LP-gas container. Allow the following clearances from any combustible materials:

Front Outlet:	8 feet (2.4 m)	Sides:	2 feet (0.6 m)
Intake:	2 feet (0.6 m)	Top:	4 feet (1.2 m)

Front Outlet must not be directed at any LP-gas container within 20 feet (6 m).

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 1/2" psi) 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 as specified on the rating plate. For protection against shock hazard the supply cord must be plugged directly into a properly grounded three-prong receptacle.
- 6 In all applications, install the heater in such a manner that it is not directly exposed to water spray, rain and/or dripping water.

# INSTALLATION USING A PROPANE SUPPLY TANK

- 1 When installing the heater for use with propane gas, set the gas selector valve to “Propane”.
- 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 1/2 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 *CSA-B149.1 Natural Gas and Propane Installation Code* or with the *Standard for the Storage and Handling of Liquefied Petroleum Gases, ANSI/NFPA 58*.
- 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 Standard.

# 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 1/2 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 *CSA-B149.1 Natural Gas and Propane Installation Code* or with the *National Fuel Gas Code ANSI Z223.1/NFPA 54*.

# OPERATING INSTRUCTIONS

- 1 Set GAS SELECTOR VALVE to gas being used. The conversion shall be done by the owner or lessor of the equipment.

**NOTE:** When using Propane Gas the Selector Valve **must** be in the PROPANE position.

- 2 Ensure the MANUAL VALVE (blue knob at rear of heater) is in the "ON" position.
- 3 Connect power - 115 volt supply.
- 4 Open gas supply.
- 5 Push START button AND HOLD FOR 5 SECONDS
- 6 To stop, turn gas off.

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 and combustion gases 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 use of construction heaters may be found in the applicable sections of the Natural Gas and Propane Installation Code CSA-B149.1.

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

## SEQUENCE OF OPERATION

- 1 Push start button AND HOLD FOR 5 SECONDS.
- 2 Relay closes.
- 3 Fan starts.
- 4 Fan reaches full speed and air switch closes.
- 5 Gas valve opens.
- 6 Spark is generated.
- 7 Flame rod senses flame, and then maintains flame.



# COMMON INSTALLATION AND OPERATIONAL PROBLEMS

## 1 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 maintain contact.

## 2 SUPPLY LINE TOO SMALL

## 3 INSUFFICIENT VAPORIZATION AT SUPPLY

Normally caused by too small size of supply tank.

## 4 IMPROPER GAS SUPPLY PRESSURE

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

## 5 DIRTY GAS SUPPLY

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

## 6 LACK OF PREVENTATIVE 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 recirculation.

# SAFETY FEATURES

The Model S100 incorporates devices to detect the following:

- |   |                    |   |
|---|--------------------|---|
| 1 | LOSS OF FLAME      | Gas supply is shut off if flame is lost to prevent raw gas from leaving the heater.                               |
| 2 | OVERHEATING        | High temperature limit switch in the combustion chamber   |
| 3 | LOSS OF POWER      | Total shutdown with manual restart 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.            |

# DESIGN RELATED ADDITIONAL SAFETY FEATURES

## 1 LOW SKIN TEMPERATURE

Sure Flame Heaters are designed to have a low skin temperature. This provides added safety in the workplace.

## 2 DURABLE CONSTRUCTION

The Model S100 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.

# ON-SITE SAFETY PROBLEMS

## 1 SHORTING OUT OF DEFECTIVE COMPONENTS

This common problem 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 the 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, and possible personal injury, shut off the gas supply and let the heater run until all of the liquid in the lines has been vaporized.

# PREVENTIVE 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.

## A 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) and Control Box

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

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.

Spark Plug - Clean with solvent and check spark gap.

## C CONTROL BOX

The inside of the control box should be cleaned using a dry cloth or by blowing compressed air. Do not use any liquid or aerosol spray cleaners. Also check that all electrical connections are snug and tight.

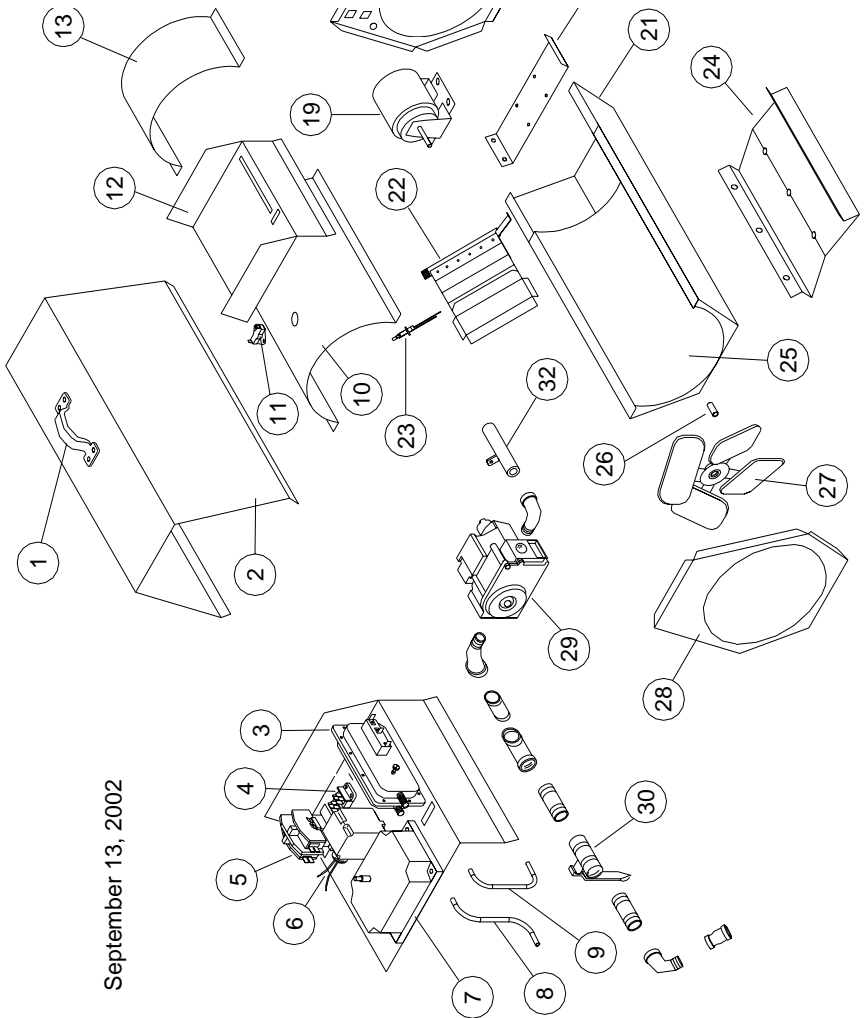
## D MOTOR

The electric motor on the S100 Heater 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.

## E FAN

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.

# S100 HEATER PARTS



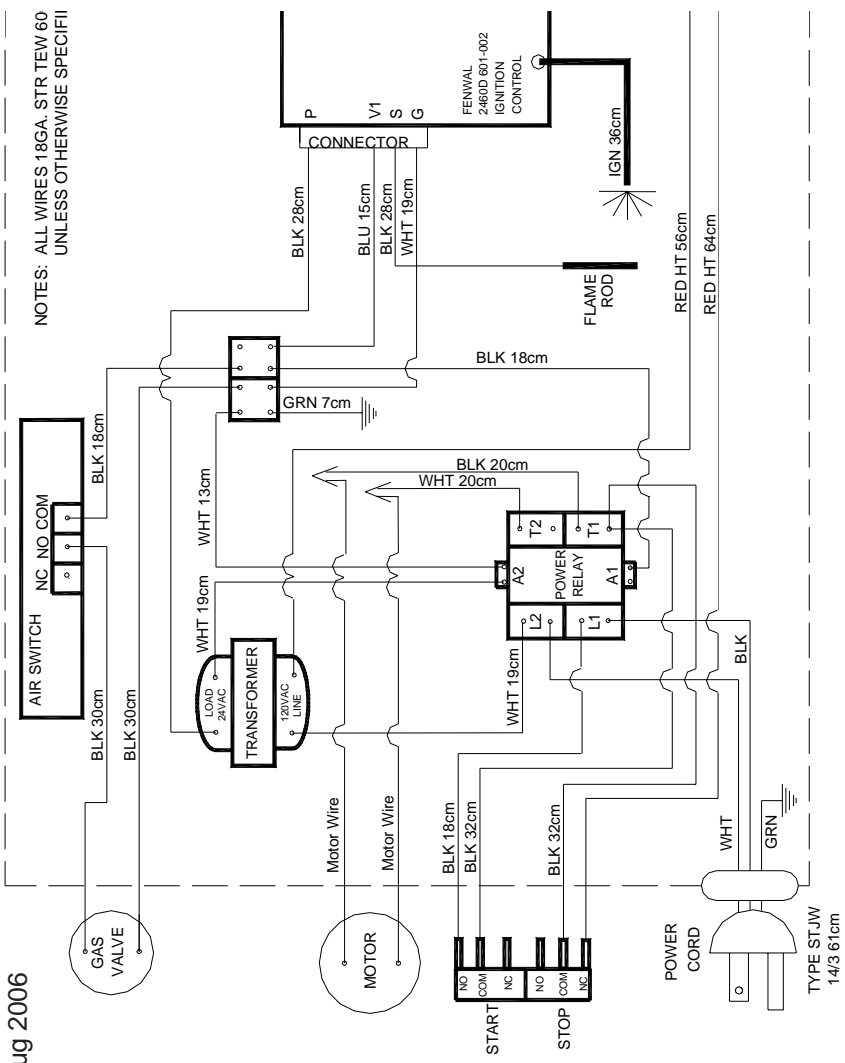
September 13, 2002

# S100 HEATER PARTS

Sept. 13, 2002

Ref.	Part No	Description
1	6897	Handle
2	S100-101	Top Shell
3	5124	Air Switch (0.2" W.C.)
4	5768	Terminal Block
5	4519	Motor Relay 24V
6	4511	Transformer 24V
7	8264	Direct Spark Ignition Control
8	S100-716	Downstream Airtube "S"
9	S100-715	Upstream Airtube "C"
10	S100-115	Front Top Heat Shield
11	2446	HI Limit Switch
12	S100-110	Control Box
13	S100-116	Top Rear Heat Shield
14	3868	24" Power Cord
15	S100-717	S100 Fan Guard
16	3337/8	OFF Switch (Red)
17	3337/9	ON Switch (Green)
18	S100-106	Rear End Panel
19	6892	1/8 HP Motor
20	S100-107	Motor Mount
21	S100-102	Bottom Shell
22	BV2-502	Burner
23	6894	Triple Electrode
24	S100-109	Base
25	S100-103	Bottom Heat Shield
26	6901	Shaft Adapter
27	2419	Fan Blade
28	S100-105	Front End Panel
29	6895	Gas Valve
30	S100-707	Changeover Valve
32	S100-501	Pipe Weldment

# S100 CONNECTION WIRING DIAGRAM



18 Aug 2006

# S100 LADDER WIRING DIAGRAM

