



**QHT Manual for:**  
**SU-3 199,000 BTU/H to 400,000 BTU/H**  
**SU-4 300,000 BTU/H to 550,000 BTU/H**

The burner shall be used only with NATURAL GAS or LP GAS .

**Warning: If the following instructions are not followed exactly, a fire or explosion may result, causing property damage, personal injury or death.**

- **Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.**

**- WHAT TO DO IF YOU SMELL GAS? -**

- Do not try to light any appliance.
- Do not touch any electrical appliance.
- Do not use any telephone in your building.
- Immediately call your gas supplier from an outside phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

- **A qualified installer, service agency or the gas supplier must perform installation and service.**
- **At least once per year, a qualified service agency needs to be contracted for other than routine maintenance.**

- All installations must be made in accordance with all state and local codes, which may differ from instructions in this manual.
- The installer should inform and demonstrate to the user the correct operation and maintenance of the appliance.
- The installer shall also inform the user of hazards of flammable liquids and vapors and shall remove such liquids and vapors from the vicinity of the burner.
- The installation adjustment data trap (or label) supplied shall be filled in and affixed to the burner or the covered appliance.

These instructions should be affixed to the burner or adjacent to the heating appliance.



**NY City MEA 363-99-E**









Massachusetts Plumbing Board  
G3-0904-16



**Manufactured by Heat Wise, Inc.**  
**28 Industrial Blvd. Unit I Medford, NY 11763**

The SU-3 and SU-4 comes in many distinct model numbers, which reflect the listing agency, OEM standard, the fuel, BTU range of the gas train and type of safety control originally supplied with the burner. Check the model number on the label located on the cover of the control box for the specifications of the burner.

**Note: Gas trains supplied with the SU-3 and SU-4 are for specific firing ranges, as covered by various codes and listing agencies. Firing this burner above the allowed firing rate will void the warranty, and may result in a fire or explosion, causing property damage, personal injury or death.**

Table 1 : SU-3 & SU-4 Models and Specifications					
Model	Range (MBH)	Fuel	Listing	Gas Train	Gas Conn.
SU-3 U.S. and Canada	199 to 400	Natural Gas And LP		VR 8305	3/4"
SU-4AN U.S. and Canada	300 to 500	Natural Gas Only		VR 8305M	3/4"
SU-4N (H or F)* Canada	300 to 550	Natural Gas Only		Two VR 8305M valves in parallel	1"
SU-4P (H or F)* Canada	300 to 550	LP Only		VR 8305M	3/4"
SU-4N (H or F)* U.S.	300 to 500	Natural Gas Only		VR8305M ANSI Z 21.17 compliant	3/4"
SU-4P (H or F)* U.S.	300 to 500	LP Only		VR8305M ANSI Z 21.17 compliant	3/4"
SU-4N (H or F)* U.S.	300 to 550	Natural Gas Only		U.L. 795** w/ low and high gas pressure switches	3/4"
SU-4P (H or F)* U.S.	300 to 550	LP Only		U.L. 795** w/ low and high gas pressure switches	3/4"

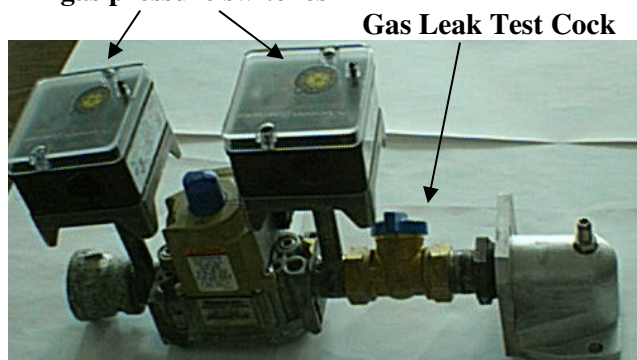
\* H=Honeywell control F= Fenwal control

\*\* Also conforms to NFPA-86

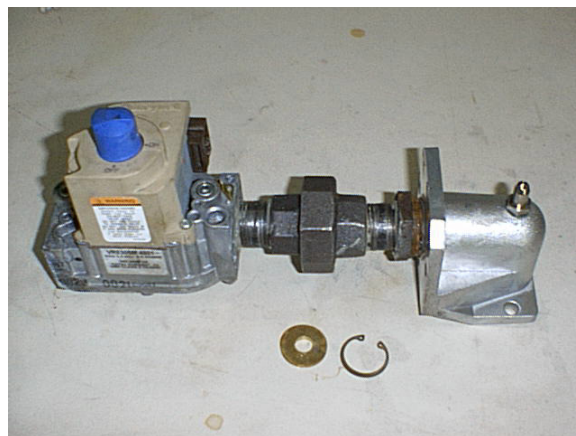
Table 2: SU-3 & SU-4 Electrical Specifications			
Primary Electric Input	Secondary Electric Input	Total Watts	Total Amps
120 Volt 60 Hz 1 Ph	24 Volts	150 Max	3 or less

- **Fuel:** The SU-3 and SU-4 Burners will fire natural gas or LP. The maximum inlet pressure at test port is 11" W.C. for both natural and LP gas.
- **Length of Flame Tube:** 5 1/4" or 14" (special order)
- **Firing System:** The burner operates as ON – OFF with a fixed air inlet shutter and proportional head setting. (See the charts for approximate firing rates. In the field, they may vary)
- **Blower Motor:** 120 Volt/ 60 Hz/1 Ph, 1/6 HP PSC motor
- **Burner Ignition:** A separate external high voltage ignition transformer provides interrupted ignition with 4 second safety timing to establish the flame.
- **Air Flow Safety Switch:** Diaphragm switch closes when the burner blower develops adequate air pressure. Loss of air pressure causes the fuel valves to close immediately.
- **Pre-Purge:** Minimum 30 seconds is standard on burners.
- **Gas Train:** Below 400,000 BTU low and high gas pressure switches are optional. Above 400,000 BTU they are standard with gas leak shut off valve. (See the setting pressures from the table given) Dual gas valves in the form of a combination valve or separate with built in pressure regulator or separate with shut off valves are all part of the factory-assembled system. When pressure switches are used, the power (120V) passes through each as a part of the limits; they will trip power to the burner as soon as pressure increases or decreases to the system. See the pictures below for common configurations of SU-3 and SU-4 gas trains. **The same gas valve is used for both natural gas and propane without any conversion kit.**

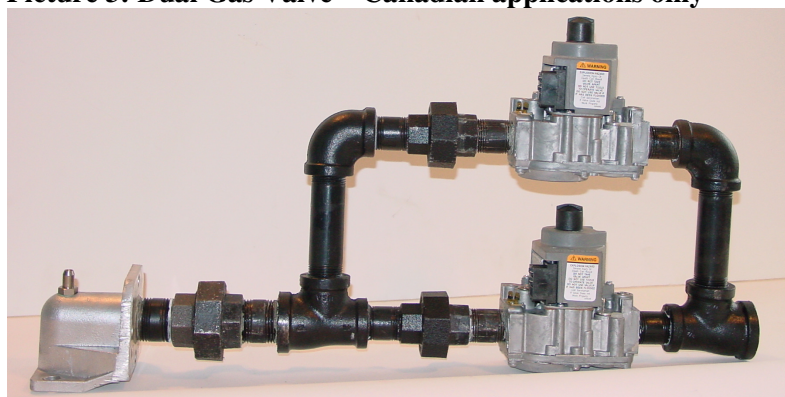
Picture 1: U.L. 795  
gas pressure switches



Picture 2: Below 400 MBH Gas Manifold



Picture 3: Dual Gas Valve – Canadian applications only

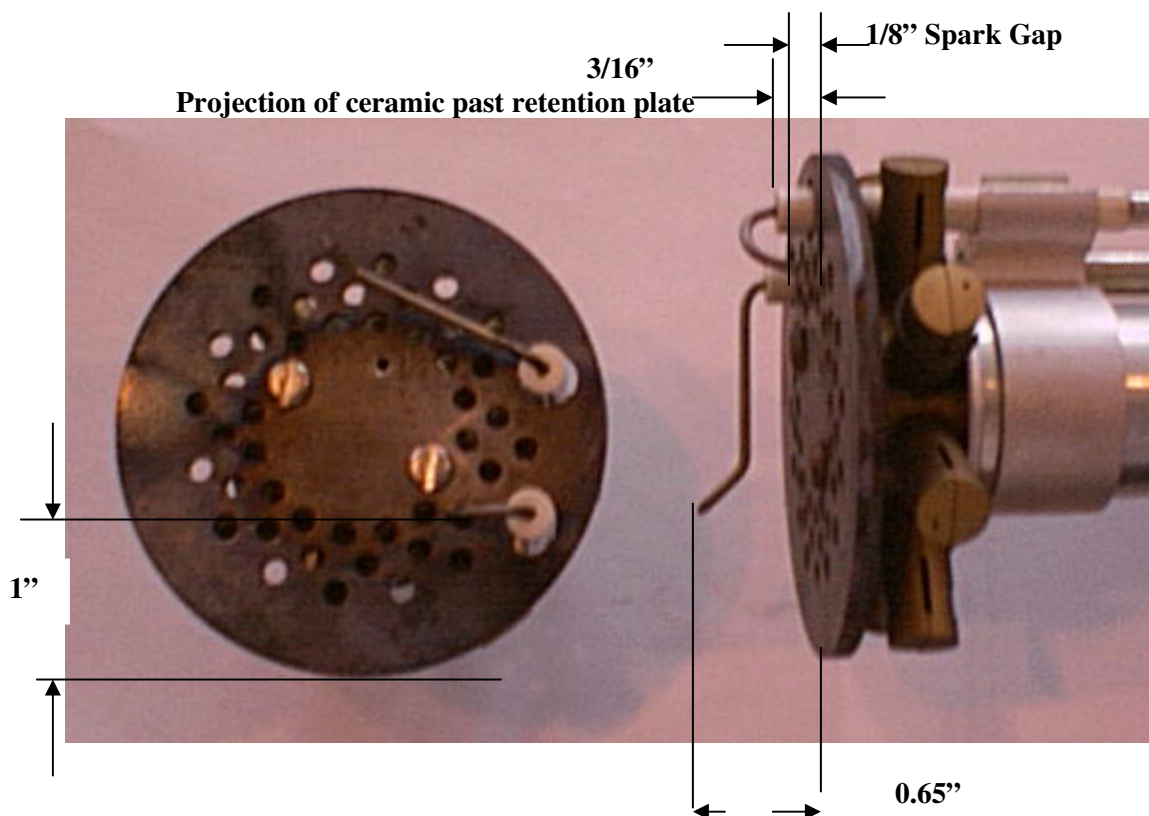


**Warning: Should overheating occur, 1) shut off the manual gas shut off valve to control the appliance; 2) DO NOT shut off the control switch to the blower**

This power gas burner is designed to convert oil and/or coal fired boilers and furnaces to a gas-burning appliance. The conversion must conform to local codes. In the absence of such codes, the American National Standard Institute (ANSI) for the installation of gas conversion burners, Z21.8A-1990 and the National Fuel Gas Code ANSI 223.1-1992 or current standards should be applied.

Two electrodes act as a sparkers and a flame rod (See Fig. 1). Flame rectification by this flame rod monitors the continued presence of the burner flame.

**Fig. 1 Electrode and Flame Sensor Positioning**



## AIR FOR COMBUSTION

If the boiler or furnace room is unusually tight, or if the house has a ventilation fan, it is recommended that the combustion air be supplied to the furnace room through intakes from the outside of the building. The intakes must terminate facing down in order to avoid obstruction from rain, snow, leaves, etc. Openings must have one square inch of free area per 10,000 BTU input rate (see Example 1). Refer to the QHT boiler manual for instructions and recommendations for installing louvers, etc.

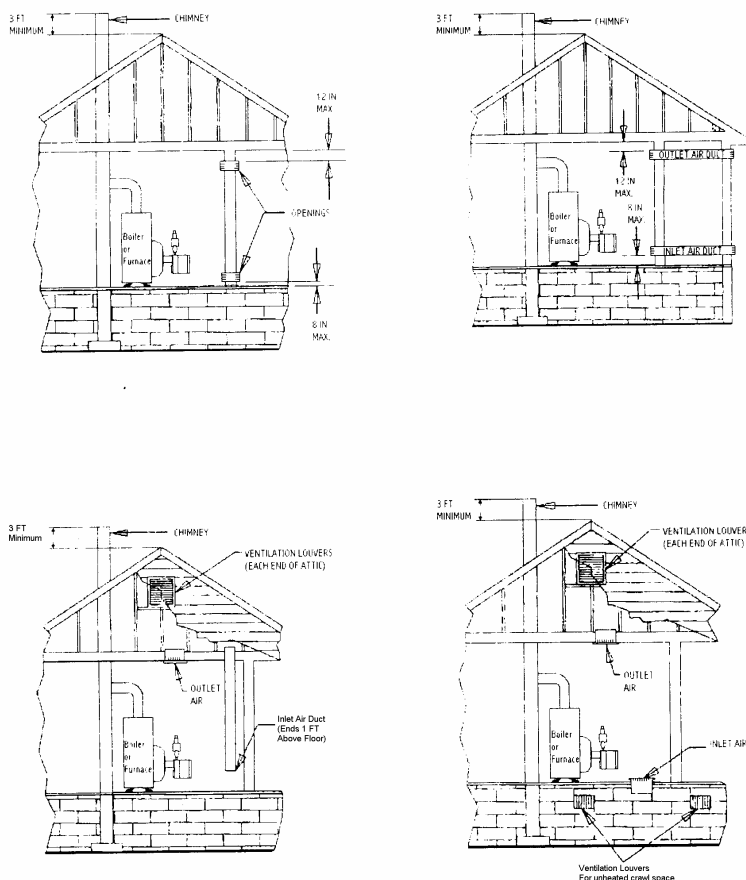
**Example 1:** 350,000 BTU/hr firing rate

$$(350,000 \text{ BTU/hr}) * \frac{(1 \text{ in}^2)}{10,000 \text{ BTU/hr}} = 35 \text{ in}^2$$

## Chimney Requirements

The chimney should extend **at least 3'** above a flat roof or the highest roof ridge (see Fig. 2) and be free in a **radius of 30'** of objects such as tree limbs, other buildings, etc, which may cause a down draft. The chimney should be lined as required by the local Gas utility or local codes. Some utilities require new chimney liners for all gas installations. Use a corrosion resistant chimney liner (approved for gas service) of the same size as the vent pipe.

**Fig. 2 Chimney and Fresh Air Dimensions**



## Installing the Burner

Install the burner on the unit and then tighten the nuts on the flange so that the burner is permanently secured. Seal off any free openings with high temperature cement.



**Picture 5: BODY FLANGE:**

First, install the gasket and boiler flange to the boiler. For heat exchangers with a square stud pattern, one allen screw on the flange should be on the top, slightly to the right of the 12 o'clock stud. The second screw should be on the left (slightly above the 9 o'clock position stud). Tighten all the nuts equally. Make sure that the allen screws are backed out, to allow enough clearance. Then, insert the SU-3/SU-4 gas burner into the boiler.

Once the burner is inserted and pushed all the way forward, tighten the allen screw on the top of the flange. This screw **MUST** go into the groove that is on the burner housing.

Tighten the second allen screw, located on the right side of the flange. This screw should be **tight**. Seal off any free openings with either high temperature cement or high temperature silicone.

## Gas Service and Pipe Capacity

Before connecting the burner to the gas supply, insure that the gas pipes and service meter are large enough to permit the additional load of the gas burner (see Table 3).

<b>Table 3: Pipe Capacity Table*( x 1,000 BTU's)</b>				
Pipe Length**	Nominal diameter of pipe in inches			
	1"	1 1/4"	1 1/2"	2"
<b>15'</b>	345	750		
<b>30'</b>	241	535	850	
<b>45'</b>	199	435	700	
<b>60'</b>	173	380	610	
<b>75'</b>	155	345	545	
<b>90'</b>	141	310	490	
<b>105'</b>	131	285	450	920
<b>120'</b>	120	270	380	850
<b>150'</b>	109	242	300	780
<b>180'</b>	100	225	225	720

\* Using 0.6 Specific Gravity Gas and a Pressure Drop of 0.3" of Water Column

\*\* Each 90° elbow counts as 3' for the purpose of these calculations

## Gas Piping to the Burner

It is advisable to run a separate gas line from the meter to the gas burner to avoid pressure drops. Refer to the above Pipe Capacity table for the correct sizes. **ALL PIPING MUST CONFORM WITH LOCAL CODES.** Use black steel pipe and malleable fittings (**do not use cast iron parts**) with a suitable pipe dope which is resistant to liquefied petroleum gases.

Piping should consist of:

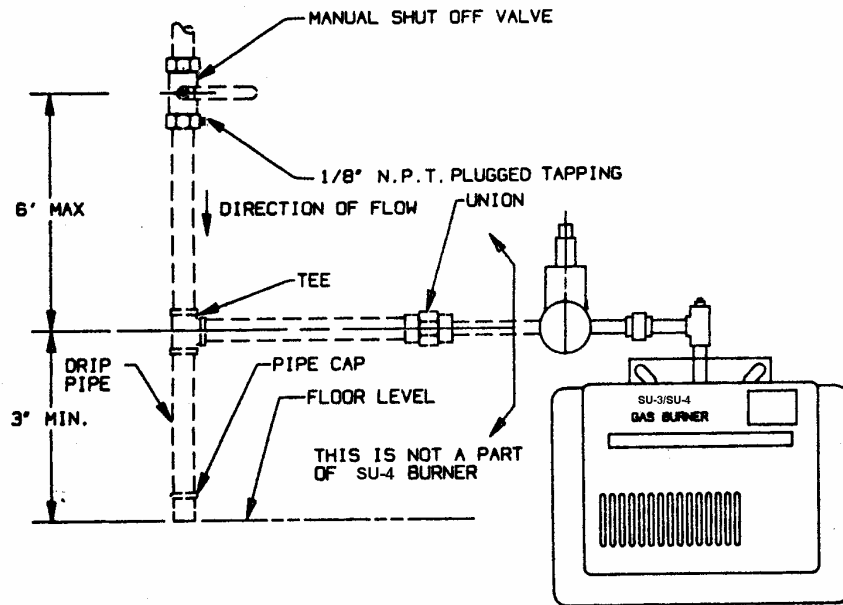
1. A shut off valve approximately 6' away from the unit.
2. A 1/8" plugged NPT tapping for gas pressure measurement preferably on the manual shut off valve (as shown or anywhere between the gas valve and the shut off valve).

**Note: The manual shut off valve and tapping are NOT part of the SU-4 Gas Burner. Please make sure you conform to local and state codes.**

3. A gas union.
4. A drip pipe.

**Caution: The gas valve should not be subjected to more than 1/2" PSIG. Therefore, the burner should be isolated during high-pressure gas leak tests.** The appliance and its individual shut off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig. The appliance must be isolated from the gas supply piping by closing its individual manual shut off valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig.



**Fig. 3 Gas Burner Piping\***

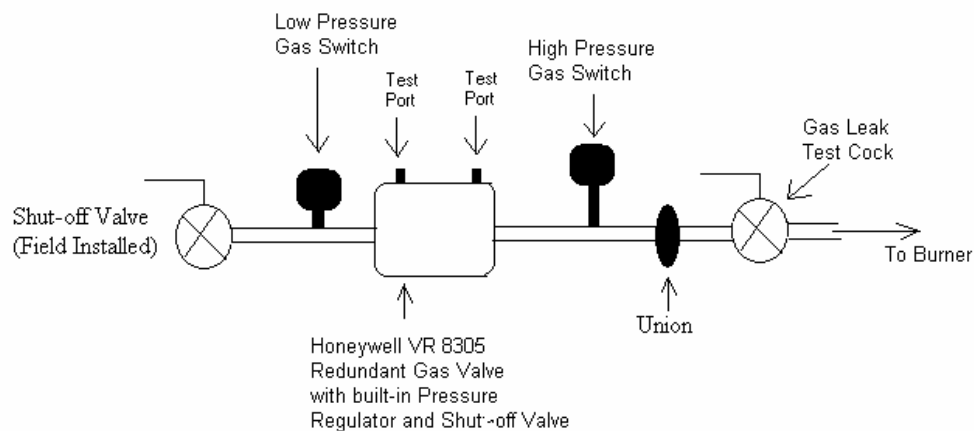
\*The dotted lines represent field installation.

## Chimney Liner, Draft Regulator And Vent Pipe

Some utilities require new chimney liners for all gas installations. Use a corrosion resistant chimney liner (approved for gas service) of the same size as the vent pipe. Use a double swing draft regulator, listed by CSA or U.L. The vent pipe should extend only to (but not beyond) the inside wall of the chimney. The draft over fire should always be positive.

## Adjusting the Pressure Switches

Figure 4 demonstrates the possible positioning of pressure switches on the SU-4 gas train. Use the figures in Table 4 to approximate the settings.

**Fig. 4 Sample Gas Train #1**

**Table 4: Pressure Switch Settings**

Gas	Firing Rate MBH	Flame Tube	Inlet Press. $T_p$	Manifold Press. $T_M$	$T_M > 50\% T_M + \Delta P^*$ LPS	$< 1.5 \times T_M$ HPS
Nat.	300	5 1/4"	6.9"	3.3"	1.6+1=2.6"	3.3x1.5=4.9"
Nat.	550	5 1/4"	5.5"	4"	2+1=3"	4x1.5=6"
Nat.	300	14"	6.9"	3.3"	1.6+1=2.6"	3.2x1.5=4"
Nat.	550	14"	5.5"	4"	3"	4"
LP	300	5 1/4"	8.6"	3.7"	1.85+1=2.85"	5.6"
LP	550	14"	9.2"	2.3"	2.2"	3.4"

\*  $\Delta P$ = Pressure drop. For this gas valve,  $\Delta P = 1"$ . Refer to the literature for the gas valve for more information on pressure drops.

## Pressure Switch Settings

The high and low gas pressure switches must be set during installation (refer to Table 3 and Table 4). To determine the setting of the low pressure gas switch (LPS), measure the manifold pressure (MP), inlet pressure (IP) and the pressure between the valve (BV):

### Initial setting of the High Gas Pressure Switch:

After the firing rate is determined, refer to the charts Table 3 or Table 4 on page 12 of this manual. Multiply the manifold pressure necessary by 1.5 and set the High Gas Pressure Switch to reflect that calculation.

### Initial setting of the Low Gas Pressure Switch:

Divide the manifold pressure by 2 and add the pressure drop across the valve.

Example: Natural Gas at 340 MBH

Required Manifold Pressure= 2.7"

Pressure drop across Honeywell valve=1.0"

$$\text{HPS} = 1.5 \times 2.7'' = 4.0''$$

$$\text{LPS} = (2.7''/2) + 1.0'' = 2.35''$$

For other valves, refer to the manual for that specific valve for the pressure drop.

**Warning:** After the burner has been adjusted so that the burner is operating properly, the pressure switches must be readjusted.

- Using a monometer, measure the manifold pressure that was necessary to achieve the exact firing rate necessary. Multiply the manifold pressure by 1.5. With the burner firing, use an analyzer and slowly increase the gas pressure up to the new calculated high pressure cutoff point. If the CO level reaches 400 ppm **before the newly calculated setting**, then at the point just before 400 ppm CO is reached is where the high gas pressure switch must be set.
- Reset the manifold pressure back to the correct setting.
- After the High Gas Pressure Switch is set, the recalculate the low gas pressure switch setting by dividing the actual manifold pressure by 2 and adding the pressure drop across the valve. With the burner firing use an analyzer and slowly decrease the gas pressure **into the valve** to the new calculated low pressure cutoff point. If the CO reaches 400 ppm before the newly calculated setting, then at the point just before 400 ppm CO is reached is where the low gas pressure switch must be set.
- Reset the incoming pressure back to the correct setting.

**If the combustion does not reach the 400 ppm mark at the set points, the burner can be left at those settings. IMPORTANT: Any switch can be adjusted, as long as it meets both sets of criteria: Not greater than 400 ppm CO and meets the appropriate calculation for the switch.**



## Adjusting the Firing Rate

See Fig. 6 below. Position D<sub>1</sub> represents the burner head all the way forward. By rotating the burner head adjustment screw *clockwise*, the head can be moved back 0.5" (to position D<sub>3</sub>). Similarly, if the head adjustment screw is turned *counter-clockwise*, the head is moved forward. At head position D<sub>3</sub>, the SU-3/SU-4 gas burner fires at 300,000 BTU when the gas manifold pressure is 3.5" W.C. Adjust the air shutter and use a combustion analyzer to set the burner to between 8.5% and 10.0% CO<sub>2</sub> for natural gas or between 10.0% and 11.5% for LP gas. (See page 13 & 14 of this manual for further details on burner operation). NOTE: The static pressure of the system may be within norm, but the pressure drop when the system is running can reduce this greatly. Check the running pressure to make sure there are no fluctuations in the pressure.

By adjusting the manifold pressure, it is possible to adjust the firing rate. Refer to Table 5.

**Fig. 5 Adjusting the Firing Rate**

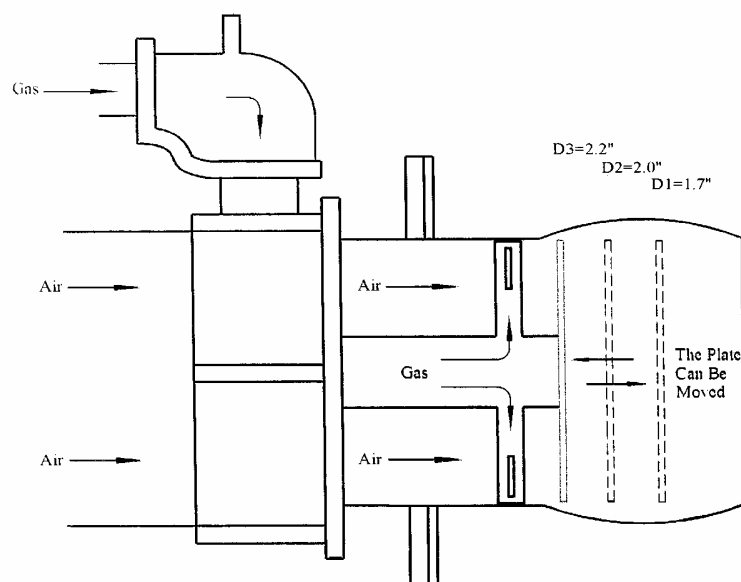


Table 5: Various Settings for QHT/Biasi Boilers							
Boiler	B10/8	B10/9	SG/6	SG/7	B40/6	B40/7	B40/8
Burner	SU-3	SU-3	SU-3	SU-3	SU-3	SU-4	SU-4
Firing Rate (Input)	272,000	308,000	279,300	330,000	323,000	426,000	529,000
Insertion	Full	Full	Full	Full	Full	Full	Full
Natural Gas							
Manifold Pressure ( " of W.C.)	1.7"	2.3"	1.7"	2.5"	2.4"	3.4"	3.8"
Head	1	1	4	3	1	7	20
Air	3.25	6.75	3.5	8.5	7.5	17	24.5
Propane/LP							
Firing Rate (Input)	272,000	308,000	279,300	330,000	308,000	406,000	504,000
Manifold Pressure ( " of W.C.)	1.3"	1.7"	1.4"	2.0"	1.9"	2.5"	2.5"
Head	1	2	4	3	1	7	18
Air	3.25	6.5	4.75	9.0	7.5	14.5	19.5

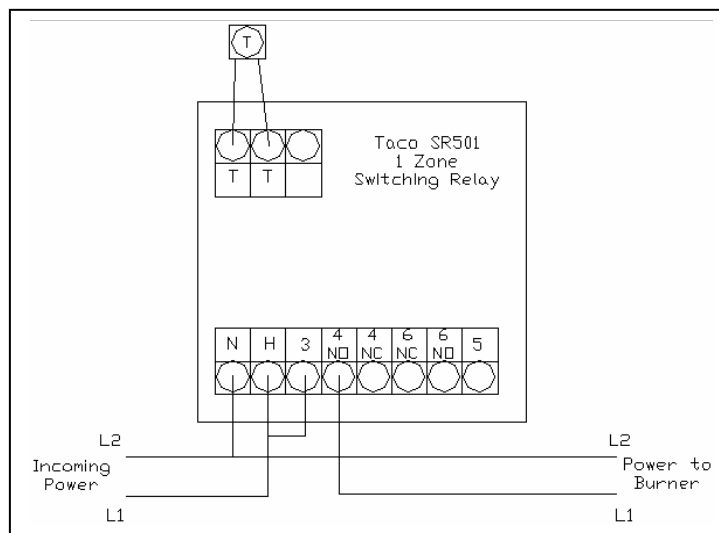
## Electric Wiring

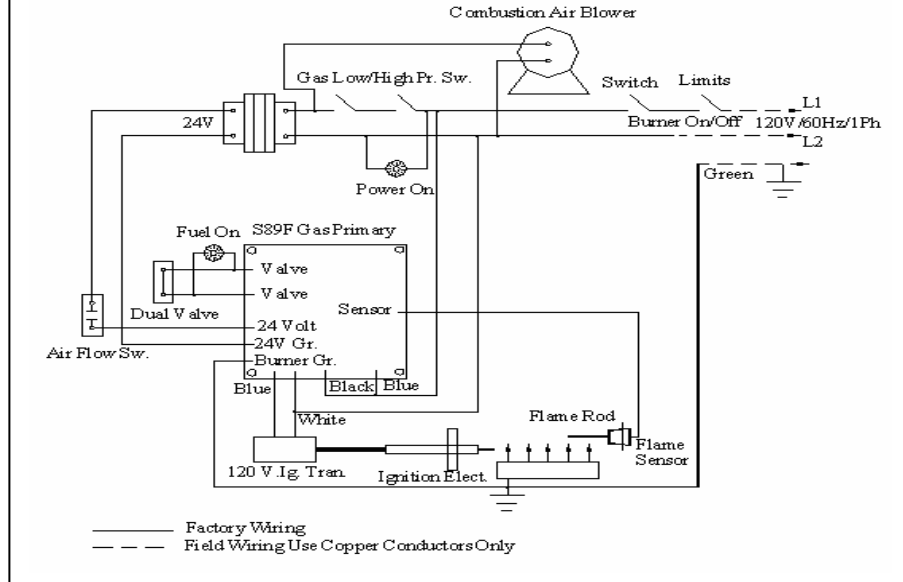
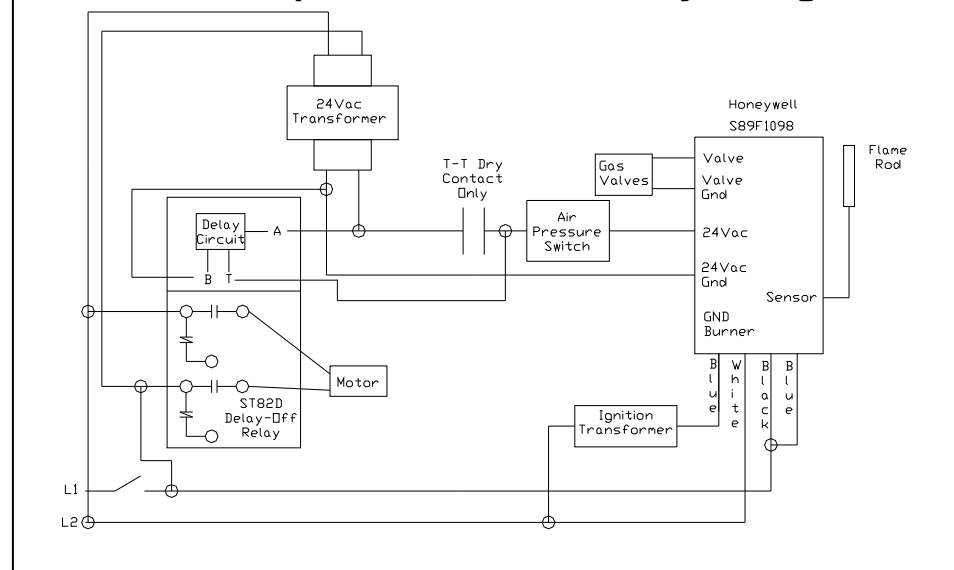
These gas burners are manufactured for use with 120 volt, 60 cycle, single-phase electric current. The installation must comply and be grounded in accordance with the National Board of Fire Underwriters and National Electric Code ANSI/NFPA No. 70-1987 (or the latest addition). All applicable local codes should be followed as well.

Installation wiring should be wired through each limit control or interlock, while operating controls (like the thermostat) should be treated as 24-Volt wiring. The burner has its own 24 Volt AC power supply. Do not add a 24 Volt AC transformer for the burner wiring. Do not use the 24 Volt transformer found on the burner to power other items in the heating system, such as thermostats, spill switches, etc. See the sample wiring diagrams provided below:

## Wiring Diagrams

Fig. 6 Wiring the SU-4 with a switching relay



**FIG. 7 Honeywell S89F****FIG. 8 Optional motor-off delay wiring**

Note: This wiring diagram is included for reference as an option for field wiring of a motor –off delay with the S89F control. Burners do not come equipped with this option and require extra components to be purchased and installed according to code.

### SEQUENCE OF OPERATIONS Honeywell S89F

1. Limits close.
2. Blower motor starts as the 24 Volt transformer powers the airflow switch.
3. Power from the airflow switch to the S89F control initiates 34 second pre-purge.
4. At the end of the pre-purge, the spark is energized for 4 seconds. At the same time, the 24 Volt transformer powers the gas valve, allowing the fuel to flow.
5. Within 4 seconds, the flame should be established and proved. The spark will shut off and the control will hold power to the gas valve until the limits open and the burner stops firing.
6. If the flame is not established, the blower motor continuously runs.
7. To restart, power should be interrupted for five minutes. Then turn on the power to start this sequence again.

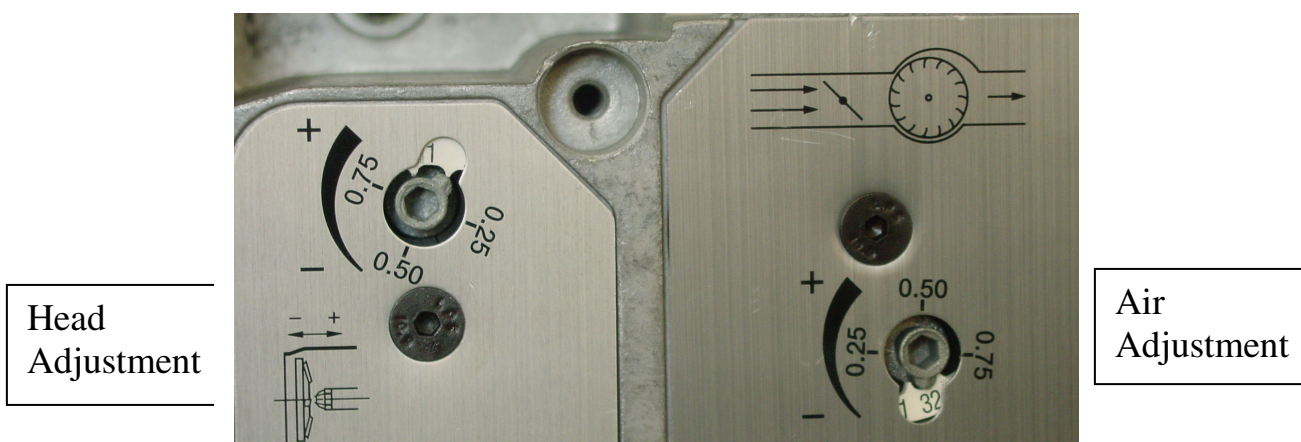
## Commissioning the Burner

Once installed, a higher or lower firing rate can be achieved by raising or lowering the manifold pressure by  $\pm 0.3$ ". Pressure changes can only be made when the burner is running. The typical working manifold pressure for natural gas is **1.5 to 3.5 Inches of Water Column ("W.C.)**, or **1.0 to 3.0 "W.C.** for propane. The maximum inlet pressure at the gas valve is **11 "W.C.**; the minimum is **5 "W.C.** Refer to Chart 5 on page 9. **NOTE:** The static pressure of the system may be within norm, but the pressure drop when the system is running can reduce this greatly. Check the running pressure to make sure there are no fluctuations in the pressure.

Clock the meter to determine the firing rate. The firing rate should be  $\pm 3\%$  of the heat exchanger manufacturers' specifications. Check the heat exchanger manual for further details.

The head is pre-set at the factory for OEM applications. Check your OEM manual for the proper head setting for that oven. Using a combustion analyzer, check the  $\text{CO}_2$  (or  $\text{O}_2$ ) and carbon monoxide levels. Adjust the air as necessary (See below :)

Picture 6



Turning the Air Adjustment dial clockwise opens the air shutter and increases the air; turning the air adjustment dial counter-clockwise closes the air shutter and reduces the air.

## Adjusting the Burner

**Using a combustion analyzer**, check the following readings:

If  $\text{CO}_2$  is greater than 9.5% ( $\text{O}_2 < 3.5\%$ ); Open Air Shutter

If  $\text{CO}_2$  is less than 8.8% ( $\text{O}_2 > 5\%$ ); Close Air Shutter

Carbon monoxide levels should be below 400 ppm; 100 ppm or less is ideal. Check local codes for emissions requirements.

**Note: if any adjustments are made, it is important to recheck the firing rate and combustion analysis.**

LIGHTING INSTRUCTIONS	
<p><b><u>To light the SU-3/SU-4 Gas Burner</u></b></p> <ol style="list-style-type: none"> <li>1. Set the thermostat to the lowest temperature</li> <li>2. The control knob on the gas valve should be in the "OFF" position for at least five minutes.</li> <li>3. Rotate the control knob counter-clockwise to the "ON" position and set the thermostat to the desired temperature settings</li> </ol>	<p><b><u>Reset, if Flame Lockout Occurs</u></b></p> <ol style="list-style-type: none"> <li>1. Turn the thermostat off, or turn the main power off</li> <li>2. Wait five minutes</li> <li>3. Turn the main power on</li> </ol> <p><b><u>To shut the burner off</u></b></p> <ol style="list-style-type: none"> <li>1. Rotate the control knob on the gas valve to the "OFF" position</li> <li>2. Set the thermostat to the lowest temperature</li> </ol>

Fig. 9 Top View Of Gas Valve

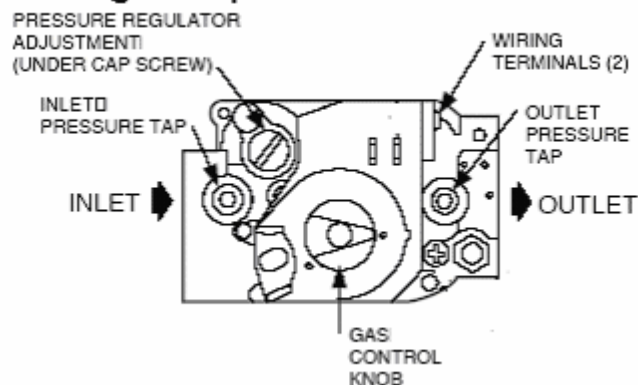
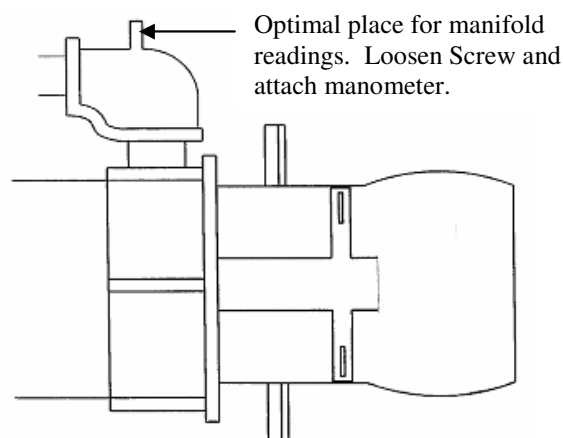


Fig. 10 Side View of Front of Burner



When commissioning the burner, make sure the gas control knob is in the "ON" position. Install monometers at the inlet pressure tap and outlet pressure tap. Record the static incoming gas pressure.

**Note:** When checking manifold pressure, do not subtract burner housing pressure during valve-on delay. When the burner lights off, record the running incoming gas pressure; *the running incoming gas pressure should never be below 5"*. Note: this pressure drop should not be greater than 1".

Check the manifold pressure from the outlet pressure tap. Refer to Table 5 on page 9 to make sure the gas pressure is set for the appropriate fuel and pressure. If adjustments need to be made, remove the cap screw and adjust the pressure regulator. Screwing the regulator clockwise will increase the manifold pressure and counter-clockwise will decrease the manifold pressure.

## Burner Operation

Before turning the burner on, check for gas supply leaks. Check the wiring diagrams; install manometers before and after the gas valve. Keep the observation port of the boiler or furnace open. Follow the instructions on the nameplate of the burner to turn it on. Follow the sequence of operations for the control (see pages 10 and 11). Record the readings below.

## COMMISSIONING/TROUBLESHOOTING CHECKLIST

There are four factors that are needed to operate the gas burner:

- \_\_\_ 1. Combustion Air
- \_\_\_ 2. Electricity
- \_\_\_ 3. Gas Flow
- \_\_\_ 4. Combustion Analysis

### ☐ 1. Combustion Air

Check the air coming into the area where the burner is located.

- \_\_\_ 1. If the burner is in a large area that air can come into freely (i.e. an open basement for home heating systems), then the air supply should be sufficient for the burner.
- \_\_\_ 2. If the burner is in an enclosed area (i.e. small room or closet) then fresh air must be supplied to the burner. The intakes to the area must terminate facing down in order to avoid obstructions. The total open free area must be 1 in<sup>2</sup> per 10,000 BTU input

Example

$$(350,000 \text{ BTU/hr}) * \frac{(1 \text{ in}^2)}{10,000 \text{ BTU/hr}} = 35 \text{ in}^2$$

## 2. Electricity

Check burner wiring

- \_\_\_ 1. Check that 120VAC is coming into the burner
- \_\_\_ 2. Check that the burner is properly grounded using a ground wire
- \_\_\_ 3. Check the polarity to the burner is correct.

(To check polarity: Set a multimeter to VAC. Touch L1 to one of the probe tips and ground to the other. If a voltage between 110 and 125 is shown then it has the correct polarity; if any other reading is shown, then check the L2 wire. If the L2 wire shows a voltage between 110 and 125 is shown then the polarity to the burner is reversed.)

## 3. Gas Flow

- \_\_\_ 1. Check that the capacity of the meter can meet the demand of the burner and all other appliances running off the meter.
- \_\_\_ 2. Check that the burner is on a direct pipe from the meter.
- \_\_\_ 3. Measure the total length of all the pipe and count the number of elbows (1 90° elbow=3 ft. of pipe). Compare the total feet of pipe and the BTU demand using the chart on Page 5 to determine the size of the pipe required.
- \_\_\_ 4. Check that the proper orifice is installed if needed.
- \_\_\_ 5. Check the gas pressure at the gas valve (line pressure). This pressure should be between 5" wc and 10" wc when the burner is not firing. *Note: When checking manifold pressure, do not subtract burner housing pressure during valve-on delay.*
- \_\_\_ 6. With the burner firing the pressure drop on the supply side should not exceed 2" wc. If the pressure drops and then surges back up, double check the piping because it means the pipes are undersized.

## 4. Commissioning the Burner

- \_\_\_ 1. Check the head and air settings and start the burner.
- \_\_\_ 2. **Use a combustion analyzer** to check CO<sub>2</sub> and CO. CO<sub>2</sub> should be between 9% and 9.8% and CO must be less than 400 ppm but we suggest less than 100ppm. If the CO<sub>2</sub> is greater than 9.8% then the air should be opened to reduce the CO<sub>2</sub>; if the CO<sub>2</sub> is below 8%, then the air should be closed to increase CO<sub>2</sub>.
- \_\_\_ 3. Check the manifold pressure to verify that it is at the specified pressure.
- \_\_\_ 4. Clock the gas meter and check that the correct firing rate is achieved. If the firing rate is low, the gas pressure should be increased slightly. If the firing rate is too high then the gas pressure should be decreased. (Usually if the stack temperature is below 300F the firing rate is too low. If the stack temperature is over 600F then the firing rate is usually too high or on rare occasions the heat exchanger is blocked up)

**Gas Input to Burner in ft<sup>3</sup>/hr \***

Seconds	1/2 ft <sup>3</sup>	1 ft <sup>3</sup>	2 ft <sup>3</sup>	5 ft <sup>3</sup>	Seconds	2 ft <sup>3</sup>	5 ft <sup>3</sup>
10	180	360	720	1800	50	144	360
12	150	300	600	1500	55	131	327
14	129	257	514	1286	60	120	300
16	113	225	450	1125	65	111	277
18	100	200	400	1000	70	103	257
20		180	360	900	75		240
22		164	327	818	80		225
24		150	300	750	90		200
26		138	277	692	100		180
30		120	240	600	110		164
35		103	206	514	120		150
40			180	450	130		138
45			160	400			

\* For BTU/hr Natural gas multiply by 1000

For BTU/hr Propane multiply by 2500

- \_\_\_ 5. If the firing manifold has been readjusted, redo steps 2 and 4
- \_\_\_ 6. Check that the draft over-fire is positive

**Use a combustion analyzer and record the readings below.**

BURNER OPERATION: Record the Readings at Steady State	
Draft over fire at steady state (should be Positive – refer to boiler manual)	
Natural Gas CO <sub>2</sub> % = (8.5% to 10.0%) or O <sub>2</sub> % = (5.0% to 3.5%)	
LP Gas CO <sub>2</sub> % = (10.5% to 11.5%) or O <sub>2</sub> % = (5.0% to 3.5%)	
Gross Stack Temperature (350°F minimum, 450°F maximum)	
NOx (If required)	
Carbon Monoxide (CO) in PPM (less than 100 PPM ideal; should not exceed 400 PPM Oxygen free)	
Incoming Gas/LP pressure = “W.C. (minimum 5”, maximum 11”))	
Manifold Pressure = “W.C.	
Head Setting	
Air Setting	

**Maintenance Instructions: TO BE FIXED/ATTACHED NEAR BURNER**

At least once a year, a qualified service agency needs to be contracted for other than routine maintenance.

1. The blower motor is the only moving part. It does not require lubrication, since the ball bearings have been permanently lubricated.
2. The user should do periodic visual checks of the burner and the flame.
3. Laundry lint or dog and/or cat hairs should not go inside the blower. If they are seen, they should be removed after disconnecting the power to the burner and cover parts should be installed before starting the burner.
4. Keep the area around the conversion burner clear and free from combustible materials, gasoline, and other flammable vapors and liquids.
5. No obstruction for the flow of combustion and ventilating air.

**Trouble shooting:**

There are three factors to operate the gas burner properly:

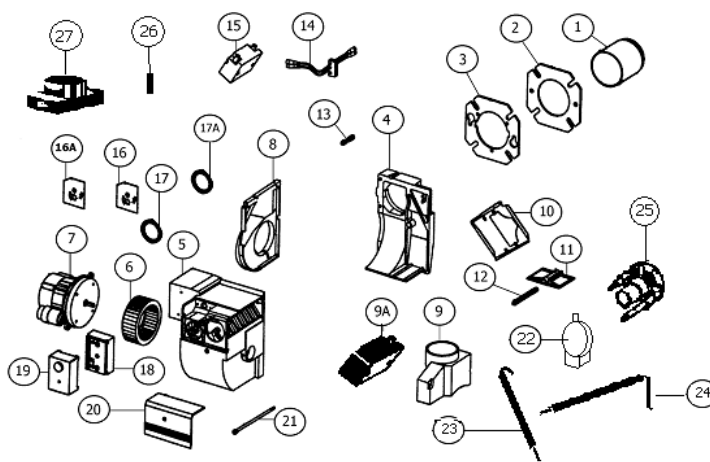
1. Electricity {(main Power 120V/60 Hz /1 Ph) ( secondary 24V)}
2. Gas flow (Incoming pressure should be 10” w.c. with proper gas line without pressure drop during burner operation).
3. Combustion air.

Check these three items properly before proceeding in detail for other problems.

Condition	Solutions
1. Burner motor runs and:	
No flame after pre-purge & no fuel indicator (where applicable)	Check 24V feed to airflow switch & after airflow switch to control. Fix or replace the airflow switch. If there is no secondary power, then replace the 24V transformer.
No flame, fuel indicator on (where applicable), faulty ignition transformer or spark separately	Check ignition transformer, electrode, cracked electrode or gap. Fix or replace.
Fenwal control defective after above tests.	Replace
Burner locks out after 4 seconds	
	First, check ionization electrode, ionization cable (for cracks) and boot. Fix as needed.
Polarity reversed	Check power feed for broken polarity
Bad earth grounding	Fix the ground wire
Gas pressure is too low	Check the gas pressure and adjust to proper pressure
2. Pulsation at start	
	First, check the burner head location with respect to the end



	of the flame tube. Adjust as necessary.
Gas pressure is too high.	Use manometer and readjust the pressures.
Blocked Flue	Check draft and clear flue of foreign materials.
3. Pulsation during operation	
Burner is not correctly adjusted.	Readjust with combustion analyzer.
The burner is dirty.	Clean the burner.
Defective chimney	Check and change if necessary with liners.
4. Burner locks out	
Ionization current is too low.	Check current. Minimum 0.8 micro amps. Check position of ionization electrode and the condition of the cable.
5. The CO content is too high	
Excess air is too high or too low.	Adjust air shutter.
The gas holes are clogged.	Clean them.
The fresh air intakes are too small.	Check and readjust.
The burner head is out of position.	Check and readjust.
6. Condensation in the heat exchanger	
Firing Rate is too low.	Increase the firing rate so that the stack temperature is 350° F or HIGHER. Insulate the chimney.



ITEM	PART	PART #	ITEM	PART	PART #
1	Blast Tube	1175-1701	17	Scale - Nozzle Line	1188-8501
2	Flange Gasket	10195-1	17A	Scale - Air Regulation	1188-7801
3	Adjustable Flange	10195	18	24 Volt Transformer	2440VA
4	Front piece - Housing		19	Safety Control	S89F
5	Rear piece – Housing		20	Plastic Cover Plate	11850001
6	Fan Wheel - 146 mm	1187-2601	21	Screw (Long Special)	1175-0702
7	1/6 HP PSC Blower motor	D82132	22	Airflow Switch	6041A
8	Shielding Plate Housing		23	Ignition Electrode	1153-4704
9	Outside Air Boot (optional)	83296	24	Flame Rod	1153-4703
9A	Silencer (optional)	11909-60105	25	Retention head	1193-8501
10	Air Regulation Plate	1186-7401	26	Union	113-9101
11	Air Damper	1186-7501	27	Gas Valve	VR 8305
12	Air Regulation Adjustment screw	1184-8401		Power On light	115-2001
13	Adjustment Screw – Nozzle Line	1191-2901		Fuel On Light	124-2001
14	Ionization Cable	1186-5805		Air light	124-2001
15	Ignition Transformer	2260-TW		Adjustable Flange Ring	11726701
				Low Pressure Gas Switch	<b>C6097B or GML- A4-4-4</b>
16	Cover Plate - Air Regulation	1188-7401		High Pressure Gas Switch	<b>C6097A or (GMH-A4-4-4</b>
16A	Cover Plate - Nozzle Line	1188-7302			