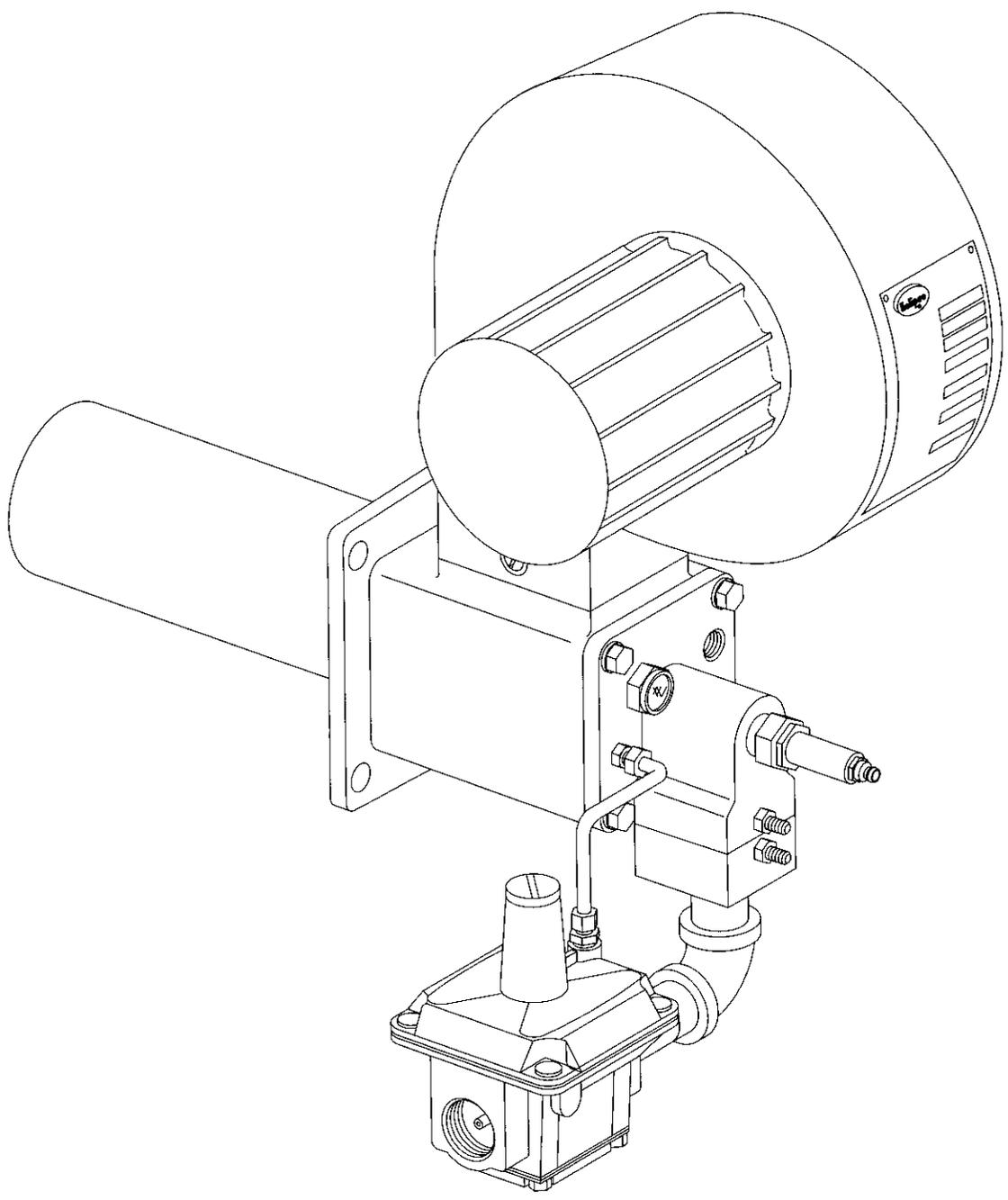


RatioMatic Burners

Model 50 RM (Version 2.00)



Eclipse Combustion

Installing the Spark Plug

1. Install spark plug (see Figure 2) into the spark plug port as shown in Figures 1 and 3.
 - Hot end of spark plug must be guided through the rear of the burner nozzle (See Figure 3, page 3). If the hot end of the spark plug is not guided through the rear of the burner nozzle, the mounting threads will not fully engage.



Note:

Do not use pipe dope or grease on spark plug threads. You can cause bad grounding of the spark plug if you apply pipe dope or grease to it. Bad grounding of the spark plug results in a weak spark.



Note:

The spark plug length is adjusted at the factory before shipping, but fine adjustment might be required due to thread engagement variation. The spark plug is shipped loose from the burner.



Caution:

Do not overtighten the mounting nut ❶ (see Figure 2). This could break ceramic insulator.

Figure 1 — Spark Plug Location

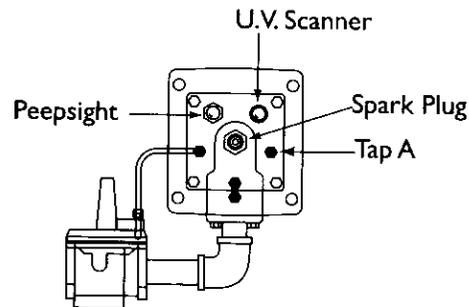
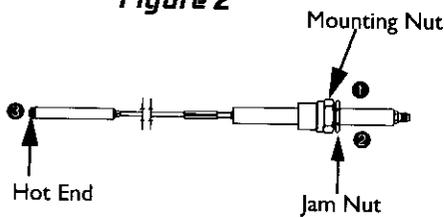


Figure 2



2. Tighten the mounting nut ❶.
3. If possible, visually check for a strong continual spark from the opposite end of the firing chamber; or, in a quiet environment, you can hear a strong spark when standing near the burner.
4. If there is not a strong spark, the burner might not light. You may need to **Adjust the spark plug.**
 - Loosen the adjusting jam nut ❷.
 - Make small adjustments (≤ 0.1 "). Adjust location of the spark plug's hot end ❸ to that shown in Figure 3. There should be about 0.1" spark gap to the burner nozzle.

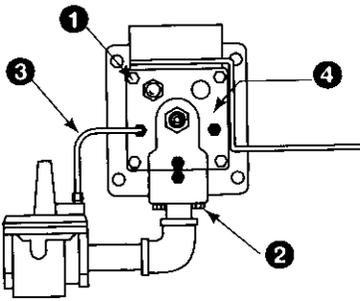
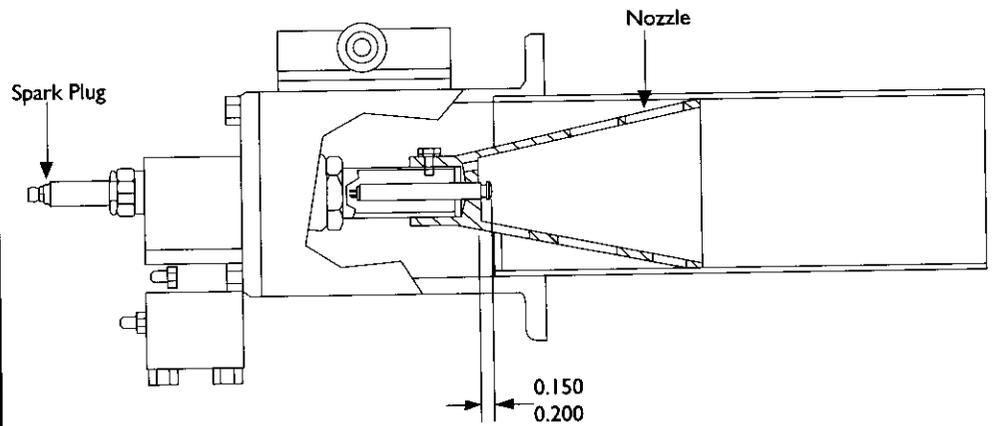


Caution:

Do not overtighten the adjusting jam nut. This could break the ceramic insulator.

- Tighten the adjusting jam nut.

Figure 3 — Spark Plug Location



If you cannot check the spark, and a weak spark is suspected, you can remove the burner internals to visually check the spark gap. To do this:

- Remove the four rear cover mounting bolts ①
- Disconnect the burner gas inlet by removing four bolts ②.
- Loosen the ratio regulator loading line ③.
- Remove the entire rear cover and nozzle assembly ④.
- Inspect the spark plug gap and adjust the spark plug accordingly.
- Reinstall the rear cover and nozzle assembly ④ with the spark plug installed and adjusted.

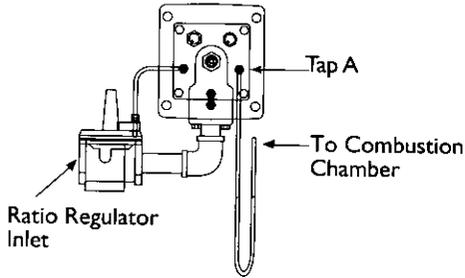
Note:

Be careful not to lose or damage the burner fuel orifice or O-rings.

Start Up & Adjustment

Factory Settings

Figure 4—Air Pressure Measurement



At low fire with the air butterfly valve shutter fully closed, combustion air differential pressure between tap "A" and the combustion chamber is 0.1" w.c. in a neutral pressure chamber. (See Figure 4)



Note:

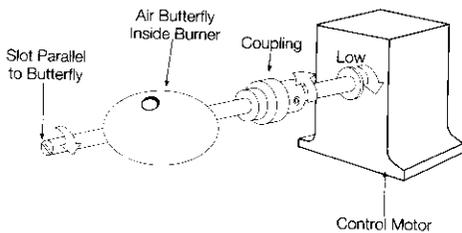
There is a slot in the end of the burner air butterfly valve shaft which is parallel to the air damper. This can be used for a visual indication of valve position. (See Figure 5)

At high fire with the air butterfly fully open and firing into a neutral pressure combustion chamber, the combustion air differential pressure between tap "A" and the combustion chamber is 3.6" w.c. with a standard air filter and 4.0" w.c. without an air filter (i.e. grille inlet).

High fire gas flow requires no adjustment. The size of the integral gas orifice is selected based on the fuel (natural gas, propane, or butane) specified at the time the burner is ordered. Alternate fuel orifices can be ordered.

Control Panel Settings

Figure 5—Air Adjustment



Pilot Adjustment: (if applicable) Some provision should be made to operate only the pilot during pilot adjustment. See literature included with the flame monitoring relay and/or control panel for information on operation with pilot only. Eclipse flame monitoring relays have a front panel pilot test button that will hold the start-up sequence on pilot during pilot adjustment.

High/Low Fire Control: During burner adjustment, you will need to drive the control motor to high and low fire several times. You may do this with the process temperature control, setting it to a higher temperature for high fire or a lower temperature for low fire; or your equipment may be fitted with a manual override attached to the control motor. Before attempting to adjust the burner, determine how you will control the motor position and become familiar with the method.

Regulator Settings

The main and pilot gas regulators must be adjusted to supply 14.0" w.c. minimum to 20.0" w.c. maximum fuel pressure at the ratio regulator inlet. See Figure 4.



Warning:

Do not operate the 50 Ratiomatic burner with less than 14" w.c. gas inlet pressure. Lower gas inlet pressures may cause the proportionator to remain fully open as the burner turns down from high fire, causing excess fuel operation and the possible accumulation of unburned fuel in the chamber. In extreme cases, this may cause explosions or fires.

Gas Valves

Close all manual and automatic gas valves.

Combustion Air Blower

Start the blower and check the impeller for correct rotation. If it's running backwards, have a qualified electrician change the motor wiring.

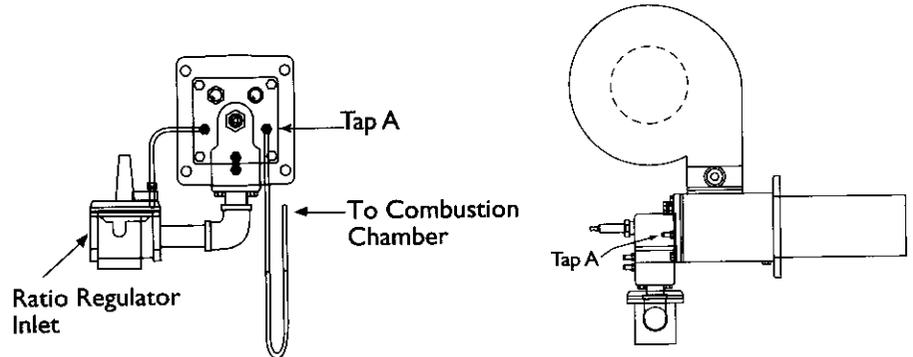
Duct or Circulating Fan

If the burner is to fire into a duct or chamber with a circulating fan, start the fan to produce full process air flow past the burner.

Adjust the Air Setting

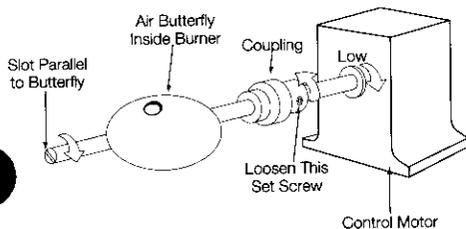
Measure the differential air pressure between Tap "A" and the firing chamber as shown in Figure 6.

Figure 6 – Differential Air Pressure Measurement



Low Fire Air Adjustment

Low fire air differential pressure: must be a minimum of 0.1" w.c obtained with the air butterfly valve in the fully closed position under neutral conditions. The slot on the end of the butterfly valve shaft is parallel to the plane of the butterfly. See figure at left.



1. Drive the control motor to the low fire position.
2. Loosen the setscrew on the motor side of the flexible coupling.
3. **Under neutral chamber pressure conditions:** Adjust the air butterfly valve to the fully closed position.

Under positive chamber pressure conditions:

Adjust the air butterfly valve slightly open to obtain a minimum 0.1" w.c. low fire air differential pressure.

4. Hold the shaft firmly in place and tighten the setscrew.

Note:

No high fire air adjustment is required when firing into a neutral pressure chamber and using a 90° travel control motor.

High Fire Air Adjustment

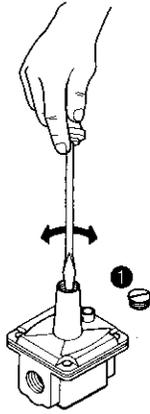
1. Drive the control motor to the high fire position (i.e. fully open).
2. If applicable, adjust the control motor travel for high fire.
3. Adjust or verify the high fire air differential pressure. To do this, measure the air differential pressure between tap "A" and the chamber as shown in Figure 6 above. The differential pressure will be approximately 3.5" w.c. with an air filter or 4.0" w.c. without an air filter.

When firing into a negative chamber pressure greater than 1.0" w.c.: it might be necessary to limit the travel of the butterfly valve short of full open. This can be done with a travel limit switch or by other means. Adjust the control motor to obtain a high fire differential pressure of 4.0" w.c.

Verify Air Adjustment

1. Cycle the control motor several times, checking high and low fire differential pressures. If they don't repeat, check for a loose valve shaft coupling or binding of the motor or valve. Record high and low fire air differential pressures and keep with system information.

Adjust the Pilot/Low Fire Flame



Note:

Drive the control motor to low fire and set the system to operate on pilot only.

Adjust the pilot gas supply

If bypass pilot piping enters immediately upstream of the ratio regulator (the standard piping configuration), pilot and low fire gas adjustment are accomplished at one time on the ratio regulator.

1. Make sure the burner control is in the low fire position.
2. Bypass pilot gas pressure should be adjusted to match the low fire gas pressure at the ratio regulator inlet.
3. Ignite the pilot/low fire flame.
4. **If the pilot does not ignite:**
 - a. Try to ignite again to purge air out of gas piping. **If pilot still does not ignite:**
 - b. Remove ratio regulator cover ❶. See figure at left.
 - c. Adjust bias screw down 1/2 turn (clockwise for more gas).
 - d. Replace and tighten ratio regulator cover.
 - e. Ignite the pilot/low fire flame. If it does not ignite again, repeat steps b through e until the burner ignites or until the steps have been repeated a maximum of six times.

Note:

The pilot gas pressure at the burner will be too low to be read reliably.

5. If the flame is visible:

- a. The flame must be mostly blue (might have small flashes of yellow) and completely within the combustion tube. When firing propane or butane, a proper low fire flame has sustained flashes of yellow.
- b. If necessary, adjust the bias screw on the ratio regulator to obtain a proper low fire: clockwise for more fuel, counterclockwise for less fuel.
- c. Replace and tighten the ratio regulator cover.

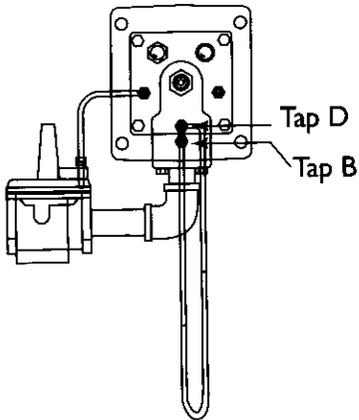
6. If the flame is not visible:

- a. Adjust the ratio regulator bias screw until the flame can be reliably detected by UV scanner, and gas flow is the smallest possible.
- b. Replace and tighten ratio regulator cover.

7. Verify pilot/low fire flame:

- a. Turn off both pilot gas and combustion blower.
- b. Restart combustion blower and ignite pilot only.
- c. Verify repeatability of ignition and pilot/low fire flame as in steps 5 and 6 above.

Verify High Fire Fuel Pressure/Flow



Check Settings & Shut Down the Burner



Note:

High fire fuel flow requires no adjustment.

1. Drive control motor to high fire.
2. Measure high fire fuel differential pressure across the integral burner orifice (between taps B and D) as shown in figure at left.
3. Verify the high fire fuel differential pressure against Table 1. Cycle the burner from high to low several times to check repeatability of settings. To make it easier to set up and troubleshoot the burner in the future, record your setup data.

Table 1 – High fire fuel differential pressure (in. w.c. \pm 10%)

FUEL	WITH AIR FILTER	WITHOUT AIR FILTER
Natural gas	1.6	1.9
Propane	2.0	2.3
Butane	2.0	2.3

1. Cycle the burner from high to low several times to check repeatability of settings. To make it easier to set up and troubleshoot burner in the future, record your setup data.



Caution:

Do not turn the blower off until the chamber temperature is below 250°F. This will prevent hot gases from flowing back through the burner and the blower and causing damage to the burner.

2. Stop the burner.



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