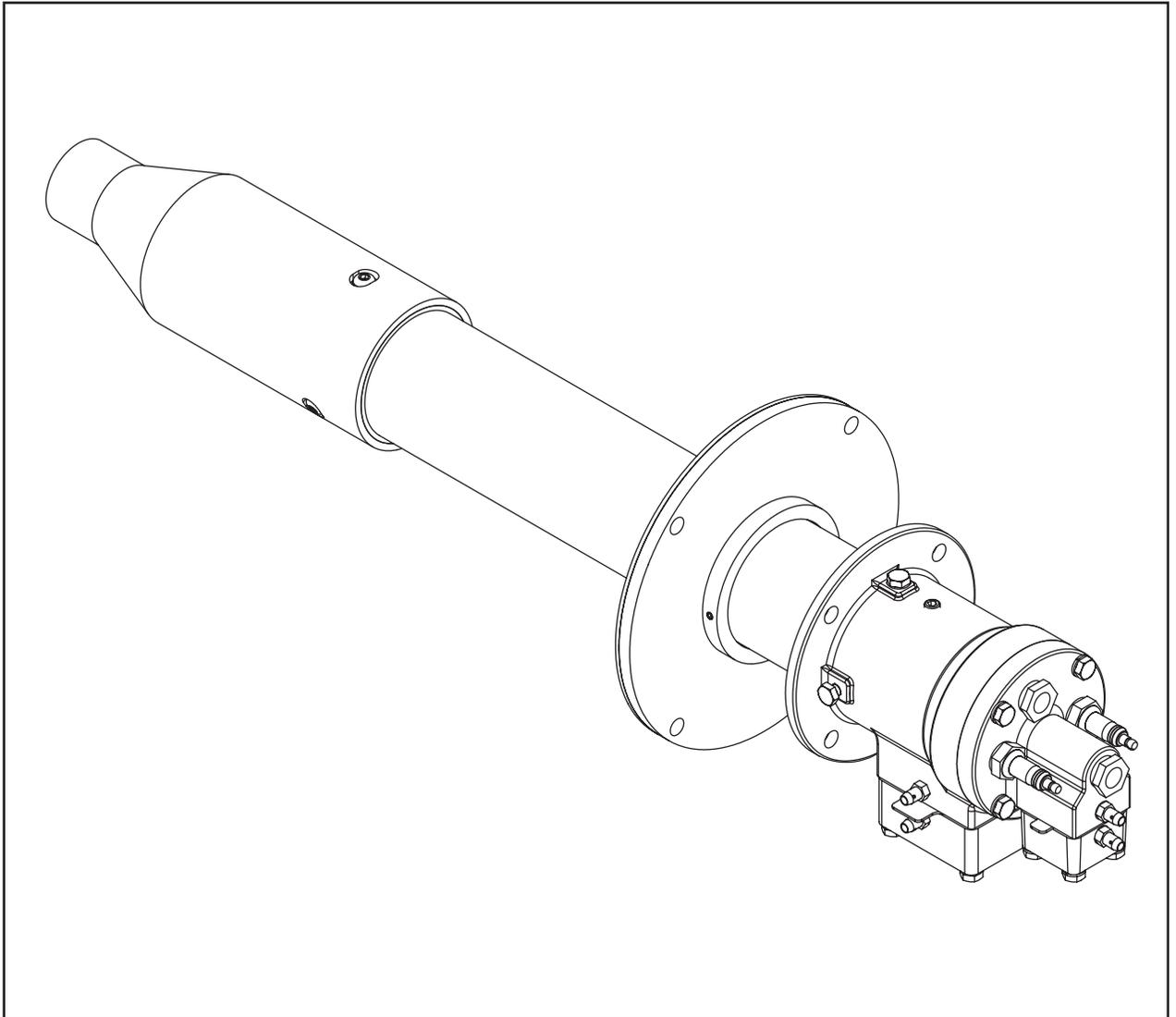


Eclipse ExtensoJet Burners

Models EJ025–EJ075
Version 2



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About This Manual

AUDIENCE

This manual has been written for people who are already familiar with all aspects of a nozzle-mix burner and its add-on components, also referred to as “the burner system”.

These aspects are:

- Installation
- Use
- Maintenance

The audience is expected to have had previous experience with this kind of equipment.

EXTENSOJET DOCUMENTS

Installation Guide No. 230

- This document

Datasheet No. 230-1 through 230-3

- Available for individual EJ models
- Required to complete installation

Design Guide No. 230

- Used with Datasheet to design burner system

Price List No. 230

- Used to order burners

Related Documents

- EFE 825 (Combustion Engineering Guide)
- Eclipse bulletins and Info Guides:
610, 710, 720, 730, 742, 744, 760, 930, I-354

Purpose

The purpose of this manual is to make sure that you carry out the installation of a safe, effective and trouble-free combustion system.

DOCUMENT CONVENTIONS

There are several special symbols in this document. You must know their meaning and importance.

The explanation of these symbols follows below. Please read it thoroughly.



Danger:

Indicates hazards or unsafe practices which WILL result in severe personal injury or even death.

Only qualified and well trained personnel are allowed to carry out these instructions or procedures.

Act with great care and follow the instructions.



Warning:

Indicates hazards or unsafe practices which could result in severe personal injury or damage.

Act with great care and follow the instructions.



Caution:

Indicates hazards or unsafe practices which could result in damage to the machine or minor personal injury, act carefully.



Note:

Indicates an important part of the text. Read thoroughly.

HOW TO GET HELP

If you need help, contact your local Eclipse representative.
You can also contact Eclipse at:

1665 Elmwood Rd.
Rockford, Illinois 61103 U.S.A.

Phone: 815-877-3031
Fax: 815-877-3336
<http://www.eclipsenet.com>



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Introduction

1

PRODUCT DESCRIPTION

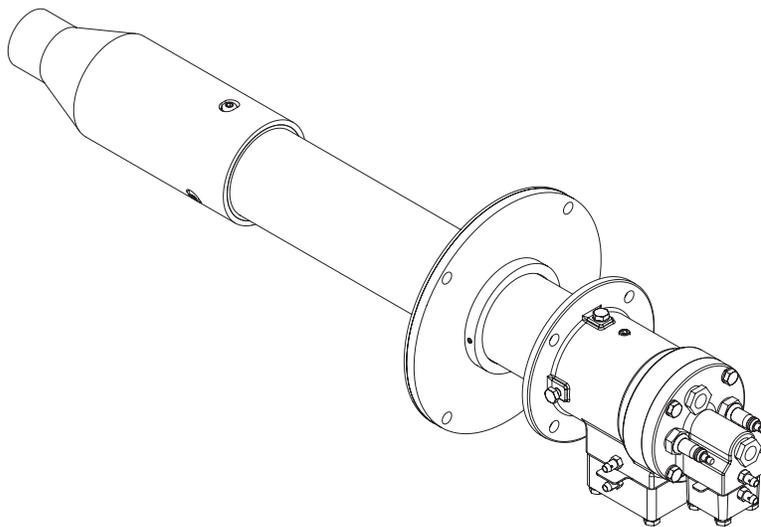
The ExtensoJet is a nozzle-mix burner that is designed to fire an intense stream of hot gases through a silicon tipped extended combustor using ambient combustion air.

The high velocity of the gases improves temperature uniformity, product quality and system efficiency. The gas velocity can be as high as 500 ft/s. The combustor comes in varying lengths from 20 inches to 56 inches.

The burner is designed for:

- On-Ratio Control
- Direct Spark Ignition
- Flame Rod Supervision
- Multiple Fuel Capability

Figure 1.1 The ExtensoJet Burner



Safety

2

INTRODUCTION

In this section you will find important notices about safe operation of a burner system.

SAFETY



Danger:

The burners covered in this manual are designed to mix fuel with air and burn the resulting mixture. All fuel burning devices are capable of producing fires and explosions when improperly applied, installed, adjusted, controlled or maintained. Do not bypass any safety feature. You can cause fires and explosions. Never try to light the burner if the burner shows signs of damage or malfunctioning.



Warning:

The burner might have HOT surfaces. Always wear protective clothing when approaching the burner.



Note:

This manual gives information for the use of these burners for their specific design purpose. Do not deviate from any instructions or application limits in this manual without written advice from Eclipse.

Read this entire manual before you attempt to start the system. If you do not understand any part of the information in this manual, then contact Eclipse before you continue.

CAPABILITIES

Adjustment, maintenance and troubleshooting of the mechanical and the electrical parts of this system should be done by qualified personnel with good mechanical aptitude and experience with combustion equipment.

OPERATOR TRAINING

The best safety precaution is an alert and competent operator. Thoroughly instruct new operators so they demonstrate an adequate understanding of the equipment and its operation. Regular retraining must be scheduled to maintain a high degree of proficiency.

REPLACEMENT PARTS

Order replacement parts from Eclipse only. Any customer-supplied valves or switches should carry UL, FM, CSA, CGA and/or CE approval where applicable.

Installation

3

INTRODUCTION

HANDLING AND STORAGE

POSITION OF COMPONENTS

APPROVALS OF COMPONENTS

In this section you will find the information and instructions needed to install the burner and system components.

Handling

- Make sure the area is clean
- Protect the components from weather, damage, dirt and moisture
- Protect the components from excessive temperatures and humidity

Storage

- Make sure the components are clean and free of damage
- Store the components in a cool, clean, dry room
- After making sure everything is present and in good condition, keep the components in original packages as long as possible

The position and amount of components are determined by the kind of control method chosen. All the control methods can be found in Design Guide 230, Chapter 3 "System Design". Use the schematics in that chapter to build your system.

Limit Controls and Safety Equipment

All limit controls and safety equipment must comply with the current following standards:

- NFPA Standard 86
- NFPA Standard 86C
- UL
- FM
- CGA
- EN 746-2
- All applicable local codes and/or standards

Electrical Wiring

All electrical wiring must comply with all applicable local codes and/or standards, which may include:

- NFPA Standard 70
- ANSI-C11981
- EN 746-2

Gas Piping

All gas piping must comply with all applicable local codes and/or standards, which may include:

- NFPA Standard 54
- ANSI Z223
- EN 746-2

APPROVALS OF COMPONENTS (CONTINUED)

Where To Get Standards:

The **NFPA Standards** are available from:
National Fire Protection Agency
Batterymarch Park
Quincy, MA 02269

The **ANSI Standards** are available from:
American National Standard Institute
1430 Broadway
New York, NY 10018

The **UL Standards** are available from:
333 Pfingsten Road
Northbrook, IL 60062

The **FM Standards** are available from:
1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood, MA 02062

The **CGA Standards** are available from:
55 Scarsdale Road
Toronto, Ontario
Canada M3B 2R3

Information on the **EN standards**, and where to get the standards is available from:

Comité Européen de Normalisation
Strassartstraat 36
B-1050 Brussels

Comité Européen de Normalisation Electronique
Strassartstraat 36
B-1050 Brussels

CHECKLIST BEFORE INSTALLATION

Intake

To admit fresh combustion air from outdoors, provide an opening in the room of at least one square inch per 4,000 BTU/hr.

If there are corrosive fumes or materials in the air, then supply the burner with clean air from an uncontaminated area.

Exhaust

Do not allow exhaust gases to accumulate in the work area. Provide some positive means for exhausting them from the furnace and the building.

Access

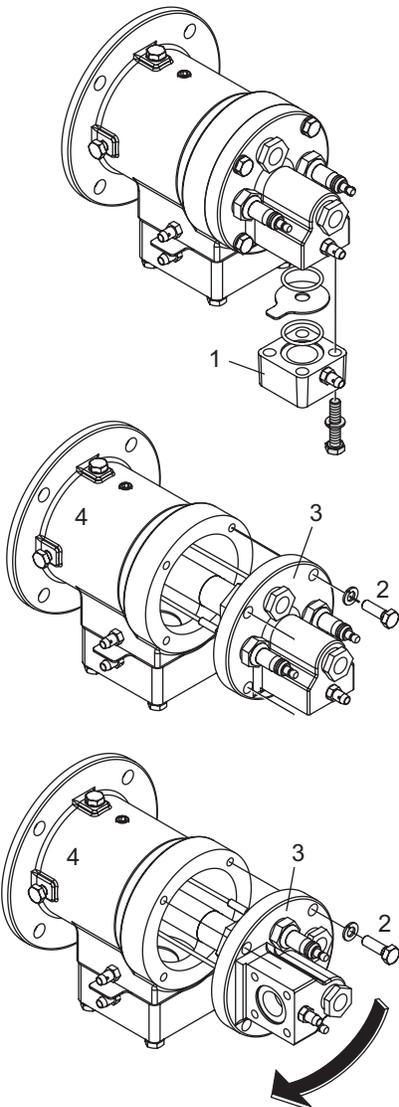
Make sure that you install the burner in such a way that you can get easy access for inspection and maintenance.

Environment

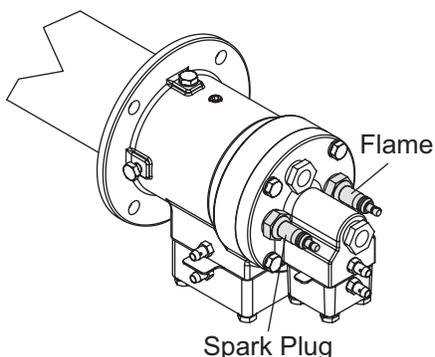
Be sure the burner operating environment matches the original operating specifications. Check the following items:

- voltage, frequency, and stability of electrical power
- fuel type and fuel supply pressure
- adequate fresh, clean, combustion air
- humidity, altitude, and temperature of the supply air
- presence of damaging corrosive gases in the air

PREPARE THE BURNER



Rotate the Rear Cover (Optional)



Installing the Flame Sensor

Several components must be installed on a burner before it can operate. Installation instructions follow:

It is possible to change the relative position of the gas inlet with respect to the air inlet. This can be convenient for the routing of the piping.

To rotate the rear cover, do the following steps:

1. Disconnect the piping at a union in the piping or the inlet flanges **1** provided on the burner.
- Note:**
 *Be careful not to lose or damage the orifice plate or the O-rings.*
2. Remove the four bolts **2**.
 3. Remove the rear cover **3** from the burner housing **4**.
 4. Rotate the rear cover **3** to the position that you want.
 5. Put the rear cover in position against the burner housing **4**.
 6. Install the four bolts **2**.
 7. Reconnect the piping. Make sure that the O-rings show no signs of damage.

Installing the Flame Sensor

1. Install the flame sensor into the 1/2" NPT opening in the rear cover.
2. Make sure that you connect the flame sensor of a burner to the electrical circuit of that burner.

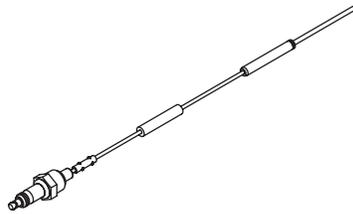


Danger:

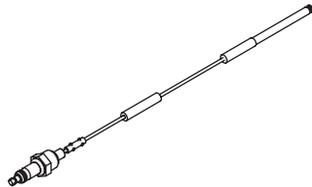
If you connect the flame sensor of a burner to the electrical circuit of the wrong burner, then you can cause fires and explosions.

PREPARE THE BURNER

(CONTINUED)



Flame Rod



Spark Plug

BURNER INSTALLATION

Flame Rod

For detailed information on how to install and connect a flame rod, refer to Bulletin/Info Guide 832.

Installing the Spark Plug

Install the spark plug into the opening in the rear cover.



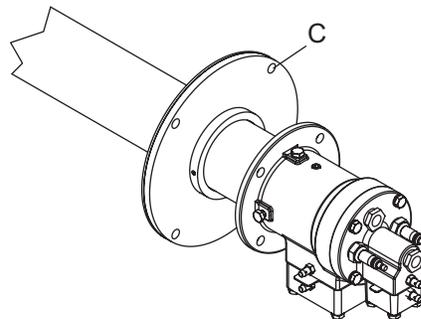
Note:

*Do **not** apply any grease to the threads of the spark plug. You can cause bad grounding of the spark plug if you apply grease to it. Bad grounding of the spark plug results in a weak spark.*

Dimensions

The burner attaches to the wall of the **chamber** with bolts or studs welded to chamber wall through holes "C". For full information on the dimensions, refer to specific datasheets.

Figure 3.1 Burner Attachment



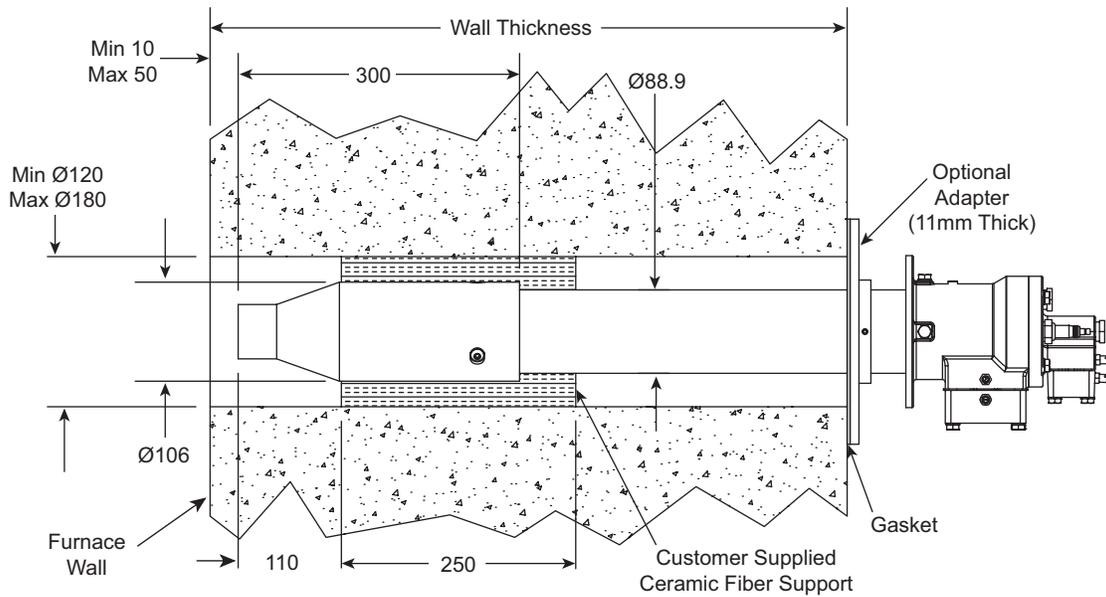
Chamber Wall

Make sure that the wall of the chamber is strong enough to carry the weight of the burner. If necessary, reinforce the area where you plan to install the burner to support the weight of the burner.

Avoid Losses

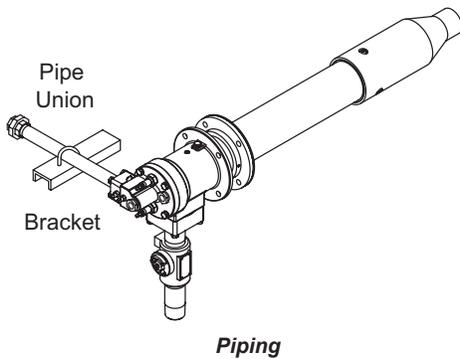
To make sure that heat does not go back to the casing of the chamber, it is important that the radial clearance around the combustor is filled with ceramic fiber.

Figure 3.2 Silicon Carbide Tube - Installation (Dimensions in mm)



Make sure the gasket is installed between the mounting flange and the chamber wall. Locate the end of the ceramic combustor between 10mm and 50mm inside furnace wall. Clearance hole in the chamber wall must be between 120mm and 180mm in diameter. Pack the gap with ceramic fiber as stated above to the dimensions shown.

PIPING



Layout

Install the piping as shown in the schematics. Refer to chapter 3 of the ExtensoJet Design Guide No. 230.

Support the Piping

Use brackets or hangers to support the gas piping. If you have questions, consult your local gas company.

Straight Run of Pipe Before a Metering Orifice



Note:

There must be a run of pipe with a straight length of at least 10 pipe diameters before the burner metering orifice. If you do not do this, the pressure readings **will** be inaccurate.

Pipe Connections

1. Install a pipe union in the gas line to the burner. This simplifies removal of the burner.
2. The use of flexible pipe nipples in the gas line to the burner is optional. Flexible nipples can absorb stress due to heat expansion and slight misalignment.



Note:

Flexible pipe nipples will cause inaccurate metering orifice readings and may cause higher pressure drops than equivalent standard pipe. Consider this when you size the gas lines.

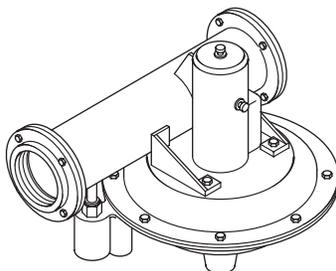
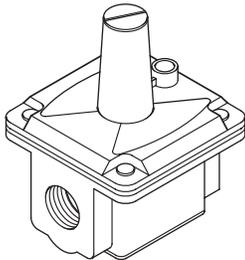
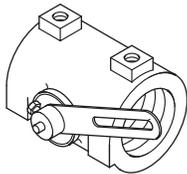
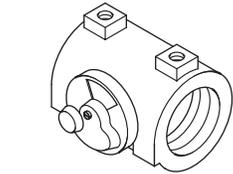
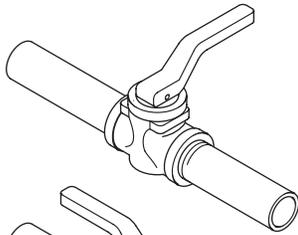
Avoid Large Pressure Drops



Note:

The pressure drop of the gas in the piping is a critical parameter. Make sure that the size of all the piping is large enough to prevent excessive pressure losses.

VALVE INSTALLATION



Valve Orientation

Install all the valves in such a way that the arrow (if present) on the valve body points in the direction of flow.

Gas Cocks

Make sure that the handle of a gas cock is at a right angle to the valve body when the valve is in the closed position. This is an important position indicator. If you do not do this, somebody may think that the gas cock is in the closed position, while it is actually in the open position.

Gas Balancing Valves

A gas balancing valve is typically the same as a manual butterfly valve. For more information, refer to the section below.

Manual Butterfly Valves

1. Install manual butterfly valves in accordance with Bulletin/Info Guide 720.
2. Install manual butterfly valves in the gas line to the burner (optional).



Note:

It is recommended that there is a run of pipe with a length of at least 10 pipe diameters between any flow altering device and the metering orifice on the burner.

Automatic Butterfly Valve

An automatic butterfly is driven by an actuator (actuator and mounting bracket not illustrated). Install the control valve in accordance with Bulletin/Info Guide 720.

Ratio Regulator

- Connect an impulse line to the ratio regulator and to the air supply line.
- Install the ratio regulator in accordance with Bulletin/Info Guide 742.

CRS Valve

Install the CRS valve in accordance with Bulletin/Info Guide 744.

CHECKLIST AFTER INSTALLATION

PREPARE FOR ADJUSTMENT

To verify proper system installation, do the following:

1. Make sure that there are no leaks in the gas lines and the air lines.
2. Make sure all the components of the flame monitoring control system are properly installed. This includes verifying that all switches are installed in correct locations and all wiring, pressure and impulse lines are properly connected.
3. Make sure components of spark ignition system are installed and functioning properly.
4. Make sure that the blower rotates in the correct direction. If incorrect, then have a qualified electrician rewire the blower to reverse its rotation.
5. Make sure all valves are installed in proper location and correctly oriented relative to the gas or air flow direction.

After installation of the burner system components is complete, the following steps should be followed in order to prepare for adjustment:

1. Set the air pressure switch so that it drops out at 4" w.c. (10 mbar) below the pressure rating of the blower.
2. Set the low gas pressure switch at 4" w.c. (10 mbar) below the gas pressure measured at the inlet to the main gas valve train.
3. Set the high gas pressure switch so that it comes on at 4" w.c. (10 mbar) above the gas pressure measured at the inlet to the main gas valve train.
4. Close all the burner gas cocks.
5. Try to light a burner before the purge and other timers have finished their cycles. Make sure that the flame monitoring system indicates a flame failure.
6. Trip out pressure switches and other limit interlocks. Make sure that the main gas valve train closes.



Danger:

If simulated limits or simulated flame failures do not shut down the fuel system within the required failure response time, immediately correct the problem before proceeding.

Adjustment, Start & Stop

4

INTRODUCTION

In this chapter you will find instructions on how to adjust a system, and how to start and stop a system. The chapter starts with general instructions that are useful for adjustment.



Danger:

Do not bypass any safety feature. You can cause fires and explosions.

Obey the safety precautions in Chapter 2.

Adjustment

There are two adjustment procedures. To adjust a modulating gas and air ratio system, refer to “Modulating Gas and Air Ratio System” on page 15. For a fixed-air system, refer to “Fixed-air System” on page 18.

If you adjust an on-ratio system for the first time, you must follow these steps (Refer to Figure 3.1 and Figure 3.3 in the ExtensoJet Design Guide No. 230):

1. Reset the system
2. Set high fire air
3. Set low fire air
4. Verify the air settings
5. Ignite the burners
6. Set high fire gas
7. Set low fire gas
8. Verify the gas settings

MODULATING GAS AND AIR RATIO SYSTEM

Step 1: Reset the System

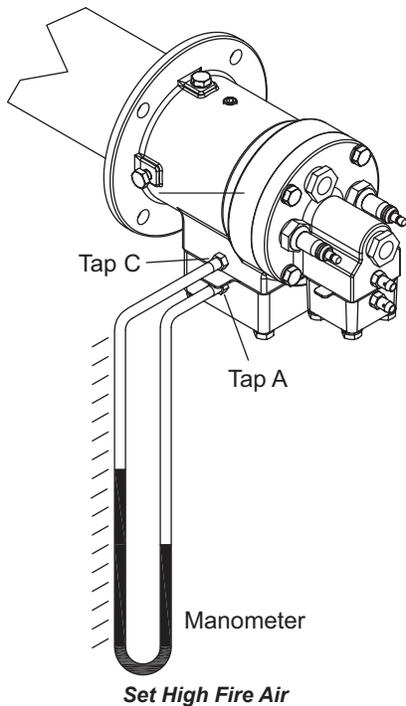
1. Close these valves: the automatic gas valves and the gas cocks.
2. Fully open the manual air butterfly valve at each burner.
 - a. Drive the automatic zone air control valve to high fire.
 - b. Adjust the automatic zone air control valve so that it is fully open. The automatic zone air control valve can be either a butterfly valve or a CRS valve.
3. Start the blower.



Caution:

Make sure that the blower rotates in the correct direction. If incorrect, have a qualified electrician rewire the blower to reverse its rotation.

Step 2: Set High Fire Air



1. Set the system to high fire, but **DO NOT** ignite the burner(s).
2. Use the air curves from the appropriate ExtensoJet Datasheet to find the differential air pressure needed at high fire. This is now the target value for high fire.
3. Set high fire air.



Note:

A pressure tap is open when the screw inside the tap is unscrewed approximately half a turn.

To set high fire air on a single burner system:

- a. Make sure that pressure taps A and C are open.
- b. Connect the manometer to taps A and C (across the air orifice).
- c. Adjust the manual butterfly valve until the high-fire differential air pressure is at the target value.
- d. Remove the manometer.
- e. Close the pressure taps.

To set high fire air on a multiple burner system:

- a. Make sure that pressure taps A and C of the first burner are open.
 - b. Connect the manometer to taps A and C of the first burner (across the air orifice).
 - c. Adjust the zone air manual butterfly valve to achieve the target value for the first burner.
 - d. Measure and note the differential air pressure across the next burner in the zone.
 - e. Repeat d for all the other burners in the zone (if any).
 - f. If all the measured differential pressures are within 0.3" w.c. (0.75 mbar) of each other, then proceed to the next section. If the variation is greater than 0.3" w.c. (0.75 mbar) it will be necessary to adjust the manual air butterfly valve at each burner to improve the balance.
 - g. Make sure that all the pressure taps are closed.
4. Repeat step 3 for other zones (if any).

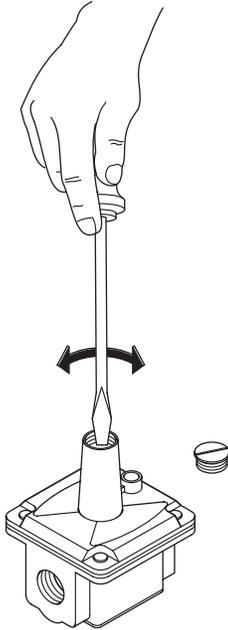
Step 3: Set Low Fire Air

1. Set the system to low fire.
2. Connect the manometer to tap A (air inlet pressure tap).
3. Adjust the automatic zone air control valve until the low-fire static air pressure is 0.2" w.c. This is the initial setting only. Further adjustment may be required.
4. Repeat 2 and 3 for the other zones (if any).

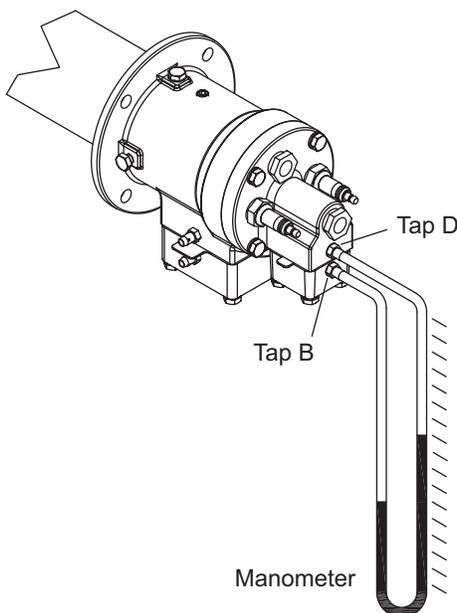
Step 4: Verify the Air Settings

Make sure all the settings are still the same after you cycle the system several times between high and low fire.

Step 5: Ignite the Burners



Step 6: Set High Fire Gas



Warning:

This procedure assumes that a flame monitoring control system is installed and is serviceable. It also assumes that normal low fire start is being used. If low fire gas is too low to be used for ignition, refer to options in “Set the bypass pilot gas (optional)” on page 21.

1. Drive the zone air automatic control valve to low fire.
2. Make sure the combustion air blower is running.
3. Set the manual gas butterfly valve at each burner to 50% open.
4. Set the adjusting screw on the ratio regulator six full (360°) turns down from the top (initial setting).
5. Open zone manual gas cock.
6. Open manual gas cock at each burner.
7. Initiate the ignition sequence through the flame monitoring control system.
 - a. Check that all the burners in the zone have ignited.
 - b. If safety shut-off solenoid valves are installed at each burner, then repeat 6 and 7 for all the burners in the zone.
8. If all the burners have ignited, drive the zone air butterfly valve to high fire. Verify flame is present at each burner. If burners do not light, add a 1/2 turn down on the proportionator, repeat steps 7 through 11.
9. Verify that air pressure drops have remained the same.
10. If air pressure drop is too high, close down the zone manual air butterfly valve.
11. If air pressure drop is too low, open the zone manual air butterfly valve.

1. Use the gas curve from the appropriate ExtensioJet Datasheet for the gas being used to find the differential gas pressure needed at high fire. This is the target value for high fire.
2. Connect the manometer to taps B and D (across the gas orifice).
3. Measure the high fire differential gas pressure for the first burner.
4. Adjust the gas butterfly valve at the burner until the gas flow is at the target value.
5. Repeat 3 thru 4 for the other burners in the zone.
6. Check the gas pressure at the inlet to the zone ratio regulator. This should be at least 5" w.c. (12.5 mbar) higher than the loading line pressure. It should not exceed the maximum pressure rating of the ratio regulator.



Warning:

Insufficient gas inlet pressure may cause the proportionator to remain fully open as the burner system 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.

Step 7: Set Low Fire Gas

1. Drive the system to low fire.
2. Use the gas curve from the appropriate ExtensoJet datasheet for the gas being used to determine the differential gas pressure required for low fire. This is your target value for low fire.
3. Measure the gas pressure at the first burner.
4. Adjust the ratio regulator until the gas flow is on the target value. (Refer to Bulletin 742 for adjustment.)



Note:

It is very difficult to measure the very low pressures experienced at low fire, and it may be necessary to rely on visual inspection. This is especially true when gas turndowns in excess of 10 to 1 are being used. The main intent is to provide a clean stable flame with a good flame signal that will not cause the furnace temperature to overshoot.

If the pressure required is too low to be measured, then adjust the ratio regulator until a gas flow is obtained that will provide a clean stable flame with a strong flame signal.

Step 8: Verify the Gas Settings

Make sure that all settings are still the same after cycling the system several times between high and low fire.



Note:

When all the settings have been completed, mark the position of the indicator on the butterfly valves to indicate valve position.

FIXED AIR SYSTEM

When you adjust a fixed-air system for the first time, you must follow these steps:

1. Reset the system
2. Set high fire air
3. Ignite the burners
4. Set high fire gas
5. Set low fire gas
6. Verify the gas settings

Step 1: Reset the System

1. Close the automatic gas valves and the gas cocks.
2. Fully open the manual air butterfly valve at each burner.
 - a. Drive the automatic zone air control valve to high fire.
 - b. Adjust the automatic zone air control valve so that it is fully open. The automatic zone air control valve can be either a butterfly valve or a CRS valve.
3. Set the manual gas butterfly valve at each burner to 50% open.
4. Start the blower.



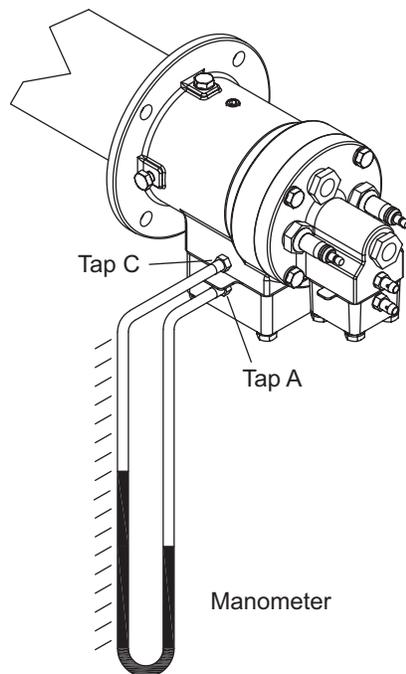
Note:

Make sure that the blower rotates in the correct direction. If incorrect, then have a qualified electrician rewire the blower to reverse its rotation.

Step 2: Set High Fire Air

1. Set the system to high fire, but **DO NOT** ignite the burner(s).
2. Use the air curves in "Orifice Curves" from the appropriate ExtensoJet datasheet to find the differential air pressure needed at high fire. This is now the target value for high fire.
3. Set high fire air.

Step 2: Set High Fire Air (Continued)



Step 3: Ignite the Burners



Note:

A pressure tap is open when the screw inside the tap is unscrewed approximately half a turn.

Single Burner System:

- a. Make sure that pressure taps A and C of the burner are open.
- b. Connect the manometer to taps A and C (across the air orifice).
- c. Adjust the manual butterfly valve until the high-fire differential air pressure is at the target value.
- d. Remove the manometer.
- e. Close the pressure taps.

Multiple Burner System:

- a. Make sure that pressure taps A and C of the first burner are open.
 - b. Connect the manometer to taps A and C of the first burner (across the air orifice).
 - c. Adjust the manual butterfly valve for the zone, until the high-fire differential air pressure is at the target value for the first burner.
 - d. Measure the differential air pressure across the next burner in the zone.
 - e. Repeat step **d** for all the other burners in the zone (if any).
 - f. If all the measured differential pressures are within 0.3" w.c. (0.75 mbar) of each other, then proceed to the next section. If the variation is greater than 0.3" w.c. (0.75 mbar) it will be necessary to adjust the manual air butterfly valve at each burner to improve the balance.
 - g. Make sure that all the pressure taps are closed.
4. Repeat 3 for other zones (if any).



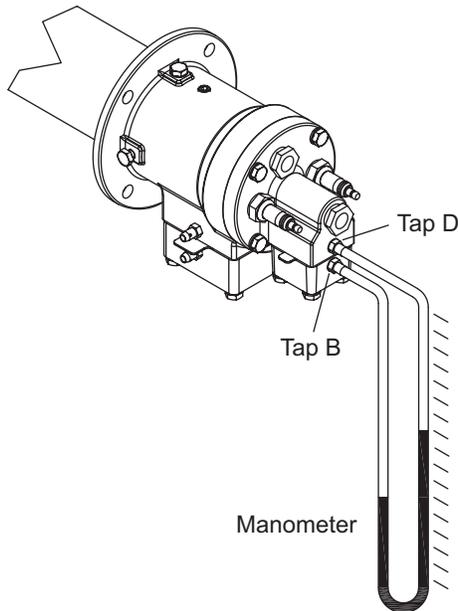
Warning:

This procedure assumes that a flame monitoring control system is installed and is serviceable. It also assumes that normal low fire start is being used. If low fire gas is too low to be used for ignition, refer to options in "Set the Bypass Pilot Gas (Optional)".

1. Drive the zone gas automatic butterfly valve to low fire.
2. Make sure the combustion air blower is running.
3. Set the burner manual gas butterfly valve to low fire.
4. Set the adjusting screw on the ratio regulator six full (360°) turns down from the top (initial setting).
5. Select the valve according to the control method:
 - a. **With high/low control:**
Set the gas bypass butterfly valve 25% open.
 - b. **With modulating gas control:**
Set the zone gas automatic butterfly valve to approximately 10% open. Stroke the valve to the open position to ensure 100% open. Readjust if necessary.
6. Open the zone gas manual gas cock.
7. Open the manual gas cock at each burner.

Step 3: Ignite the Burners (Continued)

Step 4: Set High Fire Gas



Step 5: Set Low Fire Gas

Step 6: Verify the Gas Settings

8. Initiate the ignition sequence through the flame monitoring control system.
9. Check that all the burners in the zone have ignited.
10. If shut-off solenoid valves are installed at each burner, then repeat 6 and 7 for all the burners in the zone.
11. If all the burners have ignited, drive the zone to high fire. Verify flame is present at each burner.
1. Use the gas curves from the appropriate ExtensoJet datasheet for the gas being used to find the differential gas pressure needed at high fire. This is the target value for high fire.
2. Connect the manometer to taps B and D (across the gas orifice).
3. Measure the high fire differential gas pressure for the first burner.
4. Adjust the gas butterfly valve at the burner until the gas flow is at the target value.
5. Repeat 3 and 4 for the other burners in the zone.
6. Check the gas pressure at the inlet to the zone ratio regulator. This should be at least 5" w.c. (12.5 mbar) higher than the loading line pressure. It should not exceed the maximum pressure rating of the ratio regulator (optional).

1. Drive the system to low fire.
2. Measure the gas pressure drop at the first burner.
3. Select the valve according to the control method:
 - a. **With high/low control:**
Adjust the gas bypass butterfly valve (see ExtensoJet Design Guide No. 230) until the minimum fire that will still maintain a strong flame signal is obtained.
 - b. **With modulating gas control:**
Adjust the zone gas automatic butterfly valve (see ExtensoJet Design Guide No. 230) until the minimum fire that will still maintain a strong flame signal is obtained.



Note:

It is very difficult to measure the very low pressures experienced at low fire, and it may be necessary to rely on visual inspection. This is especially true when gas turndowns in excess of 10 to 1 are being used. The main intent is to provide a clean stable flame with a good flame signal that will not cause the furnace temperature to overshoot.

Make sure that all the settings are still the same after you have cycled the system several times between high and low fire.



Note:

When all the settings have been completed, mark the position of the indicator on the butterfly valves to indicate valve position.

SET THE BYPASS PILOT GAS (OPTIONAL)

1. Set the system to low fire.
2. Make sure that the blower is on.



Warning:

Before you perform this procedure, make sure the flame monitoring control system is working.

3. Use the flame monitoring control system to start the ignition and the bypass pilot gas for all the burners in the zone.
4. Adjust the manual butterfly valve in the bypass line until you obtain reliable ignition within the required trial for ignition time limit.
5. Repeat 4 for all the other burners and zones (if any).

START PROCEDURE

1. Start the blower.
2. Open all the gas cocks.
3. Start the ignition sequence.
4. Verify that flame is present at each burner.



Danger:

If a burner does not light, and the system does not shut down automatically, then you must close the main gas cock. An uncontrolled flow of gas can cause fires and explosions.

Do not touch the ignition plug or the ignition wire when the ignition is on. You will get a shock.

STOP PROCEDURE

1. Close the following valves:
 - The manual gas cock for each burner or zone
 - The manual gas cock at the main control valve
 - All the manual shut-off valves in the gas line upstream of the burner gas cock
2. Let the burners cool down. Keep the blower on until the chamber temperature is less than 1000°F (500°C) and then stop the blower.



Note:

Keeping the blower on after the burner is off protects the burner and the other components from hot gases that flow back through the burner.

Maintenance & Troubleshooting

5

INTRODUCTION

MAINTENANCE

MONTHLY CHECKLIST

This chapter is divided into two sections:

- Maintenance procedures
- Troubleshooting guide

Preventive maintenance is the key to a reliable, safe and efficient system. The core of any preventive maintenance system is a list of periodic tasks.

Following are suggestions for a monthly list and a yearly list.



Note:

The monthly list and the yearly list are an average interval. If your environment is dirty, then the intervals may be shorter.

1. Test (leak test) safety shut-off valves for tightness of closure.
2. Test air pressure switch settings by checking switch movements against pressure settings and comparing with actual impulse pressure.
3. Visually check ignition cable and connectors.
4. Inspect impulse piping for leaks.
5. Remove, clean and inspect all the burners.
6. Make sure that the following components are not damaged or distorted:
 - the burner nozzle
 - the spark plugs
 - the flame sensors
 - the flame tube or combustion block
7. If applicable, remove and clean all the orifice plates.

YEARLY CHECKLIST

1. Inspect flame-sensing devices for good condition and cleanliness.
2. Check for proper inlet air/gas ratios.
3. Test all the alarm systems for proper signals.
4. Check ignition spark plugs and check proper gap.
5. Check valve motors and control valves for free, smooth action and adjustment.
6. Check for proper operation of the ventilating equipment.
7. Test the interlock sequence of all safety equipment; manually make each interlock fail, noting that related equipment closes or stops as specified by the manufacturer.
8. Test flame monitoring control system by manually shutting off gas to burner.
9. Test main fuel hand-valves for operation.
10. Clean or replace the combustion air blower filter.

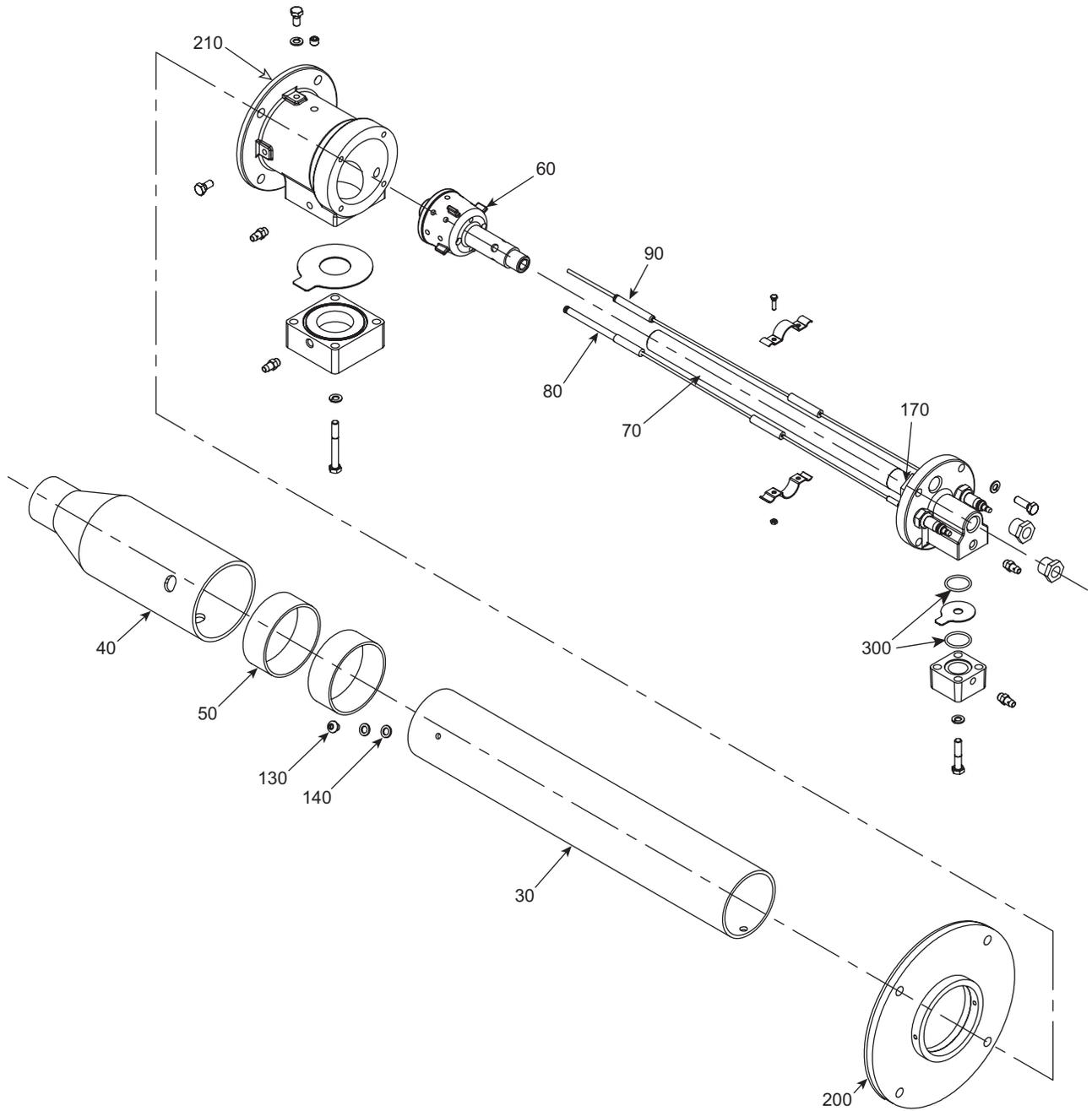
TROUBLESHOOTING PROCEDURES

Problem	Possible Cause	Solution
Cannot initiate start sequence	Air pressure switch has not made contact	Check air-pressure switch adjustment. Check air filter. Check blower rotation. Check outlet pressure from blower.
	High gas pressure switch has tripped	Check incoming gas pressure. Adjust gas pressure if necessary. Check pressure switch setting and operation.
	Low gas pressure switch has tripped.	Check incoming gas pressure. Adjust gas pressure if necessary. Check pressure switch setting and operation.
	Malfunction of flame monitoring control system such as shorted out flame sensor or electrical noise in the sensor line.	Have a qualified electrician, investigate and rectify.
	Purge cycle not completed	Check flame monitoring control system or purge timer.
	Main power is off	Make sure power is on to control system.
	No power to control unit	Call qualified electrician to investigate.
Start-up sequence runs but burner does not light	No ignition: There is no power to the ignition transformer	Restore power to the ignition transformer.
	No ignition: Open circuit between the ignition transformer and the spark plug	Repair or replace the wiring to the spark plug.
	No ignition: The spark plug needs cleaning	Clean the spark plug.
	No ignition: The spark plug is not correctly grounded to the burner	Clean the threads of the spark plug and the burner. Do not apply grease to the thread of the spark plug.
	Too much gas: Improper gas valve train sequence	Verify solenoid valve is down-stream of proportionator.
	Too much gas: Manual gas butterfly valves have been opened too far	Check pressures and settings against start-up report and adjust as necessary.
	Too much gas: Gas pressure out of the main gas pressure regulator is too high	Check start-up setting. If necessary, remove regulator and investigate.
	Not enough gas: The gas pressure out of the main gas pressure regulator is too low	Check start-up setting. Check regulator and adjust if necessary.
	Not enough gas: Start gas solenoid valve does not open	Check solenoid valve coil for proper orientation. Replace if necessary.
	Not enough gas: Gas valve not open	Check wiring to the automatic gas shut-off valve.
	Not enough gas: Air in the gas line	Check output from the flame safeguard. Open gas cock. Purge gas line.

TROUBLESHOOTING PROCEDURES (CONTINUED)

Problem	Possible Cause	Solution
The low fire flame is weak or unstable	Low fire adjusted too slow	Increase low fire gas setting.
	Not enough gas	Check start-up settings and adjust to increase low gas flow.
	Not enough air	Check start-up settings. Investigate any change, i.e. blocked filter, loose connections.
The burner goes off when it cycles to high fire	Insufficient air (flame too rich)	Check start-up settings. Check air filter, clean or replace if required.
The burner is erratic and does not respond to adjustment	Flame signal weak	Check condition of flame monitoring device.
	Internal damage to the burner. Some parts inside the burner may be loose or dirty.	Contact Eclipse.
The burner is unstable or produces soot or smoke	The air/gas ratio is out of adjustment	Measure all gas pressures and air pressures. Compare to initial start-up settings, and adjust them where necessary.
Cannot achieve full capacity	Air filter is blocked	Clean or replace the air filter.
	Gas pressure is too low into the main gas pressure regulator	Adjust gas pressure.
	Increase furnace/chamber pressures	Re-check setup pressures.
	Poor piping practices	Contact Eclipse.

PARTS DRAWING MODELS EJ025 THRU EJ075



PARTS DRAWING MODELS EJ025 THRU EJ075

Item	Part No.	Qty	Description
30	10010072	1	Barrel for 20 inch (508 mm) long burner
30	10010618	1	Barrel for 24 inch (610 mm) long burner
30	10010620	1	Barrel for 28 inch (711 mm) long burner
30	10010621	1	Barrel for 32 inch (813 mm) long burner
30	10010622	1	Barrel for 36 inch (914 mm) long burner
30	10010073	1	Barrel for 40 inch (1016 mm) long burner
30	10010623	1	Barrel for 44 inch (1118 mm) long burner
30	10010624	1	Barrel for 48 inch (1219 mm) long burner
30	10010626	1	Barrel for 52 inch (1321 mm) long burner
30	10010071	1	Barrel for 56 inch (1422 mm) long burner
40	L300D33	1	Ceramic combustor with 33 mm outlet
40	L300D48	1	Ceramic combustor with 48 mm outlet
50	10017365	4	Combustor gasket tape
60	10010671	1	Burner nozzle
70	10010519	1	Gas tube for 20 inch (508 mm) long burner
70	10040629	1	Gas tube for 24 inch (610 mm) long burner
70	10010630	1	Gas tube for 28 inch (711 mm) long burner
70	10010631	1	Gas tube for 32 inch (813 mm) long burner
70	10010633	1	Gas tube for 36 inch (914 mm) long burner
70	10010520	1	Gas tube for 40 inch (1016 mm) long burner
70	10010634	1	Gas tube for 44 inch (1118 mm) long burner
70	10010635	1	Gas tube for 48 inch (1219 mm) long burner
70	10010636	1	Gas tube for 52 inch (1321 mm) long burner
70	10010518	1	Gas tube for 56 inch (1422 mm) long burner
80	100354-1	1	Spark rod for 20 inch (508 mm) long burner
80	100354-2	1	Spark rod for 24 inch (610 mm) long burner
80	100354-3	1	Spark rod for 28 inch (711 mm) long burner
80	100354-4	1	Spark rod for 32 inch (813 mm) long burner
80	100354-5	1	Spark rod for 36 inch (914 mm) long burner
80	100354-6	1	Spark rod for 40 inch (1016 mm) long burner
80	100354-7	1	Spark rod for 44 inch (1118 mm) long burner
80	100354-8	1	Spark rod for 48 inch (1219 mm) long burner
80	100354-9	1	Spark rod for 52 inch (1321 mm) long burner
80	100354-10	1	Spark rod for 56 inch (1422 mm) long burner
90	100355-1	1	Flame rod for 20 inch (508 mm) long natural gas burner
90	100355-2	1	Flame rod for 24 inch (610 mm) long natural gas burner
90	100355-3	1	Flame rod for 28 inch (711 mm) long natural gas burner
90	100355-4	1	Flame rod for 32 inch (813 mm) long natural gas burner
90	100355-5	1	Flame rod for 36 inch (914 mm) long natural gas burner
90	100355-6	1	Flame rod for 40 inch (1016 mm) long natural gas burner
90	100355-7	1	Flame rod for 44 inch (1118 mm) long natural gas burner
90	100355-8	1	Flame rod for 48 inch (1219 mm) long natural gas burner
90	100355-9	1	Flame rod for 52 inch (1321 mm) long natural gas burner
90	100355-10	1	Flame rod for 56 inch (1422 mm) long natural gas burner
130	10001937	3	M8 Button head screw
140	10001938	6	M8 Lock washer
200	10001843	1	Adjustable flange and gasket
210	10017664	1	Burner gasket
300	14777	2	Gas inlet o-ring



Appendix

CONVERSION FACTORS Metric to English

From	To	Multiply By
cubic meter (m ³)	cubic foot (ft ³)	35.31
cubic meter/hr (m ³ /h)	cubic foot/hr (cfh)	35.31
degrees Celsius (°C)	degrees Fahrenheit (°F)	(°C x 1.8) + 32
kilogram (kg)	pound (lb)	2.205
kilowatt (kW)	BTU/hr	3414
meter (m)	foot (ft)	3.28
millibar (mbar)	inches water column ("w.c.)	0.401
millibar (mbar)	pounds/sq in (psi)	14.5 x 10 ⁻³
millimeter (mm)	inch (in)	3.94 x 10 ⁻²
MJ/m ³ (normal)	BTU/ft ³ (standard)	2.491 x 10 ⁻²

Metric to Metric

From	To	Multiply By
kiloPascals (kPa)	millibar (mbar)	10
meter (m)	millimeter (mm)	1000
millibar (mbar)	kiloPascals (kPa)	0.1
millimeter (mm)	meter (m)	0.001

English to Metric

From	To	Multiply By
BTU/hr	kilowatt (kW)	0.293 x 10 ⁻³
cubic foot (ft ³)	cubic meter (m ³)	2.832 x 10 ⁻²
cubic foot/hour (cfh)	cubic meter/hour (m ³ /h)	2.832 x 10 ⁻²
degrees Fahrenheit (°F)	degrees Celsius (°C)	(°F - 32) ÷ 1.8
foot (ft)	meter (m)	0.3048
inch (in)	millimeter (mm)	25.4
inches water column ("w.c.)	millibar (mbar)	2.49
pound (lb)	kilogram (kg)	0.454
pounds/sq in (psi)	millibar (mbar)	68.95
BTU/ft ³ (standard)	MJ/m ³ (normal)	40.14

