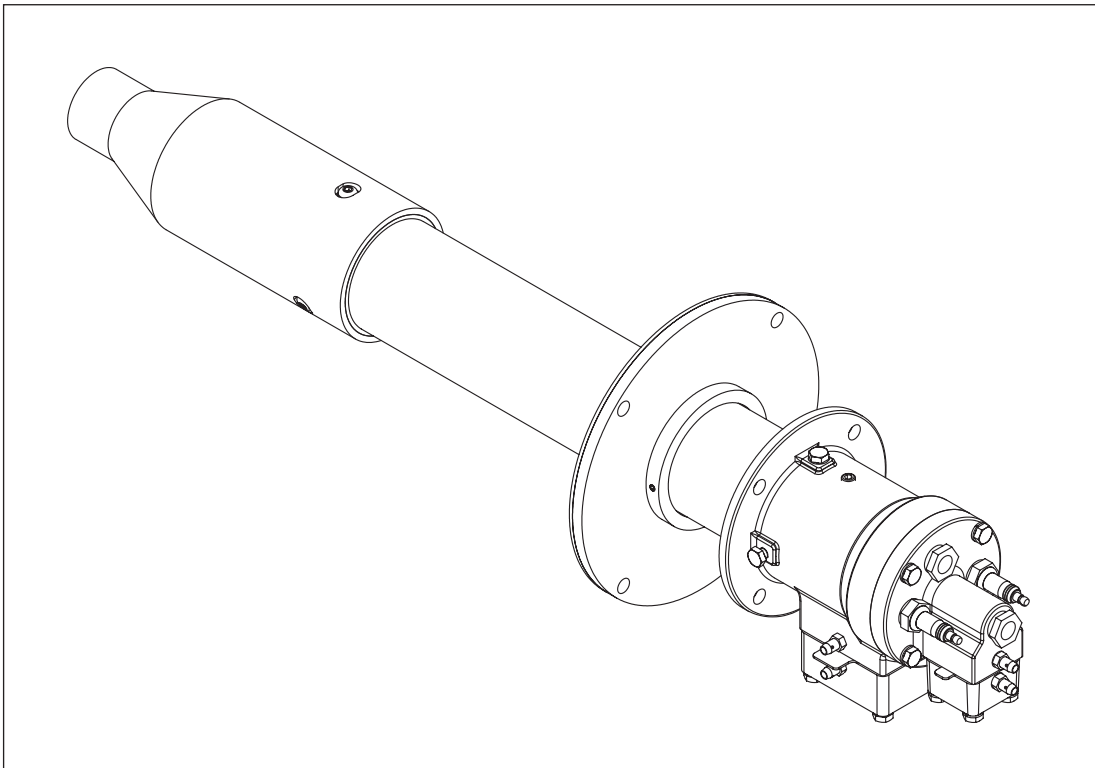




ExtensoJet *Burners*

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

Data Sheet No. 230-1 through 230-3

- Available for individual EJ models
- Required to complete installation

Design Guide No. 230

- Used with Data Sheet 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.

If you need help, you can contact your local Eclipse representative.

HOW TO GET HELP



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Introduction

1

PRODUCT DESCRIPTION

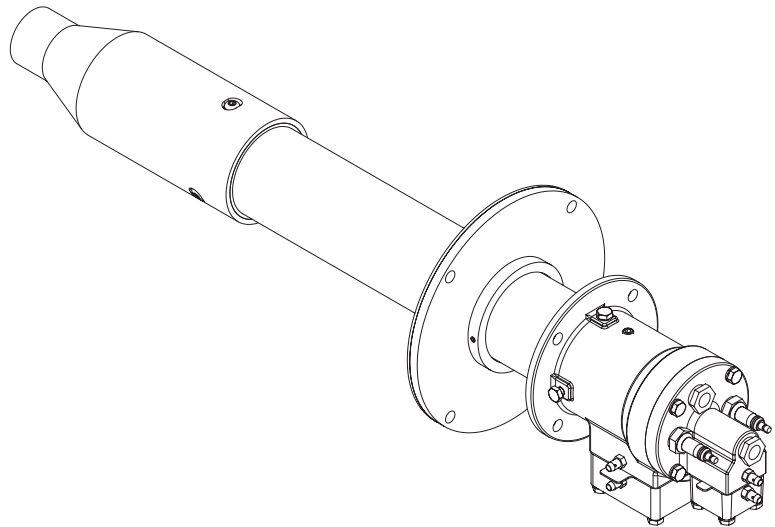
The Extensojet is a nozzle-mix burner that is designed to fire an intense stream of hot gases through a silicon tipped extended combustor using ambient combustion air.

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 I.1 The Extensojet Burner



Safety

2

INTRODUCTION

SAFETY

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



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 is likely to 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, Inc.

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 your local Eclipse representative or Eclipse, Inc 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

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

HANDLING AND STORAGE

Handling

1. Make sure the area is clean.
2. Protect the components from weather, damage, dirt and moisture.
3. Protect the components from excessive temperatures and humidity.

Storage

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

POSITION OF COMPONENTS

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.

APPROVAL OF COMPONENTS

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 the electrical wiring must comply with one of these standards:

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

The electrical wiring must also be acceptable to the local authority having jurisdiction.

Gas piping

All the gas piping must comply with one of these standards:

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

The gas piping must also be acceptable to the local authority having jurisdiction.

Where to get the 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 Pflingsten 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
Stassartstraat 36
B-1050 Brussels
Phone: +32-25196811
Fax: +32-25196819

Comité Européen de Normalisation Electronique
Stassartstraat 36
B-1050 Brussels
Phone: +32-25196871
Fax: +32-25196919

CHECKLIST BEFORE INSTALLATION

Intake

To admit fresh combustion air from outdoors, provide an opening in the room of at least one square inch per 4000 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.

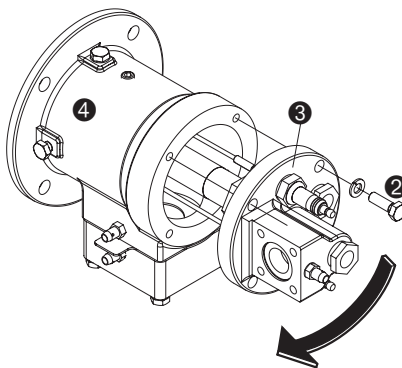
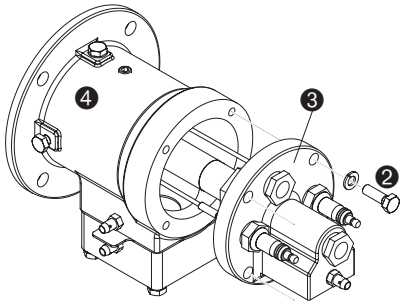
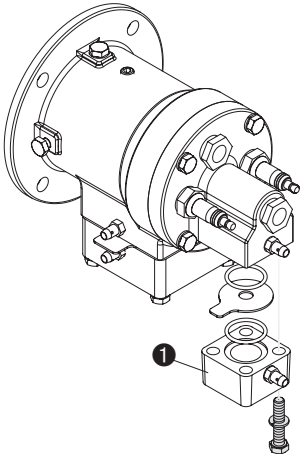
Environment

Make sure that the local environment matches the original operating specifications. Check the following items:

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

PREPARE THE BURNER

Rotate the rear cover (optional)



Several components must be installed to 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 ❶ provided on the burner.



Note:

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

2. Remove the four bolts ❷ .

3. Remove the rear cover ❸ from the burner housing ❹ .

4. Rotate the rear cover ❸ to the position that you want.

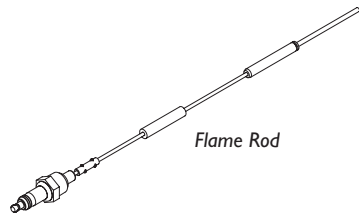
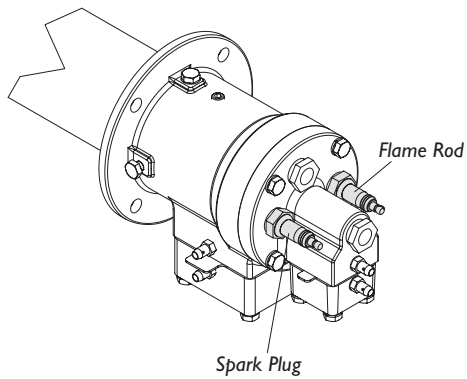
5. Put the rear cover in position against the burner housing ❹ .

6. Install the four bolts ❷ .

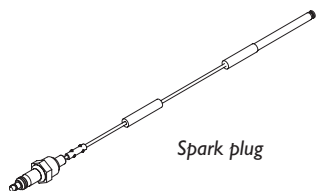
7. Reconnect the piping.

Make sure that the O-rings show no signs of damage.

Installing the flame sensor



Installing the spark plug



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:

Connecting the flame sensor of a burner to the electrical circuit of a different burner, can cause fires and explosions.

- **Flame rod:**

For detailed information on how to install and connect a flame rod, refer to:

- Bulletin / Info guide 832.

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.*

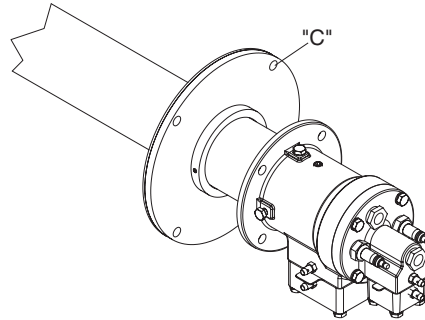
INSTALLATION

Burner

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 data sheets.

Figure 3.1 Burner attachment



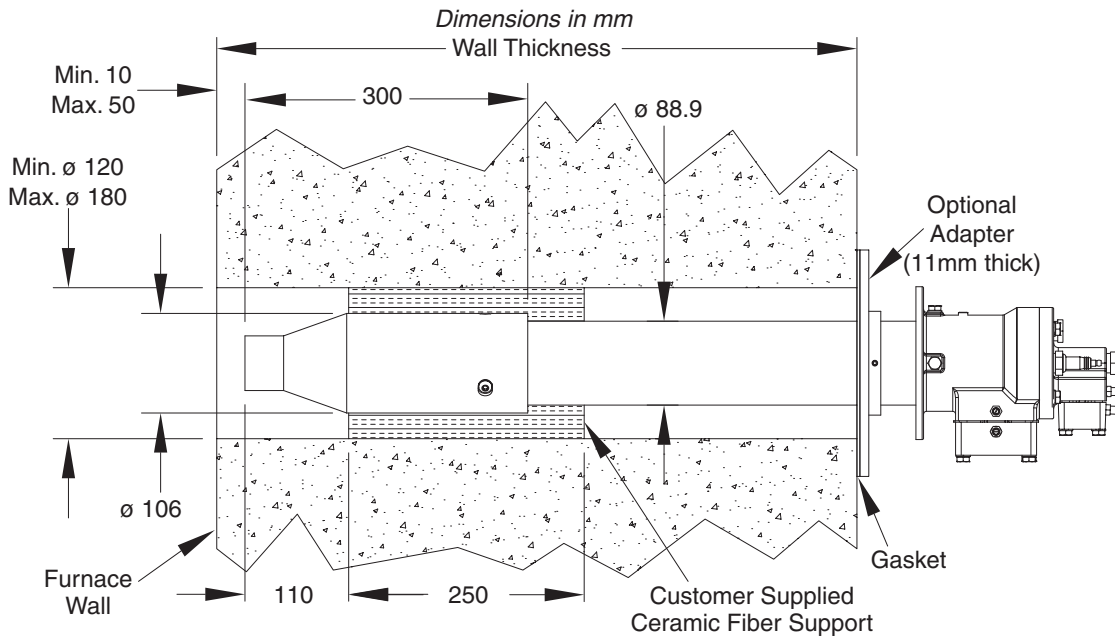
Chamber wall

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

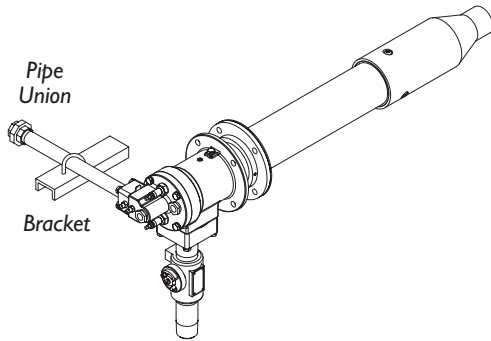
To make sure that heat does not go back to the casing of the chamber, it is important that the radial clearance around the combustor is filled with ceramic fiber.

Figure 3.2 Silicon Carbide Tube – Installation



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.

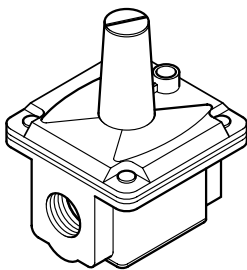
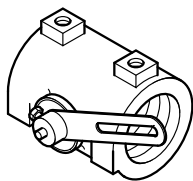
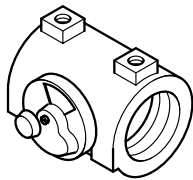
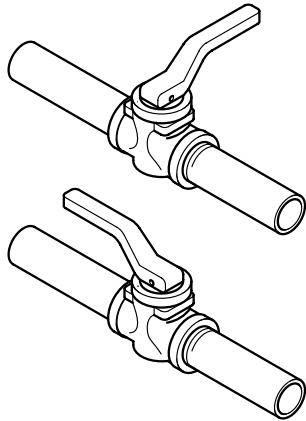
Avoid large pressure drops



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.

Valves



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.

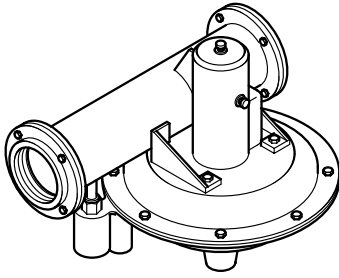
Automatic butterfly valve

An automatic butterfly is driven by an actuator (actuator and mounting bracket not illustrated).

1. Install the control valve in accordance with Bulletin/Info Guide 720.

Ratio regulator

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



CHECKLIST AFTER INSTALLATION

PREPARE FOR ADJUSTMENT

CRS valve

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

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, Safety.

Adjustment

There are two adjustment procedures:

- Adjust a modulating gas and air ratio system (Refer to “Modulating Gas and Air Ratio system” on page 18)
- Adjust a fixed-air system (Refer to “Fixed-air system” on page 22).

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):

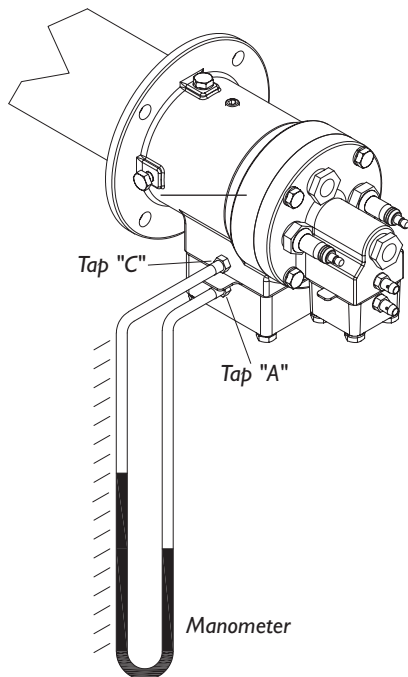
1. Reset the system
2. Set high fire air
3. Set low fire air
4. Verify the air settings
5. Ignite the burners
6. Set high fire gas
7. Set low fire gas
8. Verify the gas settings.

1. Close these valves:
 - the automatic gas valves
 - 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.

MODULATING GAS AND AIR RATIO SYSTEM

Step 1: Reset the system

Step 2: Set high fire air



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.

1. Set the system to high fire, but **DO NOT** ignite the burner(s).
2. Use the air curves from the appropriate Extensojet Data Sheet 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.

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.

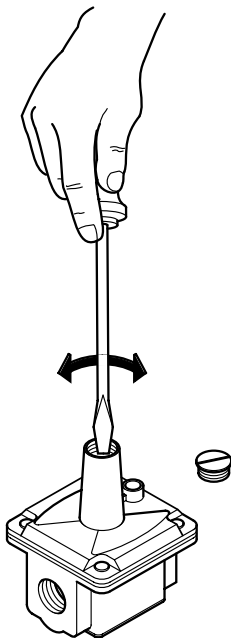
Multiple Burner System:

- 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 **3.** for other zones (if any).

Step 3: Set low fire air

Step 4: Verify the air settings

Step 5: Ignite the burners



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).

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



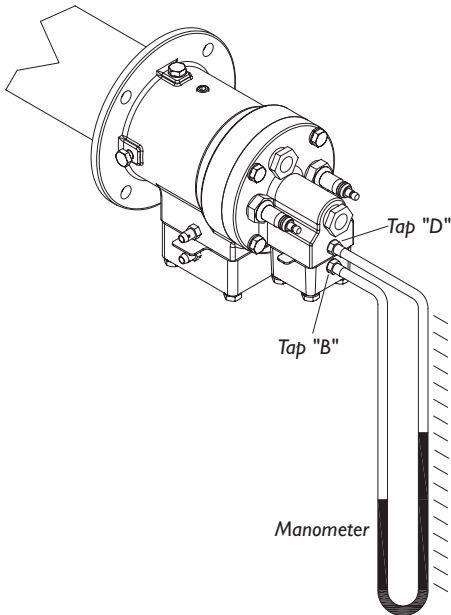
Warning:

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 25.

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.

Step 6: Set high fire gas



1. Use the gas curve from the appropriate Extensojet Data Sheet 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 Data Sheet 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 (Refer to Figure 4.2 and Figure 4.4):

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 these valves:
 - the automatic gas valves
 - 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:**

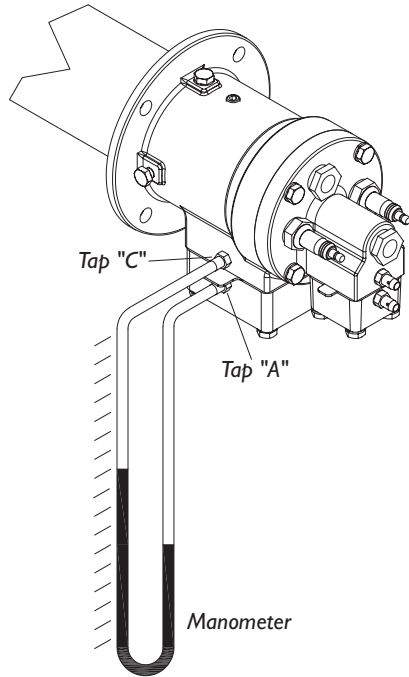
Make sure that the blower rotates in the correct direction. If incorrect, then have a qualified electrician rewire the blower to reverse its rotation.

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 Data Sheet 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.



Step 3: Ignite the burners

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 **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:

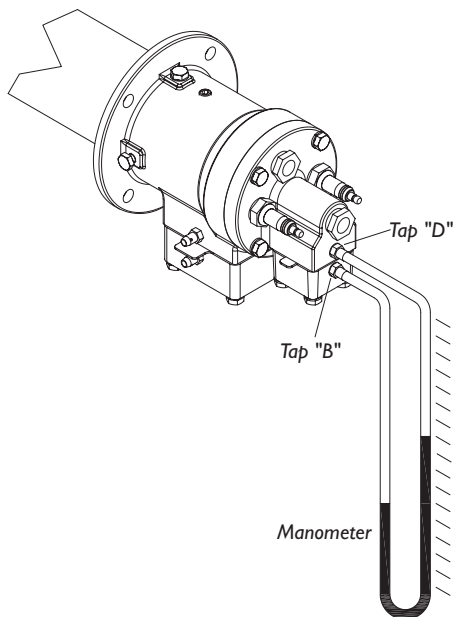
This procedure assumes that a flame monitoring control system is installed and is serviceable. It also assumes that normal low fire start is being used.

If low fire gas is too low to be used for ignition, refer to options in "Set the bypass pilot gas (optional)" on page 25.

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.
8. Initiate the ignition sequence through the flame monitoring control system.
 - a. Check that all the burners in the zone have ignited.
 - b. If shut-off solenoid valves are installed at each burner, then repeat 6. and 7. for all the burners in the zone.
9. If all the burners have ignited, drive the zone to high fire. Verify flame is present at each burner.

Step 4: Set high fire gas



1. Use the gas curves from the appropriate Extensojet Data Sheet 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 (optional).

Step 5: Set low fire gas

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.

Step 6: Verify the gas settings

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 these 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

This section is divided into two parts:

- The first part describes the maintenance procedures.
- The second part helps identify problems that may occur, and gives advice on how to solve these problems.

MAINTENANCE

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

Monthly 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.

Yearly Checklist

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.

TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	SOLUTION
Cannot initiate start sequence	<ul style="list-style-type: none"> Air pressure switch has not made contact 	Check air-pressure switch adjustment Check air filter Check blower rotation Check outlet pressure from blower
	<ul style="list-style-type: none"> High gas pressure switch has tripped 	Check incoming gas pressure Adjust gas pressure if necessary Check pressure switch setting and operation
	<ul style="list-style-type: none"> Low gas pressure switch has tripped 	Check incoming gas pressure Adjust gas pressure if necessary Check pressure switch setting and operation
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> Purge cycle not completed 	Check flame monitoring control system, or purge timer
	<ul style="list-style-type: none"> Main power is off 	Make sure power is on to control system
	<ul style="list-style-type: none"> No power to control unit 	Call qualified electrician to investigate

PROBLEM	POSSIBLE CAUSE	SOLUTION
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 downstream 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 & adjust if necessary
	Not enough gas: • Start gas solenoid valve does not open	Check solenoid valve coil for proper operation. 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	

PROBLEM	POSSIBLE CAUSE	SOLUTION
The low fire flame is weak or unstable	• Low fire adjusted too low	Increase low fire gas setting
	• Not enough gas	Check start-up settings and adjust to increase 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 your Eclipse representative or the Eclipse factory
The burner is unstable or produces soot or smoke	• The air/gas ratio is out of adjustment	Measure all the 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
	• Increased furnace/chamber pressures	Re-check setup pressures
	• Poor piping practices	Contact factory



Appendix

CONVERSION FACTORS

Metric to English.

FROM	TO	MULTIPLY BY
cubic meter (m ³)	cubic foot (ft ³)	35.31
cubic meter/hour (m ³ /h)	cubic foot/hour (cfh)	35.31
degrees Celsius (°C)	degrees Fahrenheit (°F)	(°C × 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 ("wc)	0.401
millibar (mbar)	pounds/sq in (psi)	14.5 × 10 ⁻³
millimeter (mm)	inch (in)	3.94 × 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

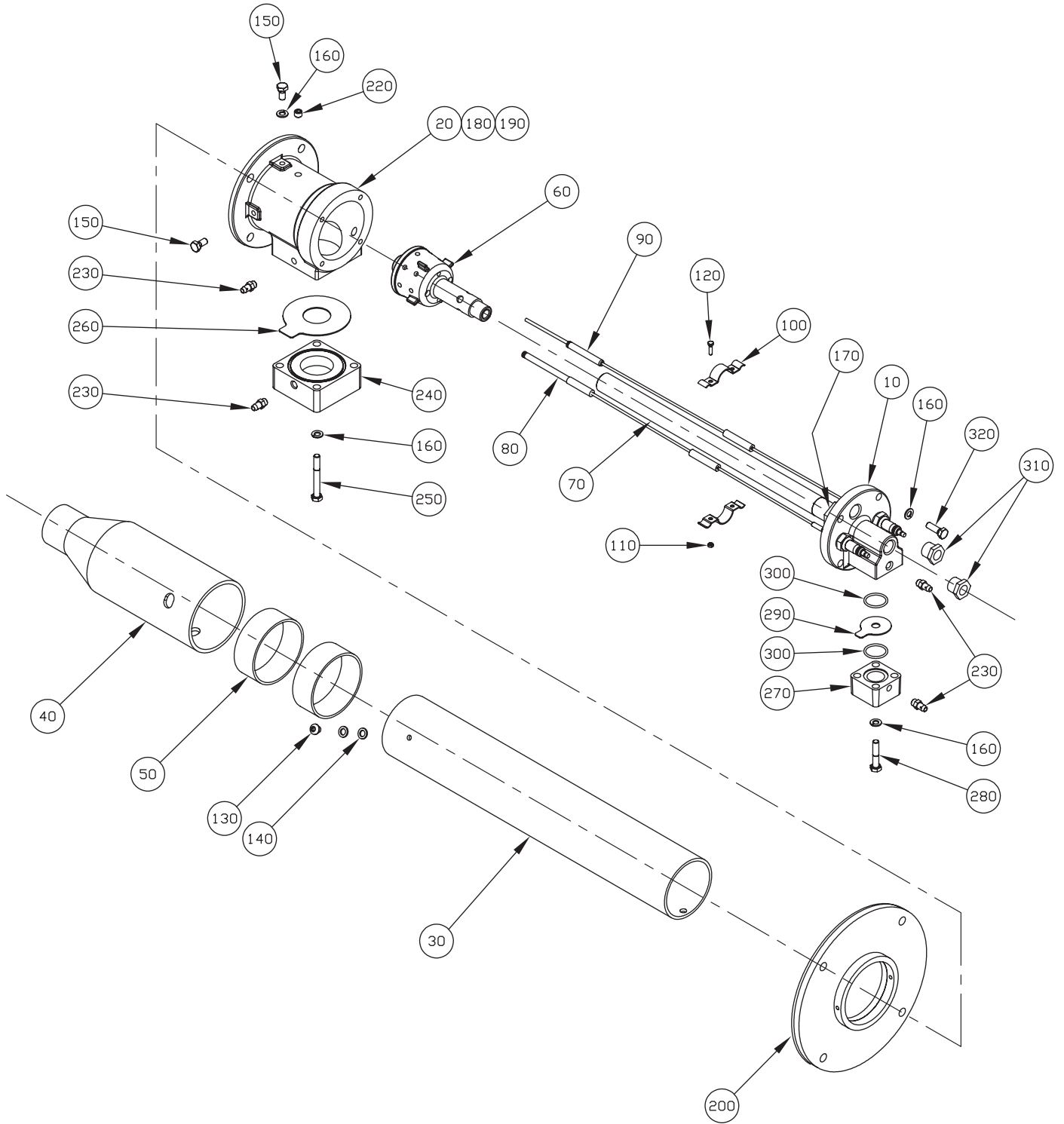
English to Metric.

FROM	TO	MULTIPLY BY
Btu/hr	kilowatt (kW)	0.293 × 10 ⁻³
cubic foot (ft ³)	cubic meter (m ³)	2.832 × 10 ⁻²
cubic foot/hour (cfh)	cubic meter/hour (m ³ /h)	2.832 × 10 ⁻²
degrees Fahrenheit (°F)	degrees Celsius (°C)	(°F – 32) ÷ 1.8
foot (ft)	meter (m)	0.3048
inches (in)	millimeter (mm)	25.4
inches water column ("wc)	millibar (mbar)	2.49
pound (lb)	kilogram (kg)	0.454
pounds/sq in (psi)	millibar (mbar)	68.95

EXTENSOJET ILLUSTRATED PARTS LIST

Item	Qty	Part Number	Description
10	1	7103-2	Rearcover
20	1	7118-1	Body, Machined, Size 2, Platform 1000
30	1	10010072	Barrel, 327mm Long, EJv2
30	1	10010618	Barrel, 429mm Long, EJv2
30	1	10010620	Barrel, 531mm Long, EJv2
30	1	10010621	Barrel, 633mm Long, EJv2
30	1	10010622	Barrel, 735mm Long, EJv2
30	1	10010073	Barrel, 837mm Long, EJv2
30	1	10010623	Barrel, 939mm Long, EJv2
30	1	10010624	Barrel, 1041mm Long, EJv2
30	1	10010626	Barrel, 1143mm Long, EJv2
30	1	10010071	Barrel, 1245mm Long, EJv2
40	1	L300D33	Cone, Combustor, EJ025, 33mm Opening
40	1	L300D48	Cone, Combustor, EJ050, EJ075, 48mm Opening
50	2	10017365	Gasket, Mounting, Ceramic Combustor, ExtensoJet
60	1	10010671	Nozzle, Metric Tube, ExtensoJet
70	1	10010519	Tube, Gas, 262mm, EJv2
70	1	10010629	Tube, Gas, 364mm, EJv2
70	1	10010630	Tube, Gas, 466mm, EJv2
70	1	10010631	Tube, Gas, 568mm, EJv2
70	1	10010633	Tube, Gas, 670mm, EJv2
70	1	10010520	Tube, Gas, 772mm, EJv2
70	1	10010634	Tube, Gas, 874mm, EJv2
70	1	10010635	Tube, Gas, 976mm, EJv2
70	1	10010636	Tube, Gas, 1078mm, EJv2
70	1	10010518	Tube, Gas, 1180mm, EJv2
80	1	100354-1	Spark rod, Assembly, EJv2, 359mm Long.
80	1	100354-2	Spark rod, Assembly, EJv2, 461mm Long
80	1	100354-3	Spark rod, Assembly, EJv2, 563mm Long
80	1	100354-4	Spark rod, Assembly, EJv2, 665mm Long
80	1	100354-5	Spark rod, Assembly, EJv2, 767mm Long
80	1	100354-6	Spark rod, Assembly, EJv2, 869mm Long
80	1	100354-7	Spark rod, Assembly, EJv2, 971mm Long
80	1	100354-8	Spark rod, Assembly, EJv2, 1073mm Long
80	1	100354-9	Spark rod, Assembly, EJv2, 1175mm Long
80	1	100354-10	Spark rod, Assembly, EJv2, 1277mm Long
90	1	100355-1	Spark/Flame rod, 0.5 in.NPT, 324mm Long.
90	1	100355-2	Spark/Flame rod, 0.5 in.NPT, 426mm Long
90	1	100355-3	Spark/Flame rod, 0.5 in.NPT, 528mm Long
90	1	100355-4	Spark/Flame rod, 0.5 in.NPT, 630mm Long
90	1	100355-5	Spark/Flame rod, 0.5 in.NPT, 732mm Long
90	1	100355-6	Spark/Flame rod, 0.5 in.NPT, 834mm Long
90	1	100355-7	Spark/Flame rod, 0.5 in.NPT, 936mm Long
90	1	100355-8	Spark/Flame rod, 0.5 in.NPT, 1038mm Long
90	1	100355-9	Spark/Flame rod, 0.5 in.NPT, 1140mm Long
90	1	100355-10	Spark/Flame rod, 0.5 in.NPT, 1242mm Long.
100	2	10017308	Bracket, Support, Spark and Flame Rod
110	2	90786	Nut, Hex, Flanged, Rib, M4
120	2	20394	Screw, Hex, Flanged, Rib, M4x12mm Long
130	3	10001937	Screw, Button Head, Socket Cap, M8-1.25x8mm
140	6	10001938	Washer, Lock, Split, M8
150	2	20411	Screw, Cap, Hex, M8x1.25x14 Long
160	13	15222	Washer, Lock, M8
170	1	18847	P.F. Locknut, 3/4-14 NPSM
180	1	20729	Nameplate, Generic Platform 1000, With Eclipse Logo.
190	4	18933	Screw, Drive, No. 2, 1/8 in. Lg., Type U
200	1	10001843	Flange, Adjustable, Size 2, EJv2
220	1	15398	P.F. Pipe Plug, NPT, 1/8 in., Hex Socket
230	4	13445	Tap, Pressure, 0.125 in. NPT Male Hose Connection
240	1	3973-2	Block, Inlet, 2 in. NPT
240	1	3973-10	Block, Inlet, Rc 2
250	4	15893	Screw, Hex Head, M8 X 50
260	1	14188-20	Orifice Plate, 30.0mm Diameter, EJ025, Air
260	1	14188-31	Orifice Plate, 36.0mm Diameter, EJ050, Air
260	1	14188-17	Orifice Plate, 44.0mm Diameter, EJ075, Air
270	1	3974-2	Block, Inlet, 3/4 in. NPT
270	1	3974-1	Block, Inlet, Rc 3/4 in.
280	4	15887	Screw, Hex Head, M8 X 45mm Long
290	1	14191-36	Orifice Plate, 8.8mm, EJ025, Natural Gas
290	1	14191-35	Orifice Plate, 11.0mm, EJ050, Natural Gas
290	1	14191-43	Orifice Plate, 13.2mm, EJ075, Natural Gas
290	1	14191-22	Orifice Plate, 6.7 mm, EJ025, Propane
290	1	14191-42	Orifice Plate, 8.6mm, EJ050, Propane
290	1	14191-32	Orifice Plate, 10.6mm, EJ075, Propane
290	1	14191-41	Orifice Plate, 6.1mm, EJ025, Butane
290	1	14191-31	Orifice Plate, 7.9mm, EJ050, Butane
290	1	14191-16	Orifice Plate, 10.0mm, EJ075, Butane
300	2	14777	Seal, O-Ring, Size 2-121, 1.049 in. ID X .103 in. Cs
310	2	11737	Peepsight, 1/2 in. NPT
320	4	15892	Screw, Hex Head Cap, M8 X 1.25, 25mm Long

EXTENSOJET ILLUSTRATED PARTS DRAWING MODELS EJ025 THROUGH EJ075





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