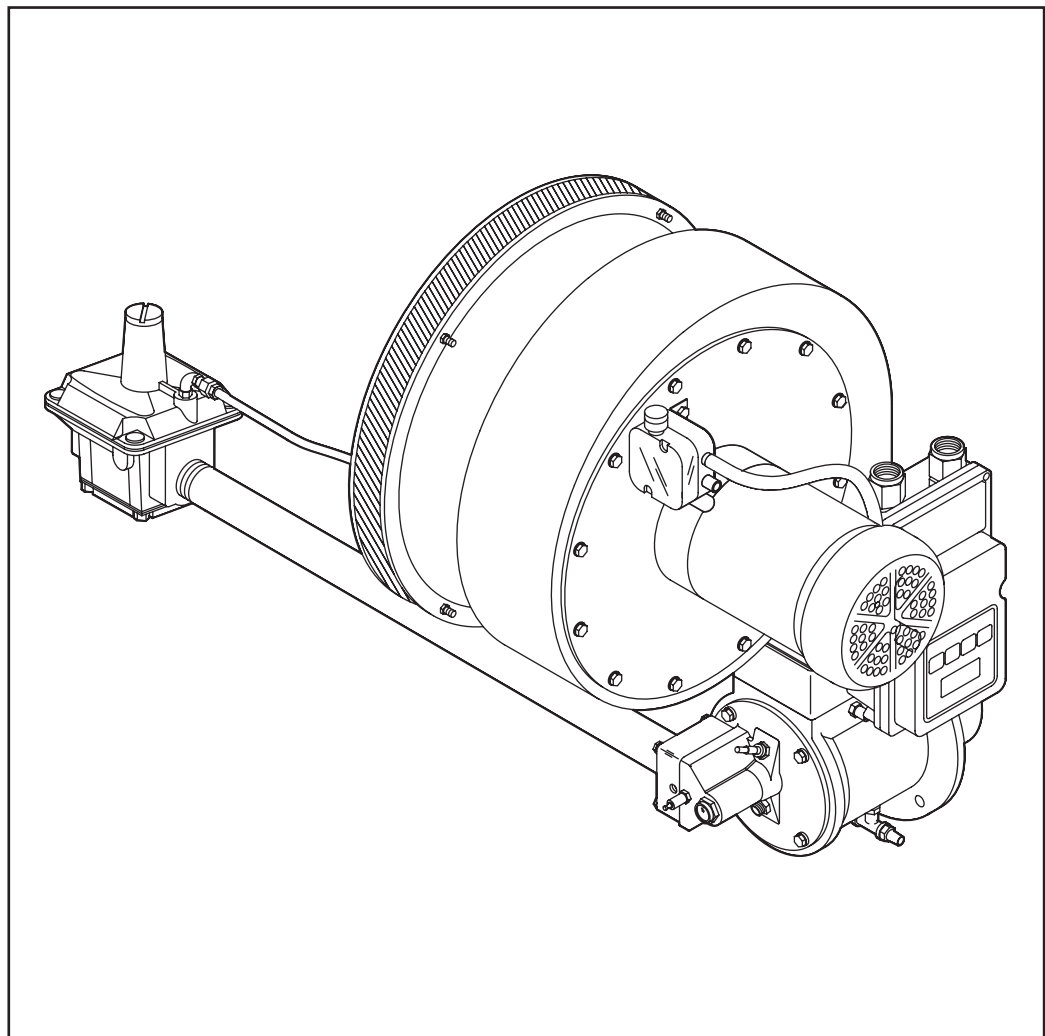




ImmersoPak Burners

IP Series
Version 2



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Any operation expressly prohibited in this Guide, any adjustment, or assembly procedures not recommended or authorized in these instructions shall void the warranty.



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 experience with this kind of equipment.

IMMERSOPAK DOCUMENTS

Installation Guide No. 360

- This document

ImmersoPak Data Sheets, Series 360

- Available for individual IP models
- Required to complete design & selection

Design Guide No. 360

Used with Data Sheet to design burner system

ImmersoPak Price List No. 360

Used to order burners

RELATED DOCUMENTS

- EFE 825 (Combustion Engineering Guide)
- Eclipse Bulletins and Info Guides: 710, 732, 742, 760, 818, 832, 852, 854, 856, 610, 620, 630, 826, 820, 930, I-354.

Purpose

The purpose of this manual is to ensure the installation of a safe, effective, and trouble-free combustion system is carried out.

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 Combustion representative. You can also contact Eclipse Combustion at any of the addresses listed on the back of this document.



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Introduction

1

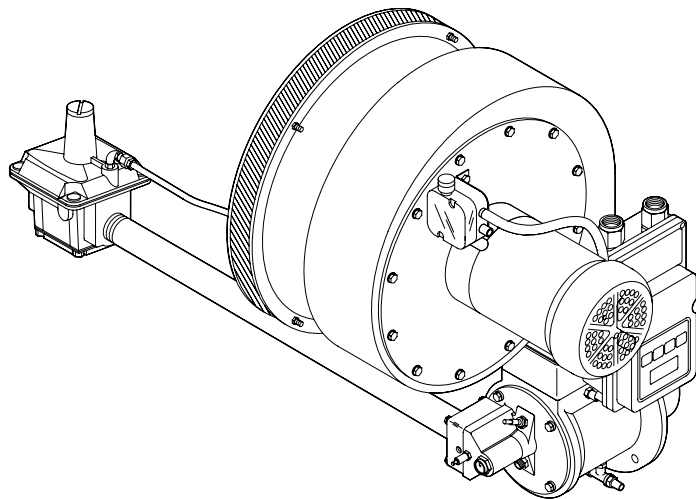
PRODUCT DESCRIPTION

The ImmersoPak burner (IP Series) is a nozzle-mix burner with a packaged combustion air blower that is designed to fire on-ratio (proportional air/gas control) or fixed air on smaller models over a turndown of 10:1. Integral gas and air orifices are provided to ease burner setup. The burner is designed for:

- efficient ratio controlled combustion
- reliable burner operation
- simple burner adjustment
- direct spark ignition
- multiple fuel capability

A wide variety of options and configurations are available due to the modular design of the burner.

Figure 1.1 **ImmersoPak Burner**





2

INTRODUCTION

SAFETY

This section is provided as a guide for the safe operation of the ImmersoPak burner system. All involved personnel should read this section carefully before operating this system.

Danger:



The ImmersoPak burners, described herein, are designed to mix fuel with air and burn the resulting mixture. All fuel burning devices are capable of producing fires and explosions if improperly applied, installed, adjusted, controlled, or maintained.

Do not bypass any safety feature; fire or explosion could result.

Never try to light a burner if it shows signs of damage or malfunction.

Warning:



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

Note:



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

Read the entire manual before attempting to start this system. If you do not understand any part of the information contained in this manual, contact your local Eclipse representative or Eclipse Combustion before continuing.

CAPABILITIES

Only qualified personnel, with good mechanical aptitude and experience on combustion equipment, should adjust, maintain, or troubleshoot any mechanical or electrical part of this system.

OPERATOR TRAINING

The best safety precaution is an alert and trained operator. Train new operators thoroughly and have them demonstrate an adequate understanding of the equipment and its operation. A regular retraining schedule should be administered to ensure operators maintain a high degree of proficiency.

REPLACEMENT PARTS

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



Installation

3

INTRODUCTION

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

HANDLING AND STORAGE

Handling

Inspect the system, being sure the components are clean and free of damage.

Use the appropriate support and handling equipment when lifting the burner.

Protect all components on the system from weather, damage, dirt and moisture.

Protect the system and its components from excessive temperatures and humidity.

Storage

When storing the system for an extended period Eclipse recommends placing it in a cool, clean, dry room.

Keep all the system components stored in their original packaging as long as possible.

APPROVALS OF COMPONENTS

Limit controls and safety equipment

All limit controls and safety equipment must comply with all applicable local codes and/or standards, which may include:

- NFPA Standard 86
- NFPA Standard 86C
- UL
- FM
- CGA
- EN 746-2

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

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 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
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

PRE-INSTALLATION CHECKLIST

Air Supply

Provide an opening in the burner room of at least one square inch per 4000 BTU/hr (6 cm² per 1 kW) to supply the burner intake with fresh, outdoor, combustion air.

If there are corrosive fumes or materials in the surrounding air, find an uncontaminated source to supply air to the burner.

Exhaust

Do not allow exhaust gases to accumulate in the work area. Provide a means for exhausting these gases from the building.

Access

Install the burner so it may be easily accessed for inspection and maintenance.

Environment

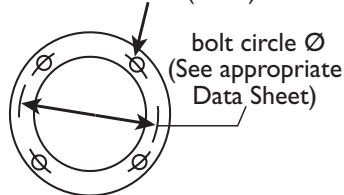
Be sure the burner operating environment matches the original operating specifications. Check the following items:

- 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
- prevent direct exposure to water.

INSTALLATION Burner

Bolt Hole Pattern
(See appropriate Data Sheet)

4 x Ø 12mm (0.47")



Dimensions

Bolt the burner to the immersion tank wall or immersion tube flange. For bolt hole patterns, see the Data Sheet for your ImmersoPak model.

Caution:

If adapters are used, burner flange should not be spaced farther than 4" from tank wall

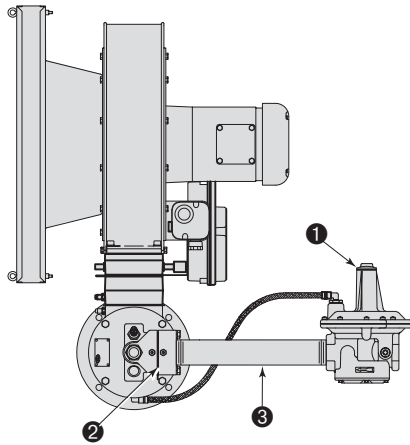
Tank wall

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

INSTALLATION

(CONTINUED)

GAS PIPING



Burner Piping

The burner is factory assembled and shipped as ordered.

Note:

It is not recommended to redirect piping. If necessary, be sure the:

- ratio regulator spring column ❶ is pointing up.
- arrow on the ratio regulator points in the direction of gas flow.
- integral fuel orifice and o-rings ❷ are re-installed.
- same straight runs of pipe ❸ remains between the ratio regulator and the burner .
- IP004 and IP005 burners may contain B.S.P. or N.P.T. transition piping.

Supply Piping

Install the piping using the following steps:

- Locate the valve train close to the burner. The gas must reach the burner during the fixed trial for ignition.
- Sufficiently size shut off valves in the valve train.
- Make sure piping is large enough.
- Minimize piping elbows.

Pipe Connections

- Installation of a pipe union in the gas line is recommended to simplify burner removal.
- Use of flexible pipe is optional.



Note:

Flexible pipe causes higher pressure drops than standard pipe. Consider this when sizing your gas lines.

Piping Support

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

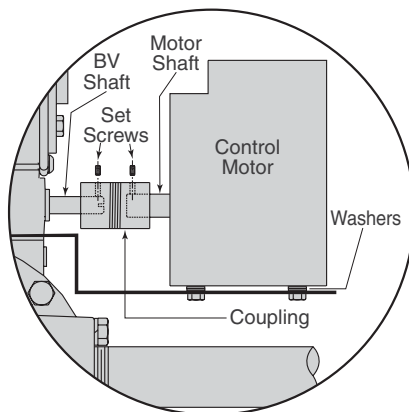
Control Motor

Install a control motor to modulate the air butterfly valve if not previously installed on the burner.

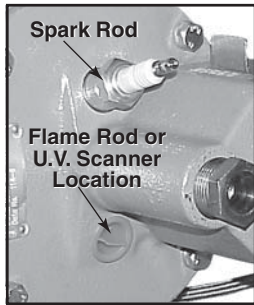


Note:

Be sure the control motor shaft and air butterfly valve shaft are aligned properly. If using an Eclipse Actuator Mounting Parts Kit, the supplied washers may be used as shims (stacked 0, 1, or 2 high) to ensure proper alignment. Additionally, a flexible coupling can be used to handle minor misalignment.



Installing the flame sensor



CHECK LIST AFTER INSTALLATION

There are two different types of flame sensors:

U.V. scanner:

Each ImmersoPak burner is capable of U.V. flame monitoring. The burner will not come equipped with a U.V. scanner. A 1/2" NPT connection is provided on each ImmersoPak burner for the connection of a U.V. scanner.

For detailed information on how to install and connect an Eclipse U.V. scanner, refer to:

- straight U.V. scanner; Bulletin / Info Guide 854
- 90° U.V. scanner; Bulletin / Info Guide 852
- self-check U.V. scanner; Bulletin / Info Guide 856.
- solid state U.V. I.R. scanner; Bulletin / Info Guide 855.

Flame rod:

If the flame rod option was selected when the burner was ordered, the burner will be delivered with the flame rod already installed on the burner.

Note:

Only specific burner sizes are capable of using a flame rod. These models are IP004, 005, and 006.

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

- Bulletin / Info Guide 832.

To verify the system was properly installed, perform the following checks:

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

Adjustment, Start & Stop

4

INTRODUCTION

In this chapter, you will find instructions on how to adjust, start, and stop the burner system. Become familiar with burner control methods before attempting to make adjustments.

Danger:



The ImmersoPak burners, described herein, are designed to mix fuel with air and burn the resulting mixture. All fuel burning devices are capable of producing fires and explosions if improperly applied, installed, adjusted, controlled, or maintained.

Do not bypass any safety feature; fire or explosion could result.

Never try to light a burner if it shows signs of damage or malfunction.

ADJUSTMENT

Adjustment steps:

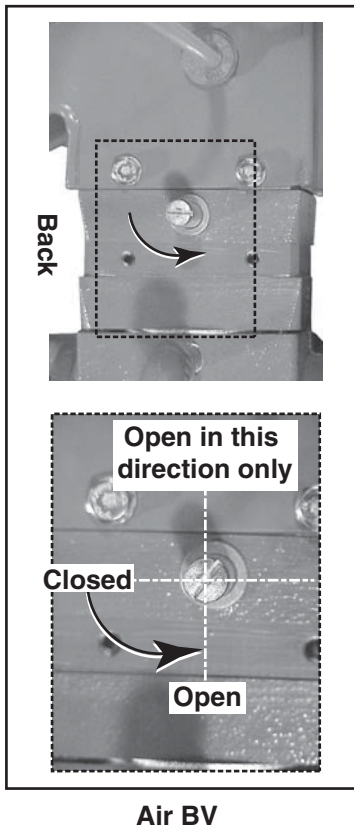
1. Reset the system
2. Verify air flow
3. Set low fire air
4. Ignite the burner
5. Verify settings

Reset procedure:

1. Set the air flow switch so that it drops out at 20% below the maximum pressure of the combustion air blower.
2. Set the low gas pressure switch at 20% below the gas pressure measured at the inlet to the main gas valve train.
3. Set the high gas pressure switch at 20% above the gas pressure measured at the inlet to the main gas valve train.
4. Close all the burner (and by-pass pilot, if applicable) gas valves, manual and automatic.
5. Start the combustion air blower.
6. Try to ignite the burner; be sure the flame monitoring system indicates a flame failure.

Step 1: Reset the system

**Step I: Reset system
(continued)**



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

7. Activate the pressure switches and other limit interlocks. Be sure the switches fail as intended in the event of a power failure.

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.

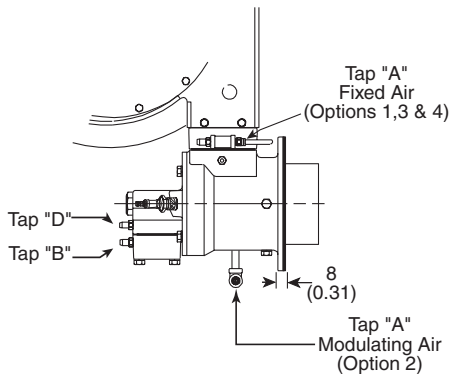
8. Adjust main gas inlet pressure to the ratio regulator within the range specified in the appropriate data sheet.

Warning:
Gas inlet pressures must stay within the specified range. Pressure above the specified range can damage the ratio regulator.

Warning:
Pressure below the specified range can impair the ability of the ratio regulator to control the gas flow.
Operating the system outside the specified range can cause excess fuel consumption and the possible accumulation of unburned fuel in the tube.
In extreme cases, this accumulation of unburned fuel may cause fires or explosions.

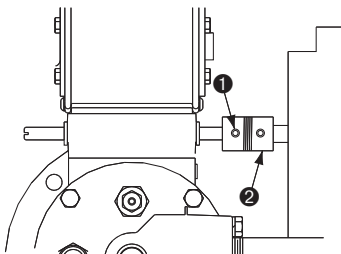
9. With modulating air burners, verify that the actuator opens the air BV towards the back of the burner as shown. If it doesn't, refer to the actuator's literature for instructions on how to reverse the direction.

Step 2: Verify air flow

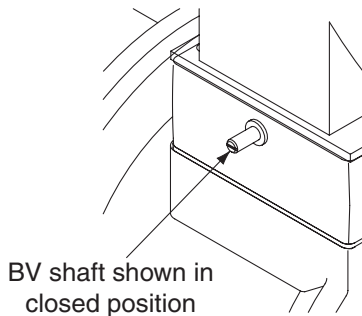


Pressure Tap Locations

Step 3: Set low fire air



Air BV Adjustment



Air BV Shaft

1. Set the system to high fire, but **DO NOT** ignite the burner(s).
2. Start the combustion air blower.
3. Use the data from the appropriate ImmersoPak Data Sheet to find the static air pressure at high fire. This is now the target value for high fire.

Note



Tube back pressure may limit the burner from reaching the data sheet value.

Note



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

- a. Make sure that pressure tap A is open.
- b. Connect the manometer to tap A .
- c. Verify target value from step 3 above. Verify that the slot on the end of the butterfly valve shaft (if applicable) is parallel to flow (fully open). If necessary, adjust the control motor travel for high fire.

Low fire air adjustment procedure: (Modulating Air)

1. Start combustion air blower.
2. Drive control motor to low fire position.
3. Set low fire air.
 - a. Loosen the set screw ① on burner side of coupling ②.



Note:

There is a slot in the end of the BV shaft that is parallel to the air damper. This slot is used for visual indication of the BV position. The BV is closed when the shaft slot is perpendicular to the direction of air flow through the BV.

- b. Rotate air BV shaft to fully closed position. (Holes in BV damper will supply low fire air.)
 - c. Hold BV shaft firmly in place and tighten set screw ① .
5. Verify high fire air
 6. Return the control motor to the low fire position.
 7. Close the pressure taps.

Step 4: Ignite the burner

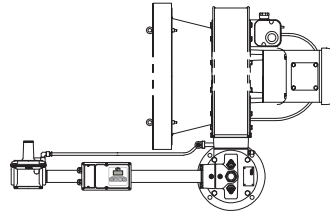
Ignition procedure:



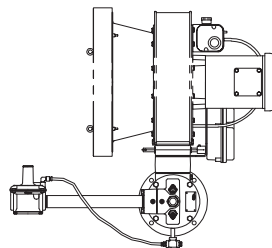
Warning:

This procedure is written with the assumption the burner has a flame monitoring control system installed and operating. A proper purge cycle must be part of the system and purge timing should not be bypassed.

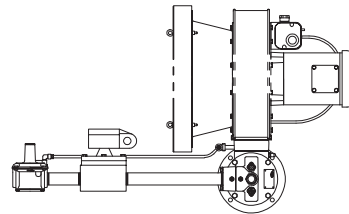
Determine system layout and use the applicable ignition procedure.



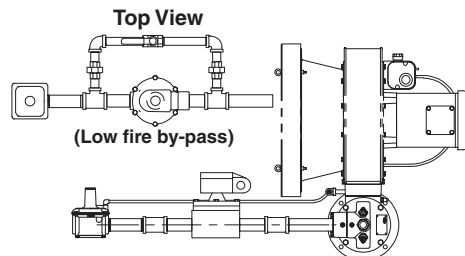
**Modulating Gas (Fixed Air)
Procedure A**



**Modulating Air (Ratio Control)
Procedure A**

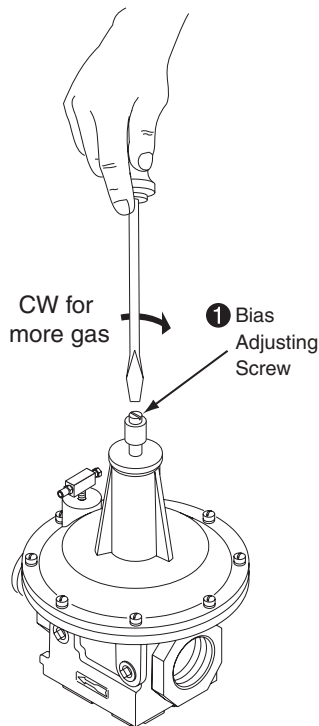


**High - Off (Fixed Air)
Procedure B**



**High - Low (Fixed Air)
Procedure B**

Step4: Ignite the burner
Procedure A: Low fire start.
Modulating Air or Gas




Ratio Regulator

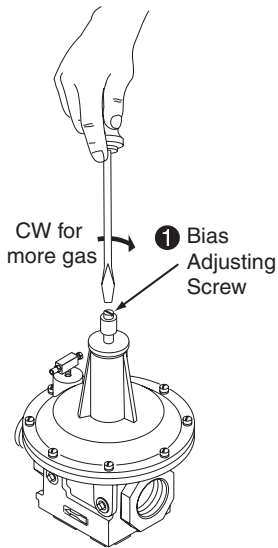
Low fire start:

1. Drive air or gas control motor to low fire.
2. Be sure combustion air blower is running.
3. Verify bias adjusting screw ❶ on ratio-regulator spring column is six full clockwise turns (360° x 6) down from the top (initial setting).
4. Open main gas manual shut off valves.
5. Set system control to stay at low fire during and after ignition sequence.
6. Attempt to ignite burner.
7. If burner does not ignite:
 - a. Attempt to ignite burner again to purge air from the gas piping.
 - b₁. (Modulating Air) If burner still does not ignite, turn bias adjusting screw ❶ a half turn clockwise to increase gas flow.
 - b₂. (Modulating Gas) If burner still does not ignite, adjust the control motor to incrementally increase gas flow.
 - c. Attempt to ignite burner.
 - d. Repeat steps b and c until burner ignites. If necessary, refer to Chapter 5 for troubleshooting tips.
8. Flame signal strength:

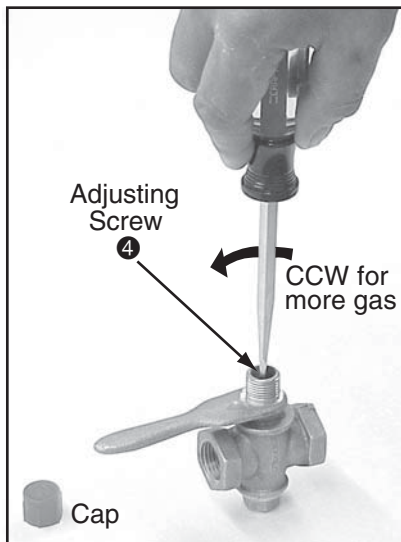
Adjust gas flow as described above in step 7b to maintain a stable flame signal and reliable ignition.

 **Note:**
If viewing the flame, it should be blue with flashes of yellow. When firing propane or butane, a proper low fire flame may have sustained flashes of yellow.
9. Verify low fire flame:
 - a. Shut off gas. Allow process to cool.
 - b. Verify repeatability of ignition and low fire flame signal at cold conditions.

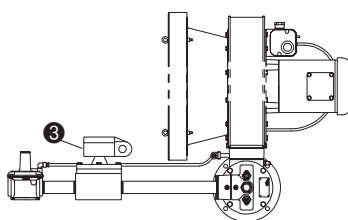
Step4: Ignite the burner
Procedure B: Fixed Air
(High/Low or High/Off)



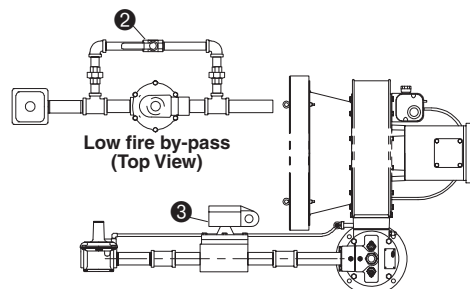
Ratio Regulator



Adjustable Limiting Orifice
 Gas Cock ②



High - Off (Fixed Air)



High - Low (Fixed Air)

1. Be sure combustion air blower is running.
2. Verify bias adjusting screw ① on ratio-regulator spring column is six full clockwise turns (360° x 6) down from the top (initial setting).
3. Be sure the main gas manual shut off valves are closed.
3. Open adjustable limiting orifice gas cock ② in the low fire bypass (if applicable).
4. Open the main gas manual shut off valves.
5. Attempt to ignite burner.



Note:

Gas solenoid valve ③ must be open for high/off and closed for high/low

6. If burner does not ignite:
 - a. Attempt to ignite burner again to purge air from the gas piping.
 - b₁. (High/Low) If burner still does not ignite, turn adjusting screw ④ a half turn counterclockwise to increase gas flow.
 - b₂. (High/Off) There is no adjustment.
 - c. Attempt to ignite burner.
 - d. Repeat steps a, b and c until burner ignites. If necessary, refer to Chapter 5 for troubleshooting tips.
8. Flame signal strength:
 Adjust bypass gas flow with adjusting screw ④ (if applicable) to maintain a stable flame signal and reliable ignition.

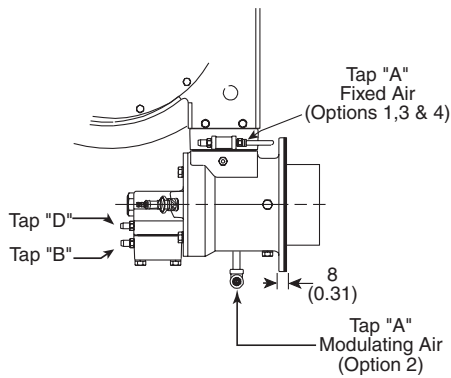


Note:

If viewing the flame, it should be blue with flashes of yellow. When firing propane or butane, a proper low fire flame may have sustained flashes of yellow.

9. Verify low fire flame (if applicable):
 - a. Shut off gas. Allow process to cool.
 - b. Verify repeatability of ignition and low fire flame signal at cold conditions.
10. Shut down the system.

Step5: Verify Settings



Setting verification:

1. With burner lit, go to high fire.
2. Wait for the process to reach normal operating conditions.
3. Measure high fire fuel differential pressure between tap "D" and tap "B". Compare this to the "Fuel Orifice ΔP vs. Input" graph in the data sheet for your burner.

Note:

If modulating air or gas, adjustment of the control motor to set high fire gas to the desired input /efficiency calculated for your process is necessary.



4. Measure high fire air static pressure tap "A". Compare this pressure to the Data Sheet for your burner.
5. Go to low fire (if applicable) and verify low fire flame signal and flame appearance (if viewing).

Note:

Gas pressure at low fire will be too low to measure and verify the fuel settings.



6. Cycle burner from high to low (if applicable) several times to check repeatability of settings.
7. Readjust burner if the settings do not repeat as expected. If necessary, refer to Chapter 5, Maintenance & Troubleshooting.
8. Record all setup data as an aid for future troubleshooting and setup operations.

Caution:

Do not turn the combustion air blower off immediately.



Allow time for the process to cool. This will prevent hot gases from back flowing into the burner and blower causing damage to the burner.

9. Stop the burner.

Maintenance & Troubleshooting

5

INTRODUCTION

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.

MAINTENANCE



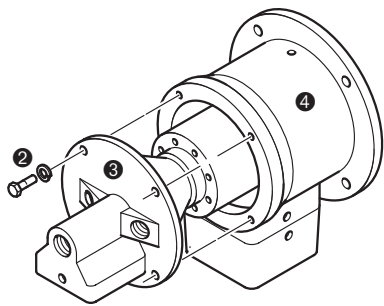
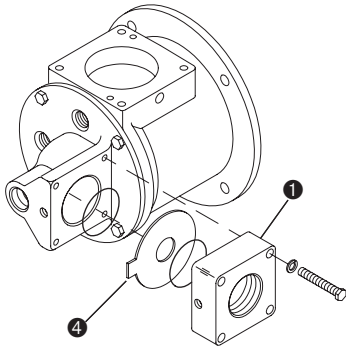
Note:

These are guidelines only. The customer should make the final determination on maintenance intervals and tasks to be performed while considering the working environment.

Monthly Checklist

1. Inspect the flame sensing devices for good condition and cleanliness.
2. Check for proper air/gas pressures (Refer to the ImmersoPak Data Sheets, Series 360).
3. Test all the system alarms for proper response signals.
4. Check and clean igniter electrodes.
5. Check valve motors and control valves for free, smooth action and adjustment.
6. Check for the proper operation of ventilating equipment.
7. Test the interlock sequence on all safety equipment. Manually force each interlock to intentionally fail while at the same time noting if related equipment closes or stops as specified by the manufacturer. Test the flame safeguard by manually shutting off the gas to the burner.
8. Test the manual gas shut off cocks for proper operation.
9. Clean and/or replace the combustion air blower filter.
10. Inspect and clean the combustion air blower rotor.

Yearly Checklist



1. Leak test the safety shut-off valves for tightness of closure.
2. Test the pressure switch settings by checking the switch movements against pressure settings and comparing these with the actual impulse pressure.
3. Visually check igniter cable and connectors.
4. Inspect impulse piping for leaks.
5. Remove, clean, and inspect all burners.
6. Remove and clean the orifice plate ④ .
7. Be sure the following components are not damaged or distorted:
 - the burner nozzle.
 - the igniter.
 - the flame sensors.
 - the combustion tube or block.

The nozzle and combustion tube/block can be inspected without removing the burner from the chamber wall or entering the chamber. Perform the following:

- a. Shut the burner off and manually close the main gas shut off cocks.
- b. Allow the chamber temperature to cool down to 250°F (121°C).
- c. Disconnect the gas piping at a union or the gas inlet flange ① provided on the burner.
- d. Remove the four bolts ②.
- e. Remove the rear cover ③ from the burner housing ④.
- f. To re-assemble, follow this sequence in the reverse order.

TROUBLESHOOTING PROCEDURES

PROBLEM	POSSIBLE CAUSE	SOLUTION
Start-up sequence runs but burner does not light.	No ignition: <ul style="list-style-type: none"> There is no power to the ignition transformer. 	Restore the power to the ignition transformer.
	No ignition: <ul style="list-style-type: none"> Open circuit between the ignition transformer and the igniter. 	Repair or replace the wiring to the igniter.
	No ignition: <ul style="list-style-type: none"> The igniter needs cleaning. 	Clean the igniter.
	No ignition: <ul style="list-style-type: none"> The igniter is not correctly grounded to the burner. 	Clean the threads on the igniter and the burner. NOTE: Do not apply grease to the threads on the igniter.
	No ignition: <ul style="list-style-type: none"> Igniter insulator is broken. Igniter is grounding out. 	Inspect the igniter. Replace if broken.
	Not enough gas: <ul style="list-style-type: none"> The gas pressure going into the ratio regulator is too low. 	Check the start-up settings. Measure the gas pressures and adjust where necessary.
	Not enough gas: <ul style="list-style-type: none"> The impulse line to the ratio regulator is leaking. 	Repair any leaks.
	Not enough gas: <ul style="list-style-type: none"> The pilot adjusting valve or bypass valve is not open far enough. 	Adjust bypass or low fire gas.
	Not enough gas: <ul style="list-style-type: none"> Start gas solenoid valve does not open. 	Check the solenoid valve coil for proper operation. Replace it if necessary.
	Not enough gas: <ul style="list-style-type: none"> Gas valve does not open. 	Check the wiring to the automatic gas shut-off valve. Check the output from the flame safeguard. Open manual gas cock.
Not enough gas: <ul style="list-style-type: none"> Ratio regulator is incorrectly set. 	Adjust the ratio regulator to the proper setting.	

PROBLEM	POSSIBLE CAUSE	SOLUTION
Start-up sequence runs but burner does not light. (continued)	No flame signal: •Broken flamerod •Dirty UV scanner lens	Inspect and clean sensor Replace if necessary
	No flame signal: • Spark plug and flamerod reversed	Exchange spark plug/flamerod or their wiring
	Too much gas: • Wrong or missing burner fuel orifice.	Check ImmersoPak Data Sheets, Series 360 for fuel orifice and the given fuel.
The low fire flame is weak or unstable.	• Not enough gas flowing to the burner.	Adjust the ratio regulator to increase the gas flow.
	• Not enough air.	Check for proper blower rotation. Check air filter for blockage. Compensate for chamber by opening the low fire air butterfly valve position.
The burner goes out when it cycles to high fire.	• Not enough gas pressure into the ratio regulator.	Check the start-up settings. Measure the gas pressures and adjust them where necessary. Check for valve train pressure loss.
	• Loading line to the ratio regulator is leaking.	Repair the leak in the loading line.
The burner is erratic and does not respond to adjustment.	Internal damage to the burner: • Some parts inside the burner are loose, dirty, or burned out.	Contact your Eclipse representative or Eclipse Combustion for further information.
The burner is unstable or produces soot, smoke, or excessive carbon monoxide.	• The air/gas ratio is out of adjustment.	Measure all the gas pressures and air pressures. Compare these pressures to the documented initial start-up settings and adjust them where necessary.
The burner cannot achieve full capacity.	• Air filter is blocked.	Clean or replace the air filter.
	• Gas pressure going into the ratio regulator is too low.	Adjust the gas pressure.
	• Tube back pressure is limiting performance.	Review system design.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Cannot initiate a 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 activated. Low gas pressure switch has activated. 	Check incoming gas pressure. Adjust gas pressure if necessary. Check pressure switch setting and operation.
	<ul style="list-style-type: none"> Malfunction of the flame safeguard system (e.g., shorted-out flame sensor or electrical noise in the sensor line). No power to the control unit. 	Have a qualified electrician troubleshoot and correct the problem.
	<ul style="list-style-type: none"> Main power is off. 	Be sure the main power to the system is switched to the “on” position.

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 ("w.c.)	0.401
millibar (mbar)	pounds/sq in (psi)	14.5 × 10 ⁻³
millimeter (mm)	inch (in)	3.94 × 10 ⁻²
MJ/m ³ (normal)	BTU/ft ³ (standard)	2.491 × 10 ⁻²

Metric to Metric.

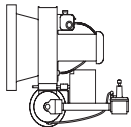
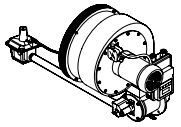

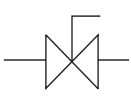
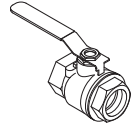
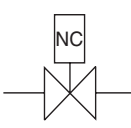
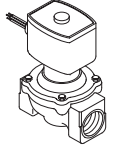
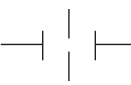
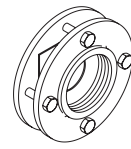
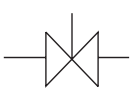
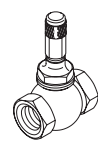
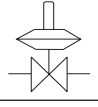
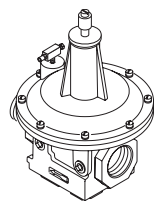
kiloPascals (kPa)	millibar (mbar)	10
meter (m)	millimeter (mm)	1000
millibar (mbar)	kiloPascals (kPa)	0.1
millimeter (mm)	meter (m)	0.001

English to Metric.


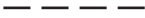
From	To	Multiply By
BTU/hr	kilowatt (kW)	0.293 × 10 ⁻³
cubic foot (ft ³)	cubic meter (m ³)	2.832 × 10 ⁻²
degrees Fahrenheit (°F)	degrees Celsius (°C)	(°F – 32) ÷ 1.8
foot (ft)	meter (m)	0.3048
inches (in)	millimeter (mm)	25.4
inches water column ("wc)	millibar (mbar)	2.49
pound (lb)	kilogram (kg)	0.454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

**KEY TO SYSTEM
SCHEMATICS**

These are the symbols used in the schematics.

Symbol	Appearance	Name	Remarks	Bulletin/ Info Guide
		ImmersoPak		
		Main Gas Shut-off Valve Train	Eclipse Combustion, Inc. strongly endorses NFPA as a minimum	756
		Gas Cock	Gas cocks are used to manually shut off the gas supply on both sides of the main gas shut-off valve train.	710
		Solenoid Valve (normally closed)	Solenoid valves are used to automatically shut off the gas supply on a bypass gas system or on small capacity burners.	760
		Fuel Orifice Meter	Fuel orifice meters are used to measure gas flow.	910
		Adjustable Limiting Orifice	Adjustable limiting orifices are used for fine adjustment of gas flow.	
		Pressure Regulator	A pressure regulator reduces gas pressure to a stable, usable pressure.	684
		Ratio Regulator	A ratio regulator is used to control the air/gas ratio. The ratio regulator is a sealed unit that adjusts the gas flow in ratio with the air flow. To do this, it measures the air pressure with a pressure sensing line, the impulse line. This impulse line is connected between the top of the ratio regulator and the burner body.	742

**KEY TO SYSTEM
SCHEMATICS (CONTINUED)**

Symbol	Appearance	Name	Remarks	Bulletin/ Info Guide
		Pressure Taps		
		Impulse Line		

Part Numbers ImmersoPak version 2.00

Part Desc.	Item No.	IP004	IP005	IP006	IP008	IP010	IP012
Body	1	7118-4	7046-6	3994-4	7036-2	7036-2	7036-2
Rear Cover	2	7032-1	3998-1	3995	7037-1	7037-1	7037-1
Nozzle	3	7033-2	7133-1	3997-1	7038-1	7038-1	7038-1
Gas Inlet NPT	4	3974-4	7001-1	7156-2	3973-3	3973-2	3973-2
Gas Inlet BSP	4	3974-3	7001-3	7156-1	3973-1	3973-10	3973-10
Gas Orifice	5	14191-X	14934-X	14188-X	14188-X	14188-X	14188-X
Comb. Tube	6	14887-13	20400-7	20859	101279-1	101279-1	101279-1
Ratio Reg NPT	7	11080	15939	15939	20312	10315	10315
Ratio Reg BSP	7	20900	19999	19999	20311	19990	19990
BV	8	501239	501201				
Spark rod	9	23045	16927-1	16927-1	23045	23045	23045
Flame Rod (Natural Gas)	10	10002242-1	10002219-3	10002219-1			
Flame Rod (Prop/But)	10	00.7030029.01	00.7030029.04	00.7030029.03			
Actuator	11	See Table A	See Table A	See Table A	See Table A	See Table A	See Table A
Air Switch	12	20475	20475	20475	20475	20475	20475
Air Switch (SST)	12	20440	20440	20440	20440	20440	20440
Air Switch Kit	13	101146	101146	101146	101146	101146	101146
Air Switch (SST) Kit	13	101182	101182	101182	101182	101182	101182
Gasket	14	17054	20422	14932	10027	10027	10027
Air Orifice	15	14188-24	20362-7	14802-11	10039-5	10039-1	10001732-1*
Nozzle screw (2)	16	19969	15885	15885	15885	15885	15885
Nameplate scr (4)	17	18933	18933	18933	18933	18933	18933
Nameplate	18	20729	20729	20729	20729	20729	20729
Washer (13)	19	15222	15222	15222	15222	15222	15222
Rear cvr scr (4)	20	15886	15886	15886	15886	15886	15886
Peepsight	21	10509	10509	10509	13225	13225	13225
Press tap (3)	22	13445	13445	13445	13445	13445	13445
Seals (2)	23	14777	17037	14778	14778	14778	14778
Screw (4)	24	15887	15893	15893	15893	15893	15893
Scrw Fixed Air (4)	25	20246	20270				
Scrw Ratio Air (4)	25	20247	20275	20286	20424 rod	20424 rod	16005
Nut (4)					90804	90804	
Screw (4)	26	15881	15881	15881			
Washer (4)	27	15625	15625	15625			
Nylon plug (2)	28	20605	20605	20605	20605	20605	20605
Plug	29	15398	15398	15398	15398	15398	15398
Nipple (1/8")	30	18684	18684	18684	18682	18682	18682
Tee Fitting	31	19160	19160	19160	19160	19160	19160
Nipple NPT less hi/lo	32	20901	18779	18779	18807	18836	18836
Nipple BSP less hi/lo	32	20903	20891	20891	20319	20728	20728
Nipple NPT hi/lo	32	18731	18774				
Nipple BSP hi/lo	32	18745	18747				
Gas Solenoid	33	20171	20174				
BV Ratio Air	34	102246	102267	102269	200102	200102	200102
Inlet Blower	34	3977-3	7108-4				
Block	35	3977-6	7108-9	7045-5	7101-3	7101-3	
Actuator Kit	36	See Table B	See Table B	See Table B	See Table B	See Table B	See Table B
Load line (plstc)	37	34505	34505	34505	34505	34505	34505
Load line (sst)	37	SC4/30(2)	SC4/30(2)	SC4/30(2)	SC4/30(2)	SC4/30(2)	SC4/30(2)
Load line ftg, elb	38	14689	14689	14689	14689	14689	14689
Load line ftg, elb SST	38	1494	1494	1494	1494	1494	1494
Load line ftg	39	14506	14506	14506	14506	14506	14506
Load line ftg,SST	39	2484	2484	2484	2484	2484	2484
Screw Comb tube	40	15215	15215	15215	10001	10001	10001
Swtch Kit Hi &Lo		100181-2	100182-2	100183-2	100184-2	100184-2	100184-2
Swtch Kit Hi or Lo		100181-1	100182-1	100183-1	100184-1	100184-1	100184-1
Tee (2)	41	19164	19180				
Nipple (4)	42	18720	18720				
Unions (2)	43	15243	15243				
Elbows (2)	44	18604	18604				
Valve, Gascock	45	10627	10627				
Nipple	46	18736	18730				
Nipple	47	18726	18738				
Nipple (2)	48	18724	18768				

*Cone

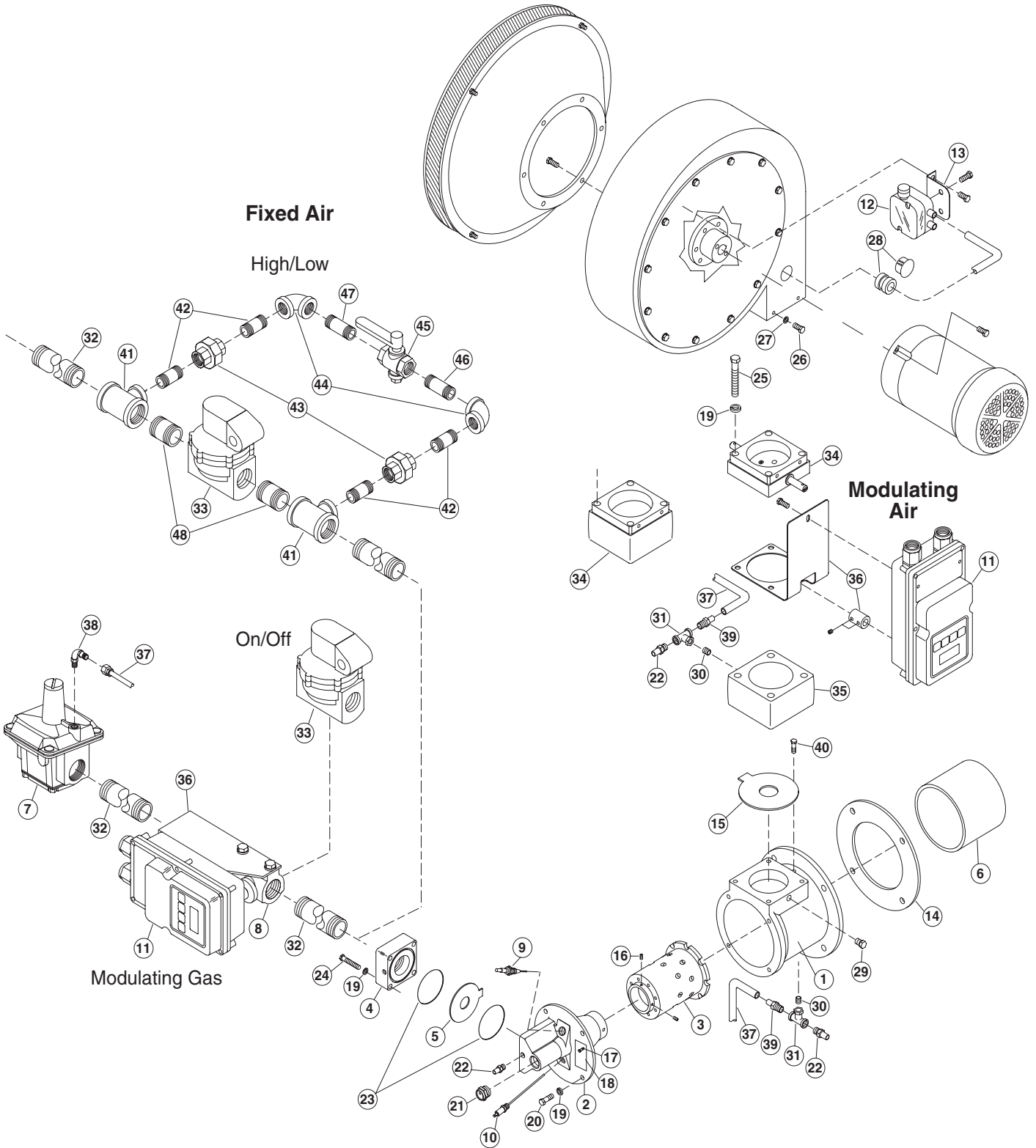
Table A

Actuator Option	Actuator Part Number
M	Eclipse Rotary Actuator (Configured)
G	22755
H	22735
Q	15273-4
T	10912

Table B

Kit Description	IP004	IP005	IP006	IP008	IP010	IP012
Rotary Act (M,R)	100318	100320	100322	100324	100324	100324
BC Act (G,H,N) Up	100257	100261	100265	100269	100269	100269
BC Act (G,H,N) Inv	100255	100259	100263	100267	100267	100267
HW Act (Q,T,P) Up	100256	100260	100264	100268	100268	100268
HW Act (Q,T,P) Inv	100254	100258	100262	100266	100266	100266
Rot Act (M) LH gas mod	100128	100128				
Rot Act (M) RH gas mod	100127	100127				
Other Acts gas mod	100099	100099				

Illustrated Parts View ImmersoPak version 2.00





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