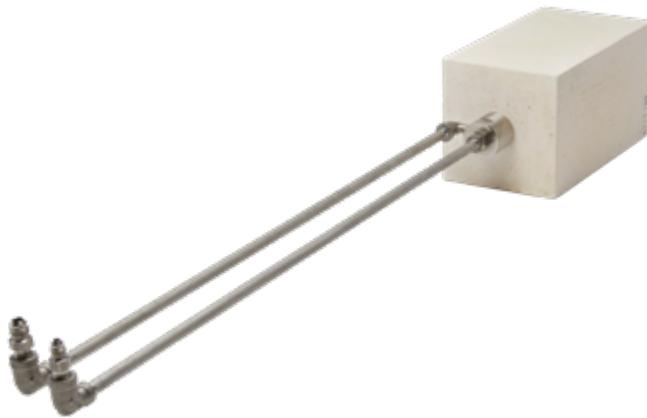


Oxy-Fuel Burner PrimeFire FH

OPERATING INSTRUCTIONS

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whether direct or consequential, including but not limited to loss of use, income, or damage to material arising in connection with the sale, installation, use of, inability to use, or the repair or replacement of Honeywell-Eclipse's products.

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

Document Conventions

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

1 2 3 a b c ... = Action

→ = Instruction/Note

Audience and Purpose

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

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

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

Safety instructions

Information that is relevant for safety is indicated in the instructions as follows:

⚠ DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

All interventions may only be carried out by qualified gas technicians. Electrical interventions may only be carried out by qualified electricians.

Safety

Important notices which help provide safe burner operation will be found in this section. To avoid personal injury and damage to the property or facility, the following warnings must be observed. All involved personnel should read this entire manual carefully before attempting to start or operate this system. If any part of the information in this manual is not understood, contact Honeywell before continuing.

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SAFETY

Disclaimer Notice

In accordance with the manufacture's policy of continual product improvement, the product presented in this brochure is subject to change without notice or obligation.

The material in this manual is believed adequate for the intended use of the product. If the product is used for purposes other than those specified herein, confirmation of validity and suitability must be obtained. Honeywell-Eclipse warrants that the product itself does not infringe upon any United States patents. No further warranty is expressed or implied.

Liability and Warranty

We have made every effort to make this manual as accurate and complete as possible. Should you find errors or omissions, please bring them to our attention so that we may correct them. In this way we hope to improve our product documentation for the benefit of our customers. Please send your corrections and comments to our Marketing Communications Manager.

It must be understood that Honeywell's liability for its product, whether due to breach of warranty, negligence, strict liability, or otherwise is limited to the furnishing of replacement parts and Honeywell-Eclipse will not be liable for any other injury, loss, damage or expenses,

⚠ DANGER

The burners covered in this manual are designed to mix fuel with oxygen 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; fire or explosion could result.
- Never try to light the burner if it shows signs of damage or malfunction.

⚠ WARNING

- The burner is likely to have HOT surfaces. Always wear protective clothing when approaching the burner.
- Honeywell products are designed to minimize the use of materials that contain crystalline silica. Examples of these chemicals are: respirable crystalline silica from bricks, cement or other masonry products and respirable refractory ceramic fibers from insulating blankets, boards, or gaskets. Despite these efforts, dust created by sanding, sawing, grinding, cutting and other construction activities could release crystalline silica. Crystalline silica is known to cause cancer, and health risks from the exposure to these chemicals vary depending on the frequency and length of exposure to these chemicals. To reduce the risk, limit exposure to these chemicals, work in a well-ventilated area and wear approved personal protective safety equipment for these chemicals.

⚠ CAUTION

- 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 Honeywell.

Capabilities

Only qualified personnel, with good mechanical aptitude and experience with 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 Honeywell only. Any customersupplied valves or switches should carry UL, FM, CSA, CGA and/or CE approval where applicable.

PRODUCT DESCRIPTION

Forehearth oxygen gas burners are small, nozzle mixing burners designed to be inserted into the forehearth to provide temperature homogeneity throughout the glass by increasing the heat of the glass melt in the area near the forehearth wall where cooling occurs more rapidly. These burners consist of a 300-series stainless steel gas tip and a 300-series stainless steel or oxygen nozzle. They produce a short, bright flame intended to keep the temperature of the glass near the forehearth wall, where cooling is most rapid, at the same level as the middle of the glass bed. Forehearth burners use one size body for all nozzle sizes making for easier maintenance and greater capacity flexibility. They fire natural gas or a Hydrogen/Natural Gas blend (up to 20% H₂/80% NG), and come with a unique block to fit the exact requirements of the burner.

BENEFITS

- Cooler running burner and block for increased reliability and product life
- No maintenance design for less downtime and lower maintenance costs

- Simple design, easy to configure and order for your specific application
 - Easy to set up and operate
 - 60% reduction in fuel consumption*
 - 80% NO_x reduction*
 - Fewer total burners required*
 - No blowers required for the combustion process*
- * as compared with Air-Fuel Pre-Mix solutions

REFERENCE INFORMATION

For further information about Oxy-Fuel Burner PrimeFire FH see:

- Technical Information for Oxy-Fuel Burner PrimeFire FH.
- Honeywell Combustion Engineering Guide

INSTALLATION

Introduction

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

Handling and Storage

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.

Approval of Components

Limit Controls and Safety Equipment

All limit controls and safety equipment must comply with all applicable local codes and/or standards and must be listed for combustion safety by an independent testing agency. Typical application examples include:

- American: NFPA 86 with listing marks from UL, FM, CSA
- European: EN 746-2 with CE mark from TuV, Gastec, Advantica

Electrical Wiring

All the electrical wiring must comply with all applicable local codes and/or standards such as:

- NFPA Standard 70
- IEC 60364
- CSA C22
- BS7671

Gas Piping

All the gas piping must comply with all applicable local codes and/or standards such as

- 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
www.nfpa.org

The ANSI Standards are available from

American National Standard Institute
1430 Broadway
New York, NY 10018
www.ansi.org

The UL Standards are available from

333 Pfingsten Road
Northbrook, IL 60062
www.ul.com

The FM Standards are available from

1151 Boston-Providence Turnpike
PO Box 9102
Norwood, MA 02062
www.fmglobal.com/approvals

Information on the EN standards and where to get them is available from

Comité Européen de Normalisation
Stassartstraat 36
B-1050 Brussels
Phone: +32-25196811
Fax: +32-25196819
www.cen.eu

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

Forehearth Oxy/Gas and Air/Gas Burners

- The oxy/gas forehearth burners consist of a stainless steel body that is universal for all oxygen and gas nozzle sizes.
- Forehearth burners are mounted directly into the forehearth burner blocks with no special mounting equipment required.

Burner Installation and Operation

Initial Forehearth Start-Up

- Burners should be out of the forehearth during furnace heatup.
- 1** Connect the oxygen (or air) and gas supply lines to fittings on the burner.
- 2** Make sure all systems are checked and ready.
- 3** Make sure all burner isolation valves are closed.
- 4** Open oxygen and gas to the zone controls.
- 5** Allow oxygen and gas to flow through the burner to ensure gas and oxygen lines are purged.
- 6** Allow chamber to reach a minimum temperature of 1500 °F (816 °C) to ensure the auto-ignition point of fuel has been reached before inserting burners and opening oxygen and gas valves.
- For oxygen burner starts, it is best to allow the furnace to rise to a temperature between 1652 °F (900 °C) to 1832 °F (1000 °C), if possible.
- It is suggested that this initially be in an area away from the heat-up burner.
- 7** Open the oxygen valve for the burners installed in step 7.
- With oxygen flowing, set the oxygen flow per burner to the flow in the following table based on burner model:

Oxygen Flow Chart

Model	Oxygen Flow, scfh (Nm ³ /hr)
FH1350	70 (1.99)
FH0935	50 (1.42)
FH0517	24 (0.684)

- Turndown is 4:1 on all models
- 8** Open the fuel valve.
- 9** Start the fuel flow and bring up to a flow per burner from the following table based on the burner model:

Model	Natural Gas Fuel Flow Rate	Hydrogen Blend ¹⁾ Fuel Flow Rate
	scfh (Nm ³ /hr)	
FH0517	5 (0.142) to 17 (0.484)	5.8 (0.15) to 19.7 (0.51)
FH0935	9 (0.256) to 35 (0.997)	10.4 (0.27) to 40.5(1.06)
FH1350	13 (0.37) to 50 (1.425)	15 (0.39) to 57.9 (1.5)

Fuel: Fuel Blend (80% NG + 20% H₂) with 863 Btu/ft³ HHV - sg = 0.49

10 Check burners to verify ignition and listen for a “screaming” or “squealing” sound. If the burners are making these sounds, open or close the gas to the burner until the sound goes away. If the sound persists, shut off gas flow to the zone and check burners for damage as well as to verify gas and oxygen/air connections are not reversed.

→ During the initial light off/heat-up, it is better to run the flame slightly gas rich.

11 Ensure heat-up burner flame is not pushing forehearth burner flame into the side of the block bore.

12 Add or reduce gas and oxy/air to keep the furnace temperature on the heat up curve.

13 Heat-up burner turndown and removal

- It is recommended to start with burners away from the heat-up burner first.

- As forehearth burners are turned on, lower the gas flow to the heat-up burner.

- When the flow to the heat-up burner is low enough, shut off the gas flow and remove the burner.

→ Pay attention to the forehearth pressure during this procedure and close off the stack as needed.

→ With oxy firing, the pressure will drop off significantly. Add fuel/oxygen to hold temperature, then add burners as necessary.

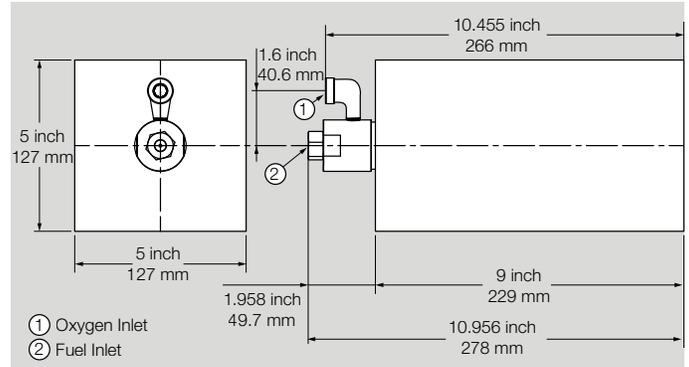
14 Repeat steps 3-15 for each zone.

15 Remove a burner and check the appearance of the flame.

16 Add burners as needed but ensure the flow of oxygen and gas remain below the maximum and above the minimum flow rates for each burner.

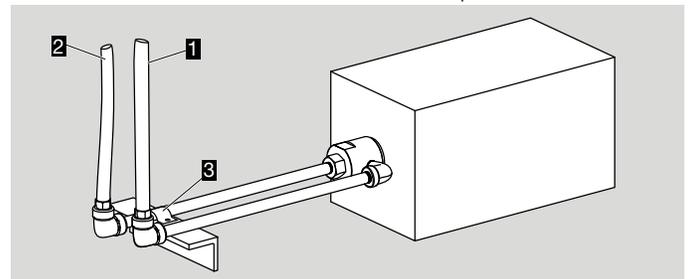
Burner Mounting

The block must rest flat on the sill or wall without rocking to allow the weight to be evenly distributed. Failure to do so could result in cracking or block failure. If burner openings are too large, shims may be used to align the burner. Avoid applying any compressive or tensile forces to the ceramic portions of the burner as this may cause premature failure. The burner opening should provide a minimum of 1/16” clearance on all three sides. High temperature furnace sealant or packing should be used between the burner and wall.



Basic dimensions of the PrimeFire FH, showing both the Oxygen Inlet and Fuel Inlet orientation to the burner and block assembly.

→ It is recommended that the PrimeFire FH be mounted such that the piping is anchored to a fixture to allow pressure on the burner/block connection in order to ensure ideal performance.



Oxygen Supply line, Fuel Supply Line and pipe clamp.

1 Oxygen Supply Line - 3/8 Stainless Steel Braided Hose (Part Number: 10057031)

- 2 Fuel Supply Line - 1/4 Stainless Steel Braided Hose (Part Number: 10057032)
- 3 Pipe clamp to keep pressure on the burner and block connection

Cooling Air Flow

Removal of the burner nozzle is recommended when the burner is out of service. If removal is not possible, or not chosen, cooling flow, either clean, dry air, nitrogen or oxygen, must be used. Typical compressed air systems contain lubrication oils, which will contaminate oxygen-clean environments and cannot be used for cooling flows without special treatment. Cooling air provided by plant process air fans is one possible source.

Hot Installation

- Minimum temperature of 1500° F (816° C)
- Failure to follow the proper installation sequence noted below could result in damage or destruction of vital burner components. Cooling oxygen or air flows should be present at all times when the burner nozzle is inserted.

- 1 Connect gas and oxy (or air) supply lines to burner fittings.
- 2 Make sure all systems are checked and ready.
- 3 Make sure burner isolation valves are closed.
- 4 Open oxygen or air valve to the burner.
- 5 Slowly open the gas valve to the burner to ignite the flame.
- 6 Open gas valve to the burner to set flow to desired rate.

Burner Ignition

⚠ CAUTION

The PrimeFire FH burner does not have self ignition capability. It is the responsibility of the end user and service personnel attempting start-up to confirm that ignition temperatures appropriate for the fuel used are present inside the furnace where the burner is located. In cases where manual ignition from the outside is required, provisions shall be made in the furnace wall adjacent to the burner. Burners should be started up at minimum fuel and oxygen flows (see page 3 (Burner Installation and Operation) to prevent sudden pressure rise in the fired chamber.

- Set correct gas and oxygen flow before attempt of burner ignition. Flow meters for oxygen and gas flow measurement should be used for proper burner adjustment.

⚠ CAUTION

Oxygen should only be used with approved materials, properly cleaned pipe and equipment, and specially designed systems. Ordinary materials can be extremely flammable in the presence of oxygen and air enriched with oxygen.

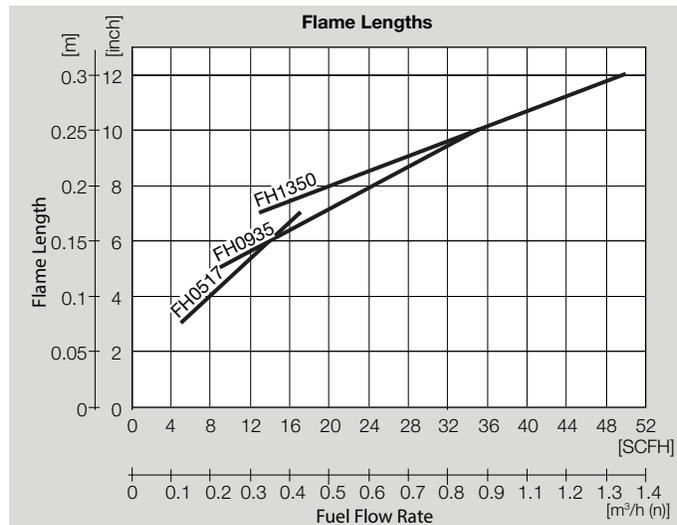
Flame Lengths

Flame lengths are given at high fire and minimum fire for each capacity. The flame length in this design has a linear relationship with the fuel flow rate. The higher the fuel flow rate at a given capacity the longer the flame

Model	Fuel Flow Rate, scfh (Nm ³ /hr)	Flame Length, inches (meters)
FH0517	5 (0.142)	3 (0.076)
	17 (0.484)	7 (0.178)
FH0935	9 (0.256)	5 (0.127)
	35 (0.997)	10 (0.254)
FH1350	13 (0.37)	7 (0.178)
	50 (1.425)	12 (0.305)

FOR MORE INFORMATION

The Honeywell Thermal Solutions family of products includes Honeywell Combustion Safety, Eclipse, Exothermics, Hauck, Kromschröder and Maxon. To learn more about our products, visit ThermalSolutions.honeywell.com or contact your Honeywell Sales Engineer. Eclipse Inc. 1665 Elmwood Rd. · Rockford, IL 61103 United States ThermalSolutions.honeywell.com



MAINTENANCE

The PrimeFire FH requires very little maintenance, if any. However, preventative maintenance is the key to a reliable, safe and efficient system. The following are suggested guidelines for periodic maintenance. Burners in severe environments or operational conditions should be checked more frequently. Spare burners not in use should be completely drained and stored vertically to prevent rusting.

NOTE: The periodic, monthly, and yearly lists are an average interval. If your environment is dirty, the intervals may be shorter. Check with local authorities having jurisdiction regarding their recommended maintenance schedules.

Periodic Checklist

- 1 Continuously monitor gas and oxygen flows.
- 2 Check flame shape to ensure there is nothing blocking the gas or oxygen nozzles which could cause damage to the burner and the burner block.
- 3 Remove burners and inspect tips for signs of carbon build-up as well as checking for any damage to the burner blocks that could result from dirty nozzles/ incorrect flows, or loose oxygen nozzles at least four times per year.
- 4 Clean all burner nozzles on a routine basis once per month and when required by flame appearance.
- 5 Check for proper oxygen/gas pressures (refer to Technical Information for Oxy-Fuel Burner PrimeFire FH).
- 6 Test all the system alarms for proper response signals.
- 7 Test the manual gas shut-off valves for proper operation.

Yearly Checklist

- 1 Test (leak test) safety shut-off valves for tightness of closure.
- 2 Test pressure switch settings by checking switch movements against pressure settings and comparing these with the actual impulse pressure.
- 3 Inspect impulse piping for leaks.
- 4 Clean and inspect all burners.

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