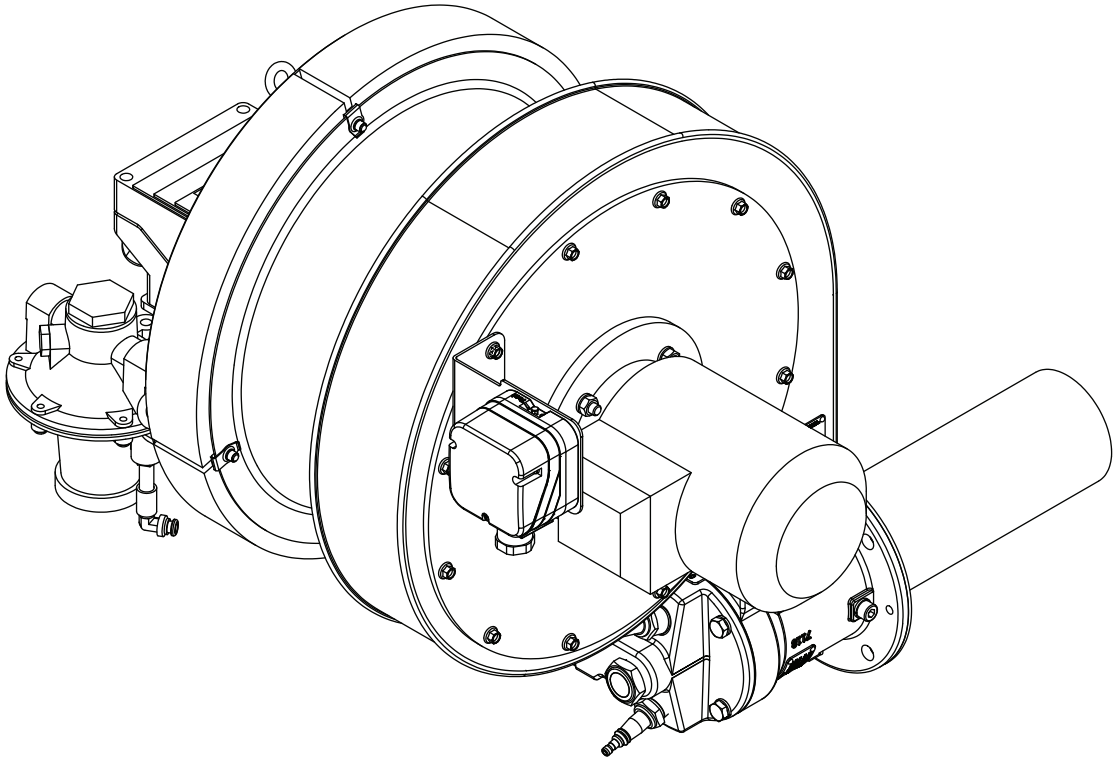
Eclipse ThermAir Burners

Model TA0015 - 0500

Operating Instructions Edition 08.15

Version 3



elster
Thermal Solutions

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Document Conventions

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

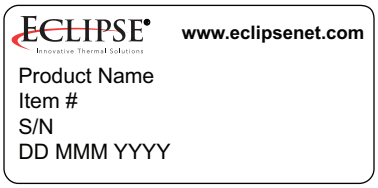
The explanation of these symbols follows below. Please read it thoroughly.

How To Get Help

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

1665 Elmwood Rd.
Rockford, Illinois 61103 U.S.A.
Phone: 815-877-3031
Fax: 815-877-3336
http://www.eclipsenet.com

Please have the information on the product label available when contacting the factory so we may better serve you.



	This is the safety alert symbol. It is used to alert you to potential personal injurt hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.
	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Is used to address practices not related to personal injury.
NOTE	Indicates an important part of text. Read thoroughly.

Table of Contents

Introduction 1

Product Description

The ThermAir is a nozzle-mix burner with a packaged combustion air blower that is designed to fire with fixed combustion air over a wide gas turndown range. An integral gas orifice is provided to ease burner setup. The burner is designed for:

- fixed air operation
- direct spark ignition
- simple gas control
- multiple fuel capability

The burner is suitable for direct and indirect air heating for a wide range of applications on industrial furnaces and ovens including:

- Dry-off and curring ovens
- Incinerators
- Indirect Air Heating
- Textile Drying
- Food Processing/Baking
- Annealing
- Aluminum Homogenizing

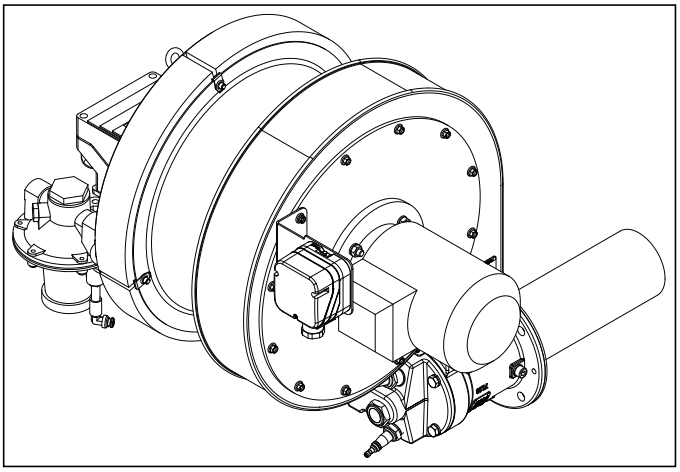


Figure 1.1. ThermAir Burner

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 previous experience with this type of equipment.

Purpose

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

ThermAir Documents

Installation Guide No. 114

- This document

Datasheet, Series No. 114

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

Design Guide No. 114

- Used with datasheet to design burner system

Spares Parts Documents, Series No. 114

- Recommended replacement part information

Related Documents

Eclipse Bulletins and Information Guides

- EFE 825 (Combustion Engineering Guide)
- 710, 732, 760, 818, 830, 832, 852, 854, 856, 610, 820, 902, 930

Safety

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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 Eclipse before continuing.

Safety Warnings

⚠ DANGER

- **The 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 and duct sections are likely to have HOT surfaces. Always wear the appropriate protective equipment when approaching the burner.**
- **Eclipse 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.**

NOTICE

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

Capabilities

Only qualified personnel, with sufficient mechanical aptitude and experience with combustion equipment, should adjust, maintain or troubleshoot any mechanical or electrical part of this system. Contact Eclipse for any needed commissioning assistance.

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. Contact Eclipse for any needed site-specific training.

Replacement Parts

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

Installation

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Introduction

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

Handling & Storage

NOTICE

- **When refractory combustion block is supplied with the burner, it is critical that the instructions for handling and storage are followed. The refractory should be considered fragile; improper handling and storage will cause premature failure.**

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

- Make sure the components are clean and free of damage.
- Store the components in a cool, clean, dry room.
- Keep all system components in their original packaging as long as possible.

Approval of Components

Limit Controls & 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
- IEC60364
- 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

Checklist Before Installation

Air Supply

To admit fresh combustion air from outdoors, provide an opening in the room of at least 1 square inch per 4,000 BTU/hr (6 cm^2 per 1 kW). If there are corrosive fumes or materials in the surrounding air, find an uncontaminated source to supply air to the burner, or provide a sufficient air filtering system.

Exhaust

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

Access

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

Environment

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

- Voltage, frequency and stability of the electrical power
- Fuel 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
- Prevent direct exposure to water.

Installing the Flame Sensor

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

⚠ DANGER

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

There are two different types of flame sensors, UV scanner and flamerod.

UV Scanner

The UV Scanner must be compatible to the flame monitoring control that is used. Refer to the manual of your selected control for proper scanner selection.

Flame Rod

NOTE: Only specific burner sizes with alloy or silicon carbide combustors can use a flame rod (see specific burner datasheets).

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

Installing the Spark Plug

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

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

NOTICE

- **Adjustments may vary from Eclipse published values if the flame controls other than those recommended in the Design Guide are used. Consult with the engineer who specified the alternate control for limitations.**

Burner Installation

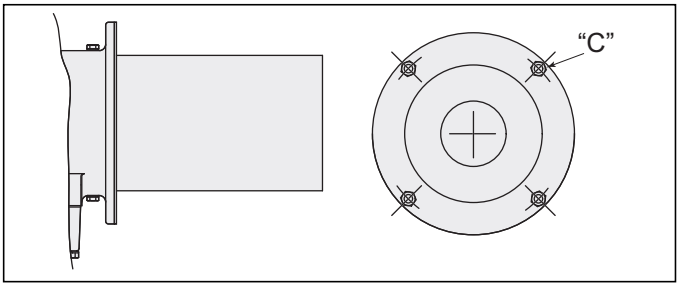

Figure 3.1 Burner Attachment

Dimensions

The burner attaches to the wall of the chamber with bolts through holes “C”. For full information on the burner dimensions, refer to specific datasheets.

Chamber Wall

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

Refractory furnace walls must allow for thermal expansion as recommended by the refractory supplier – the wall should apply no stress on the burner block or refractory layer surrounding the burner block. Expansion joints built into the furnace wall should permit the furnace shell, burner block holder, combustor or burner block and surrounding refractory to move as a unit in the event of unequal expansion of the refractory wall and furnace shell.

The combustor or combustion block must not extend beyond the inside of the furnace wall more than 1". Beyond this length it is necessary to add a spacer on the outside of the furnace to keep the end of the combustor or combustion block within 1/2" of the end of the wall.

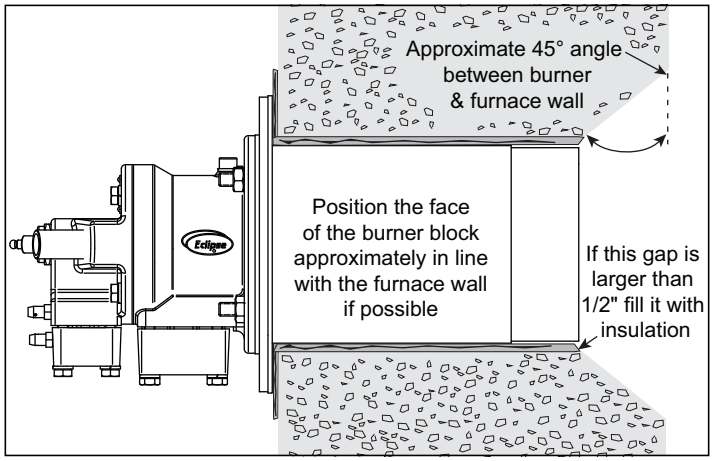

Figure 3.2 ThermAir Combustor Position

If the combustor or burner block is shorter than the furnace wall thickness the block or combustor should be recessed into the wall. To prevent refractory overheating, a 45° chamfer should be applied.

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 firing tube is filled with ceramic fiber.

Alloy Combustor (Figure 3.3)

1. Make sure the gasket ❶ is installed between the burner and the chamber wall ❷.
2. Make sure that gasket ❶ does not leak.
3. Check the size of the clearance. If the gap ❸ around the firing tube is larger than 1/2", then pack the gap with ceramic fiber ❹.

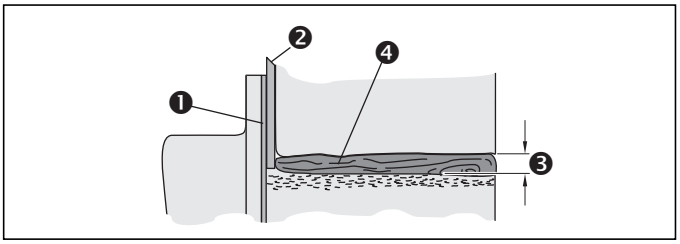

Figure 3.3 Alloy Combustor

Silicon Carbide (SiC) Combustor Only (Figure 3.4)

1. Make sure the gasket ❶ is installed between the burner flange and chamber wall ❷.
2. Make sure gasket ❺ is installed between SiC tube and flange ❻.
3. Make sure neither gasket ❶ nor ❺ leaks.
4. Check the size of the clearance. If the gap ❸ around the firing tube is larger than 1/2", pack the gap with ceramic fiber ❹ over a maximum length of 4" (100 mm). Maintain a clearance of at least 3/16" (5mm) over the remaining straight length of the firing tube.

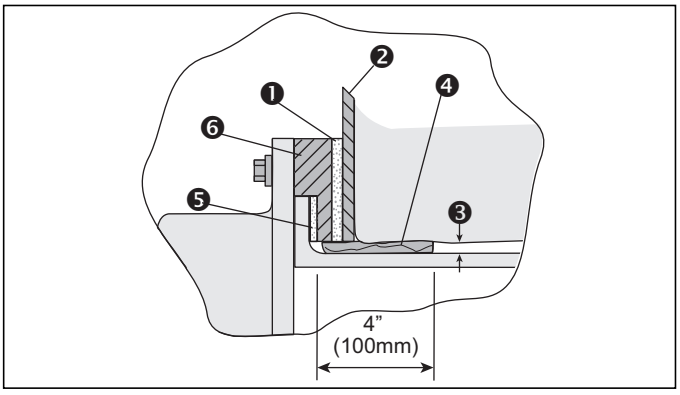

Figure 3.4 Silicon Carbide

Refractory Block (Figure 3.5)

1. Make sure gasket ❶ is installed between burner ❷ and block holder .
2. Make sure gasket ❹ is installed between block holder ❸ and chamber wall ❺.
3. Support the weight of refractory block ❻ with hard brick work anchored to the furnace shell ❼. Fill the 1/2" space between block ❻ and the three unsupported sides with soft gasket material ❽.

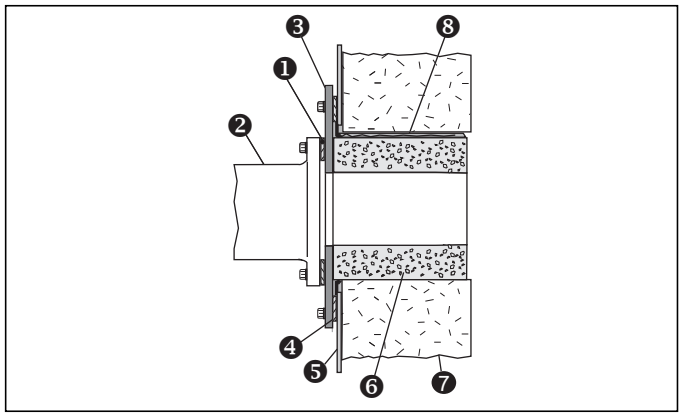

Figure 3.5 Refractory Block

Large Refractory Blocks

On the TA0500; the block must be surrounded by a collar made of brick, plastic refractory, or a castable refractory of at least 4" (10 cm) minimum thickness on all sides of the block. If the collar is cast around the block, a thin plastic film (i.e. Saran Wrap® or Glad Wrap®) should be wrapped around the block to keep moisture from leaching into it. The collar should be anchored to the furnace shell with suitable anchors and must be constructed to rest on a surface capable of supporting its weight, such as a hearth or a solid refractory or brick wall. For furnaces that are unable to support the weight of the refractory block, a stainless steel shelf can be welded to the shell to support the collar.

NOTE: All large refractory blocks are cured at a minimum temperature of 550°F (300°C) prior to shipment.

NOTE: The correct insulation of burner combustion blocks in furnaces results in longer block life and adds value by reducing downtime and maintenance.

Block Holder Temperature

Excessive block holder temperatures can cause problems. Overheating can be reduced by carefully sealing the burner blocks in the wall to prevent the leakage of hot gases back to the furnace shell.

In high temperature (>1,400°F, 760°C) fiber-wall furnace installations, the length of the metallic wrapper should extend no farther than the point in the wall where the interface temperature is higher than 1800°F (760°C).

Vertical Down Firing Blocks (Figure 3.6)

1. Down firing blocks may be suspended by customer supplied hangers ❷ attached to the burner body mounting bolts.
2. Hangers should be attached to structural support ❶.

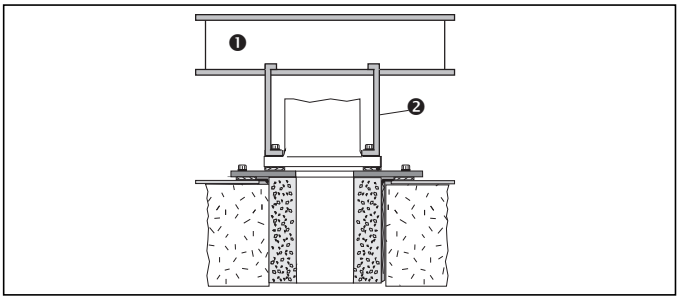

Figure 3.6 Vertical Down Firing Block

Gas Piping (Figure 3.7)

Burner Piping

The burner is factory assembled and shipped as ordered.

NOTE: If it is necessary to redirect piping, be sure the:

- ratio regulator spring column ❶ is pointing down.
- arrow on the ratio regulator points in the direction of gas flow.
- integral fuel orifice and o-rings ❷ are re-installed in the same orientation with respect to the fuel flow.
- same straight runs of pipe ❸ remains between the ratio regulator and the burner.

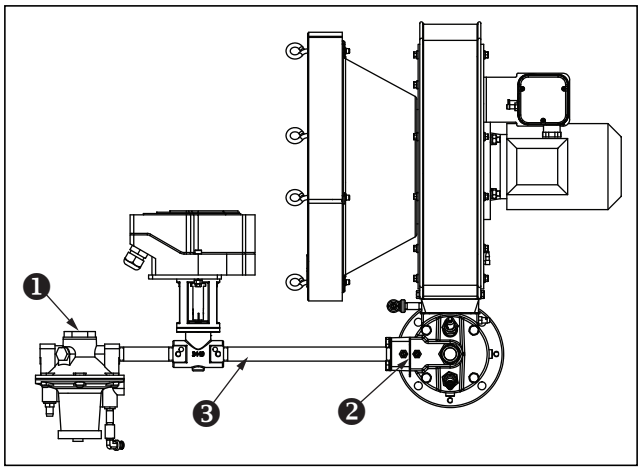

Figure 3.7 Burner Piping

Supply Piping

Inlet pressure to the ratio regulator must stay within specified limits. Refer to the appropriate ThermAir datasheet.

- Locate the valve train close to the burner. The gas must reach the burner during the fixed trial for ignition.
- Appropriately sized shut off valves in the valve train.
- Make sure piping is large enough to accommodate flow required to meet burner input.
- Minimize piping elbows.

Bypass Start Gas Piping (Optional)

Install the piping as shown in the schematics using the following guidelines:

- Locate the bypass start gas solenoids ❶ close to the burner. The gas must reach the burner during the trial for ignition period.
- Minimize piping elbows.
- Install an adjustable limiting orifice (ALO) ❷ for start gas adjustment. Refer to Bulletin 728 and 730 for further information.
- Include a straight run of pipe at least 8" (192mm) long ❸ before (upstream from) the start gas orifice ❺ (optional) and at least 4" (96mm) long ❹ after (downstream from) the start gas orifice.

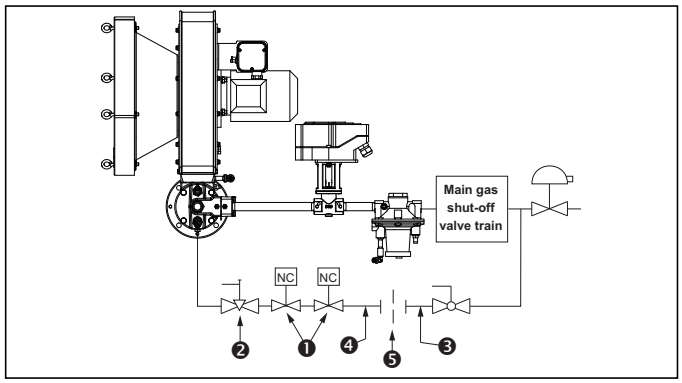

Figure 3.8 Bypass Start Gas Piping

NOTICE

■ **This is an example. Please verify that piping complies with all applicable codes and/or standards.**

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.

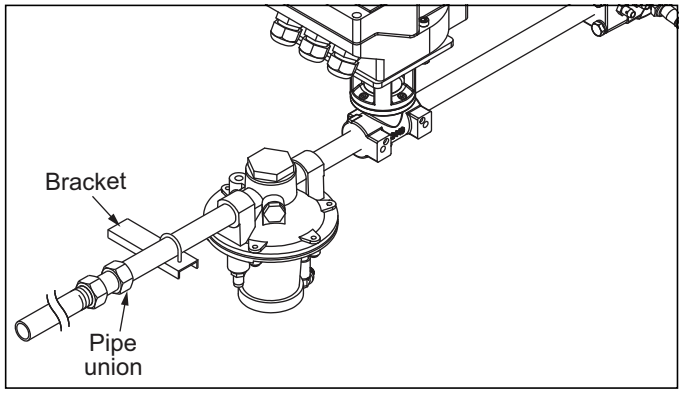

Figure 3.9 Piping Connections

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 gas control valve if not previously installed on the burner.

Checklist After Installation

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.