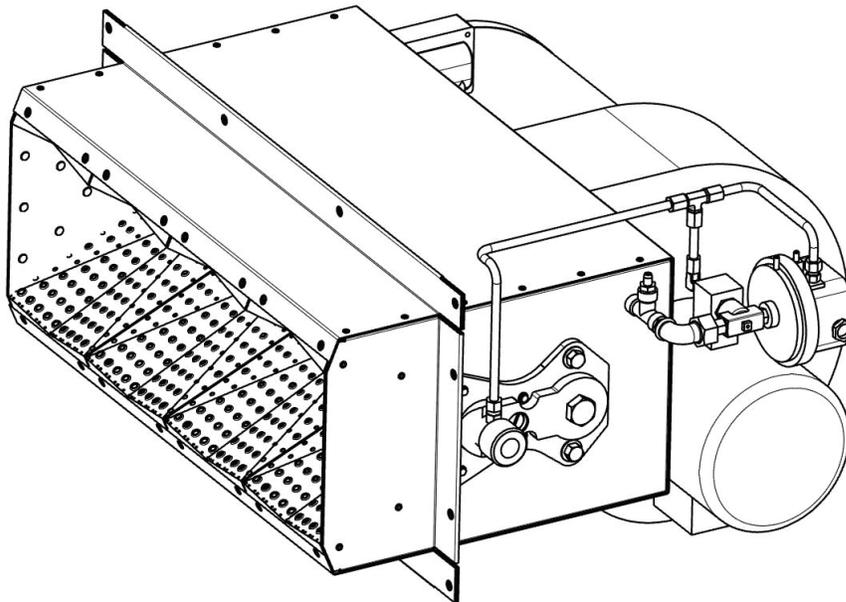


Eclipse AH-MA DualBlock Burners

Air Make Up Series

Technical Information Edition 10.18

Version 2



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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.

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

Please be sure to know your equipment's information found on the product label when contacting the factory so we may better serve you.

 ECLIPSE <small>Innovative Thermal Solutions</small>	www.eclipsenet.com
Product Name	
Item #	
S/N	
DD MMM YYYY	



This is the safety alert symbol. It is used to alert you to potential personal injury 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.

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Introduction

Product Description

The Eclipse AH-MA DualBlock burner belongs to the family of "AH-MA burners" and it is designed for work at the core of the air flow to be heated. It is modular and with the mixing in the head. The burner itself is supplied with a flange to couple it to the wall or it can be mounted on a plate ready for insertion into the unit machine or duct, needing a minimum combustion chamber. The fan may be interior or exterior to the machine or duct. The standard applications are for ducts in depression or lightly over-pressured.

These burners are designed to obtain an extremely clean combustion. Their complete independence from the air flow to be heated permits their application in all types of furnaces, ovens and dryers, even when there is a high degree of humidity, very low concentration of oxygen, large variations in the flow, etc.

The great flexibility of the power that these units can work with, a ratio higher than 20 to 1 permits changing from the maximum to minimum power to correctly attend the needs of the system temperature.

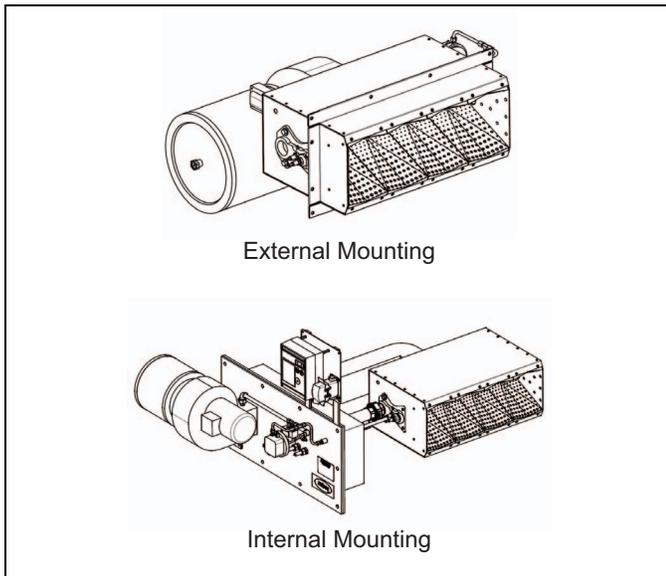


Figure 1. AH-MA DualBlock Burner

Audience

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

These aspects are:

- Design / Selection
- Use
- Maintenance

The audience is expected to be qualified and have experience with this type of equipment and its working environment.

Purpose

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

AH-MA DualBlock Documents

Technical Information

- This document

Datasheet

- Available for individual AirHeat models
- Required to complete installation

Installation Guide

- Used with Datasheet to complete installation

Related Documents

- EFE 825 (Combustion Engineering Guide)
- Depending on system configuration, refer to applicable equipment manuals and installation guides.

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 Eclipse before continuing.

Safety Warnings



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; 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.
- 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 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.

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

System Design

Design

When selecting an AH-MA DualBlock burner, choices are available to define a burner that will be safe and reliable for the system in which it will be installed. The design process is divided into the following steps:

1. Burner Option Selection:

- Burner Model / Size Selection
- Burner Style
- Air Supply
- Fuel Type
- Manifold Type
- Mounting Flange
- Burner Configuration
- Gas Pipe Connection
- Control Valve
- Ignition Type
- Flame Supervision
- Control Motor
- Air Flow Switch

2. Blower Option Selection:

- Power Supply Frequency
- Blower Motor Type
- Blower Inlet
- Motor Orientation
- Remote Blower Sizing
- Air Filter

3. Control Methodology:

- Burner Control

4. Ignition System:

- Ignition Transformer
- Trial for Ignition
- Ignition Gas Piping

5. Flame Monitoring System:

- Flame Sensor
- Flame Monitoring Control

6. Main Gas Shut-Off Valve Train Selection.

- Component Selection
- Valve Train Size

7. Process temperature control system.

NOTE: Information in Datasheet 163 is necessary to complete some of the procedures.

Step 1: Burner Option Selection

This section describes how to select burner options to suit an application. Use List 163 and Datasheet 163 when following this selection process.



CAUTION

- **Consult EFE-825, Eclipse Combustion Engineering Guide, or contact Eclipse Combustion if you have special conditions or questions.**

Burner Model / Size Selection

Consider the following when selecting the burner size:

- **Heat Input** - Calculate the required heat input to achieve the required heat balance.
- **Process Air Temperature** - Upstream process air temperature will determine the housing material required.
- **Combustion Chamber Pressure** - Consider the effects that large or varying chamber pressures have on burner performance.
- **Altitude** - Data supplied is based on burner operation at sea level.
- **Combustion Air Supply** - Combustion air should be fresh (20.9% O₂) and clean (without corrosives).
- **Combustion Air Temperature** - Changes in air supply temperature can affect the burner performance. The combustion air supply temperature should not exceed 250° F.
- **Fuel Type** - Variation in calorific value and density will affect burner performance.

Burner Style

AH-MA DualBlock burners are available in straight sections, double T geometries and cross sections. Select the geometry that best suits the installation. The housing material is stainless steel, but for burner sizes above AB600L model, the housing is manufactured in standard steel plate. For these sizes, and upstream processing temperature above 500°F (260°C), please contact Eclipse.

Air Supply

AH-MA DualBlock burners can be ordered with or without a combustion air blower directly mounted to the burner. For remote blower applications, see "Remote Blower Sizing".

Fuel Type

Table 1. Fuel Type

Fuel	Symbol	Gross Heating Value	Specific Gravity	WOBBE Index
Natural Gas	CH ₄ 90%+	1000BTU/ft ³ (40.1 MJ/m ³)	0.60	1290 BTU/ft ³
Propane	C ₃ H ₈	2525BTU/ft ³ (101.2 MJ/m ³)	1.55	2028 BTU/ft ³
Butane	C ₄ H ₁₀	3330BTU/ft ³ (133.7 MJ/m ³)	2.09	2303 BTU/ft ³

BTU/ft³ @ standard conditions (MJ/m³ @ normal conditions)

If using an alternative fuel supply, contact Eclipse with an accurate breakdown of the fuel components.

Manifold Type

AH-MA DualBlock burners are available with steel gas manifolds only.

Mounting Flange

Select the mounting hardware best suited to your application. Hardware is available for External Mounting on wall duct, and with fixing plate for Internal Mounting with process or external combustion air inlet.

Burner Configuration

Left hand or right hand piping is available. Configuration is based on viewing the burner from the air inlet.

Gas Pipe Connection

The piping, burner gas inlet, and fuel modulating valve (if selected) are threaded using the customer selected pipe thread option.

Control Valve

AH-MA DualBlock can be supplied with the following control options:

- **Burner System Mounting** – The control valve is sized based on burner input and fuel type.
- **Separated Mounting** – Order when fuel control valve cannot be mounted directly to the burner due to system considerations.
- **Less Control Valve** – If not supplied by Eclipse, customer must supply a suitable fuel control valve capable of supplying fuel in accordance with the burners operating range.

Ignition Type

Ignition can be by direct spark or spark ignited pilot for models below AB0400L. Rest of models use by spark ignited built-in pilot only.

Flame Supervision

Flame supervision is by flame rod or UV scanner. Honeywell-Eclipse recommends flame supervision to meet all applicable local codes and standards.

Control Motor

Select a control motor. Standard control motor options include various models which Eclipse will mount to the burner. Burners can be ordered with control motor bracket and mounting hardware only. Customer supplied control motors must conform to these specifications:

- Rotation not to exceed 2 rpm. (30 sec / 90° typical)
- Minimum torque of 25 in-lb. (2,8 Nm)
- 90° stroke
- Continuous modulating or high/low modulating control
- Reversible direction of rotation
- Certain applications may require control motors with a limit switch or switches if:
 - the burner capacity is to be limited to fit an application
 - there is a need to indicate a high and/or low fire butterfly valve position

Air Flow Switch

The air flow switch provides a signal to the monitoring system when there is not enough air pressure from the blower. If a switch is selected, it will be factory mounted.



WARNING

- Eclipse supports the NFPA regulation requiring, as a minimum standard for main gas shut-off systems, the use of an air pressure switch in conjunction with other system components.

Step 2: Blower Option Selection

NOTE: Standard blower options are listed in List 163, additional blower options are available through Eclipse, and leadtime may vary.

Power Supply Frequency

Select 50Hz or 60Hz. Blower Motors are 50Hz IEC compliant and CE marked. 60 Hz motors have NEMA frames and are marked UL/CSA.

Blower Motor Type

Motor types include various options: voltages, single or three phase.

If the chamber pressure is very negative, a three phase motor ensures a smooth start

Blower Inlet

When selecting an inlet, consider the following:

- Amount and size of particles in the air
- Sound level requirements
- Space limitations
- Cleanliness requirements of the process

Motor Orientation

Left-hand blower motor orientation is considered standard. If you need to install right-hand blower motor orientation, please contact Eclipse.

Remote Blower Sizing

For remote blower applications, the blower should be sized to supply sufficient flow and pressure to the burner to ensure proper burner performance.

Datasheet 163 shows the blower input required for each burner model.

Air Filter

AH-MA DualBlock burners can be supplied with the following air filter options:

- Air inlet with adjustment and protection grid.
- Air filter with internal flow adjustment.

Step 3: Control Methodology

Input is normally controlled by a motorized butterfly valve in the gas line to the burner.

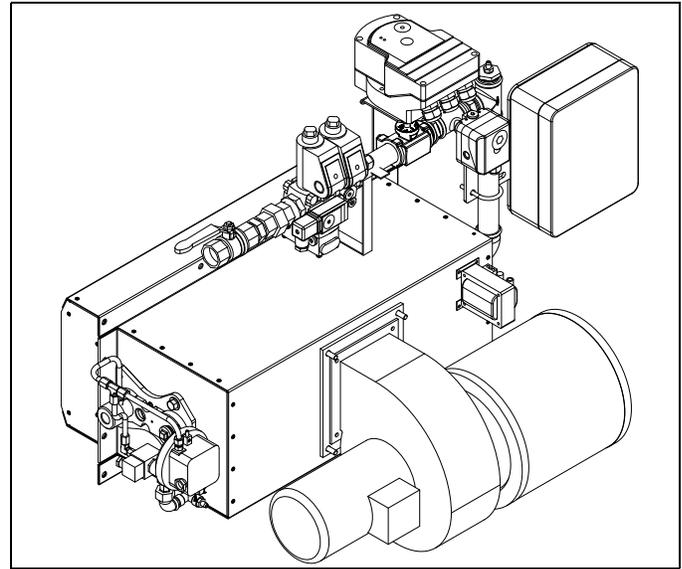


Figure 2. Burner Basic Components.

A control signal is sent from a process temperature controller (bought separately) to the control motor. (Refer to Bulletin 163 or contact Eclipse Combustion for further information on temperature controllers.)

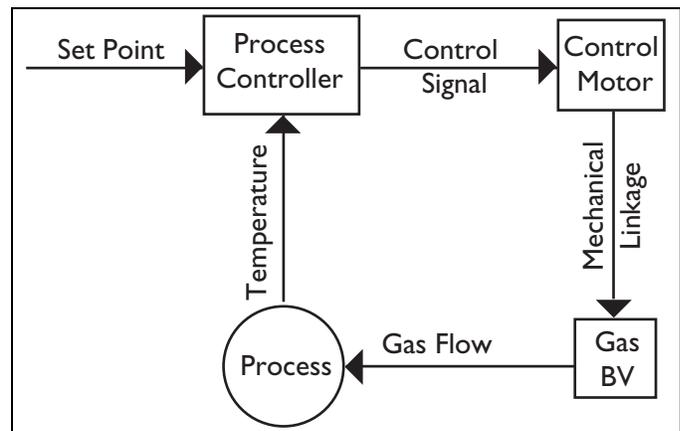


Figure 3. Basic Control Loop.

The control motor modulates the gas butterfly valve (BV) which controls the fuel flow to the burner.

Air pressure and flow in the burner body remain fixed throughout the operating range.

Modulation of fuel flow only, provides turndowns of 40:1.



WARNING

- Do not use other control methods without prior approval from Eclipse.

Step 4: Ignition System

Ignition Transformer

For the ignition system, use a transformer with:

- secondary voltage 6000 to 8000 VAC
- minimum secondary current 0.02 amp continuous
- full wave output

DO NOT USE the following:

- twin outlet transformer
- distributor type transformer

Trial For Ignition

It is recommended that low fire start be used. However, under certain circumstances AH-MA DualBlock burners must be direct spark ignition at higher gas inputs.

Most local safety codes and insurance requirements limit the maximum trial for ignition time (the time it takes for a burner to ignite). These requirements vary from one location to another; check your local codes and comply with the strictest codes applicable.

The time it takes for a burner to ignite depends on the following:

- the distance between the gas shut-off valve and the burner.
- the gas flow conditions at start-up.

The possibility exists where the low fire is too low to ignite the burner within the maximum trial for ignition time. The following options must be considered under these conditions:

- start at higher gas input levels.
- resize and/or relocate the gas controls.
- use spark ignited pilot.

Ignition Gas Piping

AH-MA DualBlock burners are capable of ignition with either direct spark or spark ignited built-in pilot.

Direct Spark Ignition

This option is available only for of low input burner models. See Datasheet 163 for more information about these models.

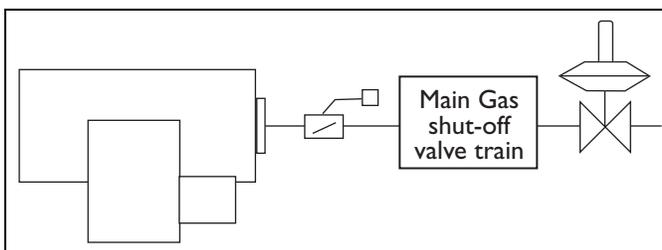


Figure 4. Direct Spark Ignition

Spark Ignited Pilot

This type of ignition must be fired at intermediate fire and for medium to large burners, or if the valve train is at a distance that does not get enough gas to the burner to boot.

When ordered, the pilot is packaged with the burner and includes an adjustable flow gas cock and pressure regulator.

This option is available for all models in the AH-MA DualBlock burner series.

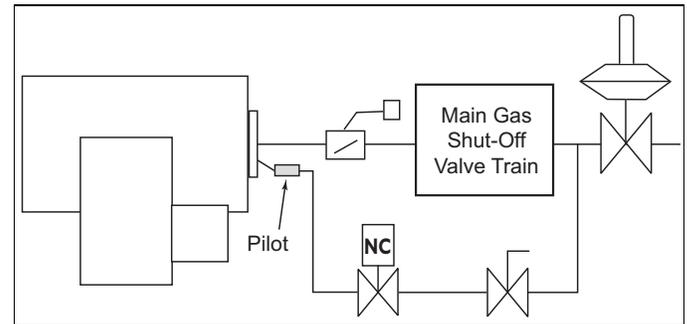


Figure 5. Spark-Ignited Pilot



- It is not possible to use a continuous or intermittent pilot. The pilot fuel flow should be interrupted after the trial ignition period has expired.

Step 5: Flame Monitoring Control System

The flame monitoring control system consists of two main components:

- flame sensor
- flame monitoring control

Flame Sensor

Two types can be used on AH-MA DualBlock Burners:

- flame rod
- 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 selection of the scanner.

Flame Monitoring Control

The flame monitoring control processes the signal from the flame sensor and controls the start-up and shut-down sequences.



- **Flame monitoring controls that have low sensitivity flame detecting circuits may limit burner turndown and change the requirements for ignition.**
- **Flame monitoring controls that stop the spark as soon as a signal is detected may prevent establishment of flame, particularly when using UV scanners. The flame monitoring control must maintain the spark for a fixed time interval that is long enough for ignition.**

Step 6: Main Gas Shut-Off Valve Train

Component Selection

Eclipse can help in the design of a main gas shutoff valve train that satisfies the customer and complies with all local safety standards and codes set by the authorities within that jurisdiction. Contact Eclipse for further information.

NOTE: Eclipse supports NFPA regulations (two gas shut-off valves as a minimum standard for main gas shut-off systems).

Valve Train Size

Fuel pressure supplied to the ratio regulator inlet must be in the value range specified in Datasheet 163. The valve train should be sized sufficiently to provide the specified pressure.

Step 7: Process Temperature Control System

The process temperature control system is used to control and monitor the temperature of the system. There is a wide variety of control and measuring equipment available. For details, please contact Eclipse.

Consult Eclipse

Eclipse can help you design and obtain a main gas shutoff valve train that complies with the current safety standards.

The shut-off valve train must comply with local safety standards set by authorized jurisdiction.

For details, please contact your local Eclipse representative or Eclipse Inc.

NOTE: Eclipse supports NFPA regulations (two shut-off valves) as a minimum standard for main gas "safety shutoff valves."

Appendix

Conversion Factors

Metric to English

From	To	Multiply By
actual cubic meter/h (am ³ /h)	actual cubic foot/h (acfh)	35.31
normal cubic meter/h (Nm ³ /h)	standard cubic foot /h (scfh)	38.04
degrees Celsius (°C)	degrees Fahrenheit (°F)	(°C × 9/5) + 32
kilogram (kg)	pound (lb)	2.205
kilowatt (kW)	Btu/h	3415
meter (m)	foot (ft)	3.281
millibar (mbar)	inches water column ("w.c.)	0.402
millibar (mbar)	pounds/sq in (psi)	14.5 × 10 ⁻³
millimeter (mm)	inch (in)	3.94 × 10 ⁻²
MJ/Nm ³	Btu/ft ³ (standard)	26.86

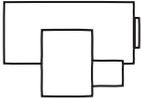
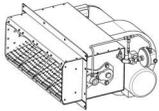
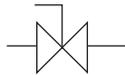
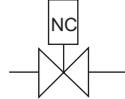
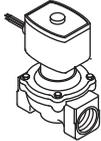
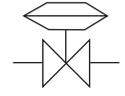
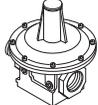
Metric to Metric

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
actual cubic foot/h (acfh)	actual cubic meter/h (am ³ /h)	2.832 × 10⁻²
standard cubic foot /h (scfh)	normal cubic meter/h (Nm ³ /h)	2.629 × 10 ⁻²
degrees Fahrenheit (°F)	degrees Celsius (°C)	(°F - 32) × 5/9
pound (lb)	kilogram (kg)	0.454
Btu/h	kilowatt (kW)	0.293 × 10 ⁻³
foot (ft)	meter (m)	0.3048
inches water column ("w.c.)	millibar (mbar)	2.489
pounds/sq in (psi)	millibar (mbar)	68.95
inch (in)	millimeter (mm)	25.4
Btu/ft ³ (standard)	MJ/Nm ³	37.2 × 10 ⁻³

System Schematics

Symbol	Appearance	Name	Remarks
		AH/MA DualBlock Burner	
		Main Gas Shut-Off Valve Train	Eclipse strongly endorses NFPA as a minimum.
		Gas Cock	Gas cocks are used to manually shut-off the gas supply on both sides of the main gas shut-off valve train.
		Solenoid Shut-Off Valve (Normally Closed)	Solenoid valves are used to automatically shut off the gas supply on a bypass gas system or on small capacity burners.
		Pressure Regulator	The pressure regulator reduces gas pressure to a stable, usable pressure.
		Combustion Air Blower	The combustion air blower provides the combustion air pressure to the burner(s).

For More Information

The Honeywell Thermal Solutions family of products includes Honeywell Combustion Safety, Honeywell Combustion Service, Eclipse, EXOTHERMICS, HAUCK, Kromschröder and MAXON. To learn more about our products, visit ThermalSolutions.honeywell.com or contact your Honeywell Sales Engineer.

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