

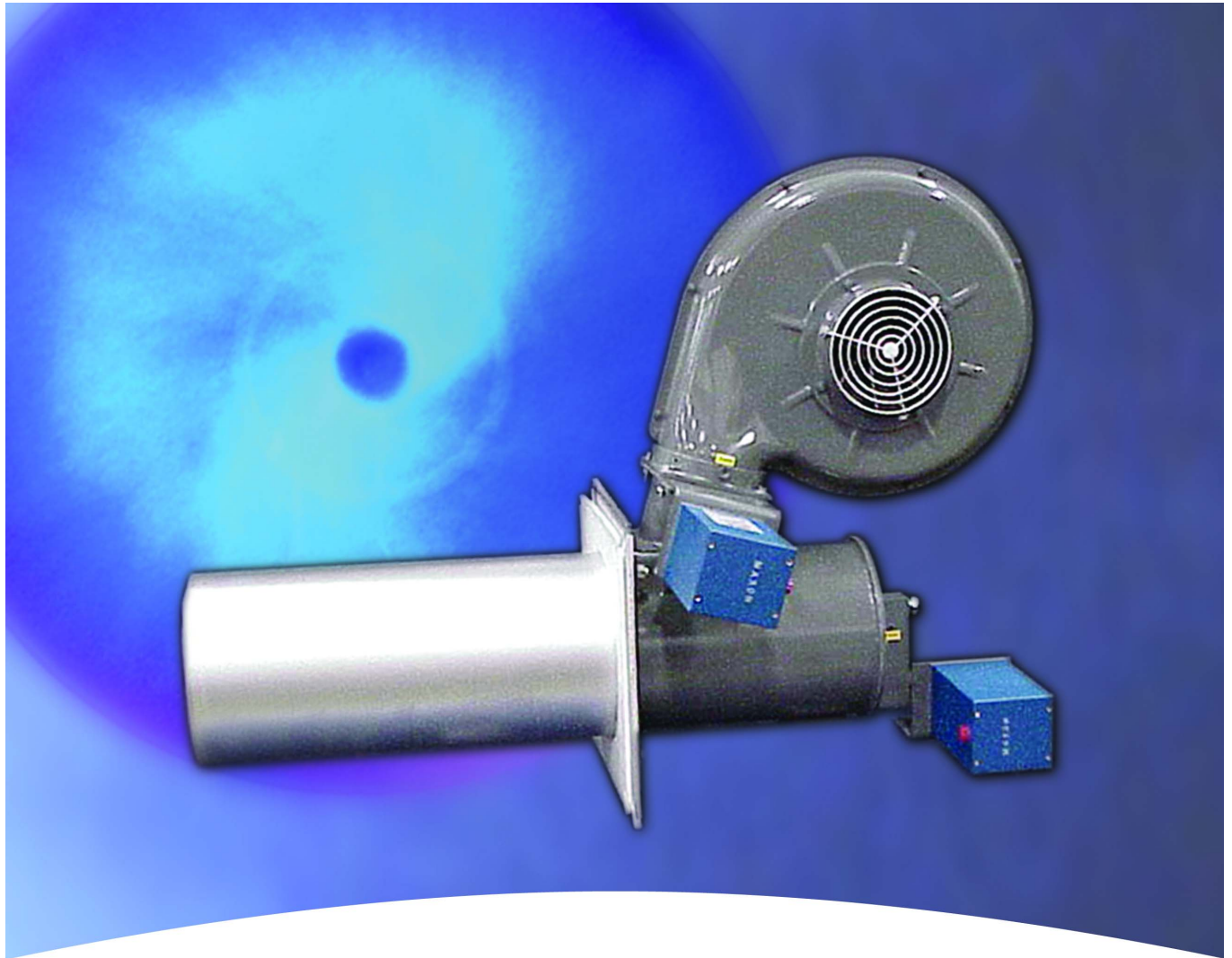
Honeywell

MAXON

MAXON M-PAKT®

ULTRA LOW NO_x BURNERS

TECHNICAL CATALOG



32M-01007-01

TABLE OF CONTENTS

| | |
|--|----------|
| Product description | 3 |
| Features and benefits | 3 |
| Typical emissions | 3 |
| Model Numbers | 4 |
| Specifications of M-PAKT® Burners | 5 |
| Materials of construction | 6 |
| Selection criteria | 6 |
| Dimensions | 8 |
| 0.4M & 0.9M Packaged Burners - gas control method "S" | 8 |
| 1.5M, 2.5M and 3.0M Packaged Burners - gas control method "S" | 9 |
| EB2 and EB3 (External Blower) Burners - gas control method "S" | 10 |
| EB4, EB5, & EB6 (External Blower) Burners - gas control method "S" | 11 |
| EB7 (External Blower) Burners - gas control method "S" | 12 |
| Alternate gas control methods - gas control method "C" | 13 |
| Accessories and options | 14 |

PRODUCT DESCRIPTION

Typical MAXON quality and reliability is found in the M-PAKT® Ultra Low NOx Burners, which provide the world's lowest levels of NOx and CO. NOx is typically single digits in most applications. The M-PAKT® low NOx burner is suitable for industrial air heating for ovens and dryers for paint finishing, paper making, food baking, textile production, grain drying, and make-up air heating. M-PAKT® burners substantially reduce emissions in oxidizers, incinerators, heat exchangers and process heaters.

FEATURES AND BENEFITS

- **Produces extremely low emissions of NO_x and CO**
- **Burns natural gas or propane**
- **Flame contained almost entirely inside the discharge sleeve**
- **Compact packaged design with a variety of control methods**
- **Durable steel outer construction with stainless steel internals**

TYPICAL EMISSIONS

The M-PAKT® Ultra Low Emissions Burner produces NOx and CO emissions up to 95% less than conventional burners. Without exotic alloys or fragile ceramics, the burner reduces NOx with a patented, advanced flame stabilization. The M-PAKT® burner's advanced anchoring of the flame reduces prompt NOx while thermal NOx is suppressed with an extremely uniform mixture.

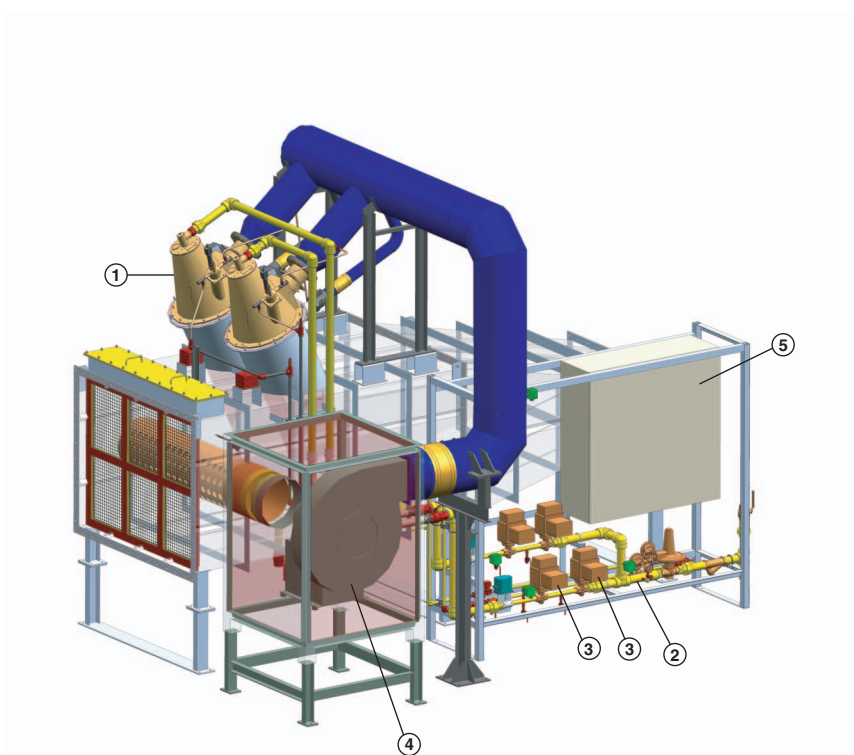
In application, the M-PAKT® Ultra Low Emissions Burner produces single digit NOx corrected to 3% oxygen. In most installations, CO production is limited to extremely low levels. Exact emissions performance may vary in your application. Contact MAXON for information on installation specific estimates or guarantees. No guarantee of emissions is intended or implied without specific written guarantee from MAXON.

Factors that can affect emissions:

- Process air direction, temperature and velocity
- Process stream constituents, especially nitrogen bearing compounds
- Combustion air quality, relative humidity and filtration
- Burner location and installation
- Fuel quality and heating value
- Emissions instrument calibration and testing protocol

Application example of M-PAKT® gas burner

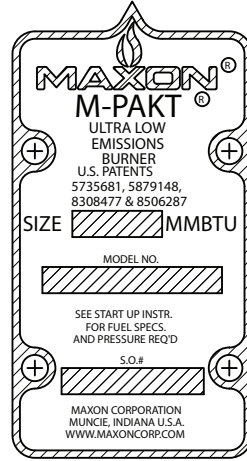
- 1) M-PAKT® Ultra Low NOx Burner
- 2) Pipe train constructed for required codes and authorities
- 3) MAXON Shut-off Valves
- 4) Combustion air blower
- 5) System control panel



A typical air heater incorporating M-PAKT burners

MODEL NUMBERS

A coded model number is provided on the nameplate of all M-PAKT® Burners to provide an instantaneous method to identify the configuration of the product. This model number ensures accuracy in identifying your product, ordering replacement parts or communicating capabilities.



| Special (S if special, blank if not) | Burner type | Size | Blower | Discharge sleeve | Mechanical gas control | Switches | Filter/ silencer | Future options |
|--|-------------|------|--------|---------------------|---------------------------|----------|---------------------|-------------------|
| S | MPB | 1 | 1 | R | S | F | N | AAA |

Burner type

MPB - M-PAKT® burner

Size

- 1 - 0.4M
- 2 - 0.9M
- 3 - 1.5M
- 4 - 2.5M
- 5 - 3.0M
- A - EB2
- B - EB3
- C - EB4
- D - EB5
- E - EB6
- F - EB7

Blower

- 1 - 240/3/50
- 2 - 575/3/60
- 3 - 110/1/60
- 4 - None

Discharge sleeve

R - RA330 stainless steel

Mechanical gas control

- C - Honeywell ControLinks
- S - SMARTLINK MRV
- E - External control (EB only)

Switches

F - None

Filter/silencer

- F - Filter only
- S - Filter/silencer
- N - None

SPECIFICATIONS OF M-PAKT® BURNERS

| Typical burner data | | | | | | |
|---|--------|-------|-------|-------|-------|-------|
| Fuel: natural gas at 60°F with 1000 Btu/ft ³ (st) HHV - sg = 0.6 [1] | | | | | | |
| Combustion air: 60°F - 21% O ₂ - 50% humidity - sg = 1.0 [1] | | | | | | |
| Stated pressures are indicative. Actual pressures are a function of air humidity, altitude, type of fuel and gas quality. | | | | | | |
| Packaged Burners | | | | | | |
| Size | | 0.4M | 0.9M | 1.5M | 2.5M | 3.0M |
| Maximum Capacity HHV [4] | MBtu/h | 0.41 | 0.9 | 1.6 | 2.5 | 3.0 |
| Minimum Capacity HHV | | 0.07 | 0.128 | 0.2 | 0.37 | 0.5 |
| Turndown | N/A | 5.9:1 | 7:1 | 8.5:1 | 7:1 | 7.4:1 |
| Pilot Capacity | KBtu/h | 20-80 | 20-80 | 20-80 | 20-80 | 20-80 |
| Natural Gas Pressure [3] | "wc | 4.1 | 10.4 | 8.6 | 10.3 | 9.5 |
| Inlet Gas Pressure | "wc | 8 | 25.5 | 19 | 37 | 33 |
| Combustion Air Pressure [5] [6] | "wc | 8.8 | 8.8 | 10.1 | 10.4 | 9.4 |
| Combustion Air Flow | scfm | 116 | 255 | 453 | 708 | 992 |
| Fan Horsepower | hp | 1.5 | 1.5 | 2 | 3 | 3 |
| Burner Sound Levels [2] | dB(A) | 86.1 | 86.3 | 87.2 | 89.3 | 89.5 |
| With Silencer | | 82.0 | 82.2 | 84.0 | 82.0 | 82.0 |

[1] sg (specific gravity) = relative density to air (density air = 0.0763 lb/ft³ (st))

[2] Sound pressure level, L_p, measured at 39 inches from the burner

[3] Gas pressure measured differentially at burner gas pressure test connection.

[4] Capacity displayed assumes blower operation on 60Hz electrical supply. Gross output will be reduced by 17% if operated on 50Hz. Fuel and air pressures should be reduced by 30% while motorpower will reduce 40% with 50Hz operation.

[5] Air differential pressure measured between chamber pressure test port and burner air test connection.

[6] Allow at least 10% more pressure at air valve inlet.

Contact MAXON for operating pressures for burners produced prior to May 2007.

| Typical burner data | | | | | | | |
|---|--------|--------|--------|--------|--------|--------|-------|
| Fuel: natural gas at 60°F with 1000 Btu/ft ³ (st) HHV - sg = 0.6 [1] | | | | | | | |
| Combustion air: 60°F - 21% O ₂ - 50% humidity - sg = 1.0 [1] | | | | | | | |
| Stated pressures are indicative. Actual pressures are a function of air humidity, altitude, type of fuel and gas quality. | | | | | | | |
| External Blower Burners | | | | | | | |
| Size | | EB2 | EB3 | EB4 | EB5 | EB6 | EB7 |
| Maximum Capacity HHV [5] | MBtu/h | 0.8 | 1.7 | 2.7 | 4.5 | 5.8 | 8.4 |
| Minimum Capacity HHV | | 0.07 | 0.128 | 0.2 | 0.37 | 0.5 | 0.9 |
| Turndown | N/A | 11.4:1 | 13.3:1 | 13.5:1 | 12.2:1 | 11.6:1 | 9.1:1 |
| Pilot Capacity | KBtu/h | 20-80 | 20-80 | 20-80 | 20-80 | 20-80 | 20-80 |
| Natural Gas Pressure [2] [3] | " wc | 12.1 | 37.2 | 24 | 32.6 | 37 | 60 |
| Inlet Gas Pressure | " wc | 14.8 | 48.5 | 34.8 | 63 | 45.8 | 78 |
| Combustion Air Pressure [4] [6] | " wc | 29.4 | 29.7 | 28 | 32.9 | 27.5 | 27.2 |
| Combustion Air Flow | scfm | 227 | 482 | 765 | 1275 | 1643 | 2380 |

[1] sg (specific gravity) = relative density to air (density air = 0.0763 lb/ft³ (st))

[2] Gas pressure measured differentially at burner gas pressure test connection.

[3] Gas differential pressure required at burner inlet when using control method 'E'

[4] Air differential pressure measured between chamber pressure test port and burner air test connection

[5] Capacity displayed assumes blower operation on 60Hz electrical supply. Gross output will be reduced by 17% if operated on 50Hz. Fuel and air pressures should be reduced by 30% while motorpower will reduce 40% with 50Hz operation.

[6] Allow at least 10% more pressure at air valve inlet.

Contact MAXON for operating pressures for burners produced prior to May 2007.

MATERIALS OF CONSTRUCTION

The M-PAKT Ultra Low NOx burner is constructed from durable, industrial steel and stainless steel components.

| Burner Part | Material |
|------------------|------------------------------|
| Housing | 1010 steel |
| Gas nozzle | 304 stainless steel (1.4301) |
| Cone | 330 stainless steel (1.4333) |
| Discharge sleeve | 330 stainless steel (1.4333) |
| Impeller | Aluminum |
| Fan case | Steel |

SELECTION CRITERIA

M-PAKT® burner versions

M-PAKT® Ultra Low NOx Burners are available as packaged burners with integral blower and fuel/air ratio control valves.

M-PAKT® may also be ordered as an EB model for use with a remote blower. EB M-PAKT® burners also include required fuel/air ratio control valves.

Application details

M-PAKT® Ultra Low NOx burner is suitable for use in industrial air heating, drying, baking and curing applications. The burner produces extremely low levels of NOx and CO for air quality compliance and end product sensitivities.

Process temperature

The M-PAKT® may be used in applications up to 1000°F. Consult page 1-1.7-15 for guidance on selecting proper burner configurations.

Process flows and oxygen content

M-PAKT® burners may be applied in inert process streams as the burner supplies all the required air for combustion and the flame is fully contained in its discharge sleeve.

Process flows up to 2500 ft/m are allowed perpendicular to the discharge sleeve although this will affect emissions performance. For best emissions performance, limit the flow velocity at the burner's discharge to < 1000 ft/m. Protection plates or secondary sleeves are acceptable to limit the cross velocity.

Process back pressure

Packaged burner models with integral fan may be applied to applications with pressures between -4.0" wc and +2.0" wc.

EB models may be used for extended capacities or for higher application pressures. Consult MAXON for assistance with high back pressure applications.

Piloting and ignition

Ignition of M-PAKT® burners should be restricted to the pilot. While direct ignition may be possible, it is not recommended.

The M-PAKT® burner is provided with an independent pilot burner. The pilot should only be operated as interrupted or intermittent. Standing pilots are not permitted as the flame scanner will not distinguish between the pilot and main flame.

In low oxygen or high moisture applications, an air feed for the pilot may be used. Consult pages 1-1.7-8 to 1-1.7-12 for location and size of pilot air connections. Pilot air is not required in most applications.

Ratio control

For greater assurance of optimal emissions or for less stable application pressures, MAXON suggests the use of parallel positioning actuator systems. MAXON's SMARTLINK® MRV and Honeywell ControLinks™ provide high resolution control of the air and fuel valve for absolute control of air fuel ratio. The external control option allows the M-PAKT® burner to be used with an external air/fuel ratio control system such as SMARTFIRE®.

Unlike inferior pressure regulators, high resolution parallel positioning provides absolute control even during transient conditions. This type of absolute control has proven to optimize efficiency while minimizing emissions of industrial burners.

M-PAKT® is not recommended for use with hi/lo or on/off control schemes.

Combustion air control and piping

Do not rotate combustion air blowers on packaged M-PAKT® burners. EB M-PAKT® burners require combustion air to enter the burner parallel to the burner's long axis.

Fuels

M-PAKT® burners provide low NOx performance on natural gas and propane only. Other clean fuel gases may be used in the burner, but performance and emissions may change.

Expected emissions

In typical applications with specified excess air, the M-PAKT® Ultra Low NOx burner will produce only 5% to 10% of the NOx of conventional burners. CO is controlled to extremely low levels but varies according to the specific application parameters of each installation.

Flame development

The flame of the M-PAKT® is entirely contained within the discharge sleeve of the burner making the effective flame length zero. Avoid locating the discharge of the burner close to walls, equipment or product as the exiting gases may be 2800°F or higher.

Discharge sleeve recommendations

| Desired Excess Air Adjustment | Application Temperature | |
|-------------------------------|-------------------------|-----------------|
| | < 1000°F | 1000°F - 1400°F |
| 55 - 70% | OK | OK |
| 40 - 55% | OK | Not recommended |

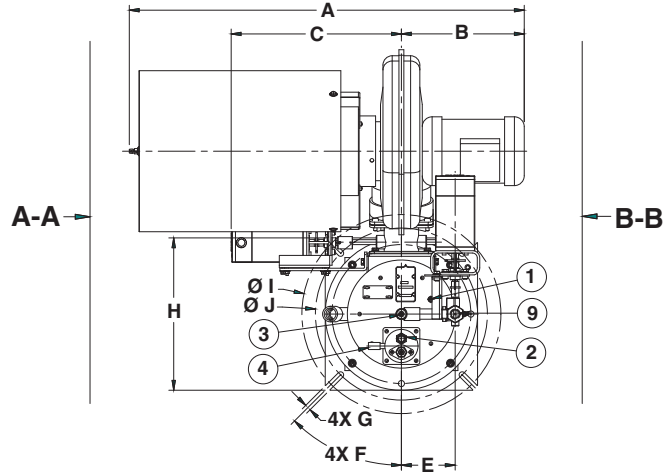
Filter/silencer

Optional round or square filter/silencer assemblies are available. Burner sound levels with and without silencer can be found in table on page 1-1.7-5. For dimensions, refer to pages 1-1.7-8 through 12.

DIMENSIONS

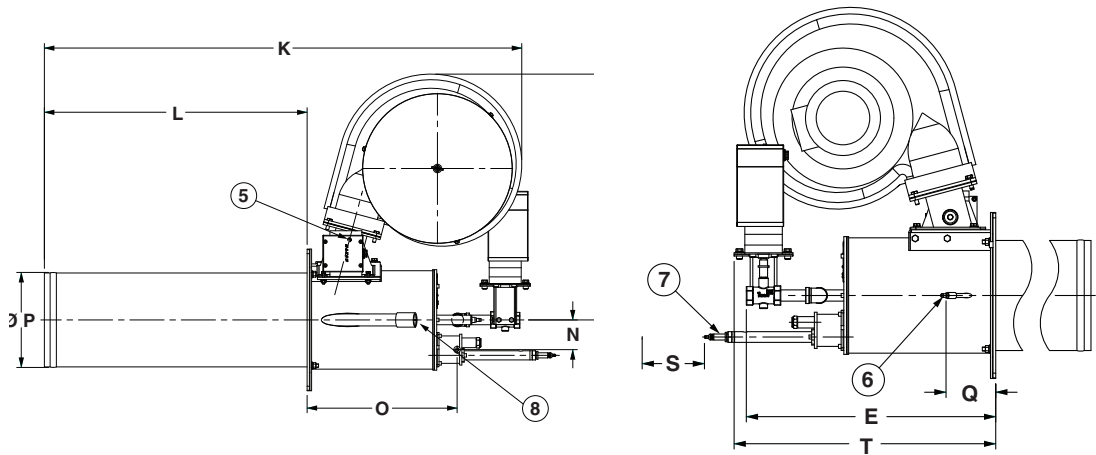
0.4M & 0.9M Packaged Burners - gas control method "S"

- 1) 1/8" NPT combustion air pressure test port
- 2) Observation port
- 3) Gas pressure test port
- 4) 1/4" NPT pilot gas inlet
- 5) Air pressure switch connection
- 6) Chamber pressure test port
- 7) Spark ignitor
- 8) Flame scanner connection 1" NPT-F
- 9) Gas inlet
0.4M - 1/2" NPT (F) 0.9M - 3/4" NPT (F)



View A-A

View B-B

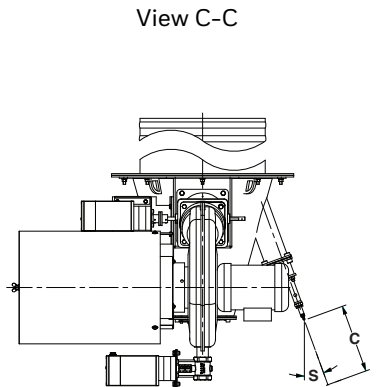
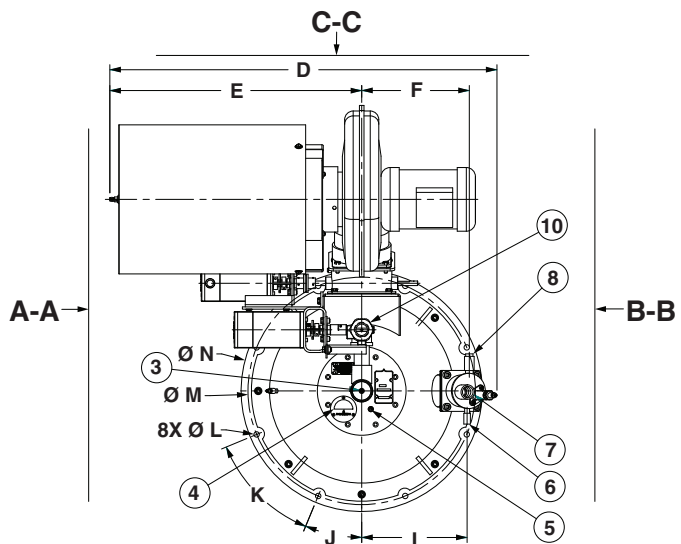


| Dimensions in inches unless stated otherwise | | | | | | | | | |
|--|------|-------|------|-------|-----|--------|----------|-------|------|
| A | B | C | D | E | F | G slot | H square | I Ø | J Ø |
| 40.19 | 12.5 | 17.32 | 5.47 | 23.29 | 45° | 0.62 | 15.5 | 20.25 | 17.5 |

| Dimensions in inches unless stated otherwise | | | | | | | | | |
|--|-------|------|------|-------|------|-----|------|------|--|
| K | L | M | N | O | P Ø | Q | S | T | |
| 52.2 | 28.75 | 26.9 | 3.25 | 16.44 | 10.4 | 4.6 | 28.0 | 24.5 | |

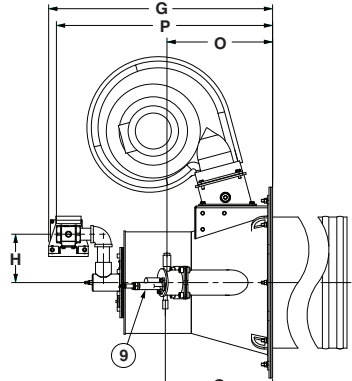
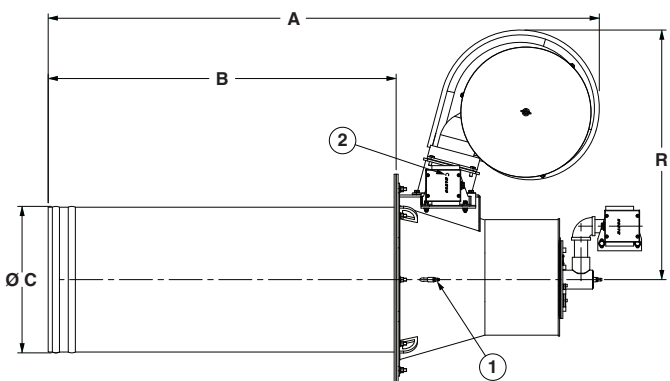
1.5M, 2.5M and 3.0M Packaged Burners - gas control method "S"

- 1) Chamber pressure test port
- 2) Air pressure switch connection
- 3) Gas pressure test port
- 4) Observation port
- 5) Combustion air pressure test port
- 6) 1/4" NPT pilot gas inlet
- 7) 1" NPT-F flame scanner connection
- 8) 1/2" NPT pilot air inlet (if required)
- 9) Spark ignitor
- 10) Gas inlet 1.5M - 1" NPT (F) 2.5M - 1-1/4" NPT (F) 3.0M - 1-1/2" NPT (F)



View A-A

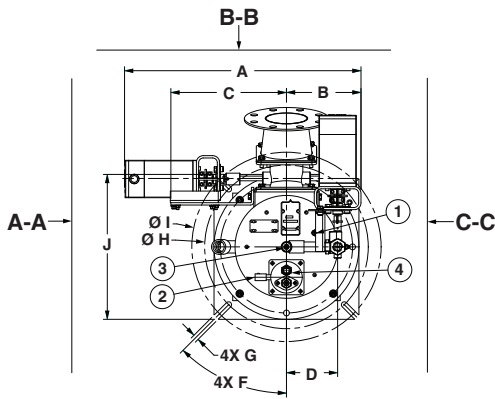
View B-B



| Dimensions in inches unless stated otherwise | | | | | | | | | | | | | | | | | | |
|--|------|-------|------|-------|-------|-------|------|-------|-----------|-----|------|------|------|-------|-----------|-----------|-----------|--|
| A | B | C Ø | D | E | F | G | H | I | J | K | L Ø | M Ø | N Ø | O | P | Q | R | |
| 69.37 | 44.0 | 18.42 | 42.6 | 27.71 | 11.83 | 30.86 | 6.72 | 11.59 | 22.5 ° | 45° | 0.59 | 25.0 | 26.5 | 14.42 | 29.7 8 | 14.6 5 | 31.3 8 | |

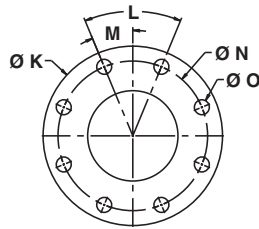
EB2 and EB3 (External Blower) Burners - gas control method "S"

- 1) 1/8" NPT combustion air pressure test port
- 2) 1/4" NPT pilot gas inlet
- 3) Gas pressure test port
- 4) Observation port
- 5) Air pressure switch connection
- 6) Spark ignitor
- 7) 1" NPT-F flame scanner connection
- 8) Chamber pressure test port
- 9) Gas inlet
EB2 - 1/2" NPT (F) EB3 - 3/4" NPT (F)

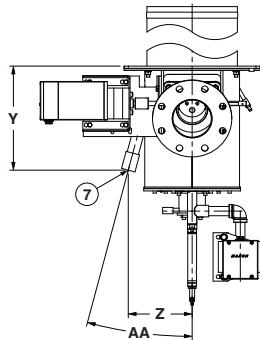


Sketch "A"

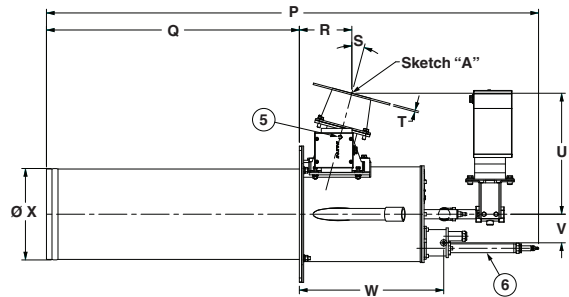
External blower adapter 6" ANSI (PN20) flange bolt pattern



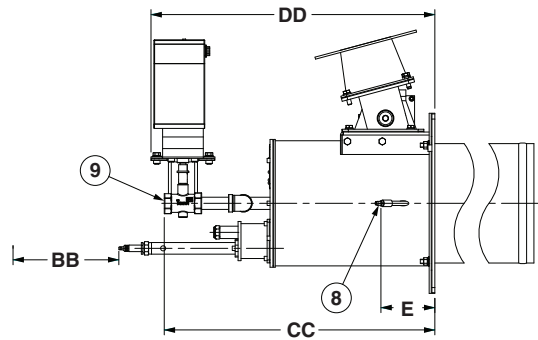
View B-B



View A-A



View C-C

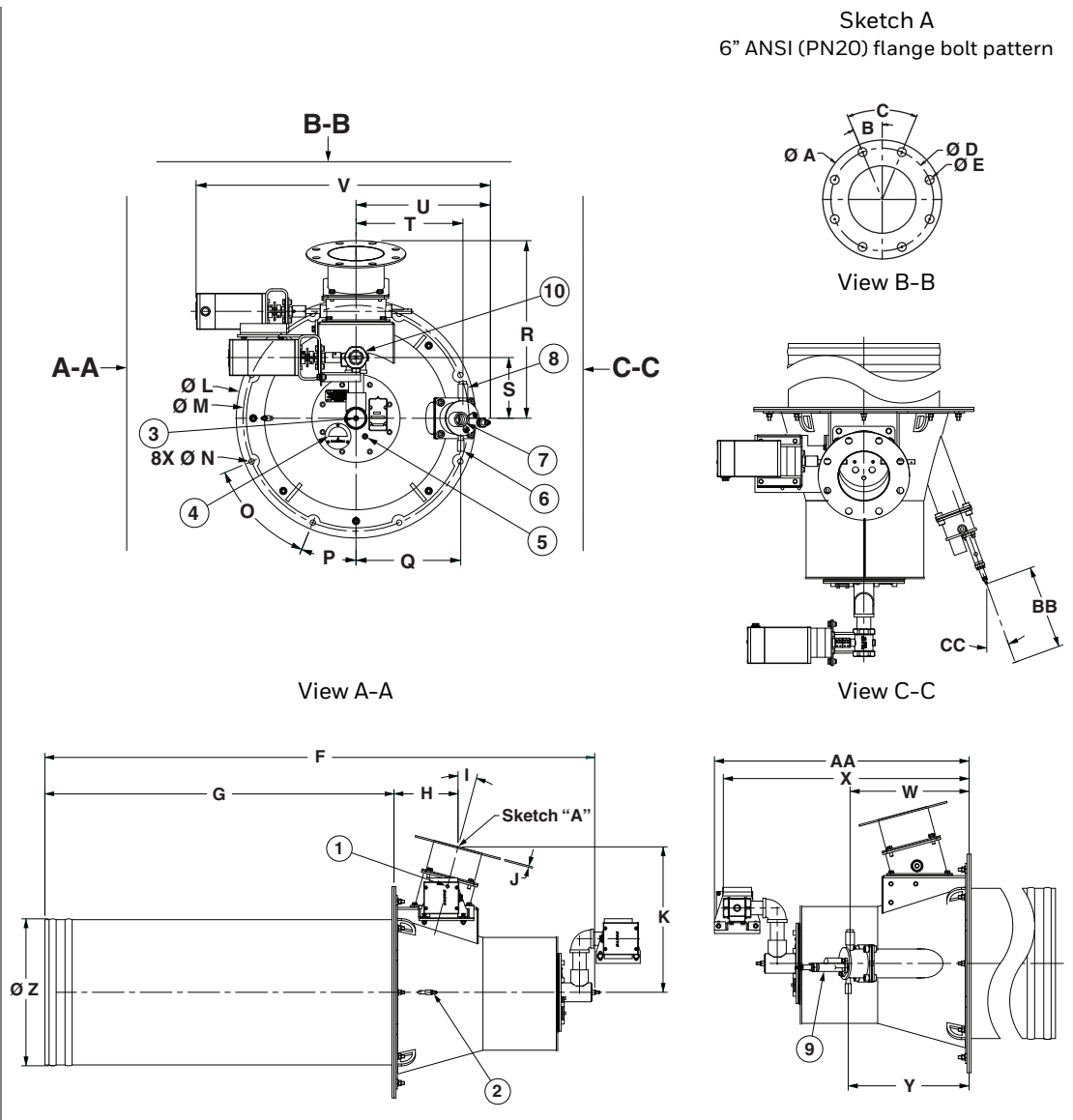


| Dimensions in inches unless stated otherwise | | | | | | | | | | | | | | | |
|--|-----|-------|------|-----|-----|--------|------|-------|------|-----|-----|-------|-----|------|-------|
| A | B | C | D | E | F | G slot | H Ø | I Ø | J | K Ø | L | M | N Ø | O Ø | P |
| 25.29 | 8.0 | 12.37 | 5.47 | 4.6 | 45° | 0.62 | 17.5 | 20.25 | 15.5 | 9.0 | 45° | 22.5° | 7.5 | 0.75 | 55.94 |

| Dimensions in inches unless otherwise stated | | | | | | | | | | | | | |
|--|-----|-----|------|-------|------|-------|------|------|------|-----|------|-------|------|
| Q | R | S | T | U | V | W | X Ø | Y | Z | AA | BB | CC | DD |
| 28.75 | 6.0 | 15° | 0.18 | 13.75 | 3.25 | 16.44 | 10.4 | 11.8 | 7.28 | 15° | 28.0 | 23.28 | 24.4 |

EB4, EB5, & EB6 (External Blower) Burners - gas control method "S"

- 1) Air pressure switch connection
- 2) Chamber pressure test port
- 3) Gas pressure test port
- 4) Observation port
- 5) Combustion air pressure test port
- 6) 1/4" NPT pilot gas inlet
- 7) 1" NPT-F flame scanner connection
- 8) 1/2" NPT pilot air inlet (if required)
- 9) Spark ignitor
- 10) Gas inlet EB4 - 1" NPT (F) EB5 - 1-1/4" NPT (F) EB6 - 1-1/2" NPT (F)

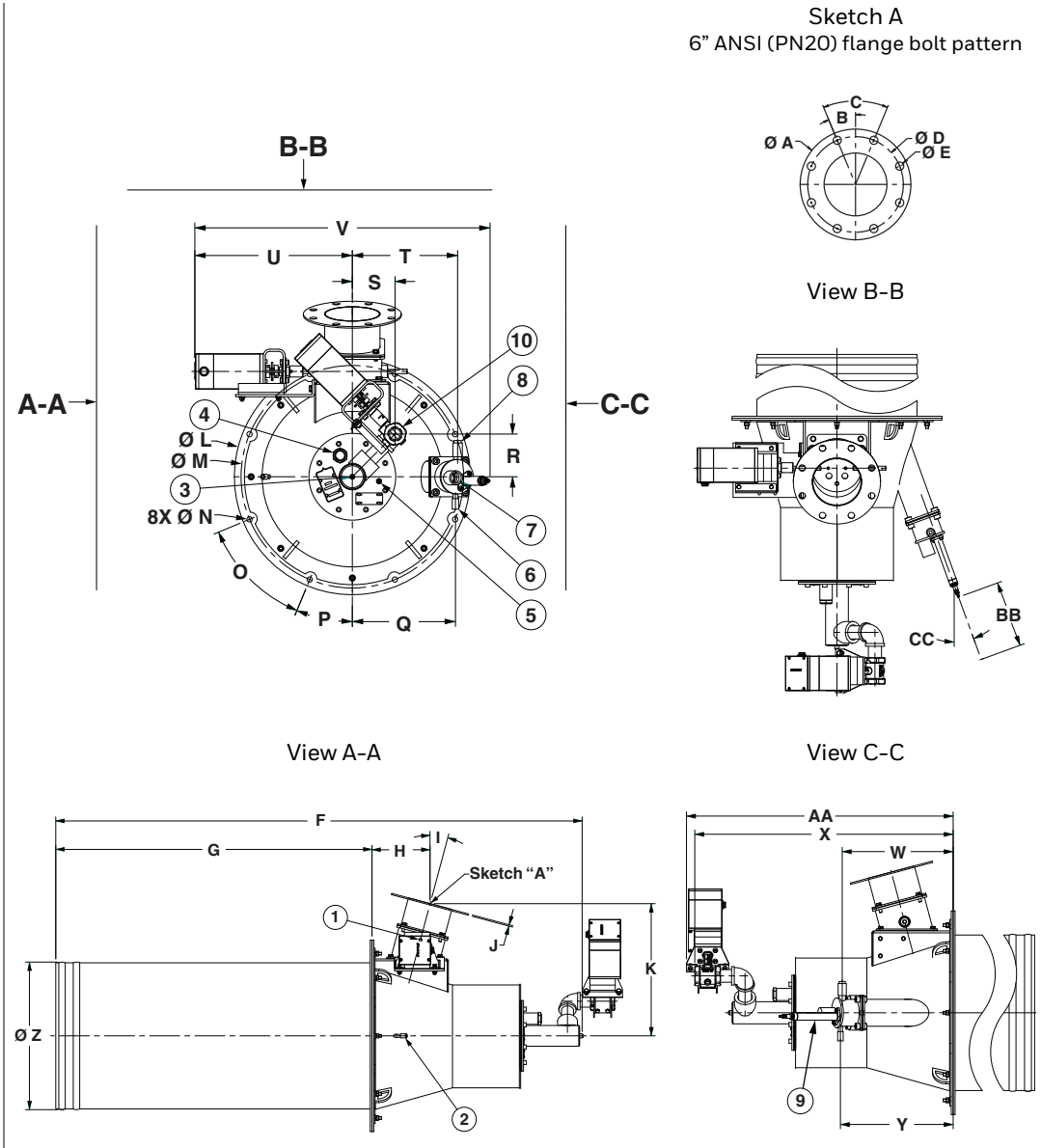


| Dimensions in inches unless stated otherwise | | | | | | | | | | | | | | |
|--|-------|-----|-----|------|------|------|------|-----|------|-------|------|------|------|-----|
| A Ø | B | C | D Ø | E Ø | F | G | H | I | J | K | L Ø | M Ø | N Ø | O |
| 11.0 | 22.5° | 45° | 9.5 | 0.81 | 69.0 | 44.0 | 8.02 | 15° | 0.18 | 18.23 | 26.5 | 25.0 | 0.59 | 45° |

| Dimensions in inches unless stated otherwise | | | | | | | | | | | | | | |
|--|-------|-------|------|-------|-------|-------|-------|--------------|-------|-------|-------|----|-----|--|
| P | Q | R | S | T | U | V | W | X | Y | Z Ø | AA | BB | CC | |
| 22.5° | 11.59 | 19.65 | 6.72 | 11.83 | 14.87 | 32.56 | 14.35 | 29.78 756 | 14.58 | 18.42 | 30.86 | 28 | 20° | |

EB7 (External Blower) Burners - gas control method "S"

- 1) Air pressure switch connection
- 2) Chamber pressure test port
- 3) Gas pressure test port
- 4) Observation port
- 5) Combustion air pressure test port
- 6) 1/4" NPT pilot gas inlet
- 7) 1" NPT-F flame scanner connection
- 8) 1/2" NPT pilot air inlet (if required)
- 9) Spark ignitor
- 10) Gas inlet 1-1/4" NPT (F)



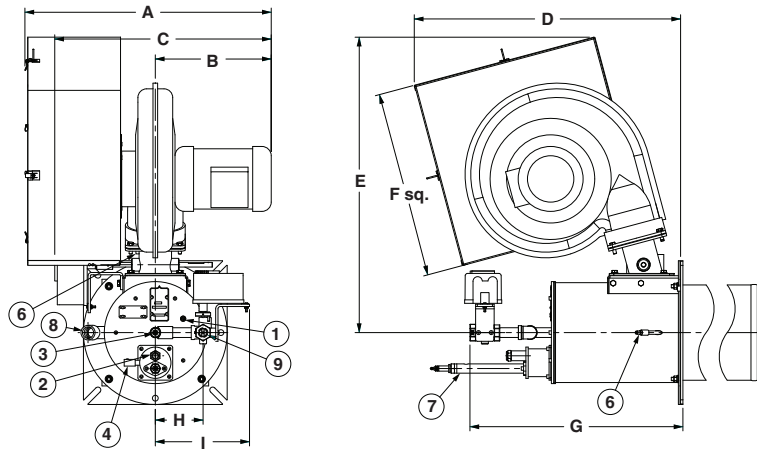
| Dimensions in inches unless stated otherwise | | | | | | | | | | | | | | |
|--|-------|-----|-----|------|------|------|------|-----|------|-------|------|------|------|-----|
| A Ø | B | C | D Ø | E Ø | F | G | H | I | J | K | L Ø | M Ø | N Ø | O |
| 11.0 | 22.5° | 45° | 9.5 | 0.81 | 72.8 | 44.0 | 8.02 | 15° | 0.18 | 18.23 | 26.5 | 25.0 | 0.59 | 45° |

| Dimensions in inches unless stated otherwise | | | | | | | | | | | | | | |
|--|-------|-----|-----|-------|------|------|-------|-------|-------|-------|-------|------|-----|--|
| P | Q | R | S | T | U | V | W | X | Y | Z Ø | AA | BB | CC | |
| 22.5° | 11.59 | 4.8 | 4.8 | 11.83 | 17.8 | 33.2 | 14.35 | 33.58 | 14.58 | 20.42 | 34.65 | 28.0 | 20° | |

Alternate gas control methods - gas control method “C”

0.4M & 0.9M Honeywell ControlLinks actuator with square filter/silencer option

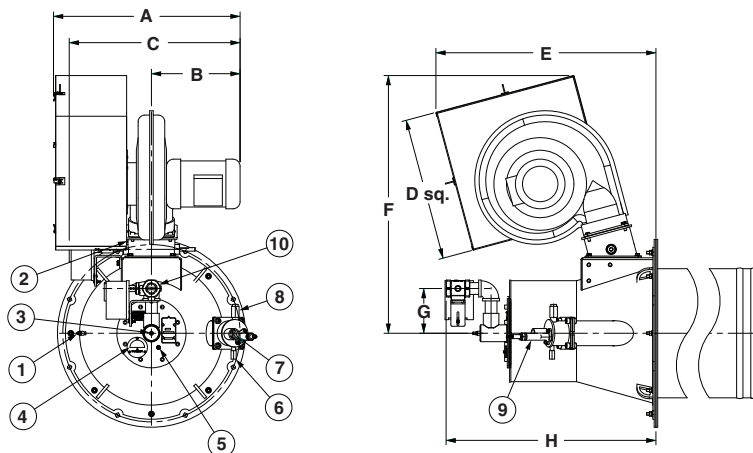
- 1) 1/8" NPT combustion air pressure test port
- 2) Observation port
- 3) Gas pressure test port
- 4) 1/4" NPT pilot gas inlet
- 5) Air pressure switch connection
- 6) Chamber pressure test port
- 7) Spark ignitor
- 8) Flame scanner connection 1" NPT-F
- 9) Gas inlet
0.4M - 1/2" NPT (F)
0.9M - 3/4" NPT (F)



| Dimensions in inches unless stated otherwise | | | | | | | | |
|--|------|------|------|------|----------|------|------|-------|
| A | B | C | D | E | F square | G | H | I |
| 26.56 | 12.5 | 23.3 | 28.7 | 31.9 | 20 | 23.0 | 5.15 | 10.16 |

1.5M, 2.5M & 3.0M Honeywell ControlLinks actuator with square filter/silencer option

- 1) Chamber pressure test port
- 2) Air pressure switch connection
- 3) Gas pressure test port
- 4) Observation port
- 5) Combustion air pressure test port
- 6) 1/4" NPT pilot gas inlet
- 7) 1" NPT-F flame scanner connection
- 8) 1/2" NPT pilot air inlet (if required)
- 9) Spark ignitor
- 10) Gas inlet
1.5M - 1" NPT (F)
2.5M - 1-1/4" NPT (F)
3.0M - 1-1/2" NPT (F)

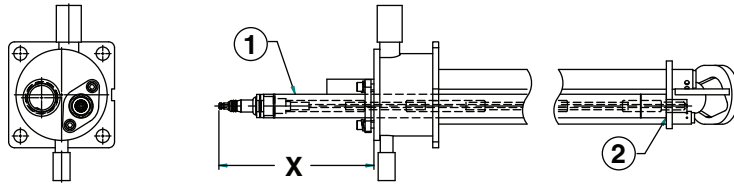


| Dimensions in inches unless stated otherwise | | | | | | | |
|--|------|-------|----------|------|----------|------|------|
| A | B | C | D square | E | F square | G | H |
| 26.31 | 12.5 | 24.09 | 20 | 31.0 | 36.3 | 6.31 | 29.6 |

Accessories and options

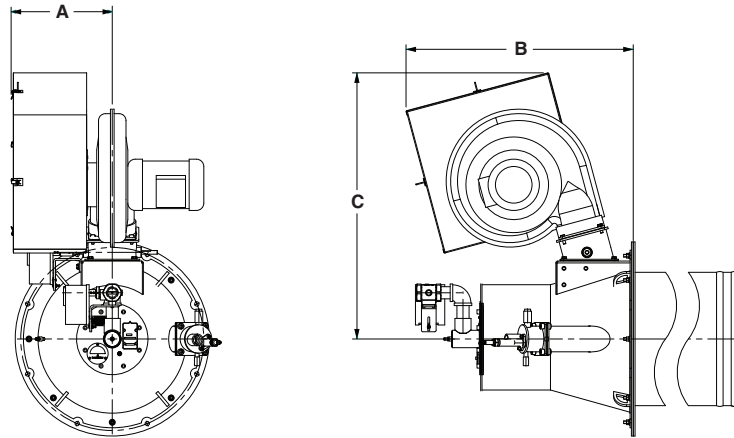
Spark ignitor

- 1) Spark ignitor
- 2) Spark ignitor does not thread into this item. Slip fit.



| Dimensions in inches unless stated otherwise | | |
|--|-------------|---------------|
| Burner size | Dimension X | Spark Ignitor |
| 0.4M & 0.9M, EB2, EB3 | 10.32 | 30 |
| 1.5M, EB4 | 8.89 | |
| 2.5M, EB5 | 4.15 | 24 |
| 3.0M, EB6 | 5.84 | |
| EB7 | 8.3 | |

Filter/silencer



| Dimensions in inches unless stated otherwise | | |
|--|-------|-------|
| A | B | C |
| 13.81 | 30.95 | 36.34 |

MAXON

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Maxon reserves the right to alter specifications and data without prior notice.

Automation and Control Solutions

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 32M-01007-01 M.S. Rev. 04-16
 Printed in United States

