

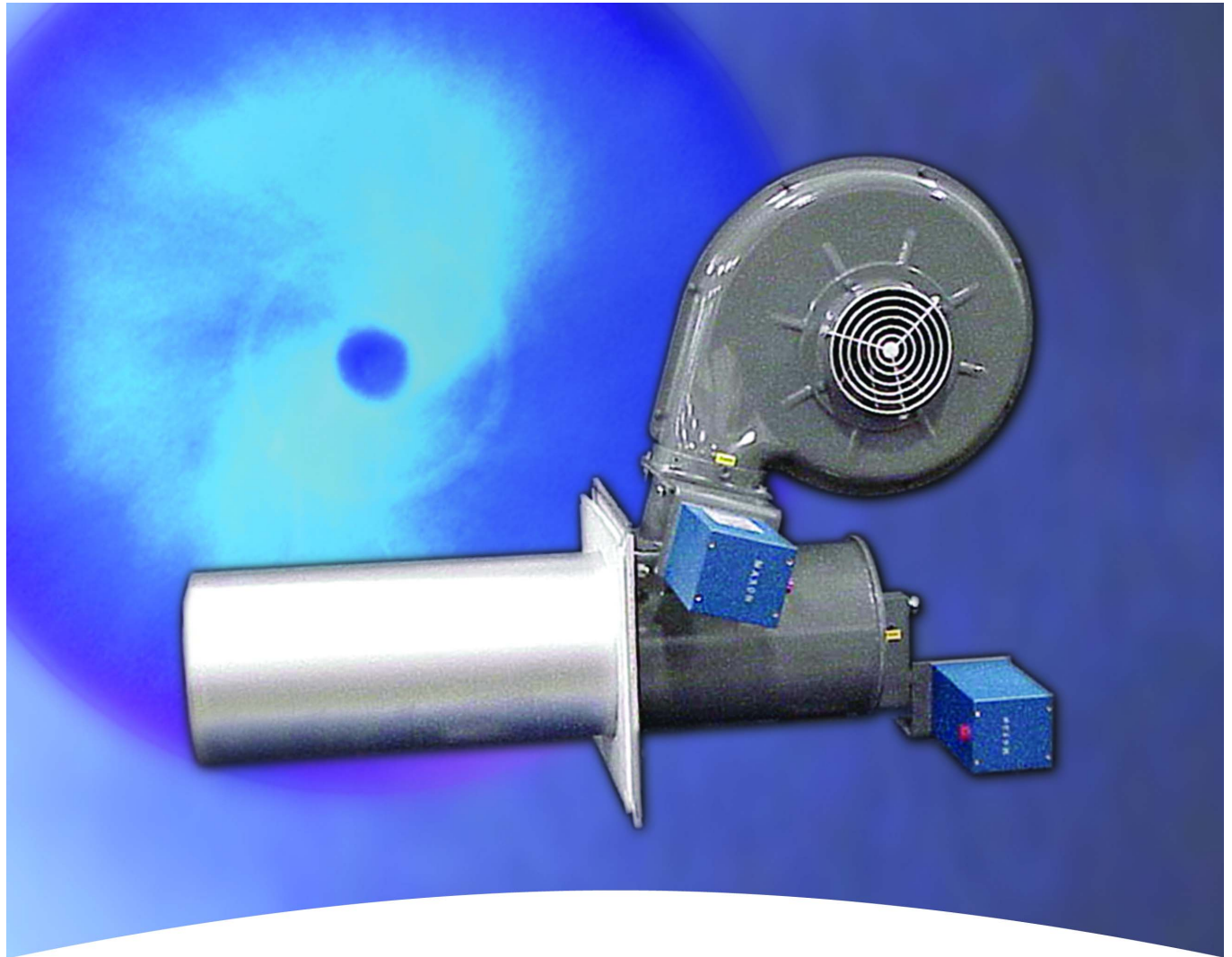
Honeywell

MAXON

MAXON M-PAKT®

ULTRA LOW NO_x BURNERS

TECHNICAL CATALOG



32M-01007-01

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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.

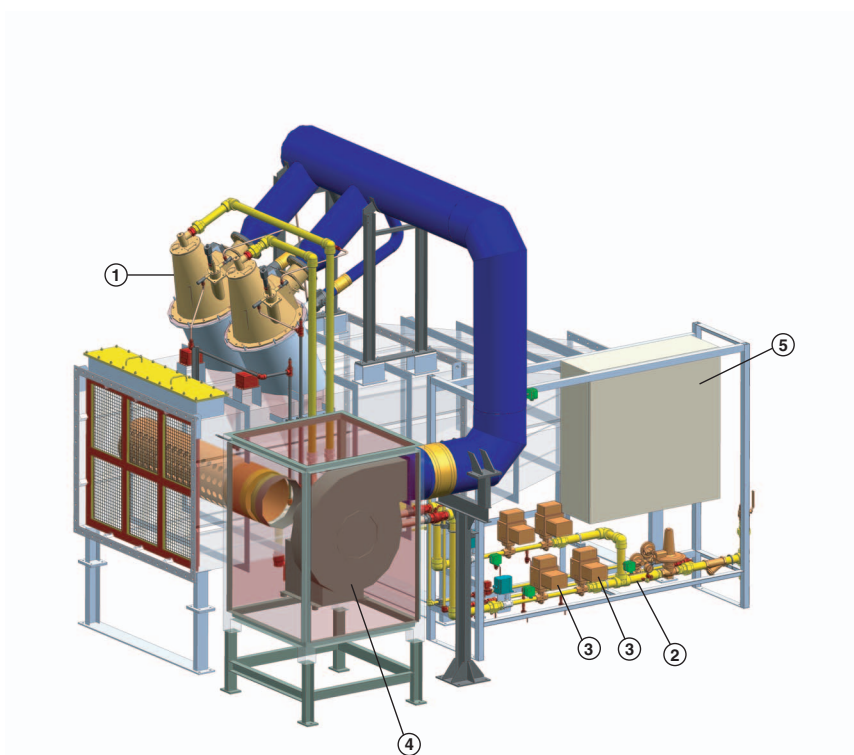
In application, the M-PAKT® Ultra Low Emissions Burner produces single digit NOx corrected to 3% oxygen. In most installations, CO production is limited to extremely low levels. Exact emissions performance may vary in your application. Contact MAXON for information on installation specific estimates 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

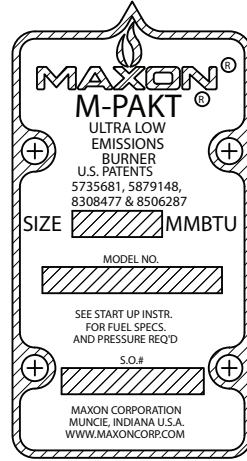
- 1) M-PAKT® Ultra Low NOx Burner
- 2) Pipe train constructed for required codes and authorities
- 3) MAXON Shut-off Valves
- 4) Combustion air blower
- 5) System control panel



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 15°C with 10.9 kWh/Nm ³ HHV - sg = 0.6 [1]						
Combustion air: 15°C - 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]	kW	120	265	468	732	878
Minimum Capacity HHV		20	38	60	110	145
Turndown	N/A	5.9:1	7:1	8.5:1	7:1	7.4:1
Pilot Capacity	kW	6 -23	6 -23	6 -23	6 -23	6 -23
Natural Gas Pressure [3]	mbar	10	26	21	26	24
Inlet Gas Pressure	mbar	20	64	47	92	82
Combustion Air Pressure [5] [6]	mbar	22	22	25	26	23
Combustion Air Flow	m ³ (st)/h	197	433	770	1203	1685
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 = 1.293 kg/Nm³)

[2] Sound pressure level, Lp, measured at 1 meter 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 15°C with 10.9 kWh/Nm ³ HHV - sg = 0.6 [1]							
Combustion air: 15°C - 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]	kW	235	500	800	1320	1700	2460
Minimum Capacity HHV		21	38	60	110	145	264
Turndown	N/A	11.4:1	13.3:1	13.5:1	12.2:1	11.6:1	9.1:1
Pilot Capacity	kW	6 - 23	6 - 23	6 - 23	6 - 23	6 - 23	6 - 23
Natural Gas Pressure [2] [3]	mbar	30	93	60	81	92	149
Inlet Gas Pressure	mbar	37	121	87	157	114	194
Combustion Air Pressure [4] [6]	mbar	74	74	70	82	68	68
Combustion Air Flow	m ³ (st)/h	386	819	1300	2166	2791	4044

[1] sg (specific gravity) = relative density to air (density air = 1.293 kg/Nm³)

[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 538°C. 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 12 m/s 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 < 5 m/s. 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 -10 mbar and +5 mbar.

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 1500°C or higher.

Discharge sleeve recommendations

Desired Excess Air Adjustment	Application Temperature	
	< 530°C	530°C - 760°C
55 - 70%	OK	OK
40 - 55%	OK	Not recommended

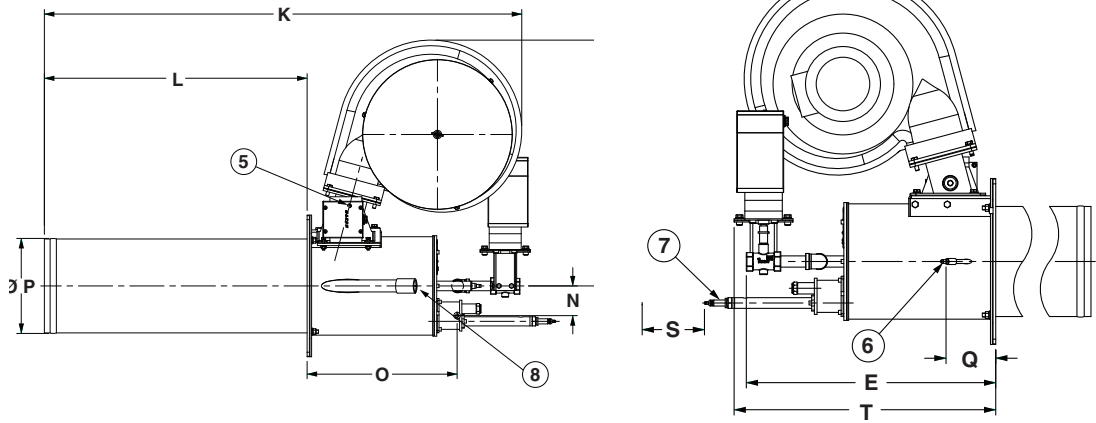
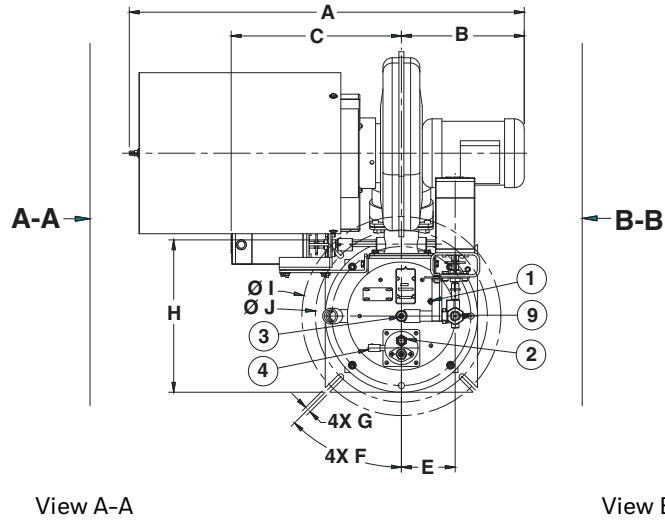
Filter/silencer

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)

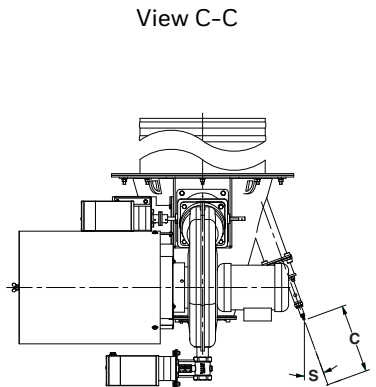
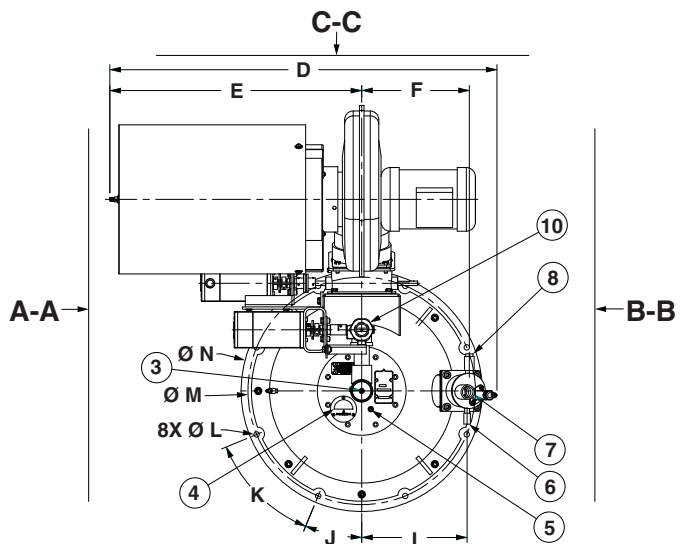


Dimensions in mm unless stated otherwise									
A	B	C	D	E	F	G slot	H square	I Ø	J Ø
1020	318	440	139	592	45°	15	393	514	444

Dimensions in mm unless stated otherwise									
K	L	M	N	O	P Ø	Q	S	T	
1325	730	683	82	417	264	117	711	622	

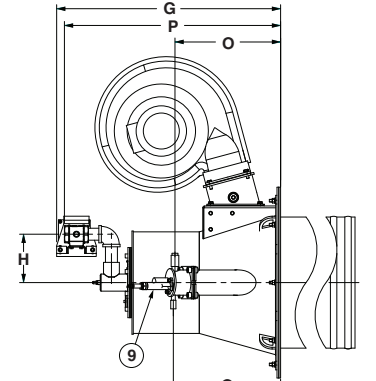
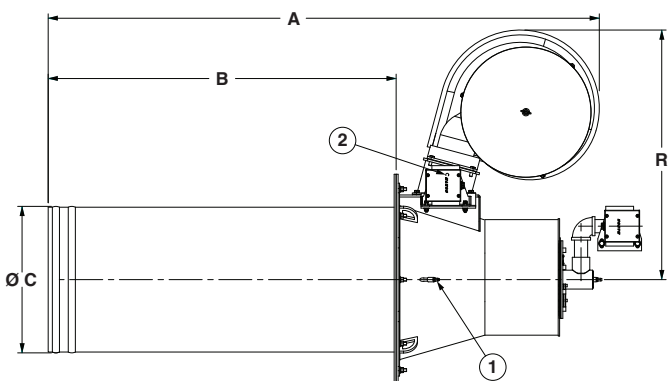
1.5M, 2.5M and 3.0M Packaged Burners - gas control method "S"

- 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

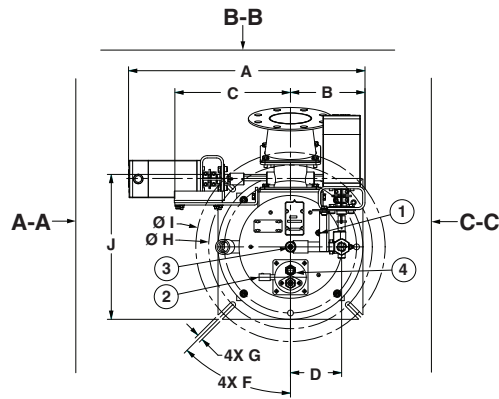
View B-B



Dimensions in mm 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
1761	1117	468	1082	703	300	784	170	294	22.5 °	45°	14	635	673	366	756	372	797

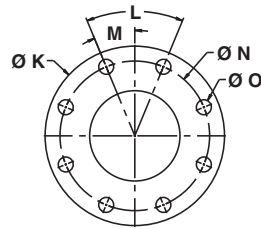
EB2 and EB3 (External Blower) Burners - gas control method "S"

- 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)

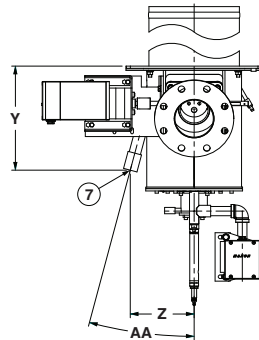


Sketch "A"

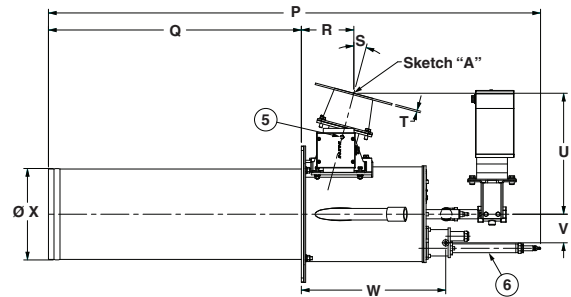
External blower adapter 6" ANSI (PN20) flange bolt pattern



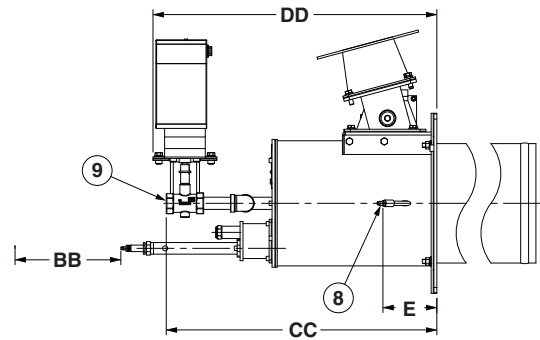
View B-B



View A-A



View C-C



Dimensions in mm unless stated otherwise

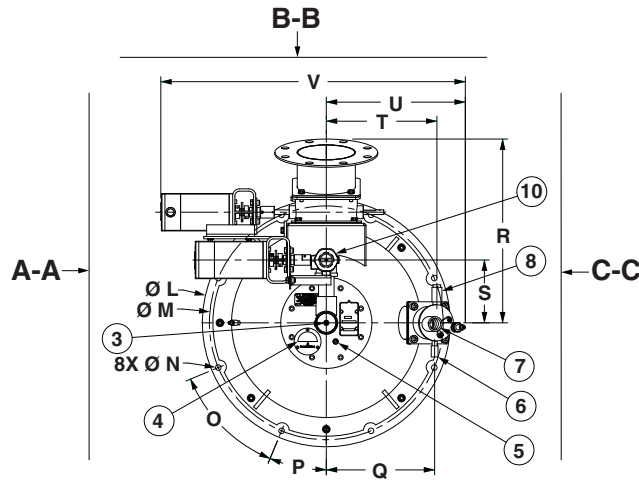
A	B	C	D	E	F	G slot	H Ø	I Ø	J	K Ø	L	M	N Ø	O Ø	P
642	203	314	139	116	45°	15	444	514	393	228	45°	22.5°	190	19	1420

Dimensions in mm unless otherwise stated

Q	R	S	T	U	V	W	X Ø	Y	Z	AA	BB	CC	DD
730	152	15°	4	349	82	417	264	300	184	15°	711	590	620

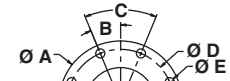
EB4, EB5, & EB6 (External Blower) Burners - gas control method "S"

- 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)

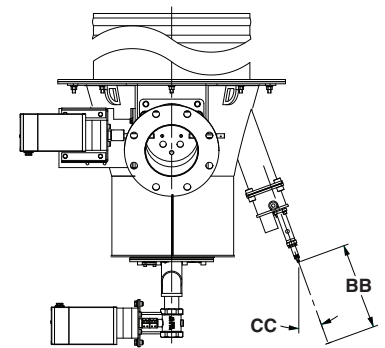


View A-A

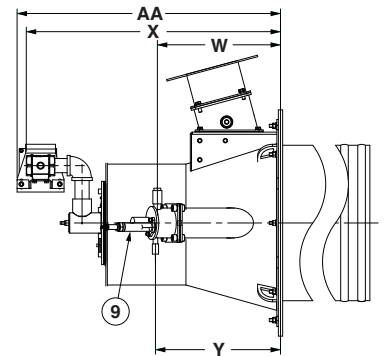
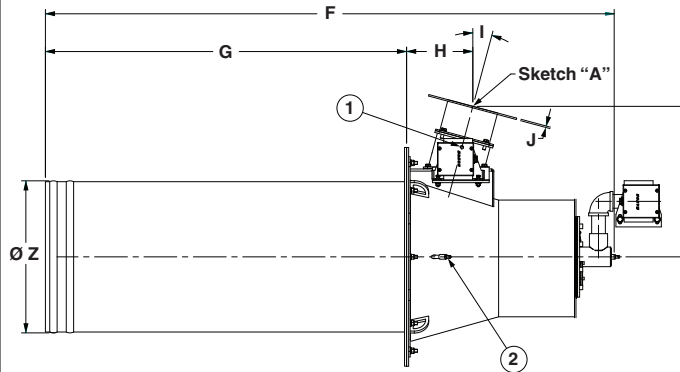
Sketch A
6" ANSI (PN20) flange bolt pattern



View B-B



View C-C

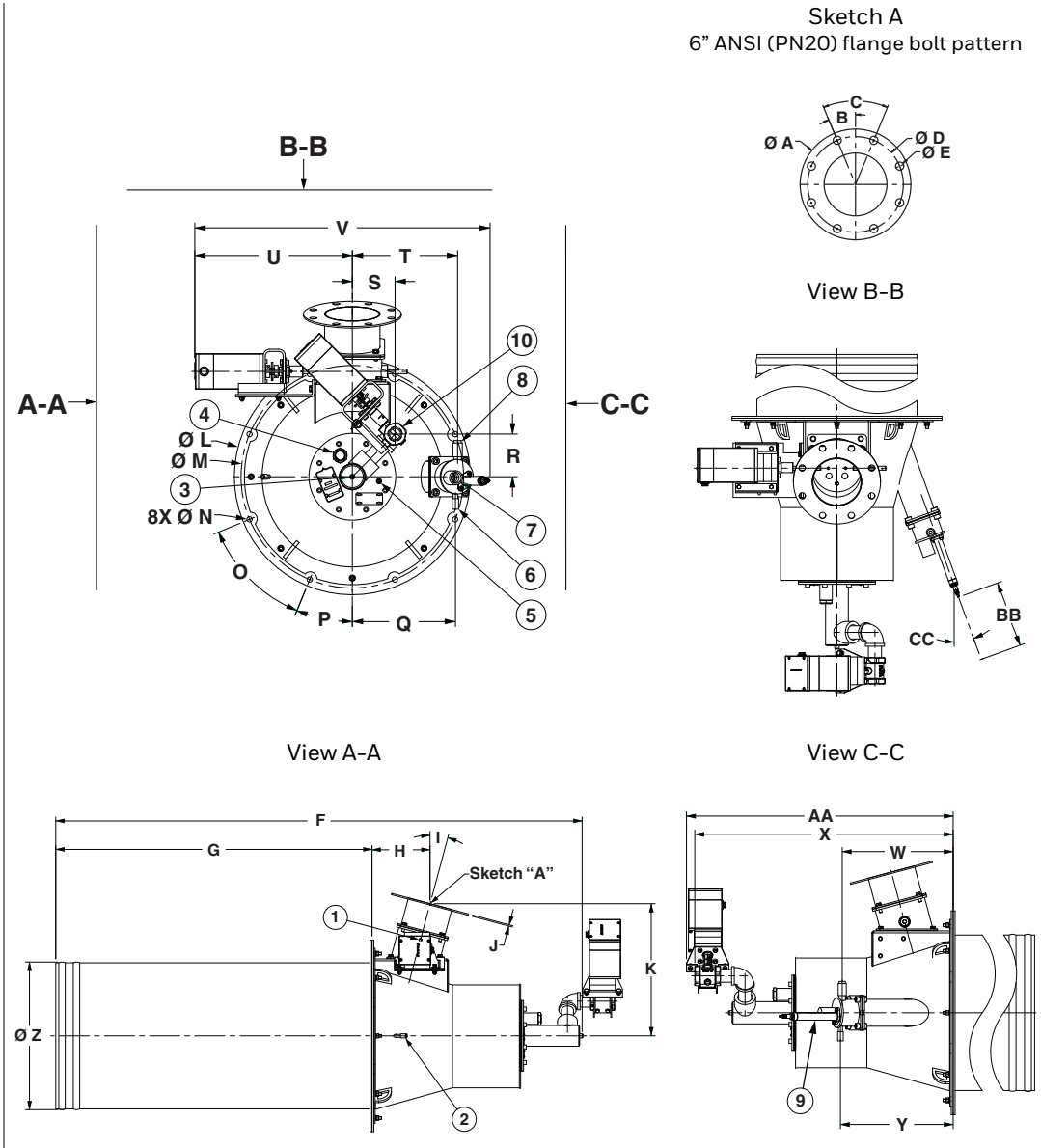


Dimensions inmm unless stated otherwise														
A Ø	B	C	D Ø	E Ø	F	G	H	I	J	K	L Ø	M Ø	N Ø	O
279	22.5°	45°	241	20	1752	1117	204	15°	4	463	673	635	14	45°

Dimensions in mm unless stated otherwise														
P	Q	R	S	T	U	V	W	X	Y	Z Ø	AA	BB	CC	
22.5°	294	500	170	300	378	827	364	29.78 756	370	468	784	711	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)



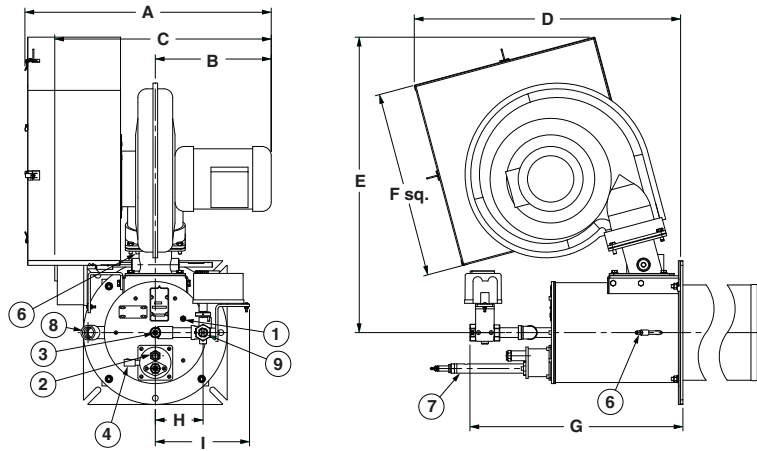
Dimensions in mm unless stated otherwise														
A Ø	B	C	D Ø	E Ø	F	G	H	I	J	K	L Ø	M Ø	N Ø	O
280	22.5°	45°	240	20	1850	1118	204	15°	5	463	673	635	15	45°

Dimensions in mm unless stated otherwise														
P	Q	R	S	T	U	V	W	X	Y	Z Ø	AA	BB	CC	
22.5°	295	122	122	300	452	843	365	853	370	518	880	711	20°	

Alternate gas control methods - gas control method “C”

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

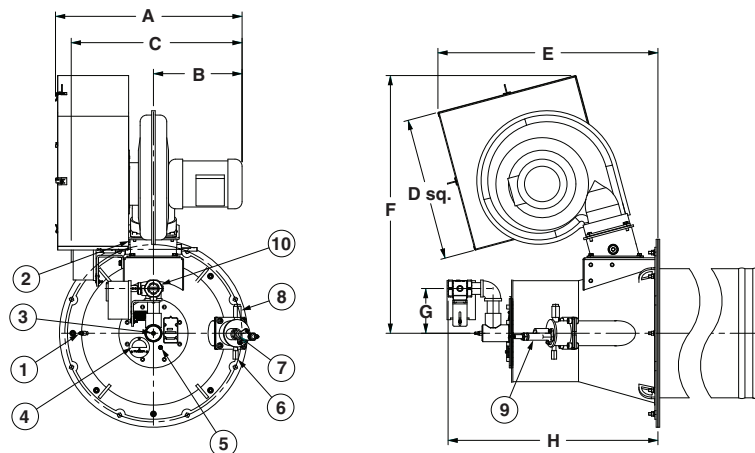
- 1) 1/8" NPT combustion air pressure test port
- 2) Observation port
- 3) Gas pressure test port
- 4) 1/4" NPT pilot gas inlet
- 5) Air pressure switch connection
- 6) Chamber pressure test port
- 7) Spark ignitor
- 8) Flame scanner connection 1" NPT-F
- 9) Gas inlet
0.4M - 1/2" NPT (F)
0.9M - 3/4"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



Dimensions in mm unless stated otherwise								
A	B	C	D	E	F square	G	H	I
675	318	592	729	810	508	584	130	258

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)

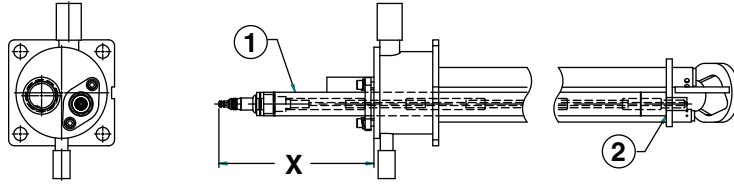


Dimensions in mm unless stated otherwise							
A	B	C	D square	E	F	G	H
668	318	612	508	787	922	160	752

Accessories and options

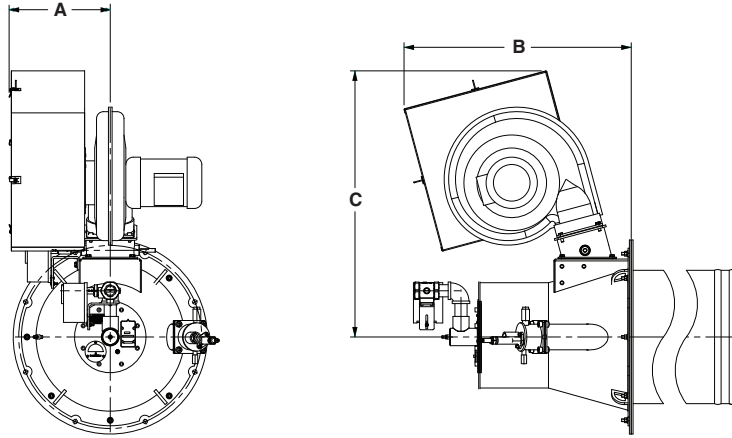
Spark ignitor

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



Dimensions in mm unless stated otherwise		
Burner size	Dimension X	Spark Ignitor
0.4M & 0.9M, EB2, EB3	262	762
1.5M, EB4	226	
2.5M, EB5	105	610
3.0M, EB6	148	
EB7	211	

Filter/silencer



Dimensions in mm unless stated otherwise		
A	B	C
350	786	923

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