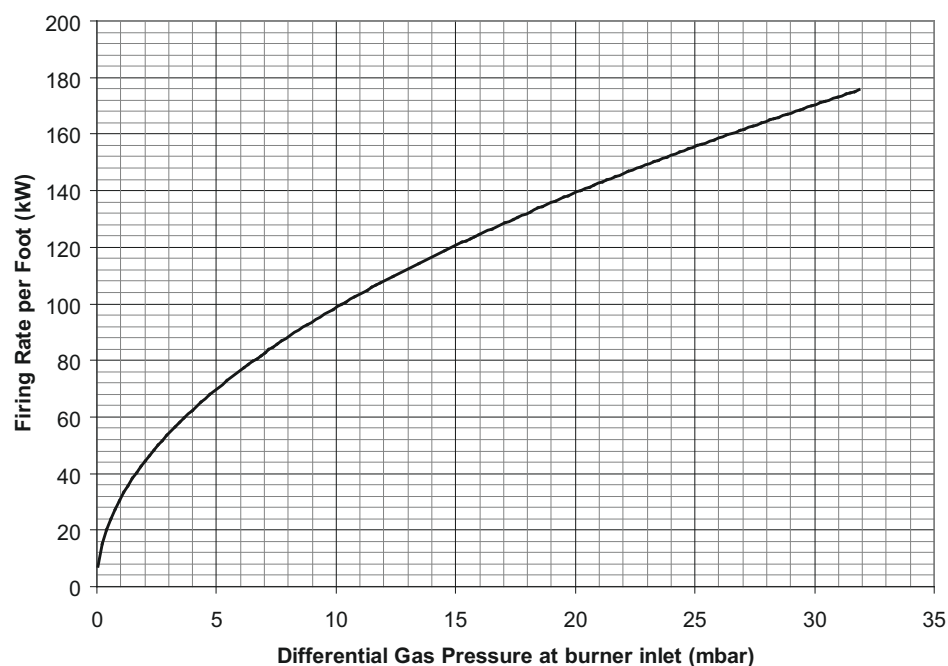


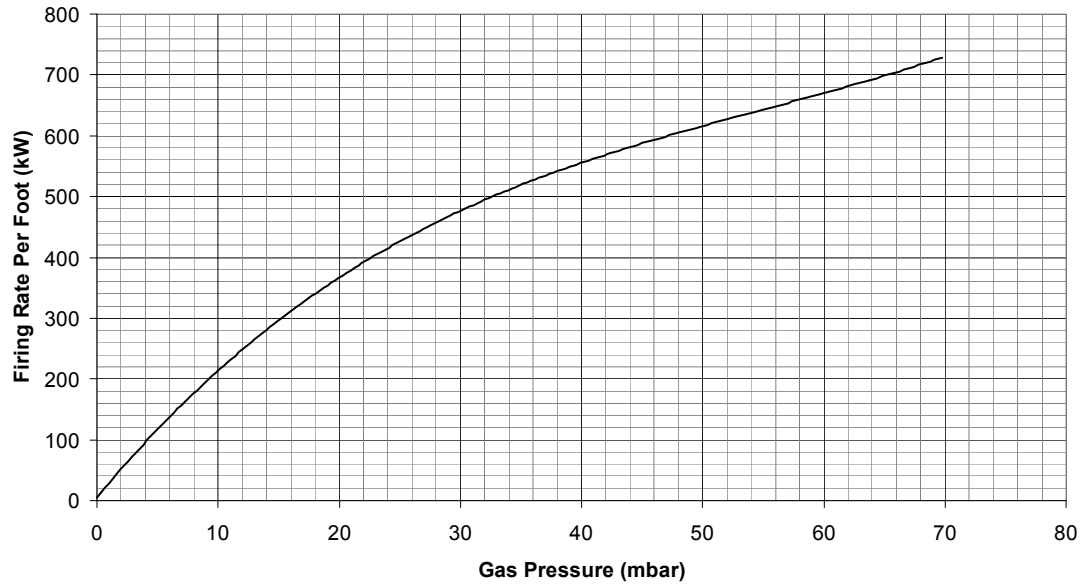
Specifications of Series LV AIRFLO® burners

Burner capacity versus gas pressure - LV-NP1 AIRFLO® burners

Capacity vs. gas pressures



- Gas pressures are valid for use with natural gas with 10 kWh/Nm³ high heating value.
- Pressures are valid for burners with standard drilling (24 drillings/foot). The use of alternative drillings will lower the required gas pressure for a given burner capacity.

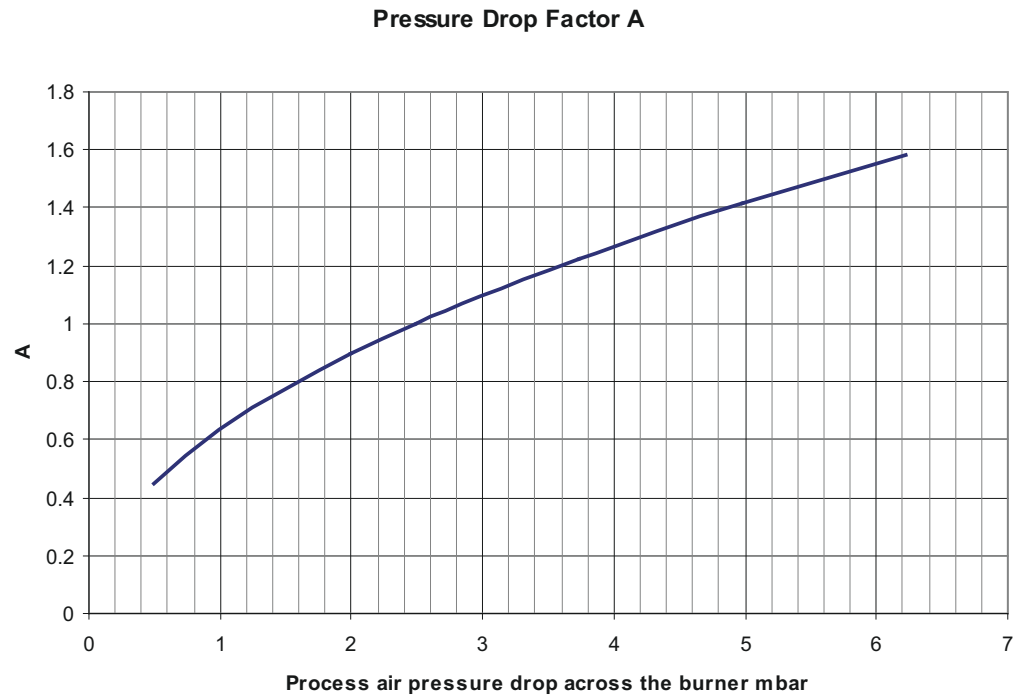
Burner capacity versus gas pressure - LV-3, -4 & -5 AIRFLO® burners**Capacity vs. gas pressures**

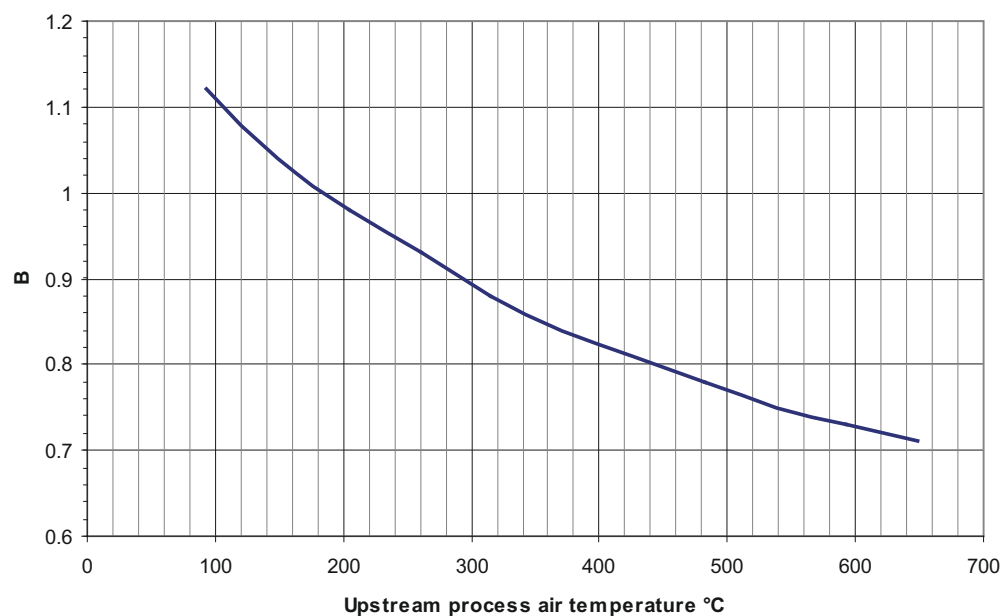
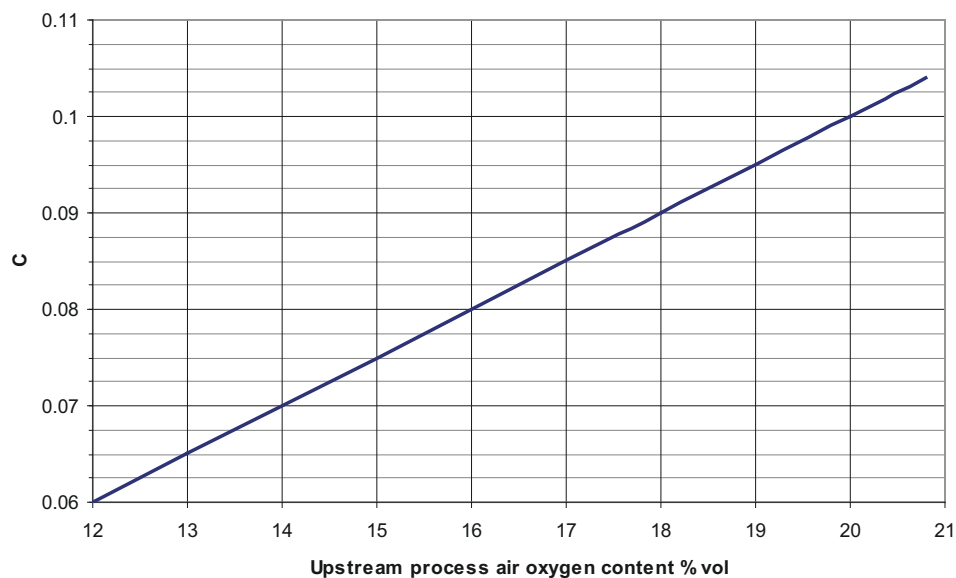
- Gas pressures are valid for use with natural gas with 10 kWh/Nm³ high heating value.
- Pressures are valid for burners with standard drilling (24 drillings/foot). The use of alternative drillings will lower the required gas pressure for a given burner capacity.

Maximum capacity

Maximum burner capacity depends on incoming process air temperature, process air oxygen content and process air pressure drop across the burner.

To determine the maximum capacity for your application, three factors (A, B, C) should be determined using the following graphs:



Temperature factor B**Oxygen content factor C**

The maximum burner capacity per foot is now given by multiplying above factors by the constant 7000.

$$\text{Maximum capacity/ft (kW)} = A \times B \times C \times 7000$$

W W W . M A X O N C O R P . C O M

COMBUSTION SYSTEMS FOR INDUSTRY

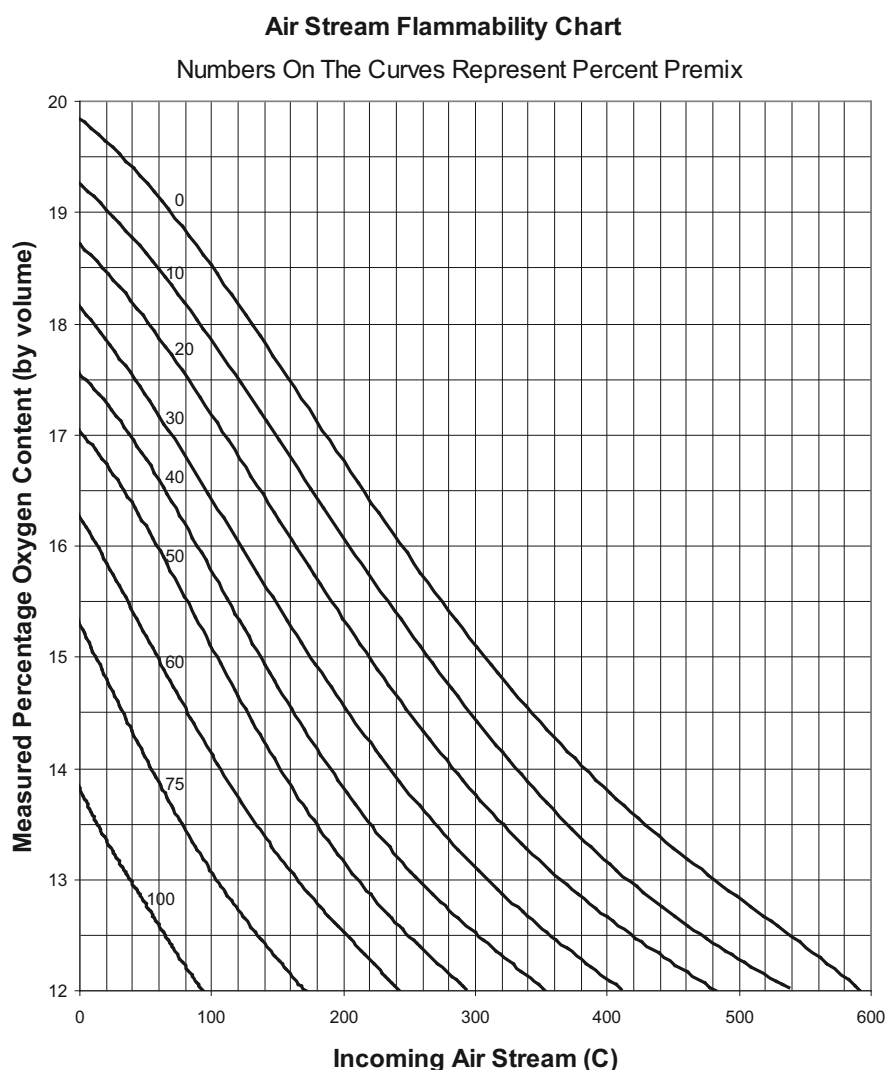
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Process flow oxygen content and flammability

Since oxygen content within the air stream is critical to the flammability range of a Series LV AIRFLO® burner, it also affects the maximum capacity (kW per lineal foot) of the burner assembly.

The graph below relates the incoming air stream temperature (°C) and the measured percentage of oxygen remaining in this air stream.

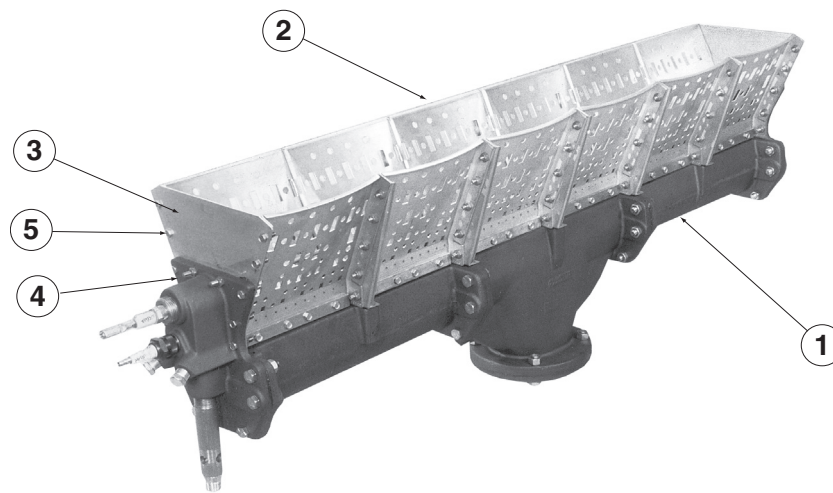
This will show graphically the flammability (or the capability) of the air stream to support raw gas combustion. Any combination of temperatures and oxygen levels falling above the raw gas firing line should support combustion with a raw gas Series LV AIRFLO® burner system. Any combination of incoming temperature and measured percent of oxygen falling below the raw gas line will normally require the designated percentage of premixture through the Series LV AIRFLO® burner system.



Materials of construction

Item Number	Burner part	Material				
		LV-NP1	LV-3G	LV-4D	LV-5D	LV-5B
1	Burner body	Gray iron	Gray iron	Ductile iron	Ductile iron	Aluminum bronze
2	Mixing plates	321 SS (1.4541)	321 SS (1.4541)	310 SS (1.4841)	Hastelloy X	Hastelloy X
3	End plates	321 SS (1.4541)	321 SS (1.4541)	310 SS (1.4841)	310 SS (1.4841)	Hastelloy X
4	End flanges	Cast iron	Cast iron	Ductile iron	Ductile iron	Aluminum bronze
5	Fasteners	Zinc plated alloy steel	Zinc plated alloy steel	300 Series SS or A-286 [1]	300 Series SS or A-286 [1]	300 Series SS or A-286 [1]

[1] Choice of fastener material based on upstream process temperature



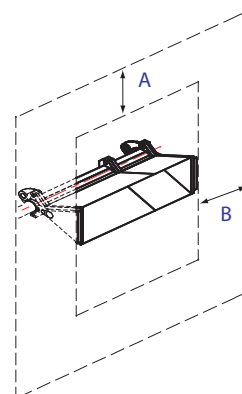
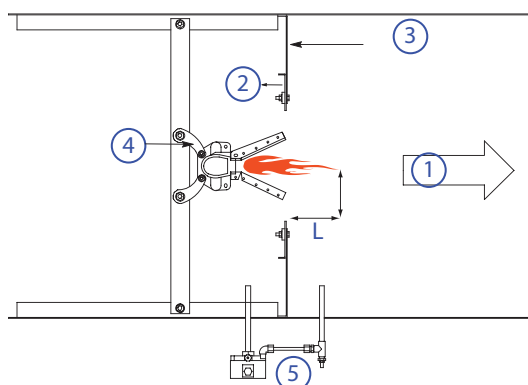
Selection criteria

Air stream velocity

Air stream velocity and resulting pressure drop affect performance of Series LV AIRFLO® burners. This velocity across and through the burner's mixing plates must be kept uniform by use of a silhouette profile plate through which the burner fires. A minimum 150 mm profile plate should be installed surrounding the interior duct walls at the leading edge of the burner's mixing plates.

- 1) direction of process air movement
- 2) adjustable profile plate
- 3) fixed profile plate
- 4) universal support bracket
- 5) differential pressure switch

A Minimum 150 mm
B Minimum 150 mm
L Flame length



Since Series LV AIRFLO® burners are installed in such widely diversified applications, it is often difficult to get into the chamber/duct and profile plate area to obtain any velocity pressure readings described above. For this reason, a close approximation of operating velocities may be made with a measurement of duct static pressure drop. Preferably, a static pressure test point on duct diameter in distance upstream from the profile plate and one duct diameter length downstream will give approximation of operating velocity across the burner. These static pressure drops relate to velocity as shown in the table below.

Velocity relative to static pressure drop											
Approximate air stream velocity at burner profile plate	m/s	5	7.5	10	12.5	15	17.5	20	22.5	25	28
Duct static pressure drop through profile opening [1]	mbar	0.25	0.5	1	1.5	2.2	3	4	5	6.2	7.5

[1] Based on profile/burner plane K factor of 0.8. May vary with your specific duct size/profile area relationship.

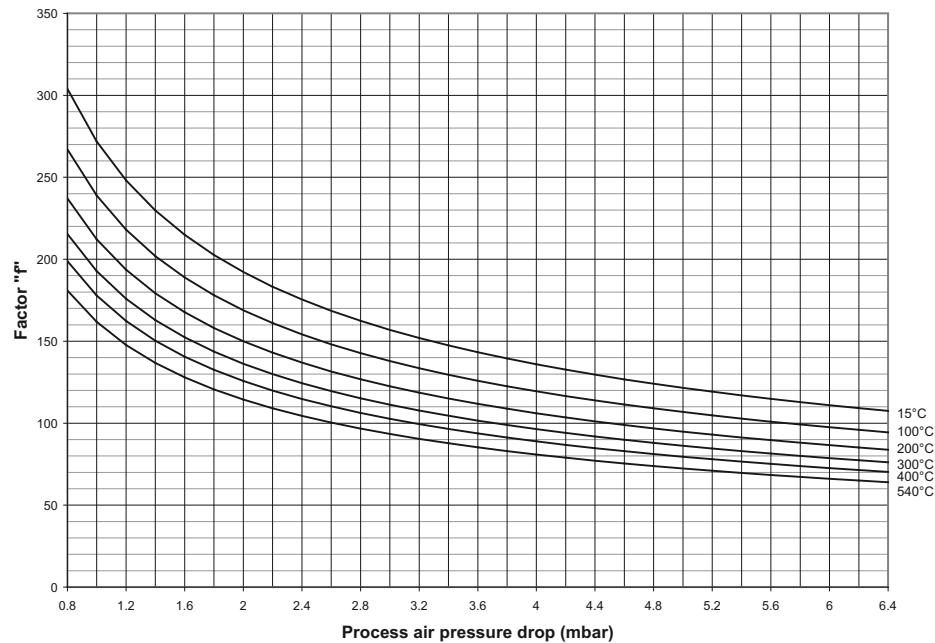
The relation between velocity and pressure differential across the burner slightly differ with the ratio between net profile area and total duct section.



CAUTION: Do not try to take a differential static pressure reading from a test port at or near an elbow in the duct or chamber due to potentially erroneous readings caused by turbulence set up within the duct at such points. Measure in a straight duct with at least one diameter in length before and after the test port location.

Profile plate calculation example

To determine the required profile plate opening area, the minimum and maximum process air pressure drop across the burner should be calculated first using the graph below.



Calculation example

Process air data:

Maximum process air flow = 30,000 m³(st)/h

Minimum process air flow = 12,000 m³(st)/h

Inlet air temperature = 540°C constant

To keep the process air pressure drop to a minimum for high air flow conditions, the process air pressure drop on low air flow conditions should be minimized. In this example, we chose 0.8 mbar.

For this condition, the factor "f" = 180 (see above chart).

The net free area is defined by the following equations:

$$\text{Net free area (cm}^2\text{)} = "f" \times \text{actual air flow (m}^3\text{/h)} / 1000$$

$$\text{Actual air flow at low flow conditions} = 12,000 \times (273 + 540) / (273 + 15) = 33,875 \text{ m}^3\text{/h}$$

$$\text{Net free area} = 180 \times 33,875 / 1000 = 6097 \text{ cm}^2$$

To calculate the pressure drop over the burner at maximum flow conditions, the same equation gives:

$$\text{Net free area (cm}^2\text{)} = "f" \times \text{actual air flow (m}^3\text{/h)} / 1000$$

$$6097 = "f" \times 30,000 \times (273 + 540) / (273 + 15) / 1000$$

$$"f" = 72$$

From the above graph:

$$\text{Process air pressure drop} = 5.2 \text{ mbar}$$

To know the actual opening area of the profile plate for this burner, the net free area calculated above need to be added to the burner displacement area. (See table on page 4-21.4-16 for burner displacement area data.)

Inlet feed limitations

The maximum number of units of burner per gas inlet connection should be limited in order to guarantee correct gas distribution inside the burner manifold. Insufficient or badly distributed gas inlet connections may affect flame length, pollutant emissions and temperature distribution downstream of the burner. Refer to the table below as a guideline for natural gas. The number of gas inlets should be reconsidered for gases different from natural gas (for example, gases with lower calorific value).

Contact MAXON for more details.

Series LV AIRFLO® burner		
Inlet pipe size	Burner section	Maximum capacity per inlet kW
1-1/4"	End inlet flange set	440
1-1/2"	End inlet flange set	700
2"	End inlet flange set	1025
2"	12" straight (12B)	2050
3"	36" back inlet (BH)	2400
3"	12" straight (12B)	3000
3"	12" x 12" cross (BX)	3000
4"	12" x 12" cross (BX)	3500

NOTE: Cast iron or ductile iron 12" x 12" cross (BX) must not be mated directly to another cast iron or ductile iron 12" x 12" cross (BX).

Burner sections

Burner type	LVNP1	LV3G24	LV3G48	LV3G96	LV3G120	LV4D24	LV4D48	LV4D96	LV4D120
	Gray iron bodies with AISI321 (1.4541) stainless steel mixing plates					Ductile iron bodies with AISI310 (1.4841) stainless steel mixing plates			
Description	Designation								
6" straight	LVNP1-6	LV3G24-6	LV3G48-6	LV3G96-6	LV3G120-6	LV4D24-6	LV4D48-6	LV4D96-6	LV4D120-6
12" straight	LVNP1-12	LV3G24-12	LV3G48-12	LV3G96-12	LV3G120-12	LV4D24-12	LV4D48-12	LV4D96-12	LV4D120-12
18" straight	LVNP1-18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24" straight	LVNP1-24	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12" x 6" tee	N/A	LV3G24-T	LV3G48-T	LV3G96-T	LV3G120-T	LV4D24-T	LV4D48-T	LV4D96-T	LV4D120-T
12" x 12" cross	N/A	LV3G24-X	LV3G48-X	LV3G96-X	LV3G120-X	LV4D24-X	LV4D48-X	LV4D96-X	LV4D120-X
12" back inlet straight	LVNP1-12B	LV3G24-12B	LV3G48-12B	LV3G96-12B	LV3G120-12B	LV4D24-12B	LV4D48-12B	LV4D96-12B	LV4D120-12B
12" x 12" back inlet cross	N/A	LV3G24-BX	LV3G48-BX	LV3G96-BX	LV3G120-BX	LV4D24-BX	LV4D48-BX	LV4D96-BX	LV4D120-BX
36" back inlet H	N/A	LV3G24-BH	LV3G48-BH	LV3G96-BH	LV3G120-BH	LV4D24-BH	LV4D48-BH	LV4D96-BH	LV4D120-BH

Burner type	LV5D24	LV5D48	LV5D96	LV5D120	LV5B24	LV5B48	LV5B96	LV5B120
	Ductile iron bodies with Hastelloy X mixing plates				Aluminum bronze bodies with Hastelloy X mixing plates			
Description	Designation							
6" straight	LV5D24-6	LV5D48-6	LV5D96-6	LV5D120-6	LV5B24-6	LV5B48-6	LV5B96-6	LV5B120-6
12" straight	LV5D24-12	LV5D48-12	LV5D96-12	LV5D120-12	LV5B24-12	LV5B48-12	LV5B96-12	LV5B120-12
12" x 6" tee	LV5D24-T	LV5D48-T	LV5D96-T	LV5D120-T	LV5B24-T	LV5B48-T	LV5B96-T	LV5B120-T
12" x 12" cross	LV5D24-X	LV5D48-X	LV5D96-X	LV5D120-X	N/A	N/A	N/A	N/A
12" back inlet straight	LV5D24-12B	LV5D48-12B	LV5D96-12B	LV5D120-12B	LV5B24-12B	LV5B48-12B	LV5B96-12B	LV5B120-12B
12" x 12" back inlet cross	LV5D24-BX	LV5D48-BX	LV5D96-BX	LV5D120-BX	N/A	N/A	N/A	N/A
36" back inlet H	LV5D24-BH	LV5D48-BH	LV5D96-BH	LV5D120-BH	N/A	N/A	N/A	N/A

N/A = Not applicable

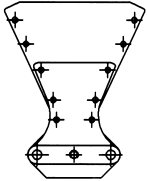
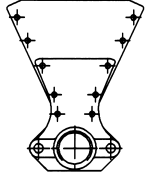
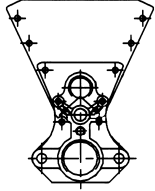
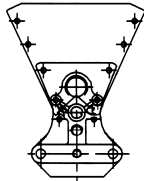
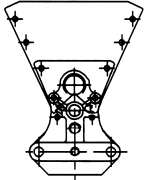
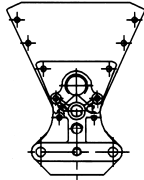
Burner displacement and weight

Burner type	LVNP1		LV3G		LV4D		LV5D		LV5B	
Description	Area cm ² /section	Weight kg	Area cm ² /section	Weight kg	Area cm ² /section	Weight kg	Area cm ² /section	Weight kg	Area cm ² /section	Weight kg
6" straight	148	3.6	176	6.3	176	5.9	176	5.9	176	6.8
12" straight	297	5.9	353	9.5	353	9.1	353	9.1	353	9.1
18" straight	446	9.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24" straight	595	11.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12" x 6" tee	N/A	N/A	427	13.1	427	12.7	427	12.7	427	13.6
12" x 12" cross	N/A	N/A	529	16.3	529	15.9	529	15.9	N/A	N/A
12" back inlet straight	297	7.2	353	13.6	353	13.1	353	13.1	353	14.1
12" x 12" back inlet cross	N/A	N/A	529	18.6	529	18.1	529	18.1	N/A	N/A
36" back inlet H	N/A	N/A	855	40.8	855	38.5	855	38.5	N/A	N/A

N/A = Not applicable

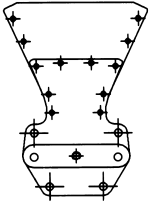
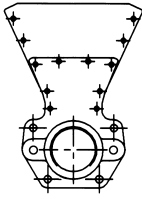
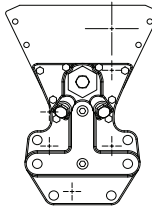
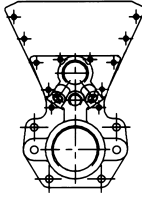

Pilots, end closures and end inlet flange sets for Series LV-NP1 AIRFLO® burners

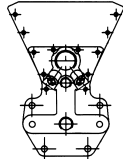
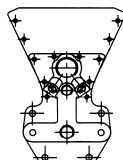
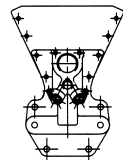
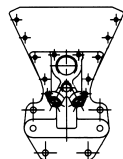
All open ends of the burner assembly must be closed off with one of these end closures or pilots.

Series LV-NP1 AIRFLO® burners			
Designation	Description	Model	Weight kg
PLAIN END PLATE SET	Plain end plate set		1.4
1.25" END INLT FLG SET	1-1/4" end inlet flange set		1.8
NPF 1.25" FR-SI 2-PC DS SET	NPF - 1-1/4" flame rod - spark ignitor 2-piece direct spark set includes a spark ignitor (order a flame rod separately)		1.8
NP MINI-PAK PILT ASY W/SI, ORIF	NP MINI-PAK pilot assembly, includes a spark ignitor and adjustable orifice (order a flame rod, if used, separately)		1.4
NP-PAK PILT SET W/SI, ETC	NP MINI-PAK pilot assembly, includes a spark ignitor, an adjustable orifice, 5/16" shut-off cock and 24" of 5/16" diameter tubing (order a flame rod, if used, separately)		1.8
NP-PAK PILT SET W/SI	NP-PAK pilot set with spark ignitor		1.8

Pilots, end closures and end inlet flange sets for Series LV-3, -4 & -5 AIRFLO® burners

All open ends of the burner assembly must be closed off with one of these end closures or pilots.

Series LV-3, -4 & -5 AIRFLO® burners			
Designation	Description	Model	Weight kg
PLAIN END PLATE SET	Plain end plate set		1.8
2" END INLET SET	2" end inlet set		1.8
DIR SPRK SET W/18075 SI	Direct spark set (includes a spark ignitor and provides for mounting a flame rod; order flame rod separately)		1.8
2" INLT DS SET W/18075 SI	2" inlet direct spark set (includes a spark ignitor and provides for mounting a flame rod; order flame rod separately)		2.3
2' END INLET FLANGE	2" end inlet flange		1.0

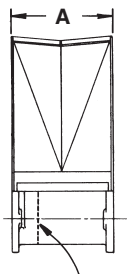
Series LV-3, -4 & -5 AIRFLO® burners			
Designation	Description	Model	Weight kg
BUILT-IN PILT SET (DIR MNT) (see illustrations below for mounting requirements)	Built-in pilot set, for direct mounted flame rod/UV scanner and spark ignitor, includes a spark ignitor (order flame rod, if used, separately)		2.7
BUILT-IN PILT SET (EXT MNT) (see illustrations below for mounting requirements)	Built-in pilot set, for externally mounted flame rod/UV scanner and spark electrode (order flame rod, if used, electrode, and external mounting assembly separately)		2.7
AIRFLO-PAK PILT SET (DIR MNT)	AIRFLO-PAK pilot set, for direct mounted flame rod/UV scanner and spark ignitor, includes a spark ignitor (order flame rod, if used, and pilot mixer separately) [1]		3.6
AIRFLO-PAK PILT SET (EXT MNT)	AIRFLO-PAK pilot set, for externally mounted flame rod/UV scanner and spark electrode (order flame rod, if used, spark electrode, pilot mixer and external mounting assembly separately) [1]		3.6

[1] For Series LV-5B assemblies, uses ductile iron castings instead of aluminum bronze castings. Lowers the maximum approach temperature to 540°C

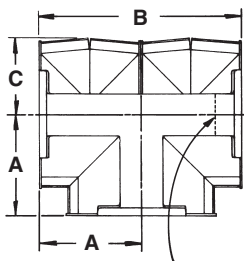
Built-in pilot assemblies

Built-in pilot assemblies must mount only where Series LV AIRFLO® burner sections provide for the segmented gas chamber within the burner body casting. See sketches below relative to possible locations for built-in pilot assemblies.

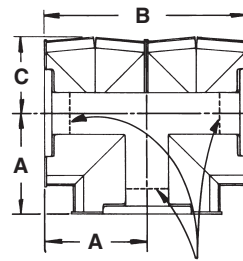
With built-in pilot arrangement, a section of the burner body casting is separated off to form a cavity for pilot gas. Pilot flame emerges through the main burner face.



All straight 6" sections, whether gray iron, ductile iron, or aluminum bronze, can accept built-in pilots on one end.

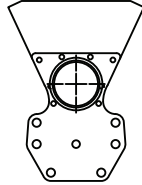
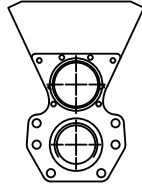
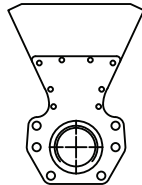
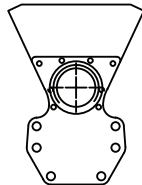
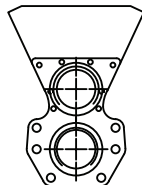


Aluminum bronze 12" x 6" tee section can accept built-in pilot only on right end of straight 12" side (when viewed from back side of the assembly)



Ductile iron 12" x 6" tee sections can have built-in pilot assembly mounted on any end.
NOTE: Gray iron tee sections do not accept built-in pilot assemblies.

A	B	C
150	300	94

Series LV-3, -4 & -5 AIRFLO® burners			
Designation	Description	Model	Weight kg
MI LVDT-PLT END PLATE SET	End plate set with feed through for LVDT-pilot burner [1] [2]		1.2
MI 2" INLET/LVDT-PLT SET	End plate set with feed through for LVDT-pilot burner [1] [2] and 2" fuel connection		1.2
MI 2" FUEL INLET END PLATE SET	End plate set with 2" fuel connection [2]		1.2
MI 2" SCANNER END PLATE SET	End plate set with 2" connection for flame scanner mounting [2]		1.2
MI 2" SCANNER FUEL INLET SET	End plate set with 2" fuel connection and 2" flame scanner connection [2]		1.2

[1] Available in cast steel (St37) for use with LV-3 and LV-4 burners

[2] Available in stainless steel (AISI304 - 1.4301) for use with LV-3, LV-4 and LV-5B burners

Piloting and ignition

Series LV AIRFLO® burners are standard equipped with raw gas pilots to ignite the main flame. Pilot burner is incorporated into the burner end plate. Depending on the burner configuration, MAXON offers the choice between a complete range of pilot end plate sets. See tables on pages 4-21.4-17 through -20 for proper selection or contact MAXON for more detailed information.

Locate one pilot valve close enough to the pilot burner gas inlet to guarantee fast and reliable ignition of the pilot burner.

For reliable piloting in environments with high process temperatures, humidity and/or pollutants, MAXON advises the use of LVDT-PILOT.

Typical ignition sequence

- Pre-purge of the combustion chamber and installation, according to the applicable codes and the installation requirements.
- Gas control valve in minimum position.
- Pre-ignition (typically 2 seconds sparking in air). Open pilot gas valves and continue to spark (typically 5 seconds to 10 seconds).
- Stop sparking, continue to power the pilot gas valves and start flame detection. Trip the burner in case no flame detected from this point on.
- Check pilot flame stability (typical 5 seconds to 10 seconds to prove stable flame).
- Open main gas valves and allow enough time for the fuel gas to reach the burner (typical 5 seconds or the time that gas needs to reach the burner).
- Close the pilot gas valves.
- Release to modulation (allow modulation of the gas control valve).
- Above sequence shall be completed to include all required safety checks during the start-up of the burner (process and burner safeties).
- Be advised that some regional codes require proving of cross-ignition by sensing flame at both ends of long burners.

Flame supervision

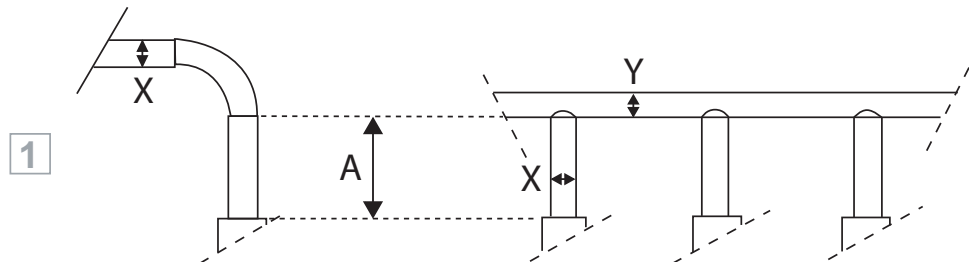
Flame supervision may be by flame rod or UV scanner with inlet temperatures below 300° C. Higher temperatures will require a UV scanner with possible addition of some cooling or purge air.

Manifolding

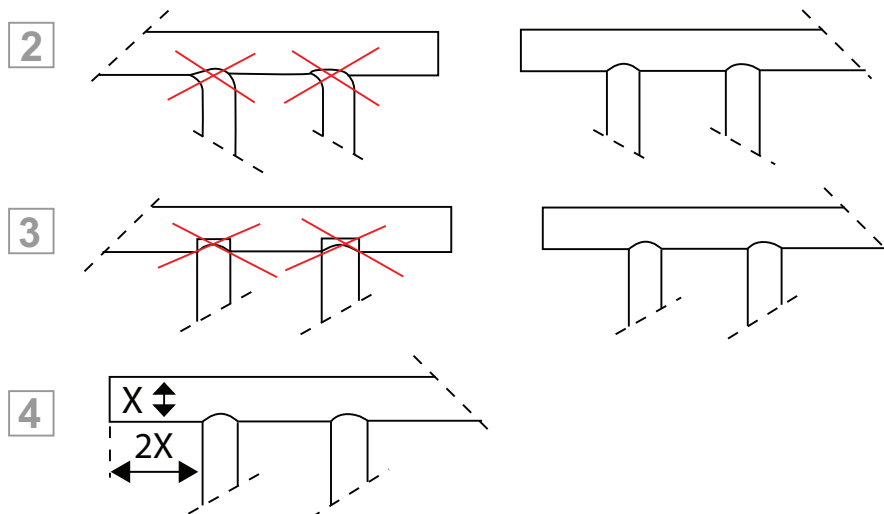
It is extremely important that the piping between the gas control valve (pipe train) and the burner inlet is correctly designed to ensure equal distribution of the gas to the burner inlet(s). Particularly with burners with multiple gas inlets, special attention should be given to this. Wrong choice of pipe diameters, incorrect construction of branch connections, wrong positions of elbow and insufficient straight pipe length to the burner inlet are some of the factors that may influence burner performance drastically.

Below are a few general guidelines to take into consideration when designing the gas manifold (contact MAXON for any questions or advice):

The pipe length "A" between any manifold offtake or elbow and burner inlet should be at least 4 pipe diameters (see Fig. 1) of the nipple used or 2-1/2 times the main manifold pipe diameter, whichever is larger ($4X < A > 2\frac{1}{2}Y$).



An offtake from a manifold should be straight and not in stream as shown in Fig. 2. Also, the offtake should be welded on the manifold in such a way that the smaller pipe does not stick into the main manifold (saddle weld), thus avoiding turbulence at the take-off point (see Fig. 3). The manifold should continue at least 2 pipe diameters beyond the last take-off (see Fig. 4).



Fuels

Series LV AIRFLO® burners produce clean and odor-free combustion with natural gas, propane, butane and hydrogen.

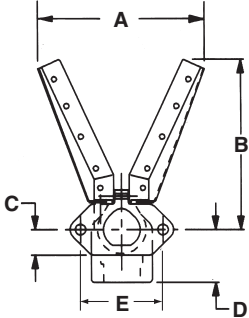
Expected emissions

Emissions are highly influenced by different burner and process-related factors, such as type of gas, burner capacity, air stream velocity, process air humidity and temperature, relation to duct/profile plate area, etc. We strongly advise to contact MAXON for evaluation of expected emissions on your typical application.

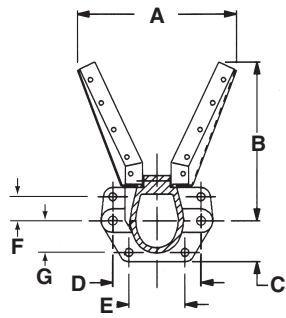
No guarantee of emissions is intended or implied. Contact MAXON for specific evaluation of your process and application for a written guarantee of emissions.

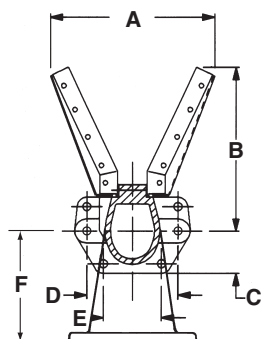
Dimensions

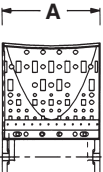
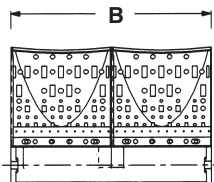
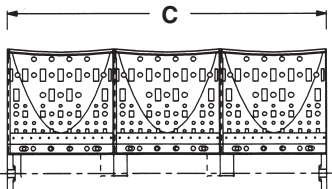
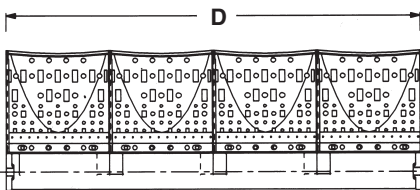
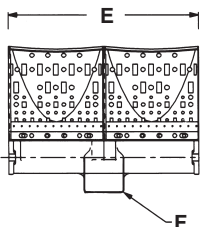
Burner sections

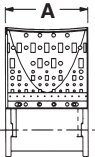
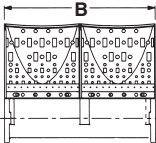
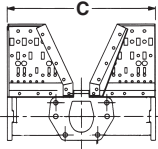
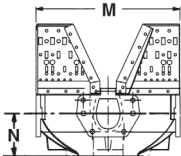
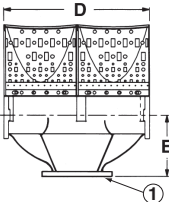
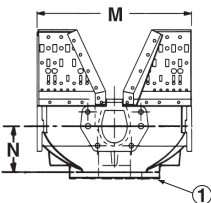
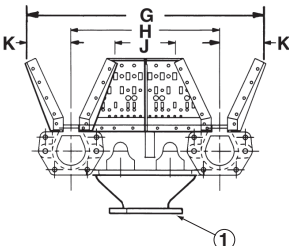
Dimensions in mm unless stated otherwise						
Burner type	A	B	C	D [1]	E	
LV-NP1	174	178	27	56	86	

[1] For 12" back inlet section only

Dimensions in mm unless stated otherwise							
Burner type	A	B	C	D	E	F	G
LV-3, -4, -5	189	190	49	105	66	28	38
							

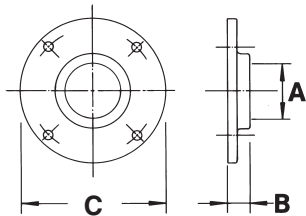
Dimensions in mm unless stated otherwise						
Burner type	A	B	C	D	E	F
LV-3, -4, -5 back inlet sections	189	190	49	105	66	127
						

Dimensions in mm unless stated otherwise						
Designation	Dimensions					
LV-NP1-6		<table><tr><td>A</td></tr><tr><td>150</td></tr></table>	A	150		
A						
150						
LV-NP1-12		<table><tr><td>B</td></tr><tr><td>300</td></tr></table>	B	300		
B						
300						
LV-NP1-18		<table><tr><td>C</td></tr><tr><td>460</td></tr></table>	C	460		
C						
460						
LV-NP1-24		<table><tr><td>D</td></tr><tr><td>600</td></tr></table>	D	600		
D						
600						
LV-NP1-12B		<table><tr><td>E</td><td>F NPT</td></tr><tr><td>300</td><td>1-1/2"</td></tr></table>	E	F NPT	300	1-1/2"
E	F NPT					
300	1-1/2"					

Dimensions in mm unless stated otherwise											
Designation	Dimensions										
LV-3G-6 LV-4D-6 LV-5D-6 LV-5B-6		<table><tr><td>A</td></tr><tr><td>150</td></tr></table>		A	150						
A											
150											
LV-3G-12 LV-4D-12 LV-5D-12 LV-5B-12		<table><tr><td>B</td></tr><tr><td>300</td></tr></table>		B	300						
B											
300											
LV-3G-T LV-4D-T LV-5D-T LV-5B-T		<table><tr><td>C</td></tr><tr><td>300</td></tr></table>		C	300						
C											
300											
LV-3G-X LV-4D-X LV-5D-X		<table><tr><td>M</td><td>N</td></tr><tr><td>300</td><td>90</td></tr></table>		M	N	300	90				
M	N										
300	90										
LV-3G-12B LV-4D-12B LV-5D-12B LV-5B-12B		<table><tr><td>D</td><td>E</td></tr><tr><td>300</td><td>130</td></tr></table> <p>1) Connection for optional back inlet flange</p>		D	E	300	130				
D	E										
300	130										
LV-3G-BX LV-4D-BX LV-5D-BX		<table><tr><td>M</td><td>N</td></tr><tr><td>300</td><td>90</td></tr></table> <p>1) Connection for optional back inlet flange</p>		M	N	300	90				
M	N										
300	90										
LV-3G-BH LV-4D-BH LV-5D-BH		<table><tr><td>G</td><td>H</td><td>J</td><td>K</td></tr><tr><td>495</td><td>300</td><td>125</td><td>95</td></tr></table> <p>1) Connection for optional back inlet flange</p>		G	H	J	K	495	300	125	95
G	H	J	K								
495	300	125	95								

Optional back inlet flanges

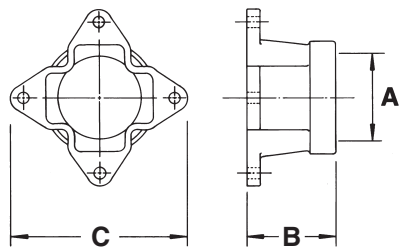
For 12B and 36BH sections



Dimensions in mm unless stated otherwise		
A Size [1]	B	C
2"	22	146
3"	44	146

[1] Available in NPT or ISO threads

For 12 x 12 BX sections



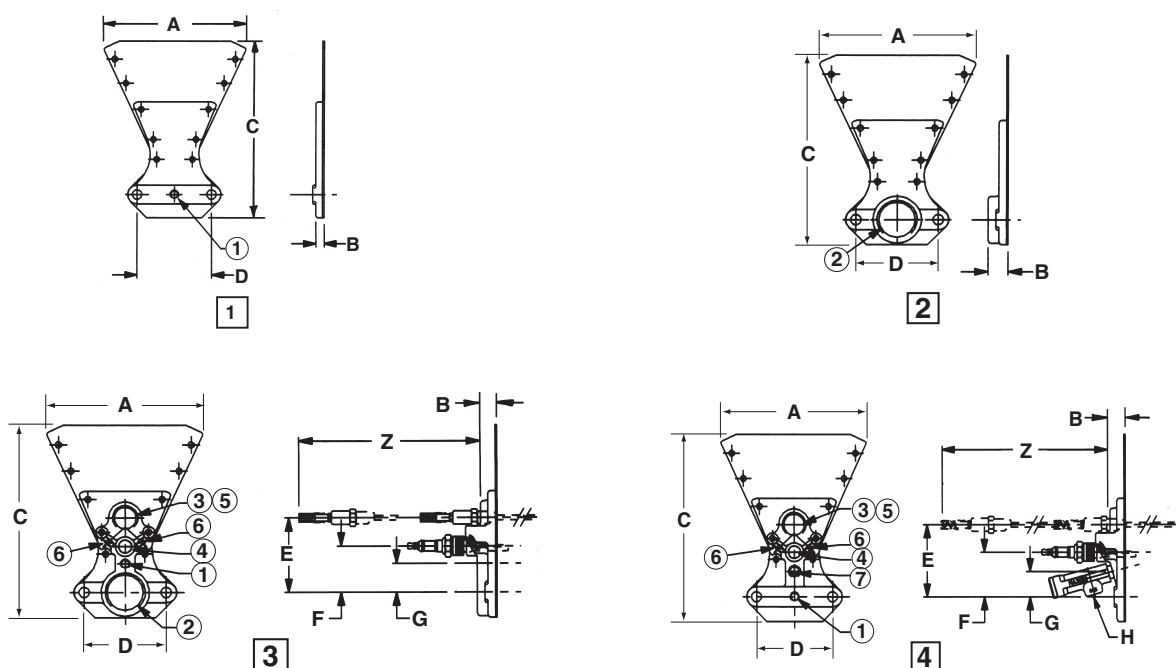
Dimensions in mm unless stated otherwise		
A Size [1]	B	C
3"	89	178
4"	89	178

[1] Available in NPT or ISO threads

End plates for Series LV-NP1 AIRFLO® burners

All open ends of the burner assembly must be closed off with one of these end closures or pilots.

Designation	Sketch	Test conn. (1)	Gas inlet (2)	UV conn. (3)	SI conn. (4)	FR conn. (5)	FR alt. conn. (6)	Pilot conn. (7)
PLAIN END PLATE SET	1	1/8" NPT	---	---	---	---	---	---
1-1/4" END INLET FLANGE SET	2	---	1-1/4" NPT	---	---	---	---	---
NPF 1-1/4" FR-SI 2-PC DS SET	3	1/8" NPT	1-1/4" NPT	3/4" NPT	14 mm	3/4" NPT	1/4" NPT	---
NP MINI-PAK PILT ASY W/SI, ORIF	4	1/8" NPT	---	1/2" NPT	14 mm	1/2" NPT	1/4" NPT	1/4" NPT
NP-PAK PILT SET W/SI, ETC	4	1/8" NPT	---	1/2" NPT	14 mm	1/2" NPT	1/4" NPT	1/4" NPT
NP-PAK PILT SET W/SI	4	1/8" NPT	---	1/2" NPT	14 mm	1/2" NPT	1/4" NPT	1/4" NPT



Dimensions in mm unless stated otherwise									
Sketch	A	B	C	D	E	F	G	H NPT	Z [1]
1	165	9	205	85	---	---	---	---	---
2	165	20	205	85	---	---	---	---	---
3	165	17	205	85	80	50	30	---	240
4	165	20	205	85	80	50	28	3/8"	240

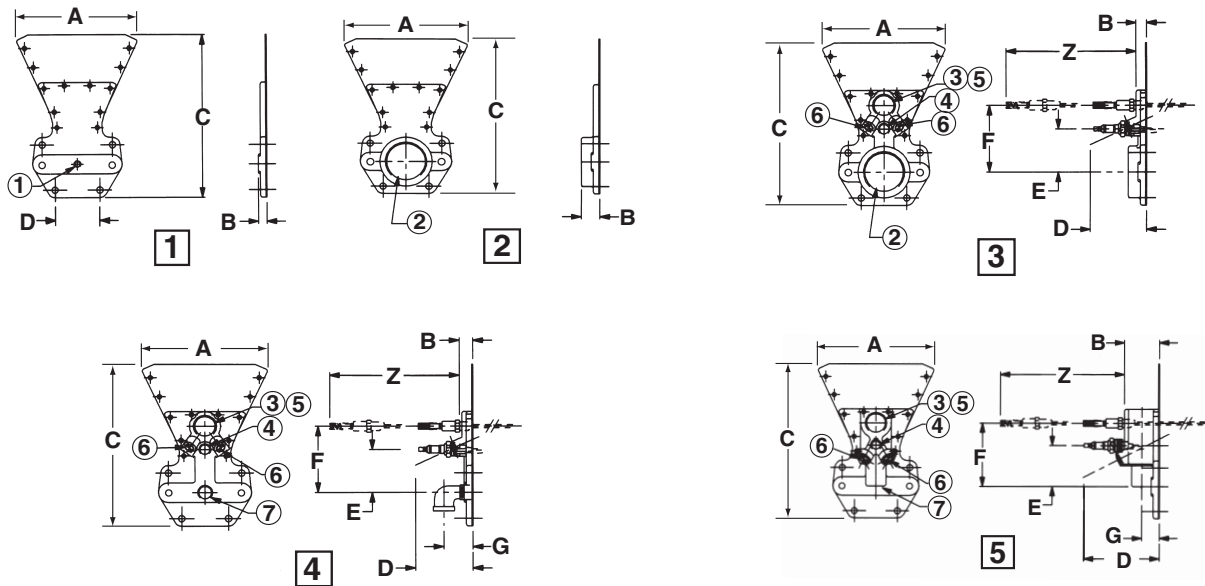
[1] Space for flame rod removal

End plates for Series LV-3, -4 & -5 AIRFLO® burners

All open ends of the burner assembly must be closed off with one of these end closures or pilots.

Designation	Sketch	Test conn. (1)	Gas inlet (2)	UV conn. (3)	SI conn. (4)	FR conn. (5)	FR alt. conn. (6)	Pilot conn. (7)
PLAIN END PLATE SET	1	1/8" NPT	---	---	---	---	---	---
2" END INLET SET	2	---	2" NPT	---	---	---	---	---
DIR SPRK SET W/18075 SI	3	---	2" NPT	1" NPT	14 mm	1" NPT	1/4" NPT	---
2" INLT DS SET W/18075 SI	3	---	2" NPT	1" NPT	14 mm	1" NPT	1/4" NPT	---
2" END INLET FLANGE	3	---	2" NPT	1" NPT	14 mm	1" NPT	1/4" NPT	---
BUILT-IN PILT SET (DIR MNT)	4	---	---	1" NPT	14 mm	1" NPT	1/4" NPT	1/2" NPT
BUILT-IN PILT SET (EXT MNT)	4	---	---	1" NPT	14 mm	1" NPT	1/4" NPT	1/2" NPT
AIRFLO-PAK PILT SET (DIR MNT) [1]	5	---	---	1" NPT	14 mm	1" NPT	1/4" NPT	1/2" NPT
AIRFLO-PAK PILT SET (EXT MNT) [1]	5	---	---	1" NPT	14 mm	1" NPT	1/4" NPT	1/2" NPT

[1] For LV5B sections only: Uses ductile iron castings instead of aluminum bronze castings. Lowers the maximum approach temperature to 540°C.



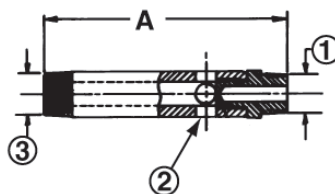
Dimensions in mm unless specified otherwise								
Sketch	A	B	C	D	E	F	G	Z [1]
1	190	13	240	66	---	---	---	---
2	190	27	240	---	---	---	---	---
3	190	16	240	82	63	98	---	355
4	190	20	240	82	63	98	42	355
5	190	54	240	116	63	98	27	355

[1] space for flame rod removal

Pilot mixers for Series LV AIRFLO-PAK pilot sets

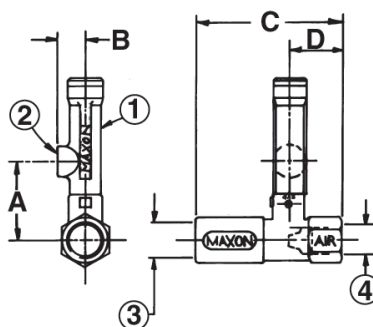
Air-gas pilot mixer - atmospheric type

- 1) 3/8" NPT gas inlet
- 2) 4x 7/64" air inlet
- 3) 1/2" NPT gas mixer outlet



Air-gas pilot mixer - pressure type

- 1) Adjustable orifice
- 2) 3/8" NPT gas inlet
- 3) 1/2" NPT mixture outlet
- 4) 3/8" NPT air inlet

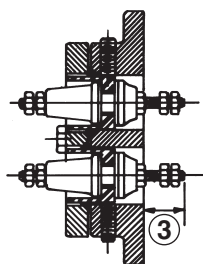


Dimensions in mm unless stated otherwise			
A	B	C	D
56	19	90	32

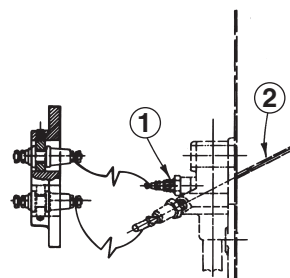
External mounting plate assemblies

External mounting plate assembly for internal spark ignitor and internal flame rod

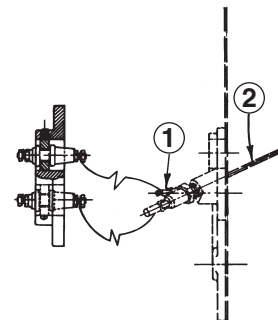
- 1) Spark ignitor
- 2) Flame rod
- 3) 19 mm



As used with AIRFLO-PAK
pilot assemblies

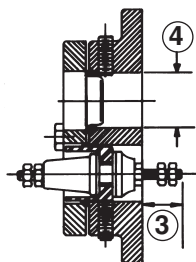


As used with built-in
pilot assemblies

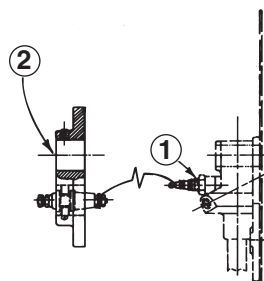


External mounting plate assembly for external UV scanner and internal spark ignitor

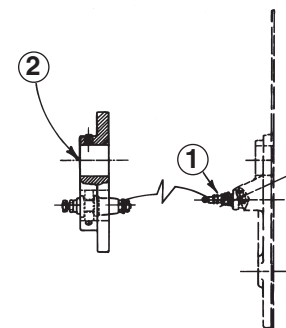
- 1) Spark ignitor
- 2) To accept 1" pipe nipple
for UV scanner
- 3) 19 mm
- 4) 1" dia.



As used with AIRFLO-PAK
pilot assemblies

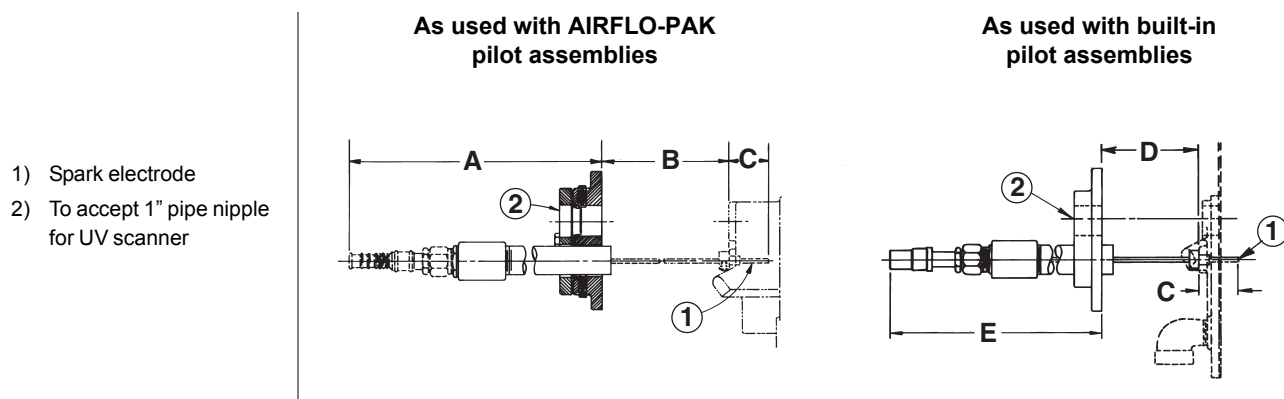


As used with built-in
pilot assemblies



External mounting plate assembly for external spark electrode and external UV scanner

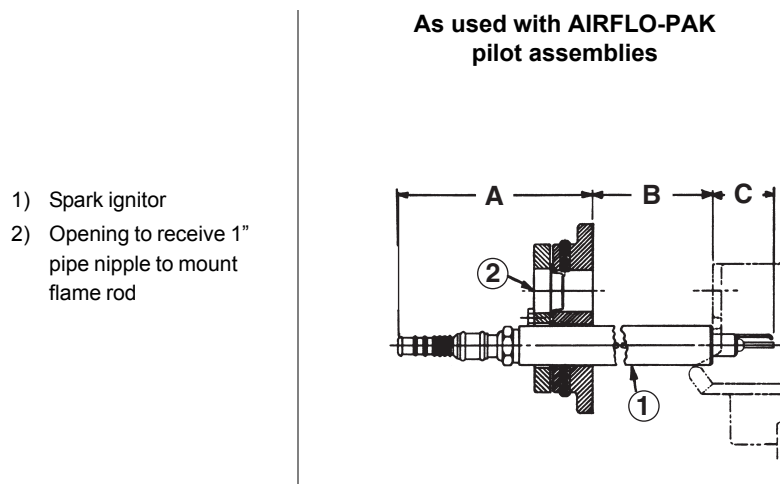
The spark electrode is not included in the mounting plate assembly and is shown to illustrate its position only.



Dimensions in mm unless stated otherwise								
A		B		C	D		E	
Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
183	279	25	375	35	25	375	183	279

External mounting plate assembly for external flame rod and external spark ignitor

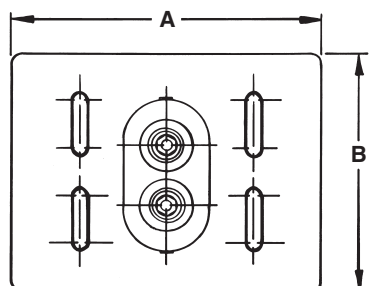
The spark electrode is not included in the mounting plate assembly and is shown to illustrate its position only.



Dimensions in mm unless stated otherwise					
For use with:	A		B		C
	Min.	Max.	Min.	Max.	
12" spark ignitor	100	292	50	241	40
18" spark ignitor	100	444	50	394	40
24" spark ignitor	100	597	50	546	40

External mounting plate details

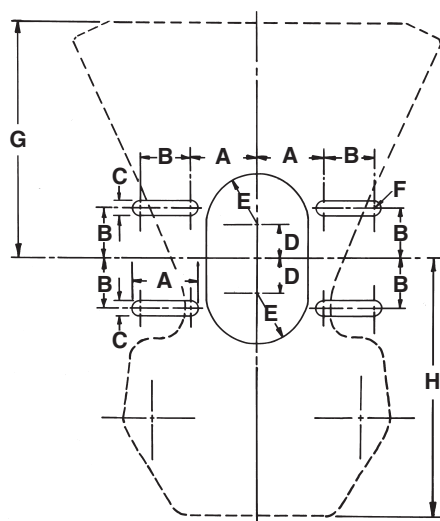
A plate is included with all assemblies shown on pages 4-21.4-31 and 32. The mounting plate features two (2) feed-through insulators for internal mounting of spark ignitor and flame rod. The same size external mounting plate is used in all assemblies shown on the previous two pages.



Dimensions in mm unless stated otherwise	
A	B
165	122

Positioning mounting plate in relation to LV-3, -4 & -5 AIRFLO® burner pilot location

Solid lines in this drawing indicate the required through-wall duct opening for external mounting plate fixation on the duct.



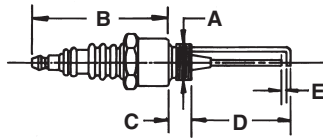
Dimensions in mm unless stated otherwise							
A	B	C	D	E rad.	F rad.	G	H
33	25	8	17	25	4	110 [1]	130 [2]

[1] From leading edge of mixing plates

[2] From bottom of flange

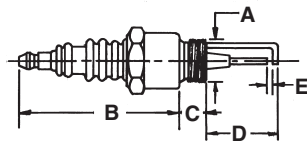
Accessories/replacement items

Direct mounted 14 mm spark ignitor for LV-NP1 AIRFLO® burners



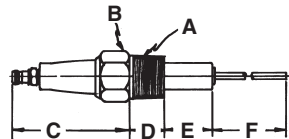
Dimensions in mm unless stated otherwise				
A	B	C	D	E gap
14 mm thd.	52	10	38	1.5

Direct mounted 14 mm spark ignitor for LV-3, -4 & -5 AIRFLO® burners



Dimensions in mm unless stated otherwise				
A	B	C	D	E gap
14 mm thd.	52	10	25	1.5

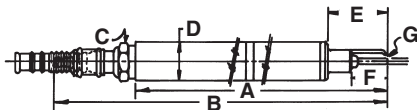
Externally mounted spark electrodes for LV-3 AIRFLO® burners



Dimensions in mm unless stated otherwise					
A	B	C	D	E	F [1]
1/2"-14 thd	5/16" hex	63	18	26	457

[1] Maximum length - to be cut to the correct size for each application

Externally mounted spark electrodes for LV-4 & LV-5 AIRFLO® burners

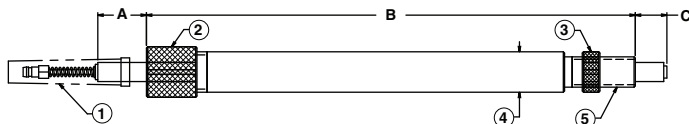


Dimensions in mm unless stated otherwise						
A	B	C	D Ø	E	F	G gap
305	350	15/16" hex	25	40	24	1.5
457	503					
610	655					
914	920					

Quartz ignitor

Grip nut, o-ring seal, shield tube and ignitor nut are packaged separately to prevent damage to the quartz assembly during transit. The end user is responsible for final assembly of the quartz ignitor before installation.

- 1) Rubber cover
- 2) Grip nut
- 3) Ignitor nut
- 4) Shield tube 1.0 Ø
- 5) 3/4-10 UNC

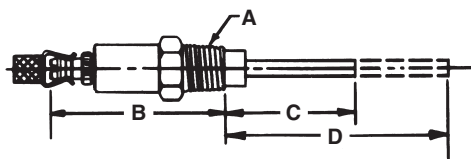


Dimensions in mm unless specified otherwise

Electrode	A	B	C
12"	30	307	20
18"	21	470	20
20"	35	505	20
24"	35	607	20
30"	25	770	20
36"	42	932	20
42"	20	1080	20
48"	20	1232	20

Flame rod

For those Series LV AIRFLO® burners using flame rods, most applications are covered by one of two sizes (specific number depends on nominal length "D" of rod extension). These may need to be cut to dimension "C" depending on your particular application.

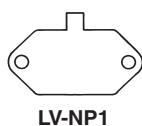


Dimensions in mm unless stated otherwise

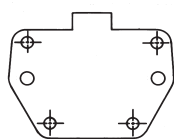
Burner model	A	B	C	D
LV-3G, -4D, -5D dir. mtd.	1/4" NPT.	50	180	180
LV-4D, -5D ext. mtd.			305	610
LV-3G ext. mtd.			457	610

Division plate

Provides isolation of burner feed(s) where desirable. This enables staging of burners for increased burner turndown.



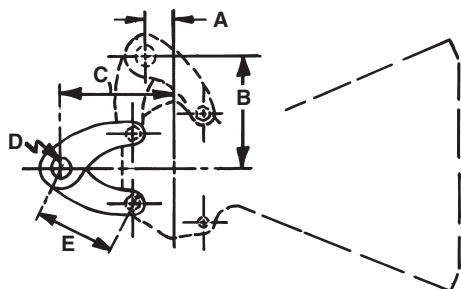
LV-NP1



LV-3, LV-4, LV-5

USB burner support bracket

Normally used in pairs as shown below. Mount to burner assembly at any joint between sections. Two versions are available: zinc plated carbon steel for maximum inlet temperature up to 400° C or 304 SS for maximum inlet temperature up to 870° C.



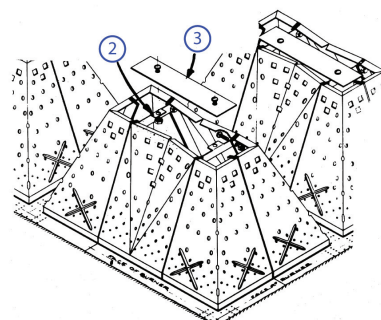
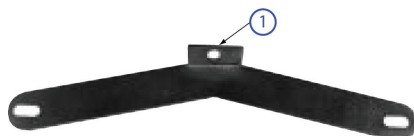
Dimensions in mm unless stated otherwise				
A	B	C	D hole	E
22	108	106	19	76

Profile plate mounting bracket

On certain high temperature rise applications of AIRFLO® line burners, it is advantageous to partially close off the square or rectangular openings within the burner assembly in addition to installing the profile plate around the outside of the burner in order to increase the velocity sufficiently.

The stainless steel profile mounting plate bracket, illustrated in the sketches below, is used to support plates for this purpose. The plate used to close off a portion of the opening will need to be sized for each individual application.

- 1) Dia. = 1/4"
- 2) Profile plate mounting bracket
- 3) Profile plate



End plate heaters

These heaters can be used in those applications where moisture on flame rods or spark ignitors can be expected. The heaters will keep the burner end plate and UV scanner tubes warmed and above dew point temperature when the burner is not firing.

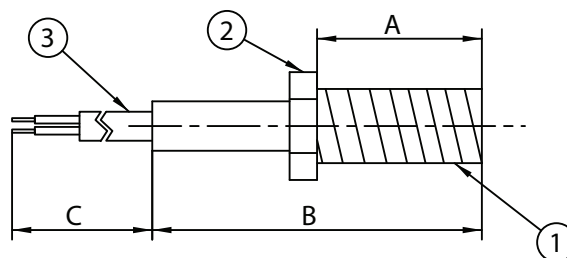
Two versions are available. Depending on local standards, select either the CE-type or the CSA/UL-type.

Both versions have a 1/4" threaded connection which will fit directly on one of the flame rod connections on the burner end plate.

Type	CSA/UL	CE-230	CE-115
Voltage	120V/60Hz	230V/50Hz	115V/50Hz
Power (watt)	90	85	85
Material	Brass	Stainless steel	Stainless steel

- 1) Heating element 1/4" ISO
- 2) 17 mm wrench
- 3) Power cable

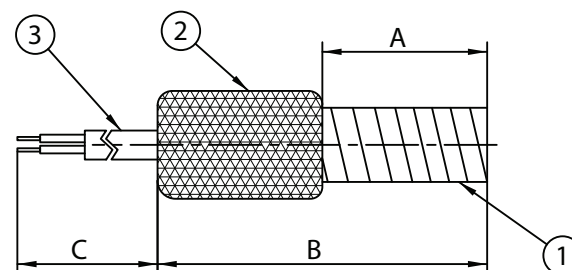
CE-type heater



Dimensions in mm unless stated otherwise		
A	B	C
30	60	1000

- 1) Heating element 1/4" NPT
- 2) Knurled end
- 3) SS braid shield power cable

CSA/UL-type heater



Dimensions in mm unless stated otherwise		
A	B	C
32	61	1830

Installation and operating instructions

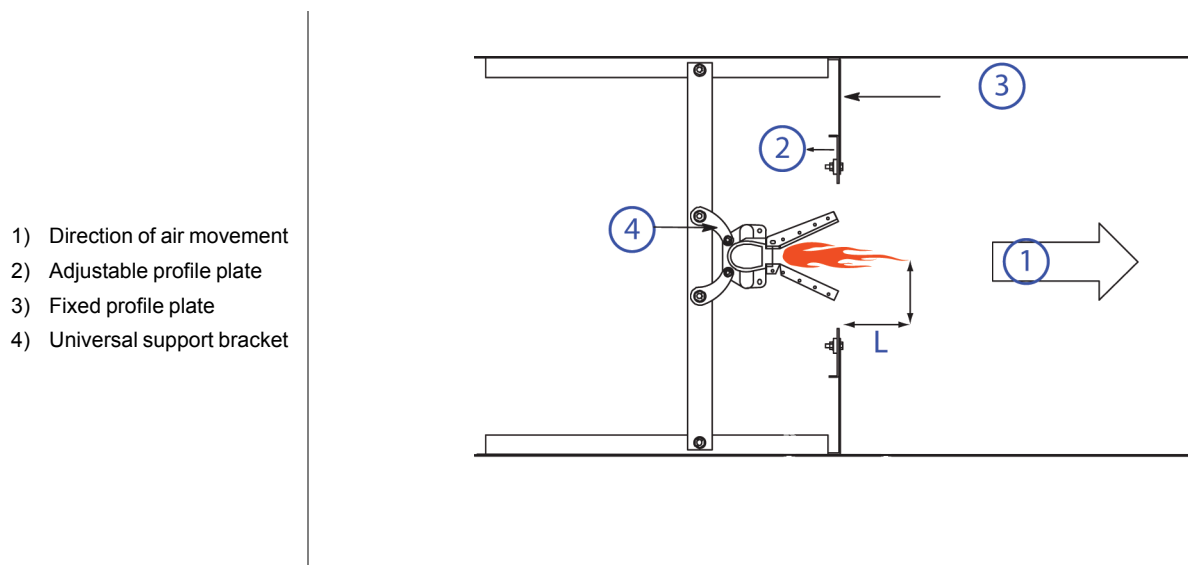
Application requirements

View port

A view port to observe the burner flame is essential to inspect flame aspect. It is recommended to locate the view port downstream of the flame, such that the entire burner front can be observed, as well as the pilot burner.

Position of the burner in the process flow

Series LV AIRFLO® burners are used only for heating fresh air in motion. They should be mounted so as to direct their flames parallel to and in the same direction as the movement of the air (see sketch below).

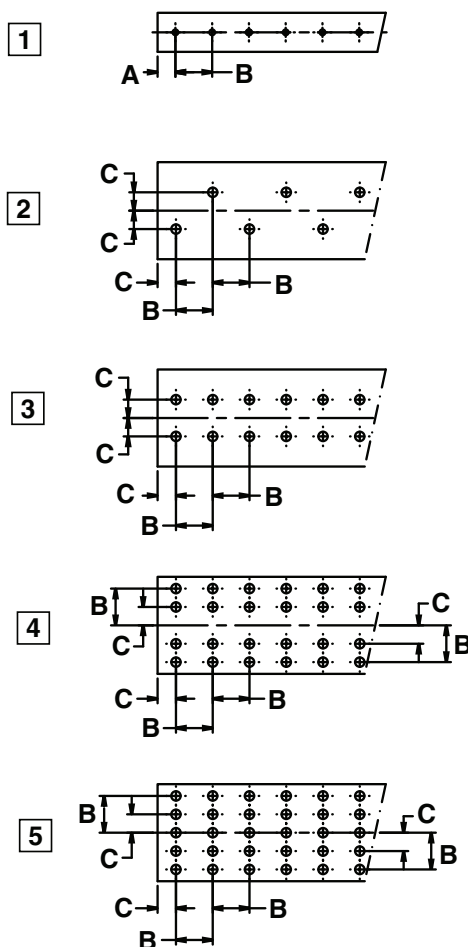


Do not mount the burner so that the movement of air is across the face of the line burner, nor should it be mounted too near to a turn in the duct which may cause air to be directed at an angle over the burner.

Velocity and flow of air at operating temperature must be uniform and not less than specified for the application (refer to diagram on page 4-21.4-9).

Drilling identification

- 1) LV-NP1 24 holes per lineal foot
- 2) LV 24 holes per lineal foot
- 3) LV 48 holes per lineal foot
- 4) LV 96 holes per lineal foot
- 5) LV 120 holes per lineal foot



Dimensions in mm unless stated otherwise		
A	B	C
6	12	6

Installation instructions

Storage

Series LV AIRFLO® burners should be stored dry (inside). Do not discard packing material until all loose items are accounted for.

Handling

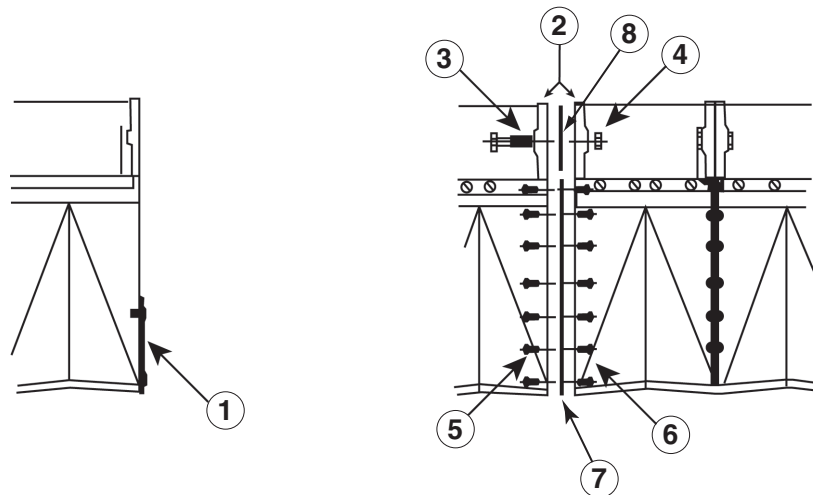
Series LV AIRFLO® burners may be shipped as complete burners, as well as in different burner parts. Handle burners with care during transport, unpacking, lifting and installation. Avoid bending or damaging the stainless steel mixing plates. Use proper equipment. Any impact on the burner could result in damage. Contact MAXON in case of questions.

Assembly instructions for burners divided into sections

Generally, the burners will be supplied as complete pre-assembled units. In some cases, however, the burner may be shipped as sub-assemblies, single sections may be supplied loose for shipping convenience (access of burner into the duct), or extra units of burner have been purchased to increase/modify the capacity/shape of the existing burner or as replacement items, etc.

Follow the assembly instructions below. In case of doubt, please contact MAXON for assistance.

Before being reassembled, the burner should be brought to the point of use. There, the burner should be arranged on the floor, mixing plates down, in the intended form. Reassemble as follows:



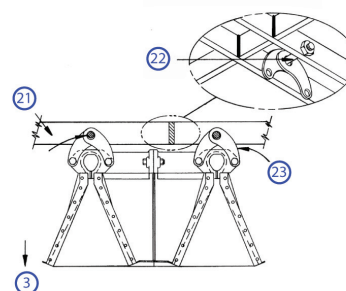
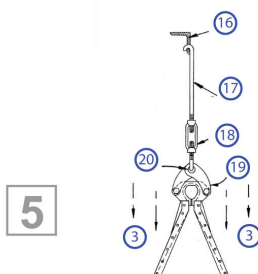
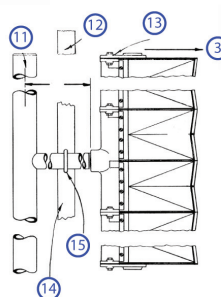
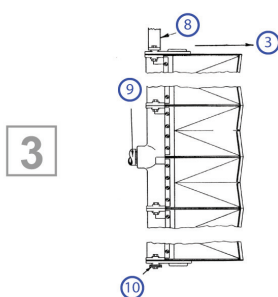
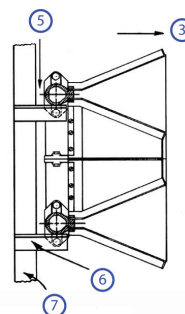
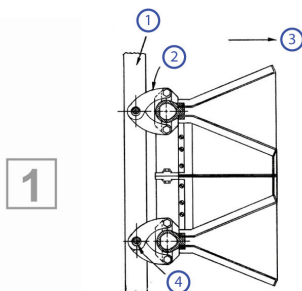
- Check the supply of gaskets, bolts and nuts attached to the crate.
- Remove the protective shipping end plates (1).
- Add support brackets, if any.
- Bring ends of burner sections together (2), insert the body gasket (8) and the mixing plate gasket (7) and bolts, and loosely assemble nuts (4) to bolts (3).
- Insert and assemble bolts (5) and nuts (6) snug but not tight.
- Tighten burner bolts (3), but ensure burner sections do not slip. Recommended torque bolt and nuts: 55 Nm.
- Tighten screws (4), keeping mixing plate gaskets (7) properly aligned.
- Examine all joints to ensure that sealing is complete.

Supporting the burner

Series LV AIRFLO® burner assemblies must be adequately supported and positioned. Avoid rigid mounting. Burner assembly expands and contracts with temperature variations.

Maintain smooth, even air flow over the burner by designing supports to provide minimum interference, deflection and turbulence. The sketches below show typical installation and support methods:

- 1) Strap iron frame
- 2) MAXON support bracket
- 3) Air movement
- 4) Bolt or rod (long enough to permit brackets to move)
- 5) Allow space for burner expansion
- 6) Angle iron support
- 7) Strap iron frame
- 8) Strap iron to top of duct
- 9) Gas inlet
- 10) Strap iron brace to side of duct
- 11) Gas manifold independently supported
- 12) Strap iron to top of duct
- 13) Ends free to move
- 14) Strap iron to bottom of duct
- 15) Oversize U-bolt drawn up loosely
- 16) Angle iron support
- 17) Rod
- 18) Turn-buckle
- 19) Support brackets
- 20) 3/4" hole
- 21) Strap iron frame
- 22) Bolt or rod (long enough to permit brackets to move)
- 23) Support brackets



Sketch 1 shows the burner suspended from a strap iron frame using MAXON USB support brackets. Note that rigid mounting is avoided by the bracket hole which slips loosely over a bolt or steel rod attached to the support. Gas piping would need independent support.

Sketch 2 shows the burner assembly resting upon angle iron brackets and not attached to them in any way. Be sure the angle iron supports allow the burner flanges to expand and contract. Gas manifolding would be independently supported and prevent forward movement of the burner.

Sketch 3 shows simple strap iron used to support the burner. Note that narrow edge of strap faces air flow to avoid undue turbulence.

Sketch 4 shows gas manifolding used to support the burner. If there are multiple inlets, avoid rigid connection by using the oversize U-bolt (loosely drawn up) illustrated.

Support for down-fired burners can be accomplished as shown in the illustration above. Always avoid rigid mounting.

Sketch 5 shows MAXON USB support brackets suspending the burner from an overhead angle iron.

Sketch 6 shows an alternate arrangement which offers the advantage of more controlled positioning.

Start-up instructions

Instructions provided by the company or individual responsible for the manufacture and/or overall installation of a complete system incorporating MAXON burners take precedence over the installation and operating instructions provided by MAXON. If any of the instructions provided by MAXON are in conflict with local codes or regulations, please contact MAXON before initial start-up of equipment.



Read the combustion system manual carefully before initiating the start-up and adjustment procedure. Verify that all of the equipment associated with and necessary to the safe operation of the burner system has been installed correctly, that all pre-commissioning checks have been carried out successfully and that all safety-related aspects of the installation are properly addressed.

Initial adjustment and light-off should be undertaken only by a trained commissioning engineer.

First firing or restart after shut-down

Before start-up, or after a longer period shut-down, the integrity of the system should be checked by an authorized combustion engineer. Besides the general mechanical installation of burner and piping (rigidity, flanged and threaded connections, tightness of piping and burner body, etc.), it is advised to check the condition of mixing plates and burner body drillings.

Check all bolted connections of the burner after first firing (first time on temperature) and retighten if necessary.

Check of safety interlocks



Guarantee that all the required safety locks as described in the applicable local codes or regulations, or extra requested for safe operation of the overall installation, are working properly and resulting in a positive safety lock of the burner. Do not bypass any of these safety interlocks. This will result in unsafe conditions.

Process air flow

Series LV AIRFLO® burners draw the required oxygen for combustion from the available process air flow across the burner.

A correct fresh air flow across the burner is essential for safe operation of the burner, and should be safeguarded by a safety interlock (pressure switch or flow switch) as described in the applicable local codes or regulations.

Refer to "Specifications" on page 4-21.4-7 for more details or contact MAXON if you require further support.

Pilot ignition

Adjust pilot gas regulator to correct set point before pilot ignition attempt. Turn adjustable orifice screw out (counter-clockwise) several turns from its fully seated position. Refine during lighting of the pilot to a hard/blue flame and/or strongest stable flame signal. In case a LVDT-PILOT is used, refer to the LVDT-PILOT literature for correct information on pilot operation and settings.

Main burner ignition

Adjust the main gas regulator at the correct set-point before igniting the main burner. Ensure that the control valve is in the start position when lighting the main burner.

Ensure operating pressure to the burner under operating conditions matches those shown on pages 4-21.4-7 and -8.

Minimum capacity and cross-ignition

Adjust the minimum burner capacity while carefully observing the flame. Ensure that the flame remains stable over the entire burner front.

The minimum capacity of the burner may be influenced by the process air distribution across the burner, the air stream velocity and the position (distribution) and number of gas inlets of the burner.

Capacity adjustment

Slightly open the gas control valve while observing the flame. Especially observe that the flame is well divided over the entire burner surface, and going straight forward in the direction of the process air flow. Check that no damage is caused to duct walls, filters, blowers, etc.

Limit the minimum and maximum position in a safe way to guarantee stable flame over the entire burner front at minimum position, and to protect the burner for overfiring at maximum position.

Flame supervision

Only use the standard connections provided on the end plates for correct flame safeguarding. Use proper flame detection equipment (flame rod or UV scanner).

Refer to the local codes and regulations to determine the number of flame sensors and their position. Be advised that some codes may require proving of cross ignition by sensing flame on both ends of long burners.

Maintenance and inspection

Safety requirements

Regular inspection, testing and recalibration of combustion equipment according to the installation's manual is an integral part of its safety. Inspection activities and frequencies shall be carried out as required by the local codes or regulations, and as specified by the overall installation user manual.

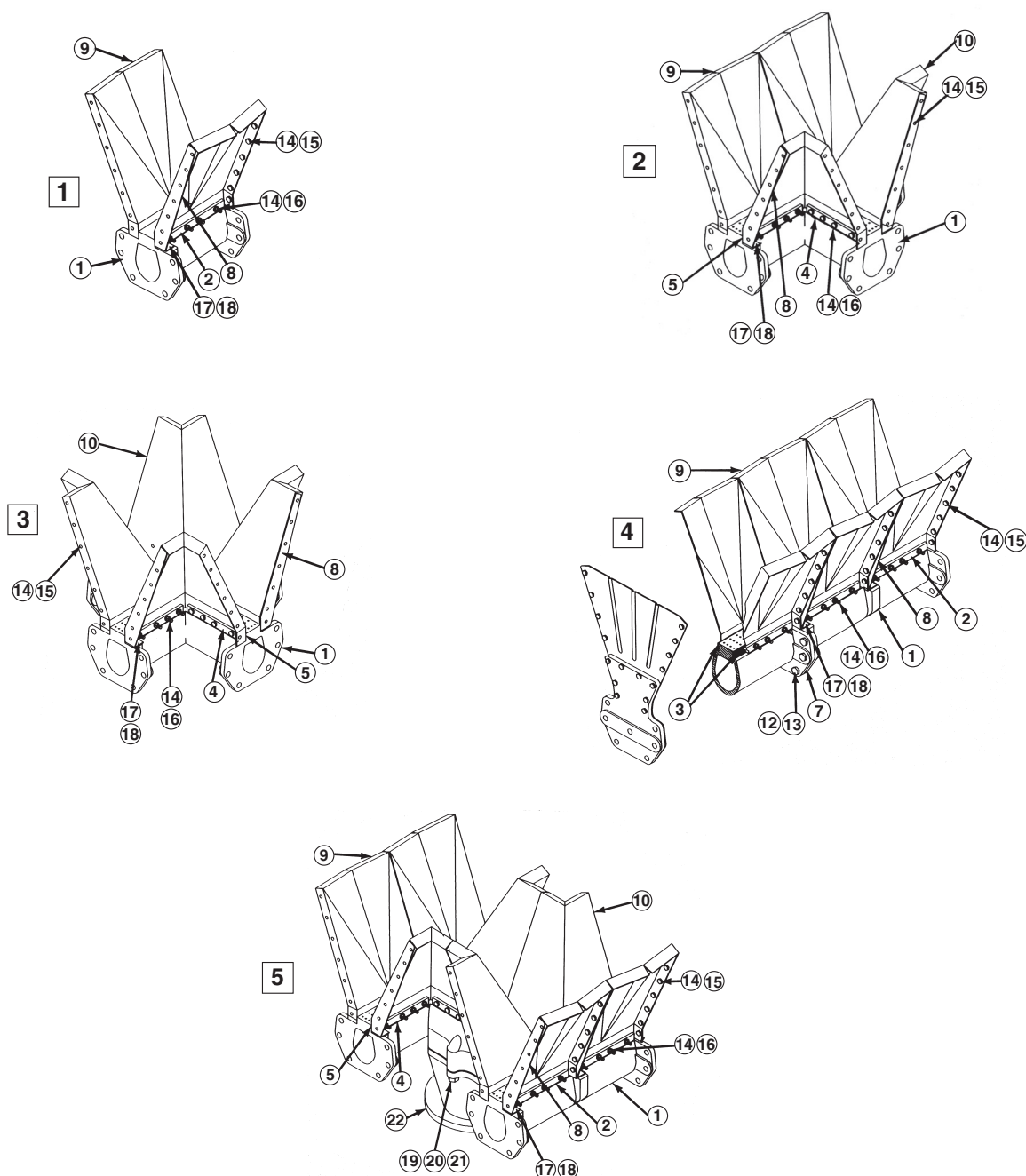
Visual inspections

Regular visual inspection of all connections (gas manifold, bolting of the burner into the duct, condition of profile plate, burner mixing plates and burner body drillings) and burner flame shape and aspect are essential for safe operation.

Recommended spare parts

Keep local stock of spark ignitor and flame sensor. For other spare parts, please refer to the component identification on page 4-21.4-46. For assistance with parts, please contact MAXON.

Maintenance and component identification for Series LV AIRFLO® burners



Sketch 1	6" straight section
Sketch 2	12" x 6" tee section
Sketch 3	12" x 12" cross and back inlet section
Sketch 4	12" straight and back inlet section
Sketch 5	36" back inlet section

Item number	Part description
1	Burner body
2	Back up bar (straight)
3	Gasket, body (straight)
4	Back up bar (inside)
5	Gasket, inside
6	Back up bar (outside)
7	Gasket, outside elbow
8	Support bracket gasket 18 GA
9	6" mixing plate
10	Corner mixing plate
12	M10 - 1.5 x 45 hex head cap screw
13	M10 - 1.5 finished hex nut
14	#10 - 24 FLEX-LOK hex nut
15	#10 - 24 x 1/2" indented hex head machine screw
16	#10 - 24 x 2-1/4" indented hex head machine screw
17	Washer
18	#10 - 24 x 3/8" indented hex head machine screw
19	M10 - 1.5 hex nut finished
20	M10 - 1.5 x 35 hex head cap screw
21	1/4" - 20 x 3/4" hex head cap screw
22	Inlet adapter