

## Specifications of V-Line burners

### V-Line burner firing on natural gas - constant combustion air

Typical burner data						
60 °F - 21% O <sub>2</sub> combustion air - 50% rel. humidity - natural gas with 1000 Btu/ft <sup>3</sup> HHV - sg = 0,6 [1]						
Stated pressures are indicative - actual pressures are function of air humidity, altitude, type of fuel, gas quality.						
Constant air : 3500 ft <sup>3</sup> /h/ft						
Capacity	[2]	MBtu/ft (HHV)	0.034	0.17	0.34	0.41
Nat. gas diff. press. @ test conn.	[3]	"wc	0.08	0.75	2.35	3.25
Flame length (fresh air firing - 21%O <sub>2</sub> , 15 °C, n = 1,1)	[4]	ft	0	0.5	3.3	4.3
Comb. air diff. press. test conn. (mix plates)	[5]	"wc	0.14			
Comb. air diff. press. inlet air box (total)	[6]	"wc	0.64			

Typical burner data						
60 °F - 21% O <sub>2</sub> combustion air - 50% rel. humidity - natural gas with 1000 Btu/ft <sup>3</sup> HHV - sg = 0,6 [1]						
Stated pressures are indicative - actual pressures are function of air humidity, altitude, type of fuel, gas quality.						
Constant air : 7000 ft <sup>3</sup> /h/ft						
Capacity	[2]	MBtu/ft (HHV)	0.034	0.17	0.34	0.68
Nat. gas diff. press. @ test conn.	[3]	"wc	0.08	0.75	2.35	8.13
Flame length (fresh air firing - 21%O <sub>2</sub> , 15 °C, n = 1,1)	[4]	ft	0.0	0.2	0.8	4.1
Comb. air diff. press. test conn. (mix plates)	[5]	"wc	0.4			
Comb. air diff. press. inlet air box (total)	[6]	"wc	2.0			

Typical burner data								
60 °F - 21% O <sub>2</sub> combustion air - 50% rel. humidity - natural gas with 1000 Btu/ft <sup>3</sup> HHV - sg = 0,6 [1]								
Stated pressures are indicative - actual pressures are function of air humidity, altitude, type of fuel, gas quality.								
Constant air : 10500 ft <sup>3</sup> /h/ft								
Capacity [2]	MBtu/ft (HHV)	0.034	0.17	0.34	0.68	1.02	1.23	
Nat. gas diff. press. @ test conn. [3]	"wc	0.08	0.74	2.34	8.13	17.36	24.55	
Flame length (fresh air firing - 21%O <sub>2</sub> , 15 °C, n = 1,1) [4]	ft	0.0	0.0	0.4	1.6	4.9	7.4	
Comb. air diff. press. test conn. (mix plates) [5]	"wc	0.8						
Comb. air diff. press. inlet air box (total) [6]	"wc	4.1						

Typical burner data								
60 °F - 21% O <sub>2</sub> combustion air - 50% rel. humidity - natural gas with 1000 Btu/ft <sup>3</sup> HHV - sg = 0,6 [1]								
Stated pressures are indicative - actual pressures are function of air humidity, altitude, type of fuel, gas quality.								
Constant air : 14000 ft <sup>3</sup> /h/ft								
Capacity [2]	MBtu/ft (HHV)	0.03	0.17	0.34	0.68	1.02	1.36	1.64 [7]
Nat. gas diff. press. @ test conn. [3]	"wc	0.08	0.74	2.34	8.13	17.36	30.03	42.65
Flame length (fresh air firing - 21%O <sub>2</sub> , 15 °C, n = 1,1) [4]	ft	0.0	0.0	0.3	1.0	2.5	6.6	9.0
Comb. air diff. press. test conn. (mix plates) [5]	"wc	1.2						
Comb. air diff. press. inlet air box (total) [6]	"wc	7.0						

- [1] sg (specific gravity) = relative density to air (density air = 1,293 kg/Nm<sup>3</sup>0.0763 lbs/ft<sup>3</sup> (st))
- [2] 10 kW/ft0.044 MBtu/ft is the minimum capacity for natural gas.
- [3] Pressure differential between test connection and combustion chamber for natural gas to be used for burner commissioning. Actual pressure differential at burner gas inlet is 5% higher.
- [4] Typical flame length for shown capacity. Flame length may vary in function of process air flow distribution, velocity, temperature, oxygen levels etc.. Contact MAXON for more information.
- [5] Differential combustion air pressure between burner air test connection and combustion chamber for commissioning.
- [6] Typical differential combustion air pressure to be used for blower selection.
- [7] For firing at capacities above 400 kW/ft1.64 MBtu/ft, please contact MAXON.

**V-Line burner firing on propane/butane - constant combustion air**

Typical burner data							
60 °F - 21% O <sub>2</sub> combustion air - 50% rel. humidity - propane with 2592 Btu/ft <sup>3</sup> HHV - sg = 1,57 [1] - butane with 3364 kBtu/ft <sup>3</sup> HHV - sg = 2,07							
Stated pressures are indicative - actual pressures are function of air humidity, altitude, type of fuel, gas quality.							
Constant air : 7000 ft <sup>3</sup> /h/ft							
Capacity	[2]	MBtu/ft (HHV)	0.034	0.17	0.34	0.68	0.82
Propane diff. press. @ test conn.	[3]	"wc	0.02	0.18	0.60	2.20	3.12
Butane diff. press. @ test conn.	[3]	"wc	0.01	0.14	0.46	1.65	2.34
Flame length (fresh air firing - 21%O <sub>2</sub> , 60 °F, n = 1,1)	[4]	ft	0.0	0.3	0.8	3.6	5.7
Comb. air diff. press. test conn. (mix plates)	[5]	"wc	0.4				
Comb. air diff. press. inlet air box (total)	[6]	"wc	2.0				

Typical burner data								
60 °F - 21% O <sub>2</sub> combustion air - 50% rel. humidity - propane with 2592 Btu/ft <sup>3</sup> HHV - sg = 1,57 - butane with 3364 kBtu/ft <sup>3</sup> HHV - sg = 2,07								
Stated pressures are indicative - actual pressures are function of air humidity, altitude, type of fuel, gas quality.								
Constant air : 10500 ft <sup>3</sup> /h/ft								
Capacity		MBtu/ft (HHV)	0.034	0.17	0.34	0.68	1.02	1.23
Propane diff. press. @ test conn.		"wc	0.02	0.18	0.60	2.20	4.79	6.82
Butane diff. press. @ test conn.		"wc	0.01	0.14	0.46	1.65	3.58	5.09
Flame length (fresh air firing - 21%O <sub>2</sub> , 60 °F, n = 1,1)		ft	0.0	0.0	0.3	2.5	4.9	6.6
Comb. air diff. press. test conn. (mix plates)		"wc	0.8					
Comb. air diff. press. inlet air box (total)		"wc	4.1					

Typical burner data									
60 °F - 21% O <sub>2</sub> combustion air - 50% rel. humidity - propane with 2592 Btu/ft <sup>3</sup> HHV - sg = 1,57 [1] - butane with 3364 kBtu/ft <sup>3</sup> HHV - sg = 2,07									
Stated pressures are indicative - actual pressures are function of air humidity, altitude, type of fuel, gas quality.									
Constant air : 14000 ft <sup>3</sup> /h/ft									
Capacity [2]	MBtu/ft (HHV)	0.034	0.17	0.34	0.68	1.02	1.36	1.64 [7]	
Propane diff. press. @ test conn. [3]	"wc	0.02	0.18	0.60	2.20	4.79	8.38	11.97	
Butane diff. press. @ test conn. [3]	"wc	0.01	0.14	0.46	1.65	3.58	6.24	8.90	
Flame length (fresh air firing - 21%O <sub>2</sub> , 60 °F, n = 1,1) [4]	ft	0.0	0.0	0.3	1.6	2.6	5.7	7.4	
Comb. air diff. press. test conn. (mix plates) [5]	"wc	1.2							
Comb. air diff. press. inlet air box (total) [6]	"wc	7.0							

- [1] sg (specific gravity) = relative density to air (density air = 0.0763 lbs/ft<sup>3</sup> (st))
- [2] 0.04MBtu/ft is the minimum capacity for natural gas.
- [3] Pressure differential between burner test connection and combustion chamber for propane/butane to be used for burner commissioning. Actual pressure differential at burner gas inlet is 5% higher.
- [4] Typical flame length for shown capacity. Flame length may vary in function of process air flow distribution, velocity, temperature, oxygen levels etc.. Contact MAXON for more information.
- [5] Differential combustion air pressure between burner air test connection and combustion chamber for commissioning.
- [6] Typical differential combustion air pressure to be used for blower selection.
- [7] For firing at capacities above 1.64 MBtu/ft, please contact MAXON.

**V-Line burner firing on natural gas - modulated combustion air**

[1] sg (specific gravity) = relative density to air (density air =0.0763 lbs/ft<sup>3</sup>(st))

Typical burner data 60 °F - 21% O <sub>2</sub> combustion air - 50% rel. humidity - natural gas with 1000 Btu/ft <sup>3</sup> HHV - sg = 0,6 [1] Stated pressures are indicative - actual pressures are function of air humidity, altitude, type of fuel, gas quality.							
V-Line natural gas firing - capacity/ft [2]	MBtu/ft (HHV)	0.04	0.17	0.34	0.68	1.02	1.36
Differential natural gas pressure [4]	"wc	0.08	0.72	2.33	8.03	17.26	30.11
Differential combustion air pressure for fresh air firing [5]	"wc	0.64	0.64	0.64	0.40	0.76	1.24
Differential combustion air pressure at blower outlet for fresh air firing [6]	"wc	0.64	0.64	0.64	2.01	4.14	6.99
(Optimal) combustion air flow for fresh air firing [7]	scfh	3531	3531	3531	7062	10594	14125
Flame length (fresh air firing) [8]	ft	NA	0.49	3.28	4.27	4.92	6.56

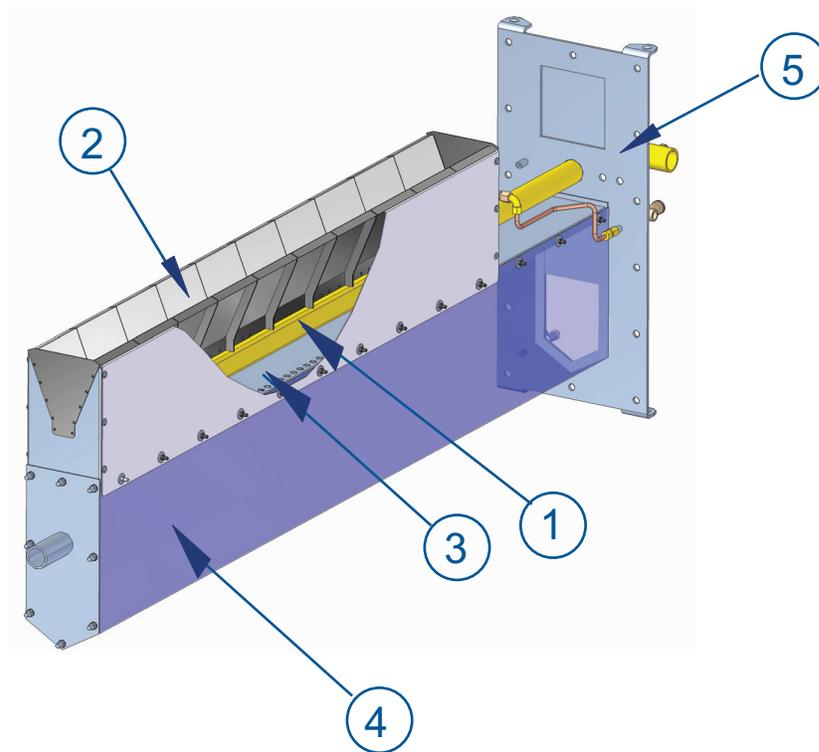
- [2] 0.04 MBtu/ft is the minimum capacity for natural gas. The maximum capacity is set at 1.4 MBtu/ft. Overfiring in fresh air heating applications is possible (up to 20%). For low oxygen recirculating applications, we advise to limit the max. capacity/ft to 1.0 MBtu with an air factor n = 1,3.
- [3] Pressure differential between burner test connection and combustion chamber for natural gas to be used for burner commissioning. Actual pressure differential at burner gas inlet is 5% higher.
- [4] Differential combustion air pressure between burner air test connection and combustion chamber for commissioning.
- [5] Typical differential combustion air pressure for 5 ft V-Line to be used for blower selection.
- [6] Advised combustion air flow and air factor 'n' for best burner performance. For recirculating air heating with low oxygen, advised air factor is 20% higher.
- [7] Typical flame length for shown air amount and capacity. Flame length may vary in function of process air flow distribution, velocity, temperature, oxygen levels etc. Contact MAXON for more information.

**V-Line burner firing on propane - modulated combustion air flow**

Typical burner data							
60 °F - 21% O <sub>2</sub> combustion air - 50% rel. humidity - propane with 91441 Btu/ft <sup>3</sup> HHV - sg = 1.57 [1]							
Stated pressures are indicative - actual pressures are function of air humidity, altitude, type of fuel, gas quality.							
V-Line propane/butane firing - capacity/ft [2]	MBtu/ft (HHV)	0.03	0.17	0.34	0.68	1.02	1.36
Differential propane gas pressure [3]	"wc	0.02	0.02	0.60	2.21	4.78	8.39
Differential combustion air pressure for fresh air firing [4]	"wc	0.24	0.32	0.16	0.16	0.77	1.24
Differential combustion air pressure at blower outlet for fresh air firing [5]	"wc	1.20	1.61	2.01	2.01	4.14	6.99
(Optimal) combustion air flow for fresh air firing [6]	scfh	5297	6180	7062	7062	10594	14125
Flame length (fresh air firing) [7]	ft	NA	0.33	0.82	3.61	4.92	5.91

- [1] sg (specific gravity) = relative density to air (density air = 0.0763 lbs/ft<sup>3</sup>(st))
- [2] 0.03 MBtu/ft is the minimum capacity for propane-firing. The maximum capacity is set at 1.4 MBtu/ft. Overfiring in fresh air heating application is possible (up to 20 %). For low oxygen recirculating applications the max. capacity/ft is limited to 1.4 MBtu, with n = 1,3.
- [3] Pressure differential between burner test connection and combustion chamber for propane to be used for burner commissioning. Actual pressure differential at burner gas inlet is approx. 5% higher.
- [4] Pressure differential between burner test connection and combustion chamber for natural gas to be used for burner commissioning. Actual pressure differential at burner gas inlet is approx. 5% higher.
- [5] Differential combustion air pressure between burner air test connection and combustion chamber for commissioning.
- [6] Typical differential combustion air pressure for 5 ft V-Line to be used for blower selection.
- [7] Advised combustion air flow and air factor "n" for best burner performance. For recirculating air heating with low oxygen, advised air factor is 20% higher (n > = 1,1 for fresh air firing, n > = 1,3 for recirculating processes).

### Materials of construction



1)	Gas manifold	AISI 304
2)	Mixing plates	AISI 430 (standard) AISI 310 (high temperature)
3)	Perforated plate	AISI 430
4)	Air box	AISI 430
5)	Mounting plate	AISI 304

## Selection criteria

### Application details

---

The MAXON V-Line burner has been especially designed for low temperature air heating applications.

Thanks to the high grade material selection, this burner can be used in applications with re-circulating process air with higher temperature and low oxygen levels.

The design of the burner guarantees an excellent flame stability and even flame pattern. Combined with a high turndown this burner is very flexible and can therefore be incorporated in a wide range of applications.

### Available V-Line versions and options

---

The V-Line burner is available as:

- a slide-in-unit complete with mounting plate for easy connection to duct walls.
- a packaged burner: this is the V-Line burner including optional available components (gas pipe train, flame safeguard, ignition transformer) which are all mounted and prewired onto the V-Line's mounting plate.

Both versions are available in a standard and a high temperature configuration. High temperature version should be used when preheated combustion air with temperatures above 140 °F is used.

Options include

- provision for UV-scanner
- insulated plug mounting (standard = mounting plate)
- external spark ignitor

Burners are available for 0.5 ft up to 6.5 ft with 0.5 ft increments.

### Process temperature

---

Max. upstream process air temperature	572 °F
Max. downstream process air temperature at low fire	752 °F
Max. downstream process air temperature at high fire [1]	1472 °F

[1] High fire = capacities not lower than 1.36 MBtu/ft.

To achieve maximum lifetime of the burner, special attention should be paid when selecting the burner to avoid downstream process air pressure above 752 °F at low fire.

V-Line burners can accept in specific circumstances higher process temperatures, both upstream and downstream of the burner. Contact MAXON for more information.

### Combustion air requirements

---

MAXON V-Line burners operate with clean fresh combustion air containing 21 Vol.% oxygen and a max. temperature of 392 °F.

When combustion air temperatures exceed 140 °F, a high temperature version of the V-Line shall be used.

## Modulated or constant combustion air

---

All MAXON V-Line burners can operate with constant air flow, as well as with modulated air flow.

At constant air flow, the required differential combustion air pressure (refer to table on page 4-22.5-7) is set by a fixed air damper (burner air inlet or fan) and the combustion air flow through the burner is constant for all burner firing rates (always max. air flow).

At modulating air flow, an additional air control valve is adjusting the combustion air in function of burner capacity (refer to table on page 4-22.5-11).

The choice whether constant or modulated air flow should be selected highly depends on the type of application and the desired emissions on CO and NO<sub>x</sub>. Refer to "Expected emissions" on page 4-22.5-17 for more details.

## Ratio control

---

In case the V-Line burner is operated with modulated air flow, best performance is realized when the burner is adjusted with ratio's as indicated in table page 4-22.5-11. This can be achieved with MAXON MICRO-RATIO<sup>®</sup> valves or SMARTLINK<sup>®</sup> MRV valves.

Changes of combustion air temperature, system back pressure variations, and other parameters could influence gas/air-ratio if the control system is not designed for compensation. Contact MAXON for more information.

## Process air flow velocity

---

The process air over the burner shall be parallel to the flame and shall be well distributed over the duct section. Typically the process air velocity will have to be within +/-30% of the average velocity in the area influencing the flame.

Min. process air velocity	[1]	6.56 ft/s
Max process air velocity	[2]	49.2 ft/s

- [1] A minimum parallel process flow for in-duct burners. Burners shall not fire without process flow. Advised minimum velocity shall be above 6 ft/s.
- [2] Optimal burner performance of V-Line burners will be realized with an uniform process air velocity around the flame between 6.5 and 26.2 ft/s. Higher process air velocities are possible (up to 65 ft/s), however may influence emissions of CO. (see page 4-22.5-17 "Expected emissions")

## Process air oxygen content

---

For heating process air with reduced oxygen, the burner will need an excess air higher than 1.1.

### Process back pressures

V-Line burners can be mounted in ducts with pressures ranging between -12 and +12 "wc.

### Piloting and ignition

V-Line burners standard have an integrated pilot burner with a connection for pilot gas. An adjustable orifice helps to set a stable pilot flame, used to ignite the burner on main flame. After the main burner is ignited, the pilot shall be interrupted. Permanent pilot is not advised. Use the main burner at minimum capacity for continuous operation.

Direct ignition of V-Line burners is also possible, if accepted by local codes.

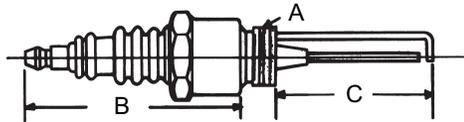
For both pilot and direct ignition, use ignition transformers with minimum 5000 V - 200 mA

### Spark igniters

Spark igniters are included into the burner endplate.

For spare parts use following spark igniter

#### 14 mm spark igniter



Dimensions in inches unless stated otherwise		
A	B	C
14 mm Thd.	2.03	1.5

Optional external spark igniter is available for firing in temperature and humid process air flows. Contact MAXON for more details.

### Typical ignition sequence (with pilot)

- Pre-purge of burner and combustion chamber, according to the applicable codes and the installation's requirements.
- Gas control valve shall be in the minimum position.
- V-Line burners with modulated combustion air shall have the combustion air valve (linked with the gas control valve) also in the corresponding minimum position to allow minimum combustion air flow to the burner.
- Pre-ignition (typically 2 s sparking in air).
- Open pilot gas and continue to spark the igniter (typically 5 s to 10 s depending on local code requirements).
- Stop sparking, continue to power the pilot gas valves and start flame check. Trip burner if no flame detected from here on.
- Check pilot flame stability (typically 5 s to 10 s to prove stable pilot).
- Open main gas valves and allow enough time to have main gas in the burner (typically 5 s + time required to have main gas in the burner).
- Close the pilot gas valves
- Release to modulation (allow modulation of the burner).

Above sequence shall be completed to include all required safety checks during the start of the burner (process and burner safeties).

We advise to position one pilot gas valve as close as possible to the pilot burner gas inlet for fast ignition of the pilot burner.

## Flame supervision

The flame of V-Line burners can be supervised with a flame rod or UV-scanner.

A flame rod is mounted on the burner endplate inside the duct and is positioned in the flame. It is easily accessible through the standard hand hole on the burner mounting plate, without the need of dismounting the burner.

A UV-scanner is mounted on an optional on the burner mounting plate and is positioned outside the duct.

When ordering the burner, specify whether a flame rod or a UV-scanner shall be installed.

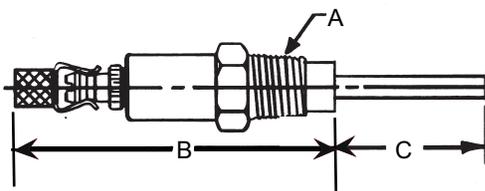
For poor quality propane, LPG or butane, we advise to use UV-scanners only.

Refer to the user manual of the UV-scanner for correct installation and operating instructions.

## Flame rods

For flame detection with flame rod, use following item (valid for all burner sizes):

### Flame rod 1/4" NPT



Dimensions in inches unless stated otherwise		
A	B	C
1/4" Thd.	3.1	6.3

## Flame development

Tables on page 4-22.5-7 and page 4-22.5-12 are giving typical flame length of MAXON V-Line burners for the shown combustion air flow and burner capacity.

Note that flame length is influenced by different factors, such as:

- Excess air factor (higher excess air will reduce flame length)
- Process air velocity (higher velocity will reduce flame length)
- Type of fuel (butane flames will typically be longer than natural gas flames)
- Burner lengths (shorter burners will give shorter flame lengths)
- Process air oxygen content

In case the burner is fired with low excess air in low oxygen environment, flames may become quite radiant. Take this into consideration for the design of combustion chambers (choice of materials, distance to the wall, expansion allowance ...).

Contact MAXON for more information.

## Fuels

MAXON V-Line burners can fire natural gas, propane, butane, LPG and are able to fire multiple fuels simultaneously if the control system is properly designed for.

Alternative fuels may be possible. Contact MAXON for more information.

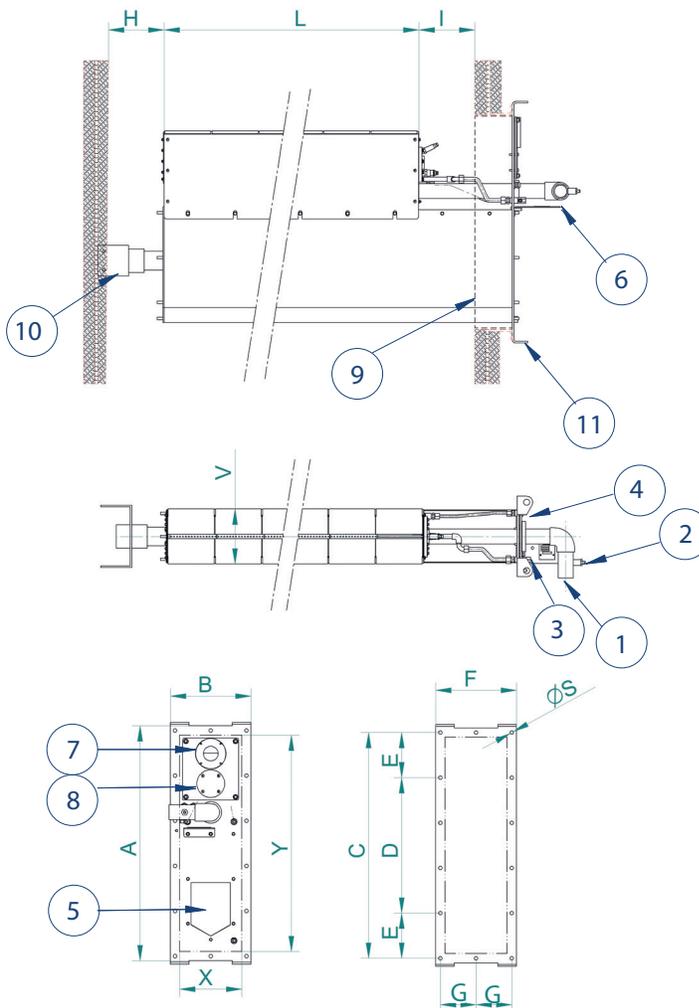
## Expected emissions

The clean hot air generated by MAXON V-Line burners meets most of the local requirements of make-up air systems, over the full turndown of the burners.

Also in low temperature ovens and drying systems, MAXON V-Line burners are able to fire with both low NO<sub>x</sub> and CO, over its entire turndown, meeting most local emission requirements.

## Dimensions and weights

- 1) Gas inlet
- 2) Gas Test Connection
- 3) Pilot Gas Inlet
- 4) Combustion Air Test Connection
- 5) Combustion Air Inlet [1]
- 6) Ignition Transformer Support
- 7) Sight Glass
- 8) Cover Plate for optional UV-Scanner
- 9) Optional Insulated Plug
- 10) Optional Induct Burner Support
- 11) Mounting plate (standard included with burner)
- [1] Optional blower adapter available on request



Burner Size	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5
Gas Inlet [1]	1"	1"	1"	1"	1"	1"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"
A	22.0	22.0	26.0	26.0	26.0	26.0	29.9	29.9	29.9	29.9	29.9	29.9	29.9
B	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6
C	20.9	20.9	24.8	24.8	24.8	24.8	28.7	28.7	28.7	28.7	28.7	28.7	28.7
D	2 x 5.5												
E	4.9	4.9	4.1	4.1	4.1	4.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
F	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6	10.6
G	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
H [2]	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
I [2]	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
L	6.3	12.3	18.3	24.3	30.2	36.2	42.2	48.2	54.2	60.2	66.1	72.1	78.1
Diam. S	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
V	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
X [3]	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
Y [3]	15.7	15.7	19.7	19.7	19.7	27.6	27.6	27.6	27.6	27.6	27.6	27.6	27.6
Weight (kg)	55	66	77	88	99	110	121	132	143	154	165	176	187

- [1] Gas connection ISO-threaded. NPT-threaded connection on request.
- [2] Min. distance
- [3] Opening in duct wall for burner mounting

## Installation and operating instructions

### Application requirements

#### View Port

---

A view port is standard available on the burner mounting plate. It is recommended to install the view port downstream of the flame, such that the entire burner front can be observed, as well as the pilot burner.

#### Required ancillary equipment

---

Ensure that all required ancillary equipment for safe operation and correct performance of the V-Line burner is installed as described in the applicable codes and process-related instructions.

#### Position of the burner in the process flow

---

MAXON V-Line burners are designed for heating of a process air flow. Refer to table page 4-22.5-15 for minimum required process air velocity.

V-Line burners should be mounted so as to direct their flames parallel to and in the same direction as the movement of the process flow.

The process flow upstream of the burner should be uniform.

#### Combustion chamber

---

In specific operating conditions (low oxygen or inert process air flows) V-Line flames can become quite luminous and radiant. Special attention should be paid to the part of the duct covering the flame (combustion chamber). Especially in narrow ducts with flames close to the wall, it is essential to use correct materials and proper construction designs.

For unprotected steel duct walls use at least 0.49 ft distance between duct wall and burner.

Contact MAXON for more information.

## Installation instructions

### Storage

---

V-Line burners should be stored dry (inside). Prevent that water and/or dust can penetrate into the burner manifold during storage.

### Handling

---

V-Line burners are shipped as complete units. Handle the burner with care during unpacking, transport, lifting and installation. Use proper equipment. Any impact on the burner could result in damage.

Remove all plastic caps closing off gas and air connections of the burner prior to connecting it with the pipe-train and combustion air fan.

### Orientation

---

V-Line burners can be mounted in any orientation (firing horizontally / vertically down and upwards).

### Mounting

---

V-Line burners are equipped with a mounting plate (see drawings page 4-22.5-2 and page 4-22.5-13). Bolt this mounting plate onto the combustion chamber's mounting flange. Use proper gasket (available as an option). Tighten the bolts with correct torque and retighten all bolts after first firing and regularly after commissioning.

Use only the V-Line burner support supplied by MAXON for supporting the burner at the opposite side of the mounting plate.

This support is especially designed to give the burner sufficient flexibility during firing. Use of different kind of supports may damage the burner.

### Hot surfaces

---

Burner parts in contact with the flame will become hot. Always wait for the burner system to cool down before cleaning.

In specific installations or operation modes, some accessible parts of the burner outside the oven or duct may become hot. If required, precautions should be taken to prevent burning injuries by contact with hot surfaces.

## 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.**

### Safety interlocks

---

Guarantee that all the required safety locks as described in the applicable local codes or regulations, or supplementary 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 operation.

### Checks during and after start-up

---

During and after start-up, check the integrity of the system. Check all bolted connections after first firing (first time on temperature) and retighten if necessary.

### Purge

---

For safety reasons, it is required to purge the installation sufficiently long enough to ensure that all possible combustibles are evacuated before ignition. Refer to the applicable local codes and your specific application requirements to determine the purge time.

### Pilot ignition

---

Turn adjustable orifice screw out (counter-clockwise) several turns from its fully seated position. Refine during lighting of the pilot to a yellow/blue flame and/or strongest stable flame signal.

### Main burner ignition

---

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

### Ratio adjustment

---

Once the main flame is ignited, adjust air/gas ratio of the burner to obtain the required combustion quality. Slowly increase capacity while observing the flame. Especially observe that the flame is well divided over the entire burner length and going straight forward in the direction of the process air flow. Check that no damage is caused to duct walls or other equipment.

## Maintenance and inspection

### Safety requirements

---

Regular inspection, testing and recalibration of combustion equipment according to the installation manual is an integral part of its safety. Inspection activities and frequencies shall be carried out as specified in the installation manual. Perform the following activities at least annually as part of a recommended preventative maintenance routine:

- Inspect burner internal parts for wear and oxidation.
- Inspect associated control instruments and devices for function with particular attention to all safety permissive detectors.
- Perform leak tests on fuel shut-off valves according to any schedule established by the authority having jurisdiction.

### Visual inspections

---

Regular visual inspection of all connections (air and gas piping to the burner, bolting of the burner mounting flange, burner support in the duct) and burner flame shape and aspect are essential for safe operation.

### Recommended spare parts

---

Keep local stock of spark igniter and flame detector. It is not recommended to keep local stock of other burner parts. Consult the installation manual for burner system spare parts and accessories.