

Specifications of DELTA-TE™ III burners

DELTA-TE™ III burners firing on natural gas

Typical burner data										
15° C - 21 % O ₂ combustion air - 50 % humidity - natural gas with 10.9 kWh/Nm ³ HHV - sg = 0.6 [1]										
Stated pressures are indicative - actual pressures are function of air humidity, altitude, type of fuel, gas quality										
Capacity per linear burner unit of 1 ft (= 305 mm)	[2]	kW HHV	20	50	100	200	300	400	500	600
Max. flame length (fresh process air - 21 Vol.% O ₂ - 15° C)	[3]	m	(NA)	0.5	1	1.75	2.2	2.5	2.7	3
Max. flame length (recirculating process air - O ₂ < 10 Vol.% - T < 350° C)	[3]	m	(NA)	0.8	1.5	2.5	3.3	3.7	4	4.5
(Optimal) combustion air flow	[4]	m ³ _(st) /h/ft	67.7	109	145	232	348	464	580	696
Optimal air factor "n"	[5]		3.5	2.25	1.5	1.2	1.2	1.2	1.2	1.2
Natural gas pressure differential	[6]	mbar(g)	0.1	0.5	2	7	14	25	37	53
Combustion air pressure differential	[7]	mbar(g)	0.4	1	2	4	9	16	25	35

[1] sg (specific gravity) = relative density to air (density air = 1.293 kg / m³(st)).

[2] 20 kW HHV is the absolute minimum capacity for natural gas firing on single shorter burners (<10 ft). The max. capacity (n = 1.2) is set at 600 kW/ft. Min. capacity will be higher when burner is mounted vertically (plug on top - 30 kW/ft.) or for longer burners (>10 ft). Multiple burners on common control valve can have higher minimum capacity too.

[3] Typical flame length for shown combustion air amount and capacity. For 600 kW/ft, flame length varies from 3 m (fresh air mode) to 4.5 m (recirculation mode).

[4] Corresponds with above capacity and below air factor "n".

[5] Advised air factor for best burner performance and emissions (NO_x and CO).

[6] Pressure at burner test connection for burner commissioning.

[7] Combustion air pressure required at burner test connection for commissioning (combustion air 15° C). Add 5 % on ratings at max. fire for air pressure at burner air inlet flange for blower sizing.

DELTA-TE™ III burners firing on propane or butane

Typical burner data										
15° C – 50 % humidity – 21 % O ₂ combustion air										
propane with 25.79 kWh/Nm ³ HHV - sg = 1.52 [1] and butane with 33.8 kWh/Nm ³ HHV - sg = 2.0 [1]										
Stated pressures are indicative - actual pressures are function of air humidity, altitude, type of fuel, gas quality										
Capacity per linear burner unit of 1 ft (= 305 mm)	[2]	kW HHV	40	100	200	300	400	500	600	
Max. flame length - propane	[3]	m	0.3	0.6	1.5	3	3.5	3.7	4	
Max. flame length - butane	[3]	m	0.2	0.7	1.7	2.2	3.1	3.3	3.5	
Combustion air flow	[4]	m ³ _(st) /h/ft	126	145	232	348	464	580	696	
Optimal air factor "n"	[5]		3.25	1.5	1.2	1.2	1.2	1.2	1.2	
Propane pressure test connection	[6]	mbar(g)	0.7	1.0	2.5	6	10	16	22	
Butane pressure test connection	[7]	mbar(g)	0.6	0.8	2.0	5	8	13	18	
Combustion air pressure differential	[8]	mbar(g)	1.2	2	4	9	16	25	35	

[1] sg (specific gravity) = relative density to air (density air = 1.293 kg / m³(st)).

[2] 40 kW HHV is the absolute minimum capacity for propane or butane firing. The maximum capacity is set at 600 kW/ft..

The minimum capacity will be higher when burner is mounted vertically (plug on top : propane -> 60 kW/ft. butane -> 100 kW/ft. or for longer burners (>10 ft). Multiple burners on common control valve can have higher minimum capacity too.

[3] Typical flame length for propane or butane firing with shown air factor.

[4] Corresponds with above capacity and below air factor "n".

[5] Advised air factor for best burner performance and emissions (NO_x and CO).

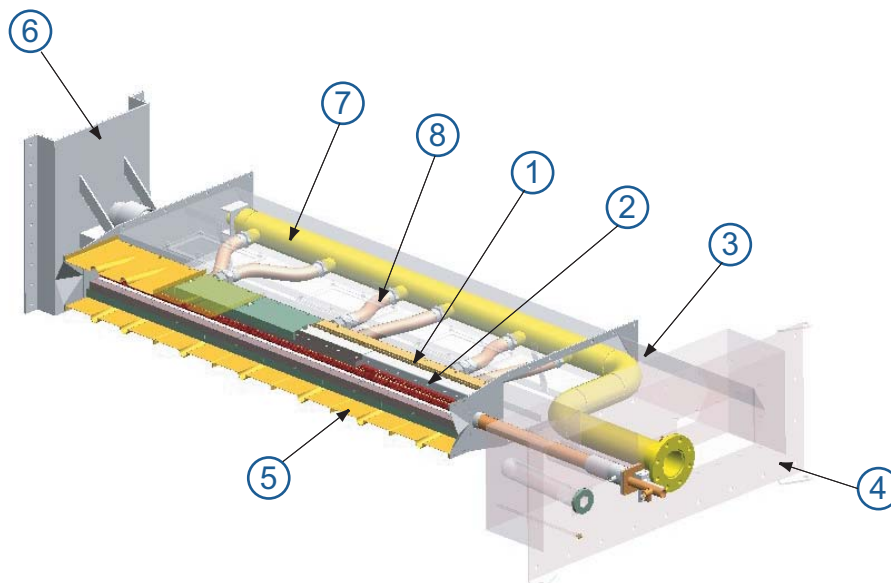
[6] For standard propane - pressure at burner test connection for burner commissioning.

[7] For standard butane - pressure at burner test connection for burner commissioning.

[8] Combustion air pressure required at burner test connection for commissioning (comb.air 15° C). Add 5 % on ratings at max. fire for air pressure at burner air inlet flange for blower sizing.

Contact MAXON for applications on other gases than specified here.

Materials of construction



1) Air/ gas-body	AISI 304 (1.4301)
2) Air orifice plate	AISI 304 (1.4301)
3) Air box	AISI 304 (1.4301)
4) Mounting plate/plug	AISI 304 (1.4301)
5) Protection plates	AISI 310 (1.4845)
6) Burner support	AISI 304 (1.4301)
7) Gas manifold [1]	ST 37 (1.0037)
8) Gas flexibles [1]	ST 37 (1.0037)

[1] Burner gas manifold and gas flexibles contain ST37 - this limits max. upstream temperature to 350° C.
Special stainless steel version is optional - contact MAXON.

Selection criteria

Application details

The DELTA-TE™ III burner has been especially designed for firing in low oxygen inert process air. It combines excellent flame stability and flexibility with extreme low emissions for direct firing. Typical applications are DeNOx and all process firing applications with low oxygen and/or high moisture (such as recirculating dryers).

Process temperature

Max. upstream process air temperature	350° C
Max. downstream process air temperature at low fire	500° C
Max. downstream process air temperature at high fire	800° C

Process upstream temperature is limited to approximately 350° C because of the use of carbon steel piping for the gas manifold. Special stainless steel manifold is available for higher upstream temperatures. Contact MAXON for detailed information.

Downstream temperature has to be limited when firing on low capacities to avoid overheating of burner parts. However, on high fire burner parts are better cooled by the combustion air flow, allowing much higher downstream temperatures.

Process flows and oxygen content

Max. process air flow	20 m/s
Max. process air flow for best emissions	8 m/s
Min. process air flow	2 m/s
Min. process air oxygen level	3 Vol.%

Even with process air velocities of 20 m/s and higher MAXON DELTA-TE™ III burners will perform well with a stable flame and high flexibility. However, it is advisable to limit the max. velocity to 20 m/s for process technical reasons.

Best emissions – especially CO – will be realized if low and uniform process air velocity around the flame, without turbulences or vortexes that may quench the flame.

DELTA-TE™ III burners can heat up process air with very low oxygen levels. Depending on temperature, capacity and air factor, almost inert process air is possible.

Contact MAXON for more information.

Process back pressure

The DELTA-TE™ III burner is standard designed for a max. back pressure of 100 mbar(g) (over- and underpressure).

On special request, burner can be reinforced for higher process back pressure. Contact MAXON for more information.

Preheated combustion air

Max. combustion air temperature at high fire	350° C
Max. combustion air temperature at low fire	200° C

At absolute minimum of the burner, the combustion air temperature is limited to max. 200° C to prevent overheating of the burner parts in contact with the flame. However, increased burner minimum will allow higher combustion air temperatures.

On high fire, the carbon steel gas manifold and gas flexibles will limit the max. combustion air temperature.

Ratio control

Best performance of DELTA-TE™ III burners is realized when the burner is adjusted with excess air levels as indicated in table on page 4-21.7-7. Accurate gas/air ratio-control can be achieved with MAXON SMARTLINK® MRV, SMARTFIRE® or MICRO-RATIO® valves.

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

An equal combustion air distribution at the burner inlet flange is essential for correct operation of the burner. Installing the air and, to some extent, the gas control valve directly on the burner or just in front of the burner may cause an uneven air velocity and disturb the air distribution in the burner.

The control valve shall be:

- located at least 10x the piping diameter upstream of the burner air inlet (advised)
- separated from the burner air inlet by a perforated plate, which will correct the uneven air distribution, should the burner be firing at lower capacities with partly closed control valves. This will, however, require a significant extra pressure drop and is not advised.

Piloting & ignition

Direct ignition of DELTA-TE™ III burners is not possible. All DELTA-TE™ III burners will be equipped with a MAXON LVDT pilot burner to ignite the main flame. The pilot burner shall be used only for ignition of the main flame (interrupted pilot). Permanent pilot operation is not advised (no "permanent" or "intermittent" pilot). Use the main burner at minimum capacity for continuous operation.

Please refer to section 30-60.3 - LVDT pilots.

Contact MAXON for more information.

Typical ignition sequence

- Pre-purge of burner and combustion chamber, according to the applicable codes and the installation's requirements.
- Combustion air control valve shall be in the 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 ignitor (typically 5 s to 10 s depending on local code requirement).
- Stop sparking, continue to power the pilot gas valves and start flame check. Trip burner if no flame from here on.
- Check pilot flame stability (typical 5 s to 10 s to prove stable pilot)
- Open main gas valves and allow enough time to have main gas in the burner (typical 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-up of the burner (process & burner safeties).

Position 1 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 a DELTA-TE™ III burner shall be supervised by a flame scanner. Scanners will be mounted on the 1" scanner tube of the LVDT pilot burner, which is the only correct position for safe supervision of both the pilot-flame and main flame (burner is always operated with interrupted pilot). It is not possible to distinguish pilot and main flame.

Allow some purge or cooling air to the scanner tube connection of the LVDT pilot burner. (typically 4 m³_(st)/h fresh clean air)

Flame development

The flame of DELTA-TE™ III burners is influenced by excess air factor, process oxygen level and temperature. Typical flame at typical conditions is rather voluminous and radiant. This should be taken into consideration for proper combustion chamber layout. Consult MAXON for more information and assistance.

Fuels

DELTA-TE™ III burners can fire on natural gas, propane, butane and is able to fire multiple fuels simultaneous if the control system is properly designed for. Contact MAXON for alternative fuels such as hydrogen, biogas etc.

Expected Emissions

Data below are typical emissions for given air factor and fresh combustion air (natural gas)

Typical emissions – combustion air 15° C – 50 % humidity – 21 Vol.% O ₂ / natural gas 10.9 kWh/m ³ (st) HHV and sg = 0.60 [1]							
Capacity per linear burner unit of 1 ft	kW HHV	100	200	300	400	500	600
Air factor “n”		1.5	1.2	1.2	1.2	1.2	1.2
Typical NO _x - fresh process air (21 % O ₂ , 15° C) [2]	mg/MJ	55	55	55	55	55	55
Typical NO _x - recirculating process air (O ₂ < 10 Vol.%, T < 350° C) [2]	mg/MJ	45	45	45	45	45	45
Typical CO - fresh & recirculating firing [3]	mg/MJ	15	15	15	15	15	15

[1] sg (specific gravity) = relative density to air (density air = 1.293 kg / m³(st)).

[2] Typical burner NO_x if the burner is firing in typical conditions - air velocity over the burner between 7 m/s and 9 m/s (cold combustion air, ambient air upstream of the burner and normal downstream temperatures, low process air velocity...) for above shown capacities and air factors.

[3] Typical CO - same remark [1] - higher process air velocities will give higher CO. Recirculation firing will give slightly higher CO, around shown limits.

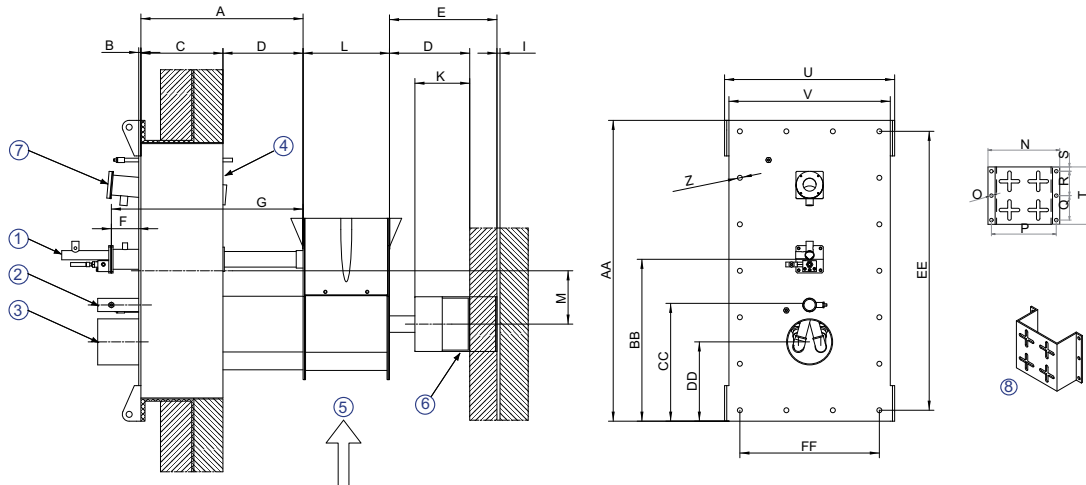
The production of pollutants can be highly dependant upon burner application and installation. Differing temperatures, process velocities, oxygen levels, fuels and other process related factors such as unequal process air distribution can all influence the actual level of emissions produced.

No guarantee of emissions is intended or implied on the above.

Contact MAXON for evaluation of expected emissions on your typical application.

Dimensions and weights

Drawing of DELTA-TE™ III burner size 1 ft to 1.5 ft with plug



- | | |
|--|-----------------------------------|
| 1) Pilot burner / UV-scanner | 5) Process air flow |
| 2) Gas inlet | 6) Burner mounting support |
| 3) Combustion air inlet | 7) View port |
| 4) Plug to be mounted in opening duct wall | 8) Detail burner mounting support |

Dimensions in mm unless stated otherwise														
Size	A [1]	B	E	K	L	M	N	O	P	Q	R	S	T	U
1	>200	8	>200	200	316	195	250	12	226	85	85	15	200	622
1.5	>200	8	>200	200	469	195	250	12	226	85	85	15	200	622
Size	V	Z	AA	BB	CC	DD	EE	FF	Burner length L	Opening duct wall	Weight			
1	590	18	1100	592	425	290	1020	510	316	430 x 940	153 kg			
1.5	590	18	1100	592	425	290	1020	510	469	430 x 940	171 kg			

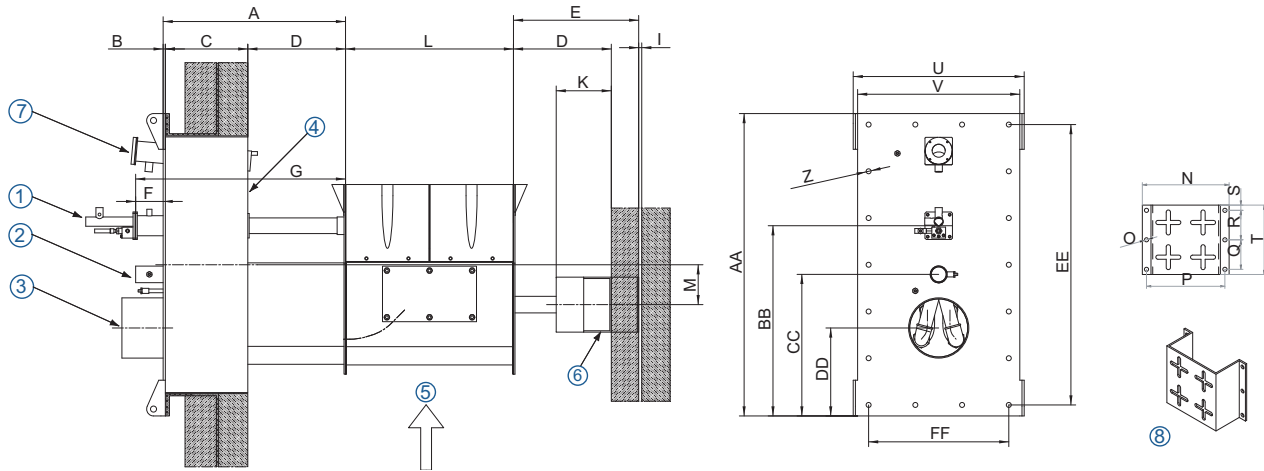
[1] min. 200 mm without plug or insulation

Following dimensions are specific to each system :

- C = default 300 mm (customer's flange elevation + customer's internal and external insulation thickness)
- D = distance between wall and burner
- F = pilot burner elevation flange LG = 50 mm to 150 mm
- G = pilot length = F + B + C + D
- I = duct wall thickness

	ISO	ANSI
Gas inlet	Rc 1 - 1/2"	1-1/2" NPT
Combustion air inlet	6"	6"
UV connection	Rp1	1" NPT

Drawing of DELTA-TE™ III burner size 2 ft to 3 ft with plug



- 1) Pilot burner / UV-scanner
- 2) Gas inlet
- 3) Combustion air inlet
- 4) Plug to be mounted in opening duct wall
- 5) Process air flow
- 6) Burner mounting support
- 7) View port
- 8) Detail burner mounting support

Dimensions in mm, unless stated otherwise														
Size	A [1]	B	E	K	L	M	N	O	P	Q	R	S	T	U
2	>300	8	>300	200	622	145	250	12	226	85	85	15	200	622
2.5	>300	8	>300	200	775	145	250	12	226	85	85	15	200	622
3	>300	8	>300	200	928	145	250	12	226	85	85	15	200	622
Size	V	Z	AA	BB	CC	DD	EE	FF	Burner length L	Opening duct wall	Weight			
2	590	18	1100	692	515	320	1020	510	622	430 x 940	189 kg			
2.5	590	18	1100	692	515	320	1020	510	775	430 x 940	207 kg			
3	590	18	1100	692	515	320	1020	510	928	430 x 940	225 kg			

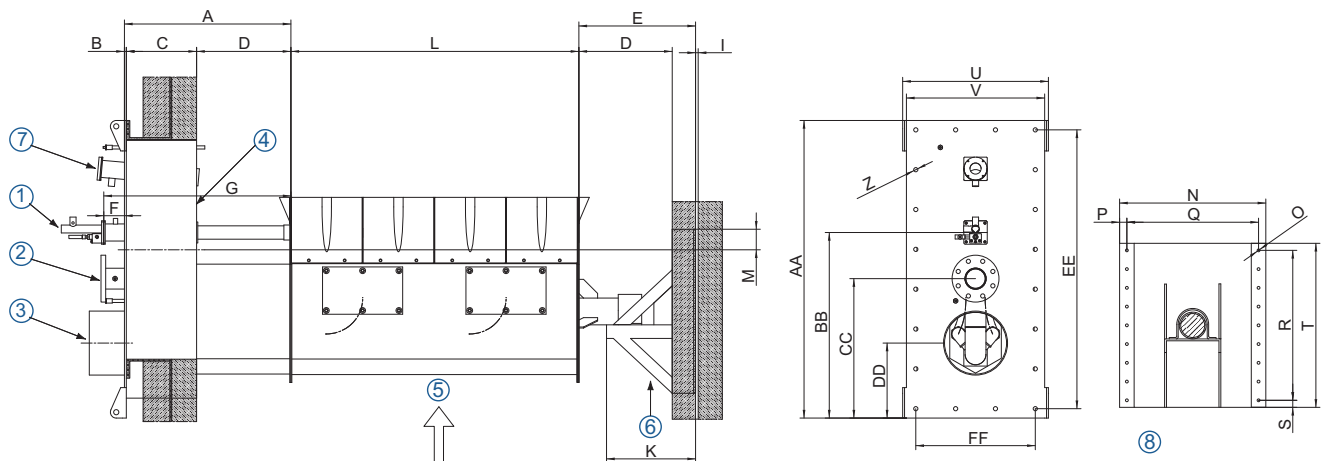
[1] min. 300 mm without plug or insulation

Following dimensions are specific to each system :

- C = default 300 mm (customer's flange elevation + customer's internal and external insulation thickness)
- D = distance between wall and burner
- F = pilot burner elevation flange LG = 50 mm to 150 mm
- G = pilot length = F + B + C + D
- I = duct wall thickness

	ISO	ANSI
Gas inlet	Rc 2	2" NPT
Combustion air inlet	8"	8"
UV connection	Rp1	1" NPT

Drawing of DELTA-TE™ III burner size 3.5 ft to 6 ft with plug



- 1) Pilot burner / UV-scanner
- 2) Gas inlet
- 3) Combustion air inlet
- 4) Plug to be mounted in opening duct wall
- 5) Process air flow
- 6) Burner mounting support
- 7) View port
- 8) Detail mounting support

Dimensions in mm, unless stated otherwise														
Size	A [1]	B	E	K	L	M	N	O	P	Q	R	S	T	U
3.5	>300	8	>300	380	1081	88	624	12	31	562	640	30	700	622
4	>300	8	>300	380	1234	88	624	12	31	562	640	30	700	622
4.5	>300	8	>300	380	1387	88	624	12	31	562	640	30	700	622
5	>300	8	>300	380	1540	88	624	12	31	562	640	30	700	622
5.5	>300	8	>300	380	1693	88	624	12	31	562	640	30	700	622
6	>300	8	>300	380	1846	88	624	12	31	562	640	30	700	622
Size	V	Z	AA	BB	CC	DD	EE	FF	Burner length L	Opening duct wall	Weight			
3.5	590	18	1270	792	595	320	1190	510	1081	430 x 1110	243 kg			
4	590	18	1270	792	595	320	1190	510	1234	430 x 1110	287 kg			
4.5	590	18	1270	792	595	320	1190	510	1387	430 x 1110	305 kg			
5	590	18	1270	792	595	320	1190	510	1540	430 x 1110	323 kg			
5.5	590	18	1270	792	595	320	1190	510	1693	430 x 1110	341 kg			
6	590	18	1270	792	595	320	1190	510	1846	430 x 1110	359 kg			

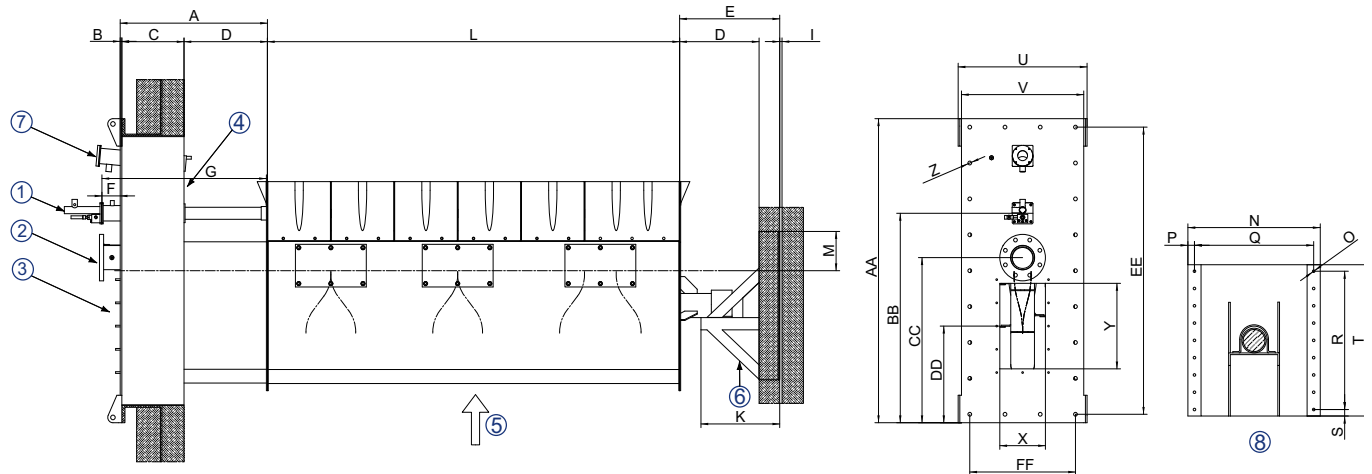
[1] min. 300 mm without plug or insulation

Following dimensions are specific to each system :

- C = default 300 mm (customer's flange elevation + customer's internal and external insulation thickness)
- D = distance between wall and burner
- F = pilot burner elevation flange LG = 50 mm to 150 mm
- G = pilot length = F + B + C + D
- I = duct wall thickness

	ISO	ANSI
Gas inlet	DN 80 DIN PN10 (ISO 7005 PN10)	3" ANSI 150 lbs (ISO 7005 PN 20)
Combustion air inlet	10"	10"
UV connection	Rp 1	1" NPT

Drawing of DELTA-TE™ III burner size 6.5 ft to 9 ft with plug



- 1) Pilot burner / UV-scanner
- 2) Gas inlet
- 3) Combustion air inlet
- 4) Plug to be mounted in opening duct wall
- 5) Process air flow
- 6) Burner mounting support
- 7) View port
- 8) Detail burner mounting support

Dimensions in mm, unless stated otherwise																
Size	A [1]	B	E	K	L	M	N	O	P	Q	R	S	T	U	V	Z
6.5	>400	8	>400	380	1999	186	624	12	31	562	640	30	700	622	590	18
7	>400	8	>400	380	2152	186	624	12	31	562	640	30	700	622	590	18
7.5	>400	8	>400	380	2305	186	624	12	31	562	640	30	700	622	590	18
8	>400	8	>400	380	2458	186	624	12	31	562	640	30	700	622	590	18
8.5	>400	8	>400	380	2611	186	624	12	31	562	640	30	700	622	590	18
9	>400	8	>400	380	2764	186	624	12	31	562	640	30	700	622	590	18
Size	AA	BB	CC	DD	EE	FF	Burner length L	Combustion air inlet X Y		Opening duct wall		Weight				
6.5	1440	992	782	458	1360	510	1999	220	405	430 x 1280		377 kg				
7	1440	992	782	458	1360	510	2152	220	405	430 x 1280		395 kg				
7.5	1440	992	782	458	1360	510	2305	220	405	430 x 1280		413 kg				
8	1440	992	782	458	1360	510	2458	220	405	430 x 1280		431 kg				
8.5	1440	992	782	458	1360	510	2611	220	405	430 x 1280		449 kg				
9	1440	992	782	458	1360	510	2764	220	405	430 x 1280		467 kg				

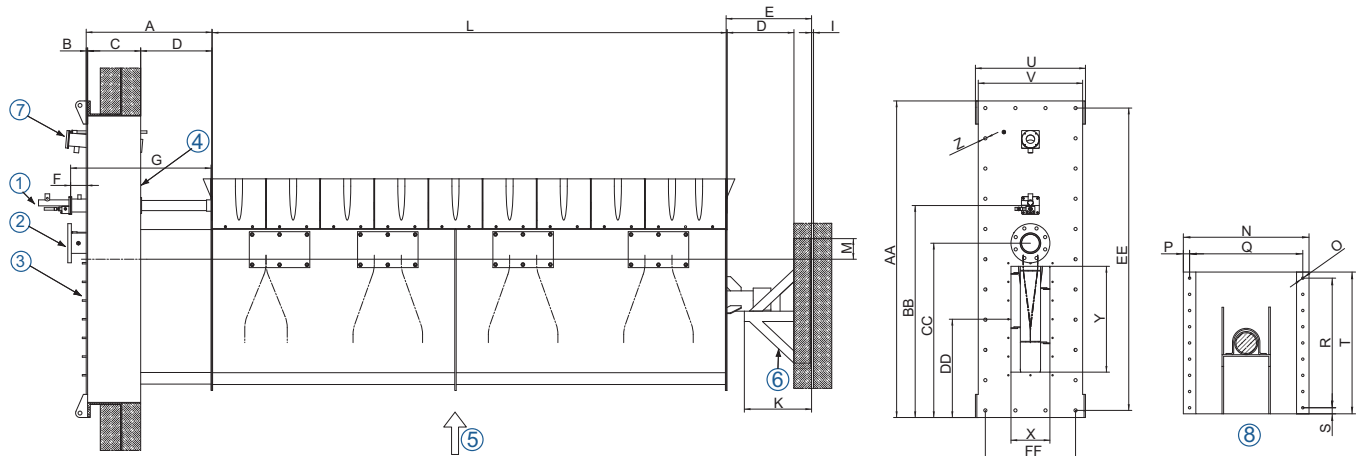
[1] min. 400 mm without plug or insulation

Following dimensions are specific to each system :

- C = default 400 mm (customer's flange elevation + customer's internal and external insulation thickness)
- D = distance between wall and burner
- F = pilot burner elevation flange LG = 50 mm to 150 mm
- G = pilot length = F + B + C + D
- I = duct wall thickness

	ISO	ANSI
Gas inlet	DN 100 DIN PN10 (ISO 7005 PN10)	4" ANSI 150 lbs (ISO 7005 PN 20)
UV connection	Rc 1	1" NPT

Drawing of DELTA-TE™ III burner size 9.5 ft to 12 ft with plug



- 1) Pilot burner / UV-scanner
- 2) Gas inlet
- 3) Combustion air inlet
- 4) Plug to be mounted in opening duct wall
- 5) Process air flow
- 6) Burner mounting support
- 7) View port
- 8) Detail burner mounting support

Dimensions in mm unless stated otherwise																
Size	A [1]	B	E	K	L	M	N	O	P	Q	R	S	T	U	V	Z
9.5	>400	8	>400	380	2917	116	624	12	31	562	640	30	700	622	590	18
10	>400	8	>400	380	3070	116	624	12	31	562	640	30	700	622	590	18
10.5	>400	8	>400	380	3223	116	624	12	31	562	640	30	700	622	590	18
11	>400	8	>400	380	3376	116	624	12	31	562	640	30	700	622	590	18
11.5	>400	8	>400	380	3529	116	624	12	31	562	640	30	700	622	590	18
12	>400	8	>400	380	3682	116	624	12	31	562	640	30	700	622	590	18
Size	AA	BB	CC	DD	EE	FF	Burner length L	Combustion air inlet X Y		Opening duct wall	Weight					
9.5	1780	1192	980	553	1700	510	2917	220	595	430 x 1620	485 kg					
10	1780	1192	980	553	1700	510	3070	220	595	430 x 1620	503 kg					
10.5	1780	1192	980	553	1700	510	3223	220	595	430 x 1620	521 kg					
11	1780	1192	980	553	1700	510	3376	220	595	430 x 1620	539 kg					
11.5	1780	1192	980	553	1700	510	3529	220	595	430 x 1620	557 kg					
12	1780	1192	980	553	1700	510	3682	220	595	430 x 1620	575 kg					

[1] min.400 mm without plug or insulation

Following dimensions are specific to each system :

- C = default 300 mm (customer's flange elevation + customer's internal and external insulation thickness)
- D = distance between wall and burner
- F = pilot burner elevation flange LG = 50 mm to 150 mm
- G = pilot length = F + B + C + D
- I = duct wall thickness

	ISO	ANSI
Gas inlet	DN 100 DIN PN10 (ISO 7005 PN10)	4" ANSI 150 lbs (ISO 7005 PN 20)
UV connection	Rc 1	1" NPT

Installation instructions

Application requirements

View port

A view port to inspect burner flame is essential to inspect flame aspect. 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 DELTA-TE™ III burner is installed, as described in the applicable local codes and/or process-related instructions. An accurate control of the air/gas-ratio is essential for optimal operation of the burner.

Position of the burner in the process flow

MAXON DELTA-TE™ III burners are designed for heating of a process flow in motion. They should be mounted so as to direct their flames parallel to and in the same direction as the movement of the process flow.

A min. velocity of 2 m/s, measured in the plane of the duct where the burners are mounted, is essential for good burner performance.



Do not mount the burner so that the movement of air is across the face of the burner, nor should it be mounted too near to a duct which causes the process flow to be directed at an angle over the burner.

Ensure that the process flow in the duct immediately upstream the burner is uniform. (max. deviation of velocity of approx. 15 % in each point of a plane immediately in front of the burners)

Duct

DELTA-TE™ III burners may have in specific operating conditions quite luminous and radiant flames.

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. Contact MAXON for more information.

Installation instructions

Storage

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

Handling

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

Make use of the available lifting lugs on the mounting plate/plug and the pipe-support at the opposite end of the burner for handling.

Flange the burner to the installation

Each burner is equipped with a mounting plate or plug. Bolt this mounting plate/plug onto the combustion chamber's burner mounting flange. Use proper gasket, available as an option. Tighten the flange bolts with correct torque. Retighten all bolts after first firing and regularly after commissioning.

Refer to drawings on page 4-21.7-12 and further for requirements on the combustion chamber's burner mounting flange.

Burner support

Only use the DELTA-TE™ III burner support supplied by MAXON for supporting the burner at the opposite side of the mounting plate/plug.

The DELTA-TE™ III burner support is especially designed to give the burner sufficient flexibility during firing. Use of different kind of supports may damage or destroy the burner.

Refer to drawing on page 4-21.7-12 and further for correct position of the burner support.

Check that the burner is not vibrating in the support once mounted (with the process air blower in operation).

Orientation

DELTA-TE™ III burners can be mounted in any orientation. Refer to drawings on page 4-21.7-12 and further for instructions on position of mounting flange and burner support.

Note that orientations with the burner face vertically down-or upwards may affect the absolute minimum firing capacity.

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.

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 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

Adjust pilot air flow and 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 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's manual is an integral part of its safety. Inspection activities and frequencies shall be carried out as specified in the installation's 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 switches.
- 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 ignitor and protection plates. It is not recommended to keep local stock of other burner parts. Consult installation manual for burner spare parts and system accessories.