

Specifications of KINEDIZER® LE burners

Typical burner data							
Fuel: natural gas at 60°F with 1000 Btu/ft ³ (st) HHV - sg = 0.6 [1]							
Combustion air: 60°F - 21% O ₂ - 50% humidity - sg = 1.0 [1]							
Stated pressures are indicative. Actual pressures are a function of air humidity, altitude, type of fuel and gas quality.							
KINEDIZER® LE size		1-1/2"	3"	4"	6"	8"	10"
Max. capacity @ n=1.3 (low NOx) [2]	MBtu/h	0.55	2.4	4.6	9.8	16	25
Max. capacity @ n=1.1	MBtu/h	0.59	2.6	5.2	11.2	17.7	32
Min. capacity	KBtu/h	27	120	230	490	740	1200
Turndown @ n=1.3 [2]		1:20	1:20	1:20	1:20	1:20	1:20
Turndown @ n=1.1		1:22	1:22	1:22	1:22	1:22	1:22
Air flow at max. capacity	scfm	110	500	950	2000	3225	5000
Air flow at min. capacity	scfm	18	57	66	120	167	248
Advised pilot capacity [3]	MBtu/h	0.1	0.2	0.2	0.3	0.5	1.0
Pilot gas pressure [4]	"wc	<0.4	1.0	<0.4	0.6	1.0	4.0
Advised pilot gas piping diameter [5]		1/2"	3/4"	3/4"	3/4"	1"	1-1/2"
Combustion air pressure @ inlet [6]	"wc	28	32	32	32	32	32
Combustion air pressure differential [7]	"wc	26	28	29	31	27	28
Natural gas inlet pressure differential [8]	"wc	55	52	42	64	40	75
Flame length @ n=1.3 [2]	ft	0.98	1.47	1.96	3.93	5.9	8.85
Flame diameter @ n=1.3 [2]	ft	0.49	0.65	0.82	1.47	2.95	3.93
Flame length @ n=1.1	ft	1.6	2.46	3.28	6.56	9.84	14.76
Flame diameter @ n=1.1	ft	0.49	0.65	0.82	1.47	2.95	3.93

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

[2] n=1.3 meaning 30% excess air

[3] Most installations will require a stronger pilot (advised pilot capacity will be required - see (3))

[4] Natural gas pressure at pilot burner gas inlet (absolute minimum pilot capacity)

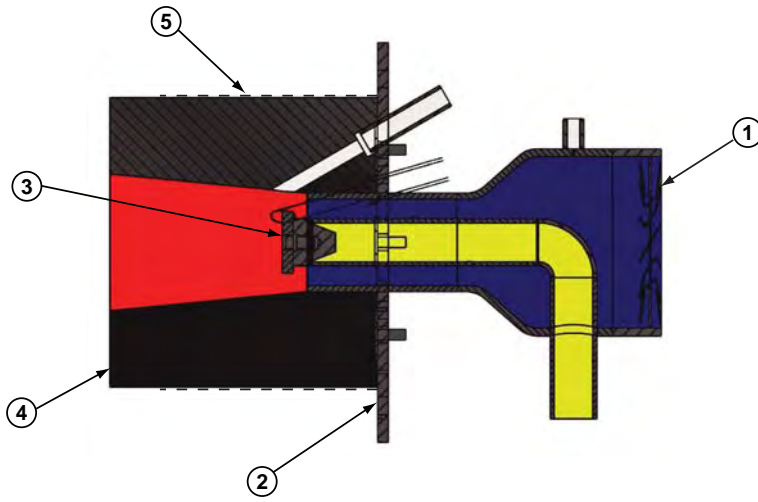
[5] For information only - strong pilots require adapted piping

[6] Differential air pressure needed to the burner

[7] Air pressure as measured at the air pressure connection port

[8] Differential natural gas pressure required at burner gas inlet (gas inlet test connection) relative to process, for the "n=1.3" maximum capacities.

Materials of construction



Item number	Burner part	Material
1	Burner housing	Carbon steel, painted [1]
2	Burner parts (in contact with furnace)	AISI 304 (1.4301)
3	Burner tip	AISI 310 (1.4541)
4	Burner block	Castable refractory [2]
5	Burner block sleeve (optional)	AISI 304 (1.4301)

[1] Optional available: 100% stainless steel burner

[2] Typical composition of castable refractory: refractory with 50% SiO₂, 45% Al₂O₃ and smaller fractions of iron oxide, titanium, lime, reinforced with needles (AISI 304-1.4301)

Selection criteria

KINEDIZER® LE burner versions

To suit the local demands of industry and specific regulations worldwide, the standard KINEDIZER® LE burner is available in different versions.

All burners can be ordered with NPT gas connection and SCH 10/40 air pipe connection (ANSI version - see drawings on page 3-11.9-10 through 3-11.9-13).

On request, special versions for hazardous locations, ISO connections, or high back pressure may be supplied. Contact MAXON for more details.

Application details

KINEDIZER® LE burners can be used in all direct fired high temperature air heating applications. It combines flexibility and stability with high turndown and the lowest available NO_x emissions. The use of KINEDIZER® LE burners in indirect applications requires special consideration. Contact MAXON for application details.

Maximum capacities

All KINEDIZER® LE burners can be fired at higher maximum capacities if sufficient combustion air and fuel gas is allowed to the burner. Maximum capacities of all sizes can be 20% higher.

Preheated air/reduced O₂ air

KINEDIZER® LE burners accept preheated combustion air up to 660°F (800°F on request). Maximum capacities shall be reduced. Preheated combustion air can have reduced O₂ (as low as 17% if combustion air temperature is 800°F). Mixing of some low O₂ flue gas allows to combine increased system thermal efficiency with best emissions.

Process back pressure

Standard KINEDIZER® LE burners can accept static back pressures between -40"wc and 40"wc. The burner shall be connected to a fuel gas and combustion air control system that is capable of controlling a correct fuel gas ratio against all possible installation back pressures. Special versions are available to accept up to 14.5 psi back pressure (with PED-certification).

Process temperature

The construction of the burner allows operation in all applications with process temperatures from ambient up to 2000°F. Protect burner from high furnace temperatures during burner stop (purge to avoid back flow of hot furnace/process air).

Piloting & ignition

Direct ignition of standard KINEDIZER® LE burners is possible. In case the use of a pilot is preferred, the KINEDIZER® LE burner will be equipped with a raw gas pilot to ignite the main flame (using main burner combustion air). Pilots shall be used only for ignition of the main flame (interrupted). Permanent pilot operation is not advised (no permanent or intermittent pilot). Use main burner at minimum capacity for continuous operation.

Use minimally 5000 V/200 VA ignition transformers for sparking of the spark ignitor. Optional ignition equipment for hazardous locations is available as well as high energy ignitors for direct ignition.

Typical ignition sequence

- Pre-purge of burner and installation, 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).
- 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 (typically 5 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-up of the burner (process and burner safeties).

Locate one pilot gas valve as close as possible to the pilot burner gas inlet to have fast ignition of the pilot burner.

Ratio control

KINEDIZER® LE burners can be fired stable with air factors ("n") : $1.05 < n < 1.60$ (5% to 60% excess air) from 20% to 100% of listed maximum air flows (lower capacities require somewhat higher excess air). Flame dimensions and burner emissions are heavily affected by the excess air amount.

In order to achieve the best ratio control and emissions, MAXON SMARTFIRE® or SMARTLINK® control systems should be utilized. MAXON MICRO-RATIO® valves are also available to obtain good performance over the entire turndown of the burner.

Ratio control on reduced capacity

Most KINEDIZER® LE applications will require burner operation with 30% excess air to have low NOx.

On reduced capacities, the excess air will slowly increase.

KINEDIZER® LE burners will operate with low NOx between 20% and 100% of their listed maximum capacity. Below 20% firing rate, the air factor will slightly increase to have the listed air flow at minimum capacity. Changes of combustion air temperature, system back pressure and other parameters could influence gas/air ratio if the control system is not designed to compensate for these.

Flame supervision

KINEDIZER® LE flames shall be supervised by UV scanners. Two scanner positions are available. Both locations allow verification of both pilot flame and main flame. (It is not possible to distinguish main and pilot flame.)

Scanners are mounted on the burner flange and look through the block (30° relative to the burner center line).

Pay attention to possible pick-up of strange flames (if any in the furnace). Allow some purge or cooling air to the scanner connections (typically 1.5 scfm of fresh clean air).

Flame development

KINEDIZER® LE burners shall be installed in combustion chambers or furnaces that allow full development of the burner flame. Cylindrical combustion chambers shall have diameters of 1.5 to 2 times burner flame diameter (see table on page 3-11.9-5).

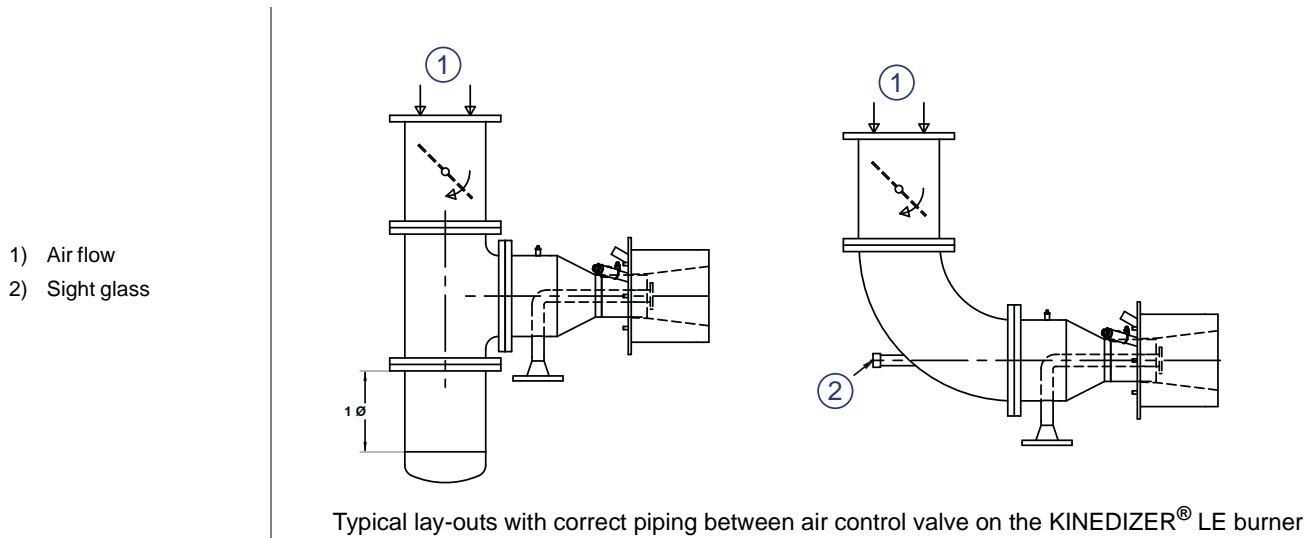
Consult MAXON for proper combustion chamber lay-out.

Cross velocities

Cross velocities up to 3000 ft/min can be allowed over the KINEDIZER® LE flame. Contact MAXON for proper lay-out and correct emission information in case of cross velocity over the flame.

Combustion air control and piping

KINEDIZER® LE burners require combustion air control valves with high turndown (to guarantee correct air flow at minimum capacity). Air control valves shall be properly sized. Typically, the air control valve diameter shall be smaller than the burner air inlet. Combustion air piping to the burner shall be done in such a way that the air flow to the burner will not disturb the flame. Location of air control valves directly on the burner inlet is not possible.



Fuels

Standard KINEDIZER® LE burners are designed for low NO_x firing of natural gas only. Special versions are available to fire propane/LPG. Multi-fuel burners will have higher NO_x on the alternative fuel.

Expected emissions

Typical NO_x for KINEDIZER® LE burners firing natural gas with 30% excess air:

- cold furnaces (< 1382°F): 50% of a conventional burner
- furnaces up to 1742°F: 40% of a conventional burner

CO highly depends on the installation's lay-out and can be reduced if sufficient dwell time after the flame is allowed. Consult MAXON for correct application information.

Low NO_x furnace requirements

Low NO_x operation requires properly designed combustion chamber or furnace.

KINEDIZER® LE flames have a medium velocity and will be influenced by the atmosphere around the flame. Contact MAXON for proper design.

CO and low NO_x operation

Low NO_x in combination with low CO is possible if sufficient dwell time is available after the flame. Mixing that occurs too fast with cold process air will increase CO.

Burner blocks

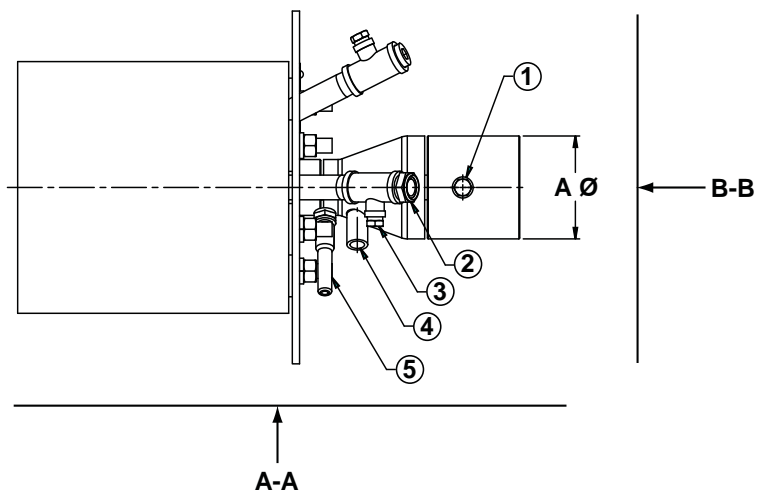
Standard KINEDIZER® LE burners will be shipped with block as shown on page 3-11.9-10. Two long block options are available: standard (without supporting sleeve) and with supporting sleeve.

Standard blocks without supporting sleeves shall be used only if the blocks are supported by the furnace walls. Supporting sleeves shall be used in all installations where the blocks are not supported (soft walls or steel ducting). Protect the supporting sleeve with insulation if used on high temperature furnaces. Consult installation instructions for detailed information.

Dimensions and weights

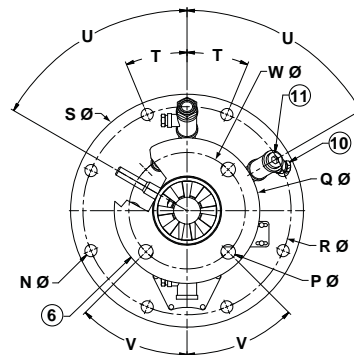
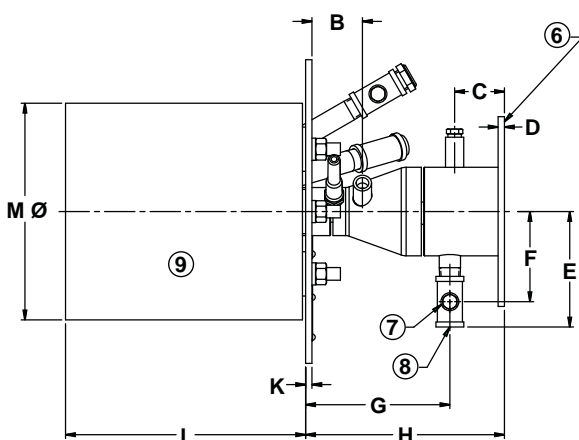
1-1/2" KINEDIZER® LE burners

- 1) 1/4" NPT air test connection
- 2) Observation port
- 3) 1/4" NPT chamber test connection
- 4) 1/4" NPT pilot gas inlet
- 5) Spark ignitor
- 6) Optional air inlet flange
- 7) 1/4" NPT gas test connection
- 8) 1/2" NPT main gas inlet
- 9) Standard block or block with sleeve option
- 10) 1/4" NPT purge air connection
- 11) 1/2" NPT scanner port



View A-A

View B-B



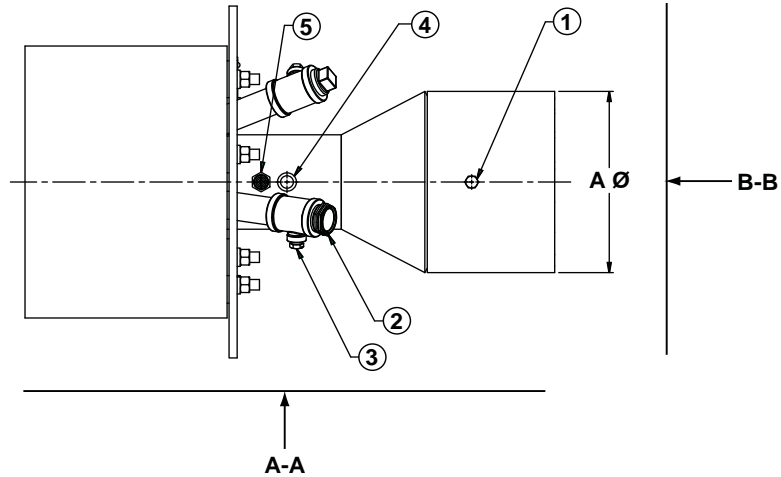
Dimensions in inches unless stated otherwise

Size	A Ø	B	C	D	E	F	G	H	K	L	M Ø
1-1/2"	3.5	2.0	1.97	0.25	4.6	3.6	5.7	7.86	0.25	9.5	8.6

Size	N Ø	P Ø	Q Ø	R Ø	S Ø	T	U	V	W Ø	Weight lbs
1-1/2"	0.625	0.75	7.5	10.73	12.0	22°	60°	45°	6.0	66

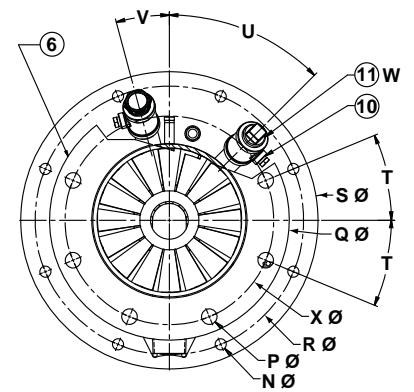
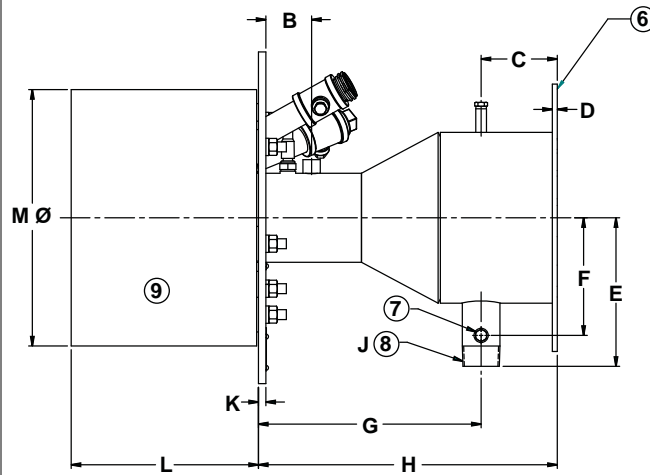
3" & 4" KINEDIZER® LE burners

- 1) 1/4" NPT air test connection
- 2) Observation port
- 3) 1/4" NPT chamber test connection
- 4) 3/8" NPT pilot gas inlet
- 5) Spark ignitor
- 6) Optional air inlet flange
- 7) 1/4" NPT gas test connection
- 8) Main gas inlet
- 9) Standard block or block with sleeve option
- 10) 1/4" NPT purge air connection
- 11) Scanner port



View A-A

View B-B

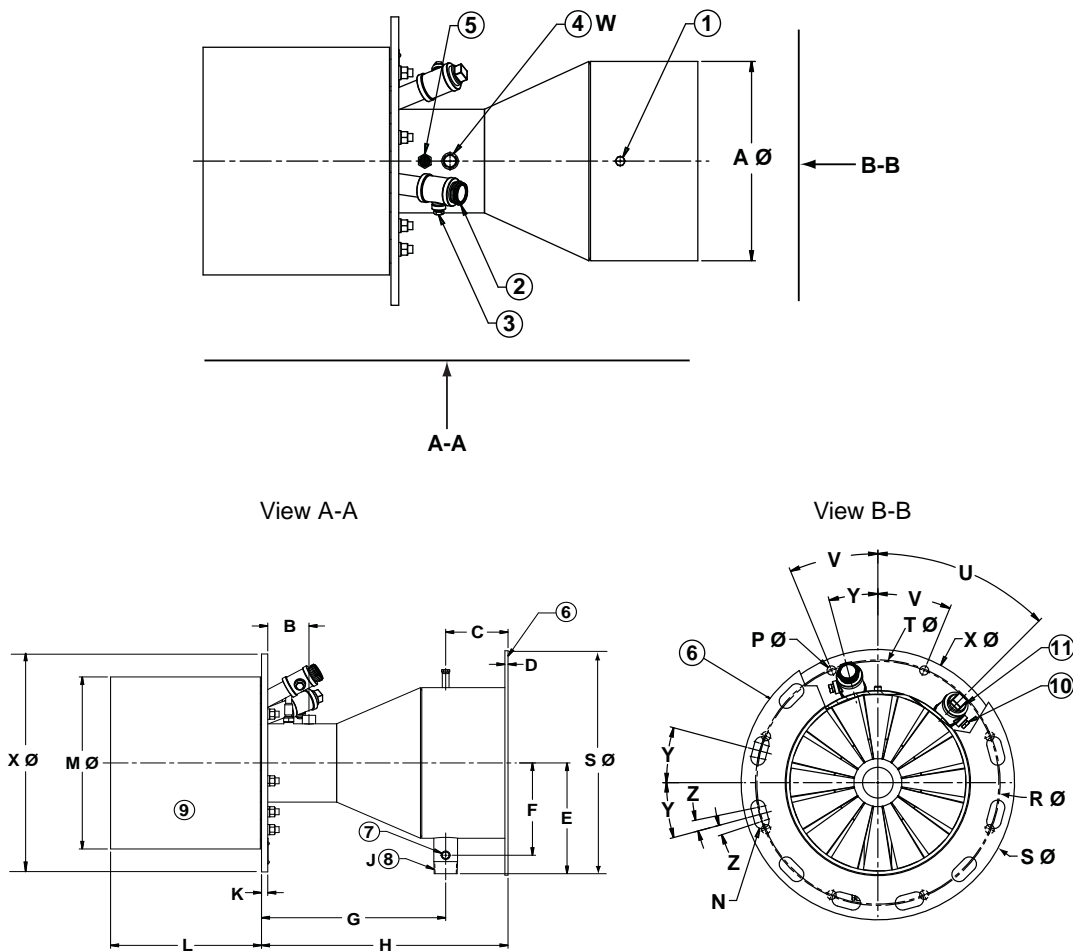


Dimensions in inches unless stated otherwise											
Size	A Ø	B	C	D	E	F	G	H	J NPT	K	L
3"	6.62	2.99	3.12	0.25	6.25	4.69	6.94	10.06	1-1/4"	0.375	9.5
4"	8.62	2.31	3.84	0.25	7.5	5.94	11.24	15.09	1-1/2"	0.375	9.5

Size	M Ø	N Ø	P Ø	Q Ø	R Ø	S Ø	T	U	V	W NPT	Weight lbs
3"	10.4	0.625	0.875	11.0	12.52	14.15	22°	45°	15°	1/2"	100
4"	12.9	0.625	0.875	13.5	15.12	16.75	30°	45°	15°	1"	165

6" & 8" KINEDIZER® LE burners

- 1) 1/4" NPT air test connection
- 2) Observation port
- 3) 1/4" NPT chamber test connection
- 4) Pilot gas inlet
- 5) Spark ignitor
- 6) Optional air inlet flange
- 7) 1/4" NPT gas test connection
- 8) Main gas inlet
- 9) Standard block or block with sleeve option
- 10) 1/4" NPT purge air connection
- 11) 1" NPT scanner port



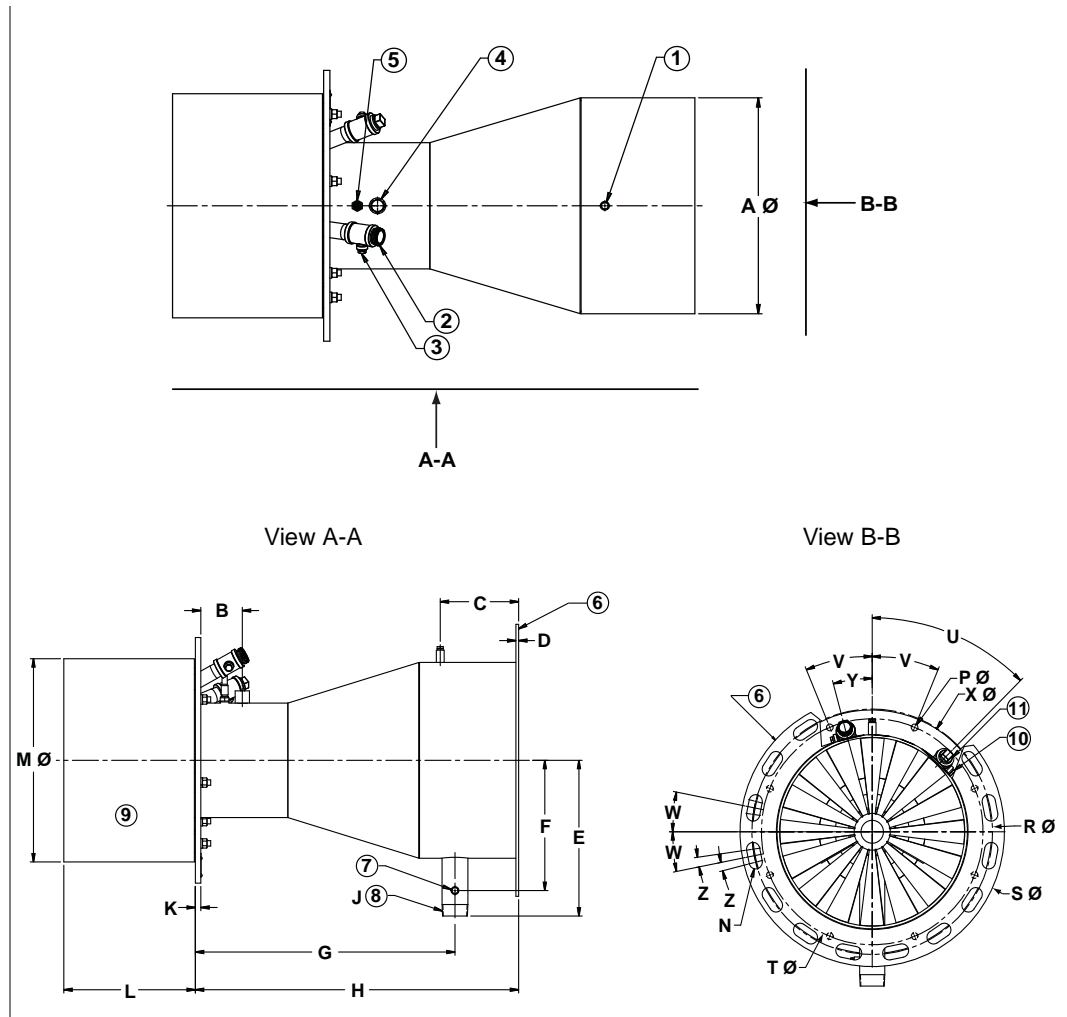
Dimensions in inches unless stated otherwise												
Size	A Ø	B	C	D	E	F	G	H	J NPT	K	L	M Ø
6"	12.75	3.3	5.0	0.25	9.38	7.81	14.76	19.75	1-1/2"	0.5	12.1	14.6
8"	12.75	3.81	7.2	0.25	11.69	9.35	16.42	22.79	2"	0.5	12.1	16.6

Size	N	P Ø	R Ø	S Ø	T Ø	U	V	W NPT	X Ø	Y	Z	Weight lbs
6"	0.5	0.625	17.0	19.0	16.823	45°	30°	1/2"	18.45	15°	3°	265
8"	0.5	0.625	17.0	19.0	18.82	45°	30°	3/4"	20.45	15°	3°	331



10" KINEDIZER® LE burners

- 1) 1/4" NPT air test connection
- 2) Observation port
- 3) 1/4" NPT chamber test connection
- 4) 3/4" NPT pilot gas inlet
- 5) Spark ignitor
- 6) Optional air inlet flange
- 7) 1/4" NPT gas test connection
- 8) 2" NPT main gas inlet
- 9) Standard block or block with sleeve option
- 10) 1/4" NPT purge air connection
- 11) 1" NPT scanner port



Dimensions in inches unless stated otherwise												
Size	A Ø	B	C	D	E	F	G	H	K	L	M Ø	N
10"	18.0	3.81	7.2	0.25	14.31	11.97	23.86	29.71	0.5	12.1	18.7	0.62

Size	P Ø	R Ø	S Ø	T Ø	U	V	W	X Ø	Y	Z	Weight lbs
10"	0.625	22.75	25.0	20.95	45°	22°	11°	22.57	15°	3°	662