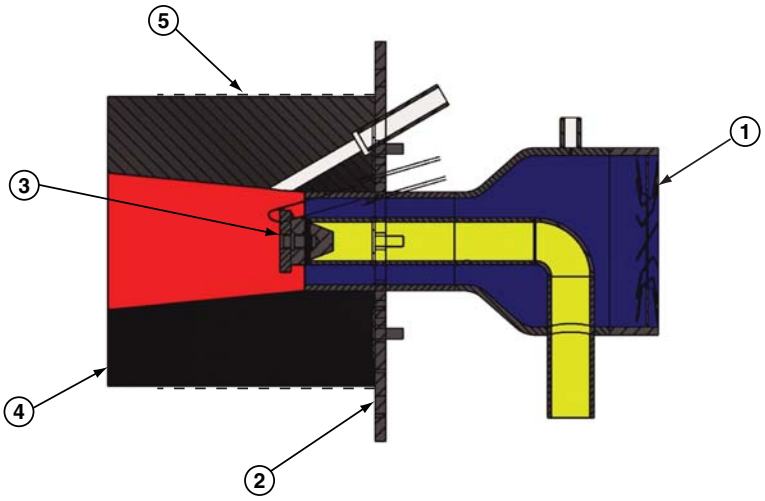
Specifications of KINEDIZER® LE burners

Typical burner data Fuel: natural gas at 15°C with 10.9 kWh/Nm^3 HHV - sg = 0.6 [1] Combustion air: 15°C - 21% O_2 - 50% humidity - sg = 1.0 [1] Stated pressures are indicative. Actual pressures are a function of air humidity, altitude, type of fuel and gas quality.									
KINEDIZER® LE size		1-1/2”	3”	4”	6”	8”	10”	14”	16”
Max. capacity @ n=1.3 (low NOx) [2]	kW	160	700	1350	2870	4630	7120	16100	21960
Max. capacity @ n=1.1	kW	173	760	1525	3280	5190	8355	17590	24900
Min. capacity	kW	8	35	67	144	230	355	805	1098
Turndown @ n=1.3 [2]		20:1	20:1	20:1	20:1	20:1	20:1	20:1	20:1
Turndown @ n=1.1		22:1	22:1	22:1	22:1	22:1	22:1	22:1	22:1
Air flow at max. capacity	m^3(st)/h	200	880	1700	3600	5810	8940	20220	27600
Air flow at min. capacity	m^3(st)/h	10	44	84	180	290	445	1010	1390
Advised pilot capacity [3]	kW	30	60	60	90	145	290	290	290
Pilot gas pressure [4]	mbar	<1.0	2.5	<1.0	1.5	2.5	10.0	1.2	1.2
Advised pilot gas piping diameter [5]		1/2”	3/4”	3/4”	3/4”	1”	1-1/2”	1-1/2”	1-1/2”
Combustion air pressure @ inlet [6]	mbar	71	79	80	79	80	80	79	75
Combustion air pressure differential [7]	mbar	66	69	73	77	67	75	70	70
Natural gas inlet pressure differential [8]	mbar	140	128	105	159	100	187	298	548
Flame length @ n=1.3 [2]	m	0.3	0.5	0.6	1.2	1.8	2.7	3.0	3.0
Flame diameter @ n=1.3 [2]	m	0.2	0.2	0.3	0.5	0.9	1.2	1.2	1.5
Flame length @ n=1.1	m	0.5	0.8	1.2	1.8	2.4	3.0	3.4	3.4
Flame diameter @ n=1.1	m	0.2	0.2	0.3	0.5	0.9	1.2	1.2	1.5

[1] sg (specific gravity) = relative density to air (density air = 1.293 kg/Nm^3)
[2] n=1.3 meaning 30% excess air
[3] Most installations will require a stronger pilot (advised pilot capacity will be required)
[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% SiO_2, 45% Al_2O_3 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 3-11.9-15).

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 NOx 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 O_2 air

KINEDIZER® LE burners accept preheated combustion air up to 350°C (430°C on request). Maximum capacities shall be reduced. Preheated combustion air can have reduced O_2 (as low as 17% if combustion air temperature is 430°C). Mixing of some low O_2 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 -100 mbar and 100 mbar. 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 1 bar(g) back pressure (with PED-certification).

Process temperature

The construction of the burner allows operation in all applications with process temperatures from ambient up to 1100°C. 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 verfication 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 2.5 m^3(st)/h 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.

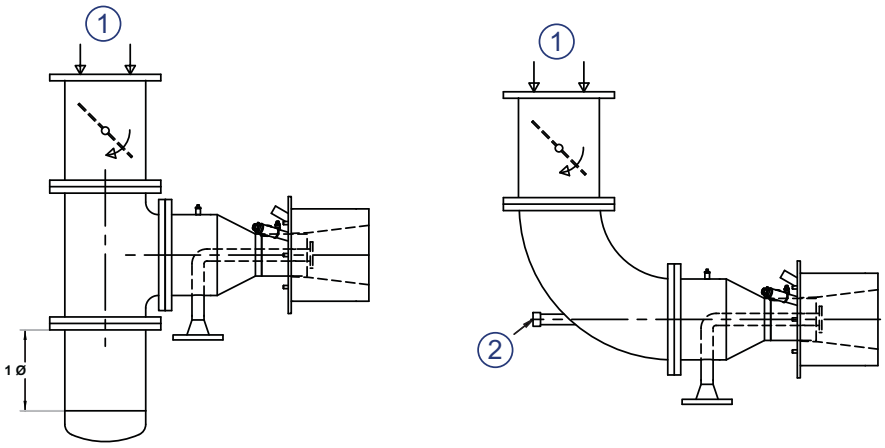
Cross velocities

Cross velocities up to 15 m/s 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.

1) Air flow
2) Sight glass



Typical lay-outs with correct piping between air control valve on the KINEDIZER® LE burner

Fuels

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

Expected emissions

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

- cold furnaces (< 750°C): 50% of a conventional burner
- furnaces up to 950°C: 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 NOx furnace requirements

Low NOx 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 NOx operation

Low NOx 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

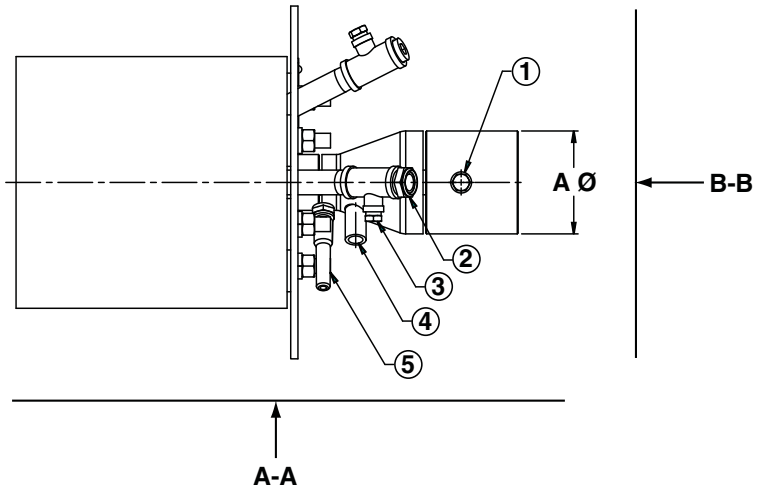
Standard KINEDIZER® LE burners will be shipped with block as shown on page 3-11.9-10. Two long block options are available: standard (without supporting sleeve) and with supporting sleeve.

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.

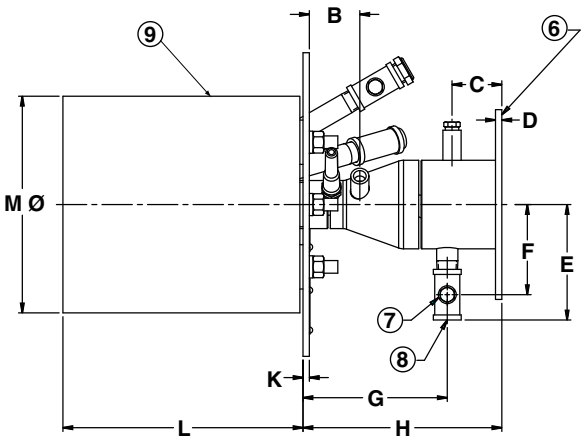
Dimensions and weights

1-1/2” KINEDIZER® LE burners

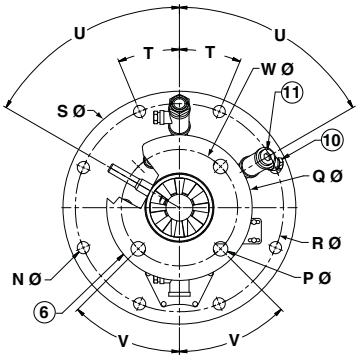
1) 1/4” NPT air test connection
2) Observation port
3) 1/4” NPT purge air connection
4) 1/4” NPT pilot gas inlet
5) Spark ignitor
6) Optional air inlet flange
7) 1/4” NPT gas test connection
8) 1/2” NPT main gas inlet
9) Standard block or block with sleeve option
10) 1/4” NPT purge air connection
11)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



View A-A



View B-B

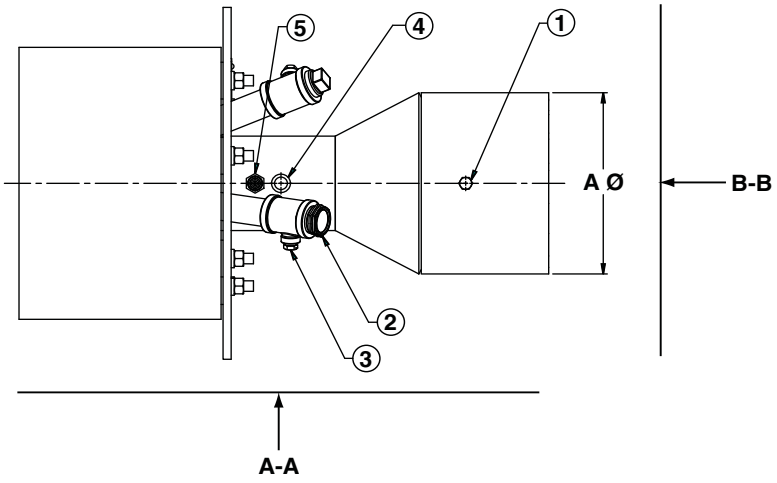


Dimensions in mm unless stated otherwise											
Size	A Ø	B	C	D	E	F	G	H	K	L	M Ø
1-1/2”	89	51	50	6	117	91	145	200	6	241	218

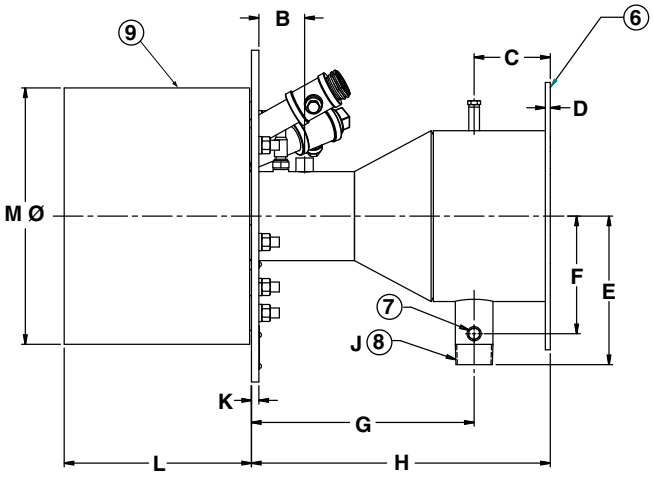
Size	N Ø	P Ø	Q Ø	R Ø	S Ø	T	U	V	W Ø	Weight kg
1-1/2”	16	19	190	273	305	22°	60°	22.5°	152	30

3” & 4” KINEDIZER® LE burners

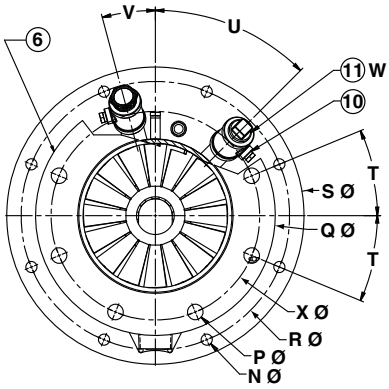
1) 1/4” NPT air test connection
2) Observation port
3) 1/4” NPT purge air connection
4) 3/8” NPT pilot gas inlet
5) Spark ignitor
6) Optional air inlet flange
7) 1/4” NPT gas test connection
8) Main gas inlet
9) Standard block or block with sleeve option
10) 1/4” NPT purge air connection
11) Scanner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



View A-A



View B-B

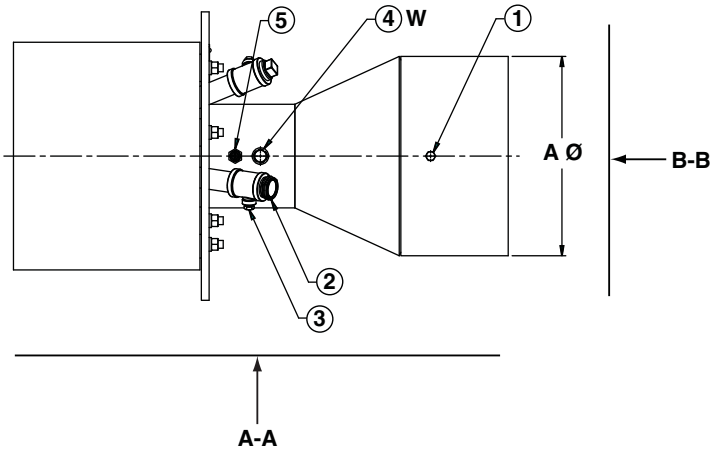


Dimensions in mm unless stated otherwise												
Size	A Ø	B	C	D	E	F	G	H	J NPT	K	L	M Ø
3”	168	76	79	6	159	119	176	255	1-1/4”	10	241	264
4”	219	59	97	6	190	151	285	383	1-1/2”	10	241	328

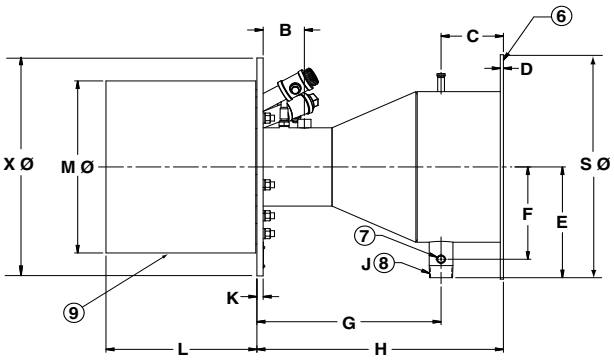
Size	N Ø	P Ø	Q Ø	R Ø	S Ø	T	U	V	W NPT	X Ø	Weight kg
3”	16	22	279	318	359	22°	45°	22.5°	1/2”	241	45
4”	16	22	343	384	425	30°	45°	22.5°	1”	241	75

6” & 8” KINEDIZER® LE burners

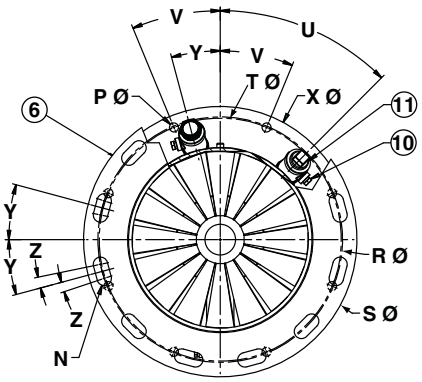
1) 1/4” NPT air test connection
2) Observation port
3) 1/4” NPT purge air connection
4) Pilot gas inlet
5) Spark ignitor
6) Optional air inlet flange
7) 1/4” NPT gas test connection
8) Main gas inlet
9) Standard block or block with sleeve option
10) 1/4” NPT purge air connection
11) 1” NPT scanner port



View A-A



View B-B

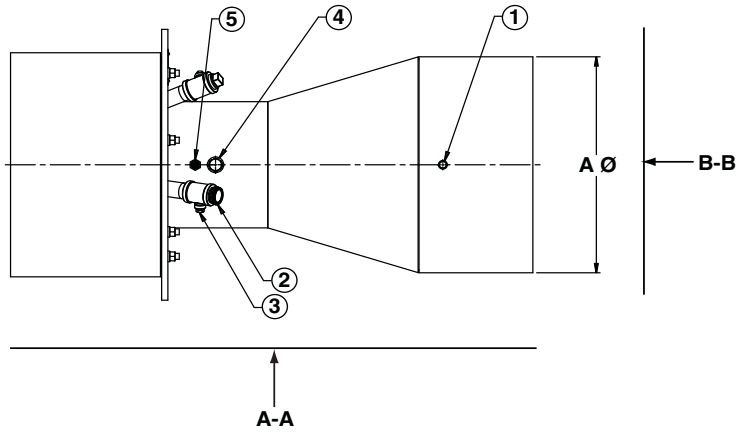


Dimensions in mm unless stated otherwise												
Size	A Ø	B	C	D	E	F	G	H	J NPT	K	L	M Ø
6”	324	84	127	6	238	198	375	502	1-1/2”	13	307	371
8”	324	97	183	6	297	237	417	579	2”	13	307	422

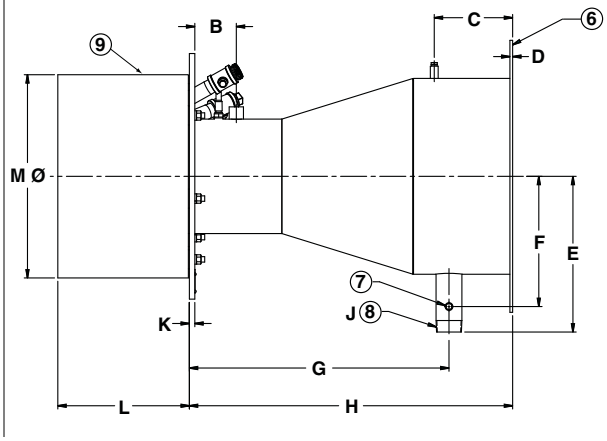
Size	N	P Ø	R Ø	S Ø	T Ø	U	V	W NPT	X Ø	Y	Z	Weight kg
6”	13	16	432	483	427	45°	22.5°	1/2”	469	15°	3°	120
8”	13	16	432	483	478	45°	22.5°	3/4”	519	15°	3°	150

10” KINEDIZER® LE burners

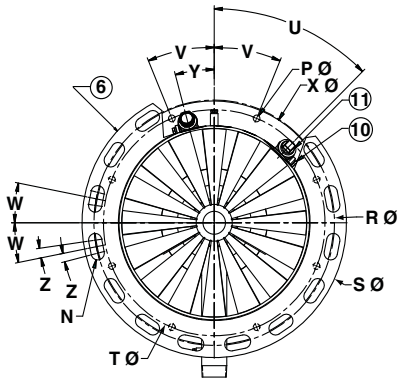
1) 1/4” NPT air test connection
2) Observation port
3) 1/4” NPT purge air connection
4) 3/4” NPT pilot gas inlet
5) Spark ignitor
6) Optional air inlet flange
7) 1/4” NPT gas test connection
8) 2” NPT main gas inlet
9) Standard block or block with sleeve option
10) 1/4” NPT purge air connection
11) 1”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



View A-A



View B-B

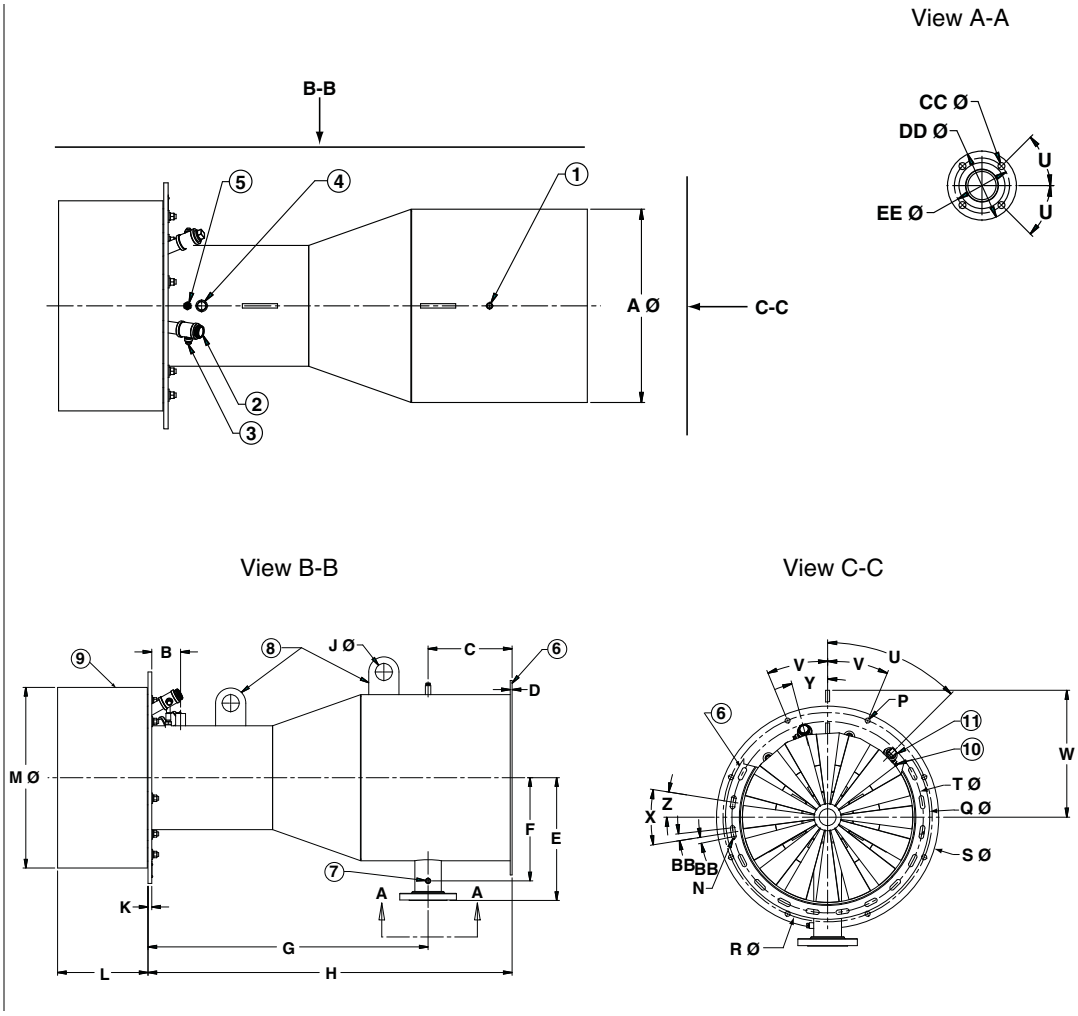


Dimensions in mm unless stated otherwise												
Size	A Ø	B	C	D	E	F	G	H	K	L	M Ø	N
10”	457	97	183	6	363	304	606	755	13	307	475	16

Size	P Ø	R Ø	S Ø	T Ø	U	V	W	X Ø	Y	Z	Weight kg
10”	16	578	635	532	45°	22.5°	11°	573	15°	3°	300

14” KINEDIZER® LE burners

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



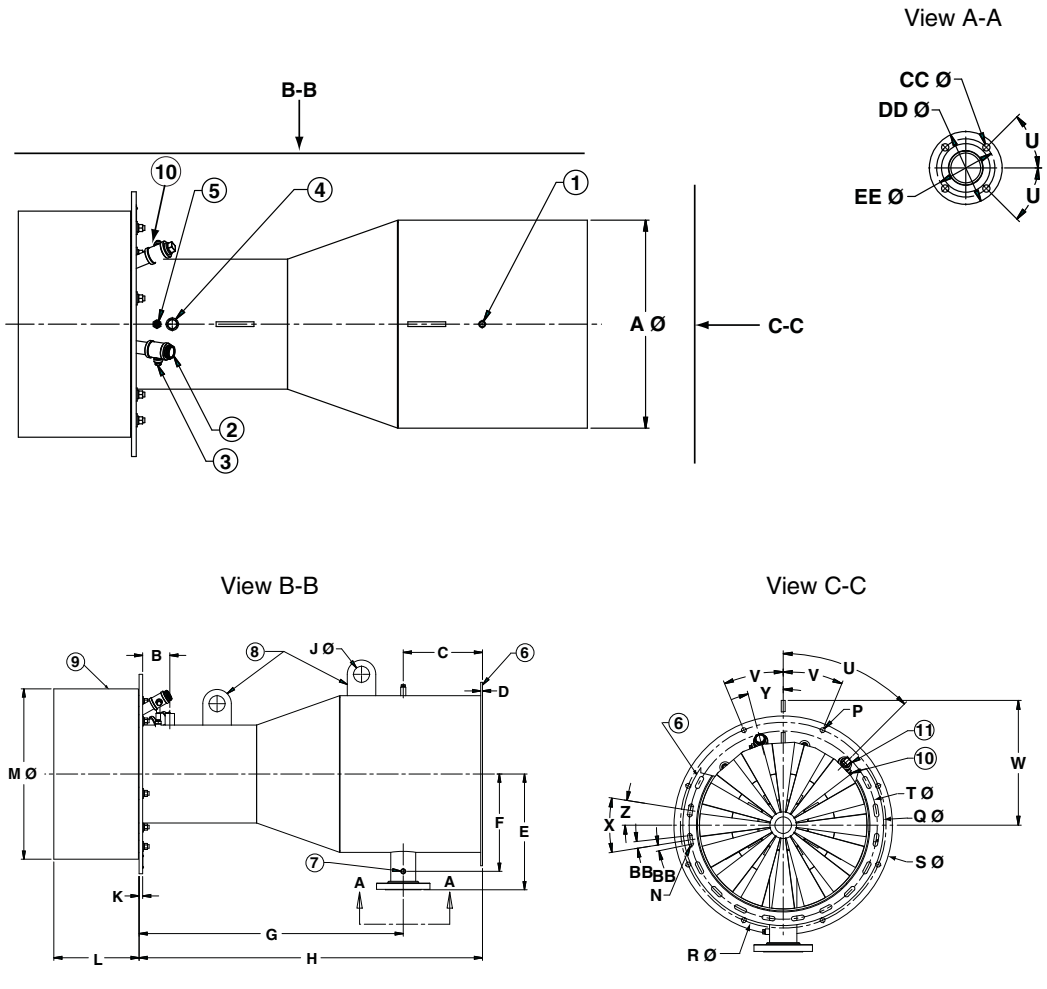
Dimensions in mm unless stated otherwise										
Size	A Ø	B	C	D	E	F	G	H	J Ø	K
14”	559	97	282	6	413	347	942	1225	57	13

Size	L	M Ø	N	P Ø	Q Ø	R Ø	S Ø	T Ø	U	V
14”	305	607	7	16	654	670	711	613	45°	22.5°

Size	W	X	Y	Z	BB	CC	DD	EE	Weight kg
14”	406	18°	15°	9°	2.65°	19	190	152	430

16” KINEDIZER® LE burners

1) 1/4” NPT air test connection
2) Observation port
3) 1/4” NPT purge air connection
4) 3/4” NPT pilot gas inlet
5) Spark ignitor
6) Air inlet flange
7) 1/4” NPT gas test connection
8) Lifting lugs
9) Standard block or block with sleeve option
10) 1/4” NPT purge air connection
11) 1” NPT scanner port



Dimensions in mm unless stated otherwise										
Size	A Ø	B	C	D	E	F	G	H	J Ø	K
16”	710	97	282	6	489	423	1018	1454	57	13

Size	L	M Ø	N	P Ø	Q Ø	R Ø	S Ø	T Ø	U	V
16”	386	679	7	16	806	740	781	765	45°	22.3°

Size	W	X	Y	Z	BB	CC	DD	EE	Weight kg
16”	482	15°	15°	7.3°	2.4°	19	190	152	470

Installation instructions for KINEDIZER® LE burners

Application requirements

View port

A view port to observe burner flame is essential to inspect flame aspect. Locate the view port downstream of the flame, looking back to the burner block. Make sure the complete flame can be evaluated.

Support burner air and gas piping

The KINEDIZER® LE burner shall not be used as support for the piping to the burner. Gas and air piping shall be supported in such a way that no additional loads will be created on the burner.

Burner mounting flange loads

Check burner weight and reinforce burner mounting flange or combustion chamber/furnace back wall if necessary to take complete burner weight.

Installation instructions

Storage of KINEDIZER® LE burners

KINEDIZER® LE burners shall be stored dry (inside). Burner blocks have been cured carefully before shipment and shall be kept dry. Wetting of blocks could result in premature failures.

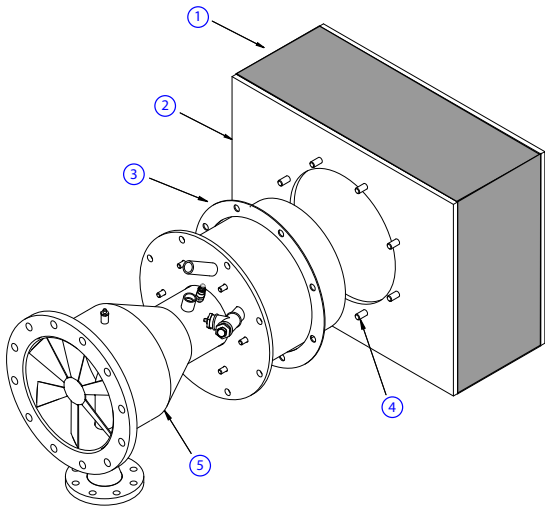
Handling of KINEDIZER® LE burners

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

Flange the burner to the installation

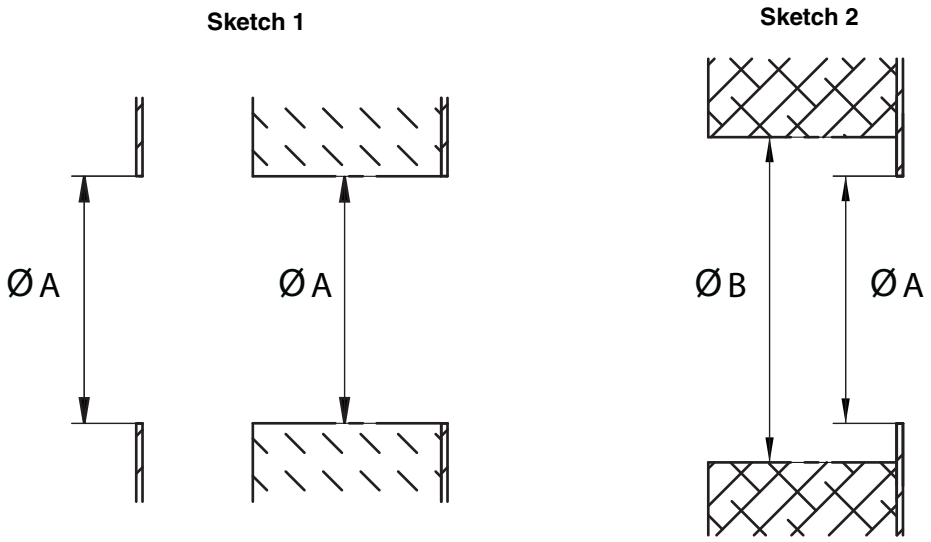
Bolt the burner to the installation's burner mounting flange. Use proper gasketing. Tighten the flange bolting with correct torque. Retighten all bolts after first firing and regularly after commissioning.

1) Insulation
2) Furnace shell
3) Gasket (by others)
4) Mounting studs
5) Burner



Burner mounting

Furnace/combustion chamber requirements



Dimensions in mm unless stated otherwise								
Burner size	1-1/2”	3”	4”	6”	8”	10”	14”	16”
A Ø [1]	244	292	356	396	447	500	607	680
B Ø [2]	368	416	480	521	571	625	729	800

[1] Ø A = block diameter + 25 mm
[2] Ø B = block diameter + 147 mm

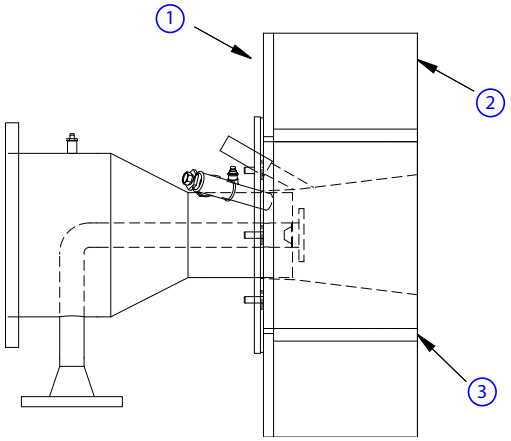
Sketch 1: sheet metal combustion chambers, furnaces without internal insulation or with soft wall internal insulation: flange / opening internal diameter shall be = Ø A

Sketch 2: furnaces or ovens with brick walls: opening in brick wall shall be = Ø B (to be rammed with castable refractory)

Standard blocks

Burners with standard blocks require supporting of the burner block by the furnace wall. Ram the gap between block and furnace wall with castable refractory.

1) Furnace shell
2) Furnace wall
3) Castable refractory material



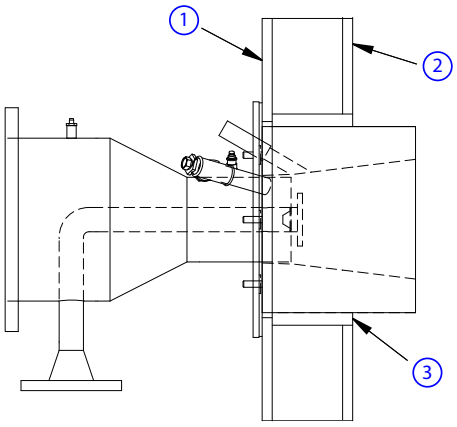
Blocks with supporting sleeve

Burners with blocks that have supporting sleeves can be used in all applications if the supporting sleeve is protected from temperatures that may be too high.

Sheet metal combustion chambers without internal insulation do not require any provision for supporting or protecting the burner blocks.

Furnaces with internal insulation or refractory walls will require protection of the block supporting sleeve from the high temperature. Close the gap between block and furnace wall with soft insulation fiber to provide thermal protection of the block sleeve.

1) Furnace shell
2) Panel wall
3) Soft insulating material



Start-up instructions for KINEDIZER® LE burners

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

During first start-up of the burner, and after every longer installation shut-down, the temperature rise shall be limited. Allow the burner to fire on low fire for some time to allow the parts to heat up slowly.

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.

Pilot ignition

Before ignition of the pilot, adjust the combustion air to the minimum burner air flow. Pilot will not ignite if too high an air flow. Set pilot gas flow to the correct value before pilot ignition attempt.

Main burner ignition

Set correct gas flow for burner minimum capacity before attempt of main burner ignition.

After ignition of main burner, allow some time on minimum capacity to allow the burner parts to heat up slowly.

Adjust air/gas ratio, set maximum capacity

Once the main flame is ignited, adjust air/gas ratio of the burner to have the required combustion quality and slowly increase capacity. (Do not increase capacity too fast to avoid damage to burner parts or furnace due to excessive temperature gradient.)

Maintenance & inspection instructions

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.

Visual inspection

Regular visual inspection of all connections (air and gas piping to the burner, bolting of the burner to the furnace) and burner flame size and aspect are essential.

Spare parts

Keep local stock of spark ignitor. It is not recommended to keep local stock of other burner parts.

Consult installation manual for burner spare parts and system accessories.