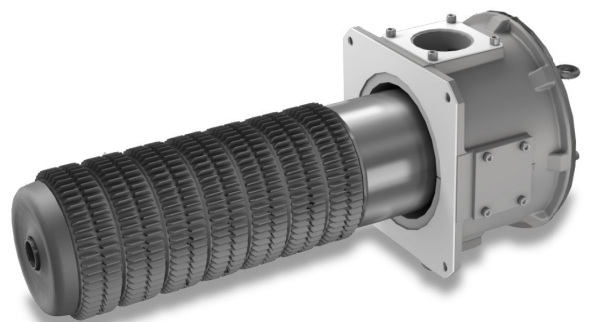




HK-MAX

Self-recuperative burner

Product Manual



Honeywell

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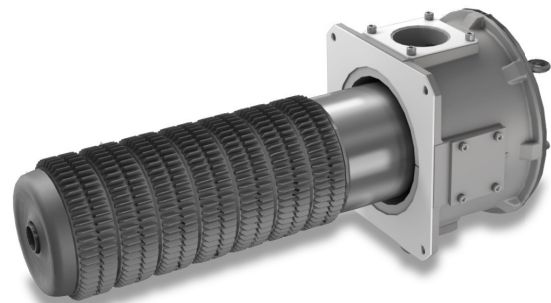
HK-MAX

Self-recuperative burner



TECHNICAL INFORMATION

- For direct and radiant tube heating
- Applicable gas types: natural gas, LPG, COG and low calorific value fuels
- Economical, energy-saving operation by virtue of internal air
- Flame velocity up to 170 m/s
- Uniform distribution of temperature by means of a high burner impulse
- 7 sizes from 25 to 500 kW
- Highly efficient with a ceramic burled tube recuperator or a cast steel ribbed tube recuperator
- The sturdy and durable metal heat exchanger has a long service life



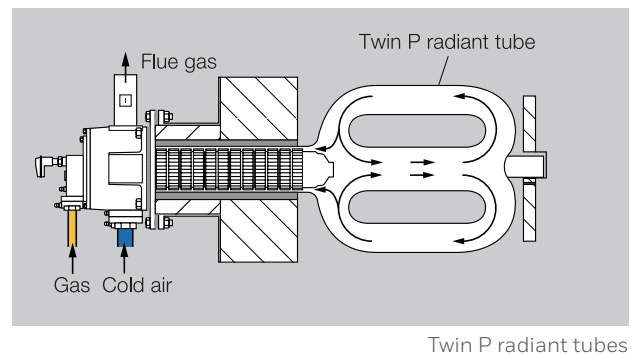
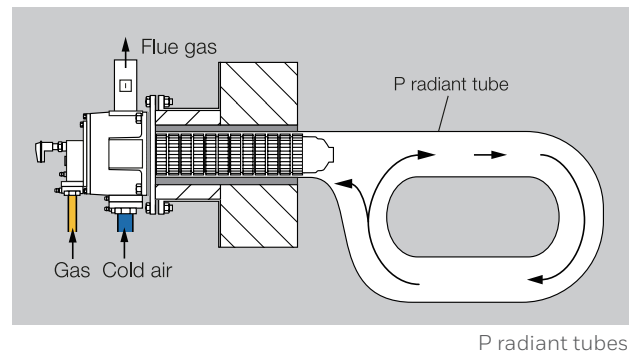
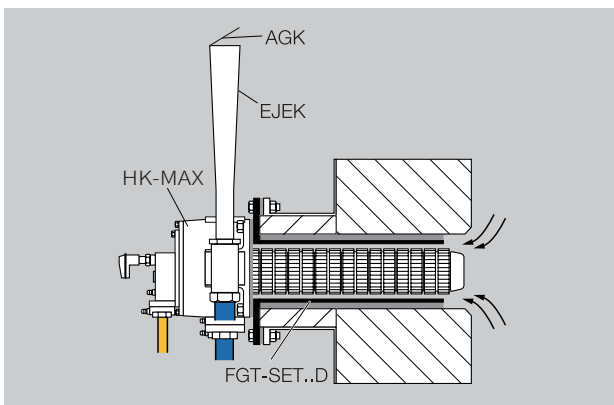
1. Application

The self-recuperative burners HK-MAX are used for heating furnace systems in ON/OFF intermittent mode. The hot flue gases are fed through the ceramic or metallic heat exchanger integrated in the burner, heating the additional supply of cold combustion air flowing in the opposite direction.

The maximum achievable air preheat temperature is approx. 650°C, depending on the application.

1.1 Direct heating

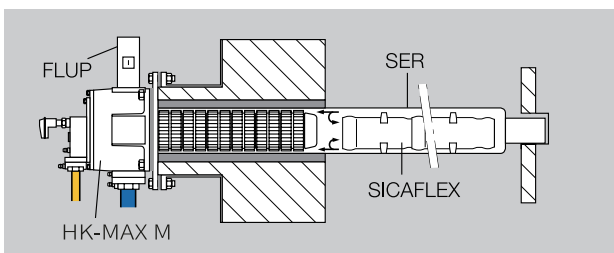
In conjunction with an eductor EJEK to extract the flue gases, the burner HK-MAX is used to save energy in a direct heating system without the need for long hot air lines which require insulation. Applications include heat treatment furnaces in the steel and iron industry and in the non-ferrous metal industry.



1.2 Radiant tube heating

Self-recuperative burners HK-MAX are used in combination with metallic or ceramic radiant tubes and segmented ceramic flame tubes SICAFLEX for indirect heating. Radiant tube heating systems are used if the combustion gases must be separated from the product, for example for heat treatment furnaces with an inert gas atmosphere in the steel industry or for the heat treatment of aluminium.

- I radiant tubes
- P radiant tubes
- Twin P radiant tubes



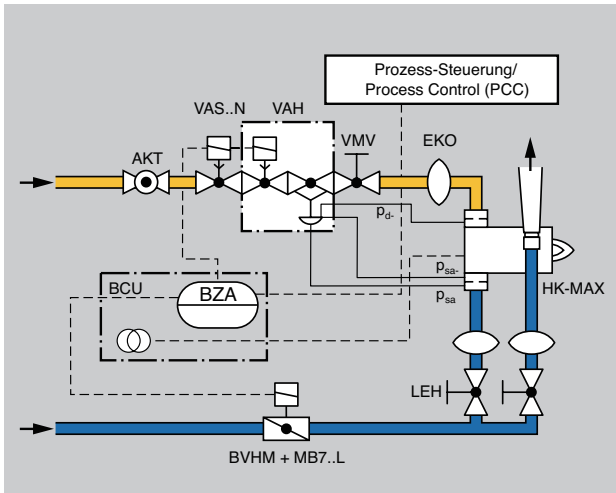
1.3 Control mode

1.3.1 HK-MAX for direct heating:

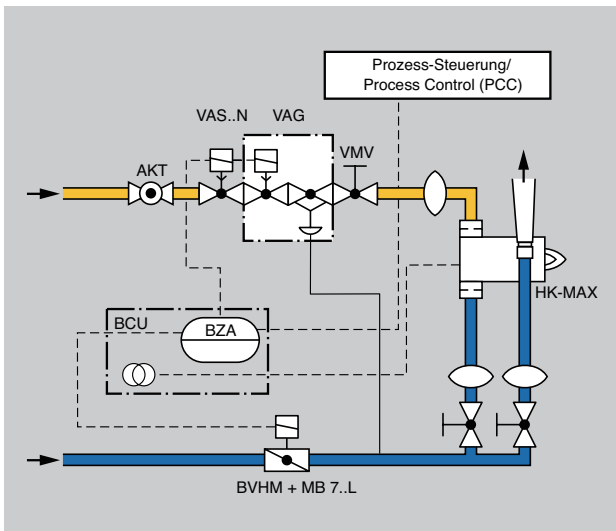
- a. Flow rate control
- b. Air/gas ratio control
- c. Without pneumatic ratio control system

Recommended configuration for direct heating:

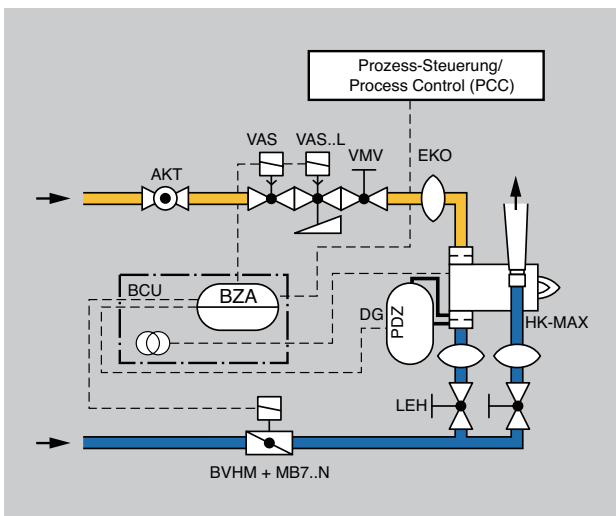
- Recommended to meet EN 746-2 and ISO 13577-2
- Recommended to use VAH for flow rate control
- Recommended to use VAG for Air/gas ratio Control
- Slow opening gas valves and quick opening air control valves are to be used to ensure a safe burner start for applications without a pneumatic ratio control system. An air flow monitor is recommended pressure protection device
- Recommended to use BCU4 controller and flame rod or UVS for flame monitor
- For specific system configuration, please contact Honeywell Sales team



a. Flow rate control



b. Air/gas ratio control



c. Without pneumatic ratio control system

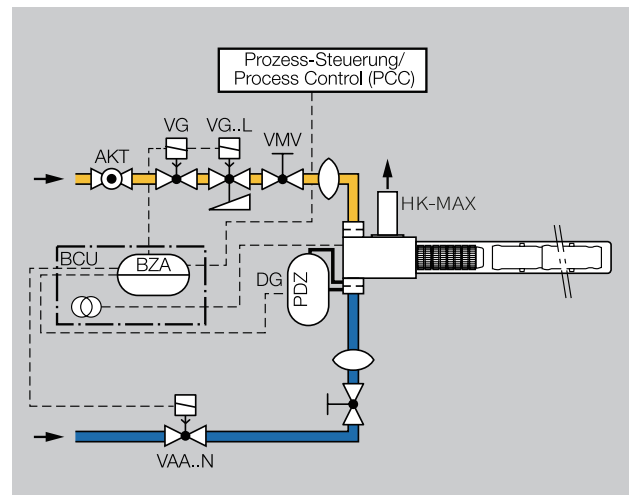
1.3.2 HK-MAX for radiant tube heating

a. No pneumatic ratio control system

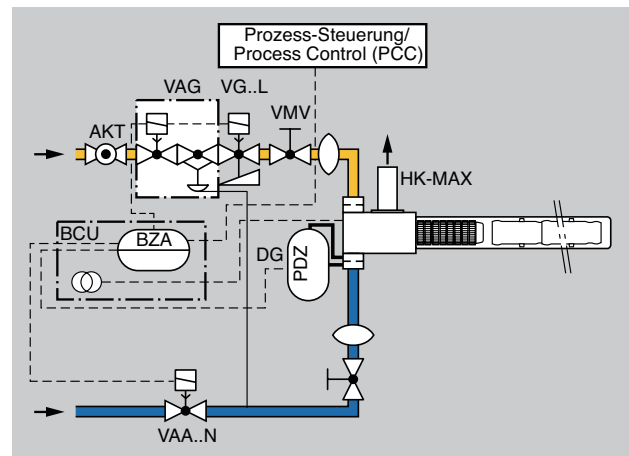
b. Air/gas ratio control

Recommended configuration for radiant tube heating:

- Recommended to meet EN 746-2 and ISO 13577-2
- Slow opening gas valves and quick opening air control valves are to be used to ensure a safe burner start for applications without a pneumatic ratio control system. An air flow monitor is recommended pressure protection device
- Recommended to use BCU4 controller and flame rod or UVS for flame monitor
- For specific system configuration, please contact Honeywell Sales team



a. No pneumatic ratio control system



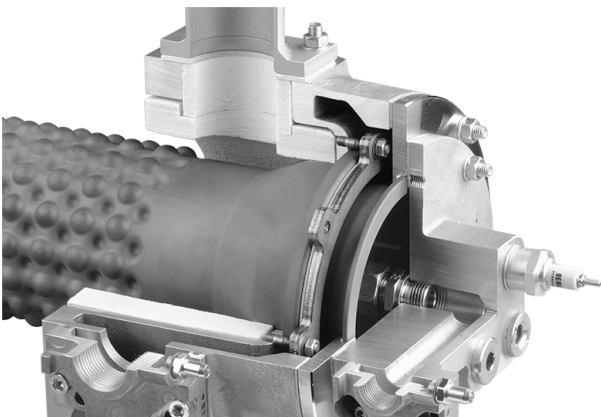
b. Air/gas ratio control

2. Mechanical construction

The burner HK-MAX is composed of four modules: burner body, recuperator, air guide tube and gas insert. The modular design facilitates adapting the burners to the respective application or integrating them into an existing furnace system. Maintenance and repair times are reduced, and existing furnace installations can easily be converted.

2.1 Burner body

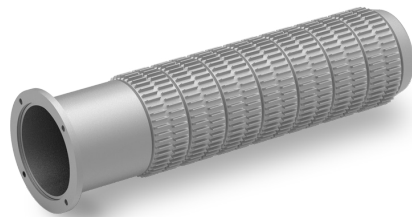
The burner body is made of cast aluminium, which means it has a low weight. The housing has a double-wall design. The combustion air is fed into the burner via the outer annular void. This cools the burner body and reduces emissions. On the flue gas side, there is a shaped part made of vacuum-formed ceramic fibres (RCF) inserted in the housing to act as internal insulation.



2.2 Recuperator

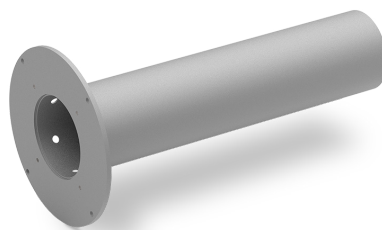
The burner HK-MAX is available in two versions:

- HK-MAX C with ceramic burled tube recuperator
- HK-MAX M and HK-MAX P with cast steel ribbed tube recuperator



2.3 Air guide tube

Burners HK-MAX M have an air guide tube made of heat-resistant steel.



2.4 Gas insert

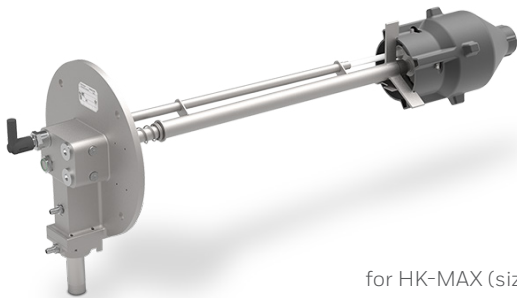
The gas insert consists of the gas connection flange, the gas lance with burner head and the spark electrode (also serves as monitoring electrode). An integrated measuring orifice in the gas insert makes it possible to carry out a simple measurement of the gas flow rate. The orifice is designed to suit the gas type.

An uninhibited flow is required to ensure accurate measurements of the pressure differential on the integrated orifice.

The burners HK-MAX are therefore supplied as standard with a special pipe nipple to act as the inlet section at the gas connection.



for HK-MAX M (sizes 1–3)



for HK-MAX (sizes 4–5)

2.5 EJEK flue gas eductor

The eductor EJEK generates a negative pressure with a centrally positioned nozzle and thus draws the flue gases out of the furnace chamber through the burner's heat exchanger.



HK-MAX C

Option	Part number
EJEK 1-K269-M625-H-AGK-HT-S	802004591
EJEK 2-K285-M540-H-AGK-HT-A-S	802004592
EJEK 3-K292-M620-AGK-HT-A-S	802004593
EJEK 4-K345-M920-AGK-HT-A-S	802004594
EJEK 5-K345-M1165-AGK-HT-A-S	802004595

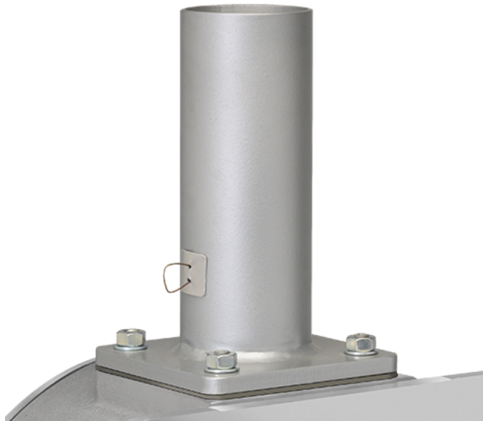
For part numbers of other lengths, please contact Honeywell Sales team.

HK-MAX M

Option	Part number
EJEK 1-K269-M625-H-AGK-S	802004241
EJEK 2-K285-M540-H-AGK-A-S	802004242
EJEK 3-K292-M620-AGK-A-S	802004243
EJEK HK4- K345-M920-AGK-A-S	802003943
EJEK 5-K345-M1165-AGK-A-S	802004244
EJEK 6-K530-M1618-AGK-A-S	802004245

2.6 FLUP flue gas connector

For indirect heating, the flue gas connector FLUP discharges the flue gases into the site flue gas system on the furnace.



Option	Part number
FLUP 0-32D-M230-C-B-S	802004246
FLUP 1/2-50D-M331-C-S	802003985
FLUP 3-65D-M353-C-S	802004247
FLUP 4/5-100D-M399-C-S	802004248

For part numbers of other lengths, please contact Honeywell Sales team.

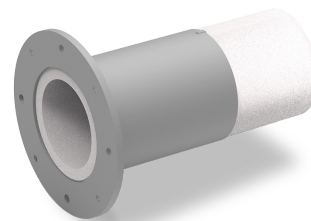
2.7 Flue gas guide tube FGT

When using the HK-MAX burners for direct heating, a flue gas guide tube FGT set..D is required.

The FGT set..D is available in lengths in various increments, which are suited to different burner lengths.

There is a version for furnace chamber temperatures up to 1250°C for HK-MAX C.

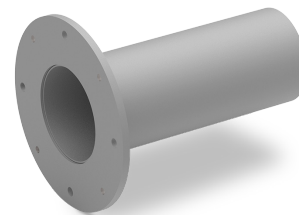
Scope of delivery: flue gas guide tube FGT with burner gasket, mounting gasket, as well as 4 threaded bolts, washers and nuts for attaching it to the burner.



FGT for HK-MAX C

Option	Part number
FGT-SET HK 1C545/D-HT	802004586
FGT-SET HK 2C545/D-HT	802004587
FGT-SET HK 3C545/D-HT	802004588
FGT-SET HK 4C545/D-HT	802004589
FGT-SET HK 5C545/D-HT	802004590

For part numbers of other lengths, please contact Honeywell Sales team.



FGT for HK-MAX M

Option	Part number
FGT-SET HK 1M545/D	802004236
FGT-SET HK 2M545/D	802004237
FGT-SET HK 3M545/D	802004238
FGT-SET HK 4M545-D	802003942
FGT-SET HK 5M545-D	802004239
FGT-SET HK 6M545-D	802004240

For part numbers of other lengths, please contact Honeywell Sales team.

2.8 SICAFLEX

The standard length for SICAFLEX® is 300 mm. Shortened segments in 50 mm increments are available for length adjustment.



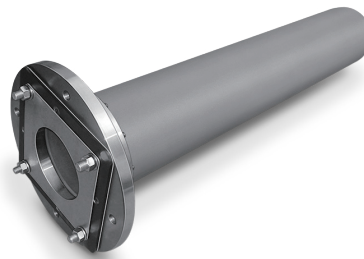
Option	Part number	Radiant tube internal diameter
SICAFLEX 100/088/084-300	802004724	88 ~ 93 mm
SICAFLEX 142/127/123-300	802004725	127 ~ 132 mm
SICAFLEX 152/133/129-300	802004726	133 ~ 146 mm
SICAFLEX 162/147/143-300	802004727	147 ~ 156 mm
SICAFLEX 175/157/153-300	802004728	157 ~ 166 mm
SICAFLEX 202/186/182-300	802004103	186 ~ 200 mm
SICAFLEX 300/280/275-300	802004729	280 ~ 300 mm

For part numbers of other lengths, please contact Honeywell Sales team.

2.9 Radiant tubes

For HK-MAX C

The HK-MAX C burner is designed to be used in the ceramic radiant tube SER-C.



Radiant tubes	Burner	SICAFLEX
SER-C 100/088	HK-MAX 0C	SICAFLEX 100/088/084
SER-C 142/128	HK-MAX 1C	SICAFLEX 142/127/123
SER-C 162/148	HK-MAX 2C	SICAFLEX 162/147/143
SER-C 202/188	HK-MAX 3C	SICAFLEX 202/186/182

For part numbers of other lengths, please contact Honeywell Sales team.

HK-MAX M

HK-MAX M burner radiant tubes are recommended to use the following dimensions:

Burner	Minimum inner diameter of the radiant tube di (mm)	Recommended id (mm) of the radiant tube
HK-MAX 1M	128	140
HK-MAX 2M	147	164
HK-MAX 3M	185	202
HK-MAX 4M	248	266
HK-MAX 5M	280	298

For part numbers of other lengths, please contact Honeywell Sales team.

Depending on the different geometric shapes, radiant tubes may require additional matching flanges.

3. Performance

3.1 Technical data

The self-recuperative burner HK-MAX uses the heat from the flue gases to preheat the combustion air. The heat exchanger (recuperator) required for this is part of the burner.

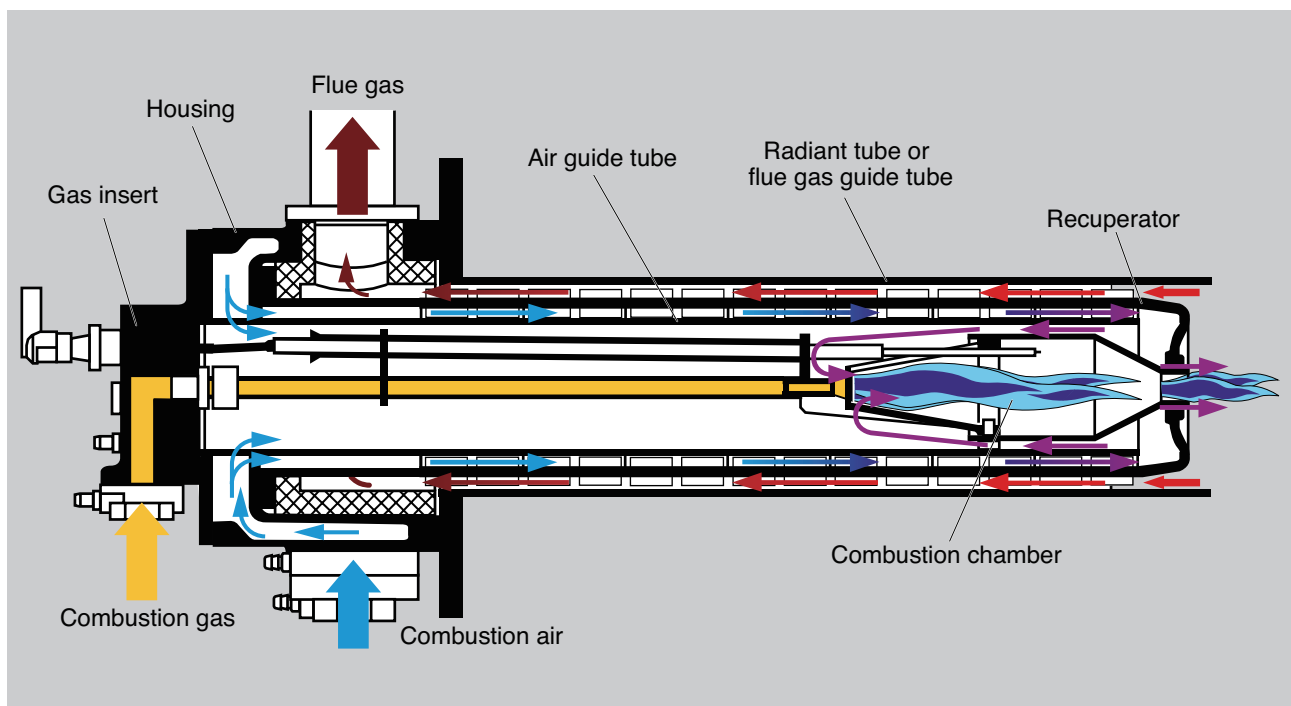
After entering the gap between the air guide tube and the recuperator, the combustion air flows towards the burner nozzle (blue arrows). Some of this air is fed into the inside of the burner, where it is combusted in the first combustion stage.

The rest of the combustion air flows at high speed through the gap between the combustion chamber and the recuperator head where it is combusted in the second combustion stage (violet arrows).

Heat is exchanged between the hot flue gases and the cold combustion air through the recuperator wall.



- Gas supply pressure and air supply pressure each dependent on the type of use and gas type.
- Adjusting range: 60% to 100%
- HK-MAX C flue gas temperature at recuperator inlet up to 1250°C
- HK-MAX M flue gas temperature at recuperator inlet up to 1150°C
- Flame velocity: approx. 130 to 170 m/s
- Flame control: direct ionization control (UV control as an option).
- Ignition: direct spark ignition
- The required purge air volume is approx. 0.5 to 1.0% of the air volume for rated capacity, but subject to a minimum of 1 m³(st)/h.



3.2 Capacity

Size	Capacity		Recuperator			Flame length
	kW	k BTU/h	C	M	P	mm
HK-MAX0	25	95	●	-	-	300
HK-MAX1	36	136	●	●	-	300
HK-MAX2	60	227	●	●	●	400
HK-MAX3	100	378	●	●	●	450
HK-MAX4	180	681	●	●	●	800
HK-MAX5	250	945	●	●	-	800
HK-MAX6	500	1890	-	●	-	1000

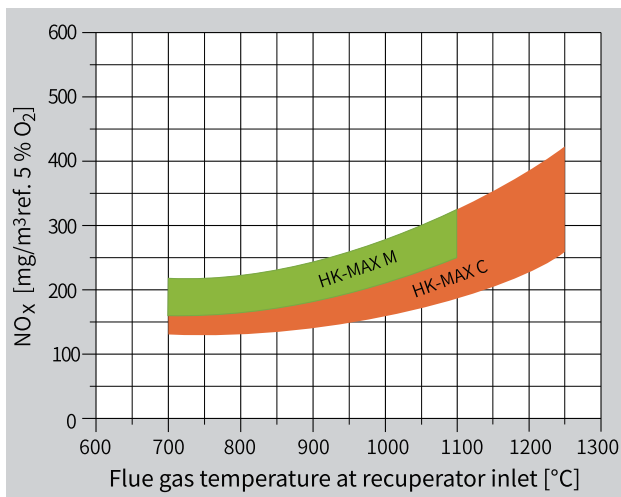
● = available - = not available

- 1) Capacity values refer to operation with natural gas. For operation with coke oven gas, the output is approx. 80%, for operation with LCV gas, approx. 65%.
- 2) Capacities in kW refer to the lower heating value LHV.
- 3) Capacities in BTU/h refer to the higher heating value HHV (gross calorific value).
- 4) The natural gas described in this manual: Density: 0.85kg/m³; Low calorific value LHV: 11.0kWh/m³.

3.3 Emission

NO_x values depend on the furnace chamber temperature, air preheating, burner type and burner settings.

NO_x values in the diagram apply to natural gas.



4. Selection table

4.1 Burner

Type					HK-MAX	3	M	695	-S	B	/R-L
Burner											
Burner size	0	1	2	3							
	4	5	6								
Recuperator Type	C: With ceramic burled tube recuperator made of SiSiC										
	M: With cast steel ribbed tube recuperator										
	P: With cast steel ribbed tube recuperator for P radiant tube										
Recuperator Length	395 mm ~ 695 mm										
Staged Combustion	-S										
Fuel type	B: Natural gas D: Coke oven gas G: LPG L: LCV gas										
Application	/D- For direct heating with eductor										
	/R- For radiant tube heating without eductor										

4.2 Selection table for flue gas eductor EJEK

Option	EJEK 0	EJEK 1	EJEK 2	EJEK 3	EJEK 4	EJEK 5	EJEK 6
Axis spacing in mm ¹⁾	-K269	-K269	-K285	-K292	-K345	-K345	-K530
Installation height in mm	-M625	-M625	-M540	-M620	-M920	-M1165	-M1618
Distance in mm ¹⁾	-T50-500	-T50-500	-T50-500	-T50-500	-T50-500	-T50-500	-T50-500
Burner installation position		-H, -V	-H, -V				
Installation on the burner ²⁾	-3, -9	-3, -9	-3, -9	-3, -9	-3, -9	-3, -9	-3, -9
Eductor angle	-F5-15 -R5-15	-F5-15 -R5-15	-F5-15 -R5-15	-F5-15 -R5-15	-F5-15 -R5-15	-F5-15 -R5-15	-F5-15 -R5-15
With mechanical flue gas valve	-AGK	-AGK	-AGK	-AGK	-AGK	-AGK	-AGK
High temperature version ³⁾	-HT	-HT	-HT	-HT	-HT	-HT	-HT
Construction stage	-A, -B	-A, -B	-A, -B	-A, -B	-A, -B	-A, -B	-A, -B
Standard dimensions	-S	-S	-S	-S	-S	-S	-S

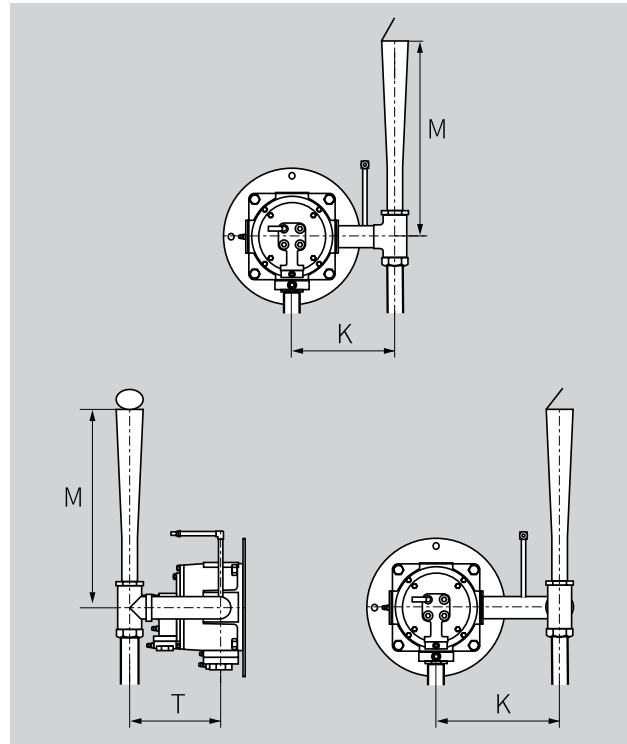
1) Special dimensions on request

2) Only relevant for special dimensions T

3) HT version for HK-MAX C

4.2.1 Type code

EJEK	Flue gas eductor
0-6	Size
-K296-530	Axis spacing K in mm
-M620-1165	Installation height M in mm
-T50-500	Distance T in mm
-H	Burner installation position: horizontal
-V	Burner installation position: vertical
-3	Installation on the burner: right
-9	Installation on the burner: left
-F5-15	Eductor angle: x° towards the furnace
-R5-15	Eductor angle: x° away from the furnace
-AGK	With mechanical flue gas valve
-HT	High temperature version
A, B	Construction stage
-S	Standard dimensions



4.3 Selection table for flue gas connector FLUP

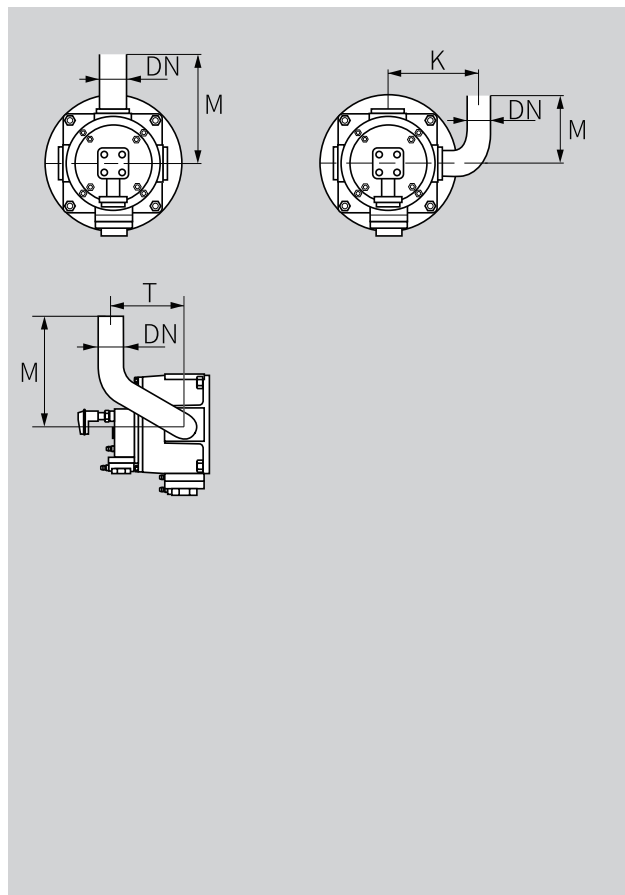
Option	FLUP 0	FLUP 1-2	FLUP 3	FLUP 4-5
Nominal diameter	-32	-50	-65	-100
Pipe connection	D, F	D, F	D, F	D, F
Axis spacing in mm	-K100-800	-K100-800	-K100-800	-K100-800
Installation height in mm ¹⁾	-M230	-M231	-M353	-M399
Distance in mm ¹⁾	-T10-900	-T10-900	-T10-900	-T10-900
Burner installation position ²⁾		-H, -V		
Installation on the burner ²⁾	-0, -3, -9	-0, -3, -9	-0, -3, -9	-0, -3, -9
Pressure test point	-C, -A	-C, -A	-C, -A	-C, -A
High temperature version	-HT	-HT	-HT	-HT
Construction stage	-B			
Standard dimensions	-S	-S	-S	-S

1) Special dimensions on request

2) Only relevant for special dimensions K and/or T

4.3.1 Type code

FLUP	Flue gas connector
0-6	Size
-32-100	Nominal size
D	Pipe connector
F	Flange to ISO 7005
-K296-530	Axis spacing K in mm
-M620-1165	Installation height M in mm
-T50-500	Distance T in mm
-H	Burner installation position: horizontal
-V	Burner installation position: vertical
-0	Installation on the burner: top
-3	Installation on the burner: right
-9	Installation on the burner: left
-C	Measuring port with sealing clip
-A	Threaded pressure tap with cap
-HT	High temperature version
A, B	Construction stage
-S	Standard dimensions



5. Installation and Operation

5.1 Installation

Direct heating:

The burner HK-MAX may be installed as required between an angle of 0° (horizontal) and 90° (vertical from top to bottom). The HK-MAX may be angled upwards from the horizontal at a maximum angle of 15°.

Installation position of eductor EJEK: vertical, maximum angle 10°.

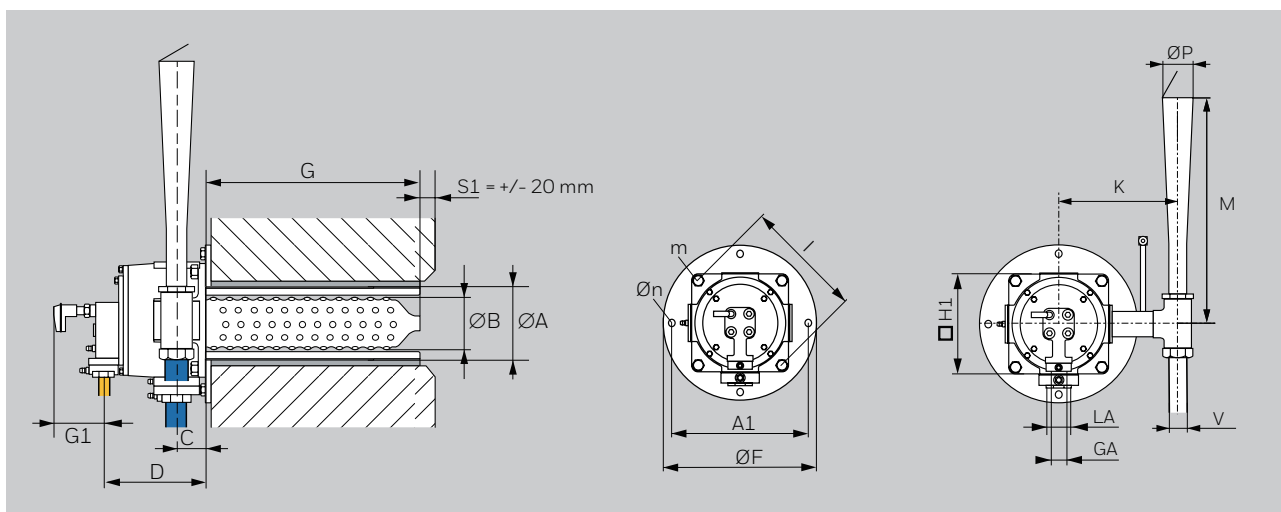
If the burner is installed at an angle of more than 10° to the vertical or horizontal, a special version of the flue gas eductor EJEK is required, which is available on request.

Radiant tube heating:

Installation position of burner with FLUP: horizontal, vertically downwards and angled downwards.

5.2 Dimensions

HK-MAX C direct heating



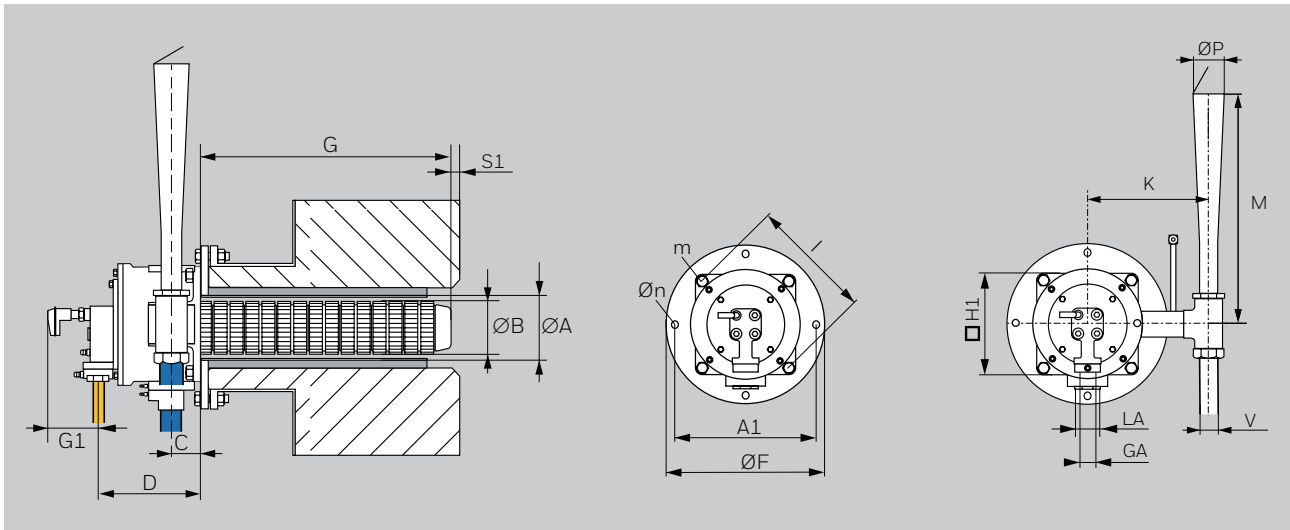
Type	HK-MAX								FGT set						EJEK				Weight
	GA	LA	Ø B	C ¹⁾	D ¹⁾	G1	G	H1	Ø A ²⁾	Ø F	A1	Ø n	l	m	V	K	M	Ø P	
			mm						mm						mm				
HK-MAX 0C	R ½	Rp 1	86	60	179	~78	395, 475, 556, 636	182	142	300	260	4 x 18	210	4 x M12	R 1¼	269	625	43	~11
HK-MAX 1C	R ½	Rp 1	123	60	212	~80	545, 593, 641, 689	236	180	330	280	4 x 19	290	4 x M16	R 1¼	269	625	43	~19
HK-MAX 2C	R ½	Rp 1½	142	60	212	~80	545, 613, 681	236	200	330	280	4 x 19	290	4 x M16	R 1½	285	540	83	~21
HK-MAX 3C	R ½	Rp 2	178	83	262	~80	545, 617, 689	280	236	385	325	4 x 19	330	4 x M16	R 2	292	620	98	~33
HK-MAX 4C	R ¾	Rp 2	240	95	298	~86	545	368	300	480	420	4 x 19	445	4 x M16	R 2½	345	920	128	~48
HK-MAX 5C	R 1	Rp 2	273	95	298	~86	545	368	336	480	420	4 x 19	445	4 x M16	G 2½	345	1165	153	~55

1) Without gasket (d = 1.3 mm).

2) Diameter without metal holder (with metal holder: ØA + approx. 3 mm).

3) Weight of the shortest length burner.

HK-MAX M direct heating

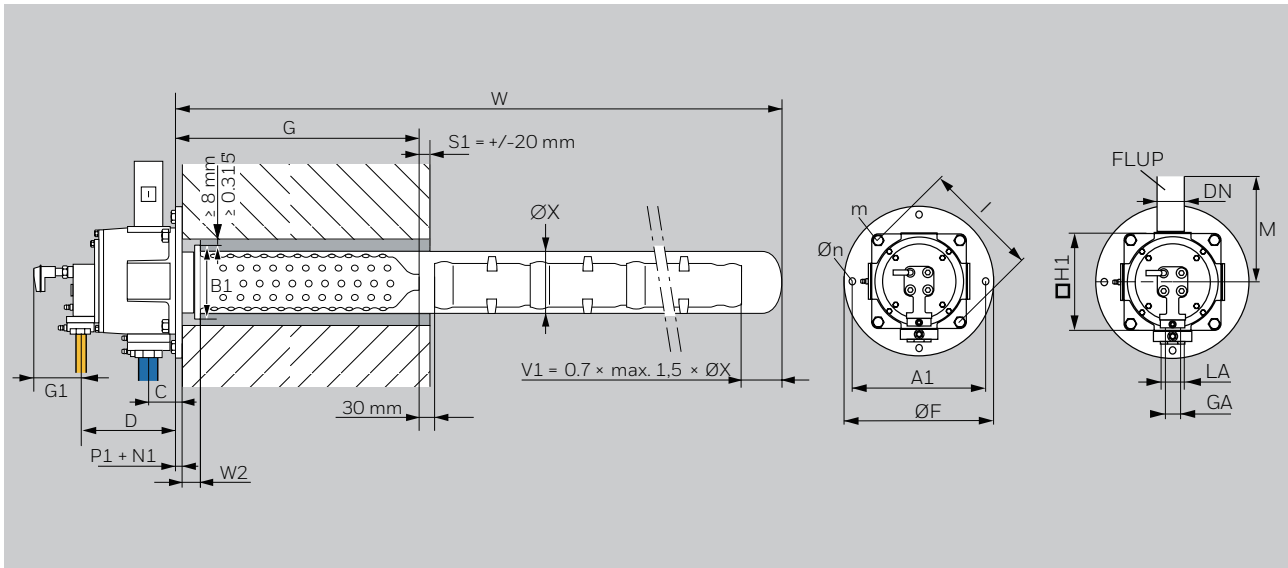


Type	HK-MAX								FGT set						EJEK				
	GA	LA	Ø B	C ¹⁾	D ¹⁾	G1	G	H1	Ø A	Ø F	A1	Ø n	l	m	V	K	M	Ø P	Weight
			mm						mm						mm				kg ²⁾
HK-MAX 1M	R ½	Rp 1	123	60	212	~78	545, 595, 645, 695	236	133	330	280	4 x 19	290	4 x M16	R 1¼	269	625	43	~35
HK-MAX 2M	R ½	Rp 1½	142	60	212	~80	545, 595, 645, 695	236	156	330	280	4 x 19	290	4 x M16	R 1½	285	540	83	~41
HK-MAX 3M	R ½	Rp 2	178	83	262	~80	545, 595, 645, 695	280	193	385	325	4 x 19	330	4 x M16	R 2	292	620	98	~53
HK-MAX 4M	R ¾	Rp 2	240	95	298	~86	545, 595, 645, 695	368	254	480	420	4 x 19	445	4 x M16	R 2½	345	920	128	~90
HK-MAX 5M	R 1	Rp 2	273	95	298	~86	545, 695	368	287	480	420	4 x 19	445	4 x M16	G 2½	345	1165	153	~91
HK-MAX 6M	R1½	Rp 3	370	150	401	~137	545, 695	540	390	740	690	8 x 23	650	4 x M20	DN 100	530	1618	215	~265

1) Without seal (d = 4 mm).

2) Weight of the shortest length burner.

HK-MAX C radiant tube heating

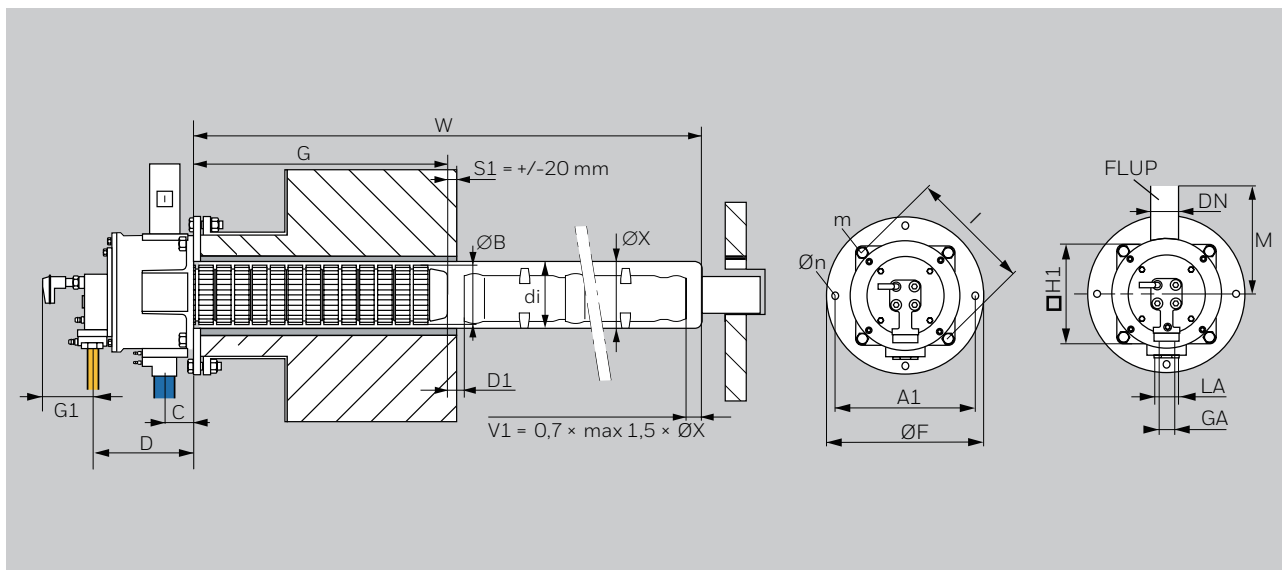


Type	HK-MAX							SER-C										FLUP		Weight
	GA	LA	C ¹⁾	D ¹⁾	G1	G	H1	P1 + N1	W2	B1	Ø X	W	Ø F	A1	Ø n	l	m	DN	M	
			mm					mm										mm		
HK-MAX OC	R ½	Rp 1	60	179	~78	395, 475, 556, 636	182	~34	35	160	100	1000-2600	290	240	4 x 14	210	4 x M12	32	230	~11
HK-MAX 1C	R ½	Rp 1	60	212	~80	545, 593, 641, 689	236	~37	50	200	142	1500-2600	330	280	4 x 19	290	4 x M16	50	331	~19
HK-MAX 2C	R ½	Rp 1 ½	60	212	~80	545, 613, 681	236	~37	50	220	162	1500-3000	330	280	4 x 19	290	4 x M16	50	331	~21
HK-MAX 3C	R ½	Rp 2	83	262	~80	545, 617, 689	280	~37	50	260	202	1500-3000	385	325	4 x 19	330	4 x M16	65	353	~33

1) Without seal (d = 4 mm).

2) Weight of the shortest length burner.

HK-MAX M radiant tube heating



Type	HK-MAX								SER-M								FLUP		Weight
	GA	LA	Ø B	C ¹⁾	D ¹⁾	G1	G	H1	D1	di	Ø X ²⁾	Ø F ³⁾	A1 ³⁾	Ø n ³⁾	l	m	DN	M	
			mm						mm								mm	kg ⁴⁾	
HK-MAX 1M	R ½	Rp 1	123	60	212	~78	545, 595, 645, 695	236	30	> 128	di + 2s	330	280	4 x 19	290	4 x M16	50	331	~35
HK-MAX 2M	R ½	Rp 1½	142	60	212	~80	545, 595, 645, 695	236	30	> 147	di + 2s	330	280	4 x 19	290	4 x M16	50	331	~41
HK-MAX 3M	R ½	Rp 2	178	83	262	~80	545, 595, 645, 695	280	30	> 185	di + 2s	385	325	4 x 19	330	4 x M16	65	353	~53
HK-MAX 4M	R ¾	Rp 2	240	95	298	~86	545, 595, 645, 695	368	50	> 248	di + 2s	480	420	4 x 19	445	4 x M16	100	399	~90
HK-MAX 5M	R 1	Rp 2	273	95	298	~86	545, 695	368	50	> 280	di + 2s	480	420	4 x 19	445	4 x M16	100	399	~91

1) Without gasket (d = 4 mm).

2) s = Wall thickness of radiant tube.

3) On site, the details are suggestions.

4) Weight of the shortest length burner.

5.3 Maintenance cycles

Twice per year, but if the media are highly contaminated, this interval should be reduced.

To learn more about our products, visit [ThermalSolutions.honeywell.com](https://thermalsolutions.honeywell.com) or contact your Honeywell Sales Engineer.

* All performance data is based on the test results of Honeywell Combustion Laboratory. The actual product performance may vary due to the application conditions at the customer's application.

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