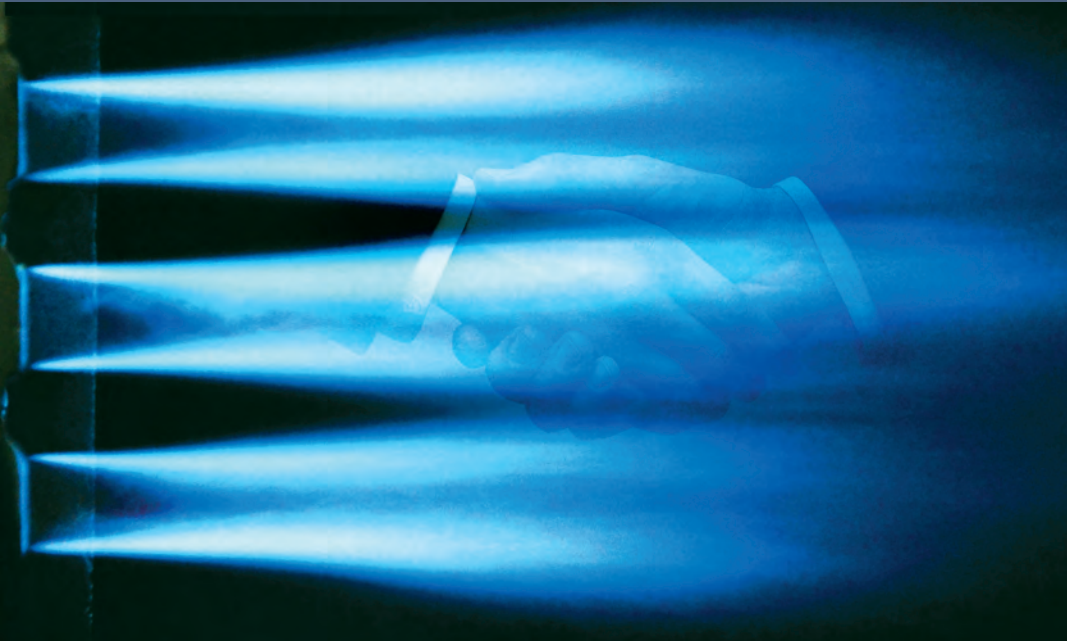
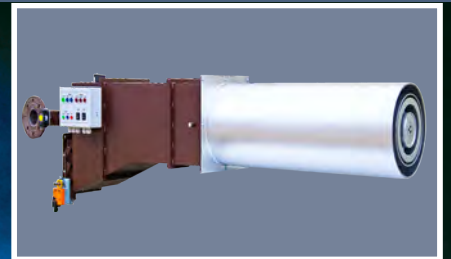
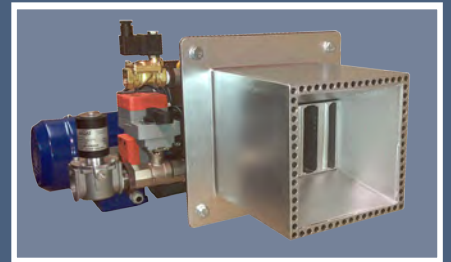
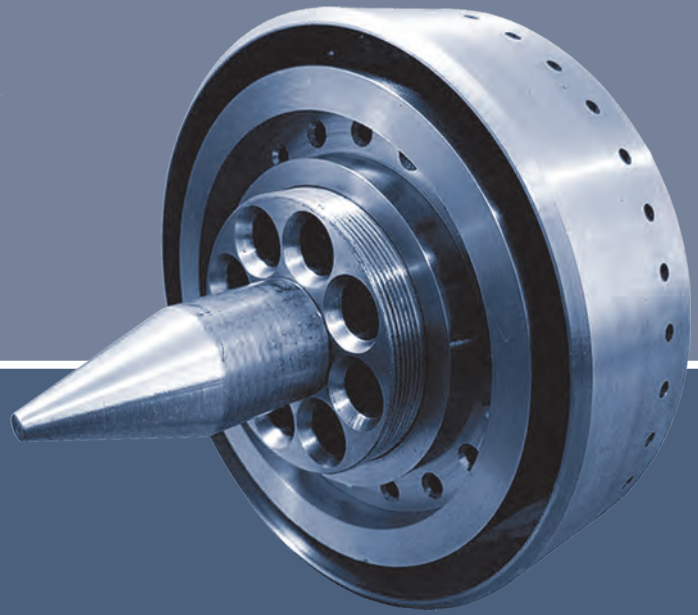


PeriFlame

Industrial Combustion Technologies and Solutions

PORTFOLIO

WE OFFER
THE BEST
COMBUSTION
TECHNOLOGY





CONTENT

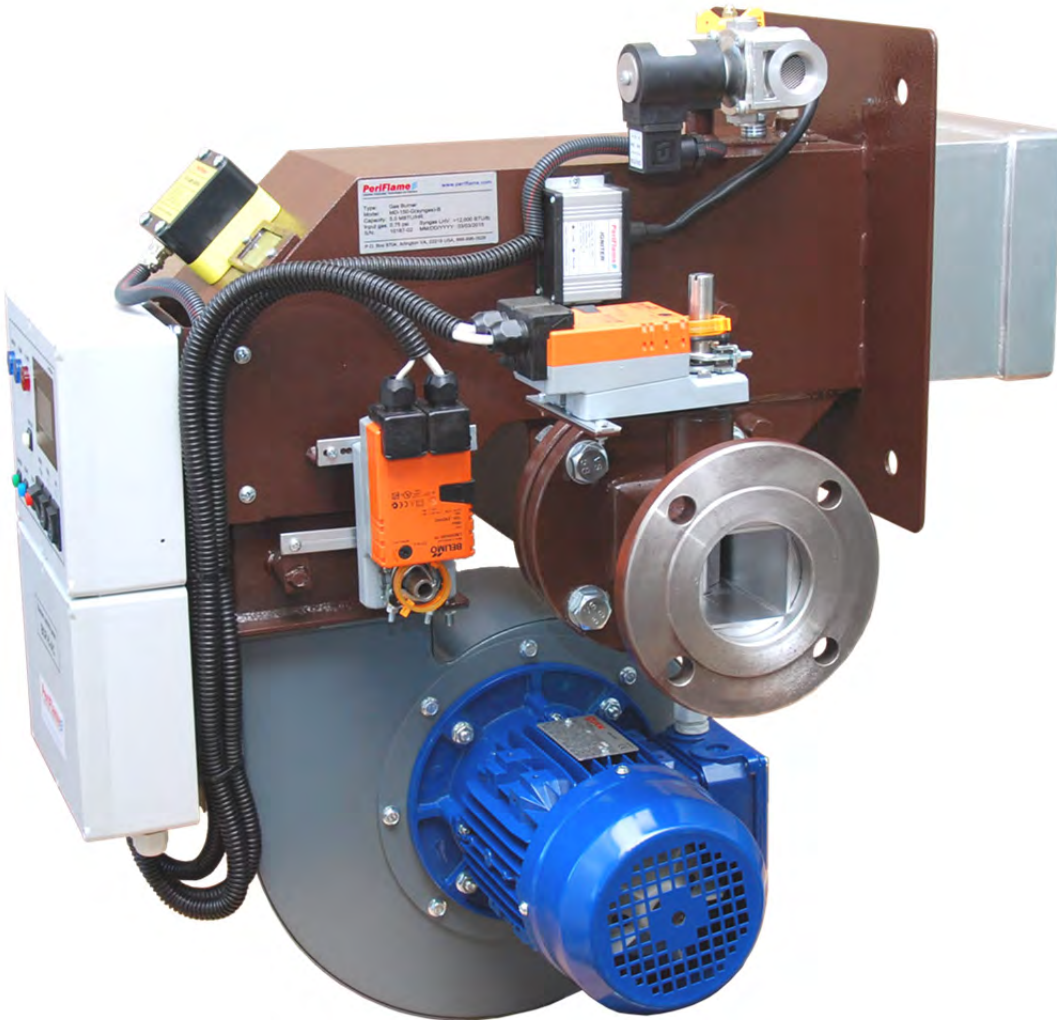
3	Business Summary
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27	Industrial Air Heaters
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29	Microdiffusion Burners were tested on Boilers, Water-Heaters, Furnaces, etc.
.35	Credentials

Who we are

- PeriFlame LLC is an Industrial Combustion Technologies and Solutions Provider founded by European and American Engineers
- PeriFlame engineers, manufactures and implements combustion equipment for all use cases and industries Heating Boilers, Steam Generator Boilers, Technological furnaces, Dryers, Oil refinery, Rotary Kilns, etc.
- 30+ years of combined experience in designing and manufacturing industrial burners and combustors
- Engineered, manufactured and deployed thousands of burners, heat generators and flares to customers world wide
- Authored and utilize state-of-the-art patented Combustion Technology
- We are customer oriented and committed to quality and excellence
- Research and Academics – PeriFlame’s research into combustion processes is recognized internationally and is presented around the world at scientific venues to the audience of a high academic pedigree
- Industry proven approaches for equipment engineering and manufacturing using MCT to provide clean, safe, and efficient combustion products, solutions and experience
- Our products are engineered to provide maximum efficiency, operational range, and to help make combustion processes more profitable and successful.

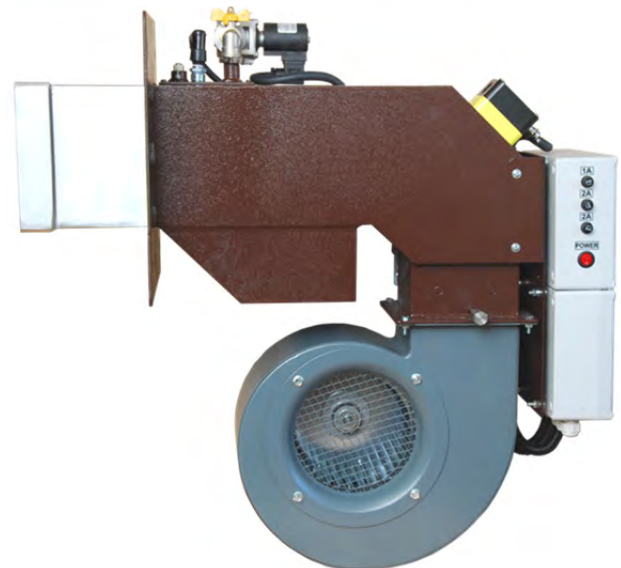


Industrial Gas Burners

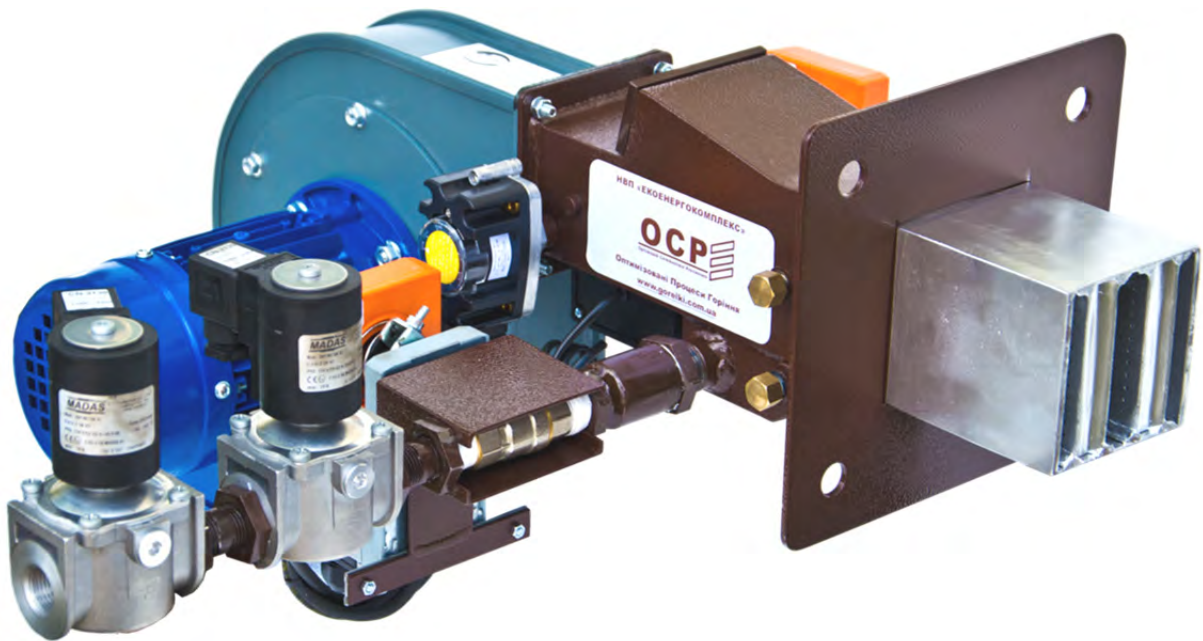


Models MD-G-B2-CP

Capacities 0.5 ... 3.5 MW



Industrial Gas Burners

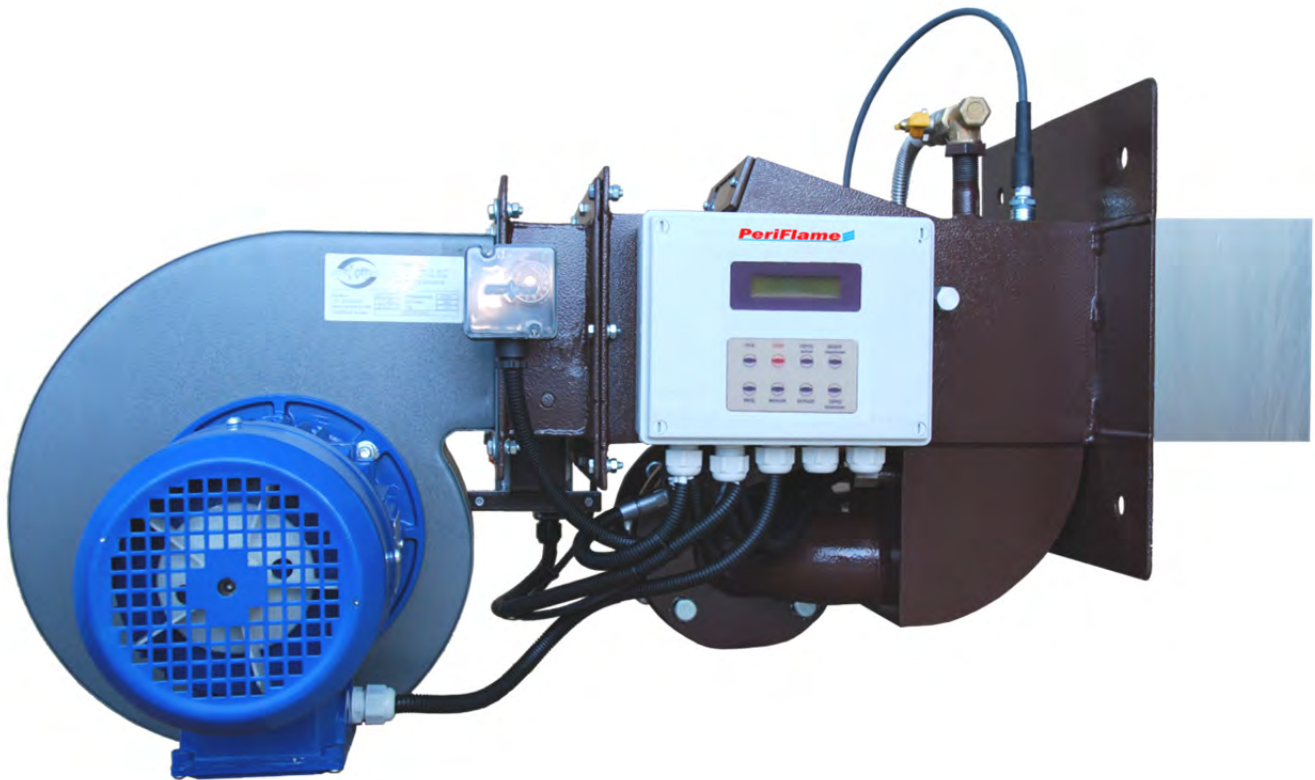


Models MD-G-B1-CP

Capacities 0.25 ... 1.5 MW

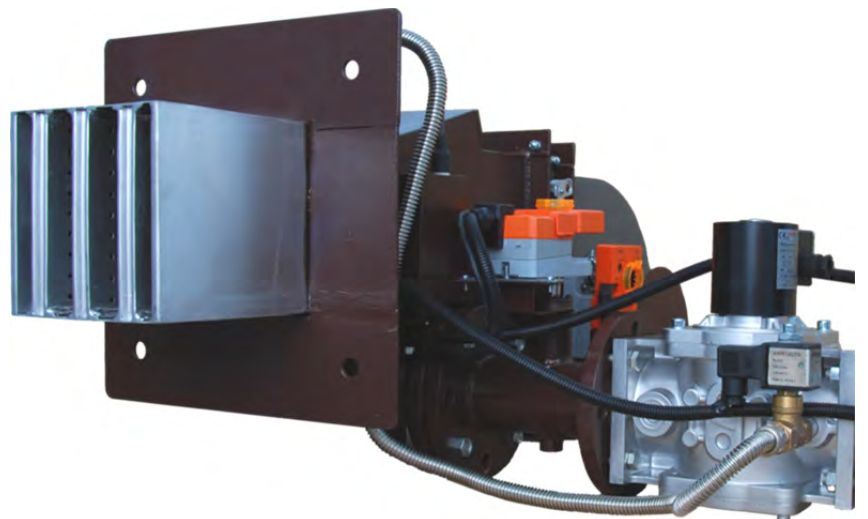


Industrial Gas Burners

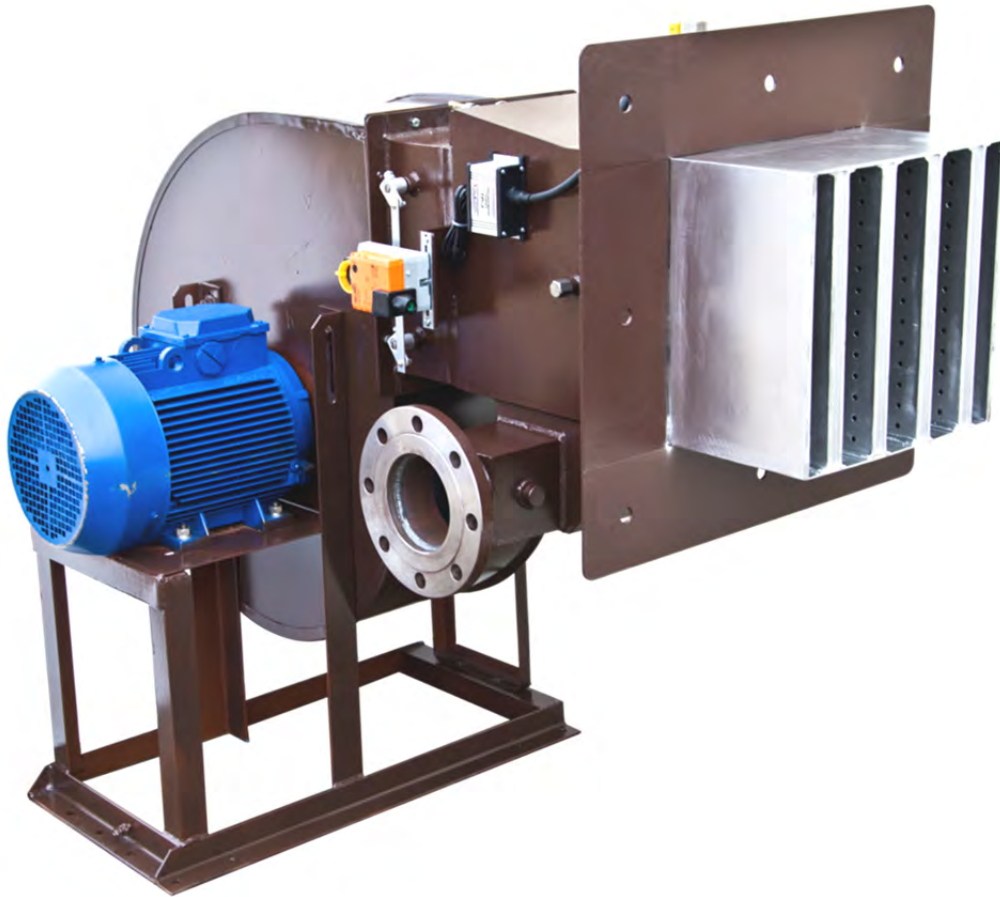


Models MD-G-B1-CP

Capacities 1.0 ... 3.5 MW

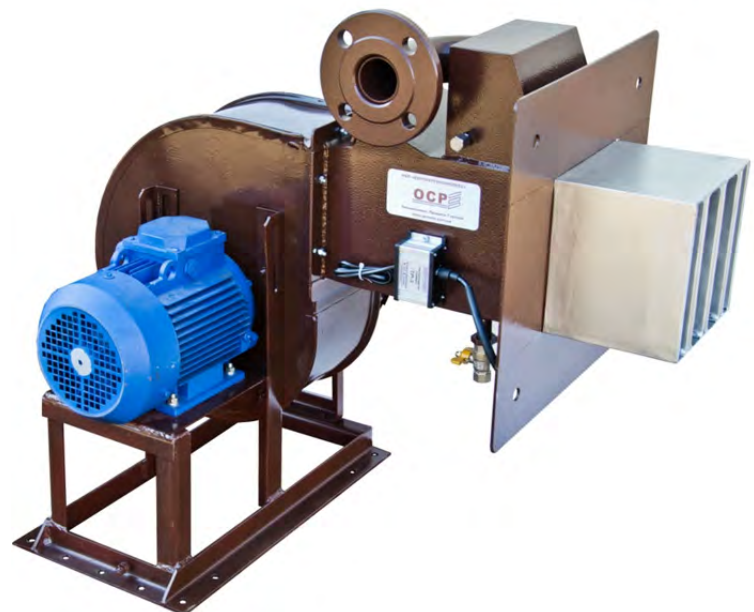


Industrial Gas Burners



Models MD-G-B-CP

Capacities 2.5 ... 5.5 MW



Industrial Gas Burners



Models MD-G-B-CP

Capacities 5.5 ... 10.5 MW

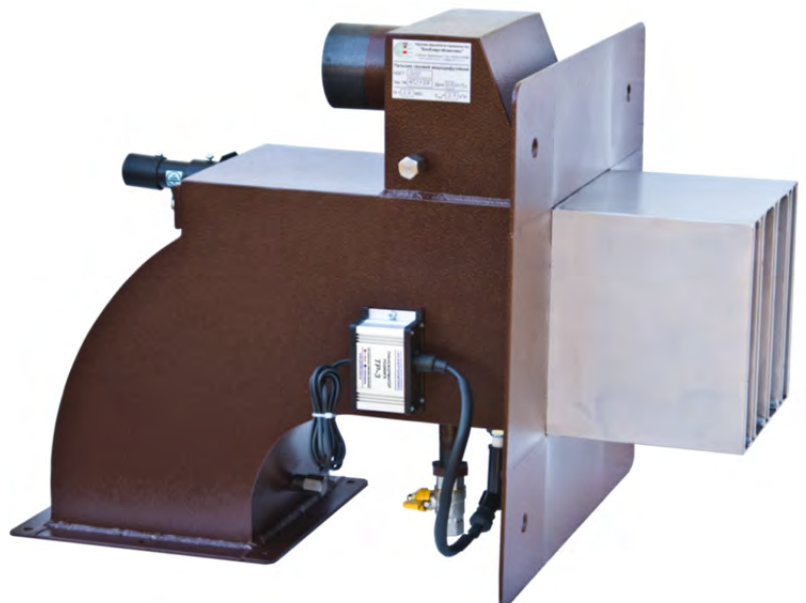


Industrial Gas Burners

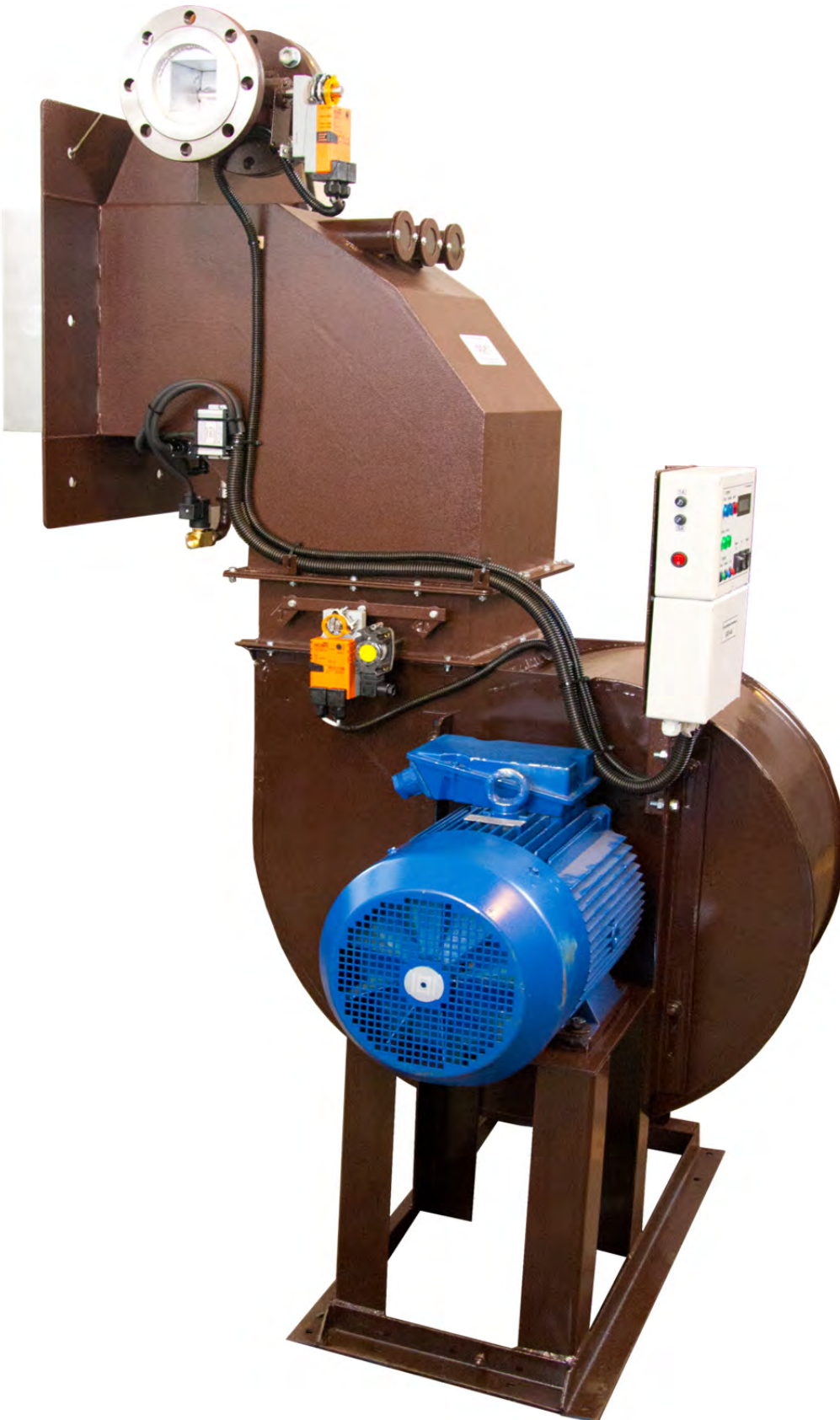


Models MD-G

Capacities 1.5 ... 36.0 MW



Industrial Gas Burners



Models MD-G-B2-CP

Capacities 10 ... 36
MW

MARKINGS OF MICRODIFFUSION GAS BURNERS

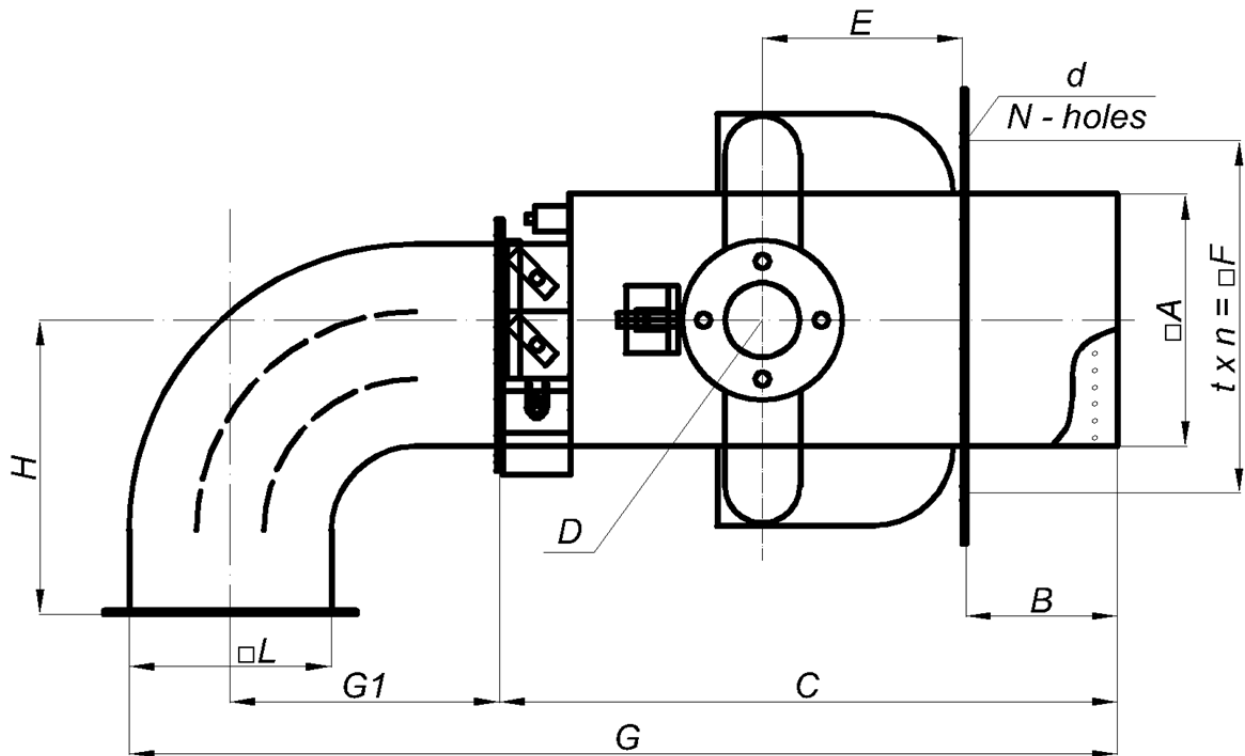
- MD-1000-G: natural gas burner of 12,5 MW (according to "Specifications") completed with an aerodynamic sleeve, an electric igniter, gas control valve and air control damper.
- MD-1000-G(propane) or MD-1000-G(butane) or MD-1000-G(CH₄-50%+H₂-20%+CO₂-30%) or MD-1000-G(H₂-50%+C_nH_m-50%): denotes main gaseous fuel.
- MD-1000-2G(NG, propane) or MD-1000-2G(NG, CH₄-50%+CO₂-50%): burner has two (2) separate gas inlets for different (unmixable) gaseous fuels or in case of fuel has variable composition.
- MD-1000-G-A500: the maximum preheat combustion air temperature is 500 F.
- MD-1000-G-O(A-50%+O₂-50%)500: the maximum preheat oxidizer (air-oxygen mixture) temperature is 500 F.
- MD-1000-G-B: the burner has an air blower instead of an aerodynamic sleeve.
- MD-1000-G-S or MD-1000-G-L: the burner has Short or Long flame length respectively.

SPECIFICATIONS

Specification	Value
Minimal excess air factor over capacity range	1,02
Admissible increase of excess air factor over capacity range	0,7 or required
Natural gas inlet pressure diff., mbar	20; 50; 100; 200
Combustion air pressure diff. at n=1,1, mbar	10 or 20
Air turndown	1:10
Pilot capacity,%	3-5
Flame length, types (see the next paragraph)	short normal long
Expansion angle of a flame, °	30 – 40

Burner	Capacity range, MW	Burner cross-section (height × width), mm
MD-25-G	0,07...0,3	95 x 95
MD-40-G	0,15...0,6	104 x 104
MD-75-G	0,2...1,0	144 x 144
MD-150-G	0,3...1,5	164 x 164
MD-200-G	0,4...2,2	196 x 196
MD-250-G	0,6...3,2	244 x 248
MD-400-G	0,9...5,2	300 x 300
MD-700-G	1,4...8,5	337 x 338
MD-1000-G	2,1...12,5	390 x 390
MD-1500-G	2,4...16,0	470 x 470
MD-2000-G	3,0...22,0	500 x 500
MD-2500-G	4,5...32,0	548 x 526
MD-5000-G	7,0...55,0	774 x 774
MD-7500-G	10,0...75,0	990 x 990
MD-10000-G	15,0...100,0	1200 x 1200

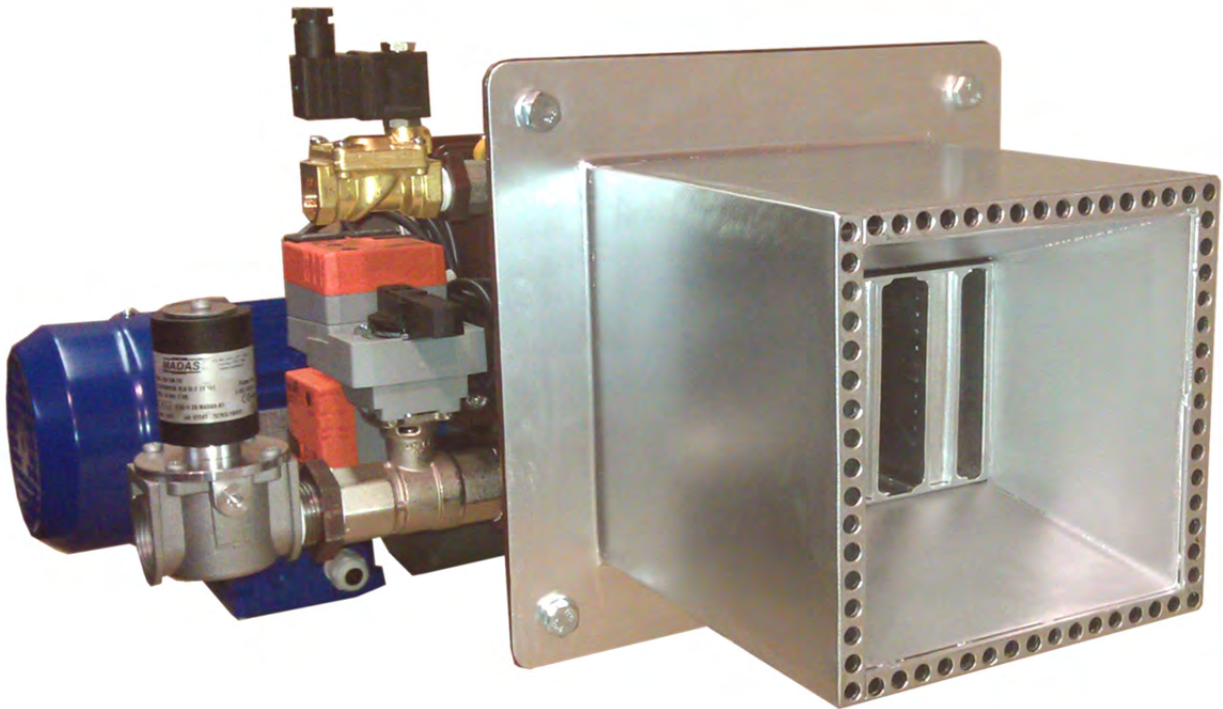
GAS BURNERS DIMENSIONS



Gas burners dimensions are represented in the table below, mm (may vary).

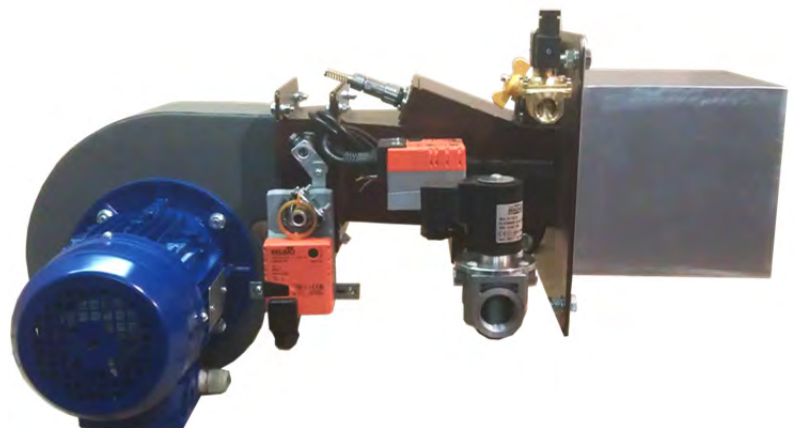
Burner	Burner's dimensions, mm										Sleeve dims, mm			G
	A	B	C	D	E	F	t	n	N	d	L	G1	H	
MD-25-G	95	135	350	25	120	175	175	1	4	14	75	200	210	588
MD-40-G	104	140	400	25	140	184	184	1	4	14	75	200	210	638
MD-75-G	144	150	450	40	150	224	224	1	4	18	140	300	300	820
MD-150-G	164	160	500	50	170	264	264	1	4	18	140	300	310	870
MD-200-G	196	160	500	65	180	296	296	1	4	18	175	400	410	988
MD-250-G	238	170	500	80	200	338	338	1	4	18	175	400	430	988
MD-400-G	300	180	550	100	250	420	420	1	4	18	220	470	510	1130
MD-700-G	338	180	550	100	270	458	458	1	4	21	280	520	550	1210
MD-1000-G	390	180	600	125	300	540	270	2	8	21	350	550	570	1325
MD-1500-G	470	200	600	150	320	620	310	2	8	21	430	600	620	1415
MD-2000-G	500	210	600	150	340	650	325	2	8	21	450	600	620	1425
MD-2500-G	548	210	600	150	350	698	349	2	8	21	500	700	720	1550
MD-5000-G	774	220	700	200	400	924	308	3	12	24	710	800	830	1855
MD-7500-G	990	250	700	225	450	1191	397	3	12	24	920	1000	1040	2160
MD-10000-G	1200	300	800	250	500	1400	350	4	16	28	1100	1200	1250	2550

Gas Duct Burners

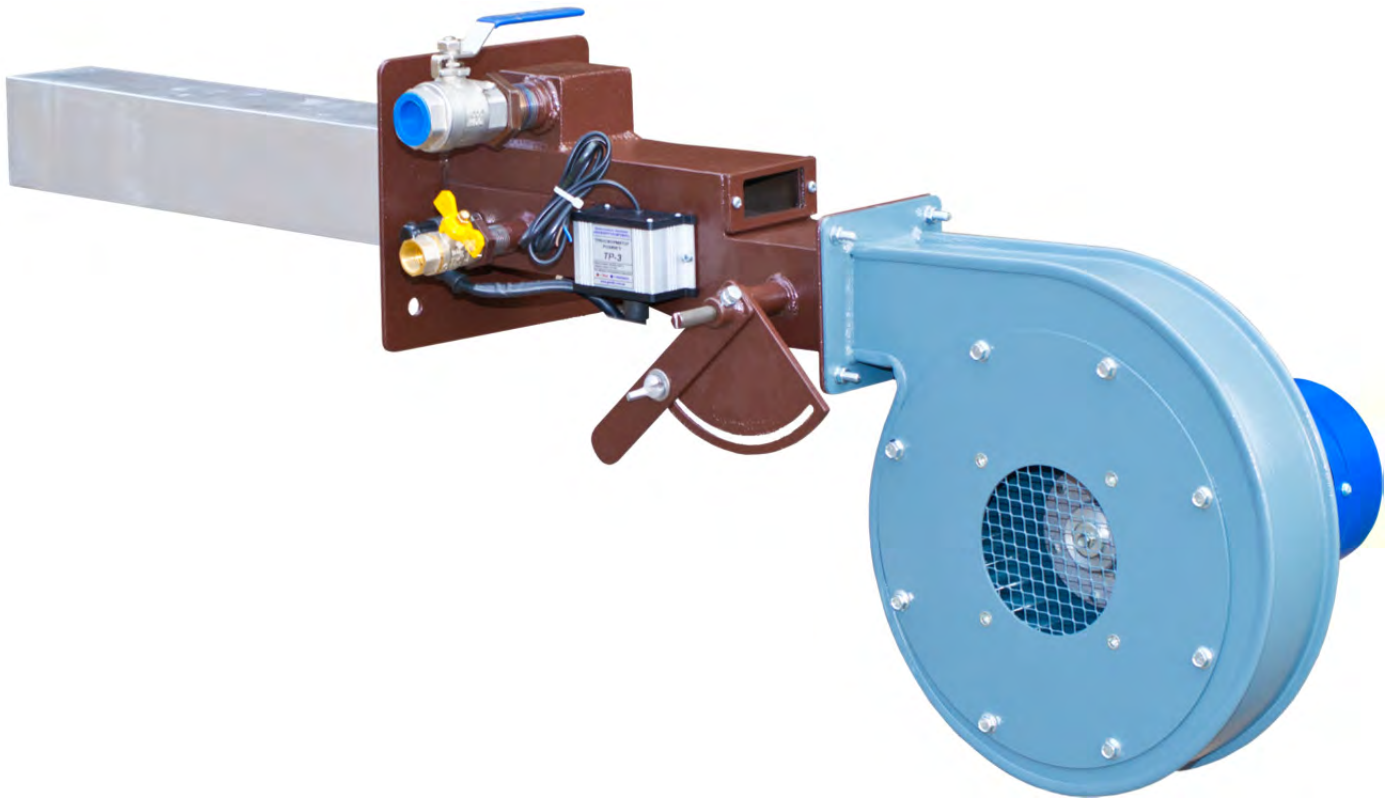


Models MD-G-D

Capacities 0.25 ... 2.5 MW

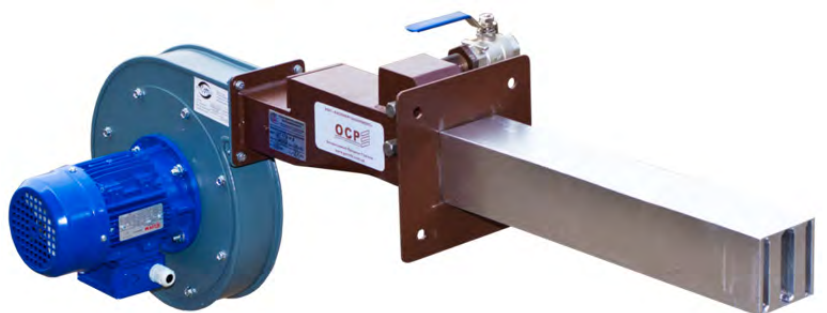


Heat Treatment Burners



Models MD-G-TF

Capacities 0.15 ... 1.5 MW



Dual Gas Burners



Models MD-2G-B-CP

Capacities 2.5 ... 8.5 MW

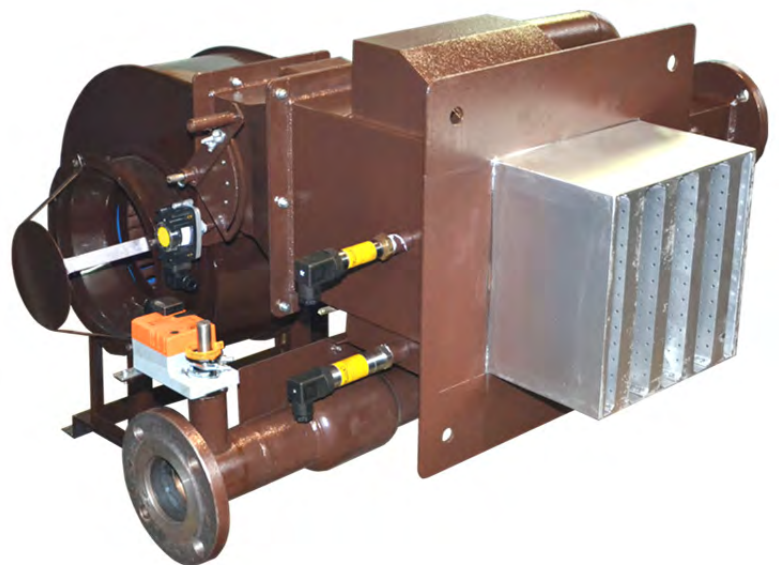


Dual Gas Burners

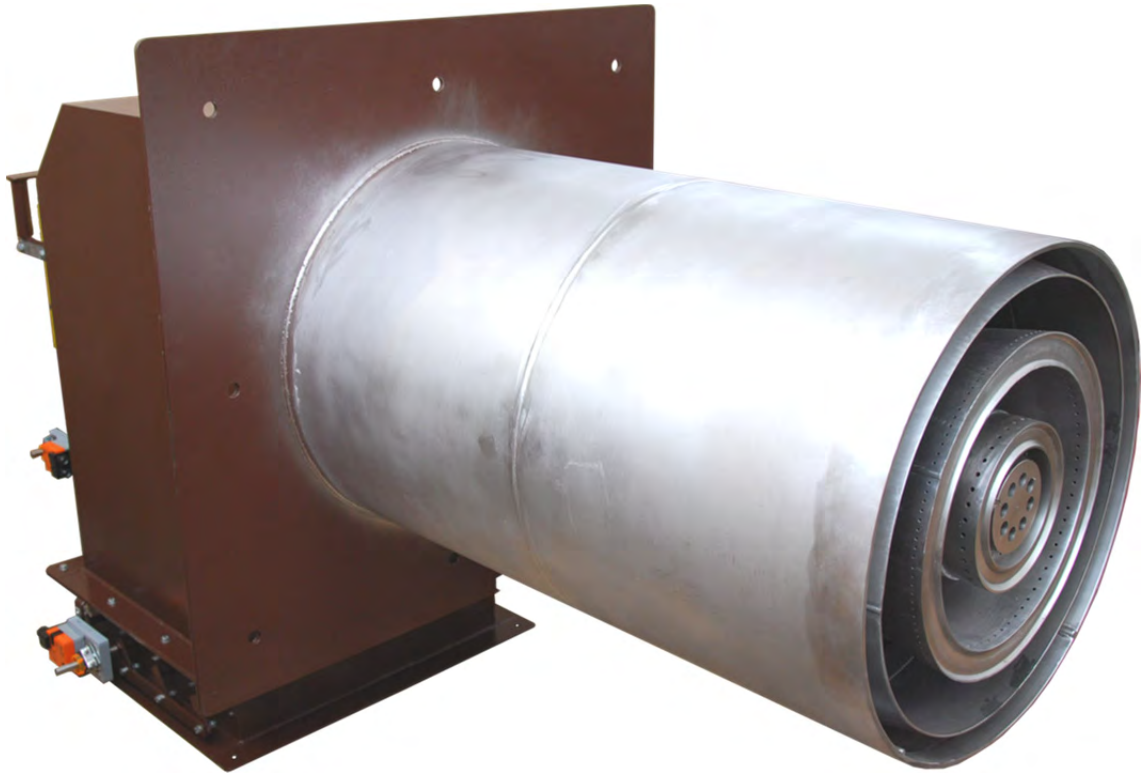


Models MD-2G-B-CP

Capacities 1.5 ... 5.5 MW



Gas Burners for Kilns



Models MD-G-RK

Capacities 15 ... 50 MW



Industrial Liquid-Fuel Burners



Models MD-OL-B-CP

Capacities 0.3 ... 2.5 MW

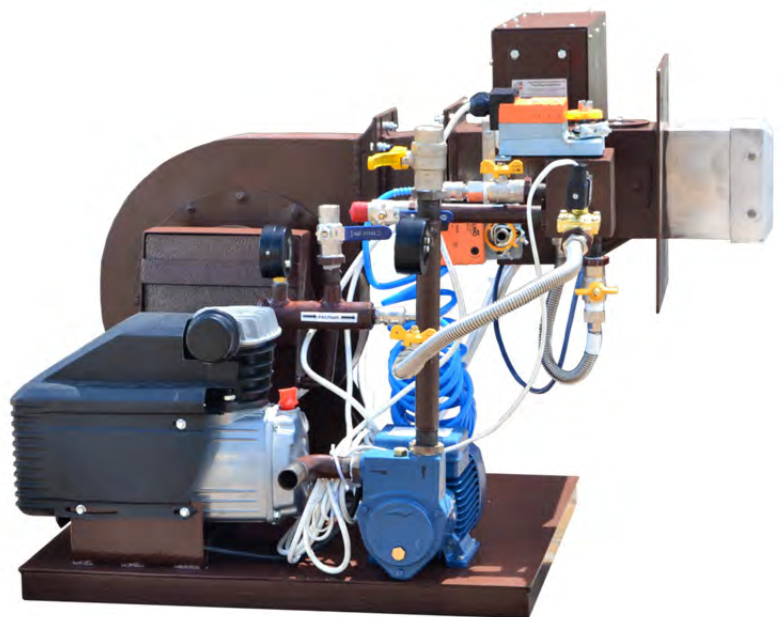


Industrial Liquid-Fuel Burners



Models MD-OH-B

Capacities 2.5 ... 7.5 MW



MARKING OF LIQUID FUEL BURNERS

Marking MD-400-O-L meaning light oil burner of 5,0 MW (according to "Specification of MD burners") completed with an aerodynamic sleeve, an electric igniter, oil control valve, oil safety valve and air control damper.

Marking MD-400-O-H means the same for heavy oil.

Marking MD-400-O-H-A500 meaning the maximum preheat combustion air temperature is 500 F.

Marking MD-400-O-H-O(A-50%+O2-50%)500 meaning the maximum preheat oxidizer (air-oxygen mixture) temperature is 500 F.

Marking MD-400-O-L-B meaning the burner has an air blower instead of an aerodynamic sleeve.

SPECIFICATIONS OF LIQUID FUEL BURNERS

Specification	Value
Minimal excess air factor over capacity range light/heavy oil	1,10 / 1,25
Admissible increase of excess air factor over capacity range	0,6
Minimal oil inlet temperature (light / heavy), F	50 / 200
Oil inlet pressure (light / heavy), bar	2,5 / 4,5
Atomizing air (steam) pressure (light / heavy), bar	2,5 / 4,5
Atomizing air (steam) flow rate (specific), m ³ /(hour·MW)	3 – 5
Combustion air pressure diff. at n=1,1, mbar	15
Air turndown (gas / oil)	1:10 / 1:4
Pilot capacity,%	3-5
Expansion angle of a flame, °	40 – 60

Burner	Capacity range, MW	Burner cross-section (height x width), mm	Diameter of burner's frontal part, mm
MD-25-O	0,07...0,3	95 x 95	120
MD-40-O	0,15...0,6	104 x 104	140
MD-75-O	0,2...1,0	144 x 144	170
MD-150-O	0,3...1,5	164 x 164	200
MD-200-O	0,4...2,2	196 x 196	240
MD-250-O	0,6...3,2	260 x 260	266
MD-400-O	0,9...5,2	320 x 320	380
MD-700-O	1,4...8,5	337 x 338	440
MD-1000-O	2,1...12,5	390 x 390	510
MD-1500-O	2,4...16,0	470 x 470	580
MD-2000-O	3,0...22,0	500 x 500	688
MD-2500-O	4,5...32,0	548 x 526	750

Industrial Liquid-Fuel Burners



Models MD-OG-B-CP

Capacities 0.5 ... 3.5 MW



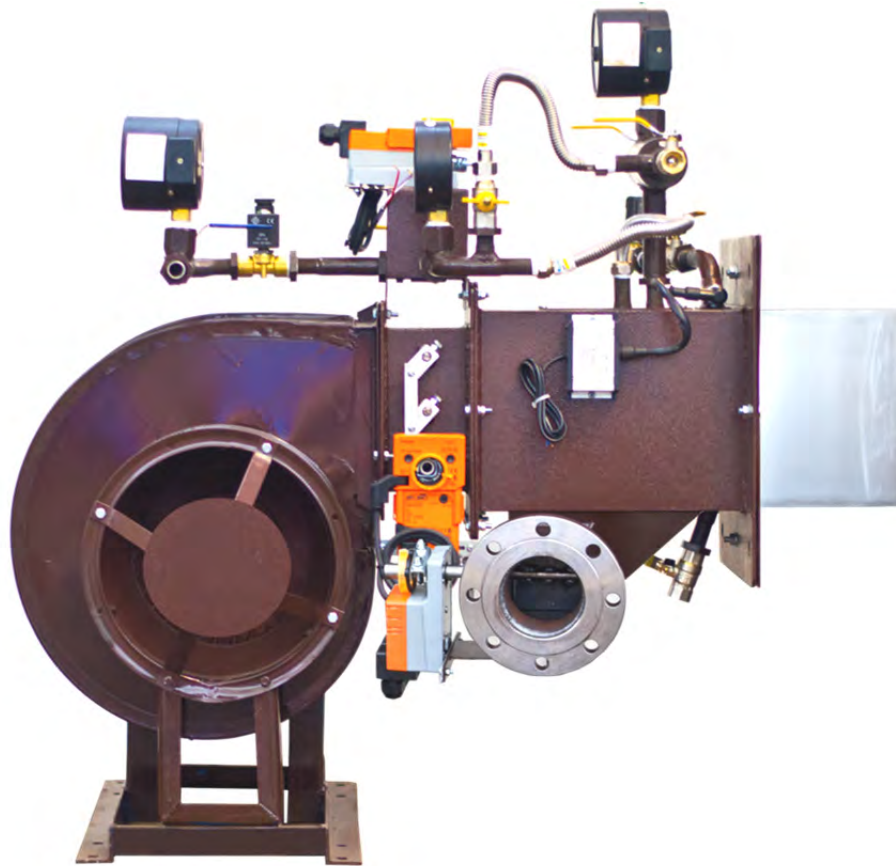
Industrial Dual Fuel Burners



Models MD-OG-B-CP
Capacities 3.5 ... 8.5 MW

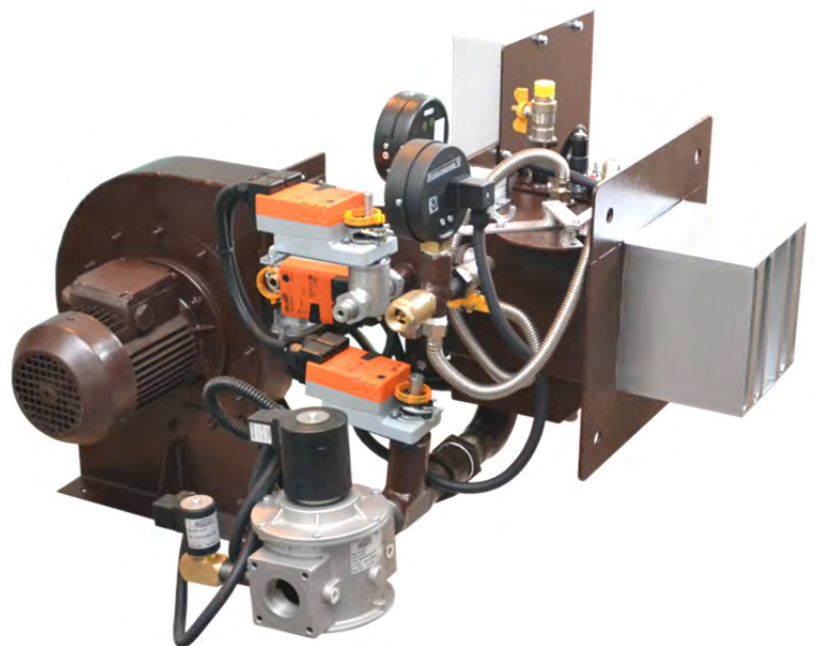


Industrial Dual Fuel Burners

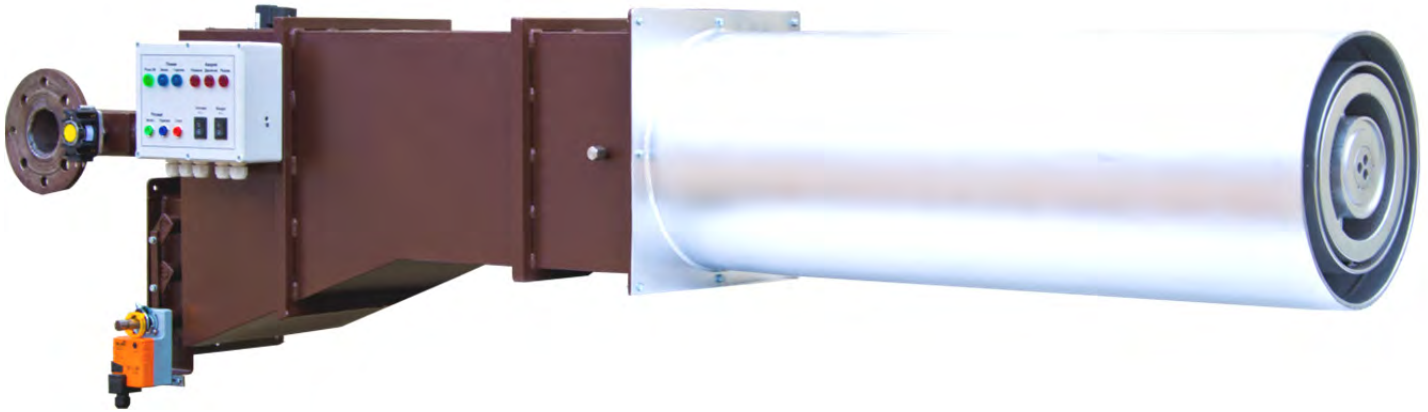


Models MD-OG-B-CP

Capacities 0.5 ... 3.5 MW



Dual Fuel Burners for Kilns



Models MD-OG-RK

Capacities 6.5 ... 15 MW

About Microdiffusion Combustion Technology

MCT addresses two (2) critical industrial combustion challenges:

Challenge #1:

Provide a stable flame at extreme velocities of combustible mixture while allowing for shape flexibility and minimizing dimensions of a flame-holder, and offering an superior flame performance and flame management capabilities.

Challenge #2:

Pre-mixed flames have high volume intensities, but an extremely narrow range of flame stability and combustion completeness when modulating excess-air factor.

Solution #1:

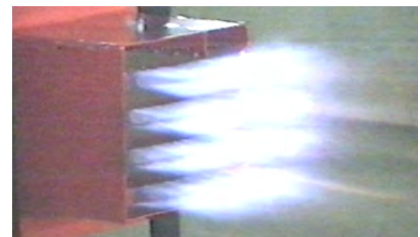
MCT address this challenge by utilizing optimal topological schemas for straight-flow flame-holders. (**note:** we investigated, developed and adapted the topological schemas for all industrial combustion applications).

Solution #2:

MCT resolves this industrial challenge by using proprietary multi-jet fuel feeding system. All relevant parameters of microdiffusion fuel feeding systems for gaseous and liquid fuels are precisely defined.

Microdiffusion Combustion Technology is distinguished among other technologies due to the following reasons:

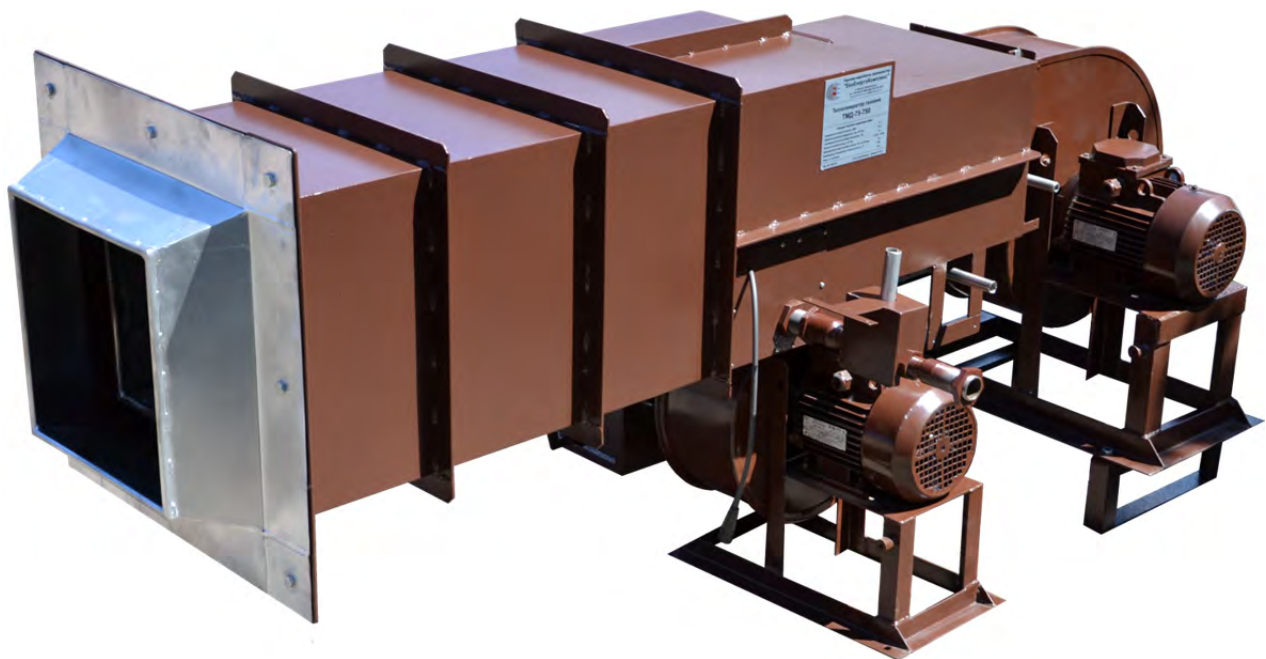
- MCT utilizes a novel combustion theory (combustion constants), novel topological schemas and calculation methods.
- Addresses well-documented, industry wide challenges related to design and adaptation of combustors and flame-holders for all industrial applications.
- MCT's mechanism combines straight-flow flame-holders and a proprietary fuel-feeding system.
- MCT avoids disordered and superfluous mixing of a combustible mixture with combustion products.
- Microdiffusion flames are extremely close to the theoretical structure. Therefore, we utilize them on our industrial equipment for their advantageous properties.



Industrial Heat Generators



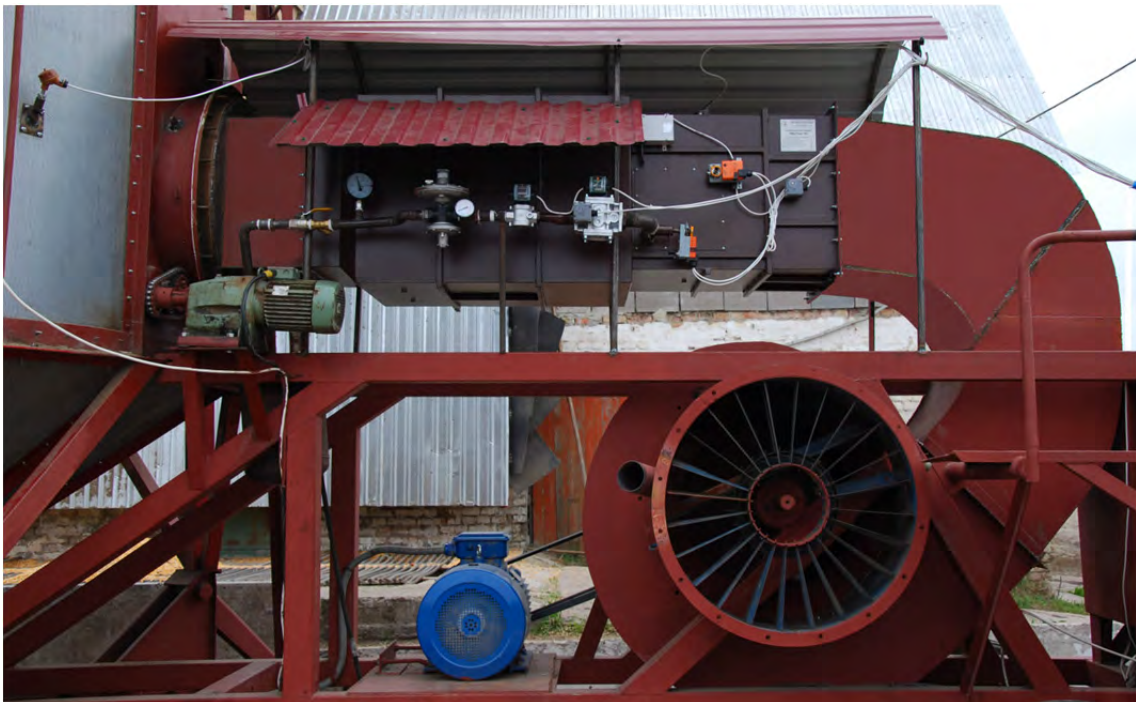
Heat Generator (2.2 MW) with a Gas Burner



Industrial Heat Generators



Mobile Heat Generator (2.2 MW) with a Diesel MD-Burner



Heat Generator (1.0 MW) with a Duct Gas Burner

Industrial Air Heaters



Enclosed Ground Flares



Bio Gas Burner (25 MW) with combustion chamber for the Flare



Enclosed ground flare (25 MW) with automatic ignition

Microdiffusion Burners were tested on Boilers, Water-Heaters, Furnaces, etc.



Water-heaters with MD Gas Burners



Steam boiler with MD Gas Burners



Water-heaters with MD Gas Burners



Water-heaters with MD Gas Burners



Steam boiler with MD Gas Burners of 20 MW (NG+Biogas)



Steam boiler with MD Gas Burner of 30 MW capacity



Water-heater with MD Gas Burner of 20 MW capacity



Steam boiler with MD Gas Burner of 12 MW capacity



Heating Furnace with MD Dual Gas Burner of 3.0 MW capacity



Steam boiler with MD Bio Gas Burner of 5.5 MW capacity



**Dr. Vladimir
Kryzhanovsky**

*Author of novel theory of
combustion of gases*

*Author of Microdiffusion
Combustion Technology
(MCT)*

CREDENTIALS

50 YEARS OF FUNDAMENTAL RESEARCHES

Scientific researches of the flame structure and flame front parameters have been started in 1962 by a prominent Ukrainian scientist, Dr. Vladimir Kryzhanovsky.

30 YEARS OF THE MOST ADVANCED COMBUSTION MECHANISM REVEALING

Calculation and design methods for the ultimate parameters of combustion have been created.

In 1983 it has been proved that flame was the most optimal for industrial usage.

20 YEARS OF INDUSTRIAL ADAPTATION OF MICRODIFFUSION COMBUSTION TECHNOLOGY (MCT)

In 1995 the first burners were manufactured and deployed in Kiev plant, where they are currently operating.

10 YEARS OF OUR TECHNOLOGY OF LIQUID FUEL BURNING AND PULVERIZED COAL BURNING

100 YEARS OF PERSPECTIVE

Application of MCT is used to develop and enhance combustion processes to include:

- MD Burners: Gas burners, Liquid burners, Multi-fuel burners & Heat Generators
- Novel combustors for modernization of all types GTE
- Afterburners of propulsion systems
- Novel thermal nozzle designs of ramjet and scramjet engines
- Calculation of required fuel characteristics



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