

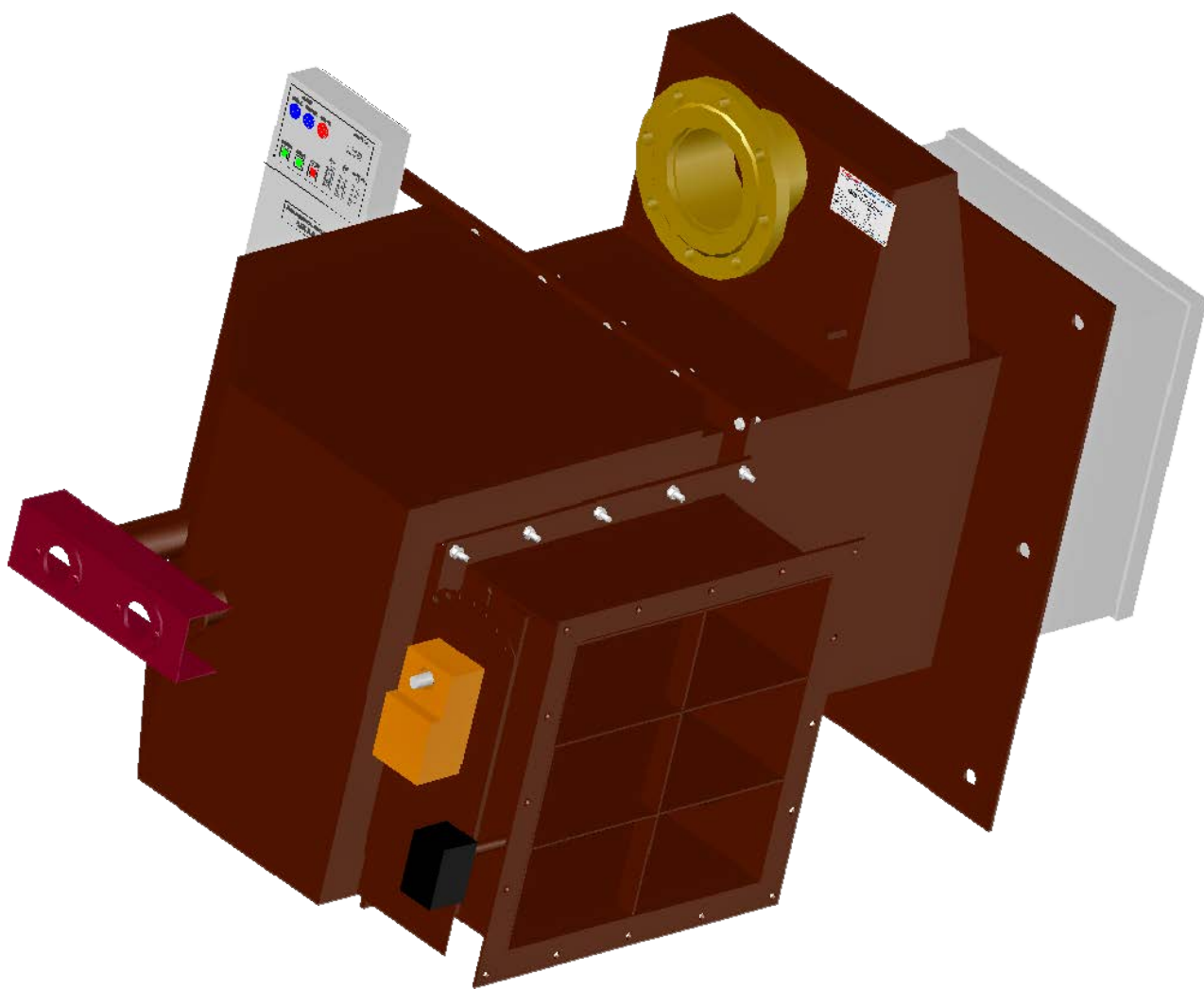
Operations and Maintenance Manual for

**INDUSTRIAL MICRODIFFUSION GAS BURNERS**

***Models MD-25-G...MD-10000-G***

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*December 2012*



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# **INTRODUCTION**

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## **DISCLAIMER**

In accordance with the manufacturer's policy of continual product improvement, the product presented in this brochure is subject to change without notice and obligation.

Periflame warrants that these burners do not infringe upon any United States patents.

## **AUDIENCE**

This manual is written for specialists who are already familiar with all aspects (selection, use, maintenance) of operation of gas burners and fuel-firing equipment (furnaces, boilers, air heaters, etc.). The personnel working with these burners should have corresponding qualification. Specialists must know general principles of usage and maintenance of gas burners.

## **OVERVIEW**

This manual describes in detail specifications, installation instructions and usage cases for PeriFlame Burners. PeriFlame offers a variety of industrial burners for industrial heating applications. Periflame's products, designed by our experienced Engineering Department, reflect our commitment to excellence. We design and optimize our burners and combustion chambers to meet our clients' requirements and we guarantee exceptional results. Our customer-oriented approach and state-of-the-art technology make PeriFlame an attractive, innovative solution.

# SAFETY

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This manual is written for specialists who are already familiar with all aspects (selection, use, maintenance) of operation of gas burners and fuel-firing equipment (furnaces, boilers, air heaters, etc.). The personnel working with these burners must have all corresponding qualification. It is assumed that specialists know general principles of gas burner implementation, operation, usage and maintenance.

Legend:



**DANGER**



**WARNING**

You must know the meaning and importance of all safety symbols



**DANGER**

All fuel burning devices are capable of producing fire and explosions when improperly applied, installed, adjusted, controlled and maintained.

The probability of depressurization of fuel train system always exists.

For normal operation burner needs a pressure difference. Pressure difference can be provided by a blower or other configurations. The probability of malfunction of pressure difference system always exists.



**DANGER**

Do not bypass any safety features. Bypassing safety features can cause Fire and explosion.

## **For your safety**

For your safety, our burners can have a minimal inlet gas (fuel) pressure and any required air pressure difference.



**WARNING**

Burner parts might be hot during operation. Always use appropriate caution when approaching the burner.

## **For your safety**

Adjustment and maintenance of burners (mechanical and electrical parts) must be administered by qualified personnel that are experienced in combustion equipment.

Continuous retraining of operators must be administered to ensure a high degree of proficiency.

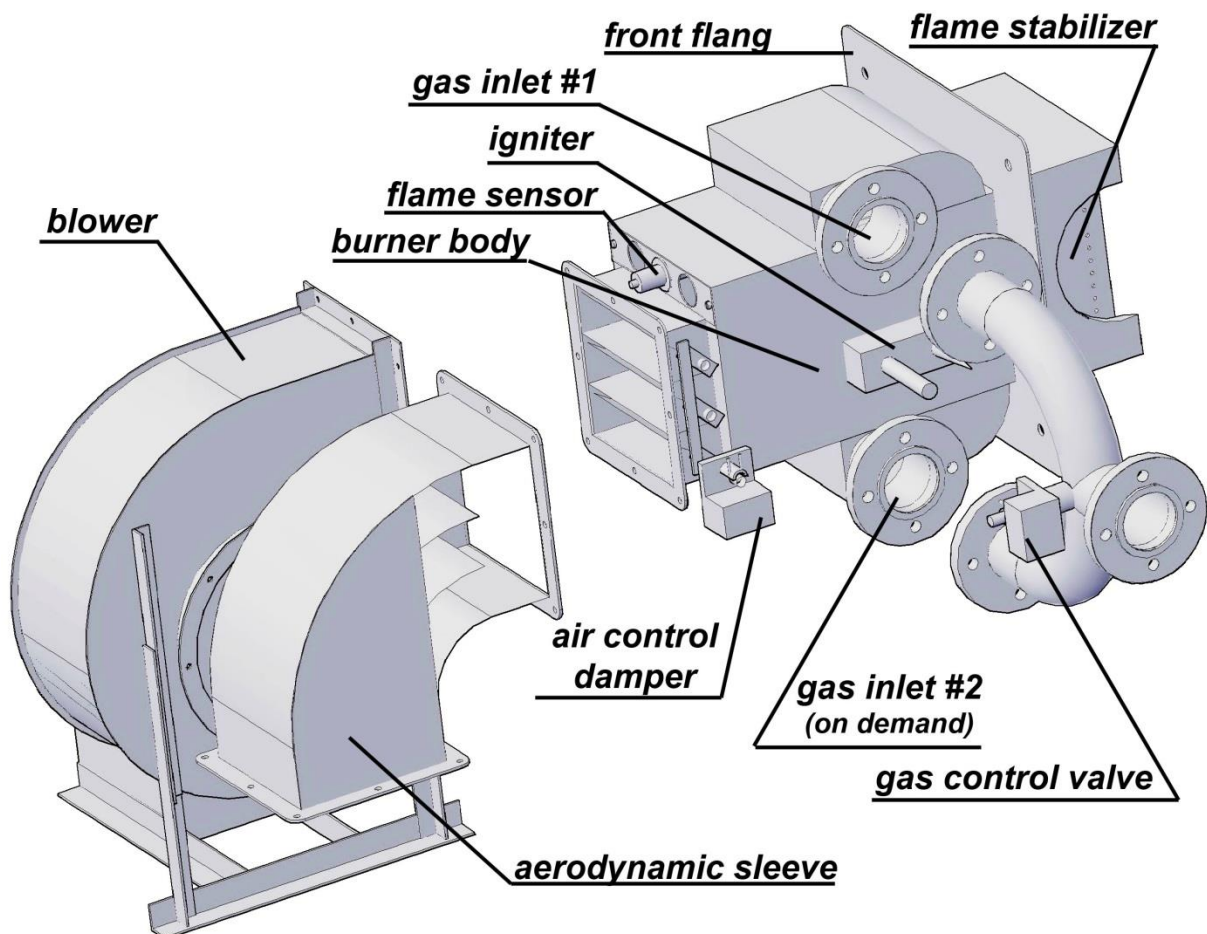
## **For additional information**

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# MD BURNERS OVERVIEW

## DESCRIPTION

- MD-G burners are intended to fire any gaseous fuels with various oxidizing parameters inputs.
- MD-G burners use patented flame-holder system with direct-flow microdiffusion stabilizers. Depending on capacity, the number of stabilizers range from 2 to 8. Stabilizers have two internal gas allocation systems, which provides kinetic and diffusion combustion simultaneously. In addition, burners utilize the most optimum assemblage of combustion parameters.
- MD-G burners provide a stable flame over all capacity ranges (5–120 %) and at excess air factors from 0.8 up to 20. Absence of CO emission warrants at excess air factors from 1.03 to 1.70.
- Low NO<sub>x</sub> emission is accomplished due to entirely transparent flame and a patented method of microdiffusion combustion.
- Burners are available in 15 sizes, which operate over a range of 0.25MW to 100 MW. MD-G burners are compatible with all types of ovens, boilers, vaporizers, dryers and heaters.
- Every burner is equipped with an electric igniter, main combustion gas control valve, and multi-blade air damper. Each control valve and damper has servomotor (110 V, three-point guidance) and position sensor (potentiometer with resistance 1k, 5k or required).
- The burner can be completed with an aerodynamic sleeve and/or air blower.



Pic. 1 – Gas burner MD-G with blower or aerodynamic sleeve.

## MANUFACTURING MATERIALS

AISI 310 (1.4541) for burner parts with the flame and shielding. AISI 304 (1.4301) for other parts. Blower housing and burner sleeves are optional. Available in 100% stainless steel or in painted carbon steel.

## MARKINGS

- 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.
  - Each damper has servomotor (110 V, three-point guidance) and position sensor (potentiometer with resistance 1k or 5k or required).
- MD-1000-G(propane) or MD-1000-G(butane) or MD-1000-G(CH<sub>4</sub>-50%+H<sub>2</sub>-20%+CO<sub>2</sub>-30%) or MD-1000-G(H<sub>2</sub>-50%+CnHm-50%): denotes main gaseous fuel.
- MD-1000-2G(NG, propane) or MD-1000-2G(NG, CH<sub>4</sub>-50%+CO<sub>2</sub>-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%+O<sub>2</sub>-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 x 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		

## BURNER SELECTION

Burner selection instructions:

- capacity (see *Specifications* above)
- main and secondary fuel (based on project requirements)
- fuel pressure (select according to project requirements, see above)
- combustion chamber pressure measuring (based on equipment)
- oxidizer parameters and air feeding type (according to technological scheme)
- installation variant (we offer few variants, see below)
- additional NOx suppression system
- additional requirements
- FILL IN THE SELECTION FORM (Appendix #1).

## FLAME LENGTH AND COMBUSTION CHAMBER DIMENSIONS

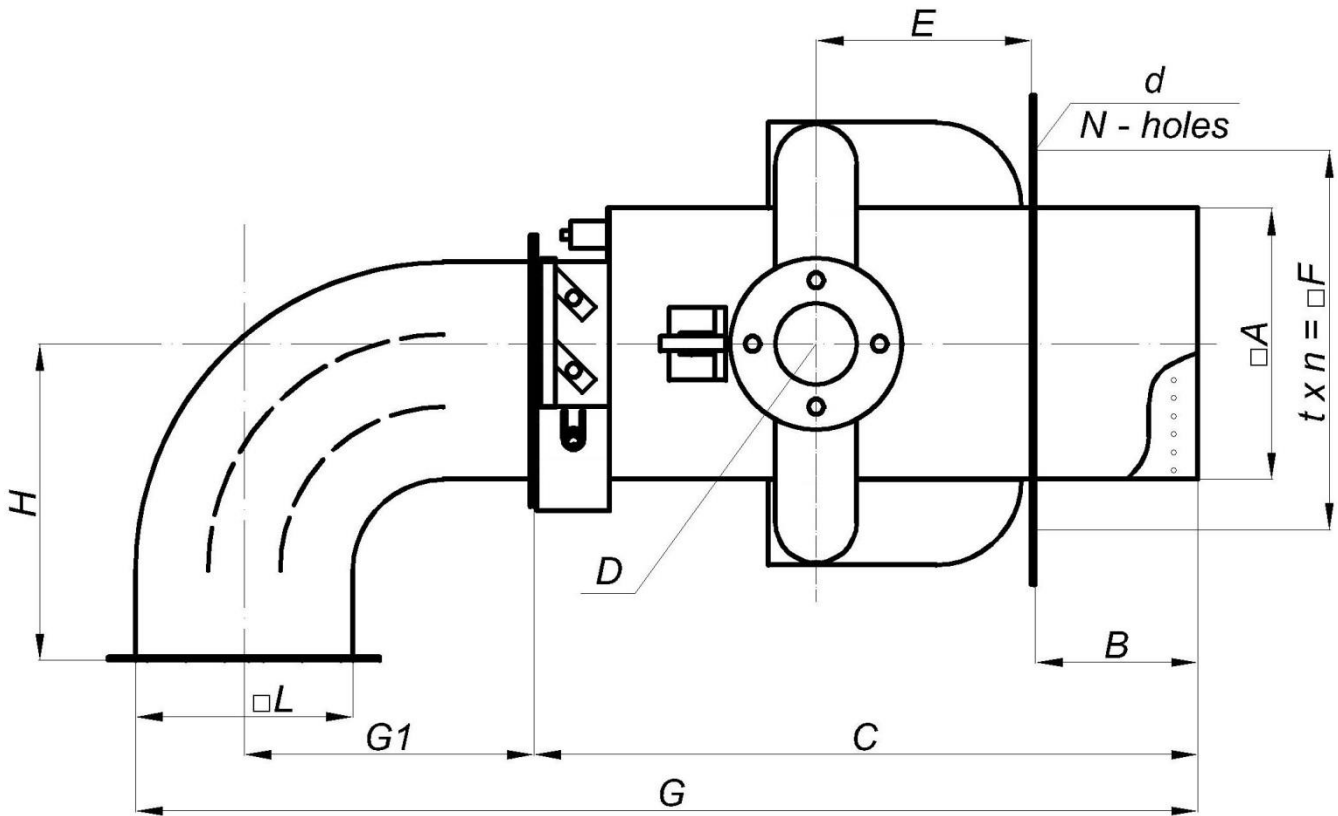
MD burners can be assembled with various flame lengths: Short (S), Normal (N) or Long (L).

- Normal (N) flame length is recommended for most equipment types.
- Short (S) flame length maybe preferred for heat generators with compact combustors and similar equipment.
- Long (L) flame length may be preferred for kilns and similar equipment.

Flame length is given for natural gas at excess air factor 1,1.

Burner	Max. flame length, m			Min. eq. diameter of comb. chamber, m
	Short	Normal	Long	
MD-25-G	0,2	0,4	-	0,4
MD-40-G	0,3	0,6	-	
MD-75-G	0,4	0,8	-	0,6
MD-150-G	0,5	1,0	-	
MD-200-G	0,6	1,5	-	0,9
MD-250-G	0,7	1,8	-	
MD-400-G	1	2,2	6,0	1,3
MD-700-G	1,0	2,7	10,0	
MD-1000-G	1,2	3,0	12,0	1,8
MD-1500-G	1,5	3,4	12,0	
MD-2000-G	-	4,0	15,0	2,2
MD-2500-G	-	4,5	15,0	
MD-5000-G	-	5,0	18,0	3,5
MD-7500-G	-	5,5	18,0	
MD-10000-G	-	6,0	18,0	5,0

**DIMENSIONS**



Pic. 2 – 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

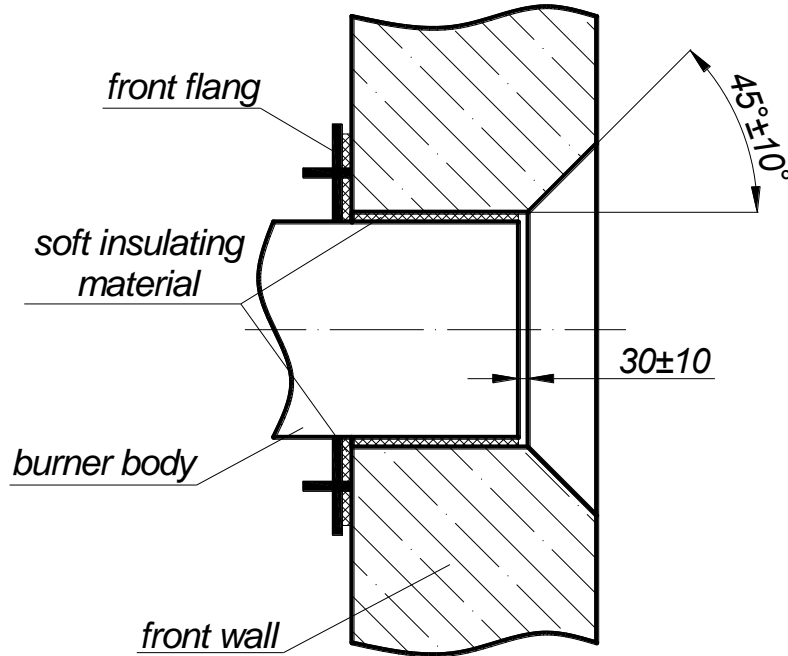


## INSTALLATION

PeriFlame strongly recommends organizing an embrasure of the burner in accordance with the scheme below. Otherwise must fulfill the following demands:

- must expel contact of combustion products to an exterior parts of the burner's body;
- must consider that high furnaces gases near a flame will influence burning characteristics.

### Burner embrasure in front wall of combustion chamber:



Pic. 3 – Burner embrasure (recommendations).

### Pipe connection

The MD burners can be supplied with NPT or BSP pipe fittings (gas inlet) for sizes from MD-25-G to MD-150-G. For sizes MD-200-G and above gas inlet has an ANSI or DIN flange.

### Burner and air inlet orientation

Normal position of burner means that aerodynamic sleeve directs air flow from below upwards to the burner. Reverse position means the contrary.

The burner can be positioned horizontally.

### Gas inlet orientation

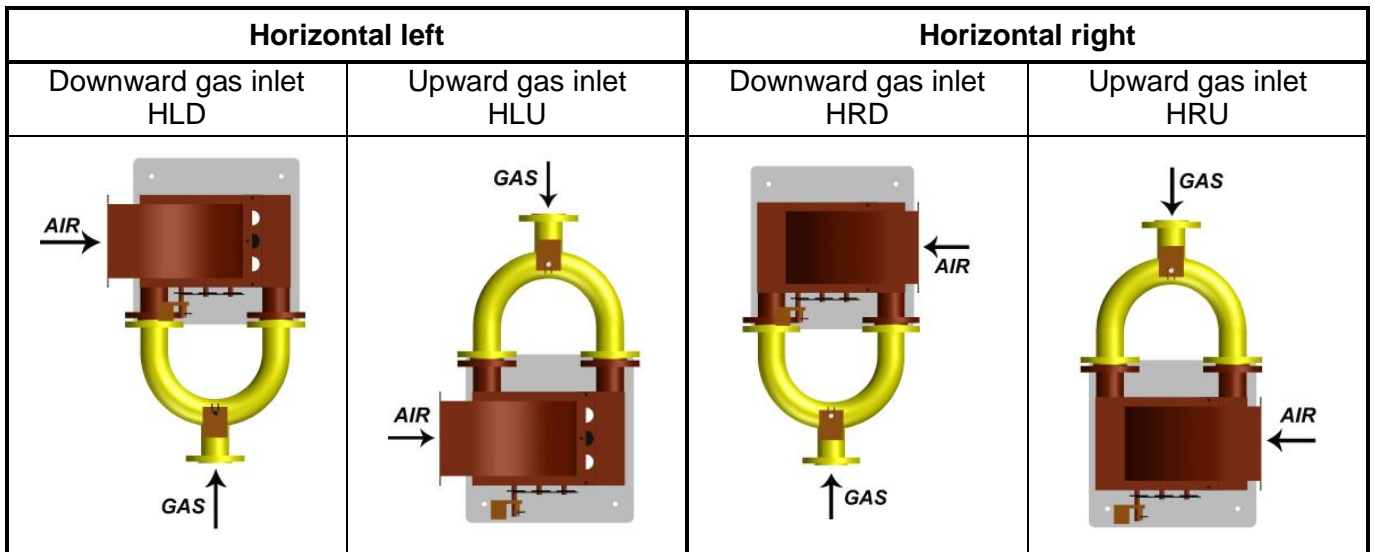
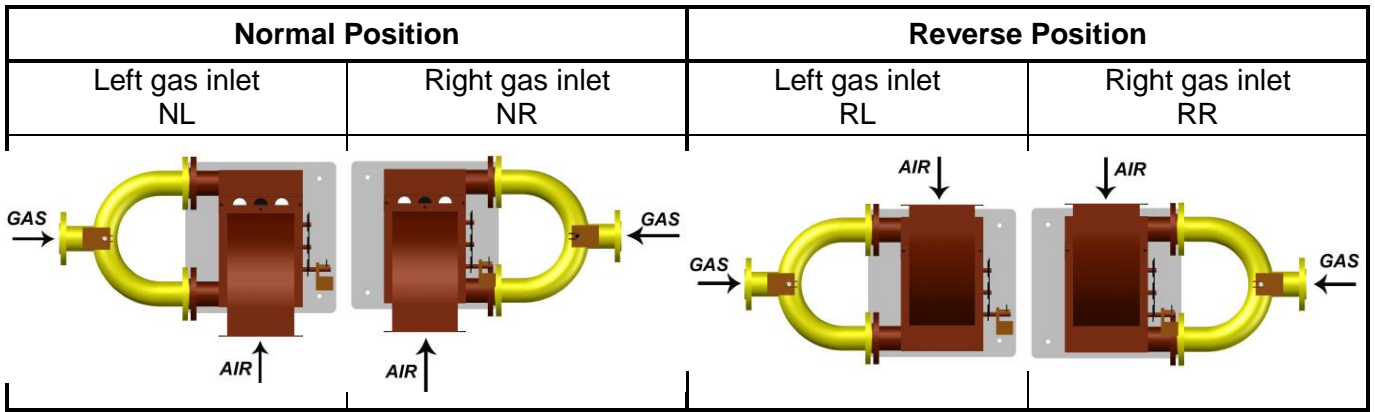
For one gas inlet gaseous fuel burner, inlet may be on the left or on the right (if looking at a front wall of combustor). For burners with two gas inlets they are located on both sides (left and right) of burner.

The Customer may specify inlet location: left gas inlet or right gas inlet.

### Air inlet System

Every burner has multi-blade damper for creating optimal aerodynamic structure of oxidizer. In addition, the damper allows for best flame stabilization and for supplying of required flame shape. Air inlet system can consist of aerodynamic sleeve with rotation displacement at 90° or from a blower.

## INSTALLATION OPTIONS



## OPTIONAL EQUIPMENT

### Combustion chamber pressure control

When commissioning the burner pressure differentials, measurements between input lines and the combustion chamber are required. Air blower or other air feeding system must be correlated and tuned with this pressure. It is very important to know exact pressure at the *peak* capacity when the system is being designed.

### Fuel pressure control and gas train safety system

The burner has combustion gas control valve. Fuel inlet pressure (before the control valve) can be defined by the Customer or chosen from the following options: 20; 50; 100 and 200 mbar.

Fuel train safety system should be designed to meet the requirements of the local codes and insurance carriers.

### Ignition system

Electric igniter consists of pilot gas cock with an adjustable orifice and full-wave spark transformer.

Advised pilot capacity should be about 3-5% of nominal. Pilot gas piping diameter is ½ or 1 in.


## Flame monitoring system

The burner has two different brackets for flame sensor installation. Flame sensor (UV scanner) must be matched with the flame monitoring system.

MD burners can be supplied with UV sensor for flame detection with relay output.

## PRODUCT LABEL

All PeriFlame burners come with a unique Serial Number for identification and tracking purposes.

	<a href="http://www.periflame.com">www.periflame.com</a>				
Burner type MD-	<input type="text"/>	-	<input type="text"/>	- G -	<input type="text"/>
Capacity	<input type="text"/>	MW	Input gas	<input type="text"/>	kPa
S/N	<input type="text"/>	MM/DD/YY	<input type="text"/>		

# APPENDIX



## APPENDIX #1 – ORDER BURNER FORM

#	Feature	Value							
1	Capacity, MW								
2	Main and secondary fuel	M:				S:			
3	Fuel pressure, mbar								
4	Combust. chamber pressure (diapason)	- mbar				+ mbar			
5	Air feeding type	blower				sleeve			
6	Oxidizer parameters (if with a sleeve)	P= mbar		T= ° F					
7	Installation variant	NR	NL	RR	RL	HRD	HRU	HLD	HLU
8	Additional NOx suppression system	Yes				No			
9	Flame length	Short		normal		long			
10	Additional requirements								

Send request to get detail information.

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