

HEATFLAM

Ultra low NO_x burners FN

TECHNICAL INFORMATION

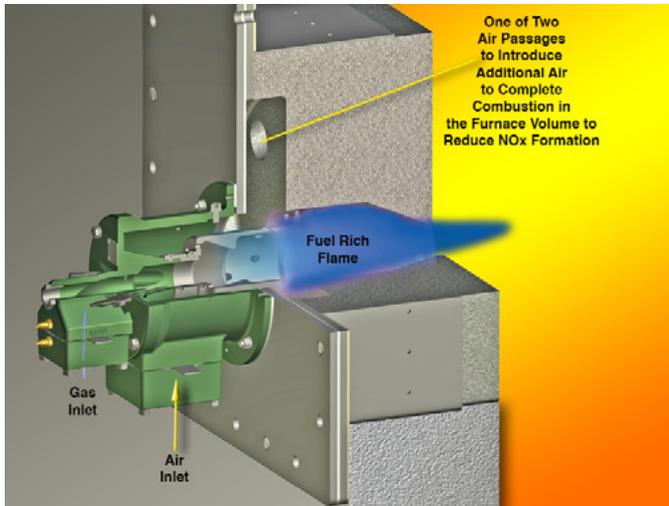
- NO_x emissions less than 30 ppm at 3% O₂ in most high temperature furnace applications
- Five sizes with capacity range: 0.25–2 MBtu/h (66–530 kW)
- Turndown: 10:1
- Max. process temperature: 2800°F (1540°C)
- Max combustion air temperature with standard design: 300°F (150°C)
Max combustion air temperature with insulated body design: 1100°F (600°C)
- Air and gas inlets are independently adjustable in 90° increments to suit a variety of piping alternatives



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1 Application



For continuous high temperature applications (e.g. annealing/pickling lines) as well as noncontinuous applications such as forge and heat treatment furnaces. FN is a direct fired furnace burner with exceptionally low emissions for continuous high-temperature processes, e. g. in steel

industry. FN is capable of producing NO_x emissions of less than 30 ppm at 3% O_2 in most high-temperature applications. To achieve high efficiency, the burner is controlled on-ratio throughout the operating range. Available in standard configuration up to 300°F preheated combustion air, or a special, insulated body version for higher temperature preheated combustion air. The FN offers the convenience of multi-fuel capability with no nozzle change. It can be fired on natural gas, propane and butane. With the FN, you can light anywhere in the ignition range with no pilot required. Typical applications are galvanizing furnaces, slot type forge furnaces and heat treatment furnaces. The FN will only achieve low NO_x in chambers operating below 5% O_2 . NO_x performance is improved by reducing excess air through the burner and O_2 in the chamber. The burner should not be used in applications that require high excess air or process air.

3 Selection table

Description	Code	Availability					Remark
		0025	0050	0100	0150	0200	
FN ultra low NO _x burner	FN	•	•	•	•	•	
Rated capacity							
250 kBtu/h (70 kW)	0025	•					
500 kBtu/h (150 kW)	0050		•				
1 MMBtu/h (290 kW)	0100			•			
1.5 MMBtu/h (440 kW)	0150				•		
2 MMBtu/h (590 kW)	0200					•	
Housing material							
Non-insulated cast body	C	•	•	•	•	•	
Preheat temperature							
No preheat ambient to 300°F (150°C)	A	•	•	•	•	•	
FN temperature							
1600–2800°F (870–1540°C)	1	•	•	•	•	•	
Nozzle material							
Stainless steel	A	•	•	•	•	•	
Combustor type							
Block and holder	B	•	•	•	•	•	
Gas type							
Butane	B	•	•	•	•	•	
Natural gas	N	•	•	•	•	•	
Propane	P	•	•	•	•	•	

3 Selection table

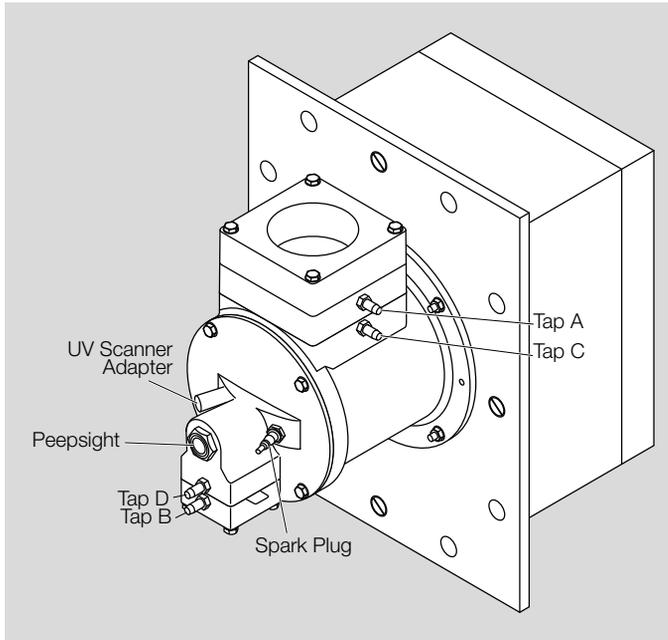
Description	Code	Availability					Remark
		0025	0050	0100	0150	0200	
Gas orifice							
7.0 mm	A6	•					Butane or propane only
9.1 mm	A9	•					Natural gas only
13.0 mm	B7			•			Butane or propane only
16.0 mm	C2				•		Butane only
18.0 mm	C4			•	•	•	FN0100: Natural gas only FN0150: Propane only FN0200: Propane or butane only
20.0 mm	C6				•		Natural gas only
24.0 mm	D1					•	Natural gas only
11.5 mm	F2		•				Natural gas only
8.5 mm	F3		•				Propane only
8.0 mm	F4		•				Butane only
Pipe connection							
Air/gas: BSP (Rc)	B	•	•	•	•	•	
Air/gas: NPT	N	•	•	•	•	•	
Air orifice							
29.0 mm	D2	•					
42.0 mm	D6		•				
57.0 mm	E2			•			
66.0 mm	E6				•		
70.0 mm	E7					•	
Flame control							
UV scanner adapter only	A	•	•	•	•	•	
UV scanner heat block seal	H	•	•	•	•	•	
Less scanner adapter	X	•	•	•	•	•	
Air orientation							
Combustion air inlet at 0° with block at 0°	0	•	•	•	•	•	
Combustion air inlet at 90° (CW) from block at 0°	1	•	•	•	•	•	
Combustion air inlet at 180° (CW) from block at 0°	2	•	•	•	•	•	
Combustion air inlet at 270° (CW) from block at 0°	3	•	•	•	•	•	

3 Selection table

Description	Code	Availability					Remark
		0025	0050	0100	0150	0200	
Gas orientation							
Gas inlet at 0° with block at 0°	0	•	•	•	•	•	
Gas inlet at 90° (CW) from block at 0°	1	•	•	•	•	•	
Gas inlet at 180° (CW) from block at 0°	2	•	•	•	•	•	
Gas inlet at 270° (CW) from block at 0°	3	•	•	•	•	•	



4 Technical data



FN0025-0200

Type of gas: natural gas, propane or butane; for any other mixed gas, contact Heatflam Heatflam.

Max. combustion air temperature with standard design: 300°F (150°C).

A special, insulated body design is available for combustion air temperatures up to 1100°F (600°C). Contact Heatflam Heatflam for more information.

Minimum operating furnace temperature: 1400°F (760°C).
For operation with low NO_x and lowest CO emissions.

Maximum chamber temperature: 2400°F (1315°C).

Flame detection: UV scanner.

All information based on laboratory testing in neutral (0.0 "w.c.) pressure chamber. Different chamber sizes and conditions may affect the data.

Plumbing of air and gas will affect accuracy of orifice readings. All information is based on generally acceptable air and gas piping practices.

4.1 Input

Type	Maximum, Btu/h (kW) ¹⁾	Minimum, Btu/h (kW) ¹⁾
FN0025	250,000 (66)	25,000 (7)
FN0050	500,000 (132)	50,000 (13)
FN0100	1,000,000 (263)	100,000 (26)
FN0150	1,500,000 (396)	150,000 (40)
FN0200	2,000,000 (527)	200,000 (53)

¹⁾ All imperial inputs based upon gross calorific values (HHV). All metric inputs based upon net calorific values (LHV). For lower inputs, contact Heatflam Heatflam.

4.2 Inlet pressure

Type	Main gas, "w.c. (mbar), measured at Tap B						Air, "w.c. (mbar), measured at Tap A ¹⁾²⁾		
	Combustion air temp.: ambient			Combustion air temp.: 300°F (150°C)			ambient	300°F (150°C)	Air orifice
	Natural gas	Propane	Butane	Natural gas	Propane	Butane			
FN0025	3.8 (9.5)	7.0 (17.4)	6.2 (15.4)	5.8 (14.4)	7.4 (18.4)	6.5 (16.2)	10.2 (25.4)	14.6 (36.4)	29 mm
FN0050	5.0 (12.5)	7.5 (18.7)	5.9 (14.7)	6.0 (14.9)	8.8 (21.9)	6.7 (16.7)	13.2 (32.8)	18.8 (46.8)	42 mm
FN0100	4.7 (11.7)	6.3 (15.7)	6.0 (14.9)	5.1 (12.7)	6.7 (16.7)	6.3 (15.7)	11 (27.4)	15.7 (39.0)	57 mm
FN0150	7.1 (17.7)	9.2 (22.9)	8.4 (20.9)	6.4 (15.9)	8.0 (19.9)	7.3 (18.2)	22.9 (57)	33.5 (83.3)	66 mm
FN0200	3.8 (9.4)	6.4 (15.9)	5.9 (14.6)	5.8 (14.4)	6.6 (16.4)	6.2 (15.4)	13.7 (34.1)	19.6 (48.8)	70 mm

1) 15% excess air at maximum input

2) Includes pressure drop across listed air orifice.

4.3 Max. high fire visible flame length

Measured from the outlet end of the combustor

Type	Natural gas	Propane	Butane
FN0025	22 (559)	14 (355)	14 (355)
FN0050	28 (711)	36 (914)	39 (991)
FN0100	38 (965)	37 (940)	42 (1065)
FN0150	38 (965)	42 (1065)	43 (1092)
FN0200	36 (914)	32 (813)	32 (813)

4.4 Performance graphs

Emissions from the burner are influenced by:

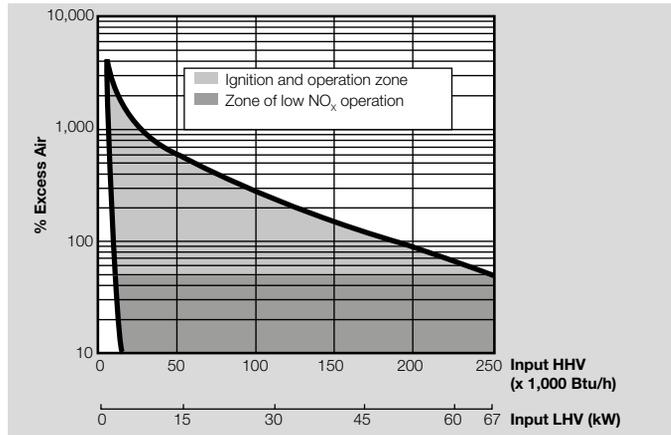
- Fuel type
- Combustion air temperature
- Firing rate
- Chamber conditions
- Percent of excess air

High fire NO_x emissions with natural gas are typically below 30 ppm at 3% O_2 in furnace applications below 2000°F (1093°C). Contact Heatflam Heatflam for an estimate of emissions for specific conditions.

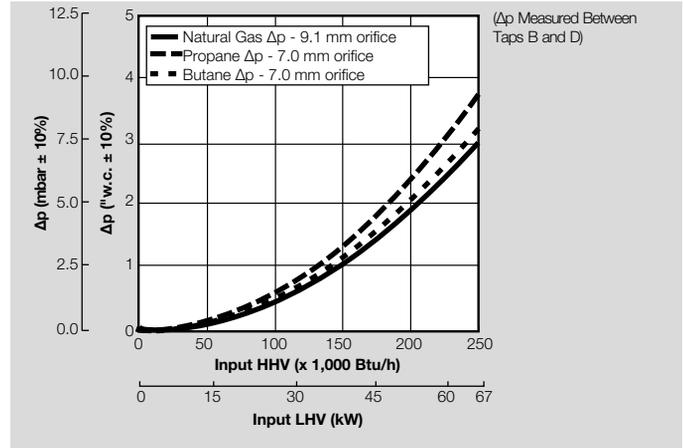
4.4.1 FN0025

Ignition and operation zone for ambient temperature

Input to be limited to 185 kBtu/h (49 kW) with a minimum of 30% EXA while the chamber is below 1400°F (760°C).

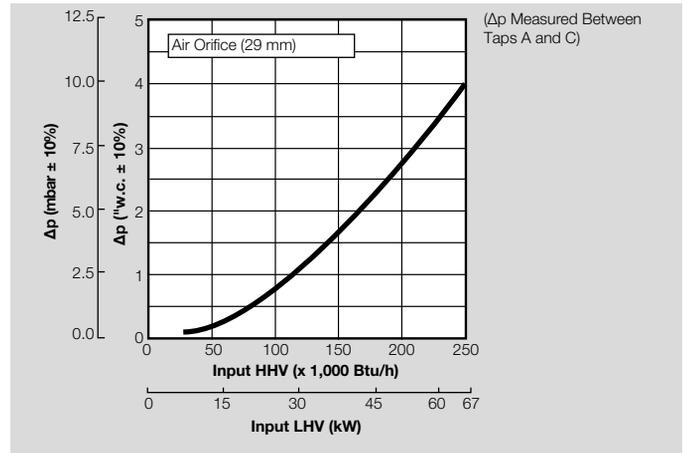


Fuel orifice Δp vs. Input



Air orifice Δp vs. Input

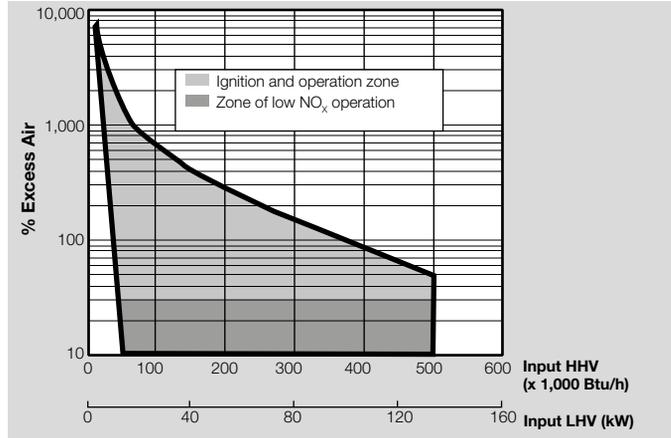
Ambient Combustion Air Temperature



4.4.2 FN0050

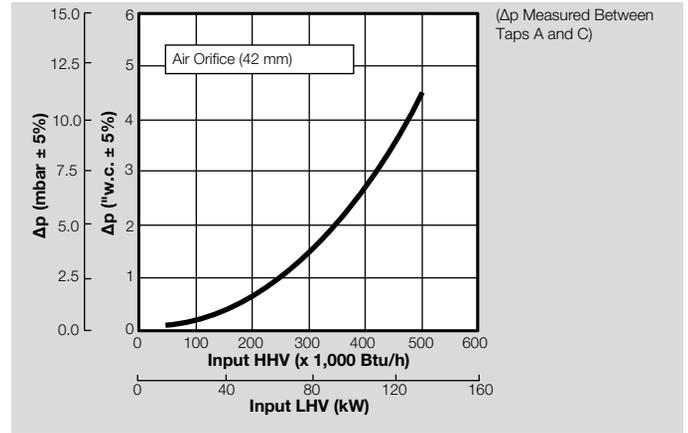
Ignition and operation zone for ambient temperature

Input to be limited to 375 kBtu/h (99 kW) with a minimum of 30% EXA while the chamber is below 1400°F (760°C).

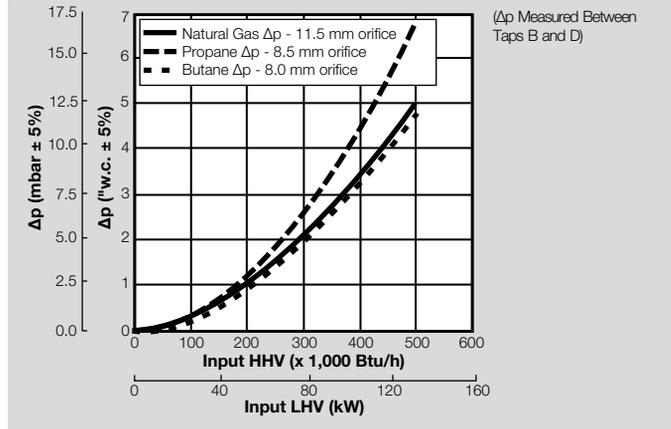


Air orifice Δp vs. Input

Ambient Combustion Air Temperature



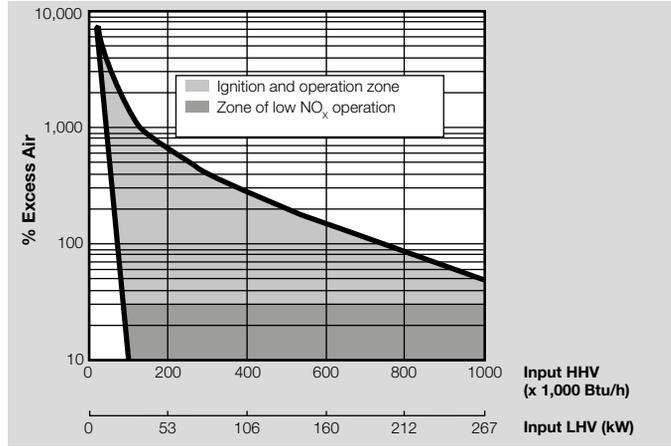
Fuel orifice Δp vs. Input



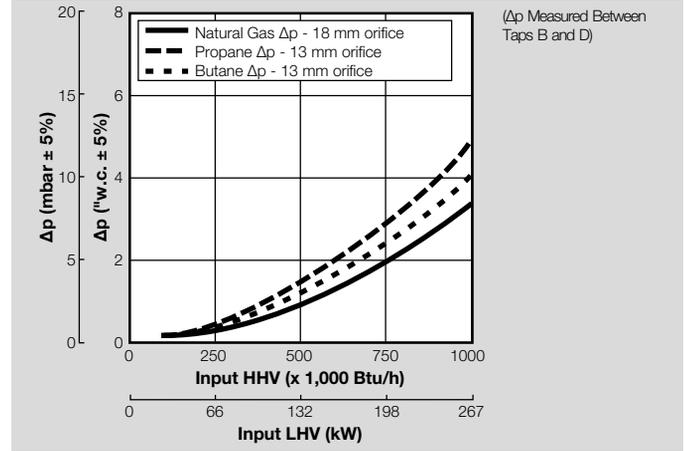
4.4.3 FN0100

Ignition and operation zone for ambient temperature

Input to be limited to 750 kBtu/h (198 kW) with a minimum of 30% EXA while the chamber is below 1400°F (760°C).

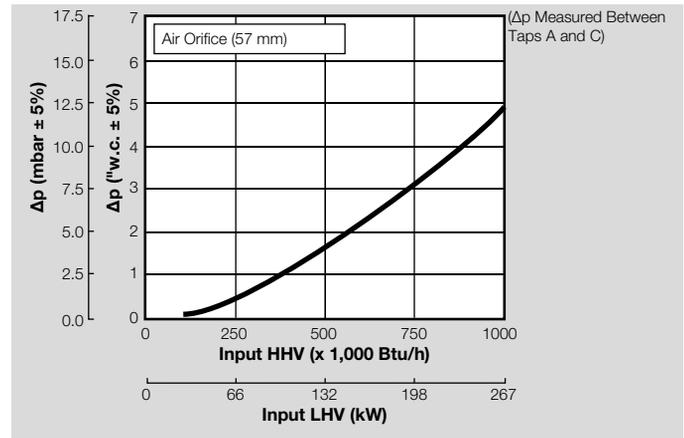


Fuel orifice Δp vs. Input



Air orifice Δp vs. Input

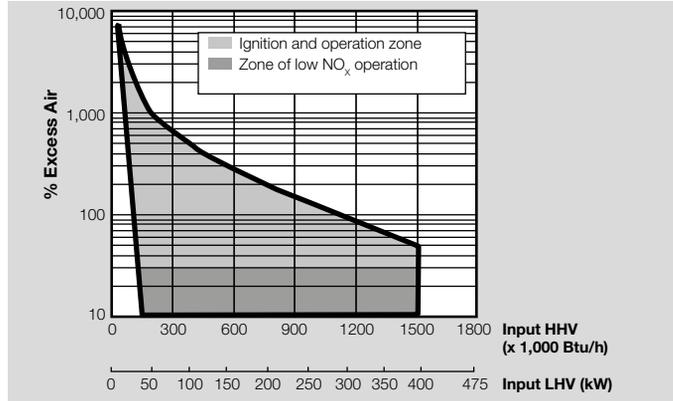
Ambient Combustion Air Temperature



4.4.4 FN0150

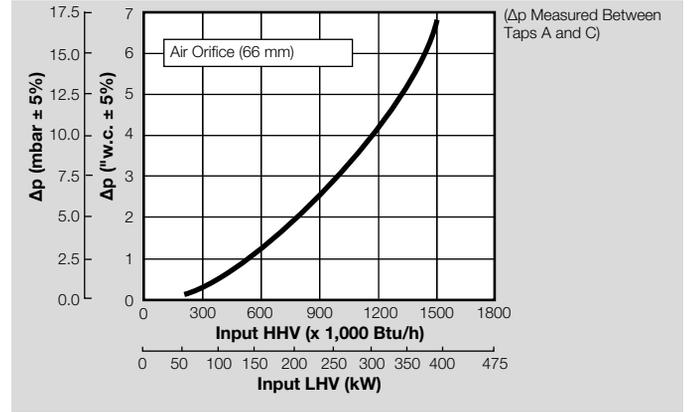
Ignition and operation zone for ambient temperature

Input to be limited to 1.13 MMBtu/h (298 kW) with a minimum of 30% EXA while the chamber is below 1400°F (760°C).

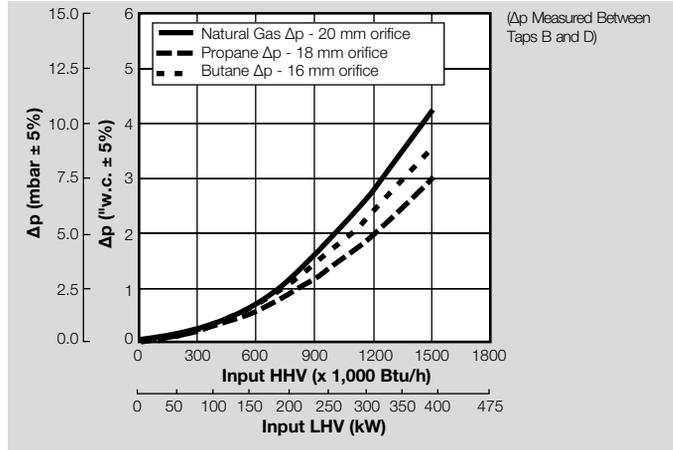


Air orifice Δp vs. Input

Ambient Combustion Air Temperature



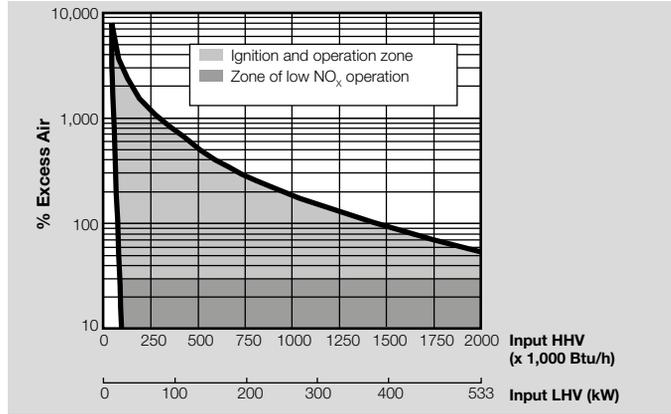
Fuel orifice Δp vs. Input



4.4.5 FN0200

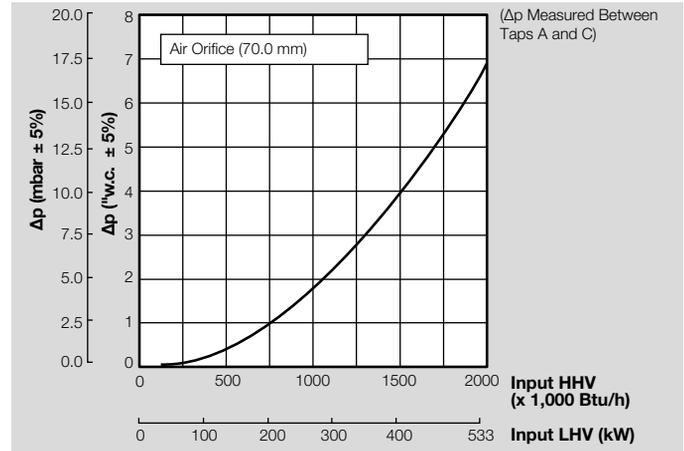
Ignition and operation zone for ambient temperature

Input to be limited to 750 kBtu/h (198 kW) with a minimum of 30% EXA while the chamber is below 1400°F (760°C).

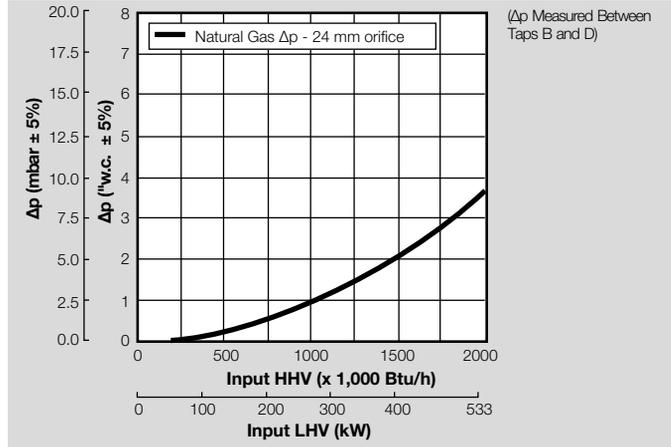


Air orifice Δp vs. Input

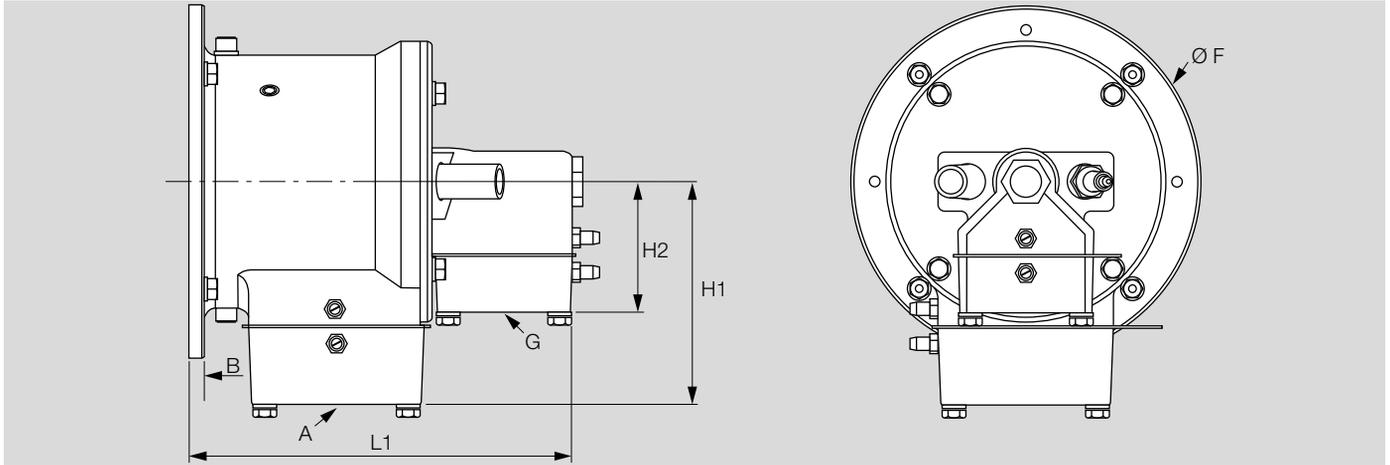
Ambient Combustion Air Temperature



Fuel orifice Δp vs. Input



4.5 Dimensions



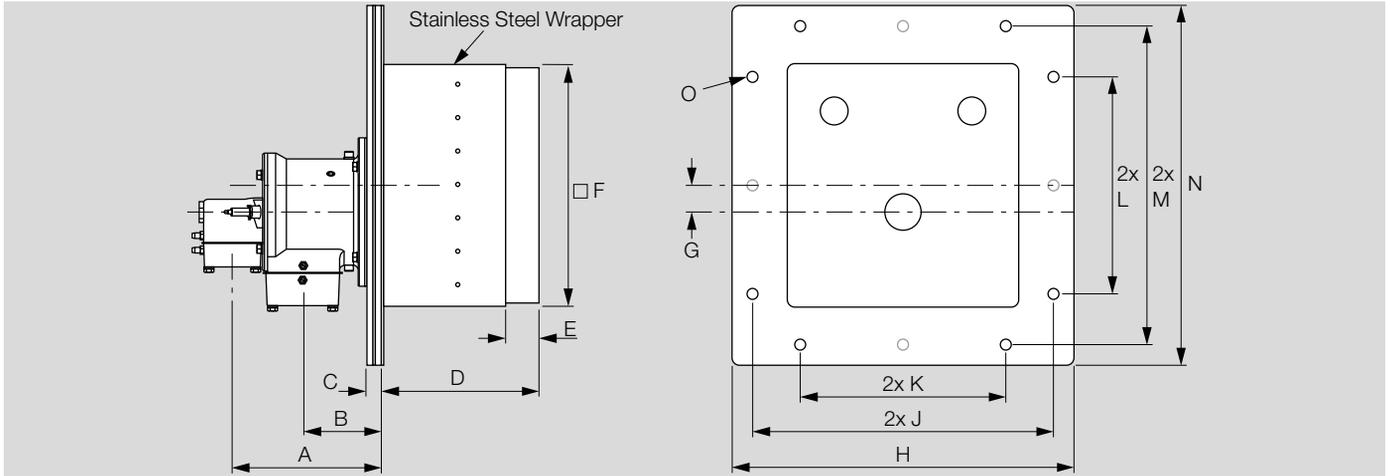
inch

Type	Gas inlet G NPT or BSP	Air inlet A NPT or BSP	L1	inch			F	Weight lbs
				H1	H2			
FN0025	1"	2.5"	8.5	5.0	3.1	7.5	37	
FN0050	1"	2.5"	8.5	5.0	3.1	7.5	37	
FN0100	1 1/2"	3"	9.4	5.5	3.2	8.7	42	
FN0150	1 1/2"	3"	9.4	5.5	3.2	8.7	42	
FN0200	1 1/2"	3"	9.4	5.5	3.2	8.7	42	

mm

Type	Gas inlet G NPT or BSP	Air inlet A NPT or BSP	L1	mm			F	Weight kg
				H1	H2			
FN0025	1"	2.5"	215	127.5	78.5	190	16.7	
FN0050	1"	2.5"	215	127.5	78.5	190	16.7	
FN0100	1 1/2"	3"	240.5	139	81.5	220	19	
FN0150	1 1/2"	3"	240.5	139	81.5	220	19	
FN0200	1 1/2"	3"	240.5	139	81.5	220	19	

4.5.1 Block and holder



inch

Type	A	B	C	D	E	F	G	H	J	K	L	M	N	O	Weight
	inch														lbs
FN0025	5.9	3.09	0.9	8.1	2.0	10.5	0.7	16.4	14.1	8.5	8.5	14.1	16.4	8x Ø0.63	135
FN0050	8.2	4.5	1.0	9.7	2.0	12.2	1.0	18.1	15.8	10.3	10.3	15.8	18.1	8x Ø0.63	188
FN0100	8.7	4.6	0.8	9.3	2.0	14.2	1.6	20.1	17.7	12.2	12.2	17.7	20.1	8x Ø0.63	230
FN0150	8.7	4.6	0.8	9.3	2.0	16.3	2.5	21.6	19.3	13.7	14.4	19.9	22.2	12x Ø0.63	290
FN0200	8.7	4.6	0.8	11	2.0	19.3	4.1	26.2	23.8	18.3	17.3	22.8	25.2	12x Ø0.63	565

mm

Type	A	B	C	D	E	F	G	H	J	K	L	M	N	O	Weight
	mm														kg
FN0025	151	78.5	22	205	50	267	19	417	357	217	217	357	417	8x Ø16	61.2
FN0050	209	114	25	247	50	311	25	461	401	261	261	401	461	8x Ø16	85.2
FN0100	221	116	20.5	265	50	360	40	510	450	310	310	450	510	8x Ø16	104
FN0150	221	116	20.5	235	50	415	64	550	490	350	365	505	565	12x Ø16	131
FN0200	221	116	20.5	280	50	490	105	665	605	465	440	580	650	12x Ø16	256