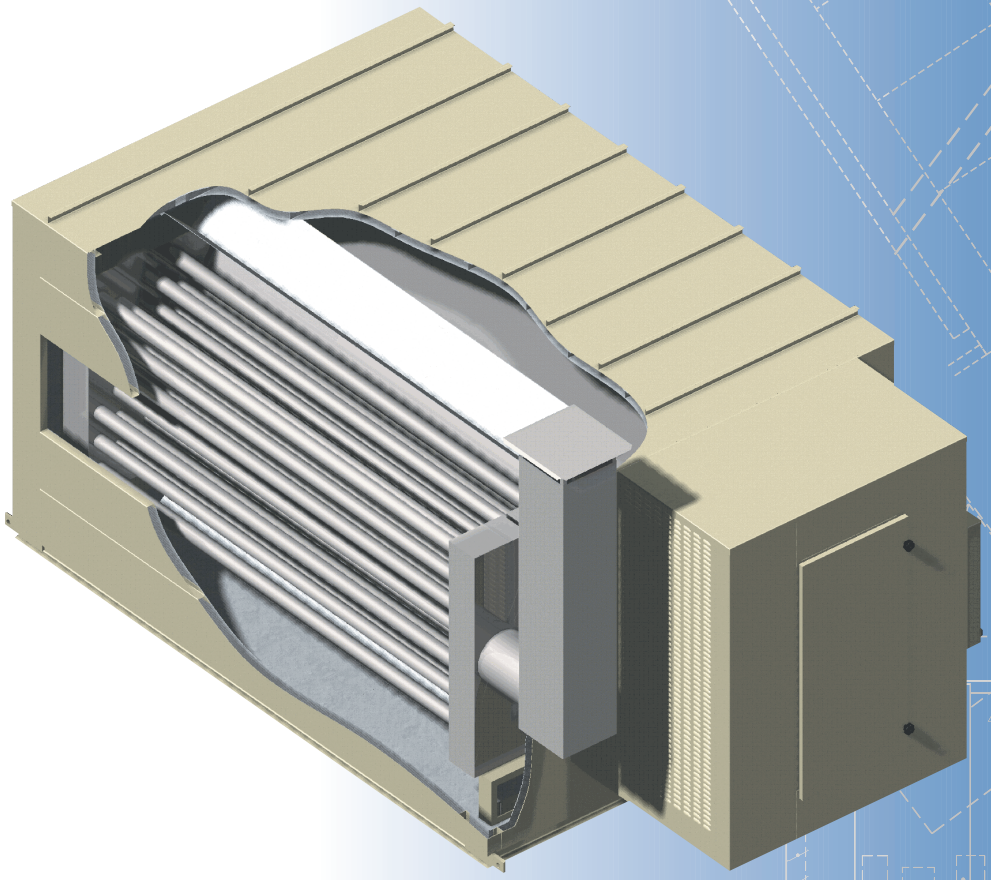
Indirect gas-fired duct heaters

HDG(I)SERIES
INDOOR/OUTDOOR
INSTALLATION



SPECIFICATIONS MANUAL

MANUFACTURED BY
BOUSQUET
BROTHERS LIMITED

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DESCRIPTION

The HDG(I) indirect gas-fired duct heaters manufactured by **BOUSQUET** are sturdy and of industrial quality; they are certified for both indoor and outdoor installation and designed to serve as a heating element in ventilation systems. They operate with a minimum thermal efficiency of 80% and use natural gas as fuel. The capacities available range from 200 to 5000 MBH (from 59 to 1464 kW) and from 1800 to 90,000 SCFM (from 850 to 42,475 l/s) of air at temperature differences of 50°F to 100°F (28°C to 56°C), which enables flexibility of use for multiple applications.

The multiple pass heat exchanger comprises a primary drum and secondary tubes made of 304L series stainless steel requiring no thermal treatment to prevent the cracking of welded joints. In addition, 300 series stainless steel is known for its great resistance to corrosion and high temperatures, which increases the service life of the unit. The exchanger is equipped with access panels for the inspection and cleaning of the tubes. It is installed as to enable the thermal expansion that occurs during the heating cycles of the unit. The forced draft and high gas modulation burner with a 20:1(minimum) turndown ratio offers optimal heat transfer on all the surfaces of the exchanger while maintaining optimal combustion efficiency through the entire range of capacity.

The support frame of the unit is sturdy and consists of welded U-shaped steel channels. The sides and top are of 2-inch thick double wall construction, with maximum 20-inch wide panels made of 18 gauge satin finish steel with double folded edges for structural rigidity; the liner is made of 22 gauge G90 galvanized steel. The unit is insulated with 2-inch thick high temperature insulation with a density of 1.5lb/ft^3. For outdoor installation, a weatherproof cabinet is required to enclose the burner, gas piping, controls and electrical components. The outer surfaces of the unit are treated with a phosphate cleaner-conditioner and painted with one coat of anticorrosive epoxy primer exceeding the Canadian (type 1-GP-40) and American (type TT-P-636 D) standards for salt mist and humidity. The finish is ensured with first quality high performance alkyd resin enamel. All HDG(I) duct heaters are cETLus approved and are certified according to standards CAN/CGA3.2 and UL 795.

APPLICATIONS

- Fresh air compensation
    - Apartment building corridors
    - Schools
    - Hospitals
    - Industries

- Industrial and commercial warm air heating systems
- Ventilation / make-up air systems
- Industrial processes

SELECTION CRITERIA

1. Capacity

- Airflow (CFM)
- The blower must have the capacity to provide the required CFM to compensate for the total pressure drop of the system (heat exchanger and system air friction)
- Air temperature rise
- Final air temperature

2. Type of installation

- Indoor
- Outdoor

3. Control location

- On the left-hand or right-hand side of the heater (when facing the airflow)

4. Airflow configuration

- Horizontal air flow (standard)
- Vertical air flow (downward or upward)

5. Temperature control

- Electronic controller with integral temperature sensor
- Electronic controller for a 0-10 VDC or 4-20 mA external signal

6. Remote controls (optional)

- Basic control panel
- Deluxe control panel
- Room thermostat

7. Other options

- Low limit temperature sensor
- Lighting
- Power outlets
- Switches
- Main power disconnect
- Gas piping according to FM standard
- Gas piping according to IRI standard

INSTALLATION GUIDELINES

The installer of a duct heater such as the HDG(I) must follow certain rules in order to comply with the codes governing gas equipment. Here are some recommendations:

- The blower must be installed upstream of the duct heater so that it is submitted to positive air pressure.
- The final air temperature should be controlled by a duct thermostat located downstream of the duct heater.
- When gas pressure exceeds 1/2 psig (3.5kPa), a high pressure regulator with the same capacity as the burner must be supplied and installed by the contractor. This regulator must have the capability to regulate the pressure with a modulating turndown ratio of 40:1.
- Allow for sufficient clearance around the unit to enable its installation and maintenance.

For indoor installation,

- all bleed valves and regulator vents must be individually connected to the exterior according to code **CGA-B149** or other codes in effect;
- the chimney must satisfy the following requirements:
  - have double walls
  - be certified for positive pressure units (type **PS**)
  - be **ULC/UL** certified;
- ensure that there is enough air for the combustion in the room where the duct heater is installed (refer to code in effect);
- ensure that the combustion air is clean and free of dust or corrosive material that could reduce the service life of the unit.

For chimney and breeching dimensions, consult the manufacturer.

For any other information related to the installation of the HDG(I) duct heaters, refer to the installation and service manual pertaining to these units.

SELECTION TABLE

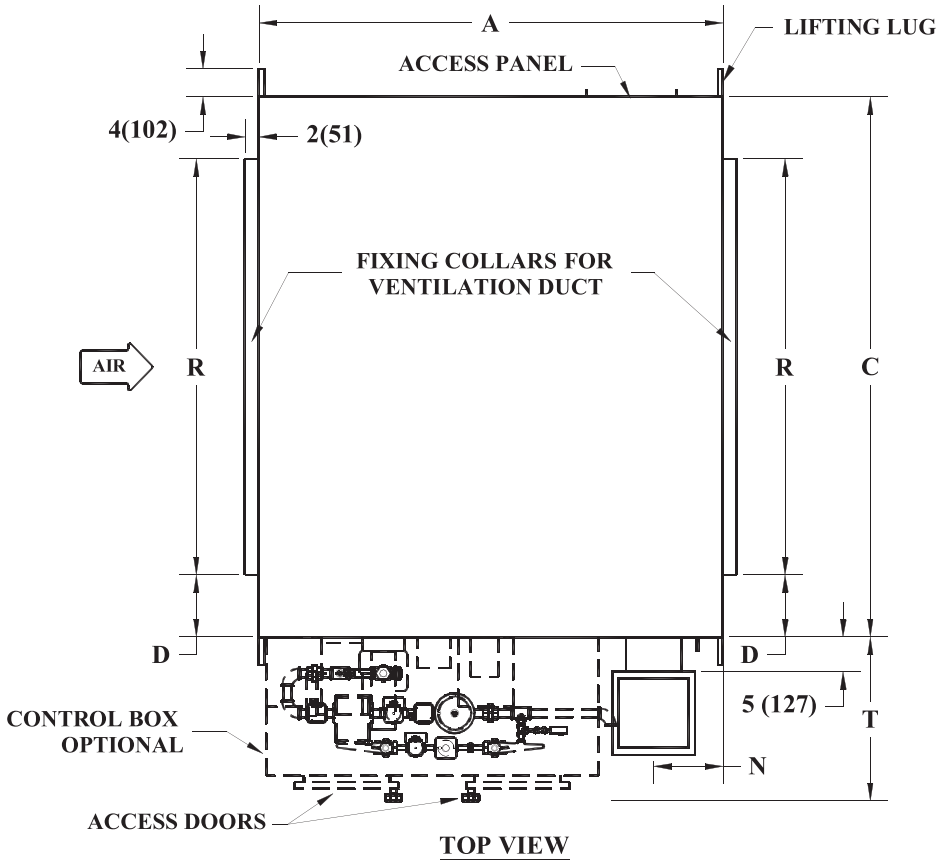
Using the selection table below, choose the HDG(I) duct heater according to the required airflow and net heating capacity.

Model	Burner capacity[1]		Net capacity		Amperage[2] (A)	Airflow[3]	
HDG(I)	MBTU/H	kW	MBTU/H	kW	(575/3/60)	SCFM[3]	l/s
20[4]	250	73	200	59	1.6	1860-3710	878-1751
30[4]	375	109	300	88	1.6	2780-5560	1312-2624
35	438	128	350	102	1.6	3250-6480	1534-3058
40	500	146	400	117	1.6	3710-7410	1751-3497
50	625	183	500	146	1.6	4630-9260	2185-4370
55	688	201	550	161	1.6	5100-10190	2407-4809
65	813	238	650	190	1.6	6020-12040	2841-5682
75	938	275	750	220	1.6	6950-13890	3280-6555
85	1063	311	850	249	1.6	7870-15740	3714-7428
100	1250	366	1000	293	1.6	9260-18520	4370-8740
125	1563	458	1250	366	1.6	11580-23150	5465-10926
150	1875	549	1500	439	2.25	13890-27780	6555-13111
175	2188	641	1750	512	2.25	16210-32410	7650-15296
200	2500	732	2000	586	2.25	18520-37040	8740-17481
250	3125	915	2500	732	2.25	23150-46300	10926-21851
300	3750	1098	3000	878	2.25	27780-55560	13111-26221
350	4375	1281	3500	1025	2.62	32410-64820	15296-30592
400	5000	1464	4000	1171	3.12	37040-74080	17481-34962
500	6250	1830	5000	1464	3.12	46300-92600	21851-43702

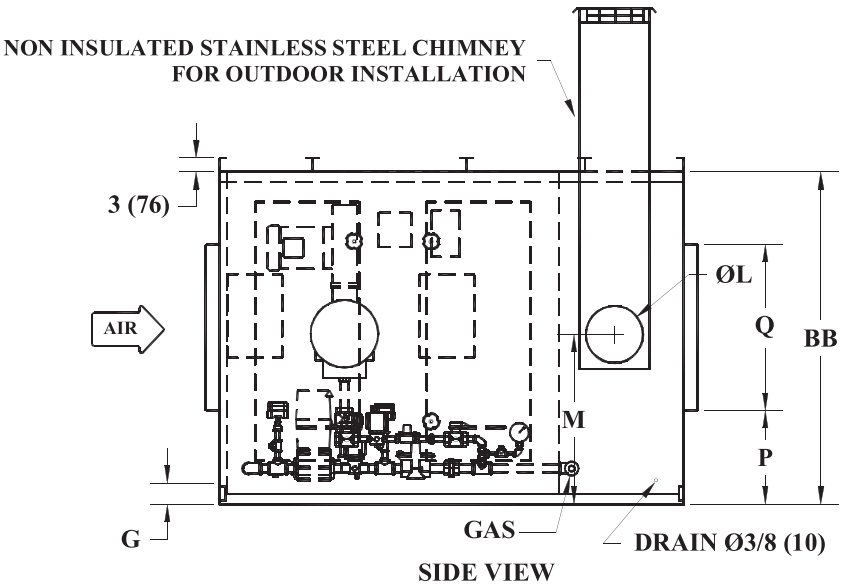
Notes :

1. According to the burner and gas piping nominal capacity
2. Amperage required for the burner controls and motor at 575/3/60
   For other voltage, consult the manufacturer.
3. For a temperature rise of 50˚F to 100˚F (28˚C to 56˚C)
   For smaller or larger amounts of CFM, consult the manufacturer.
4. The HDG(I) 20 and 30 duct heaters are not certified $_{C}$ETL in Canada.

DIMENSIONS



TOP VIEW



SIDE VIEW

( ) : Dimensions in mm

Notes: The controls shown are on the left-hand side of the unit (controls on the right-hand side not shown).

DIMENSIONS

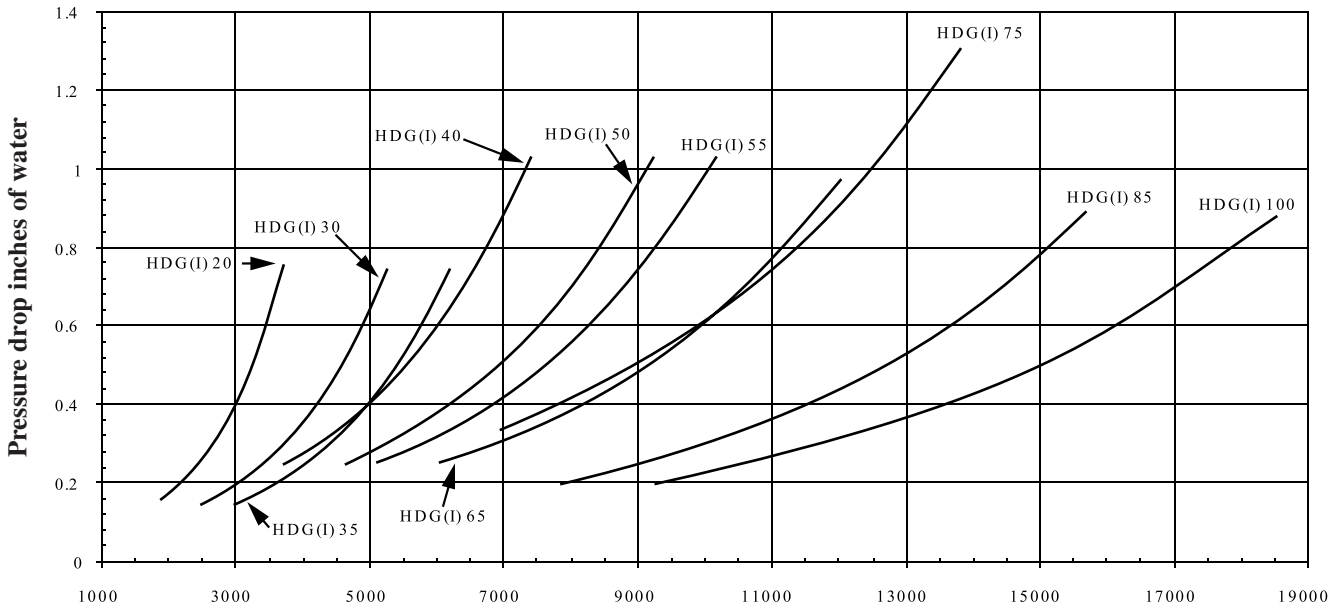
	HDG(I) 20-30-35		HDG(I) 40-50-55		HDG(I) 65-75		HDG(I) 85		HDG(I) 100	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
A	58	1473	58	1473	58	1473	67	1702	67	1702
BB	41	1041	41	1041	41	1041	48	1219	48	1219
C	40	1016	54	1016	74	1016	78	1981	78	1981
D	5	127	5	127	7	178	9	229	9	229
G	3	76	3	76	3	76	3	76	3	76
L	6	152	6	152	8	203	8	203	8	203
M	21	533	21	533	21	533	24-1/2	622	24-1/2	622
N	10-1/8	257	10-5/8	270	9-3/4	248	10	254	10	254
P	12	305	12	305	12	305	12 1/2	318	12-1/2	318
Q	18	457	18	457	18	457	24	610	24	610
R	30	762	44	1118	60	1524	60	1524	60	1524
T	34	864	34	864	34	864	32	813	32	813
Ø GAS[1]	1	25	1	25	1	25	1	25	1-1/2	38
Ø VENT[2,3]	1/2	13	1/2	13	1/2	13	1/2	13	1/2	13
Ø BLEED VALVE[3]	1	25	1	25	1	25	1	25	1	25
WEIGHT	1544 lbs	700 kg	1823 lbs	827 kg	2282 lbs	1035 kg	2875 lbs	1304 kg	2875 lbs	1304 kg

	HDG(I) 125-150-175		HDG(I) 200-250		HDG(I) 300-350		HDG(I) 400		HDG(I) 500	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
A	74	1880	80	2032	106	2692	106	2692	106	2692
BB	62	1575	74	1880	77	1956	83	2108	89	2261
C	98	2489	108	2743	150	3810	150	3810	150	3810
D	8-1/2	216	6	152	9	229	9	229	9	229
G	4	102	4	102	5	127	5	127	5	125
L	8	203	10	254	10	254	12	305	12	305
M	32	813	38	965	40	1016	43	1092	46	1168
N	9-5/8	244	10-1/2	267	12-1/8	308	11-1/8	283	11-1/8	283
P	20	508	26	660	28	711	31	787	34	864
Q	24	610	24	610	24	610	24	610	24	610
R	81	2057	96	2438	132	3353	132	3353	132	3353
T	32	813	36	914	36	914	39	991	39	991
Ø GAS[1]	1-1/2	38	1-1/2	38	2	50	3	75	3	75
Ø VENT[2,3]	1/2	13	1/2	13	1/2	13	3/4	19	3/4	19
Ø BLEED VALVE[3]	1	25	1	25	1	25	1-1/2	38	1-1/2	38
WEIGHT	4122 lbs	1870 kg	4827 lbs	2189 kg	7203 lbs	3267 kg	7295 lbs	3309 kg	7743 lbs	3512 kg

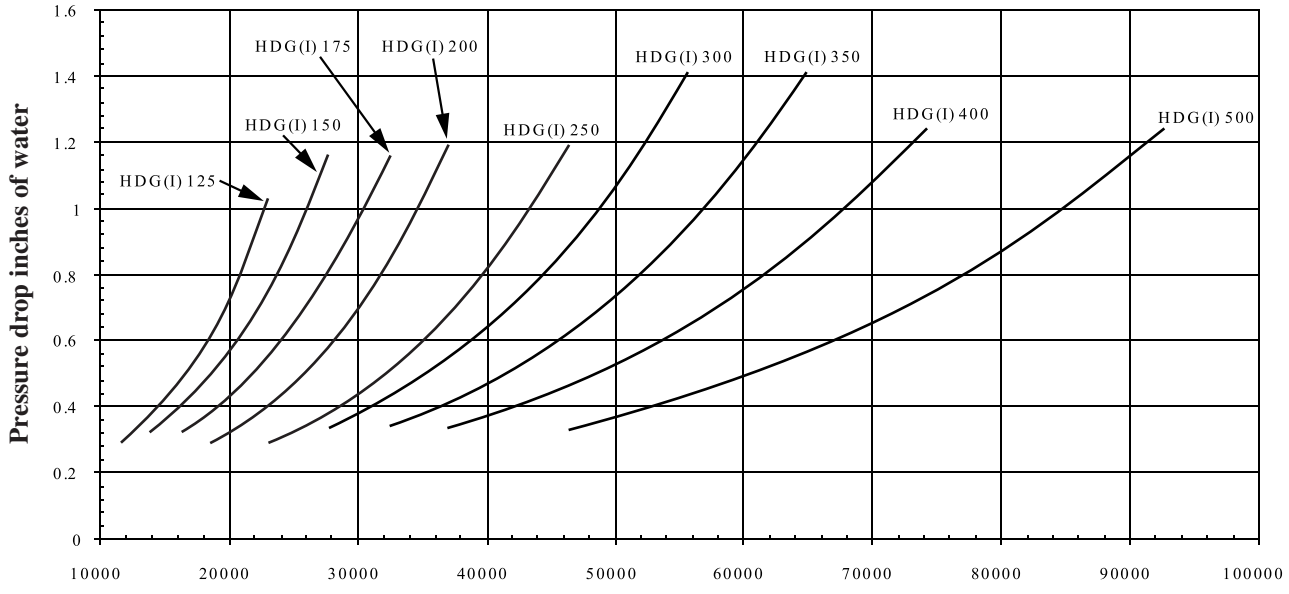
Notes :
1. With an inlet gas pressure of 14 inches of water (3.5kPa)
2. Outdoor installation only
3. The bleed valve (IRI option) and regulator vents must be piped separately to the outdoors.

PRESSURE DROP THROUGH HEAT EXCHANGER

HDG(I) 20-100

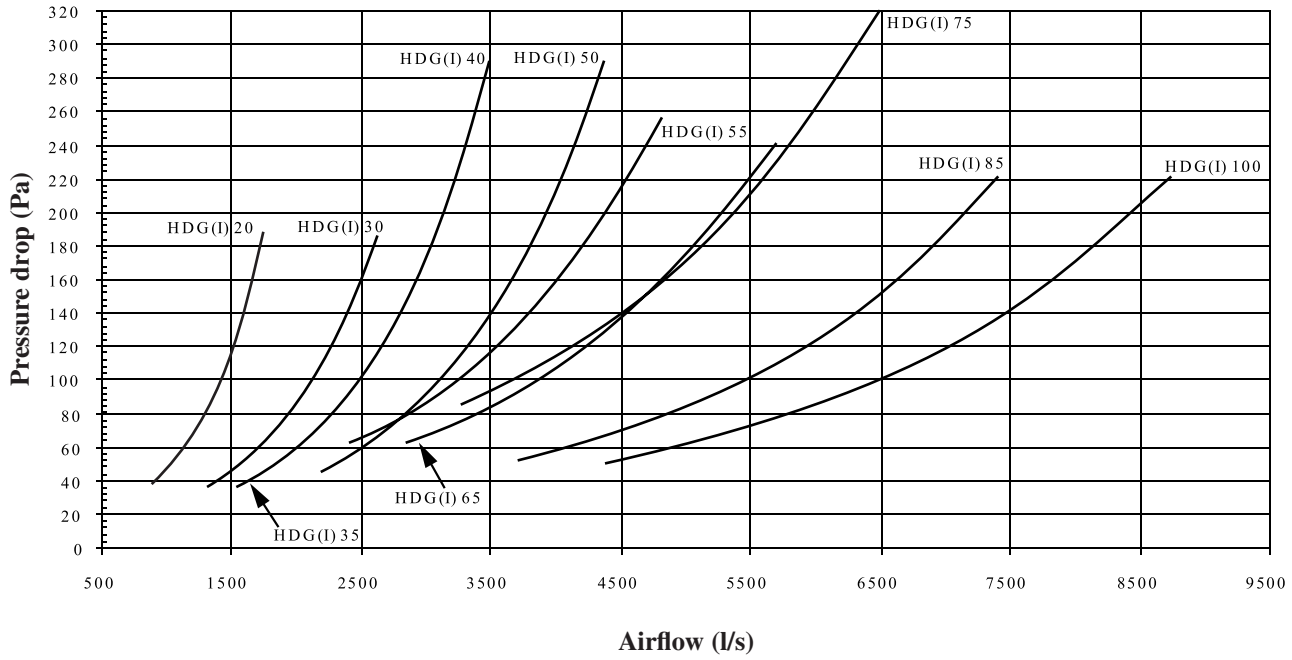


HDG(I) 125-500

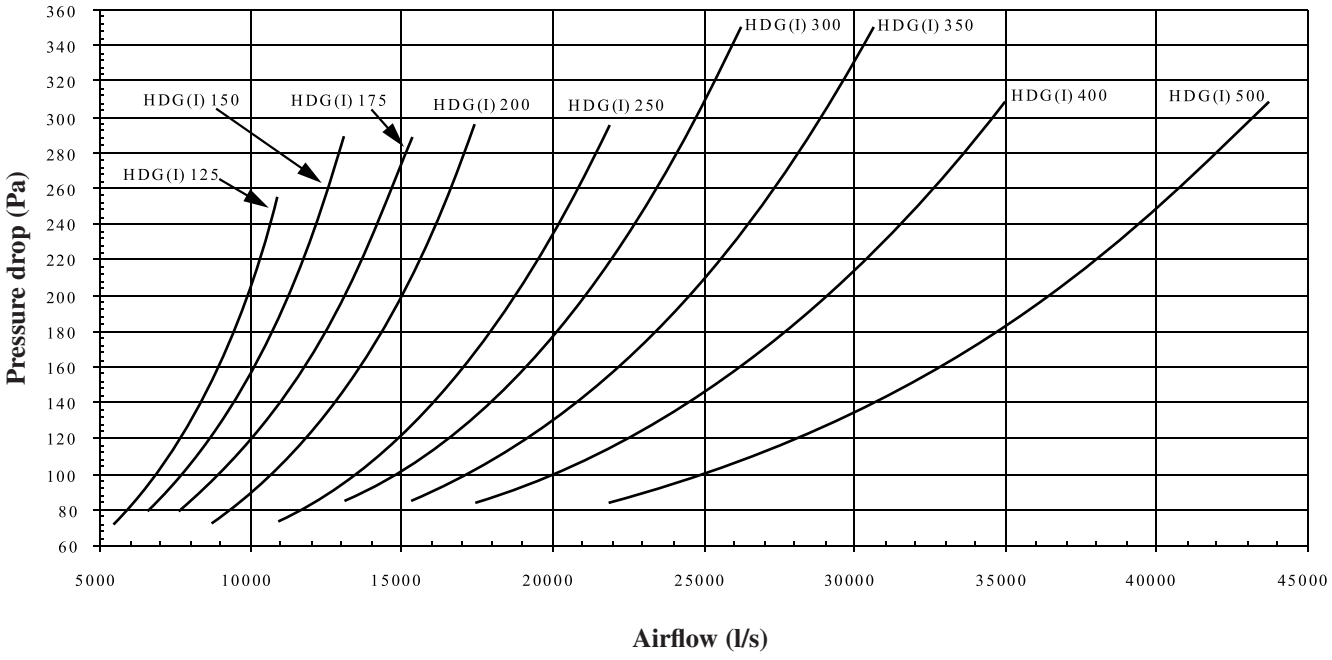


PRESSURE DROP THROUGH HEAT EXCHANGER

HDG(I) 20-100



HDG(I) 125-500



OPTIONS

Heat exchanger for vertical air flow

Marine lighting fixture

Annunciator S7830A1005

Display S7800A1035

REMOTE CONTROL PANEL (optional)

Basic Panel

Standard equipment:

- Off-blower-burner switch
- Blower indicating light
- Burner indicating light
- Connecting terminal block

Optional equipment:

- Temperature selector (shipped separately)

Deluxe panel

Standard equipment:

- Blower on-off switch
- Burner on-off switch
- Blower indicating light
- Burner indicating light
- Flame failure alarm light
- Connecting terminal block

Optional equipment:

- Discharge air low limit light
- Clogged filter light
- High gas pressure light
- Low gas pressure light
- Purge cycle completed light
- Temperature selector (integrated)
- Key lock

Note : Refer to the manufacturer for other arrangement or feature.

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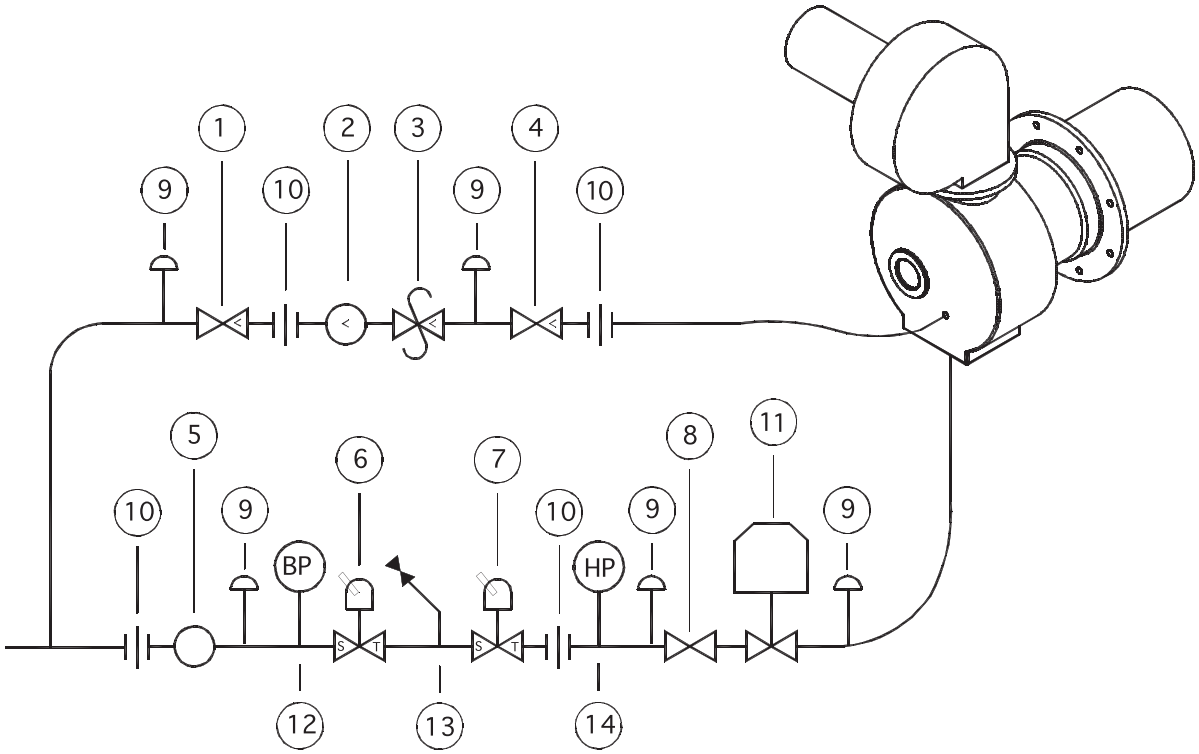
GAS PIPING



COMPONENTS	DESCRIPTIONS
	PILOT PIPING
1	Manual shut-off valve
2	Gas pressure regulator
3	Automatic shut-off valve
4	Manual ignition cock
	MAIN BURNER PIPING
5	Pressure regulator
6	Automatic quick-closing shut-off valve
7	Automatic slow-opening and quick-closing shut-off valve
8	Manual ignition cock
9	1/8-inch diameter test port
10	Piping union
11	Modulating valve supplied with burner
	OPTIONS
12	Low gas pressure switch (required for FM, IRI and pressure in excess of 1/2 psig)
13	Normally open automatic vent valve (required for IRI)
14	High gas pressure switch (required for FM, IRI and pressure in excess of 1/2 psig)

CHARACTERISTICS

STANDARD CHARACTERISTICS:

- $_{C}ETL_{US}$ certified
- Natural gas
- GP Combustion burner (20:1 modulation)
- Heat exchanger with 304L stainless steel drum and tubes
- Inlet gas pressure of 14 inches of water (3.5kPa)
- Main power supply (575 volts/3 phases/60 cycles)
- Connecting terminal block
- All the electric and mechanical components required for the proper operation of the unit
- Flame rod detector
- Pre-purge period
- All safety controls
- Satin finish steel (18 gauge) outer panels coated with an enamel based paint and G90 galvanized steel (22 gauge) inner walls
- 2-inch thick (51 mm) high temperature insulation with a 1.5lb/ft^3 density
- Lifting lugs on both sides of the unit for easy handling and installation
- Access panel to the exchanger tubes (for cleaning purposes)
- Drain
- Burner automatic valve interlock
- Supply air temperature controller

OPTIONAL CHARACTERISTICS:

- Electric power supply (208, 460 volts/3 phases/60 cycles)
- High gas pressure regulator
- MAXON burner (10:1 modulation)
- Propane gas
- Heat exchanger with 316L stainless steel drum and tubes
- Gas piping to FM or IRI requirement
- Ultra-violet flame detector
- Main power supply disconnect with or without fuses
- Controls and wiring required to interface with a centralized building automation system
- Modulation controller with 0-10 VDC or 4-20 mA signal from a central building automation system
- Room thermostat
- 120-volt electrical outlet
- Exchanger for vertical air flow

Note : Refer to manufacturer for any other options.

TYPICAL SPECIFICATIONS

GENERAL

Supply and install a Bousquet model HDG(I)_____ indirect gas-fired duct heater operating on natural gas for indoor (outdoor) installation. The manufacturer must be accredited by the CWB to certify that he complies with standard CSA W47.1 regarding all types of welds including those on a stainless steel heat exchanger.

PERFORMANCE

The duct heater will have the capacity to heat _____ CFM of standard air from _____°F to _____°F, for a net heat output of_____ MBH at a minimum combustion efficiency of 80%. The fuel used will be natural gas at an inlet pressure of _____ psig. The air pressure drop shall not exceed _____ inches of water.

UNIT CONSTRUCTION

The support frame will be made of welded U-shaped structural steel. The sides and top will be of 2-inch thick double wall construction, with maximum 20-inch wide panels made of 18 gauge satin finish steel with double folded edges for structural rigidity; the liner will be made of 22 gauge G90 galvanized steel. The unit will have 2-inch thick high temperature insulation with a density of 1.5lb/ft^3. The outer surfaces of the unit will be treated with a phosphate cleaner-conditioner and painted with one coat of anticorrosive epoxy primer exceeding the Canadian (type 1-GP-40) and American (type TT-P-636 D) standards for salt mist and humidity. The finish will be ensured with first quality high performance alkyd resin enamel applied at the plant. For outdoor applications, all the controls and piping will be installed inside a weatherproof cabinet with a full-sized access door for easy maintenance.

HEAT EXCHANGER

The multiple pass heat exchanger will consist of a primary drum and secondary tubes, entirely made of 304L stainless steel requiring no thermal treatment to prevent the cracking of welded joints and providing great resistance to corrosion and high temperatures, for longer service life of the unit. The exchanger will be equipped with access panels for tube inspection and cleaning. 400 series stainless steel, aluminized steel and carbon steel heat exchangers are not acceptable.

BURNER AND GAS PIPING

The burner will be of a forced draft type, factory-installed on the exchanger with all gas piping and control wiring required for the proper operation of the unit.

The gas pilot piping will be equipped with an electronic spark ignitor, a pressure regulator, manual and automatic shut-off valves as well as a manual ignition cock. The gas supply piping to the burner will include a pressure regulator, manual shut-off valve, automatic quick-closing shut-off valve, automatic slow-opening valve, manual ignition cock, test ports and modulating valve. The burner and gas piping assembly will have a modulating turndown ratio of at least 20:1.

BURNER CONTROL MODE

- G1: A temperature sensor with adjustable set point is installed in the air discharge to maintain the desired final temperature.
- G2: A temperature sensor with adjustable set point is installed in the air discharge to maintain the desired final temperature. Upon a demand for heating from the room thermostat, the burner modulates to satisfy the heating needs of the room.
- Other

REMOTE CONTROL PANEL (optional)

A remote control panel will be supplied by the manufacturer to turn the unit on or off from a remote location. It will be equipped with a blower/burner on-off switch and indicating lights.

CERTIFICATION

All HDG(I) heaters must be $_{c}$ETL$_{us}$ approved and certified according to standards CAN/CGA3.2 and UL 795.

OPTIONS

The duct heater will be equipped with the following options.

(List other required options.)

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