

Gas-Fired Unit Heaters Commercial & Industrial



Model PSH



Model BSH

Separated Combustion
High Efficiency



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DANGER

Units must not be installed where they may be exposed to potentially explosive or flammable atmosphere.

- All models approved for use in California by the CEC (when equipped with IPI), in New York City by the MEA Division, and in Massachusetts.

CAUTION

To prevent premature heat exchanger failure do not locate ANY gas-fired units in areas where chlorinated, halogenated or acid vapors are present in the atmosphere.

CSA certified to ANSI Z83 standards.



As Modine Manufacturing Company has a continuous product improvement program, it reserves the right to change design and specifications without notice. Unit heater is certified for non-residential applications.

Application, Design, Construction Overview



Rated at 82% Average Thermal Efficiency

Modine Separated Combustion high efficiency unit heaters are rated at an average thermal efficiency of 82%. This increased efficiency means greater savings in fuel costs from the moment a Modine Separated Combustion unit heater is installed. Through quality design and assembly of all components and factors influencing efficiency and comfort — Btu input versus output, thermal efficiency, seasonal efficiency, cfm rating, final air temperature, outlet velocity and heat spread or throw — the savings in fuel will continue far into the future. Some of the unique design features of the Modine Separated Combustion unit heater are discussed here.

Pre-Purge and Post-Purge Extend Vent System Life

Upon the call for heat, the power exhauster pre-purges the vent system. A safety pressure switch monitors the pressure within the unit and does not allow ignition of the pilot or main burner until positive venting has been assured.

When the unit shuts off, the power exhauster will continue to operate for a short period of time in order to clear the vent system of moist combustion gases. This helps prevent the moist air in the vent system from condensing on the vent pipes, thereby reducing the potential for rusting and corrosion.

100% of Combustion Air is Taken from Outside the Building

All of the air required for proper gas combustion is taken directly from the outside atmosphere. No more using conditioned inside air for combustion. And, because the unit does not use inside air for combustion, the design of this unit makes it ideal for hard to heat applications which include dusty or dirty atmospheres, high humidity, buildings with negative pressure, greenhouses,

automobile repair facilities, parking garages, institutional buildings, and in buildings where indoor air quality is of the utmost importance.

Primary Heat Exchanger Tubes Individually Fired for Faster Heating, Greater Fuel Economy

Each primary heat exchanger tube is individually and directly flame-fired. Heating is fast. Heat exchanger design promotes uniform distribution of warm air across the exterior surfaces of the tubes from top to bottom of the heat exchanger. Longer heat exchanger life, greater comfort and maximum utilization of all surface heat for improved fuel economy are the results. The primary heat exchanger tubes are die-formed from corrosion- and rust resistant aluminized steel (stainless steel optional).

Secondary Heat Exchanger Tubes Reclaim Heat from Flue Exhaust Gases for Increased Fuel Economy

The unique design of the heat exchanger and collector box assembly provides greater fuel economy by reclaiming heat normally lost through the vent pipe. Hot combustion gases are collected at the top of the primary (fired) heat exchanger tubes and then drawn through the secondary heat exchanger tubes. This process removes additional heat from the combustion gases before they are mechanically exhausted from the unit and discharged out of the building.

For a long service life, the secondary heat exchanger tubes are die-formed from corrosion-resistant stainless steel and welded to a stainless steel header at both the top and bottom of the heat exchanger assembly.

Power Exhauster Meters Correct Amount of Combustion Air for Maximum Fuel Combustion Efficiency

All Modine Separated Combustion unit heaters have an integral, factory-mounted power exhauster. This power exhauster pulls in the correct amount of combustion air from the outside atmosphere for ideal combustion efficiency. Once the fuel has been burned and passes through both the primary and secondary heat exchanger tubes for maximum heat extraction, it is exhausted from the unit and the building. In addition, **power exhausting offers the flexibility of either horizontal or vertical venting.**

Totally Enclosed Motors with Built in Thermal Overload Protection

Modine unit heaters with standard 1 ϕ motors are totally enclosed with built in thermal overload protection (refer to page 23).

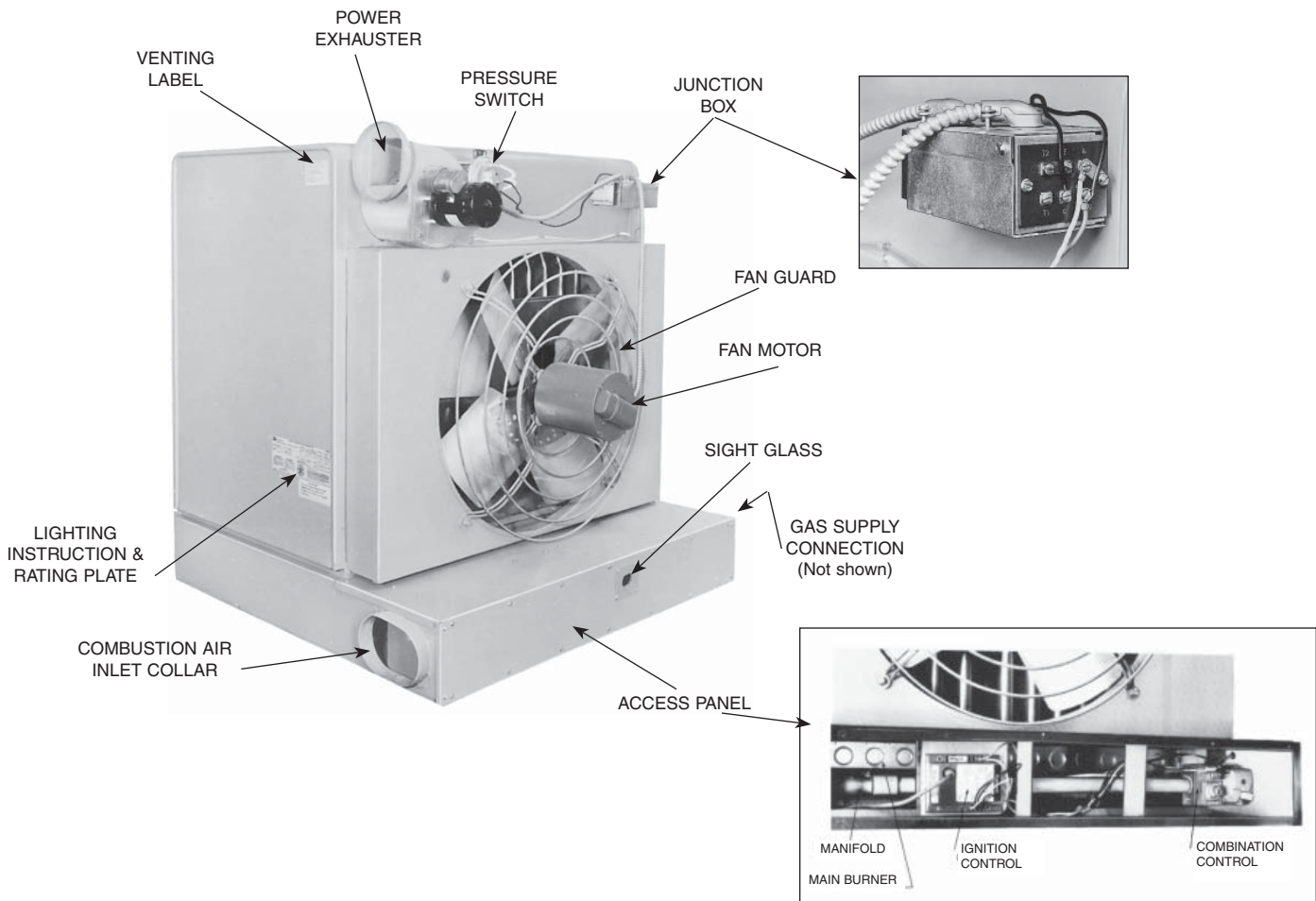
The propeller motors are designed specifically for the unit they are to be used with to assure proper motor/fan load balance. The units also include vibration isolation.

Designed for Easy Service

Rear access panel provides easy access to gas valve and ignition controller. A hinged casing bottom drops down to provide quick and ample access to the burner and pilot assembly.

Large junction box with terminal board connections makes wiring easy.

Unit Components



Heat Exchanger - Airfoil contoured tubes allow expansion and contraction stresses to flow out evenly across the heat exchanger tubes. There are no ridges or sharp bends in the tubes where stresses can concentrate to cause early heat exchanger failure through metal fatigue. Operational noises during warm-up and cool down are also minimized by the tube design. Heat exchangers are die formed from corrosion and rust resistant 20 gauge aluminized steel (409 stainless steel optional).

Burner - Corrosion-resistant aluminized steel (409 stainless steel optional) with slotted, oversized ports and 409 stainless steel separator strip to help prevent clogging and reduce maintenance (refer to Fig. 4.1).

Enclosure - Aluminized steel with baked-on gray-green polyester powder paint finish. Hinged bottom pan allows access to burner and pilot assembly. Removable side panels enable maintenance and suspension point adjustment.

Standard Controls - 115V/60Hz/1 ϕ power supply and 25-volt controls. Limit control shuts off main burner to prevent overheating. Single-stage intermittent pilot ignition for natural gas with safety redundant gas valve. 100% safety shut-off.

Junction Box - Factory installed junction box supplied with marked terminals for thermostat and accessory connections.

Mounting Means - Adjustable mounting brackets to allow for level hanging with a variety of accessories attached to the unit.

Figure 4.1
Burner Port Closeup



Options

**Table 5.1
Factory Mounted Options**

Finger Proof Fan Guard

Standard fan guard may be factory replaced with finger-proof fan guard on propeller models.

Stainless Steel Burner

Factory Mounted 409 stainless steel burners are available on all models as a replacement to the standard aluminized steel burners.

Control Options

Modine offers single-stage, intermittent pilot ignition systems for use with natural or propane gas. For gases or mixtures other than natural or propane, please consult the factory. Table 5.2 lists the available control systems and lists their respective Control Code numbers.

**Table 5.2
Control Options** ① ② ③ ④

Control System Description	Control Code No.	Service Voltage	Thermostat Voltage	Type of Gas
Single-Stage, Intermittent Pilot Ignition, 100% Shut-off with Continuous Retry — Utilizes a single-stage combination gas control and an ignition control (continuous retry). Pilot is automatically lit on call for heat.	30	115V	25V	natural
	31	200-208/230V	25V	natural
	③ 32	460V	25V	natural
	③ ④ 33	575V	25V	natural
	85	115V	25V	propane
	86	200-208/230V	25V	propane
	③ 93	460v	25V	propane
	③ ④ 94	575v	25V	propane

Table 5.3

Supply Voltage	Control Code Selected	Factory Installed Transformers	Additional Field Installed Accessories Required	
			Additional transformer required	Motor Starter Coil Voltage ^⑤
115V/1 ϕ	30, 85	115V to 25V	—	N/A
200-208V/1 ϕ	31, 86	200-208V to 25V	—	N/A
230V/1 ϕ	31, 86	230V to 25V	—	N/A
200-208V/3 ϕ	31, 86	200-208V to 25V	—	200-208V
230V/3 ϕ	31, 86	230V to 25V	—	230V
460V/3 ϕ ③	32, 93	460V to 230V to 25V	—	230V
575V/3 ϕ ③ ④	33, 94	575V to 230V to 25V	—	230V

① Table 5.3 provides instructions on specifying the proper control code and motor starter coil voltage.

② Shaded controls are standard.

③ CGA approved 460V and 575V available on blower units only.

④ 575V motor available on blower units only.

⑤ All motor starters are supplied by others and field installed.

Unit Accessories

Table 6.1

Field Mounted Accessories (all accessories shipped separately)

Control Accessories

Single-Stage Room Thermostat - 1.5 amp @ 30VAC; 45-75°F Temperature Range; heat anticipator 0.18 to 1.0 amp rating. Robertshaw CM-260.

Sub-Base - For use with Robertshaw CM-260 thermostat. Switching, System - auto/off, Fan - auto/on. Robertshaw SB-3A-1.

Single-Stage Room Thermostat - 1.5 amp @ 30VAC; 55-95°F Temperature Range; heat anticipator 0.18 to 0.8 amp rating. Honeywell T822D1008.

Control Transformer - Step-down transformers for 460V or 575V supply to 230V. Available in 500VA.

Other Accessories / Control Devices

S.P.S.T. Relay - Single pole, single throw, 25V coil, max. contact rating of 18 amp @ 115V.

Pipe Hanger Adapter Kit - Consists of 2, 4, or 6 1/2" - 13 x 1-3/4" capscrews to facilitate threaded pipe suspension.

Summer/Winter Toggle Switch - Max. rating 15 amp @ 125V, 10 amp @ 250V. In summer position the fan runs continuously and the gas valve is cycled by the thermostat. Shipped separately.

Energy Saver Kit - Used to reduce stratified air in high mounting height applications. SPDT switch, 30° - 100° range. 16 amp @ 120V. Honeywell T-631A113.

Gas Regulator - Fisher type S-100-3/4" pressure regulator, 5-10 psi inlet pressure. Capacity 30,000 to 400,000 btu/hr. For use with natural or propane gas.

Thermostat Guard - Clear plastic for room thermostats. Guard is locking type and comes complete with two keys.

Touch-Up Paint - Single, 13 oz. Aerosol spray, gray-green enamel.

Vent Cap - Gary Steel or Breidert Vent Caps for single wall vent.

Horizontal Concentric Vent Kit - Enables horizontal concentric venting. Kit consists of one concentric adapter, one vent terminal, and one bird screen. (See page 21.)

Vertical Concentric Vent Kit - Enables vertical concentric venting. Kit consists of one concentric adaptor, one combustion air inlet cap, and one vent terminal cap. (See page 21.)

Vertical Deflector Kit - Enables side distribution of airflow.

Blower Enclosure - Fully encloses blower to enable the attachment of filter racks and/or duct. Blower units only. (Note: shipped disassembled)

Filter Racks and Duct Connectors - Combination filter rack/duct connector consisting of 1" thick, cleanable filter, shipped separately. Requires the addition of a blower enclosure kit. For use with blower type units only.

Outlet Duct Connectors - Enables duct work to be connected to discharge of unit. For use with blower type units only. (Note: shipped disassembled)

Belt Guard - Designed to enclose the motor, belts, and sheaves (pulleys) on blower type unit heaters.

Discharge Nozzles - 40° downward and splitter double deflection, 90° vertical double deflection, or 5-way downward nozzles available. Velocity generating. For use with blower type units only.

Discharge Transitions - Enables the connection of 18" (BSH 130-170), or 24" (BSH 225-340) polytube (by others) to discharge of blower unit. Polytube not included. For use with blower type units only.

Deflector Hood - 30°, 60°, 90° downward air deflector hood for use with propeller or blower type unit heaters. 20 ga. cold rolled steel with baked-on gray-green polyester powder paint. Non-velocity generating. (Note: shipped disassembled)

Power Code Descriptions

Table 7.1
Propeller PSH Models ① ② ③

Power Code	Electric Power	PSH130	PSH150	PSH170	PSH225	PSH280	PSH340
		Horsepower					
01	115/60/1	1/6	1/6	1/6	1/3	1/2	1/2
02	230/60/1	1/6	1/6	1/6	1/3	1/2	1/2
03	200-208/60/1	1/6	1/6	1/6	–	–	–
04	200-208/60/3	1/3	1/3	1/3	1/3	1/2	1/2
05	230/460/60/3	1/3	1/3	1/3	1/3	1/2	1/2

Table 7.2
Blower BSH Models ② ③

Power Code	Electric Power	BSH130		BSH150		BSH170		BSH225		BSH280		BSH340	
		HP	Drive	HP	Drive	HP	Drive	HP	Drive	HP	Drive	HP	Drive
01	115/60/1	1/3	-13	3/4	-18	3/4	-18	3/4	-18	1	-16	1-1/2	-16
02	230/60/1	1/3	-13	3/4	-18	3/4	-18	3/4	-18	1	-16	1-1/2	-16
03	200-208/60/3	1/3	-13	3/4	-18	3/4	-18	3/4	-18	1	-16	1-1/2	-16
04	230/460/60/3	1/3	-13	3/4	-18	3/4	-18	3/4	-18	1	-16	1-1/2	-16
81	575/60/3	1/3	-14	3/4	-18	3/4	-18	3/4	-18	1	-16	1-1/2	-178
05	115/60/1	1/4	-21	1/2	-25	1/2	-25	3/4	-22	1	-18	1	-219
06	230/60/1	1/4	-21	1/2	-25	1/2	-25	3/4	-22	1	-18	1	-219
07	200-208/60/3	1/4	-21	1/2	-25	1/2	-25	3/4	-22	1	-18	1	-219
08	230/460/60/3	1/4	-21	1/2	-25	1/2	-25	3/4	-22	1	-18	1	-219
82	575/60/3	1/4	-165	1/2	-25	1/2	-25	3/4	-22	1	-18	1	-219
09	115/60/1	1/3	-15	1/2	-22	1/2	-22	1	-16	1-1/2	-23	–	–
10	230/60/1	1/3	-15	1/2	-22	1/2	-22	1	-16	1-1/2	-23	–	–
11	200-208/60/3	1/3	-15	1/2	-22	1/2	-22	1	-16	1-1/2	-23	2	-32
12	230/460/60/3	1/3	-15	1/2	-22	1/2	-22	1	-16	1-1/2	-23	2	-32
83	575/60/3	1/3	-166	1/2	-22	1/2	-22	1	-16	1-1/2	-177	2	-32
13	115/60/1	1/3	-57	–	–	–	–	3/4	-25	–	–	–	–
14	230/60/1	1/3	-57	–	–	–	–	3/4	-25	–	–	–	–
15	200-208/60/3	1/3	-57	–	–	–	–	3/4	-25	–	–	–	–
16	230/460/60/3	1/3	-57	–	–	–	–	3/4	-25	–	–	–	–
84	575/60/3	1/3	-167	–	–	–	–	3/4	-25	–	–	–	–

① PSH units with 460V/3 ϕ power supply are not listed by CSA for Canadian use.

② All motors used are produced, rated and tested by reputable manufacturers in accordance with NEMA standards and carry the standard warranty of both the motor manufacturer and Modine. All motors are totally enclosed and all single phase motors have built-in thermal overload protection.

③ All motor starters are supplied by others and field installed.

Power Code Descriptions

Table 8.1

Blower Drive Numbers

Sheave Drive No.	Belt No. Browning	Blower Sheave		Motor	
		Pitch Diameter	Bore	Minimum/Maximum Pitch Diameter	Bore
13	A43	8	3/4	1.9/2.9	1/2
14	A44	8	3/4	1.9/2.9	5/8
15	A44	9	3/4	1.9/2.9	1/2
16	A48	8	1	1.9/2.9	5/8
18	A49	9	1	1.9/2.9	5/8
21	A52	13	3/4	1.9/2.9	1/2
22	A53	11	1	1.9/2.9	5/8
23	A56	11	1	3.4/4.4	5/8
25	A58	13	1	1.9/2.9	5/8
32	A55	11	1	3.4/4.4	7/8
57	A46	10	3/4	1.9/2.9	1/2
165	A53	13	3/4	1.9/2.9	5/8
166	A45	9	3/4	1.9/2.9	5/8
167	A47	10	3/4	1.9/2.9	5/8
177	A56	11	1	3.4/4.4	7/8
178	A48	8	1	1.9/2.9	7/8

PERFORMANCE DATA



General Performance Data

Table 9.1
Performance — PSH ④ ⑤

Model	Btu/Hrt Input	Btu/Hr Output	Entering Airflow (CFM) @ 70°F	Outlet Velocity	Air Temp. Rise (°F)	Max. Mtg. Height (Ft) ④	Heat Throw (Ft) ④	Motor Type ②
PSH 130	130,000	106,600	2540	940	39	12	50	PSC
PSH 150	150,000	123,000	2900	810	39	16	50	PSC
PSH 170	170,000	139,400	2900	820	45	16	50	PSC
PSH 225	225,000	184,500	4275	1060	40	20	65	PSC
PSH 280	280,000	229,600	4400	960	48	20	65	PSC
PSH 340	340,000	275,400	5300	980	48	20	65	PSC

Table 9.2
Motor Data and Total Unit Power Requirements — Propeller PSH Models ① ②

Voltage	115/60/1				200-208/60/1				230/60/1				200-208/60/3				230/460/3			
	Motor Amps	Motor Rpm	Total Amps	Total Watts	Motor Amps	Motor Rpm	Total Amps	Total Watts	Motor Amps	Motor Rpm	Total Amps	Total Watts	Motor Amps	Motor Rpm	Total Amps	Total Watts	Motor Amps	Motor Rpm	Total Amps	Total Watts
1/6	2.8	1075	4.6	400	1.5	1075	2.4	400	1.5	1075	2.5	400	—	—	—	—	—	—	—	—
1/3	5.4	1075	7.2	610	—	—	—	—	2.5	1075	3.5	610	1.9	1140	2.8	560	2.2/1.1	1140	3.2/1.6	560
1/2	7.5	1075	9.3	800	—	—	—	—	3.5	1075	4.5	800	2.6	1140	3.5	850	3.0/1.5	1140	4.0/2.0	850

Table 9.3
Performance — BSH ④ ⑤

Model	Btu/Hr Input	Btu/Hr Output	Entering Airflow (CFM) ③	Outlet Velocity ③	CFM Range	Air Temp. Rise Range (°F)	Max. Mtg. Height (Ft) ③	Heat Throw (Ft) ③	Motor Type ②
BSH 130	130,000	106,600	1795	682	1161-1795	55-85	11	30	SP
BSH 150	150,000	123,000	2071	596	1340-2071	55-85	10	25	SP
BSH 170	170,000	139,400	2347	675	1519-2347	55-85	11	30	SP
BSH 225	225,000	182,250	3068	781	1985-3068	55-85	13	35	SP
BSH 280	280,000	229,600	3865	852	2501-3865	55-85	14	40	CP
BSH 340	340,000	275,400	4636	869	3000-4636	55-85	15	40	CP

Table 9.4
Motor Data and Total Unit Power Requirements – Blower BSH Models ②

HP	Voltage									
	115/60/1		230/60/1		200-208/60/3		230/460/60/3		575/60/3	
	Total Amps	Total Watts	Total Amps	Total Watts	Total Amps	Total Watts	Total Amps	Total Watts	Total Amps	Total Watts
1/4	7.2	520	3.7	520	2.5	500	2.4/1.2	500	0.9	500
1/3	6.4	515	3.3	515	2.7	530	2.6/1.3	530	1.1	530
1/2	10.3	730	4.8	730	3.4	730	3.6/1.8	730	1.3	730
3/4	12.8	1000	6.5	1000	4.1	970	3.8/1.9	970	1.5	970
1	15.2	1210	7.7	1210	4.9	1230	4.8/2.4	1230	1.9	1230
1-1/2	16.8	1690	8.5	1690	6.5	1630	6.2/3.1	1630	2.3	1630
2	—	—	—	—	8.6	2080	7.6/3.8	2080	2.7	2080

- ① PSH units with 460V/3φ power supply are not listed by CSA for Canadian use.
- ② All motors used are produced, rated and tested by reputable manufacturers in accordance with NEMA standards and carry the standard warranty of both the motor manufacturer and Modine. All motors are totally enclosed and all single phase motors have built-in thermal overload protection.
- ③ Data taken at 55°F air temperature rise. At 65°F ambient and unit fired at full-rated input. Mounting height as measured from bottom of unit, and without deflector hoods.
- ④ Ratings shown are for elevations up to 2,000 ft. For elevations above 2,000 feet, ratings should be reduced at the rate of 4% for each 1,000 feet above sea level. (In Canada see rating plate.) Reduction of ratings requires the use of a high altitude kit.
- ⑤ Data listed is for standard 115-volt, 60-Hertz, single-phase motors.

PERFORMANCE DATA



Blower Unit Heaters

Models With or Without Blower Enclosures ① ②

Model Number	Air Flow CFM	Outlet Velocity FPM	Air Temp. Rise F	0.0 Static Pressure				0.1 Static Pressure				0.2 Static Pressure				0.3 Static Pressure				0.4 Static Pressure			
				RPM	HP	Drive No.	Pulley Turns Open	RPM	HP	Drive No.	Pulley Turns Open	RPM	HP	Drive No.	Pulley Turns Open	RPM	HP	Drive No.	Pulley Turns Open	RPM	HP	Drive No.	Pulley Turns Open
BSH 130	1795	682	55	385			0	460			1	520			1	570	—	—	—	620			2
	1645	630	60	355			1	435	1/3	-57	2	500			1-1/2	550	1/2	-96	3	605			2
	1519	587	65	325			2	415			2-1/2	480			2	535			1/2	590			2-1/2
	1410	549	70	305	1/4	-97	3	395			3	465	1/3	-15	2-1/2	520	1/3	-15	1	580	1/2	-96	2-1/2
	1316	517	75	285			3-1/2	380			0	450			3	510			1	570			1-1/2
	1234	489	80	270			4-1/2	365	1/4	-97	1/2	440			3	500			1-1/2	560	1/3	-13	1-1/2
	1161	464	85	250			5	350			1-1/2	430			3-1/2	490			2	550			2
BSH 150	2071	596	55	255	1/2	-25	5	330			2	390			0	445			0	500	3/4	-18	1-1/2
	1898	551	60	235	—	—	—	310			3	375			1/2	430			1/2	485			2
	1752	513	65	220	—	—	—	295			3-1/2	360			1	415	1/2	-22	1	475			2
	1627	480	70	205	—	—	—	280	1/2	-25	4	245	1/2	-25	1-1/2	405			1-1/2	470			2
	1519	452	75	190	—	—	—	270			4-1/2	335			2	395			2	460			2-1/2
	1424	427	80	180	—	—	—	260			4-1/2	325			2	390	1/2	-25	0	455	1/2	-22	0
	1340	405	85	170	—	—	—	250			5	315			2-1/2	380			0	450			0
BSH 170	2347	675	55	290			3-1/2	360			1	420	1/2	-22	1	470	3/4	-18	2	520			1
	2151	624	60	265	1/2	-25	4-1/2	335			2	400			1-1/2	455			0	505			1-1/2
	1986	581	65	245			5	305			2-1/2	385			0	440			1/2	495	3/4	-18	1-1/2
	1844	544	70	230	—	—	—	290	1/2	-25	3	370			1/2	425			1	485			2
	1721	512	75	215	—	—	—	280			3-1/2	355	1/2	-25	1	415			1	475			2
	1613	484	80	200	—	—	—	270			4	345			1-1/2	405	1/2	-22	1-1/2	465			2-1/2
	1519	459	85	190	—	—	—	250			4-1/2	335			2	395			2	460	1/2	-22	0
BSH 225	3068	781	55	385			0	440	3/4	-22	1/2	490			1-1/2	535			1/2	575	1	-16	1
	2813	722	60	345			1-1/2	415			1	465			2-1/2	510			1	555			0
	2596	672	65	315	3/4	-25	2-1/2	390			0	440	3/4	-18	3	485			2	535			1/2
	2411	630	70	285			3-1/2	365	3/4	-25	1/2	420			3-1/2	470	3/4	-18	2-1/2	520			1
	2250	592	75	260			4-1/2	350			1	405			4	455			2-1/2	510	3/4	-18	1
	2109	560	80	240	—	—	—	330			2	390	3/4	-25	0	440			3	495			1-1/2
	1985	531	85	220	—	—	—	315			2-1/2	375			1/2	425			3-1/2	485			2
BSH 280	3865	725	55	530			1/2	575	1-1/2	-23	3-1/2	615	1-1/2	-23	2-1/2	645			1-1/2	670	1-1/2	-23	1/2
	3543	670	60	490			1-1/2	535			1/2	580			3-1/2	615	1-1/2	-23	2-1/2	640			1-1/2
	3271	624	65	450			3	500			1-1/2	545			1/2	585			3-1/2	620			2
	3037	584	70	420	1	-18	3-1/2	470			2-1/2	520			1	565			0	595	1	-16	1/2
	2835	550	75	395			4	445	1	-18	3	495	1	-18	1-1/2	540	1	-18	1/2	580			1
	2657	519	80	370			5	425			3-1/2	475			2	525			1	560	1	-18	0
	2501	493	85	350	—	—	—	405			4	455			2-1/2	510			1	545			1/2
BSH 340	4636	869	55	610	1-1/2	-16	1/2	655	2	-32	1	690	2	-32	0	725	—	—	—	750	—	—	—
	4250	804	60	550			0	605	1-1/2	-16	1/2	645			1-1/2	685	2	-32	0	710	—	—	—
	3923	748	65	500			1-1/2	560			0	605	1-1/2	-16	1/2	645			1-1/2	680	2	-32	0
	3643	701	70	460			2-1/2	525			1	575			1	615			0	650			1
	3400	659	75	420	1	-219	3-1/2	490	1	-219	1-1/2	545			1/2	590	1-1/2	-16	1	625			0
	3188	623	80	390			4-1/2	465			2-1/2	520	1	-219	1	570			1-1/2	605	1-1/2	-16	1/2
	3000	591	85	360			5	440			3	500			1-1/2	550	1	-219	0	585			1

Important: Note for 575V Only ④

Model Number	From this Catalog		For 575V ⑤	
	HP	Drive	HP	Drive
BSH130	1/3	-13	1/3	-14
	1/4	-21	1/4	-165
	1/3	-15	1/3	-166
	1/3	-57	1/4	-167
BSH280	1-1/2	-23	1-1/2	-177
BSH340	1-1/2	-16	1-1/2	-178

① Ratings shown are for elevations up to 2,000 feet. For elevations above 2,000 feet, ratings should be reduced at the rate of 4% for each 1,000 feet above sea level. (Does not apply in Canada — See Rating Plate.)

② Pulley turns open are approximate. For proper operation, check blower rpm.

③ Blower models with filter require the use of blower enclosures.

④ Models not shown use same HP and drive number as cataloged.

⑤ Performance is the same; motor sheave accommodates larger shaft. When ordering 575V, specify the listed 575V drive.

PERFORMANCE DATA



Blower Unit Heaters

Models With Filter ① ② ③

Model Number	Air Flow CFM	Outlet Velocity FPM	Air Temp. Rise F	0.0 Static Pressure				0.1 Static Pressure				0.2 Static Pressure				0.3 Static Pressure				0.4 Static Pressure				
				RPM	HP	Drive No.	Pulley Turns Open	RPM	HP	Drive No.	Pulley Turns Open	RPM	HP	Drive No.	Pulley Turns Open	RPM	HP	Drive No.	Pulley Turns Open	RPM	HP	Drive No.	Pulley Turns Open	
BSH 130	1795	682	55	445	1/3	-57	1-1/2	520	1/3	-15	1	575	—	—	—	615	—	—	—	660	—	—	—	
	1645	630	60	410			2-1/2	485			1/2	545			1/2	595				640				
	1519	587	65	375			1/2	460			1	520			1	575				625			2	
	1410	549	70	345			1-1/2	435	1/3	-57	2	500	1/3	-15	1-1/2	560			0	610	1/2	-96	2	
	1316	517	75	325	1/4	-97		2	415			2-1/2	480			2	545			1/2	600			2
	1234	489	80	300			3	395			3	460			2-1/2	535	1/3	-15	1/2	585	1/3	-13	1	
	1161	464	85	285			3-1/2	380	1/4	-97	0	450			3	525			1	575			1	
BSH 150	2071	596	55	285	1/2	-25	3-1/2	350			1	415	1/2	-22	1	460			0	530			1/2	
	1898	551	60	260			4-1/2	325			2	395			2	445			0	515			1	
	1752	513	65	235	—	—	—	305			3	380			0	430	1/2	-22	1/2	505			1-1/2	
	1627	480	70	220	—	—	—	290	1/2	-25	3-1/2	365			1/2	420			1	495	3/4	-18	1-1/2	
	1519	452	75	205	—	—	—	280			4	355	1/2	-25	1	405			1-1/2	485			2	
	1424	427	80	190	—	—	—	265			4 1/2	345			1-1/2	400			1-1/2	480			2	
	1340	405	85	180	—	—	—	255			5	335			2	390	1/2	-25	0	475			2	
BSH 170	2347	675	55	325			2	385			0	445			0	490	3/4	-18	1-1/2	550			0	
	2151	624	60	295	1/2	-25	3-1/2	360			1	425	1/2	-22	1	470			2	535			1/2	
	1986	581	65	270			4-1/2	340			1-1/2	405			1-1/2	455			0	520	3/4	-18	1	
	1844	544	70	250			5	320	1/2	-25	2-1/2	390			0	440			1/2	510			1	
	1721	512	75	235	—	—	—	305			3	375	1/2	-25	1/2	425	1/2	-22	1	500			1-1/2	
	1613	484	80	215	—	—	—	290			3-1/2	365			1/2	415			1	495			1-1/2	
	1519	459	85	205	—	—	—	275			4	355			1	405			1-1/2	485			2	
BSH 225	3068	781	55	465	3/4	-18	2 1/2	515			1	550			0	600	1	-16	1/2	635			0	
	2813	722	60	420			3 1/2	485			2	515			1	565			1-1/2	610	1	-16	1/2	
	2596	672	65	385			0	455			2-1/2	490			1 1/2	540			1/2	590			1	
	2411	630	70	350			1	430	3/4	-18	3-1/2	465	3/4	-18	2 1/2	515			1	575			1	
	2250	592	75	325	3/4	-25	2	410			4	440			3	495	3/4	-18	1-1/2	560			0	
	2109	560	80	300			3	390			4-1/2	425			3-1/2	480			2	545	3/4	-18	1/2	
	1985	531	85	280			4	375	3/4	-25	1/2	405			4	465			2-1/4	535			1/2	
BSH 280	3865	725	55	595	1-1/2	-23	3	645			1-1/2	680	1-1/2	-23	0	705	—	—	—	725	—	—	—	
	3543	670	60	545			1/2	600	1-1/2	-23	3	640			1-1/2	665	1-1/2	-23	1/2	690			0	
	3271	624	65	505			1 1/2	565			4	605	1	-16	1/2	635			1-1/2	660	1-1/2	-23	1	
	3037	584	70	470			2 1/2	530			1/2	575			1	610			1/2	635			1-1/2	
	2835	550	75	440	1	-18	3	500	1	-18	1-1/2	550			0	585	1	-16	1	615			0	
	2657	519	80	415			3 1/2	475			2	525	1	-18	1	565			1-1/2	595	1	-16	1/2	
	2501	493	85	390			4 1/2	455			2-1/2	505			1-1/2	545	1	-18	1/2	580			1	
BSH 340	4636	869	55	685	2	-32	0	715	—	—	—	740	—	—	—	765	—	—	—	795	—	—	—	
	4250	804	60	615	1-1/2	-16	0	655	2	-32	1	685	2	-32	0	720	—	—	—	745	—	—	—	
	3923	748	65	560			0	605	1-1/2	-16	1/2	640			1-1/2	680	2	-32	0	705	—	—	—	
	3643	701	70	515			1	560			0	600	1-1/2	-16	1/2	645			1-1/2	670	2	-32	1/2	
	3400	659	75	470	1	-219	2	525	1	-219	1	570			1-1/2	615			0	640			1-1/2	
	3188	623	80	435			3	490			1-1/2	540	1	-219	1/2	590	1-1/2	-16	1	615	1-1/2	-16	0	
	3000	591	85	405			4	465			2-1/2	515			1	565			1-1/2	595			1/2	

Important: Note for 575V Only ④

Model Number	From this Catalog		For 575V ⑤	
	HP	Drive	HP	Drive
BSH130	1/3	-13	1/3	-14
	1/4	-21	1/4	-165
	1/3	-15	1/3	-166
	1/3	-57	1/4	-167
BSH280	1-1/2	-23	1-1/2	-177
BSH340	1-1/2	-16	1-1/2	-178

① Ratings shown are for elevations up to 2,000 feet. For elevations above 2,000 feet, ratings should be reduced at the rate of 4% for each 1,000 feet above sea level. (Does not apply in Canada — See Rating Plate.)

② Pulley turns open are approximate. For proper operation, check blower rpm.

③ Blower models with filter require the use of blower enclosures.

④ Models not shown use same HP and drive number as cataloged.

⑤ Performance is the same; motor sheave accommodates larger shaft. When ordering 575V, specify the listed 575V drive.

Downward Deflector Hoods for Propeller Models

Performance Data – 30°, 60° and 90° Downward Deflector Hoods

Mounting Height to Bottom of Heater	30° Downward Deflector Hood Blower Models ① (See Figures 12.1 and 12.2)																	
	PSH 130			PSH 150			PSH 170			PSH 225			PSH 280			PSH 340		
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
8'	11	25	34	9	22	30	11	25	35	14	31	43	16	35	48	17	37	50
10'	9	22	31	8	19	26	10	23	32	13	30	41	15	34	44	15	34	48
12'	7	19	26	6	16	23	8	20	28	12	28	38	14	32	44	15	34	46
14'	5	15	21	4	13	19	6	16	23	10	24	34	12	29	41	13	23	44
16'	—	—	—	—	—	—	—	—	—	8	22	31	10	25	36	11	28	40
18'	—	—	—	—	—	—	—	—	—	6	18	26	8	22	31	10	26	36
20'	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	20	29

Mounting Height to Bottom of Heater	60° Downward Deflector Hood Blower Models ① (See Figures 12.1 and 12.2)																	
	PSH 130			PSH 150			PSH 170			PSH 225			PSH 280			PSH 340		
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
8'	0	25	35	0	22	30	0	26	36	0	33	45	0	37	50	0	39	53
10'	0	22	30	0	18	25	0	23	32	0	31	42	0	35	48	0	37	51
12'	0	17	23	0	9	13	0	18	25	0	27	38	0	32	44	0	35	47
14'	0	10	14	—	—	—	0	13	19	0	23	32	0	29	40	0	31	43
16'	—	—	—	—	—	—	—	—	—	0	12	17	0	23	32	0	27	37
18'	—	—	—	—	—	—	—	—	—	—	—	—	0	18	26	0	17	24
20'	—	—	—	—	—	—	—	—	—	—	—	—	0	13	19	0	14	19

Mounting Height to Bottom of Heater	90° Downward Deflector Hood Blower Models ① (See Figures 13.1 and 13.2)											
	PSH 130		PSH 150		PSH 170		PSH 225		PSH 280		PSH 340	
	S	S	S	S	S	S	S	S	S	S	S	S
8'	26	23	28	32	35	37						
10'	25	22	27	31	34	36						
12'	24	21	26	30	33	35						
14'	23	20	25	29	32	34						
16'	22	19	24	28	31	33						
18'	21	18	23	27	30	32						
20'	20	—	22	26	29	31						
22'	—	—	21	25	28	30						
24'	—	—	—	24	27	29						
26'	—	—	—	—	26	28						
28'	—	—	—	—	26	27						

① Data based on units fired at full input rate and with an entering air temperature of 80° F.

Figure 12.1
30° & 60° Hoods

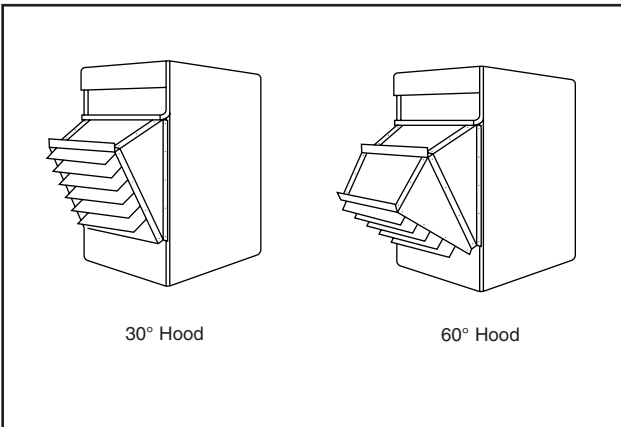
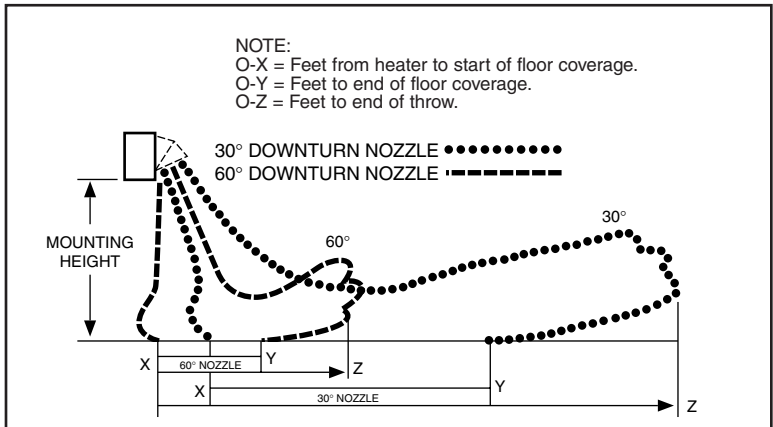


Figure 12.2
30° & 60° Hood-Throw Floor Coverage



PERFORMANCE DATA



Downward Deflector Hoods for Blower Models

Performance Data – 30°, 60° and 90° Downward Deflector Hoods

Mounting Height to Bottom of Heater	30° Downward Deflector Hood Propeller Models ① (See Figures 12.1 and 12.2)																				
	Model			BSH 130			BSH 150			BSH 170			BSH 225			BSH 280			BSH 340		
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
8'	21	44	60	19	39	53	17	37	50	26	53	73	21	43	59	22	46	62			
10'	20	43	59	17	38	52	16	35	48	25	53	72	20	42	58	21	56	61			
12'	19	42	58	16	37	50	15	34	46	24	52	70	18	41	56	10	43	59			
14'	18	41	56	15	35	48	13	32	44	23	50	69	17	39	65	18	42	57			
16'	16	38	53	13	32	44	11	28	39	21	49	67	15	37	51	17	40	55			
18'	14	36	50	10	28	39	7	20	29	20	47	64	14	34	47	15	37	52			
20'	21	31	44	8	23	33	—	—	—	18	44	61	11	29	41	13	33	47			
22'	8	24	35	—	—	—	—	—	—	16	41	58	8	23	34	8	24	36			

Mounting Height to Bottom of Heater	60° Downward Deflector Hood Propeller Models ① (See Figures 12.1 and 12.2)																				
	Model			BSH 130			BSH 150			BSH 170			BSH 225			BSH 280			BSH 340		
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
8'	0	47	65	0	42	57	0	39	54	0	57	78	0	46	63	0	49	66			
10'	0	46	63	0	40	55	0	37	50	0	56	76	0	44	61	0	47	64			
12'	0	44	60	0	38	52	0	34	47	0	54	74	0	43	58	0	45	62			
14'	0	42	57	0	35	48	0	31	43	0	52	72	0	40	55	0	43	59			
16'	0	39	53	0	31	43	0	27	37	0	50	69	0	37	51	0	40	55			
18'	0	35	48	0	25	35	0	17	23	0	47	65	0	33	45	0	36	50			
20'	0	29	40	0	19	27	—	—	—	0	44	60	0	26	36	0	31	43			
22'	0	16	23	—	—	—	—	—	—	0	39	54	0	19	26	0	21	29			

Mounting Height to Bottom of Heater	90° Downward Deflector Hood Propeller Models ① (See Figures 13.1 and 13.2)												
	Model		BSH 130		BSH 150		BSH 170		BSH 225		BSH 280		BSH 340
	S	S	S	S	S	S	S	S	S	S	S	S	
8'	56	50	46	46	77	59	65						
10'	50	45	41	41	69	53	59						
12'	46	41	37	37	63	48	53						
14'	43	38	35	35	58	45	50						
16'	40	35	32	32	54	42	46						
18'	38	33	31	31	51	40	44						
20'	36	32	29	29	49	38	42						
22'	34	30	28	28	46	36	40						
24'	—	—	—	—	45	34	38						

① Data based on units fired at full input rate and with an entering air temperature of 80° F.

Figure 13.1
90° Hood

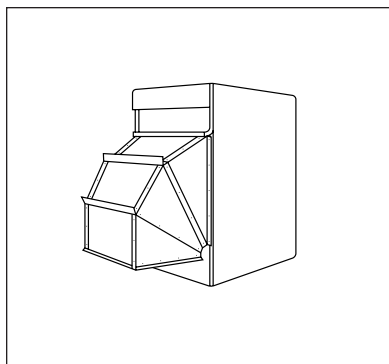
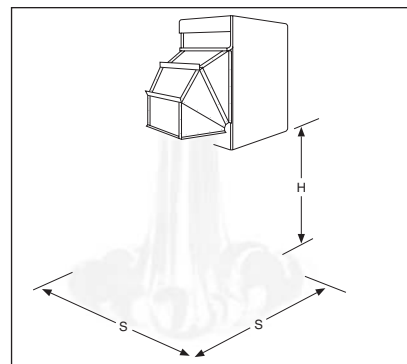


Figure 13.2
90° Hood-Throw
Floor Coverage



Velocity Generating Nozzles for Blower Models

Figure 14.1

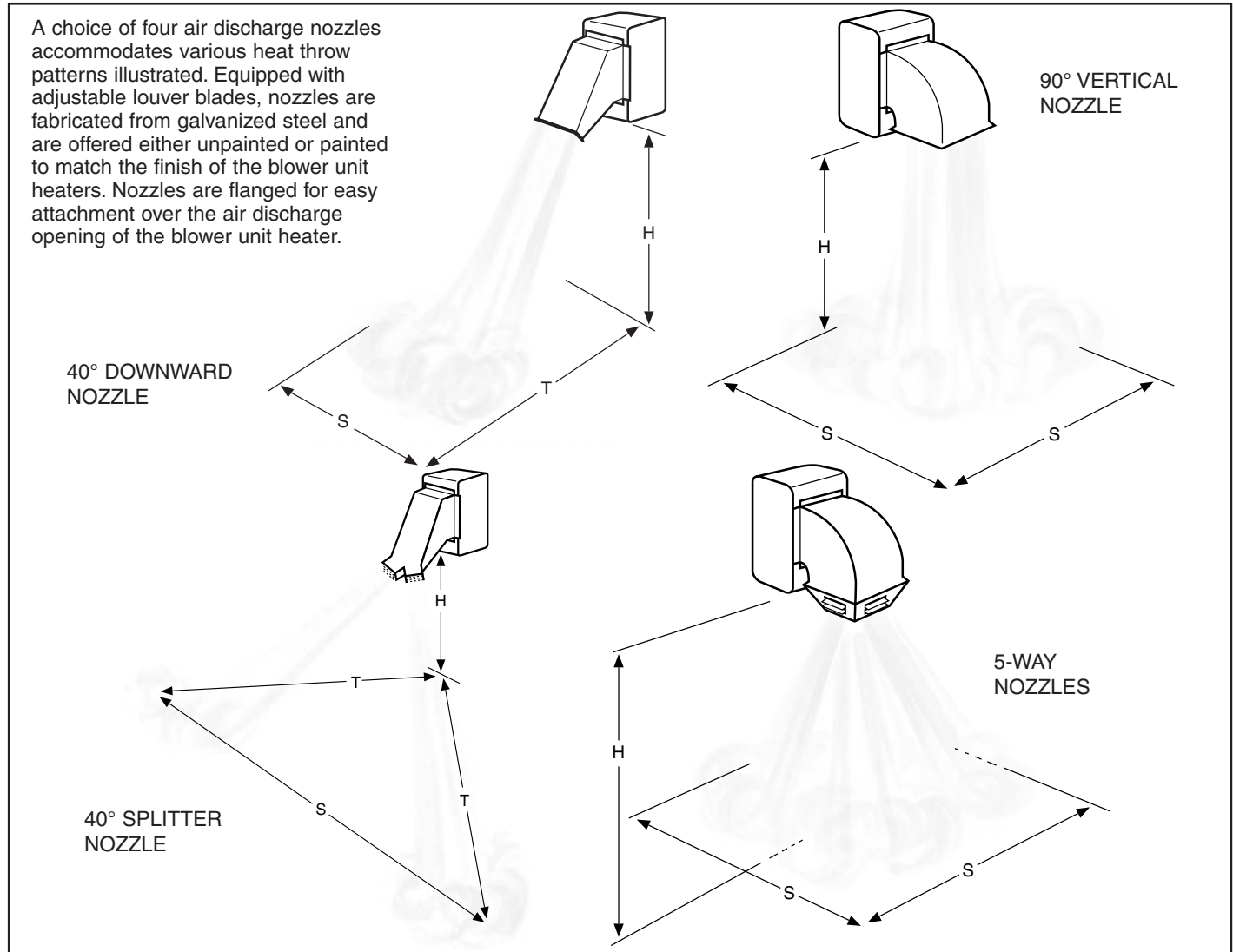


Table 14.1
Mounting Height, Heat Throw, Heat Spread (feet) ①

Nozzle Type		Model Number					
		BSH 130	BSH 150	BSH 170	BSH 225	BSH 280	BSH 340
40° Downward Nozzle	Max. Mounting Ht. H	20	21	24	24	26	28
	Heat Throw T	58	62	71	71	79	83
	Heat Spread S	20	21	24	24	26	28
90° Vertical Nozzle	Max. Mounting Ht. H	20	18	21	24	26	27
	Heat Spread S	20	18	21	24	26	27
40° Splitter Nozzle	Max. Mounting Ht. H	18	18	20	21	25	28
	Heat Throw T	45	45	51	53	62	69
	Heat Spread S	90	90	102	106	123	137
5-Way Nozzle	Max. Mounting Ht. H	16	16	18	20	19	23
	Heat Spread S	22	22	25	27	26	31

① Table 14.1 is based on an inlet air temperature of 70°F and an air temperature rise of 55°F. Air deflectors on, 40° and 90° discharge nozzles set perpendicular to the face of the air discharge opening. On 5-way nozzles all air deflectors set perpendicular to floor. Static pressure measured at 0.1" W.C. for 90° nozzle, 0.2" W.C. for 40° downward and 5-way nozzle, and 0.3" W.C. for 40° splitter nozzle. Outlet velocities are approximately 1750 FPM for the 40° nozzles, 1000 FPM for the 90° nozzle and 1300 FPM for 5-way. For motor size, drive and blower rpm refer to pages 10 and 11. Mounting height measured from bottom of unit.

Control Operating Sequence For Intermittent Pilot Ignition

Upon a call for heat from the thermostat, power is supplied to the time delay relay for the power exhaustor motor. The power exhaustor motor will come on in 1 to 25 seconds. In 45 to 90 seconds (from the call for heat) the ignition control will be turned on. This delay allows for a pre-purge of the unit and the vent. Sparking will start at the igniter at the same time the first operator of the combination gas control opens to allow gas to flow to the pilot burner. The pilot flame should light and be sensed (proven) in a few seconds. As soon as the pilot flame is sensed the sparking will stop and the second operator of the combination gas control will open to allow gas to flow to the main burner. In 10 to 45 seconds from the time the ignition control was energized (1 to 2 minutes from the call for heat from the thermostat) the fan motor will start.

On systems utilizing control codes 30-33, 85, 86, 93 or 94, the system will attempt to light the pilot for 70 seconds once there is a demand for heat. If the pilot is not sensed for any reason, the ignition control will wait for a predetermined time with the combination gas control closed and no spark.

After the predetermined time lapses, the cycle will begin again. The time that lapses between cycles is at pre-programmed intervals (approximately 6 minutes). After three cycles, some controllers lock out for approximately one hour before cycle begins again. This will continue indefinitely until the pilot flame is sensed or until power is interrupted to the system.

When the thermostat has been satisfied, power is turned off to the ignition control and the combination gas control, so both the main gas and pilot gas are turned off. The fan will continue to operate for 45 to 75 seconds to allow the heat exchanger to cool down.

DIMENSIONAL DATA



Propeller Units - Model PSH

Figure 16.1

Dimensional Drawings

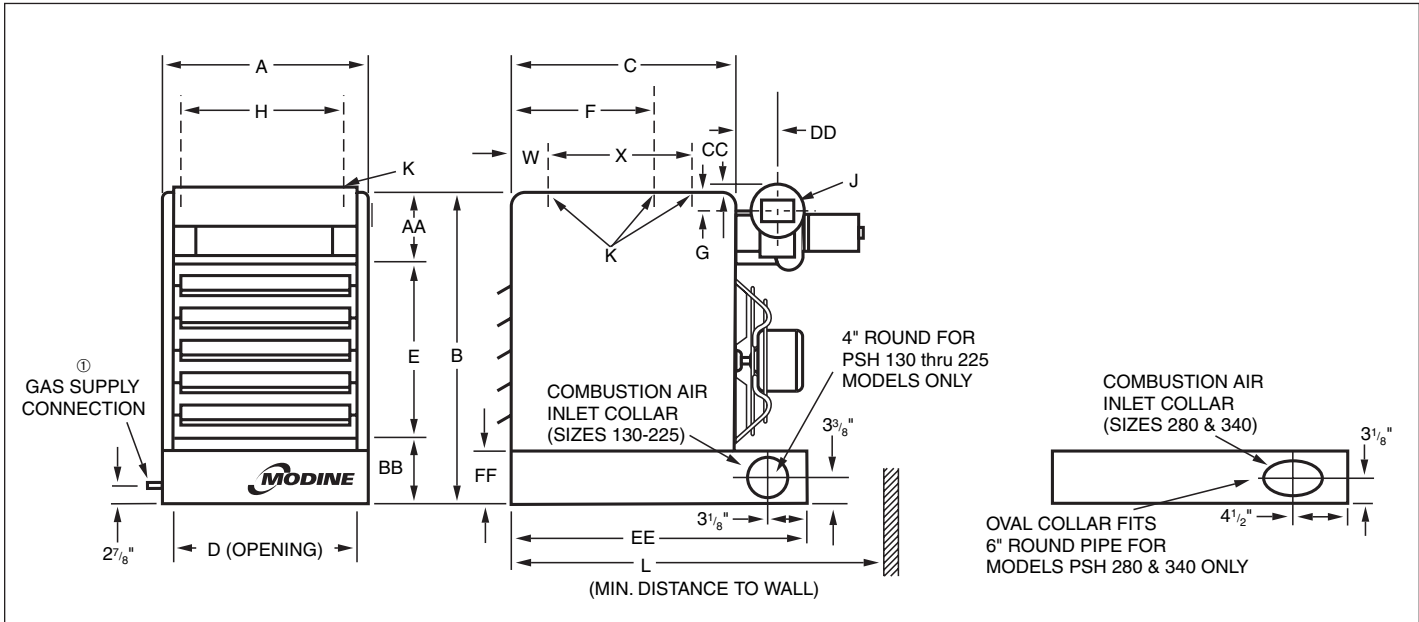


Table 16.1
Dimensions (inches) – PSH ② ③

Dimension	PSH 130	PSH 150	PSH 170	PSH 225	PSH 280	PSH 340
A	23-1/2	25-5/8	25-5/8	28-5/8	33-5/8	40
B	35-1/2	40-1/2	40-1/2	40-1/2	40-1/2	40-1/2
C	22	25	25	25	25	25
D	21-1/16	23-3/16	23-3/16	26-3/16	31-3/16	37-1/2
E	20	24	24	24	24	24
F	12-1/2	14-1/2	14-1/2	14-1/2	—	—
G	1	2	2	2	1-5/8	1-5/8
H	19-7/8	22	22	25	30	36-3/8
J (Round)	4	4	4	4	6	6
K ④	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16
L ⑤	38-3/8	42	42	42	42	48
W	—	—	—	—	5	5
X	—	—	—	—	16	16
AA	8	9	9	9	9	9
BB	7 1/2	7-1/2	7-1/2	7-1/2	7-1/2	7-1/2
CC	1	1/8	1/8	1/8	1-3/8	1-3/8
DD	3-1/4	3-1/4	3-1/4	3-1/4	3-5/8	3-5/8
EE	32-9/16	36	36	36	36-1/16	36-1/16
FF	6-1/2	6-1/2	6-1/2	6-1/2	5-7/8	5-7/8
Natural Gas Connections ⑥	1/2	1/2	1/2	1/2	3/4	3/4
Fan Diameters	18	20	20	22	22	24
Approx. Ship. Wt.	198	244	246	272	328	422

① Dimension from rear of unit burner box to center line of gas pipe connection is 6-23/32" for PSH 130 and 6-1/2" for all other models.

② Do not use propeller units with duct work.

③ For clearance to combustibles, see Installation and Service Manual.

④ PSH 130 through PSH 225 - 2 holes. PSH 280 & PSH 340 - 4 holes. (Listed is the hole diameter and threads per inch to accept threaded rod.)

⑤ Dimension equals overall plus 6".

⑥ For natural gas; may vary depending on control availability.

DIMENSIONAL DATA



Blower Units - Model BSH

Figure 17.1

Dimensional Drawings

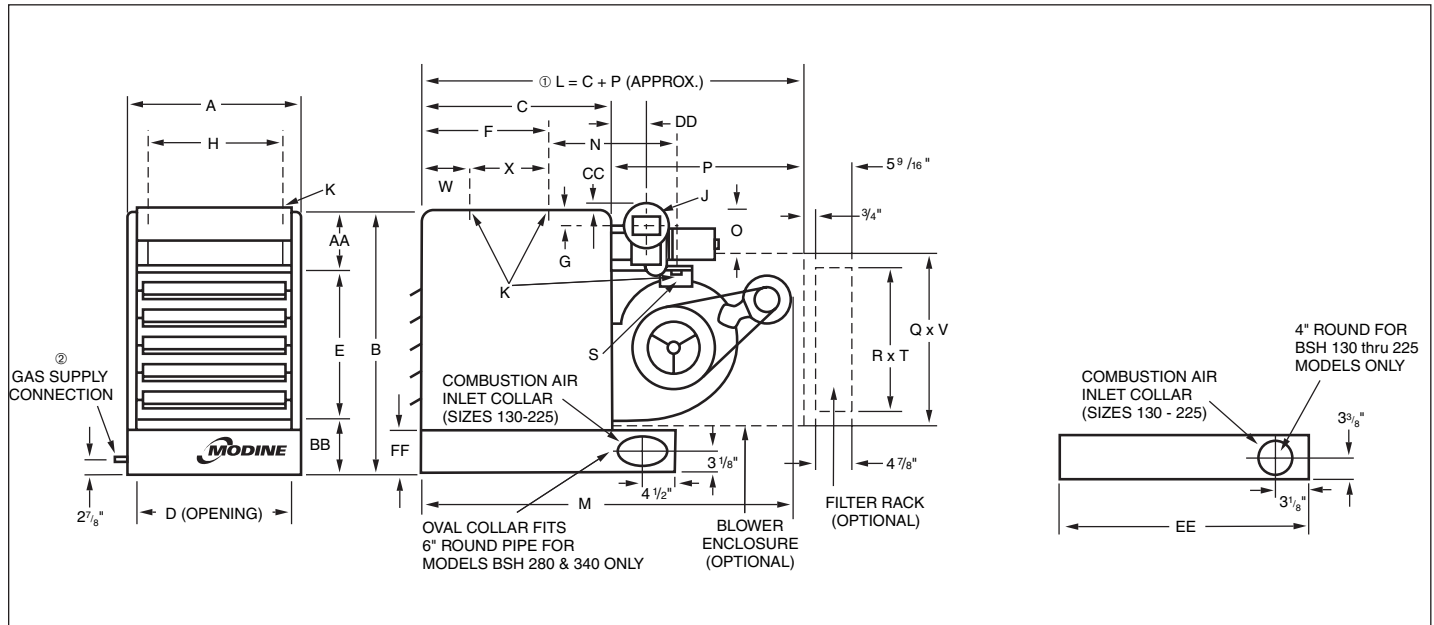


Table 17.1
Dimensions (inches) – BSH

Dimension	BSH 130	BSH 150	BSH 170	BSH 225	BSH 280	BSH 340	
A	23-1/2	25-5/8	25-5/8	25-5/8	33-5/8	40	
B	35-1/2	40-1/2	40-1/2	40-1/2	40-1/2	40-1/2	
C	22	25	25	25	25	25	
D	21-1/16	23-3/16	23-3/16	26-3/16	31-3/16	37-1/2	
E	20	24	24	24	24	24	
F	12-1/2	14-1/2	14-1/2	14-1/2	—	—	
G	1	2	2	2	1-5/8	1-5/8	
H	19-7/8	22	22	25	30	36-3/8	
J (Round)	4	4	4	4	6	6	
K (Mounting Holes) ^③	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	3/8-16	
M	47-3/4	52-3/8	52-3/8	52-3/8	52-3/8	58-1/2	
N ^④	21	24-1/2	24-1/2	24-1/2	17-15/16	22-1/16	
O	7-1/4	8-1/2	8-1/2	8-1/2	8-1/2	8-1/2	
Blower Enclosure (Accessory)	P	30	34	34	36	36	
	Q (Height)	21-3/8	25	25	25	25	
	R Inlet Duct (Height)	20	23-3/4	23-5/8	23-5/8	23-5/8	23-5/8
	T Filter Rack (Width)	27-1/2	32-3/4	32-3/4	32-3/4	42-7/8	42-7/8
V (Width)	29	34	34	34	44-1/4	44-1/4	
S (Ctr. to Ctr. of Blower Mtg. Holes)	17-3/8	20-3/8	20-3/8	20-3/8	20-3/8	20-3/8	
W	—	—	—	—	5	5	
X	—	—	—	—	16	16	
AA	8	9	9	9	9	9	
BB	7-1/2	7-1/2	7-1/2	7-1/2	7-1/2	7-1/2	
CC	1	1/8	1/8	1/8	1 3/8	1 3/8	
DD	3-1/4	3-1/4	3-1/4	3-1/4	3-5/8	3-5/8	
EE	32-9/16	36	36	36	36-1/16	36-1/16	
FF	6-1/2	6-1/2	6-1/2	6-1/2	5-7/8	5-7/8	
Natural Gas Connections	1/2	1/2	1/2	1/2	3/4	3/4	
Motor Pulley Diameter ^⑤	3	3	3	3	3	3	
Standard Blower Pulley Diameter	13	13	13	13	9	9	
Approx. Shipping Weight	240	322	322	344	436	510	

① On blower units L = C + P is distance from front of unit to back of blower enclosure and minimum of distance to wall.
 ② Dimension from rear of unit burner box to center line of gas pipe connection is 6-23/32" for BSH 130 and 6-1/2" for all other models.
 ③ BSH 130 through BSH 225 – 4 holes. BSH 280 and BSH 340 – 6 holes. (Listed is the hole diameter and threads per inch to accept threaded rod.)
 ④ Distance between mounting hole in unit casing and mounting hole on blower, except on 280 and 340, then distance from rear mounting hole in casing.
 ⑤ Motor pulley is adjustable.

DIMENSIONAL DATA

Downward Deflector Hood for Propeller and Blower Models

Figure 18.1
30 ° Hood Dimensional Drawings

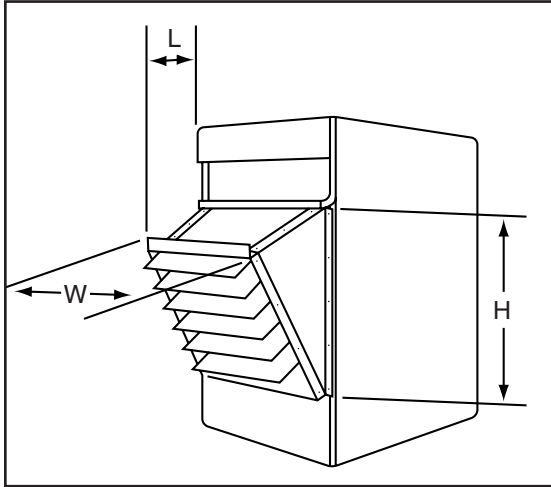


Table 18.1
30° Hood Dimensions (inches)

Models Used On	Height (H)	Length (L)	Width (W)
PSH/BSH 130	20 1/4	10 7/8	22 1/2
PSH/BSH 150-170	24 1/4	12 7/8	24 5/8
PSH/BSH 225	24 1/4	12 7/8	27 5/8
PSH/BSH 280	24 1/4	12 7/8	32 5/8
PSH/BSH 340	24 1/4	12 7/8	39

Figure 18.2
60 ° Hood Dimensional Drawings

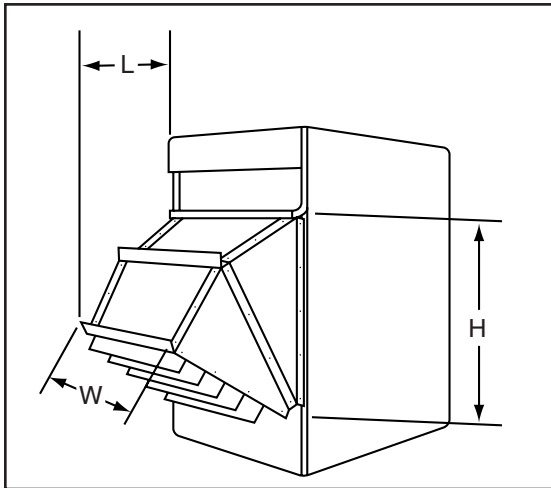


Table 18.2
60° Hood Dimensions (inches)

Models Used On	Height (H)	Length (L)	Width (W)
PSH/BSH 130	20 7/8	18 3/4	22 1/2
PSH/BSH 150-170	24 7/8	22 1/4	24 5/8
PSH/BSH 225	24 7/8	22 1/4	27 5/8
PSH/BSH 280	24 7/8	22 1/4	32 5/8
PSH/BSH 340	24 7/8	22 1/4	39

Figure 18.3
90 ° Hood Dimensional Drawings

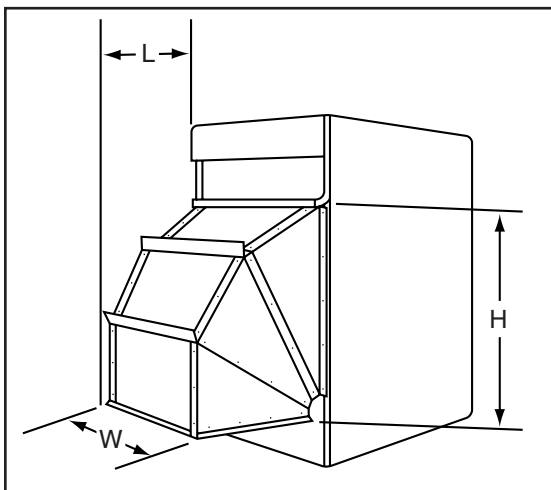


Table 18.3
90° Hood Dimensions (inches)

Models Used On	Height (H)	Length (L)	Width (W)
PSH/BSH 130	21 3/4	21 5/8	22 1/2
PSH/BSH 150-170	25 3/4	25 5/8	24 5/8
PSH/BSH 225	25 3/4	25 5/8	27 5/8
PSH/BSH 280	25 3/4	25 5/8	32 5/8
PSH/BSH 340	25 3/4	25 5/8	39

DIMENSIONAL DATA

Velocity Generating Nozzles For Blower Models

Figure 19.1
Dimensional Drawings

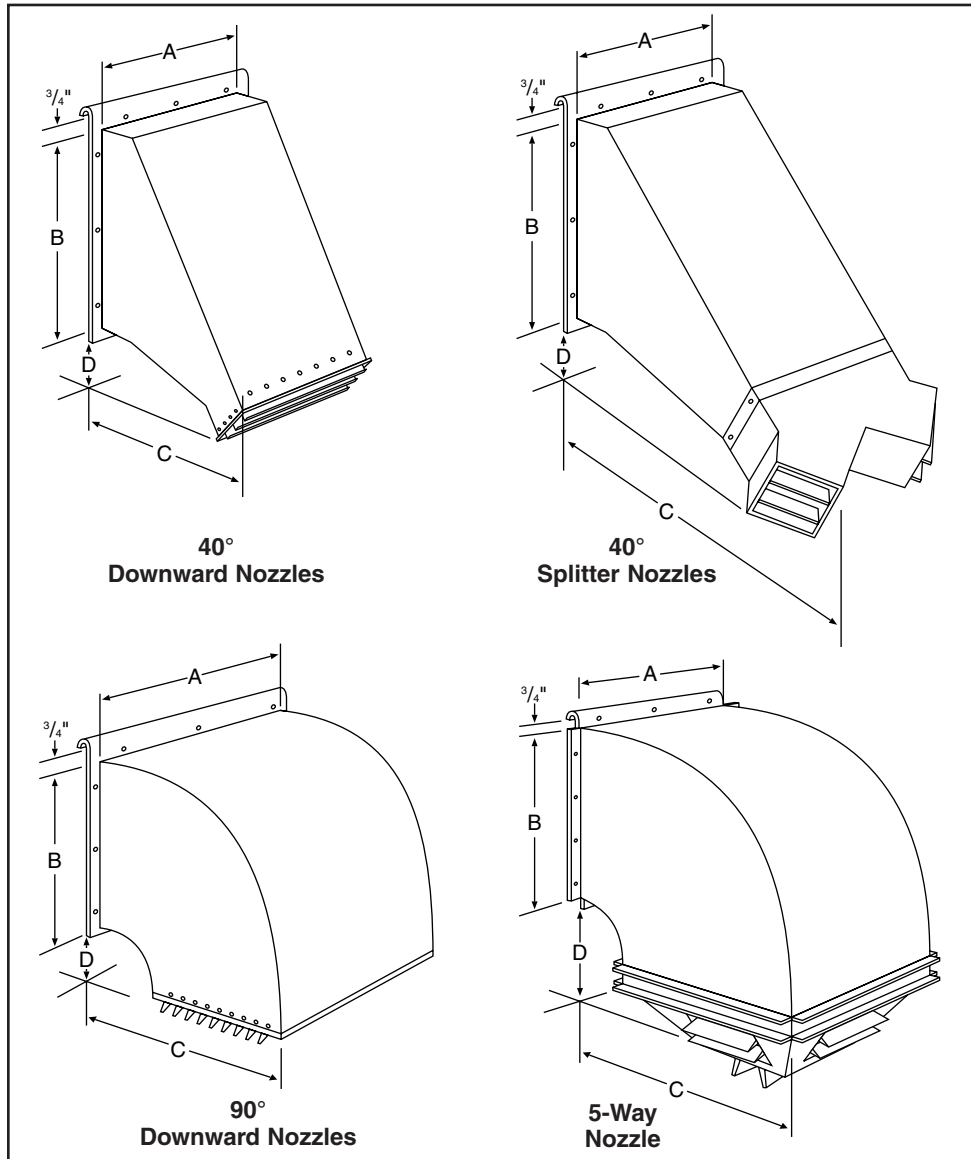


Table 19.1
Dimensions (inches)

Nozzle Type	Dimension Symbol	Model Number					
		BSH 130	BSH 150	BSH 170	BSH 225	BSH 280	BSH 340
40° Downward Nozzle	A	21-1/16	23-3/16	23-3/16	26-3/16	31-1/8	37-1/2
	B	20	24	24	24	24	24
	C	25	30	30	30	36	36
	D	4	4	4	6	11	11
90° Vertical Nozzle	A	21-1/16	23-3/16	23-3/16	26-3/16	31-1/8	37-1/2
	B	20	24	24	24	24	24
	C	23	29	29	30	34	34
	D	8	10	10	10	14	14
40° Splitter Nozzle	A	21-1/16	23-3/16	23-3/16	26-3/16	31-1/8	37-1/2
	B	20	24	24	24	24	24
	C	33-1/2	39	39	40	46	47
	D	11	12	12	14	19	20-1/2
5-Way Nozzle	A	21	23-3/16	23-3/16	26-3/16	31-1/8	37-1/2
	B	20	24	24	24	24	24
	C	27	29	29	32	37	43-1/2
	D	14	15	15	16	18	18

By adding a 40° downward nozzle or a 40° splitter nozzle to the blower unit heater, the application versatility of the blower unit heater can be extended for use as a door heater. It should be kept in mind that, although the unit would be used primarily as a door heater and be controlled by a door switch, it could also serve as a space heater when the door is closed. This can be done by wiring a thermostat in parallel with the door heater switch, and when the door is closed, the thermostat would fire the unit to maintain the temperature in the area of the door. The application of the blower unit as a door heater is made easy with the use of the graph shown in Figure 20.3 and by the following examples.

Example #1

Determine the size and quantity of units to cover a 12 ft. x 12 ft. door with an outdoor design temperature of +10°F.

Solution — Calculate the door area. In this case it is 144 sq. ft. Enter the curve shown in Figure 20.3 at the left of the curve where the 144 sq. ft. is shown. Follow across to the right until this line intersects with the +10°F curve. At this point follow down the curve and read off the Btu requirement. For this example the Btu/Hr input requirement is approximately 860,000 Btu/Hr. Choosing the fewest number of units possible without exceeding the requirement it is determined that two (2) BSH 340s with 40-degree downward nozzles and one (1) BSH 150 with a 40 degree downward nozzle will adequately cover the door loss.

Two units would be installed from the side as shown in Figure 20.4 and one from the front as shown in Figure 20.1.

Example #2

Determine the size and quantity of units to cover a 12 ft. x 7 ft. door with an outdoor design temperature of +20°F.

Figure 20.1 Typical Direct Installation for One Unit with 40° Downward Nozzle

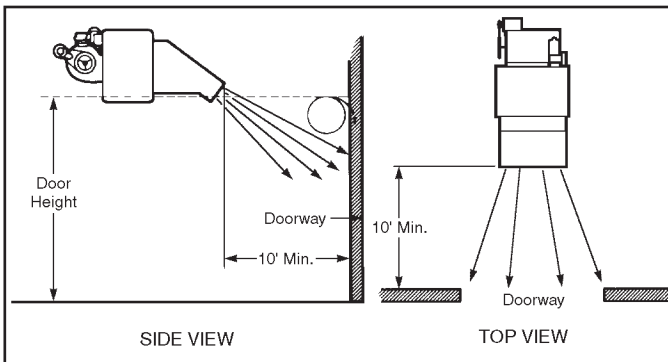


Figure 20.2 Typical Direct Installation for One Unit with 40° Splitter Nozzle

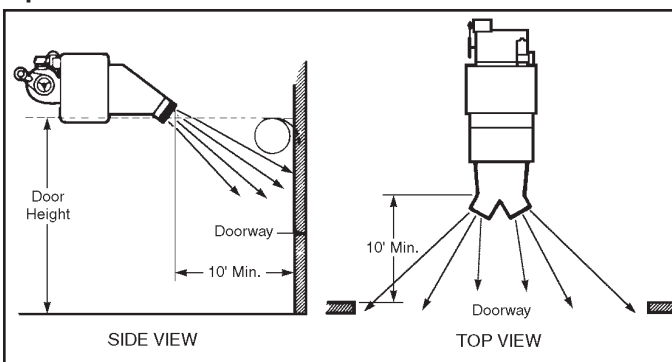
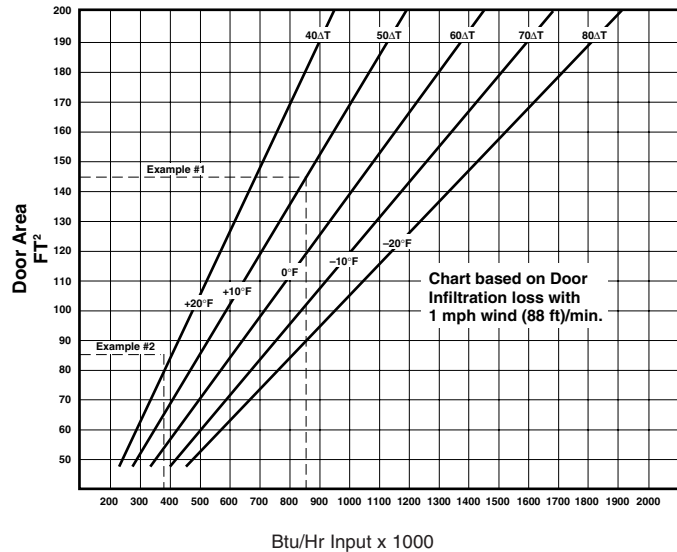
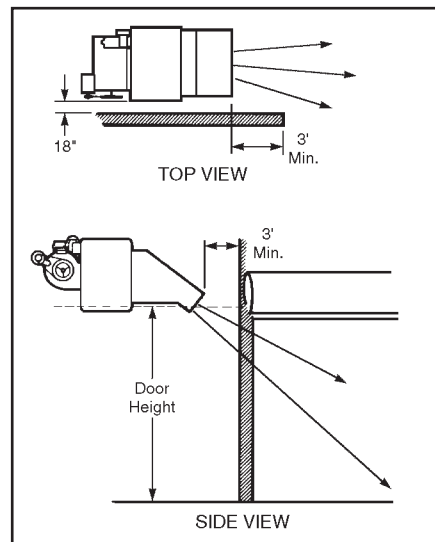


Figure 20.3
BTU Input x 1000



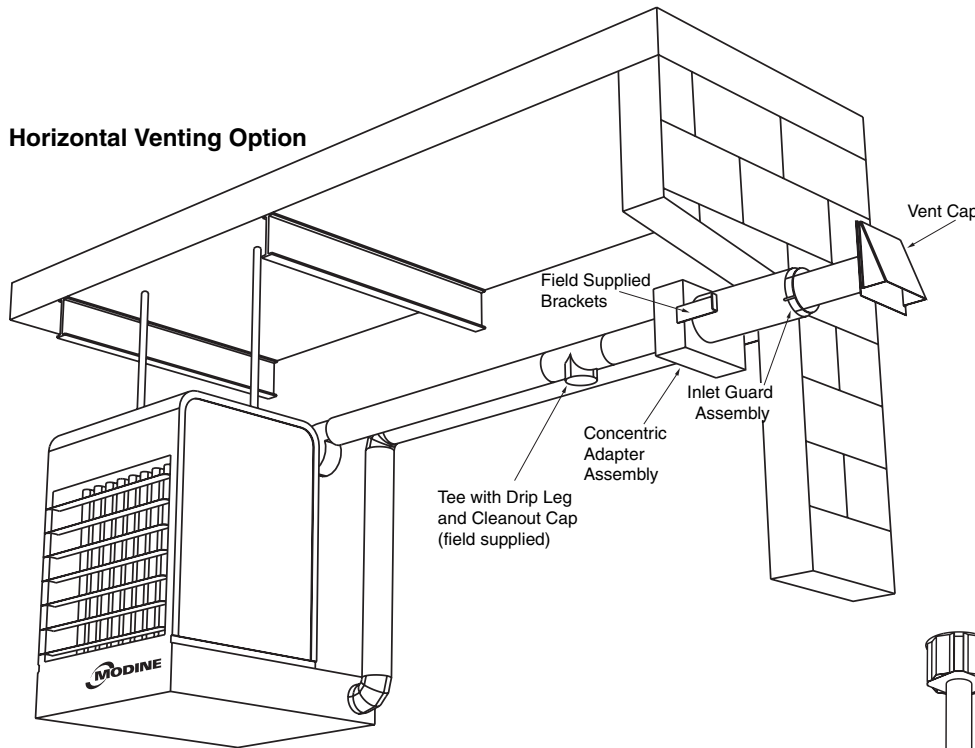
Solution — Enter the graph shown in Figure 20.3 for a door area of 84 sq. ft. Follow across to the +20F curve and read down to find the Btu/Hr input of 400,000 Btu/Hr. The largest unit available to cover this door with the minimum number of units is a BSH 340 which matches fairly well the requirement. Since this is a wide door with a small height it may be preferable to use a 40° splitter nozzle in lieu of the 40° downward nozzle in order to get a more even air distribution across the doorway when the unit is mounted as shown in Figure 20.2.

Figure 20.4 Typical Side Installation for Two Units



In locating units, consider general space-heating requirements, availability of gas and proximity to vent locations. Door heaters should be installed with the bottom of the heater at the same elevation as the top of the door. For location refer to Figures 20.1 through 20.2. When only one door heater is required, it may be installed directly in front of the door at least 10 ft. away to assure full coverage (Figure 20.1). When two door heaters are necessary to meet design conditions, one or two of the door heaters may be installed parallel to the wall as shown in Figure 20.4. For three door heaters utilize a combination of the above two locations.

Horizontal Venting Option



Modine provides a horizontal, concentric-vent kit as a standard feature with each PSH/BSH separated-combustion unit heater. The standard, horizontal kit includes a concentric adapter assembly, a vent termination cap and an air inlet guard assembly for the air inlet.

The vertical, concentric-venting adapter is an optional offering. The vertical kit includes a concentric adapter assembly, one vent termination cap and one inlet terminal. When ordering this option, the standard horizontal kit is not provided.

Vertical Venting Option

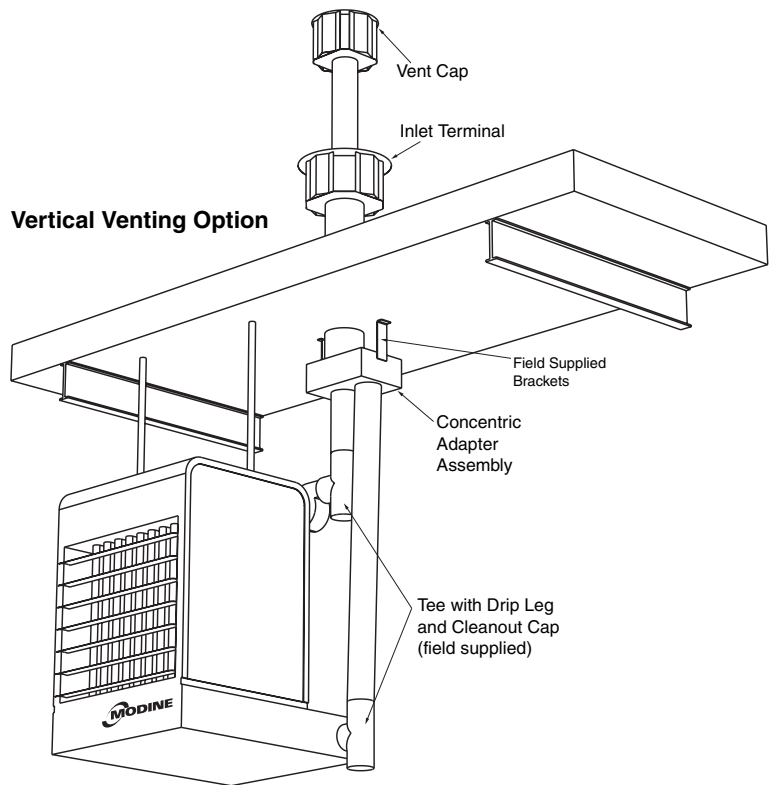


Figure 21.1
Adapter Box Assembly with Typical Field Supplied Mounting Brackets

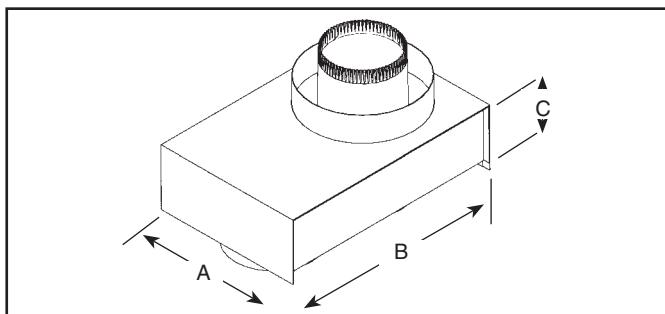


Table 21.1
Adapter Box Dimensions

Heater Sizes	A	B	C	Concentric Side	
				Exhaust	Combustion
130-225	8 ¹ / ₄ "	11 ³ / ₄ "	4"	4"	6"
280-340	10 ¹ / ₂ "	16"	4"	6"	8"

MODEL IDENTIFICATION



Figure 22.1
Model Identification Plate

Modine Mfg. Co.		Separated Combustion		UNIT HEATER FOR INDUSTRIAL / COMMERCIAL USE AEROTHERME POUR USAGE INDUSTRIEL / COMMERCIAL					
1221 Magnolia Ave.. Buena Vista, VA 24416; Phone: 540-261-2166						Made in U.S.A.			
MODEL NUMBER NUMERO DE MODELE	PSH280AV0130			MIN. INPUT BTU/HR DEBIT CALORIFIQUE MIN. BTU/HEURE	VOLTS	AMPS	PHASE	HERTZ	
SERIAL NUMBER NUMERO DE SERIE	01012010199-1000			MIN. INLET PRESS. FOR PURPOSE OF INPUT ADJUSTMENT PRESSION D'ALIMENTATION EN GAZ MIN. ADMISE	6.0	IN. W.C. PO.C.D.E	CATEGORY CATEGORIE	III	
TYPE OF GAS TYPE DE GAZ	Natural			MANIFOLD PRESSURE PRESSION A LA TUBULURE D'ALIMENTATION	3.5	IN. W.C. PO.C.D.E	APPROVALS	CAN/CGA-2.6-M86	
				MAXIMUM EXTERNAL STATIC PRESSURE PRESSION STATIQUE EXTERIEUR MAXIMUM	0.0	IN. W.C. PO.C.D.E	ACCEPTED BY CITY OF NEW YORK:	MEA 437-88-E	
		Ø TO 2000 FT. Ø ET 610 M.	(IN CANADA) 2000 TO 4500 FT. 610 ET 1370 M.	MINIMUM CLEARANCE TO COMBUSTIBLE MATERIAL DÉGAGEMENT MINIMUM POUR MATIERES COMBUSTIBLES				PENNSYLVANIA APPROVAL NO. 3465	
INPUT BTU/HR DEBIT CALORIFIQUE BTU/HEURE	280000	252000	TOP HAUT	6	IN. PO.	RIGHT SIDE COTE DROIT	18	IN. PO.	
OUTPUT BTU/HR RENDEMENT BTU/HEURE	229600	206600	BOTTOM BAS	12	IN. PO.	VENT CONNECTOR CONNECTEUR D'AERATION	6	IN. PO.	
ORIFICE SIZE DIM. DE L'INJECTEUR	22	25	LEFT SIDE COTE GAUCHE	18	IN. PO.	SERIES UNIT HEATER IS FOR USE WITH DUCTS AT A TEMPERATURE RISE RANGE SERIE AEROTHERME FONCTIONNE AVEC DES CONDUITS A UNE ELEVATION DE TEMPERATURE DE			X °F (X °C)
GENERAL				LIGHTING INSTRUCTIONS					
(IN USA) FOR INSTALLATIONS ABOVE 2000 FEET, DERATE 4 PERCENT FOR EACH 1000 FEET OF ELEVATION ABOVE SEA LEVEL. LUBRICATE MOTOR EVERY 2000 HOURS OF OPERATION WITH SAE #20 OIL. FILTERS, WHEN USED ON BLOWER UNIT HEATERS, MUST BE INSTALLED EXTERNAL TO THE HEATER CASING. PROPELLER UNIT HEATERS ARE NOT FOR USE WITH FILTERS. INSTALLATIONS IN AIRCRAFT HANGARS, PARKING STRUCTURES, AND REPAIR GARAGES SHALL BE IN ACCORDANCE WITH THE STANDARD ON AIRCRAFT HANGARS, ANSINFPFA 409, THE STANDARD FOR PARKING STRUCTURES, ANSINFPFA 88A, THE STANDARD FOR REPAIR GARAGES, ANSINFPFA 88B, AND IN CANADA WITH THE CAN1-S149 CODES.				FOR UNITS WITH INTERMITTENT PILOT 1 SET THERMOSTAT TO LOWEST SETTING. MOVE GAS CONTROL KNOB (OR LEVER) TO OFF AND WAIT 5 MINUTES. 2 MOVE GAS CONTROL KNOB (OR LEVER) TO ON. 3 SET THERMOSTAT TO DESIRED SETTING (PILOT AND MAIN BURNER WILL LIGHT AUTOMATICALLY WHEN THERMOSTAT CALLS FOR HEAT). FOR UNITS WITH STANDING PILOT 1 SET THERMOSTAT TO LOWEST SETTING. MOVE GAS CONTROL KNOB (OR LEVER) TO OFF AND WAIT 5 MINUTES. 2 MOVE GAS CONTROL KNOB TO PILOT (OR MOVE GAS CONTROL LEVER TO SET) AND DEPRESS RESET BUTTON WHILE LIGHTING THE PILOT AND HOLD FOR 1 MINUTE AFTER PILOT IS LIT. 3 MOVE GAS CONTROL KNOB (OR LEVER) TO ON. 4 SET THERMOSTAT TO DESIRED SETTING.					
COMMON REPLACEMENT PARTS				SHUT DOWN INSTRUCTIONS - TURN OFF POWER & CLOSE ALL GAS VALVES.					
For parts ordering, contact the parts wholesaler or the manufacturer's representative serving your area. A complete listing of both can be found in your installation and Service Manual. When inquiring about parts, always provide model number, serial number, description and part number. When ordering parts, provide part number listed. For service, contact your local qualified installation and service contractor or appropriate utility company.				Combination Gas Control	5H71562B2	24V Control Transformer	5H71956B1	Main Burner	3H33071B8
				Ignition Control	5H73324	Fan/Blower Motor	9F30173	Belt (Blower)	None
				Limit Control	5H71958	Time Delay Relay	5H73034-top	Thermocouple	None
				Pressure Switch	5H72275B3	Heat Exchanger	3H33229A1	Wiring Diagram	5H73048C1
GÉNÉRAL				INSTRUCTIONS D'ALLUMAGE					
TOUTES LES 2000 HEURES DE FONCTIONNEMENT LUBRIFIER LE MOTEUR AVEC DE L'HUILE SAE N° 20. LORSQU'ILS SONT UTILISÉS SUR LES APPAREILS DE CHAUFFAGE A SOUFFLANTE, LES FILTRES DOIVENT ÊTRE INSTALLÉS À L'EXTÉRIEUR DU BOÎTIER DE L'APPAREIL. NE PAS UTILISER DE FILTRES AVEC LES APPAREILS DE CHAUFFAGE À PROPULSION. L'INSTALLATION DANS LES HANGERS D'AVIONS DOIT CONFORMER AUX EXIGENCES DES AUTORITÉS COMPÉTENTES, ET DANS LES GARAGES PUBLICS DOIT CONFORMER AUX CODES CAN 1-S149				POUR UNITE EQUIPEE D'UNE VEILLEUSE INTERMITTENTE 1 RÉGLER LE THERMOSTAT SUR LE DEGRÉ LE PLUS BAS. TOURNER LA MOLETTE (OU LE LEVIER) DE COMMANDE DU GAZ SUR OFF ET ATTENDRE 5 MINUTES. 2 TOURNER LA MOLETTE (OU LE LEVIER) DE COMMANDE DU GAZ SUR ON. 3 LA VEILLEUSE ET LE BRÛLEUR PRINCIPAL S'ALLUMERONT AUTOMATIQUÉMENT QUAND LE THERMOSTAT LES DÉCLENCHERA. POUR UNITE EQUIPEE D'UNE VEILLEUSE PERMANENTE 1 RÉGLER LE THERMOSTAT SUR LE DEGRÉ LE PLUS BAS. TOURNER LA MOLETTE (OU LE LEVIER) DE COMMANDE DU GAZ SUR OFF ET ATTENDRE 5 MINUTES. 2 TOURNER LA MOLETTE DE COMMANDE DU GAZ SUR PILOT (OU TOURNER LE LEVIER DE COMMANDE SUR SET) ET TOUT EN ALLUMANT LA VEILLEUSE APPUYER SUR LE BOUTON DE REENCLENCHEMENT ET LE MAINTENIR ENFOUCÉ PENDANT 1 MINUTE APRES ALLUMAGE DE LA VEILLEUSE. 3 TOURNER LA MOLETTE (OU LE LEVIER) DE COMMANDE DU GAZ SUR ON. 4 RÉGLER LE THERMOSTAT SUR LE DEGRÉ DESIRÉ					
				INSTRUCTIONS DE FER METURE - COUPER LE COURANT ET FERMER TOUTES LES ROBINETS A GAZ. 5H73378 Rev C					

Figure 22.2
Model Number Designations

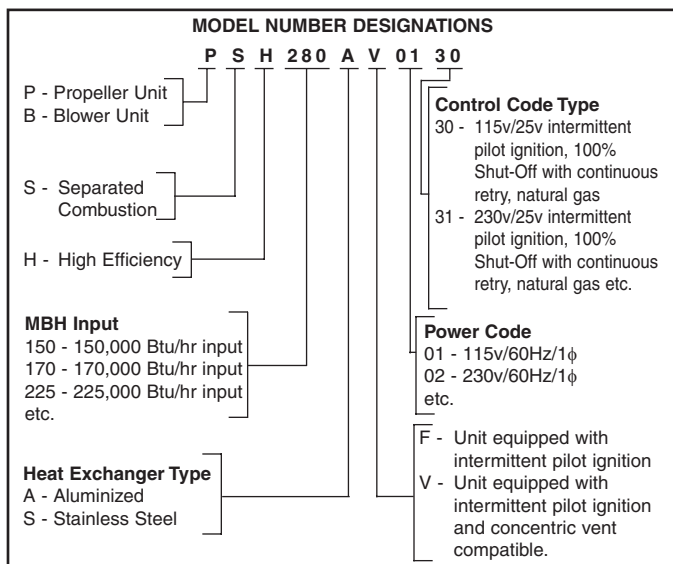
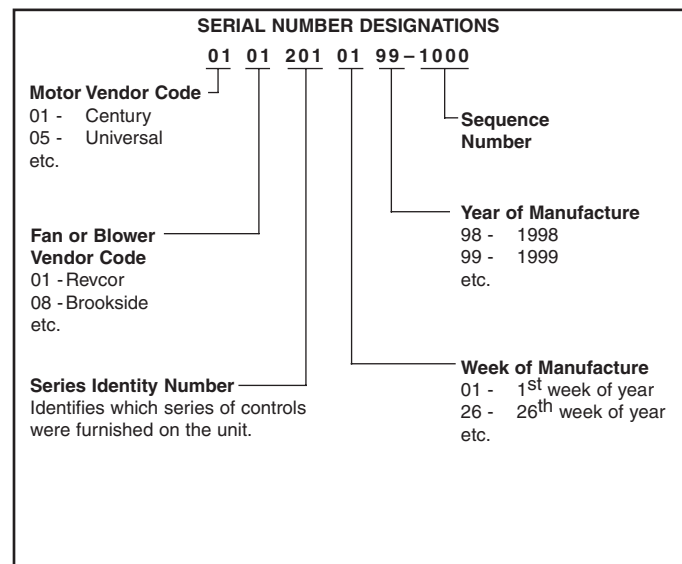


Figure 22.3
Serial Number Designations



SPECIFICATIONS



Modine Separated Combustion Propeller and Blower Unit Heaters

General

Contractor shall furnish and install Modine Separated Combustion high efficiency model PSH _____, BSH _____ gas-fired unit heater(s). Performance shall be as indicated on the equipment schedule in the plans. Unit heaters shall have C.S.A. (Canadian Standards Association) design certification.

Unit Capacity

The unit input capacity shall be as listed on the plans. The output capacity shall be a minimum of 81% or 82% of the input based on steady-state thermal efficiency as certified by the Canadian Standards Association (C.S.A.).

Casing

Casing shall be 22 gauge cold rolled steel draw-formed with aesthetically designed rounded corners, and fitted to eliminate exposed fasteners. Entire casing shall be powder painted with an attractive, tough, corrosion resistant baked-on polyester gray-green paint. Casing shall also include a hinged bottom panel for easy access to the burner compartment. Horizontal air deflector louvers shall be provided to aid in controlling the discharge air pattern (vertical louvers optional).

Burner

Burner material shall be aluminized _____, 409 stainless steel _____, with non-clogging, slotted ports with 409 stainless steel separator strip designed for good lighting characteristics without noise of extinction.

Heat Exchanger

Heat exchanger shall be designed with direct-fired primary heat exchanger tubes constructed of 20 gauge aluminized steel (stainless steel optional). The unit shall also have secondary heat exchanger tubes designed to extract heat from the combustion gases after the gases have passed through the primary heat exchanger tubes. The secondary heat exchanger tubes shall be made of Type 409 Stainless Steel. The header plates of the heat exchanger shall be constructed of Type 409 Stainless Steel and the entire heat exchanger assembly shall be completely heliarc machine-welded and shall have contoured stress-free, air-foil designed tubes.

Venting

The units shall have a factory mounted and wired integral power exhaustor directly connected to the unit collector box assembly. The unit shall also include a factory mounted and wired safety pressure switch designed to prevent pilot and main burner ignition until positive venting has been proved. Units shall be designed for single vent connection and shall include factory supplied vent terminal _____, horizontal concentric vent kit _____, vertical concentric vent kit _____.

Combustion Air

The units shall be provided with a combustion air inlet collar for connection of combustion air pipe directly to the outside atmosphere. Unit shall include factory supplied combustion air inlet terminal.

Controls

Units shall be provided with intermittent-duty pilot ignition and shall be for: natural gas with 100% shut-off and continuous retry _____, propane gas with 100% shut-off and continuous retry _____. All units shall include a redundant type main gas valve, pilot valve, low voltage control transformer, safety high limit control (overheat control), safety pressure switch, gas valve regulator, manual shut-off valve and terminal board for low voltage wiring. All gas controls shall be rated for a maximum inlet pressure of 1/2 psi. Controls shall be designed for operation with: natural _____, propane _____ gas with a specific gravity of _____ and _____ Btu/Cu. Ft. heating value for operation at _____ elevation.

Motor and Propeller Fan (Propeller Models Only)

Each unit heater shall have a single motor and propeller. Motor shall be _____ H.P., _____ volts, _____ Hz, _____ phase, totally enclosed with thermal overload protection (single phase only). Propeller shall be statically balanced and shall be equipped with a 360° safety fan guard.

Motor, Drive and Blower Fan (Blower Models Only)

Each unit shall have a single motor and centrifugal blower completely factory assembled and mounted. Motor shall be _____ H.P., _____ volts, _____ Hz, _____ phase and shall be totally enclosed. The motor and drive combination shall be capable of delivering _____ cfm at _____ external static pressure. Single phase motors shall be equipped with thermal overload protection. Blowers shall be statically and dynamically balanced for quiet operation.

Blower Enclosure and Filter Rack (Blower Models Only)

Units shall be provided with a factory designed blower enclosure and filter rack assembly. Filters shall be one-inch multi-velocity permanent filters charged with Research Products HANDI-KOTER, SUPER HANDI-KOTER, or suitable equivalent.

INDOOR AIR SOLUTIONS

The Modine brand has been the industry standard since Arthur B. Modine invented and patented the first lightweight, suspended hydronic unit heater in 1923.

No other manufacturer can provide the combined application flexibility, technical expertise and fast delivery found at Modine.

Consult your local Modine distributor for help in solving your indoor air problems.

Products from Modine are designed to provide indoor air-comfort solutions for commercial, institutional and industrial applications. Whatever your heating, ventilating and cooling requirements, Modine has the product to satisfy your needs, including:

- Gas-fired unit heaters
- Gas-fired duct furnaces
- Gas-fired high-intensity infrared heaters
- Gas-fired low-intensity infrared heaters
- Steam/hot water unit heaters
- Steam/hot water cabinet unit heaters
- Steam/hot water commercial fin tube radiation
- Oil-fired unit heaters
- Electric unit heaters
- Indoor gravity vented single and multiple duct furnace make-up air units
- Indoor separated combustion single and multiple duct furnace make-up air units
- Outdoor single and multiple duct furnace make-up air units
- Direct-fired make-up air units

With burner capacities up to 7,862,000 Btu/hr and air-handling capacities as high as 60,000 CFM, Modine products are compatible with every fuel type, including:

- **Natural or Propane Gas • Steam/Hot Water • Oil • Electric**

Specific catalogs and computer-generated heat-loss calculations are available for each product. Catalogs 75-136 and 75-137 provide details on all Modine HVAC equipment.

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